

SHOOT, DON'T SHOOT

MINIMISING THE RISK OF
CATASTROPHIC ERROR
THROUGH HIGH
CONSEQUENCE
DECISION-MAKING

DIRK MACLEAN

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DEDICATIONS

For Site Superintendent Yoshida;
for all the Yoshidas, everywhere—thank you.

In memory of...
the 290 passengers and crew on Iran Air flight 655,
the 26 personnel on board Eagle Flight,
and the 42 inside the MSF Trauma Centre,
...may they rest in peace.

And for the members of the Combat Information Center on the USS *Vincennes*,
the 24th Marine Amphibious Unit, Tiger Flight,
the Ground Force Commander at Kunduz and the USAF AC-130U aircrew,
our goal is that no-one is ever placed in your position again.

ACKNOWLEDGEMENTS

This book is written in my words, and it expresses my thoughts, but it takes more than an author for a work to appear. It also requires an opportunity to write, and above all, it needs an occasion, a problem to fix, an audience to address. These were provided by **Charles Vandeppeer**, and without his input there would be no paper in the *Australian Defence Force Journal* on 'The Changing Role of Intelligence', no High Consequence Decision-Making (HCD) training program, no *Shoot, Don't Shoot*, nothing in fact of the range of things that the words 'high consequence decision-making' now refer to.

It was Charles Vandeppeer who defined the initial problem that launched the research component of this project. Once the literature review was complete, it was Charles who saw the potential value in the kind of solution proposed, and arranged for it to be taken into the organisation's structures, where it was received warmly. From there, the request for an HCD training program emerged, which has now gone through a whole number of iterations, and proved a great success. In part, this was due to the trail blazed by Charles' own course in critical thinking, based on his popular book *Applied Thinking in Intelligence Analysis*, and presented to a similar audience.

The identification of training scenarios and their development led to the selection of the three main case studies that make up the bulk of this work. In this respect, the participants in the HCD training program deserve an expression of gratitude, as their willing engagement, their interrogation of the issues, and their insights, have all contributed to the author's understanding of the cases that the reader can find here.

This led to the book project. It was at this point that key figures in authority showed great flexibility and granted the author immense latitude, in terms of his daily routine, which allowed the writing process to go ahead. They did not have to do this, and their willingness to accommodate the demands of producing a work of this type was indispensable, it just would not have seen the light of day otherwise.

Writing, however, is only half the story. Once a draft had appeared, the editing began. Here Charles Vandeppeer stepped onto the centre stage again, and thanks to his painstaking efforts, line by line, a more readable and coherent version of the book began to take shape. This was a more difficult process than anticipated, and involved a great deal of time and patience on Charles' part, but without this input the final result would undoubtedly have been a failure, in literary terms.

Expertise was also provided by a senior figure within Headquarters Joint Operations Command. This was particularly valuable for the Part III 'Applying HCD in Real-Time', which has specific recommendations to make in relation to the functioning of a joint operations centre. In addition,

credit has to be given to Julie Iommi for coming up with the description ‘process guardian’ for the role proposed in this same chapter, one first developed in an incident management context for the Australian dairy industry.

All of those mentioned above, and many others with who the author has discussed the concept of ‘HCD’ over the past two years, have shown great enthusiasm and support for the idea. This project has been surrounded by good will from the start. This includes good friends of the author’s from an entirely non-military context, **Ali Rizvi** and **Christos Iliopoulos**, as well as his immediate peers, many of who also volunteered for the trial runs of the HCD training program. All of this goodwill has carried the author through the darker parts of the writing process, which every book writer will be familiar with, as did the many coffees and smiles from all at Caffeteca.

A special word has to be given to **Lea Bowen**, whose boundless enthusiasm, emotional support, and faith in the project has been an inspiration. It was Lea who insisted the book be written, echoing Charles but from a very different perspective, and who acted as cheerleader every step of the way. Lea also served as a patient listener, on the intricacies of IFF modes among other topics that no doubt she found fascinating(!), allowing the author to vent his excitement for having discovered something new and potentially significant in his research.

To her and to everyone, I hope you enjoy looking at the end result that is here, that you feel some satisfaction from your contribution to its appearance. All I can say is a big ‘Thank You’.

Dirk Maclean

Adelaide

October 2016

PREFACE

This book serves a number of objectives, and has been written with various audiences in mind. 'High Consequence Decision-Making' (HCD) is a program for organisational decision-making that applies in any context where the consequences of error are potentially catastrophic. The first goal of this book is to outline the program, and show how it could have been applied practically in a number of historical situations that did not end well. The bulk of this work consists of four major case studies, which are examined in great depth and sometimes in what may appear to be microscopic detail. The reason for this is to demonstrate that the HCD framework is realistic, that it reflects accurately the complexity and uncertainty that surrounds military decision-making in real operational settings. Disaster often hinges on the tiniest of details, which combine in unforeseen ways, and any program that seeks to minimise the risk of catastrophic error must be able to cope with the actual challenges that decision-makers face during operations. This includes a highly complex technical and organisational environment, even without the unpredictable input of an adversary intent on achieving its own hostile aims.

HCD is also a training program. For participants and trainers, this work acts as a textbook to fill out the scenarios presented there as course material. HCD training was initially rolled out for Air Force intelligence officers and analysts, but it is generic by nature and can be conducted usefully in any operational context, by any Service branch. Outside of Defence, it can be used by emergency service personnel for incident management, a discipline from which HCD draws heavily, and in the corporate sector by management teams striving to cope with adverse situations and prevent their escalation into damaging crises.

The HCD framework is the product of extensive research and is grounded in the relevant literature on the subject. To reflect this, the book has been written to an academic standard of rigour. Researchers, experts and practitioners in this field will recognise the main sources that have influenced this work and be able to locate it inside their discipline. In addition, several of the case studies that make up the text have been covered by an expansive secondary literature. In this book, however, we arrive at radically different conclusions and put forward a unique set of recommendations giving the key lessons to be learnt from these cases. Our studies therefore contain a degree of argument in support of our analysis, in dialogue with previous efforts to understand and explain the incidents under review.

These different themes explain the structure and content of the book. One example will demonstrate this. During the case study on the Black Hawk friendly-fire incident, we embark on a detailed examination of the F-15 pilots' decision to use Mode I IFF as their main means of interrogating the unknown hits on their radar. This obscure technical detail turns out to be critical for understanding

the entire tragedy and its discovery was something of a ‘eureka’ moment for the author. Not one of the official investigations, trials or secondary sources picked up on the significance of this action, and yet it was a key factor in the shoot down. Attention to detail on this level is one of the main reasons the HCD framework approaches organisational decision-making in an innovative manner, and has something fresh to say on the topic.

This mix of purposes and audiences inevitably has an effect on the book’s readability. Obviously, if a text is unreadable then it serves no purpose whatsoever. In this case, various readers will find some parts of the book more accessible than others, and more relevant to their own interests. While there are advantages to simply starting at the beginning and working through to the end, there is also no harm done if the reader dips in and out in accordance with their requirements, or skips through parts that are overly dense for their needs. Training participants will most likely want to start with the chapters that deal with the scenarios they have covered on course, as will specialists already familiar with these cases. Academics and researchers will want to look at the theoretical section that reviews the decision making literature and situates HCD within it. Practitioners responsible for running operations centres will want to look first at the final chapter on the MSF Kunduz airstrike, as will those with a responsibility for risk management. Commanders and trainers in military decision-making will be well advised to begin with the US Marines experience in Beirut, where the HCD framework is introduced. Intelligence professionals will find the discussion on the intelligence summary provided to the USS *Vincennes* crew highly relevant for an insight into their input into tactical decisions, and some of the pitfalls this can produce.

It is possible all readers will find some parts of this book challenging, in spite of every effort on the part of its author, reviewers or editor. At the end of the day, this is because **the subject matter is difficult**; there is simply no way around this. High consequence decision-making is not easy, nor is it risk free, but decisions still need to be taken, if for no other reason than in an operational context **not** making decisions can carry an even greater risk. This is the nature of military operations. HCD provides a practical program for minimising the potential of a catastrophic outcome, but it still requires effort and skill to master. It is our view, however, that such mastery is well worth the effort.

And finally, the term ‘High Consequence Decision-Making’ with capitals and the acronym HCD refer to the training program that this book complements, as well as the principles and processes covered in that program. The act of making decisions with high consequences will be indicated by the words ‘high consequence decision-making’ without capitals.

Dirk Maclean

Adelaide

October 2016

FOREWORD

This book is a response to a real-world challenge. As a result of the growth of intelligence, surveillance and reconnaissance (ISR) missions and processing, evaluation and dissemination (PED) functions, intelligence analysts at every level find themselves increasingly part of the decision-making sphere. This requires the ability of Air Force intelligence officers and airmen to make difficult decisions which will potentially have life or death outcomes.

Within this context, a key question for Air Force has been 'How can Air Force prepare intelligence personnel to confidently make potentially high consequence decisions?' Fortunately, when Air Force began considering this question, Dirk Maclean was the right the person in the right place to address this problem. Having had the privilege of working with Dirk over a number of years, his passion for providing people with the knowledge and techniques to make better decisions is apparent. The result was the development of interactive, scenario-based training for intelligence officers and airmen entering the Air Force. The training led to this book, written with the aim of capturing the research, concepts and analysis underpinning high consequence decision-making and making it available to a wider audience.

The aim of the High Consequence Decision-Making (HCD) program is to give intelligence officers and airmen the ability to determine if our decision-making processes are on track or are at risk of failure and, importantly, give them the confidence to step in and prevent a catastrophic outcome. Platform acquisitions, technological developments, ISR and PED processes mean that specific technical and situational expertise can reside at very junior levels. Consequently, the lowest-ranking member of a team might actually be the most knowledgeable on a particular technology, problem or situation. As expertise and knowledge do not necessarily equate to rank or experience, it is important that even the most junior person in a team has the confidence to speak up rather than shut up. This can only be achieved through an organisational culture that empowers personnel at all ranks to make decisions and take actions, which is why HCD focuses heavily on developing cultures and processes for minimising the risk of catastrophic outcomes.

HCD provides a framework for any organisation dealing in environments where the consequences of decisions and errors can be catastrophic, making it relevant beyond Air Force intelligence. Indeed, the research underpinning the concept draws upon best-practice from diverse fields, including aviation, crisis management, emergency services, and industrial safety systems, making the approach widely applicable across these fields of endeavour.

By choosing to use historical military events to illustrate the concept of high consequence decision-making, one might be tempted to think that the author is attempting to be 'wise after the event'. Instead, by taking apart these situations, Dirk achieves a far more important and ambitious goal,

trying to help us to be wise before the event. By providing detailed analysis of historical case studies, Dirk identifies factors that have proven critical to the direction and ultimately success or failure of missions, even entire operations. The book tells us what to look out for.

An important emphasis of the book is the need to move from sound situational awareness to sound situational assessment; from knowing what is happening to understanding its meaning and significance. This turns out to be key to good decision-making. Other key findings highlight the need to have a good appreciation of our own situation and, crucially, the ability to identify factors that are under our control, because control is fundamental, both to avoiding catastrophe and achieving mission outcomes. During many of the case studies examined, critical failures were not the result of a misunderstanding of an adversary but a misinterpretation of factors that were within the control of those making crucial and yet flawed decisions. This is why the focus is on catastrophic errors, because errors are avoidable. Dirk rejects the idea of decisions as clearly-defined single events, instead viewing decisions as an ongoing series of choices, options, judgments, actions or inactions by individuals and teams. By viewing decisions as a process, rather than discrete events, we are better placed to prepare and monitor the quality of judgments and actions being made where the outcomes are likely to be significant and potentially catastrophic. In *Shoot, Don't Shoot*, Dirk develops an approach that encourages critical evaluation of likely decisions and judgments within the context of what might go wrong, what decisions are likely to need to be made, by whom and when, and what are the potential consequences. This approach draws on Dirk's own background as a trainer of incident management teams in emergency service contexts, reflecting recognised best practice in this field.

The time to minimise the risk of catastrophic outcomes is long before any such life-or-death situation emerges, not in the last few minutes or seconds when the situation is chaotic and confused. As Dirk makes clear through analysis of historical situations, if we leave thinking about high consequence decisions to the last minute or moment, our chance to control or shape the situation will likely already have passed us by; the decision will have already made itself. HCD is about managing the process and anticipating where it will get difficult, which is an achievable objective because it is an area that we do have control over.

High Consequence Decision-Making is ultimately a training program. The case studies described in this book have all been developed into training for military personnel. HCD is designed to be interactive, engaging and confidence-building. The first people trained in HCD have deliberately been the most junior—officers and airmen—entering initial training within Air Force Intelligence. The training introduces personnel to types of situations that they could be involved in even early on in their careers, at the same time as exposing them to decision-making challenges but in a low-stake, low-risk classroom environment. Indeed, the training is deliberately not assessed, as the purpose is to ensure that participants are focussed on learning and becoming comfortable dealing with complicated decision-making problems. If we expect junior personnel to make significant decisions

when time is tight, the pressure is on and lives are at stake, they already need to be confident in making such decisions, which is why training is critical.

HCD is an important training program which comes at a critical time for the Royal Australian Air Force. Whilst the initial focus has been at the junior level, the concepts included in Dirk's book are applicable for everyone involved in making decisions with the risk of catastrophic outcomes. *Shoot, Don't Shoot* offers a robust approach for preparing, making and evaluating the types of potentially high consequence decisions that military personnel at all levels need to be prepared to make.

Charles Vandepeer, PhD

Squadron Leader, RAAFAR

May 2016

ABBREVIATIONS AND ACRONYMS

AAR	air-to-air refuelling
AAW	anti-air warfare
AAWC	anti-air warfare coordinator, who normally ran the AAW team but in this case only played the role of a console operator, the AAW TAO taking over his role (US Navy)
AAW TAO	anti-air warfare tactical action officer, also referred to as callsign <i>Golf Whiskey</i> , the air warfare coordinator for the task force (US Navy)
ACO	airspace control order
ADF	Australian Defence Force
Amal	a Lebanese political party associated with the Shia community
ATO	air tasking order
AMSL	above mean sea level
AGL	above ground level
ACE	airborne command element (position on AWACS aircraft), callsign <i>Duke</i>
AOR	area of responsibility
ASAP	as soon as possible
ASOC	air support operations cell
AI	area of interest or airborne intercept (radar)
ADO	Assistant Director of Operations (in Combined Force Air Component Headquarters)
AOB-N	Advanced Operating Base–North (US)
ASSF	Afghan State Security Forces
BOC	bomb on coordinate
BOT	bomb on target
CFAC	Combined Force Air Component
CJOC	Combined Joint Operations Center (US)
COMRS	Commander US forces in Afghanistan
CONOPS	concept of operations
CRM	crew resource management
CTF	Combined Task Force
DCA	defensive counter air
DICE	disasters, incidents, crises and emergencies

DO	Director of Operations
Druze	A Middle Eastern religion that incorporates elements of Islam, Judaism, Christianity and other religions
<i>Duke</i>	callsign for the airborne command element or ACE on an AWACS aircraft
EID	electronic identification
FCO	fire control officer (on AC-130U aircraft)
ft	feet
GAF	ground assault force
GAO	Government Accountability Office (US)
GIRoA	Government of the Islamic Republic of Afghanistan
IAD	international aeronautical distress (frequency), 121.5 MHz
ID	identification
IDS	identification supervisor in the combat information centre (US Navy)
IO	intelligence officer
IRSO	infra-red sensor operator (on AC-130U aircraft)
ISAF	International Security Assistance Force (Afghanistan)
JIPOE	joint intelligence preparation of the operating environment
JTAC	joint terminal attack controller
kts	knots (nautical miles per hour)
LAF	Lebanese Armed Forces
LNO	liaison officer
MAD	military aeronautical distress (frequency), 243.0 MHz
MAU	Marine Amphibious Unit
MCC	Military Coordination Center for Operation <i>Provide Comfort</i> , located at Zakhu, in northern Iraq
MD	Mission Director
MNF	multinational force
MOUT	military operations in urban terrain
MSF	Medecins Sans Frontieres
NDM	naturalistic decision making (school)
NDS	National Directorate of Security (Afghanistan)
NGO	non-government organisation
ODA	Operational Detachment Alpha (US)
OFS	Operation <i>Freedom's Sentinel</i> (US)
OODA	observe, orient, decide, act

ORM	operational risk management
ORS	Operation <i>Resolute Support</i> (US)
PID	positive identification
PKK	Kurdistan Workers' Party, a Kurdish militia active in Turkey and northern Iraq
POL	pattern of life
POV	point of view
PSP	Progressive Socialist Party, a secular Lebanese political party
RAAF	Royal Australian Air Force
ROE	rules of engagement
SAM	surface-to-air missile
SEAD	suppression of enemy air defences
SF	special forces
SOFT-A	Special Operations Task Force–Afghanistan (US)
STEP	a mnemonic for 'create a Story, Test for conflict, Evaluate the story, develop contingency Plans' which was a model developed in TADMUS research
TAA	train, advise, assist (role) (US)
TADMUS	tactical decision-making under stress research program (US Navy)
TAO	Tactical Action Officer - watch commander for the ship (US Navy)
TAOR	tactical area of responsibility
TEA	target engagement authority
TIC	tactical information coordinator; the office who ran the CIC (US Navy)
TN	track number (on a radar display)
TTP	tactics, techniques and procedures
TVSO	television sensor operator (on AC-130U aircraft)
USFOR-A	US Forces–Afghanistan
UN	United Nations
UNAMA	United Nations Assistance Mission to Afghanistan
USCINCEUR	US Commander-in-Chief Europe
VID	visual identification
WD	weapons director (position on AWACS aircraft)
WROE	wartime rules of engagement
24th MAU	24th Marine Amphibious Unit

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Part I–High Consequence Decision-Making

CHAPTER 1

Introducing High Consequence Decision-Making

The Captain was in a genuine dilemma... the threatening contact was closing about 5-6 miles a minute... he had to act quickly to defend his ship and crew before the contact got much closer than 10 miles (in order to give himself fire depth and to stay outside of Maverick range). By the time he learned of the potential threat, his decision time was less than 5 minutes.

Report on the Downing of Iran Air Flight 655 on 3 July 1988 ¹

A B-52 dropped GBU-31s on Marzak at 1828 local time under control of a GFAC (Ground Forward Air Controller), then positioned for another run to release a string of MK-82s. The bomber was 30 seconds from the launch window when another GFAC asked the bomber crew if they “could see the AC-130 below them.” They couldn’t - and with just ten seconds to go, the aircraft commander wisely “decided to withhold weapons.”

Operation Anaconda: An Air Power Perspective, HQ USAF, 7 February 2005

RAAF fighter aborted air strike on ISIS target to avoid killing civilians. When target moved into urban area in Iraq, Super Hornet crew decided risk of ‘collateral damage’ too high, defence chiefs say... The air crew had made the final decision to pull out, known as a ‘red card’.

The Guardian, 8 October 2014²

‘There are a number of people in the decision chain who can make a call to engage or not and that goes all the way to the crew that are in the cockpit,’ Air Chief Marshal Binskin said... ‘It happens all the time.’

The Sydney Morning Herald, 8 October 2014

Military decisions carry high consequences, often life or death. They contain the potential for catastrophic error, from which there can be no recovery. The collateral dead stay dead, the civilian aircraft remains shot down, the trauma of a friendly-fire incident persists for a lifetime, promising careers are cut short, units disbanded, capabilities dismantled.

'High Consequence Decision-Making' (HCD) is the name of a program whose goal is to minimise the risk of catastrophic error. This not a risk that can be eliminated altogether, the nature of military action excludes that possibility, but it **can** be reduced to a minimum through a range of measures. These measures address issues surrounding organisational culture, management systems, decision-making processes, team and individual performance. HCD offers a framework to guide leadership initiatives, the development of procedures and the design of training courses, with this single purpose in mind.

HCD began life as a research program exploring the literature on rapid, military decision-making. It was motivated from a recognition by people employed on Air Force intelligence duties that recent developments in technology, doctrine and capability are placing intelligence personnel, even at a junior level, in positions where they are making decisions that carry the potential for catastrophic error. This generated a desire to investigate what resources might be available to assist the decision-making abilities of intelligence officers and airmen in an operational environment involving high consequence decisions.

The traditional role of intelligence is to provide 'decision support' to commanders, to create a position of 'information superiority' that in turn drives 'decision superiority' over an opponent. In this conception, the roles of the intelligence and command functions are clearly separate, intelligence personnel do not make operational decisions, they inform them, commanders are the decision makers.

In practice, however, the lines are not so clear. In a targeting context, for example, a commander of a certain rank may be the only one with the authority to approve the release of a weapon during a mission. But this final decision is only one small element within a decision-making process that involves a whole number of other personnel, many at very junior ranks, whose own decisions, judgments, and actions will often so determine the outcome that the commander serves as little more than a rubber stamp. In dynamic targeting, the decision to engage is the culmination of a long process during which a set of pre-conditions, checks and balances have to be met beforehand, over several hours and sometimes days. This is known as 'F2T2EA' for short, or 'find-fix-track-target-engage-assess'.

Travis Hallen gives an example of this process in his description of the execution of Al Qaeda's leader in Iraq during 2006, Abu Musab al-Zarqawi.

Although the 10 minutes of F-16 time taken to destroy the target may have attracted the majority of attention, the contribution made by over 600 hours of airborne intelligence, surveillance and reconnaissance (ISR) tasking that supported the find, fix, track and target stages of the operation was equally important to the operational outcome.³

If anything, this understates the case.

This wider view of the military decision-making process was a key finding of the official inquiry into the shooting down of Iran Air's Flight 655 by the USS *Vincennes* in 1988, a case we will be looking at in some depth during the course of this work. The ship's commander was exonerated by the Fogarty Investigation which stated, 'Captain Rogers made the correct decision to fire given the facts which he had available and the short time to make the decision'⁴. This was an action that led directly to the tragic deaths of 290 civilians, and the launch of a seven-year research project by the US Navy into what exactly had gone wrong, but one in which the captain's role was so minor as to warrant no further discussion.

There is a great deal of discussion about intelligence analysts supporting decision-makers. What is less often recognised is that intelligence analysis is itself a form of decision-making...a continual process of forming judgments (ie making decisions) based on available information while dealing with inherent uncertainty.

Charles Vandepeer provides support for this argument by pointing out that the distinction between intelligence analysis and command decision-making does not really hold up under examination. He says,

There is a great deal of discussion about intelligence analysts supporting decision-makers. What is less often recognised is that intelligence analysis is itself a form of decision-making. Intelligence analysis is a continual process of forming judgments (ie making decisions) based on available information while dealing with inherent uncertainty. It is this analysis of information, and the judgments and assessments that analysts make, that represents the decision-making process of intelligence analysis. Consequently, intelligence analysis is part of the decision-making process and the judgments that analysts make influence the quality of other people's decisions.⁵

If this applies to intelligence analysis in general, then it does so all the more under conditions where time is compressed, to intelligence, surveillance and reconnaissance (ISR) activities carried out in real or near real-time, as seen from the perspective of the operations ISR support. In recognition of

this, the RAAF's *ISR Operating Concept*⁶ seeks to address the challenges posed by the 'time-dominant', as opposed to 'analysis-dominant', intelligence capabilities currently under development. These include the introduction of new ISR technologies and systems such as the Heron remotely piloted aircraft, EA-18G Growler, the P-8 Poseidon, the F-35 Joint Strike Fighter and above all, the Distributed Ground Station–Australia (DGS-AUS).⁷

ISR Operating Concept

As *ISR Operating Concept* is at pains to demonstrate, the key to the successful exploitation of these new capabilities is the fullest possible integration of command and control of ISR assets within the broader operational context of ongoing missions. The implications of this are stated by Maclean and Vandepeer in their paper *The Changing Role of Intelligence*.

The Air Force's *ISR Operating Concept* leaves it open as to whether operations are driving intelligence or intelligence is driving operations or if, in fact, intelligence is now operations.⁸

In fact, the distinction makes little sense. In relation to the management and prioritisation of ISR assets during missions for example, the *ISR Operating Concept* states, 'Clarity is best achieved through integrated ISR planning, rather than separating ISR activities into discrete "intelligence" and "operations" functions.'⁹ Travis Hallen makes this same point in his elaboration of airborne ISR as a concept.¹⁰ Furthermore, when ISR is being conducted under 'time dominant', 'mission focused' conditions, it is not only the separation of intelligence functions into collection (operations) and processing (analysis) that no longer applies, but also between the conduct of 'intelligence' missions and the 'operations' they form an integral part of. This is now acknowledged in the RAAF's official doctrine, which states 'Air Force views ISR as operations, rather than simply being an enabler to operations'.¹¹

For those unfamiliar with how this looks in practice, John Langley of the RAND Corporation offers a vivid description of the kinds of activities performed daily by teams within the US Distributed Common Ground System (DCGS), where intelligence personnel...

are involved in every step: planning, execution and evaluation. Whether locating improvised explosive devices on a convoy route, tracking a vehicle through heavy traffic, observing patterns of life for a person of interest, helping identify enemy targets for a kinetic strike or doing battle damage assessment, these airmen are a foundational part of the military's ISR enterprise. Furthermore, in addition to analyzing the data, they are constantly involved in coordinating and communicating with the aircraft's pilots, sensor operators, command centers, and troops 'downrange'. In some cases, even sensors on aircraft thousands of miles away are directly controlled from the DCGS.¹²

Under the RAAF's *ISR Operating Concept*, liaison officers will be 'embedded in end user units' with these units, in turn, sending representatives to the 'central planning cell', in order to achieve a workable level of integration.¹³ Within the Air Operations Centre (AOC), an ISR hub will sit tightly within the Theatre Air Control System (TACS) while at the same time the mission command concept of 'decentralised execution' will improve 'decision-making speed and quality by granting ISR units maximum flexibility to achieve a desired effect', including 'the appointment of an ISR mission commander'.¹⁴ Intelligence personnel will be making operational decisions at every level.

The development of the Distributed Ground System–Australia (DGS-AUS) capability will reinforce this trend. The work of intelligence officers and airmen engaged in the processing, exploitation, and dissemination (PED) of information coming through DGS-AUS will make up the bulk of the decision-making process during missions that are drawing on this capability in 'near real-time'.

The PED crew commander may be well-positioned to determine the optimum method of satisfying an outstanding requirement, or to judge when a requirement has been satisfied. This gives the PED crew a key role in the management and execution of ISR missions, including coordinating and directing employment of airborne platforms and sensors.¹⁵

Through effective dissemination, a PED crew will directly influence operations as they unfold, in fact this will be its performance metric, 'ISR's effectiveness is determined by the influence it has on decisions'.¹⁶

And all this applies in a context where RAAF's ISR assets are currently not 'weaponised'.

These changes to the role of Air Force intelligence mean that officers and airmen, at a relatively junior level, will be directly involved in operational decision-making, often in real or near real-time, where the consequences of error can be catastrophic. It is this new context for the intelligence function that has provided the impulse behind the initial research and now the program that is High Consequence Decision-Making.

Who Carries out High Consequence Decision-Making?

A review of the literature quickly revealed, however, that Air Force intelligence units are not alone in facing this kind of challenge. In the context of military action, and also in many civilian settings, it is surprisingly common for those decisions that carry the highest potential for catastrophic error to be made by relatively junior personnel, those with direct responsibility for conducting operations. While senior commanders or corporate executives will define the overall mission and set their immediate intent, it is when these are implemented that the risk of catastrophe is at its highest.

In firefighting, for example, it is the on-scene commander (OSC) rather than the incident controller (IC) who makes the tactical decisions that puts fire-fighter lives on the line during a major incident, the IC and their incident management team being located in an incident control centre (ICC) some

distance away and concerned with the strategic management of the fire. Critical decisions, such as whether to mount an internal or external attack on a structure fire, or where exactly to position a strike team during a fast-moving wildfire, are not made in the ICC but at the scene itself, and these are the decisions that are most likely to cause loss-of-life if they are made poorly.

Tactical decision-making of this kind is, of course, set within a wider context. In a well managed incident, a strike team is allocated a sector of the fire in accordance with an overall action plan, taking all the relevant information into account in relation to predicted fire behaviour, weather and terrain, safety considerations, assets at risk, resources already deployed, as well as wider strategic and organisational objectives. But it is at the scene itself, in the fullness of the situation as it unfolds, that all these factors play out and deliver their verdict on the success or failure of the mission, on whether catastrophe will strike, and it is the on-scene commander whose decision-making most influences the final outcome.

In many cases, it is precisely the quality of this 'on-scene command' that averts a catastrophic chain of events that would have occurred had orders and directives from above been blindly carried out.

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Fukushima Nuclear Accident

A classic example from the field of disaster management is given by the conduct of Site Superintendent Yoshida during the Fukushima nuclear accident that followed in the wake of the Great East Japan earthquake and tsunami of 2011. It was Yoshida who held responsibility for coordinating the emergency response at the Tokyo Electric Power Company (TEPCO) site and it was his leadership that undoubtedly prevented the situation spiralling even more out of control than it did. The site superintendent did this by combining a solid technical understanding of the plant's normal operation with having the clearest possible picture of the situation by virtue of being on the spot.



Fukushima I nuclear power plant in March 2011

(Source: Reuters)

Yoshida matched this with a determination to take whatever decisions the situation required, no matter what pressure he came under from his superiors in Tokyo who lacked the same appreciation of the desperate conditions inside the plant, or who were motivated by wider corporate and political considerations rather than public safety. Yoshida's resolve was put to the ultimate test when he made the decision to inject seawater into Unit 1 at 1454 hours on 12 March, following the depletion of all available fresh water. Water was vital to cool the plant and prevent another hydrogen explosion, however seawater would permanently damage the reactor beyond all chance of repair in the future. The National Diet of Japan's investigation into the accident described Yoshida's actions in these words,

About 20 minutes after the injection of seawater into Unit 1, TEPCO Fellow Takekuro learned of it via telephone communication with Site Superintendent Yoshida. He instructed Yoshida to suspend the injection for the moment, as the Kantei (the Prime Minister's residence) was in the process of considering the risks associated with the action...

Site Superintendent Yoshida, believing that he could not suspend the injection of seawater that had finally begun, pretended to have complied with the instruction at the videoconference, but actually used his own judgment and decided to continue with the injection of seawater.

The confusion in the government's own decision making and the subsequent instruction by TEPCO Fellow Takekuro had no impact at all on the injection of seawater.¹⁷

At 19.55 Prime Minister Kan finally gave his consent, and at 20.20 Yoshida gave an official order to resume the seawater injection, although in fact, "the injection of seawater was never suspended".¹⁸

TEPCO's Off-Site Emergency Response Centre, and its head office, alongside the Prime Minister's Crisis Management Centre, all came to approve of the decision to inject seawater, in their own time. But this authorisation only came several hours after Yoshida's initial and correct action. Furthermore, none of the off-site agencies possessed either the technical expertise or appreciation of the position inside Fukushima on which to base their decisions. This knowledge was, however, available to Yoshida and his on-site team. In the words of the Diet investigation, Yoshida

felt dissatisfaction and a sense of crisis, in that TEPCO's head office was taking orders and instructions from the team at the Kantei without resistance, even though the Kantei team did not have a grasp of the situation and were not nuclear power experts.¹⁹

For Yoshida to have bowed to political and commercial pressure under these circumstances would have been a dereliction of his duty, his commitment to public safety and the survival of the crews still frantically working to prevent a total disaster from occurring. The Site Superintendent, and the 'Fukushima Fifty' he led, were to become legends in Japan for their conduct during the emergency. Yoshida himself has since died of cancer.

Yoshida faced constant political interference from above and attempts at remote control... None of these contributed to effective decisions on site. While Yoshida remained focused on the demands of the situation, head office continually introduced non-operational considerations into his decision-making process.

This pattern of decision-making was repeated over and over again during the incident. Yoshida faced constant political interference from above and attempts at remote control of the position by TEPCO, the Prime Minister and various ministry officials. None of these contributed to effective decisions on site. While Yoshida remained focused on the demands of the situation, head office continually introduced non-operational considerations into his decision-making process. On 14 March, for example, the following dialogue took place.

Head Office: We spoke with NISA [Nuclear Industry Safety Agency] a few minutes ago, and NISA wants us to set the time of the start of the injection of seawater into Unit 2 with pressure reduction, saying that any further delay could increase risks similar to those at Unit 1 or Unit 3.

Superintendent Yoshida: 3.30 may be a difficult deadline to meet. Right now I am making inquiries about the actual conditions at the site.

Head Office: But any further delay could make the agency angry at us again.

Superintendent Yoshida: I know that, of course. But this is what we can do based on our all-out efforts.

TEPCO head office tried on several occasions to develop its own independent estimate of the position from afar, and from there, to instruct Yoshida on how to proceed. The results were often laughable, and at times, drove the Site Superintendent to distraction.

Head Office: If you start the injection of seawater in the order of Unit 3, 1 and then 2, would it be difficult to start the injection of seawater into Unit 2 at 4.00?

Site Superintendent Yoshida: Are you asking me again if that would be difficult? I had hoped you would understand by now. How many times do I have to explain? We cannot do that until the pit is filled with seawater.²¹

Throughout the Fukushima crisis, high consequence decision-making was concentrated in the hands of the Site Superintendent. 'If Yoshida wasn't there, the disaster could have been much worse.'²² 'If Yoshida hadn't been plant manager, Tokyo would be a no-man's land right now.'²³ His actions even won the praise of those he had to confront during the emergency, Prime Minister Naoto Kan paying Yoshida the following tribute on his death, 'I bow in respect for his leadership and decision-making'.²⁴

Senior leaders, both at TEPCO, NISA and in the Kantei, in spite of their overall responsibility for the wider aspects of the crisis, the potential impact on the local population if the plant exploded, on power supply to the nation, and the after effects of the tsunami which had just struck the coastal regions, were in no position to direct the on-site decision-making processes that, in the end, did avert a monumental disaster. It was Yoshida and his team at Fukushima who held the impending catastrophe at bay.

The Air Support Operations Cell in Operation *Anaconda*

A similar lesson from recent military history can be found in the shape of Operation *Anaconda*, in particular, the role played by the Air Support Operations Cell (ASOC) during the battle that erupted in the Shah-i-Kot Valley, Afghanistan during March 2002. As an operation, *Anaconda* was ultimately a success; the main objective was achieved. However, credit for this achievement does not lie with the commanders who conceived the operation and formulated the initial plan.



Map 1-1: Eastern Afghanistan, the location of Operation Anaconda

This concept of operations (CONOPS) seriously under-estimated the number of enemy forces, putting them as low as 168 when, in reality, up to 1000 took part in the action. It also misread the enemy's intent, failing to take into account the key role this valley had played during the Soviet-Mujahideen War as a place of last refuge, with heavily fortified defensive positions, dug-in artillery and a large storage of ammunition. Intelligence assessments placed the majority of enemy fighters in the three villages of the valley and predicted that on contact with coalition forces, they would use the escape routes through the mountains to the east of the valley. In fact, the fighters were already in position on the slopes of these mountains, the only inhabitants in the villages being 30–40 cooks who arrived daily to prepare 700 meals.²⁵

The plan called for air power to play a decisive role, as ground forces would be operating without artillery support, not even the organic mortar crews that normally accompanied infantry units. Primary supporting fires would be delivered exclusively from the air.

This concept was developed initially by special forces (SF) planners who were used to deploying single AC-130 gunships directly under the command and control of an SF unit, providing close air support (CAS) within designated joint special forces operating areas (JSOA). These aircraft, however, usually operated only at night, due to their vulnerability to surface fire. The Land Component Commander who took over *Anaconda*, similarly conceived of the role played by air power in terms familiar to him, with CAS provided by Apache helicopters and air mobility by CH-47 Chinook helicopters, both dictated by the tactical situation on the ground.²⁶

As a result, the air component within the joint task force was left out of the planning process until the last minute, and was only included as an afterthought when senior Air Force commanders became aware of the upcoming operation through informal channels and protested. This meant that,

views of the most efficient use and application of airpower differed significantly... air and ground planners and operators alike were following different doctrinal concepts on the use of airpower in relation to the ground battle²⁷

...where friendly troops were under fire from “areas, not precise points”, US Army planners chafed at having to transmit precision coordinates in order to employ JDAMS. In fact, the whole concept of precision coordinate bombing seemed at odds with what the [Combined Forces Land Component Commander–Forward] CFLCC-Fwd wanted many times during the battle. The CFLCC-Fwd's perspective was that the precision bombing process slowed down close air support and delayed vital suppressive fires.²⁸

The commander was used to dealing with artillery, where the concept of an area barrage is familiar, but for the Air Force, the whole thrust of the past four decades has been towards achieving greater and greater precision.

From an Air Force perspective, the role of air power extends far beyond the provision of CAS at the call of ground forward air controllers (GFACs) or combat and logistical support as required by ground commanders. Once brought into the planning team, Air Force personnel began to examine the scope for pre-planned air strikes on key enemy firing positions, including artillery, mortar and DShK heavy machine gun sites, fortifications, lines of egress, main supply and reinforcement routes. They also planned strikes for neutralising anti-air threats, for taking out time-sensitive and high-value targets that might emerge during the course of the battle and considered the need for ISR missions.

Alongside any understanding of the actual role air power would play in the operation, *Anaconda's* initial planners from the Land Component had no conception of the practical challenges involved in delivering even the minimal air requirements they had set out under the conditions of the Shah-I-Kot Valley. General Moseley, the Combined Forces Air Component Commander (CFACC), on being briefed of the plan for *Anaconda* during a video teleconference (VTC), reacted as follows.

General Moseley told General Franks during the VTC that “given a certain set of considerations” the air component was ready to execute. But this assumed “deconfliction and orchestration of fires” plus knowing the airlift sustainment requirement, approving preplanned targets, understanding the ROE inside and outside engagement zones, defining ODA and OGA activities, the status and equipment of ETACs and GFACs and more. As General Moseley said in the VTC, “If everybody’s got all that ready and can forward that data, and give us a chance to orchestrate this and incorporate it, then I’ll be ready to execute on the 28th.”²⁹

‘Assumed’ and ‘if’ are the key words here as, in fact, nothing was in place at this time, just one week before the start of the operation.

The extent of the challenge in play here is worth examining in detail, because ultimately it was the members of the Air Support Operations Cell (ASOC), stood up at the last minute and composed of junior officers and airmen, who overcame the difficulties listed by General Moseley, and did so in the heat of the battle. As with Site Superintendent Yoshida and his team inside the stricken nuclear plant, it was the ASOC who had to cope with the situation in its full complexity and make the critical decisions that would determine the success or failure of the operation. Throughout all of this, the joint task force commander in charge of *Anaconda* would appear as ignorant of the scale and realities of the task at hand as were the Kantei, NISA, and TEPCO head office during Fukushima.

Not only this, but the ASOC had to put up with the same kind of interference as did the site superintendent, disrupting their efforts to bring some order and system to the urgent task of efficiently prioritising requests for air support and allocating air assets in the most effective manner.

Watching a live Predator feed, the JOC [joint operations centre] at Bagram spotted a truck behind the battle lines that appeared to be re-supplying enemy forces and ordered it killed. CJTF [Commander Joint Task Force] Mountain told the ASOC cell to blow up the truck. The ASOC told him they had troops-in-contact (TIC) requests but he reiterated the order.³⁰

What followed ultimately failed to destroy or even locate the vehicle, which was moving through a narrow ravine.

The truck was difficult to find without a Forward Air Controller (FAC) in place to pass along the coordinates and help talk the aircraft onto the target. ... The ALO [Air Liaison Officer] remembered that the commander came over to him and said: “Do I have to call in air myself: Who do I need to talk to on this phone?” He picks up the hotline, he’s screaming and hollering, trying to talk to the CAOC [Combined Air Operations Center]. ... The fundamental issue remained about the propriety of diverting strike assets from troops-in-contact (TIC) to chase a truck. He [the ALO] summarized that the Predator’s live feed stared at that truck for hours ... It was a waste of an asset that could have helped defend guys, could have helped with other targeting.³⁰

F-16s, F-18s and the Predator itself were all misdirected in this manner; at a crucial point in the fight. Redirecting missions in this way was no simple matter. The area of operations (AO) for *Anaconda* was extremely small, by air standards. The valley floor measured little more than 3 x 5 nautical miles (nm) in size, and the entire AO of 8 x 8 nm amounted to less than ‘one sixteenth the size of an Operation *Desert Storm*—era killbox’³¹. Within this small space, a number of separate engagements were taking place at the same time, involving airborne assault troops, special forces units and Afghan coalition units, all operating independently under their own command arrangements. *Anaconda* made for the most complex airspace control arrangements yet seen in Afghanistan. General Corley, Director of the CAOC, later described the challenge this presented.

The battle space was extremely constrained. The CAOC would have B-52s at higher altitudes dropping JDAMS; B-1s at lower altitudes; unmanned vehicles such as Predator flying through there; P-3s, aircraft contributing to the ISR assets; helicopters down at the ground; fast moving aircraft F-14s, F/A-18s, F-16s, F-15Es; tanker aircraft... On top of this we had three civil air routes opened up... NGO [non-government organisations] relief flights used the airspace as did Army helicopters.³²

Omitted from General Corley’s list were AC-130 gunships, operating at night under the tactical control of special forces units, providing close air support.³² The job of deconflicting this airspace and assigning priorities fell to the ASOC, set up at the last moment and located at Bagram Air Base. Up to this point, air operations in the Afghanistan theatre had been run out of the CAOC in

the Gulf, for the most part driven by the needs of special forces units embedded within Northern Alliance coalition partners. The low volume of requests for air support, combined with their nature, for the most part taking the form of interdiction strikes against enemy combatants at some distance from friendly forces, meant that this arrangement had worked well so far. In *Anaconda*, on the other hand, intense fire support was required in an area congested with scattered friendly units heavily engaged with the enemy at close quarters.

Bagram was still in the process of being set up as a properly functioning base. The ASOC did not have access to secure communications, with which to build a common air or ground picture, nor could they speak directly to strike aircraft.³³ The availability times of tanker and carrier-based aircraft was known only to the CAOC. On being stood up, the ASOC had to make do with email, chat and non-secure phone lines, and work with Army liaison staff who had no appreciation of their function.³⁴ In spite of this, it was the ASOC that had to manage the 'postage stamp' airspace and assign missions as the air assets allocated by the CAOC arrived at the AO in a constant stream.

Furthermore, a major complication lay in the rules of engagement (ROE) in force across Afghanistan. This was a factor the land-component planners had not taken into account, assuming that the normal CAS rules would apply and that ground commanders would have a free rein within the AO. The reality of the situation was very different.

This was an intricate type of war ... Dozens of Joint Special Operations Areas, engagement zones, special engagement zones, restricted fire areas, no fire areas, off-limits sites of interest, and constant unknowns about friendlies created a jigsaw puzzle of battlespace control measures. It was all very different from the phase lines, corps boundaries and fire support coordination lines of a doctrinally conventional battlefield ... Only the Airmen ... were routinely familiar with the mosaic.³⁵

This meant that the JTTF commander would be issuing orders for airstrikes without any awareness of what was involved before they could actually proceed. Often this required approval from the CFACC or the CAOC, in some cases permission was needed from US Central Command (USCENTCOM) or even authorities back in the United States, at Tampa or Washington, DC. 'The ROE piece of this was not understood by CJTF Mountain at all.'³⁶

Of all the personnel within this chain, it was the Air Liaison Officer (ALO) whose decision-making carried the highest risk of catastrophic error, either in the form of an air-to-air collision, friendly-fire incident, or a failure to meet an emergency request for air support from troops-in-contact.

It was understood, on the other hand, by the members of the ASOC who had to implement the commanders' orders and deconflict the missions with the realities of the situation in both the air and on the ground. The Assistant Division Air Liaison Officer (ALO), who headed up the ASOC, played this pivotal role, in many ways analogous to the part played by Site Superintendent Yoshida at Fukushima. The ALO combined specialist knowledge in relation to airpower, understood the demands of the situation in its full complexity, and in spite of being relatively junior in the larger chain of command, had enough authority to influence the final outcome. Of all the personnel within this chain, it was the ALO whose decision-making carried the highest risk of catastrophic error, either in the form of an air-to-air collision, friendly-fire incident or a failure to meet an emergency request for air support from troops-in-contact.

In the end, the ASOC rose to the occasion, as did all those on the ground in Shah-i-Kot and the skies directly above, all of whom carried the battle through to its successful conclusion.

Operation *Anaconda* was successful because of ... the outstanding tactical leadership and decisions made on the ground and in the air. This was a case of superior performance from soldiers, Special Forces, and Airmen, overcoming the shortcomings of prior planning and the serious failures of communication between the components.³⁷

Tactical leadership proved decisive. More precisely, the critical element lay at that level where decision-making first confronted the demands of the situation as a whole, in its full complexity. In the air operations supporting *Anaconda*, this level was located one step above the GFACs and aircrew who had to respond to the specific requirements of their sector within the battlespace, and one level below the CFACC and CAOC whose responsibilities did not reach into the immediate air and ground picture of the Shah-i-Kot Valley itself. At this mid-point, decision-making took this entire picture into account, carried enough weight as to potentially affect the outcome of the entire operation, and had such an instant impact that any error stood no chance of being corrected before catastrophe struck.

In *Anaconda*, therefore, as far air operations were concerned, high consequence decision-making was concentrated above all in the ASOC. It was here that the potential for catastrophic error stood at its highest and it is at this level that HCD as a program is directed first and foremost.

This is not to deny that high consequence decision-making takes place within a wider context. The ASOC was stood up on the initiative of senior Air Force commanders who recognised the inadequacy of the arrangements in place under the initial CONOPS for *Anaconda*. They also reinforced the ASOC at a crucial moment in the battle, when it was under the greatest strain, and sought to overcome its limitations and weaknesses by applying additional resources elsewhere. And of course, ASOC personnel were part of a broader organisational environment, with established doctrine, procedures, training and culture.

HCD is concerned with all of these larger elements and addresses them in some depth, as will become clear in Part II of this book. The argument is, however, that during an operation, a disaster or an emergency situation, decision-making has to directly confront the situation in its full complexity and carry enough weight to determine the outcome. That is when high consequence decision-making is most concentrated. It is here that all the factors generated by organisational culture, leadership, doctrine, procedures, training, team processes and individual qualities meet and play themselves out. And this point is not at the top, but somewhere in the middle, at the level of the on-scene commander, the site superintendent or the ALO.

In the wake of *Anaconda*, the US military worked hard to absorb the lessons and improve coordination in the planning and conduct of joint operations. It is not difficult to detect the influence of these efforts in current RAAF doctrine, including the *ISR Operating Concept*, where integration at all levels is the guiding principle. It is also not hard to see how ISR mission commanders and DGS-AUS crew commanders, can find themselves in a similar position to the ASOC team leader at Bagram in that they possess the clearest picture of the situation and have a critical role to play in operational decision-making.

A Different Kind of Tactical Decision-Making

This trend, where relatively junior officers are placed in positions where they have to cope with the highest degree of complexity of anyone in the chain of command, is the product of a number of factors. Some of these are captured in a study carried out by the US Marines in 2008, which pinpointed as a key organisational goal, 'Improving the Decision Making Abilities of Small Unit Leaders'.³⁸ The study identifies these leaders as company commanders. The factors driving this imperative turn out to apply with equal strength to the Air Force.

Among the factors producing this trend is the changing character of warfare itself, expressed in two terms 'the long war' and 'hybrid war', both of which accurately capture the nature of current operations in Iraq. The time frame of 'the long war' is measured in 'generations' and is global in 'scale and scope'.³⁹ 'Hybrid war' involves opponents that switch between conventional, irregular, cyber and criminal modes of operation, use sophisticated communications technologies, exploit the 24-hour media cycle and seek to turn international law to their advantage.⁴⁰ In 2006, the term was used to describe Hezbollah during its conflict with Israel; today it offers a useful description of Islamic State or Da'esh.

The implications of this kind of warfare were first spelled out by US Marine Corps General Krulak who coined the phrase 'the era of the strategic corporal', where even individual marines 'will be required to make tactical and moral decisions with strategic consequences'.⁴¹ They would have to do so without headquarters support in 'distributed operations' with units down to squad and fire-team levels functioning independently.⁴² After some experimentation and adjustment, in 2008 the Marines arrived at the concept of 'enhanced company operations' as the most suitable response to

the challenges of hybrid and long warfare. This involved the ‘downward movement of battalion level functions to the company commander’.⁴³ It also meant that ‘small unit leaders’, notably enhanced company commanders, needed to be ‘up to the task of making rapid tactical decisions that may have strategic impact’.⁴⁴

These decisions however, differ fundamentally from the classical concept of ‘tactics’, and, as a result, the kind of decision-making involved has departed from traditional models such as the military appreciation process (MAP). Scott Holmes of the Australian Army captures the essence of tactical decision-making as it has been classically conceived, and taught to junior officers for decades,

When making decisions at the tactical level, commanders analyse the situation to determine the most appropriate combination of tactical techniques and procedures to apply to achieve the desired outcome. It is assumed that through training junior commanders have developed a sound understanding of the tactics, techniques and procedures (TTP) applicable at sub-unit level and below. Therefore, the decision-making environment for the junior commander is the selection and application of the most appropriate TTP at the right time.”⁴⁵

In line with this, the MAP gives greatest weight to course-of-action (COA) development and selection. The desired outcome, or mission, is assumed to be unproblematic and is quickly skipped over. In the combat version of the MAP, for rapid decision-making, the mission drops out of the picture altogether, the CMAP taking into consideration only knowledge of ‘own force, of the enemy, of terrain’⁴⁶

In a volatile operating environment, apparently calm situations can degrade into full combat with little warning. In such situations, an optimal course of action may not be immediately apparent.

This conception clearly works in a conventional land warfare environment, such as applied during World War II, which is the type of context for which it was developed. However, this bears little resemblance to the conditions under which the Australian Army, or the US Marines, normally operate today. These are marked, above all, by their complex nature, calling for an ability to meet the demands of ‘full-spectrum’ warfare. ‘In a volatile operating environment, apparently calm situations can degrade into full combat with little warning. In such situations, an optimal course of action may not be immediately apparent, given that immediate actions can have longer term second and third order effects.’ Discussing their experience in Afghanistan, junior USMC officers described having to, ‘shift gears from an aggressive stance to a more “humanitarian” mission and vice versa’ involving ‘dramatic changes in perspective and attitude for him and his Marines several times a week, and often on a daily basis’ forcing them to switch between the roles of ‘diplomat and warfighter’.⁴⁷

Complexity of this kind brings with it challenges that traditional models of tactical decision-making are ill suited to meet. As David Walker, also of the Australian Army, explains, complex problems,

are roughly speaking problems where multiple objectives compete for resources, and the pursuit of one objective can affect others in ways that are extremely difficult or impossible to predict ... While conventional warfare is concerned primarily with physical effects on physical entities, complex warfare is additionally concerned with social effects on social entities. Commanders must these days be military leaders, aid workers, economists, politicians, educators, and even social engineers. And with each additional objective there is an exponential increase in complexity.⁴⁸

It is in this regard, that the MAP fails miserably as a decision-making tool. Walker's scathing assessment is worth quoting in full, as it gets to the heart of the matter.

At first glance one might suggest that the Mission Analysis is the step at which objectives are determined, and therefore the MAP handles this requirement. But the Mission Analysis is not where objectives are determined, it is where they are received. There is a world of difference. Rather than supporting efforts to discover a suitable set of objectives, the Mission Analysis is configured to achieve almost the opposite. It actually seeks to prevent the decision-maker from considering objectives not specifically issued by superior command.⁴⁹

Non-linear Modes of Thinking in Dynamic and Complex Environments

The significance of this for Air Force intelligence personnel cannot be overstated. ISR mission commanders, DGS-AUS and PED crew commanders will not simply be responsible for implementing a CONOPS pre-prepared by more senior officers in the planning cells of the AOC or the operational units previously conceived as an intelligence section's 'customers'. Functioning in real or near real-time, and so with the highest available level of situational awareness, relatively junior intelligence officers will play a critical role in **determining** mission objectives and desired outcomes, assessing the continued relevance and appropriateness of earlier conceptions and anticipating 'second and third order' consequences, as events unfold.

This idea is not unique to HCD; it is also contained in the already-adopted conceptual frameworks Complex Adaptive Campaigning⁵⁰ and Systemic Operational Design. Both of these are attempts to deploy non-linear modes of thinking to military operations in dynamic and complex environments in ways that echo the impulse behind John Boyd's famous OODA loop (Observe-Orient-Decide-Act).⁵² These concepts dissolve the segregation between planning and execution, between a commander's intent and its implementation by subordinates, between assessing a situation and embarking on a COA to shape it. The goal of military action is as much to 'develop a more comprehensive appreciation of the situation'⁵³ as it is to 'advance desired goals'. In this radical vision, the causal relationship between 'intelligence preparation of the battlespace' and the operations that proceed

on the basis of this classic intelligence section product, is reversed. It is operations that ‘prepare the battlespace’ so that it can be understood properly by intelligence personnel, just as in Boyd’s original conception of OODA, ‘action’ precedes ‘observation’ and tests ‘orientation’ once combat is underway.⁵⁴

Furthermore, operational performance is no longer measured against pre-conceived desired end-states, on whether mission goals were achieved, but on an assessment of whether these turned out to have been the right objectives at all. A judgment of this kind is never final, but falls under constant review, as the consequences of earlier actions play themselves out, history rewrites itself, backwards.

Complex Adaptive Campaigning, Systemic Operational Design and the UK military’s 2011 joint doctrine *Decision-Making and Problem Solving: Human and Organisational Factors*⁵⁵ might take on the appearance of intellectual flights of fancy. Systemic Operational Design in particular, is often coming under this criticism. The reality is, however, that these conceptual frameworks represent attempts to bring military thinking and doctrine into line with a changed set of circumstances against which traditional modes of thought and ways of operating are no longer helpful. This can be clearly seen in the argument during Operation *Anaconda* between the ASOC ALO and the CJTF Mountain over the misdirection of ISR and other air assets to chase a truck. In this dispute, it is just not possible to take the senior commander’s side from any perspective that takes operational necessity as its starting point.

But this is only one example. The experiences of Iraq and Afghanistan, both ‘long wars’ and involving a ‘hybrid’ opponent, provide countless others.

The US Army’s *Decision Skills Training* program for military operations in urban terrain (MOUT) arrives at the same conclusions.

Traditional training approaches ... in which the decision maker analyses the costs and benefits of alternative courses of action ... has not proved effective in improving performance in field settings. One reason for the inadequacy of this analytical approach is that many decision making situations do not involve choices between alternative courses of action ... skilled decision makers spend more time sizing up the situation than comparing alternative courses of action.⁵⁶

The explanation for this lies in the nature of the complexity that defines ‘complex warfare’ such as MOUT, for this complexity is contained within the situation; it manifests itself **as a situation**, in all its richness. Decision-making under conditions of complexity means the ability to navigate through complex situations. This is a key component of high consequence decision-making.

The HCD program builds on the insights contained in all these frameworks and programs. It also draws on non-military sources where decision-making is equally driven by the demands of a situation. These include the management of major incidents, emergencies, natural disasters and industrial accidents. It looks at positive examples of organisations who operate successfully under conditions

where the consequences of error are potentially catastrophic—high reliability organisations such as nuclear power plants, air traffic control and hospital intensive care units. It also examines the lessons learnt from past failures, incidences of friendly-fire, air crash investigations, major safety breaches and systemic breakdowns, and it seeks to incorporate the benefits contained in initiatives such as aviation's crew resource management programs.

From these sources, HCD seeks to define a desired organisational culture, determine guiding principles behind management systems and procedures, identify the main elements of situation-driven decision-making, including rapid military decision-making, ideal team processes and leadership roles, and to introduce a new concept—the role of the process guardian. HCD approaches all these tasks from the perspective of a single objective—to minimise the risk of catastrophic error.

CHAPTER 2

Set Up to Fail –

The Shooting Down of Iran Air Flight 655

No one knows who said it first, but someone in the CIC openly speculated that the contact was an 'Astro', a code word for an F-14 Tomcat

Harold Lee Wise, *Inside the Danger Zone*⁵⁷

'Possible Astro!' Anderson sang out, at a moment of near chaos in the CIC. It was 9:51. Having swung full circle, Rogers was now bringing his reloaded forward gun to bear on the Iranian launches. The gun fired off 11 rounds - and jammed. The skipper again ordered the rudder hard over. The stern swung around, and in the CIC, papers and books toppled off consoles as the ship heeled over. At his station to Rogers's left, Lustig looked at his screen. The incoming plane was 32 miles away. What do we do?' he asked Rogers.

'Sea of Lies', *Newsweek* 1992⁵⁸

'Go/no go', 'shoot/don't shoot', 'engage/withdraw', a split-second choice, lives hanging in the balance, victory or defeat—there are moments when military action is reduced to no more than an either/or decision of this type, which makes all the difference between success or failure, life or death.

On 17 May 1987, the USS *Stark*, while on patrol in the Persian Gulf, was hit by two Exocet missiles launched from an Iraqi Mirage F-1 fighter that had been under its observation for one hour. At the moment of impact, the ship's fire control radar was not switched on, chaff counter-measures were not armed, the air defence Close In Weapon System (CIWS) was in stand-by mode. The decision had been made not to engage the aircraft. Thirty-seven crew members died in the missile attack.

Just over one year later, on 3 July 1988, in the same Persian Gulf waters, the USS *Vincennes* launched two missiles at an approaching aircraft during a surface engagement with Iranian gunboats. Both missiles found their target. Iran Air Flight 655, carrying 290 civilian passengers, 66 of them children, was shot down. There were no survivors.



USS Stark after being hit by Exocet missile (Source: Reuters)

It was 2105 on that May night of 1987, when the Iraqi Mirage changed its course and turned directly towards the *USS Stark*. At 2107, the tactical action officer (TAO) in charge of the ship's combat information centre (CIC) took the decision to issue a verbal warning to the aircraft. At this point, the first Exocet had already been released. It struck the ship at 2109.

Iran Air Flight 655 first appeared on the *Vincennes*' radar screen at 0947, the captain was informed of its presence at 0950⁵⁹. The order to launch missiles was given at 0954.

These two decisions, each made in less than four minutes, were not quite split-second choices, but certainly time compressed. They were opposites in their content but almost identical in their outcome—both catastrophic errors.

In spite of their age, these two examples of high consequence decision-making are extremely valuable to us today. Following the *USS Stark* incident and the shooting down of Iran Air Flight 655 (IR655), extensive investigations took place into what had happened. The documentary record emerging from official inquiries, eye-witness accounts and the secondary literature allow us an important opportunity to dissect the issues and challenges surrounding decisions of this kind, to learn some lessons, and above all, the chance to avoid a repetition.

One direct outcome of the investigation of the downing of the Iran Air flight was the launch of the US Navy's Tactical Decision Making Under Stress (TADMUS) project. This was a major research program, extending over seven years, that sought to find out exactly what had gone wrong within



USS Vincennes (Source: US Navy)

the USS *Vincennes*' CIC on that Sunday morning, and to find ways to fix those problems it identified. The TADMUS research coincided with some important intellectual developments, and these were quickly incorporated into the program.

One of these was the work known as 'human factors engineering', which was too new a field to have influenced the initial design of the state-of-the-art AEGIS Combat Information System that was installed on the *Vincennes*. Human factors research looked at the interaction between operators and technological systems, and how this departed from the assumptions made by system designers, making certain kinds of operator error almost inevitable. The product of this human factors approach was a series of design changes in the AEGIS user-interfaces to eliminate obvious sources of error; two of which were recognised as directly contributing to the mistaken identification of IR655 as an F-14 with hostile intent.

Another input was the emergence of the 'naturalistic decision making' (NDM) school, pioneered by Gary Klein among others. NDM arose out of a critique of classical decision-making theory and the assumptions it rested on, beginning with the observation that, in practice, no-one ever made decisions in the manner 'rationalist theory' prescribed. NDM had its origins in strategic



Map 2-1: Eastern Persian Gulf Region

management, but as traditional military decision-making models had adopted classical rationalism wholesale, ‘naturalistic’ concepts soon found a ready audience in military circles seeking to improve the quality of military decisions in combat situations such as those that faced the crews on USS *Stark* and *Vincennes*. NDM scholars Janis Cannon-Bowers and Eduardo Salas played a central role in the TADMUS research, Klein has gone on to provide a pivotal reference point in almost every major attempt to review and reform military decision-making ever since.



An Iran Air A300 (Source: Iran Air)

Investigation of the Downing of Iran Air Flight 655

At least two investigations were conducted into the shooting down of IR655. The US Government investigation, conducted by Rear Admiral William Fogarty, produced a report *Formal Investigation into the Circumstances Surrounding the Downing of Iran Air Flight 655 on July 3, 1988*, generally known as the Fogarty report. Shortly after this, the International Civil Aviation Organization (ICAO) conducted an investigation of the event and published its report in December 1988. Hearings before the Committee on Armed Services in the US Senate were also conducted and recommendations made.

How could these individual members of the CIC have made such a horrendous error? How come it was not picked up, either by team processes or higher up the chain of command?

All the analysis and decision-making relevant to the downing of Iran Air Flight 655 took place in the combat information centre (CIC) on the USS *Vincennes*. Within the CIC, communications and sensor data relating to air, surface and sub-surface is received, evaluated and displayed to provide ordered timely information flow to the battle staff and the captain. The *Vincennes*' CIC contained 23 positions, with approximately half of these involved in anti-air warfare (AAW). The key AAW positions are the:

- Anti-air warfare tactical action officer (AAW TAO) who is the captain's primary advisor on AAW matters and who operated the radio communications with Commander JTFME on behalf of the captain using the callsign *Golf Whiskey* (GW),
- Force anti-air warfare coordinator (FAAWC), who shares the tactical air picture with allied ships, aircraft and shore stations,
- Tactical information coordinator (TIC) who coordinates the inputs to the ship's tactical air picture,
- Identification supervisor (IDS) who is primarily concerned with the identification of airborne targets, and
- Own ship display assistant (OSDA).



Combat information centre on the USS Vincennes (Source: US Navy)

The sequence of events inside the USS *Vincennes*' CIC in the immediate run up to the shooting down of IR655 posed some difficult questions for investigators and researchers alike. Admiral Crowe, Chairman of the Joint Chiefs of Staff at the time of the shoot-down, made the following comments.

By far the most puzzling mistake to me was the ultimate misreading of altitude... at a range between 15 and 12 miles, the Tactical Information Coordinator (TIC) reported that the altitude (which he estimated had previously reached 11,000 feet) was decreasing... The investigation was unsuccessful in satisfactorily reconciling the conclusion that the contact was descending with subsequent data analysis. The TIC's belief, however, was supported by three other watchstanders, although it is not clear that they had arrived at that conclusion independently.⁶⁰

General Crist, who as Commander US Central Command was responsible for US operations in the Persian Gulf region, likewise pointed to the TIC as the 'primary source for the reports that the aircraft of interest was rapidly decreasing in altitude'. He added his own conclusion, 'This assessment can not be logically explained in that his battle station's character read out (CRO) would have been showing an exact opposite profile.'⁶¹ Admiral Fogarty's report itself added further details, all painting a similar picture. For example, the *Vincennes*' identification supervisor (IDS) in the CIC later recalled that he observed the radar track of IR655 showing a speed of 445 kts at an altitude of 7800 ft and descending about a minute before missile launch, while the *Vincennes*' recorded data for the same time showed an altitude of 12 000 ft, ascending, and at an airspeed of 380 kts.⁶²

How could these individual members of the CIC have made such a horrendous error? Why was the error not picked up—either by team processes or higher up the chain of command? These questions became the focus of the initial research into the tragic incident.

Human factors engineering soon identified flaws in the ways information was displayed to console operators. These flaws went some way towards explaining the mistakes and confusion inside the CIC, in particular, how a military Mode II IFF (Identification Friend or Foe) designation, which is only used by military aircraft, was given to IR655's track when the aircraft was consistently squawking a civilian Mode III identifier.⁶³ This was a key factor in the assessment that the track was an Iranian F-14, and after the USS *Sides* had illuminated the aircraft with its fire control radar, it was assigned the 'hostile-engaged' symbol for all to see on the large screen display.⁶⁴

The radar track number first assigned to IR655, track number (TN) 4474, was automatically changed mid-flight to TN 4131, in line with its identification by USS *Sides*. The *Vincennes*' captain, however, was unaware of this change and at one point asked for information on the status of TN 4474. According to the theory developed by Kristen Dotterway, and supported by Harold Wise, this may have been the source of the 'descending' call, as by this point TN 4474 had been reassigned to an US Navy A-6 making a carrier landing in the Arabian Gulf.⁶⁵ 'This was a freak occurrence, but it lasted long enough to imprint indelibly the vision of a rapidly descending airplane in the minds of

some of the *Vincennes* crew.⁶⁶ Another possibility was that the TIC had mistaken range information, which was decreasing rapidly, for altitude.⁶⁷

Making Decisions under Conditions of Extreme Stress

Faced with these discrepancies between system and operator, making changes to information displays and other user interfaces was one solution. Another was to look at the psychological factors that had caused CIC members to ignore the information right in front of their eyes, and to mitigate these. The Fogarty Investigation had already called in a team of psychologists from the US Navy Medical Corps experienced in the study of 'combat stress'.⁶⁸ These arrived at the conclusion that, 'the most reasonable explanation' was that the TIC's behaviour 'was induced by a combination of physiological fatigue, combat operations, stress and tension which can adversely affect performance and mission execution'.⁶⁹

There is little doubt that stress was present inside the CIC and showed itself in the behaviour, communication style and actions of the TIC and others. General Crist gives an indication of this when he says that the TIC,

took it upon himself to take 'every open spot' he was getting on Circuit 15 (the Command channel) to ensure 'everyone up in the command decision area was informed, kept aware of what was going on in case they got sidetracked by other events'. In the end it is reported he was yelling out loud.⁷⁰

In this respect, the TIC achieved his purpose, directly shaping the decision taken by his superior, the anti-air warfare tactical action officer (AAW TAO), and in turn, the captain. Of the AAW TAO, Crist states,

Even though the tone of these reports must have seemed increasingly hysterical (yelling and shouting), Golf Whiskey made no attempt to confirm the reports on his own. Quick reference to the CRO on the console directly in front of him would have immediately shown increasing not decreasing altitude... As he said, 'I had no reason to doubt them [his subordinates]. I had to make a split second recommendation to the Commanding Officer, and I did'. While many factors played in Captain Rogers' final decision to engage, the last report by the AAW TAO that the aircraft was rapidly descending directly toward the ship may have been pivotal.⁷¹

High stress levels were not confined to the *Vincennes*' CIC, 'There was growing excitement and yelling in the Sides' CIC about the contact being a commercial aircraft'⁷² as the tragedy unfolded. Meanwhile, on the USS *Elmer Montgomery*, constant warnings were being sent out on the civilian international air distress (IAD) VHF frequency of 121.5 MHz, as they were from the USS *Vincennes*. In the tense atmosphere, it is possible, as the ICAO Fact Finding Commission considered, that no-one noticed these broadcasts were going out simultaneously, making neither audible to the aircraft

they were intended for. This may explain why none of the air traffic control facilities or most of the shipping in the area overheard the warnings.⁷³

As a result, both the Fogarty report and the Senate hearings that followed it recommended research be undertaken into the effects of combat-related stress on decision-making. This became the 'Under Stress' component of TADMUS⁷⁴.

As the TADMUS researchers found, high-stress environments are not unique to the military and their impact on performance has been widely investigated. Richard Gasaway, for example, has explored the effect of stress on firefighting command and control. One of the most immediate of these is to trigger a number of physiological processes that shut down the brain's ability to use its capacity for analytical judgment. Processing complex information becomes highly problematic, instead the brain reverts to instinctive and intuitive means, functioning in a non-linear, holistic and instantaneous manner to arrive at a meaningful assessment of a situation and determine what to do.⁷⁵

Under conditions of extreme stress, tasks that are normally very simple to perform can become a major challenge, with a high probability of error. Under these circumstances, the IDS' failure to identify TN 4474 as IR655 is hardly surprising. Not only is it understandable, it is predictable, and if it can be predicted, then it can be prevented.

Under conditions of extreme stress, tasks that are normally very simple to perform can become a major challenge, with a high probability of error. An example of this was the attempt by the *Vincennes*' ID supervisor to verify if track number 4474 was a commercial flight by referring to a chart laying out the regular airline schedules for Bandar Abbas. This took place in the middle of the surface engagement, with the ship at full speed and 5-inch rounds being fired off every few seconds. Barry and Charles describe the conditions the IDS was working under.

He reached beside his console for the navy's listing of commercial flights over the gulf. But as he scanned the schedule, he missed Flight 655. Apparently, in the darkness of the CIC, its lights flickering every time the *Vincennes*'s five-inch gun fired off another round at the hapless Iranian gunboats, he was confused by the gulf's four different time zones.⁷⁶

Firefighters will instantly recognise this picture, being similar to the challenge of finding a street address in a directory from the back seat of the truck, at night, while it bounces around, heading Code 1 to the scene of an emergency call. They will also know how the words 'smoke showing-persons reported' magnify the difficulty as now a mistake on their part could cost someone's life.

Most commentaries skip past this episode in the tragic series of events, but it is worth dwelling on, as success rather than failure in this seemingly simple task would have made all the difference for IR655's passengers and crew. It was just as the IDS was reaching for the commercial airline schedule that he received the indication of a military Mode II IFF from the same location as TN 4474, and that TN 4472, an Iranian P-3, turned towards the Vincennes and was illuminated by the ship's fire control radar to warn it off. Moments later, the USS *Sides* used its radar to 'light up' TN 4474, from now on to be displayed as 'F-14 hostile-engaged'. One minute later still, the USS *Vincennes*' 5-inch gun jammed.

The foul bore in MT51 caused the TAO to maneuver the ship radically, using 30 degrees rudder at 30 KTS ship's speed, in order to keep MT52 pointed at the most threatening of the surface contacts... The high speed, large rudder angle turn caused books, publications, and loose equipment to fall from desks and consoles in CIC.⁷⁷

These were the highly stressful conditions under which the IDS had to locate and then consult a chart of information and arrive at a decision on whether TN 4474 was a scheduled commercial flight. Furthermore, this was not a straightforward question of looking at a watch and comparing this against the printed word. Bandar Abbas and Dubai are in two time zones, a half hour apart, with the more westerly of the two in front of the other. This had to be calculated against Zulu time. In addition, it was not clear whether the departure time listed referred to 'push off' time from the gate, or actual take off, a 12-minute difference in the case of IR655. If the former, then the aircraft was not 27 minutes behind schedule, as stated in the Fogarty report, but only 15, a fairly routine figure.

As Gasaway's research confirms, arriving at an objective analytical assessment of this kind of information-based problem would have been extremely difficult, as the stress generated by the environment in the CIC would have acted to force the IDS' mind into intuitive mode. In this mode, the senses become 'hyper-vigilant' and the processing of a detailed chart would have to compete for available cognitive capacity alongside the other sensory information bombarding the brain.⁷⁸ Under these circumstances, the IDS' failure to identify TN 4474 as IR655 is hardly surprising.

Not only is it understandable, more importantly, it is **predictable**, and if it can be predicted, then it can be **prevented**, or at least any negative consequences countered. This is a key point we will return to.

The TADMUS research into the effects of combat-related stress led directly to the design of training programs, with the goal of providing individuals with,

- knowledge of and familiarity with the stress environment,
- training those skills required to maintain effective performance under stress, and
- building performance confidence.⁷⁹

Stress training to prepare individuals for making decisions under combat conditions is clearly a good idea. However, it is unlikely that any amount of training or preparation would have made enough of a difference to overcome the challenge that faced the IDS during those critical moments in the *Vincennes* CIC. The likelihood of error may have been reduced, but it would still have been significant. Given the catastrophic consequences that followed, something more is needed; HIGH CONSEQUENCE DECISION-MAKING can not stop at this point.

Shifting Perspective—What Happened Before IR655 Was in the Air?

The initial investigations into the downing of IR655 concentrated their attention on the decisions made by members of the CIC during the seven short minutes the aircraft was in the air. The Fogarty report's main objective was to deliver a verdict on Captain Rogers, to determine whether his decision to launch missiles was justifiable under the circumstances, in spite of the tragic outcome. Its judgment was to exonerate the commander, stating he acted, 'in a prudent manner'.⁸⁰ This judgment was endorsed by Admiral Crowe, 'Given what was in his mind at the time, there was no other prudent or responsible course'.⁸¹

This shifted the main burden of responsibility onto the captain's juniors, the AAW TAO, the TIC and the IDS, all of whom were subjected to criticism for their role in the tragedy.

A focus on these mid-level ranks is consistent with the argument raised earlier that high consequence decision-making is centred at that mid-point within the chain of command where the full complexity of the situation is encountered. In this case, that would clearly be the AAW TAO, and to a lesser extent the TIC; the captain's attention extended beyond the air picture to cover the surface engagement that was in full swing. General Crist's defence of the captain lends support to this view.

One might criticize the Captain for not devoting more attention to the air picture, but this would be judgmental. Captain Rogers believed the most immediate threat to his ship was the small boats and he could count on the advice of the AAW TAO to keep him informed.⁸²

The AAW TAO was 'the one officer upon whom Captain Rogers had placed his trust and confidence to evaluate the AAWC situation and provide accurate assessments and recommendations upon which to base an engagement decision'.⁸³

In contrast with his reluctance to be 'judgmental' of the captain, the general leaves no one in doubt as to his assessment of the AAW TAO. 'The performance of *Golf Whiskey* leaves room for question'.⁸⁴

But is this fair? And is it helpful, from the perspective of minimising the risk of such an error being repeated? Would another officer being placed in the same position as *Golf Whiskey* have prevented catastrophe? Any other officer? Or perhaps just some? If so, what percentage of US Navy officers at that rank? The Fogarty report's emphasis on combat stress and psychology suggests the solution

might lie in the proper selection of suitable personnel for high-stress roles inside a CIC. This is directly stated in his recommendation that

the Chief of Naval Operations (CNO) direct further study be undertaken into the stress factors impacting on personnel in modern warships with highly sophisticated command, control, communications and intelligence systems, such as AEGIS. This study should also address the possibility of establishing a psychological profile for personnel who must function in this environment.⁸⁵

Like stress training, proper personnel selection processes are clearly a good idea, as is the notion that these should include a psychological component.

From an HCD point of view, however, these proposals are extremely limited. First and foremost, this is because their understanding of the problem is far too narrow and is focused exclusively on the actions taken during the brief period IR655 was airborne. What this narrow focus fails to take into account is the very large number of decisions taken outside of this short window that contributed directly to the outcome. The time frame for these wider decisions ranges from hours earlier, to days, weeks, months, and if we include the US Navy's senior command response to the USS *Stark* incident, one whole year before.

This is not a long bow to draw. The changes made to the rules of engagement (ROE) for US warships in the Gulf following the attack on the USS *Stark*, the commander's statement of intent that accompanied these amendments and the treatment delivered to the *Stark*'s Captain Brindel, his career coming to an abrupt end, all served to send a strong signal to US Navy commanders. This said, in effect, 'above all, avoid the fate of the *Stark*'. This context played a pivotal role in shaping the captain of the *Vincennes*' decision-making when it came to IR655, as it was intended to do.

This is acknowledged openly by Admiral Crowe.

As a result of the STARK incident, our commanders were given a revised set of ROE which clarified their authority to take positive protective measures when hostile intent was manifested. It was emphasized that they do not have to be shot at before responding and that they have an unambiguous responsibility to protect their units and people.⁸⁶

In a statement to House of Representatives Armed Services Committee, the admiral left no room for doubt on this score and along the way gave a clear insight into the thought processes and motivation of Captain Rogers on 3 July 1988.

The US ROE strongly emphasized that each commanding officer's first responsibility was to the safety of his ship and crew. If he was to err, it was to be on the side of protecting his people. In this day and age of supersonic missiles, our warships cannot be expected to

take the first shot before reacting. It's a heavy burden but ships' captains are expected to make forehanded judgments, and if they genuinely believe they are under threat, to act aggressively.⁸⁷

The point this demonstrates is that a key element in the decision-making processes inside the CIC had been determined, not in the seven minutes following IR655's take off from Bandar Abbas, but a full year in advance. It is here, for example, that an explanation can be found in the otherwise seemingly cavalier dismissal by Captain Rogers of the combat information officer's warning, 'possible comair' just one minute before missile launch. The captain had understood perfectly, and was carrying out, **his** senior commander's intent.

The significance of this cannot be overstated. By shifting our perspective beyond the narrow frame set between 0947 and 0954 in time, and inside the CIC in space, we unleash a whole new world of possibilities for understanding the contributing factors that led to IR655 being shot down, and above all, for preventing a repeat. From an HCD perspective, this is the decisive move, because unlike the Fogarty Investigation, our aim is not to assign, or avoid, blame. Instead, it is to discover, and then mobilise, every possible opportunity for minimising the risk of catastrophic error.

The great advantage of this approach is that 'time compression' is no longer a factor. The aftermath of the USS *Stark* incident, which was a response to one kind of catastrophic outcome, created conditions that significantly increased the likelihood of a second, different kind of catastrophe. However, and this is the key point, a full twelve months existed to manage this newly created catastrophic risk. It is the opportunity created by this larger time frame that is of most interest to HCD.

In the event, this opportunity went to waste, and catastrophe struck. But our purpose is again not to pass judgment, but to learn. The response of senior US Navy commanders to the *Stark* incident increased the risk that a commercial airliner would be shot down in error, but this is not a criticism; it is merely a statement. Still less is it an argument against the decision to change the ROE or send a signal to ships' captains that amounted to 'if in doubt, shoot first and ask questions later'. In fact, as will be developed later, this kind of clear statement of commander's intent is precisely what HCD will advocate as the way leaders should behave in situations with a potential for catastrophic error. Risks of this nature are simply part of military operations, and at times, an aggressive stance is exactly what is called for.

HCD, in other words, accepts catastrophic risk as a reality that cannot be eliminated from military action. But to accept is not to ignore. Instead, HCD adopts as its guiding motive, the desire to mobilise every possible avenue to minimise this risk. This is a crucial difference; it sets in motion a very different, and much more comprehensive, approach to high consequence decision-making.

Setting the Crew up for Failure

The limitations of the more narrow approach can be seen in a USAF study that tested the tactical decision skills of F-15 pilots when faced with a difficult combat scenario involving the defence of an airfield under attack by bombers with a fighter escort. The purpose of the research was to account for 'differences in observed mission performance among skilled fighter pilots'⁸⁸ and was successful in that respect, for reasons we will explore further. However, the study is also of interest in another respect.

First, even the top pilots in the sample performed poorly at times... of the six categories, weapon employment decisions clearly produced the highest number of 'poor performance' comments... usually such comments focused on the failure to employ weapons, that is, to take a shot... Thus it would appear that weapons employment decisions may be more problematic than 'building the big picture'⁸⁹

'Weapon employment decisions' are precisely the kind of 'either/or', 'go/no go' split-second choices that almost all military action comes down to at some point or another. The problem, however, lies in the unpredictable nature of this kind of combat, when this is linked to a potentially catastrophic outcome—in other words, when the stakes are raised in the kind of incident typified by the USS *Stark* incident or the shooting down of IR655. This is the significance of the USAF study, for if even the 'top pilots' cannot deliver consistent results, then surely it is not realistic to expect anything other than catastrophes to take place sooner or later if high consequence decision-making is of this 'either/or' nature, if it is reduced to 'weapon employment decisions'.

The key to success is to target and destroy the bombers prior to 15 nm and then target the fighters. If the ranges become so close that all four threats must be dealt with simultaneously, then the mission is likely to fail.⁹⁰ In other words, 'don't be there'; don't set your crew up for failure.

This is why the criticisms of the AAW TAO, the TIC, and the IDS are not fair, from an HCD perspective. All the evidence points to the fact, that if CIC personnel are placed in this position repeatedly, then it is a statistical certainty that a catastrophic error will take place, sooner or later, just as it did on 3 July 1988. Or to borrow from the safety management literature, it is an 'accident waiting to happen'.

The USAF study supports this conclusion. In fact, its purpose was precisely to lend a scientific foundation to the hypothesis that situational awareness and not 'either/or' weapon employment

decisions was the key to combat success even in the highly tactical scenarios thrown at the F-15 pilots. This is a finding that will go to the core of HCD's approach to the problem. 'In the sample scenario, the key to success is to target and destroy the bombers prior to 15 nm and then target the fighters. If the ranges become so close that all four threats must be dealt with simultaneously, then the mission is likely to fail.'⁹¹ In other words, 'don't be there'; don't set your crew up for failure.

This sounds trivial, but it is anything but. For the same logic applies to the challenge faced by the identification supervisor on the *Vincennes*, as he sought to locate, process and assess the ambiguous information surrounding commercial aircraft movements, while receiving a military Mode II IFF on his display, monitoring the interactions with the Iranian P-3 and as the USS *Sides* lit up track number 4474 with its fire control radar. 'If all four have to be dealt with simultaneously, the mission is likely to fail'.

The point becomes clearer when we step back and consider whether the identification supervisor needed to be placed in such a position, in the middle of an intense surface engagement, at high speed, with guns firing and drastic ship manoeuvres. Was it really the case, that the information management problem of determining the identity and intent of a departure from Bandar Abbas, could only be confronted once a radar contact appeared on a screen within the CIC of a ship located a mere 47 nm from the relevant airport? Could this not have been addressed earlier?

To ask the question is to answer it. Bandar Abbas was the only joint military-civil use airport in the area of operations (AO). It was thus the only location from where confusion could arise over whether a departing aircraft was civilian or military, with all the potentially catastrophic consequences that could follow from a misidentification. This was not a problem that suddenly presented itself at 0947, although it was exactly that from the IDS' perspective. This was a situation that existed throughout the entire period US warships were deployed to the Gulf and IR655 made its routine run to Dubai every Tuesday and Sunday morning. It is from this point of view that the decision-making processes on the *Vincennes* need to be assessed, and a wider perspective adopted.

The Warnings Issue—a Question of Interpretation

An important consideration in the decision to launch missiles lay in the failure of IR655 to respond to warnings issued over both military and civil aeronautical distress frequencies. This was interpreted by the ships' crews as a sign of hostile intent. After all, why would an innocent civilian airline piloted by experienced crew fully aware they were flying over a war zone, not monitor the designated distress frequency and reply promptly in order to avoid being blown out of the sky? The logic behind the captain's decision to shoot is compelling.

Unfortunately, this logic was flawed, catastrophically so. The expectation that an Iranian civilian flight taking off from Bandar Abbas would identify itself on either frequency was not realistic. There were several reasons for this, all of which pre-existed the flight and were entirely foreseeable.

The US had issued two Notices to Airmen (NOTAMs)—one in 1984 and a second in 1987, to warn commercial aviation of the presence of US warships in the Gulf and to serve as a guide on how to avoid being misidentified as a military aircraft with hostile intent. Both NOTAMs in effect declared a defensive zone around US ships of 5 nm and 2000 ft. The later NOTAM also gave notice that unknown aircraft would be challenged to identify themselves and called for constant monitoring of the military and civil distress frequencies to facilitate this.

The problem was that Iran contested the legality of the NOTAMs. The various Gulf states already had existing procedures in place that applied to commercial air traffic in the region, and these were endorsed by the International Civil Aviation Organization (ICAO). The NOTAMs on the other hand, lacked this stamp of approval and, in fact, were later criticised by the ICAO for the vagueness in their wording.⁹² This meant that it was unclear what instructions Iran Air pilots had been given in relation to the NOTAMs, or even whether they had been distributed inside Iran. Furthermore, as civilian airliners do not generally fly at 2000 ft, it is unlikely that commercial pilots would have considered their provisions to be very relevant. And in fact, of the 150 challenges issued by US warships in the month leading up to 2 July 1988, only two were to commercial aircraft.⁹³ According to *Flight International*, the international aeronautical distress (IAD) frequency was not taken that seriously by pilots, often being used as a 'chat' channel. Later on 3 July, in the Persian Gulf, 'an open microphone was placed in front of a commercial radio and was for some time broadcasting Wimbledon tennis match commentaries on 121.5'.⁹⁴

IR655 did not have the listening capacity for 243 MHz, the military distress frequency. It is not known whether their radio was tuned into the IAD frequency of 121.5 MHz. It is possible that it was, but the warning messages may have been inaudible. What is known is that during its brief flight, the IR655 cockpit maintained a constant dialogue with Bandar Abbas Tower, as was normal for commercial pilots following take off. But even if the crew had heard the warnings being issued over the IAD, it is not obvious that they would have realised these were directed at IR655. This was due to the wording,

British airline pilots have told Flight that radio interrogation in the Gulf by US warships is confusing. Typically, US warships will say 'Aircraft at 20,000 ft, range 15 n.m., bearing 310°; this is US warship...; state your nationality and intentions'. This is ambiguous, as the aircraft being asked does not know where the ship is, and so may not realise the message is addressed to him."⁹⁵

In IR655's case, the difficulty was compounded by errors in the speed and altitude given as identifiers. Not only this, but the crew would not have been aware of the surface engagement going on below, or that they were flying over a 'war zone'. During the Iran-Iraq War, the northern Gulf area was

considered a war zone and civilian aircraft generally avoided this area. However, this did not apply to the southern Gulf, and air route Amber-49 between Bandar Abbas and Dubai was a busy, regular commercial route. Iran had its own warning system, called 'Red Alert', which was mainly directed against attacks on civilian aircraft and ground facilities by Iraq, in the north. Exactly whether its procedures covered the type of ship-on-ship exchange taking place between the USS *Vincennes*, *Montgomery* and the Pasdaran gunboats, or how quickly it was capable of notifying civilian air traffic control, is unknown. However, it was always unlikely Bandar Abbas Tower would have been issued a Red Alert on 3 July in time to notify IR655.

The decision-making process within the CIC, therefore, was set up in advance by the presence or absence of a realistic appreciation of the situation as it applied to warnings. Situational awareness, in other words, was the critical component.

All of these considerations formed part of the general situation that applied to US military forces operating in the Gulf throughout 1987 and 1988. An awareness of these, and an understanding of their significance, was essential for the correct interpretation of IR655's failure to respond to the 11 warnings given over the civil and military distress frequencies. The decision-making process within the CIC, therefore, was set up in advance by the presence or absence of a realistic appreciation of the situation as it applied to warnings. Situational awareness, in other words, was the critical component.

A proper appreciation of the situation would not only have affected decision-making during those intense minutes that IR655 was airborne, it would have radically altered the situation inside the CIC itself; it would have created a 'don't be there' effect. The USS *Vincennes* may still have been at exactly the same location, in the middle of a surface engagement with Iranian gunboats, but the decision-making challenge posed by the appearance of TN 4474 at 0947 would have been entirely different. This is worth laying out in detail.

Solely taking into account the points discussed so far, and these cover only one part of the picture, genuine situational awareness would have included the recognition of the following points.

Genuine Situational Awareness	
1	The changes to the ROE had generated an increased risk of accidentally shooting down a commercial airliner, and steps needed to be taken in order to counter this risk. This would require the development of special procedures and contingency plans.
2	Bandar Abbas, as a joint-user airport, presented a challenge, air route Amber-49 in particular. US warships should be aware of their own position in relation to this route at all times, and avoid the centreline if possible.
3	For a ship in the vicinity of the Straights of Hormuz, an aircraft departing from Bandar Abbas could be inside the ship's defensive perimeter within minutes. If the determination of an aircraft's identity depended on actions taken during this small window, a high probability of error existed. Resources and planning were necessary to avoid this scenario.
4	If a warship found itself inside Iran's 12 nm territorial waters, and so even closer to Bandar Abbas, it was likely that this was because it was in the middle of a surface engagement. Additional resources and decision-making support should be on hand for this contingency.
5	If the USS <i>Vincennes</i> was the ship, then this would be its first combat engagement and the first use of the AEGIS combat information system in actual combat. Performance of both the crew and the system under these circumstances would be unpredictable but almost certainly include mistakes and errors.
6	Under these highly stressed conditions, any attempt by an operator to confirm the identity of an aircraft departure from Bandar Abbas by consulting commercial schedules was likely to end in failure. Other means of achieving this task should be set in place.
7	The failure of a track to respond to warnings would have an entirely ambiguous meaning—it could be a commercial flight or a hostile military aircraft. No store should be given to this when making a decision as to its identity or intent.

Table 2-1: Indicators of Situational Awareness in the Iran Air Incident

As is not hard to see, this kind of situational awareness can have a profound influence over the extent of the challenge posed when faced with decisions that carry the potential for a catastrophic outcome. It allows foresight and planning to alleviate the impact of time compression. It identifies those points where the risk of error is highest, so that steps can be taken to minimise this. This is the benefit of adopting a perspective that goes beyond the immediate context of a ‘go/no go’ decision.

Awareness of One’s Own Situation—Anticipating Critical Vulnerabilities

Situational awareness of this nature also includes awareness of one’s own situation. This goes beyond the categories of capabilities and disposition, where you are and what you can do, to incorporate motivation, goals and desires—all of which can govern behaviours and performance. Self-awareness in this sense, both at an individual and organisational level, opens up the opportunity to anticipate the circumstances where critical vulnerabilities are likely to appear and take counter-measures.

An example of this is the pre-occupation of Captain Rogers with the surface engagement involving the Iranian gunboats, while key members of his CIC team grappled with the task of assessing the threat posed by the aircraft which had just departed from Bandar Abbas. In his own account of the incident, the captain sought to shoulder the bulk of the responsibility for the tragedy by giving the impression he was fully in control throughout all the key developments that took place inside the CIC.⁹⁶ The Fogarty report, on the other hand, paints a different picture.

The Commanding Officer’s attention which was devoted to the ongoing surface engagement against IRGC forces (the “wolf closest to the sled”), left very little time for him to personally verify information provided to him by his CIC team in which he had great confidence.⁹⁷

The surface engagement had a significance and a purpose that lay beyond any immediate threat posed by the Iranian gunboats. These posed little danger to the *Vincennes* or the USS *Elmer Montgomery*⁹⁸, even in the event of a deliberate head on collision, but there had been no precedent to suggest an attack of this type. Nor were any merchant ships in the immediate area, which was inside Iranian territorial waters. The action was initiated at 0939 when the USS *Vincennes* reported to Commander Joint Task Force Middle East (CJTFME) that the ship was under attack and received permission to open fire. According to a study of the data by USMC Lieutenant Colonel David Evans, it was at this point that the Iranian vessels sprang into motion and turned towards the *Vincennes* at high speed, letting off small arms fire at maximum range.⁹⁹

The captain’s action in opening fire was consistent with his behaviour throughout the entire morning. The *Vincennes* was, in fact, under orders to proceed away from the area and return to Bahrain.¹⁰⁰ It had been instructed to launch its helicopter in order to reconnoitre the vicinity of the gunboats. The ROE for reconnaissance missions by helicopter stated it should approach no closer than 4 nm, but for reasons unknown, the *Vincennes*’ helicopter came within 2 nm of the Iranian boats, who then fired

at it, without effect. The helicopter then withdrew to safety. The *Vincennes*, however, now opened up to full engines and headed directly towards the gunboats.

The *Vincennes* had acted in this manner before; its nickname among members of the US fleet in the Gulf was 'Robocruiser'. For some this was meant as a compliment¹⁰¹, but it also reflected disagreements at command level as to the nature of its mission. These came out in the open during an incident on 2 June. In this case, an Iranian frigate, *Alborz*, had stopped and boarded a bulk carrier the *Vevy*. Under international shipping law, this is a legal act, allowed to prevent war supplies reaching an opponent during a time of war.¹⁰² Captains Hattan and Carlson, successively in command of the USS *Sides* during June and July 1988, describe the *Vincennes*' actions,

Rogers wanted me to fall astern of the Iranian frigate by about 1,500 yards. I came up on the radio circuit and protested the order from the *Vincennes*. I felt that falling in behind the Iranian would inflame the situation... 'Hattan was very concerned that Rogers was going to spook the Iranian skipper into doing something stupid... The higher headquarters at Bahrain... agreed and detached the *Sides* from the *Vincennes*' control and, in addition, ordered the cruiser to back off and simply observe the Iranian warship's activities.¹⁰³

An officer on the *Vincennes*, however, interpreted the same events very differently.

The restraint we showed in early June during an incident where an Iranian frigate stopped, boarded, searched, and interned a Cypriot merchant vessel. Under the rules of engagement, we would have been permitted to fire upon the frigate, and we were ready to do so, had the request to stop the internment come from the Cypriot government.¹⁰⁴

Clearly a Very Different Perspective.

Carlson understood the US mission to be, 'to reduce tension where possible, to show by our presence that we were resolved to protect US interests, and to demonstrate prejudice against any unnecessary conflict'. By contrast, his impression of the *Vincennes* was that, 'an atmosphere of restraint was not her strong suit. Her actions appeared to be consistently aggressive.'¹⁰⁵

The motivation behind this 'aggression' did not only stem from a different understanding of their mission in the Gulf, and interpretation of the ROE. It also flowed from a desire to test the state-of-the-art AEGIS combat information system for the first time in real combat.

The motivation behind this ‘aggression’ did not only stem from a different understanding of their mission in the Gulf, and interpretation of the ROE. It also flowed from a desire to test the state-of-the-art AEGIS combat information system for the first time in real combat. The decision to deploy the USS *Vincennes* to the Gulf was controversial on strategic and tactical grounds.¹⁰⁶ Carlson argues, ‘My guess was that the crew of the *Vincennes* felt a need to prove the viability of Aegis in the Persian Gulf, and that they hankered for an opportunity to show their stuff.’¹⁰⁷ Lieutenant Commander Agresti, an officer on the *Vincennes*, lends support to this idea. ‘Certainly there was a lot of professional jealousy and animosity in the Navy over AEGIS—the new kid on the block—at the time, and secretly, I believe that many wanted it to fail.’¹⁰⁸

This helps explain the helicopter’s behaviour and *Vincennes* instant response to the helicopter coming under fire. The opportunity to engage 13 gunboats simultaneously and put AEGIS through its first real test of fire was too good to miss. And this did involve a genuine challenge, not because the small craft posed any real threat to the ship, but because AEGIS was designed for open water engagements against a conventional naval opponent, not fast moving boats in a littoral environment. ‘The Iranian launches were so small that as they bobbed on the swell, they flickered in and out of the *Vincennes*’s surface search radar, showing up not as separate targets but as a single symbol on the radar screen.’¹⁰⁹ The *Vincennes* fired 72 x 5-inch rounds at the boats, the USS *Elmer Montgomery* fired a further 47, only one hit, although claims were later made that up to five boats were sunk.¹¹⁰

It is no surprise therefore, that the *Vincennes*’ captain was preoccupied with the surface engagement. At the same time, a hit on one of the Iranian gunboats would have complicated the air picture, as both the P-3’s turn towards the *Vincennes* and the appearance of IR655 taking off from Bandar Abbas could have signalled the launch of a search-and-rescue effort.

All of these factors contributed to a position where the capacity of both captain and crew on board the USS *Vincennes* to handle the air picture was seriously degraded, at that exact moment when the challenge presented by IR655 appeared. However, none of these elements that made up the ship’s ‘own situation’ at this critical point were created by the airliner’s take off on route Amber-49. All of them **pre-existed** the air engagement that was to follow, some by minutes and hours, others by weeks and months.

The importance of this lies in the fact that the opportunity was there to **manage** these factors in order to reduce the risk of catastrophic error. The desire of the crew to prove their and the AEGIS system’s worth, to answer their critics, would have predated their arrival in the region. How this shaped their behaviour in action was in plain sight from 2 June on. The challenge that would be involved in using AEGIS to engage Iranian gunboats close to the shore, among dozens of islands, close to the Straights of Hormuz and underneath a major commercial airline route, was simply part of the operational context that confronted the *Vincennes*, on every day of her tour of duty.

Creating Options—Moving the Goal Posts

These were management problems and responsibility for dealing with them lay with the higher command function. The Commander JTFME had the resources at his disposal to reduce any risk of catastrophic error that might arise in the event of the *Vincennes* being drawn into a major surface engagement. This included having air assets on hand that could make a visual identification of any departures from Bandar Abbas.

As Fogarty recognised in his report, ‘Visual identification (VID) is the only positive means to distinguish friendly or commercial aircraft from potentially hostile aircraft’.¹¹¹ For this reason it was common practice to use the fast jets based on the carrier group deployed to the region for air support. An incident where this occurred on 18 April 1988 was outlined in a report.

Rear Admiral Zeller, Commander of the USS *Enterprise*, recalled, ‘We received a report that there was an F-4 taking off from Bandar Abbas airfield. Minutes later we noticed an aircraft proceeding from Bandar Abbas toward an area where several of our ships were gathered and we thought maybe it was the F-4. Not knowing one way or another we cleared a section of F-14s in on this target’... Although the F-14s were more than capable of shooting down any suspicious plane from beyond visual range, Zeller gave instructions that the pilots were to visually identify the enemy plane before engaging it. ‘As the *Enterprise* planes neared the area, they saw the contact was not an F-4, rather it was an Airbus A-300, a civilian passenger plane. So they broke off the contact’... Admiral Zeller explained. Air corridors blanket the Gulf and Navy personnel recognized the possible dangers of shooting a civilian plane.’¹¹²

In relation to 3 July, Rear Admiral Fogarty stated, ‘Visual identification of the aircraft was not feasible due to the lack of combat air patrol’.¹¹³ Captain Rogers ruled out the possibility of a VID for lack of time, and certainly by the time the CIC had arrived at a determination that TN 4131 was a hostile F-14, less than 4 minutes remained before the aircraft would be inside the ship’s missiles’ minimum range and could not be shot down.

But once again, this is too narrow a perspective to adopt. In fact, US fast jets **were** available for a VID. Two F-14s were standing by just five minutes flying time away¹¹⁴, for precisely this type of contingency. What was required was an appreciation of the limited capacity on board the USS *Vincennes* to respond effectively to a departure from Bandar Abbas once it had engaged with the gunboats and make up for this deficiency by deploying additional resources. The USS *Forrestal* had dispatched the aircraft in anticipation of just such a need, the USS *John Hancock* was also monitoring the engagement closely, as was CJTFME and his staff on board the USS *Coronado*.

In other words, the decision-making authority was present to make an additional option open to the USS *Vincennes*, the chance to obtain a VID, should an unknown track enter the ship’s air picture during that critical period. When interviewed by Admiral Crowe, the air group commander aboard

Forrestal ‘did not know if Vincennes was fully aware of the F-14’s location or availability’.¹¹⁵ If so, then Captain Rogers lacked the information necessary to consider a VID as a viable possibility. This was a communication failure not a decision-making error.

In Admiral Crowe’s opinion, a VID was not possible. But his formulation of the problem reinforces HCD’s central argument, that this was a ‘don’t be there’ situation. The admiral stated, ‘The threat became apparent to the Vincennes around 0950 local, less than five minutes before the shootdown. At that time the F-14s were 58 miles away flying at 390 knots. In his view to close and identify the Airbus in 5 minutes would have been virtually impossible even if the communication and deconfliction problems could have been resolved.’¹¹⁶ In other words, the failure to set in place command and control, and battlespace control arrangements in advance was the real problem. This was after all why the F-14s had been hanging back at such a distance from the *Vincennes*’ AO.¹¹⁷ According to Crowe, this was Rear Admiral Fogarty’s position too. ‘In his view, the air control, deconfliction and communication practicalities prevented a quick response.’¹¹⁸

Senior commanders had other resources on hand, too. One of these was the signals intelligence (SIGINT) capability to monitor Iranian radio traffic. For the most part, this was focused on military communications, as would be expected. Nevertheless, the allocation of intelligence assets is simply a matter of determining information priorities, against collection capacity. A major shortcoming on board the USS *Vincennes* was a lack of VHF radios inside the CIC that could monitor air traffic control radio chatter. This was corrected following the incident.¹¹⁹ Monitoring air traffic control communications is standard procedure in order to create good situational awareness of commercial air movements and is widely favoured over the use of the IAD frequency to interrogate unidentified aircraft. The US was criticised in the ICAO Report for its failure to follow this practice in the Gulf.¹²⁰ The ability to listen in to tower communications at Bandar Abbas would have alerted the CIC to the presence of IR655 at 0634, 20 minutes before the shoot down, when the pilot first asked for taxi and take off clearance.¹²¹

The task force as a whole was also in a good position to know the commercial airline schedules for route Amber-49, to be fully aware that IR655 had not yet departed and therefore was likely to do so shortly. With both the US Ships *Coronado* and *John Hancock* anchored quietly in port at Bahrain, these were well placed to develop this important element of situational awareness and assist the *Vincennes* with this information. Following the take off of IR655, they could also have contacted Bandar Abbas directly, by radio or telephone, to clarify the fact that it was IR655 which had just departed and pass on the warnings being sent over the IAD so that the tower could alert the cockpit.

This is why situational awareness is so pivotal for high consequence decision-making. A sound understanding of the situation, including one’s own, allows for the creation of additional resources and options that ease the difficulty of decisions during critical moments, and so reduce the likelihood of a catastrophic error.

The USS *Vincennes* was part of a larger organisation, JTFME, and it operated in a context where the risk of accidentally shooting down a civilian airliner was understood to be an everyday hazard. There was no reason why the *Vincennes* CIC needed to be placed in such a position where it was left on its own, under the stress of combat, working with unproven technology, to make a life or death call over TN 4131 in the space of four minutes.

Team Processes—Defining the Performance Requirements

The strength of this argument is demonstrated by a single fact—that the USS *Sides*, under the tactical control of the *Vincennes*, **did correctly identify IR655** and yet was unable to influence the decision-making process that took place inside the *Vincennes* CIC. It is possible to argue, therefore, as with the VID option, that the real cause of the tragedy was not a mistaken decision at all, but a failure of team functioning.

The TADMUS project recognised this and devoted a large amount of attention to the problem of team processes and the role these had played in the incident. The TADMUS research uncovered seven key elements that define the performance requirements of teams in high-stress, combat conditions. This work is one of the most important legacies of TADMUS today. At the same time, however, it is important again to widen our perspective. TADMUS concentrated its focus on the team interactions that took place within the CIC, but this was not the only team in play during the incident. The same challenge of developing effective team processes applied at a ship-to-ship level, between those whose task it was to build an overall shared appreciation of the situation, the dangers it contained and apply all available resources to manage those risks.

A flavour of the information flows within this team was given by Captain Rogers, when he recounted, ‘When an attempt by the *Sides*’ air tracker to get the TAO’s attention was made, he was told to “Shut up, you’re making too much noise”.¹²⁰

One of the key elements identified by TADMUS covers information management and exchange within a team, the necessity to get relevant information to the team member who requires it to make a decision, in good time. In this case, the knowledge that TN 4131 was a commercial airliner was held within the team, by members of the USS *Sides* CIC, but the team’s mode of functioning did not allow this information to reach the member who needed it, the captain of the *Vincennes*. The USS *Forrestal* CIC, observing developments through Link-11, had also arrived at the same assessment of the track. A flavour of the information flows within this team was given by Captain Rogers, when he recounted, ‘When an attempt by the *Sides*’ air tracker to get the TAO’s attention was made, he was told to “Shut up, you’re making too much noise”.¹²²

Poor information management and communication flows between the key officers on the various ships directly and indirectly involved in the engagement, meant that these did not function as an effective team during the incident. But as the TADMUS research confirmed, it was not realistic to expect otherwise at that moment. Team formation is a protracted process; it takes time and also requires both a supportive organisational culture and leadership commitment. The captains of the *Vincennes*, *Sides*, *Elmer Montgomery*, the JTFME staff officers and the commanders on the *Forrestal* were all strong personalities. Between them lay important disagreements as to their mission in the Gulf and their understanding of the ROE. These in part reflected differences in temperament, with the most obvious being between Rogers and Carlson.

In Navy culture, a captain is used to being in charge, making the key decisions and taking personal responsibility for the ship's performance. In this regard, there was nothing to separate the captains of the *Vincennes* or the *Sides*. Both felt deeply responsible for what happened with IR655; neither sought to downplay their role in the tragedy. Ship's commanders, in other words, are not usually measured by their ability to act as team players.

The situation, on the other hand, called for critical team processes to be in place and functioning. Communication and information flows are essential for building a common operating picture or shared assessment of the situation, including one's own position. This in turn facilitates both sound decision-making and coordinated action. To build this kind of effective team functioning required a deliberate effort and time to overcome the obstacles standing in the way. In this incident, the obstacles were in the shape of US Navy culture, the captains' individual personalities, their personal motivations and their outstanding disagreements over the nature of their mission and the ROE.

The USS *Sides* was placed under tactical command of the *Vincennes* at 0951, while the surface engagement was already well underway and after IR655 had taken off. There was no possibility at that point of creating the kind of processes TADMUS was able to identify as essential for high performance teams operating under combat conditions. Nor would it be reasonable to expect either Captains Rogers or Carlson to drive such a process, to strive to overcome their differences and weld together their crews as an effective tactical decision-making team. Following the 2 June incident, the personal antagonism between the two was obvious for anyone to see, including the senior command element.

The task of working with this situation and improving the position was a **leadership** responsibility. Recognition of the inadequacies of information flows, communication, the sharing of situational assessment, the coordination of resources and the actions needed to overcome these deficiencies was a task for the senior leaders of the fleet and the Commander JTFME, throughout the period of their deployment in the Gulf. One of the key elements in effective team processes is the concept of 'mutual assistance'—team members coming to each other's aid when this is called for.

But as the TADMUS research highlighted, the issue here is above all a cultural one. The challenge is to create a team culture where first of all, a member who is in trouble is comfortable asking for help. The member will not seek to hide a situation where they are either uncomfortable, anxious, fearful, stressed, overwhelmed, under-trained or unprepared to cope with, because they have confidence their team mates will respond positively to such a request. This means egos have to be managed, individual interests subordinated to the demands of the situation and a successful team outcome. It also involves team members monitoring each others' performance, in a supportive manner, and recognising when another member is in trouble, even if they don't speak up. For this to happen, teams need to have built up a good picture of the strengths and weaknesses of their members, their level of experience, competence and motivation, under a variety of conditions. This is possible only after a period of team formation, where these qualities are brought out into the open and a climate of trust and reinforcement built up.

Creating a team culture where 'mutual assistance' takes place, is first and foremost a leadership task, it is **the** challenge before the team leader.

Another feature of high performing teams is the ability to locate and relocate the hub of decision-making as a fluid and dynamic situation unfolds. This is a theme of the literature examining high reliability organisations, and in the management of complex emergencies involving multiple agencies. The best vantage point, and also the best people, to assess the situation and drive decisions changes constantly in the course of an incident and the challenge is to delegate authority appropriately so that the right individual and organisational expertise is applied at any point in time. This means command arrangements often reverse, subordinates take the place of commanders and vice versa. This also requires a culture of trust and mutual respect, and a 'deference to expertise'.¹²³

It is not hard to see how these principles could be applied to the situation as it evolved on 3 July 1988, had an effective ship-to-ship leadership team already been formed during the period running up to the tragedy. Some of the elements were in place, such as the decision by the USS *Forrestal* to send F-14s to the area, 'just in case'. Likewise, Captain McKenna on the USS *John Hancock*, and Admiral Less, Commander JTFME on board the USS *Coronado*, both gave their full attention to the engagement as it unfolded, ready to assist in whatever way they could.

However, in the event, all of these commanders drew back and decided the best thing they could do was to give the captain of the *Vincennes* the latitude to handle the situation as he saw fit. Typical was the commander of the *Forrestal*, who had earlier given the order to launch F-14s to provide air support. 'Aboard the carrier, Admiral Smith held them off. His staff was telling him that the blip was most likely a commercial airliner. Smith stuck to the navy rule that the captain on the spot makes the decisions. He decided to let Rogers fight his own battle.'¹²⁴

The group as a whole had the resources to seek other means to verify the aircraft, ranging from a visual ID, an independent check of the airline schedules, access to signals intelligence, the possibility of direct contact with Bandar Abbas Tower. None of these options were available to the *Vincennes* under the circumstances.

This was consistent with Navy culture, but not with the high performing team principle of ‘mutual assistance’, or ‘deference to expertise’, as it was precisely at this point that the *Vincennes*’ captain was least able to cope with the challenge posed by TN 4474. It meant that responsibility for the air picture remained with the USS *Vincennes*, and even though Captain Rogers’ attention was fully absorbed by the demands of the surface engagement, it did not occur to him to ask for help with the challenge posed by the unidentified departure from Bandar Abbas or to consider delegating this responsibility to a team member on another ship. Meanwhile, the captain of the USS *Sides* was tracking the aircraft and had already arrived at an assessment of its identity and intent that was in fact the correct one. It was here that the ‘expertise’ lay.

The *Sides* CIC was also in a position to consult with the *Forrestal* and Commander JTFME to consider their perspectives on the track. As discussed, the group as a whole had the resources to seek other means to verify the aircraft, ranging from a visual ID, an independent check of the airline schedules, access to signals intelligence, the possibility of direct contact with Bandar Abbas Tower. None of these options were available to the *Vincennes* under the circumstances.

Commander JTFME also had the authority to step in and deliver assistance, even if this wasn’t requested, to take on a team leadership role that took into account the difficulties of the situation inside the *Vincennes* CIC at that crucial point. For example, it became clear from the Fogarty investigation that there was confusion over exactly where the centreline of route Amber-49 was, and whether IR655’s track was off-centre or not. At one stage, there was an estimate that the aircraft was 3–4 miles off the air route, but this later turned out to be inaccurate.¹²⁵ This was one of the considerations that supported the judgment that TN 4131 was not a commercial aircraft. Even though the USS *Coronado* was not linked to the AEGIS system on board the *Vincennes* and could not access its display screens, there was certainly scope for the group of commanders to set their staff to work on this problem and seek clarification, given the stakes involved.

Drawing on wider resources in this way might have lead to other options being explored that were never considered. One of these was the possibility that the USS *Vincennes* steer a course at right angles to the centreline and see if the aircraft changed it’s bearing to follow the ship. The feasibility of this would have depended on the tactical and navigational position of the *Vincennes*, but in any

case it was never proposed, even though the ROE did stipulate active manoeuvring as one of the warning steps to be taken before opening fire.¹²⁶

The situation has parallels with the challenge faced by Site Superintendent Yoshida in Fukushima over the problem of venting Unit 2 on the morning of 15 March 2011 and the failure of TEPCO's Head Office to provide any meaningful decision support to the plant on this issue.

While people at the plant were making frantic attempts at venting by connecting automobile batteries to the vent system that had lost power due to the loss of the DC power supply, people at head office only repeated the orders for the implementation of the venting... The head office was expected to provide necessary technical advice to people at the accident site from a birds-eye perspective. In reality, however, the head office failed to provide any useful advice and instead only confused the venting operation, as people at head office misidentified the vent valve configuration... leaving the judgment about what to do entirely to people at the accident site.¹²⁷

Admiral Less, Commander JTFME, did not cause the *Vincennes* the same kind of headaches TEPCO Head Office did for Yoshida by seeking to meddle in the difficult decision-making processes taking place inside the CIC, and consciously so. However, the analogy does apply in the failure of the Commander JTFME to provide 'any useful advice' or put to use the advantages of the 'birds-eye perspective' available to the group of senior commanders observing the engagement from a distance. Harold Lee Wise describes the commander's contribution in these words,

In Bahrain, Admiral Less continued to monitor the developing situation. He expected *Vincennes* to soon resume the transit to Bahrain, but 'about that time that he (Rogers) starting talking about this airplane that was inbound. So, we started talking about it in the command center and then it all went extremely fast. They were coding it out as an F-14 and in a descent. I talked to them a couple of times and I told them we had no indications whatsoever on any of our channels, sensors, or anything else that there was an F-14 airborne'. Even with that data, Less left the final decision to Rogers.¹²⁸

That the admiral 'left' the decision is hardly surprising; the 'data' was useless from the perspective of the decision at hand, as it was purely negative. What was needed from Bahrain was a **positive** indication of what the aircraft might be—this would have been 'useful advice'. That information **was** available—it was in the hands of the USS *Sides* CIC and captain, but the absence of a functioning team environment to guide ship-to-ship information flows at commander level meant that Captain Rogers did not have access to it in time to influence his decision. The Commander JTFME's 'data' had no impact on the outcome whatsoever; the *Vincennes*' captain still had to 'fight his own battle', as did Yoshida his.

Captain Carlson, likewise, had no influence over the final decision either, in spite of his correct identification of TN 4131. This failure left him with a profound and lifelong sense of regret. He explained his actions later in a conversation with another ship's commander.

Dick Carlson... was very troubled by what had happened with the Vincennes. We had long talks about it. He didn't think it was an F-14. He had been on the ship maybe a month, and he was on a reserve FFG-7, the low end of the US Navy surface combatant ship inventory. He was sailing with the newest, highest technology surface combatant ship in the world, with a very experienced Captain, who was a senior O-6 and he was just an O-5 commander, and Carlson kept telling himself, he's got to know something I don't know. He was obviously troubled that night about, 'why didn't I say something'.¹²⁹

The commander of the USS *Sides* could have spoken to Commander JTFME, after failing to get his message through to the *Vincennes*, but bypassing the chain of command in such a manner would violate every rule of Navy culture, as it would in most militaries. Information flows were governed by the demands of hierarchy, not the situation, or the principles of high performance teams. Nor was this a case of 'deference to expertise', although it appeared to be so from Carlson's point of view, for in fact the *Vincennes* was the last place a decision over TN 4131 should have been located at that point. But this was not for the captain of the USS *Sides*, or even the *Vincennes*, to determine; it called for a 'birds-eye' view, a proper understanding of 'one's own' situation.

The Critical Role Played by the Intelligence Picture

The situation also called for a 'worm's eye' view, an awareness by the officers and crew of the *Vincennes*' CIC of the extent to which their captain could devote cognitive resources to the air picture and arrive at an independent assessment in relation to the unidentified track. Under the circumstances, this was minimal; the captain was most likely to follow the recommendations of his juniors, in whom he had confidence. CIC officers would also have been aware of the attack on the USS *Stark*, the intent behind the changes in ROE following that incident, and how this would have been uppermost in the captain's mind if there was a question of 'which side to err on'. In addition, they knew their captain personally and his temperament where 'restraint was not his long suit'.

In this situation, it was not the captain but his immediate subordinates who had the key role to play in making a decision about TN 4131. The TIC, in particular, knew the captain was distracted. He also knew that his commander would prefer anything over becoming another '*Stark*'. Therefore, once the TIC had made his own mind up that the track was an F-14, he did everything in his power to ensure that the captain was not side tracked from taking the appropriate action which was to launch missiles before it was too late.

This is why, from an HCD perspective, criticism of the TIC has to be balanced with an appreciation that, given 'the facts as he understood them', the TIC recognised that leadership was required from a junior level if the looming catastrophe—another *Stark*—was to be averted. The TIC stepped up to this mark. In HCD training, this is exactly what junior officers are encouraged to do—to understand the decision-making context and process of their commander and take responsibility on their own shoulders for meeting the demands of the situation. This is why the ASOC are singled out for their role in Operation *Anaconda*.

Looking at the scene inside the CIC from this angle, the TIC's actions can be seen in a different light. Rather than combat stress leading him to make a poor judgment call, and become increasingly hysterical as time went on, it was his assessment that the ship faced an imminent attack that was causing his stress level to rise, coupled with his correct appreciation that the captain was absorbed in the surface picture and would not take any action over the F-14 unless his attention was refocused, and quickly.

But the TIC was wrong in his assessment, and if his error cannot be attributed to combat-related stress, then what was its source? And why did the IDS first make the call 'Astro'; why did the OSDA put F-14 up on the ship's display screens without questioning it; why did the AAW TAO concur so readily? General Crist provides a clue when he says of *Golf Whiskey*, 'He admits his judgment was influenced by the July 4th intelligence warning'.¹³⁰

This warning was one part of an intelligence picture that specifically 'warned of the possibility of some kind of unusual assault on the 4th of July weekend'.¹³¹ Admiral Crowe gave a summary of the intelligence provided to the USS *Vincennes* crew,

For several months preceding the Air Bus shootdown, the US had received reports of Iranian efforts to improve their ability to attack US men-of-war. These have included attempts to outfit both aircraft and small boats for suicide assaults, to reconfigure F-4s, F-14s, and other types of aircraft to carry a variety of air-to-surface missiles, and to develop small boat 'swarm' tactics which could break through a ship's defensive perimeter... Of special interest was the recent shift of F-14s from Bushehr to Bandar Abbas. In the few days preceding this incident several F-14 flights, operating from Bandar Abbas, took place in the southern Gulf. On 2nd July, USS Halsey had to warn away a potentially threatening Iranian F-14.¹³²

The Fogarty report provided some details of the intelligence briefing given to the ship immediately prior to 3 July.

USS Vincennes was apprised of the general Iranian situation on 30 June and 1 July, specifically that because Iraq had extended its successes in the ground war to the NPG with a renewed air campaign against Iranian shipping and oil facilities, Iranian reaction should

be expected, ‘in the meantime, anticipate IRGC ship attacks in retaliation for Iraqi Air Force attacks on Iranian shuttle tankers’.¹³³

This came on top of earlier reports over the previous two weeks, addressing flight patterns, F-4 modifications, and the redeployment of F-14s.

The addition of the F-14s to the air order of battle at Bandar Abbas was perceived by CJTFME as a significant upgrade in Iranian air capability at Bandar Abbas... All units are cautioned to be on the alert for more aggressive behavior... Iran is clearly working hard to develop an anti-shipping capability as well, and innovative techniques of adapting air defense weapons systems for ASM purposes are continuing... The F-14 deployment represents an increased threat to allied aircraft.¹³⁴

Another piece of the picture was supplied by Fogarty when he referred back to the naval engagement that had taken place on 18 April, when, ‘Eleven F-4s scrambled during the day from Bandar Abbas. USS *Wainwright* launched missiles at one of the aircraft, damaging it when the aircraft failed to respond to repeated warnings and continued to close the ship.’¹³⁵ Admiral Crowe spelled out the significance of this reference, stating that the *Vincennes* ‘had every right to suspect that the contact was related to his engagement with the IRGC boats.’¹³⁶ Whether this was a reasonable suspicion is something we will examine below, as 18 April was the day of Operation *Praying Mantis*, the largest engagement of this entire period.

It was against this background that the warning over the 4 July weekend was set, ‘Special occasions, such as Moslem or American holidays, inevitably precipitated intelligence reports that the Iranians were preparing a particular operation directed at Americans.’¹³⁷ For the crew of the *Vincennes*, therefore, there was little room for doubt as to what an ‘unusual assault’ might look like. This was even spelt out in the ROE.

The most serious threat is that of terrorist/suicide attack. If such an attack occurs, it is most likely to happen from a craft (e.g. military cargo or surveillance aircraft, non-military boats or aircraft) which appears to be operating in a “normal” manner up to the point of attack. There is less danger of overt attack by Iranian or Iraqi naval ships and combatant military aircraft but that threat, too, is serious.¹³⁸

This intelligence picture tells a powerful story; it could not do anything except but make a strong impression on the members of the *Vincennes* CIC, as was its purpose.

It is at this point that the ideas of the naturalistic decision making (NDM) school are most helpful for reconstructing the decision-making processes that took place inside the CIC, and understanding why key players acted in the way they did. ‘According to this theory, people interpret a situation in which they find themselves by comparing it with similar, previously experienced situations.’¹³⁹ This

is known as 'recognition primed' or 'pattern recognition' and is an example of the kind of intuitive-style thinking that takes place under conditions of high stress. Expertise is intimately linked to the ability to recognise patterns in this way, and foresee the consequences of taking a certain course of action, or of doing nothing. This kind of decision-making cannot only be rapid, but even instant, and is highly effective in the right hands.

'Naturalistic decision making suggests that expertise happens over time on the basis of decision makers' experiences.'¹⁴⁰ But what happens when the decision makers have no experience to draw on? In a training environment, this is where analytical, step-by-step processes such as the military appreciation process (MAP) come into their own. They are designed to assist novices to work their way rationally through an unfamiliar problem and arrive at some kind of solution that can stand up under scrutiny. However, this takes time, and at least enough control over stress to be able to calmly follow the steps to a conclusion.

In reality, the task in front of the IDS was impossible; there was simply nothing to base a determination on ... There was only one source of relevant information available on which to arrive at an assessment of the track's identity and intent. This was the intelligence picture, and this was unambiguous—an attack was likely.

The *Vincennes* CIC did not have this kind of time available, and were operating under highly stressful circumstances; analytical processes were simply not feasible. At the same time, the crew lacked experience; it had no patterns in its memory to refer to. This was the ship and its AEGIS CIS' first real combat engagement; it was the first time it had to deal with a potentially hostile incoming track just minutes away. The *Vincennes* had been in the Gulf less than six weeks, and had spent most of this period on routine patrols without incident, aside from on 2 June.

When TN 4474 appeared on the IDS' console at 0947, the critical task was to determine this aircraft's intent. The track's ID was important too, but only as a step towards determining its intent. After all, IR655 could have been the victim of a hijacking and on a suicide mission—an unlikely possibility but not so far fetched. A dot on a radar screen does not provide much basis on which to determine intent; there is so little data to work with, speed, bearing, altitude. The problem is worse in that even this minimal information is completely ambiguous, especially if the 'most serious threat' comes from a 'craft' that appears to be 'operating in a normal manner'.

In fact, ambiguity was present at every turn. The IFF indicator returned a military Mode II as well as a civilian Mode III, and in any case, intelligence had reported Iranian Air Force aircraft to respond in Modes I, II, or III at different times.¹⁴¹ The commercial schedule was impossible to decipher. The P-3's behaviour was sending mixed signals; on the surface, the gunboats were not backing off.

In reality, the task in front of the IDS was **impossible**. There was simply nothing to base a determination on, nothing in the data, nothing from previous experience to draw on. But a decision was required, urgently.

There was only one source of relevant information available on which to arrive at an assessment of the track's identity and intent. This was the intelligence picture and this **was** unambiguous—an attack was likely, and the newly transferred F-14s in Bandar Abbas a serious candidate as its executor. Under these conditions, the IDS had no choice but to state out loud, 'possible Astro'. It was the only responsible thing to do.

Leaning on NDM theory, the TADMUS project developed the 'recognition/ metacognition' (R/M) model to explain this kind of decision-making process and also to provide a foundation for building the skills to improve its results.

Cues in a situation activate an interpretation of their meaning. (For example, an aircraft popping up on radar at high speed and low altitude, heading towards a US ship from an unfriendly country, is recognized as having the intent to attack). This interpretation in turn may activate knowledge structures that organize actual or potential information. A story is one such structure.¹⁴²

A story, or narrative, is the means by which sense is made of incoming information, and an appropriate course of action worked out. This story includes background factors against which new developments are set. 'For example a story about an attacking airplane may include the motivation of the attacking country, the reason attackers use this type of airplane, the reason they chose ownership as a target, and what they will do next.'¹⁴³

For the inexperienced members of the CIC, there was only one available narrative to work with—the one provided by intelligence. This left no doubt as to Iran's hostile intent towards US warships in the Gulf, the presence of triggering factors such as recent Iraqi air strikes on Iranian shipping, and indicated a growing air capability for delivering an attack through the refitting of the F-4s and the arrival of F-14s. This context set the framework through which the events on the morning of 3 July were interpreted. The Iranian gunboats attempted to shoot down *Ocean Lord 25*; they broke up at high speed in order to mount a swarm attack on the *Vincennes*; the P-3 was turning to join the engagement; air support was being launched from Bandar Abbas; any erratic and confusing behaviour was either part of a deception plan or building for an imminent suicide attack.

The pieces of the puzzle fitted; they made up a plausible story; they were consistent with the intelligence picture. The impact of this intelligence narrative went further than simply shaping the interpretive frame through which *Vincennes* CIC members made sense of the events unfolding around them. It also set up the decision-making process on board in such a way that a shoot-to-kill order on TN 4131 was almost **inevitable**. This is worth examining in more detail.

As with the ROE, the intelligence briefings delivered to US Navy personnel in the Gulf were cast in the shadow of the USS *Stark* incident. Their intent was to avoid a repeat of the *Stark*'s failure to recognise a threat in time and take the necessary steps to avoid catastrophe. Intelligence reports sought to sustain a state of high alertness on all of the ships in the JTFME and to this end, developments were presented from a 'worst case scenario' perspective to prevent any complacency setting in.

This was a reasonable objective. However, what the intelligence reports failed to do was provide a means for assessing any situation that arose, **other** than as an indicator of hostile intent. Instead, the reports set up a story so that no matter what took place, it would fit a narrative whereby an attack was imminent.

Admiral Crowe gives this away in his discussion of the Mode II IFF misidentification of IR655. 'Even if the Commanding Officer had been informed that there was no Mode II indication, that information alone has little significance. An attacker could easily be either squawking Mode III or no mode if he believes it will camouflage its identity.'¹⁴⁴ On the question of the track's position inside route Amber-49, the Admiral states, 'An attacker would probably prefer to be in an air corridor if it confused its target.'¹⁴⁵ And on the aircraft's altitude, the Admiral says, 'its mid-range altitude was consistent with either a hostile or a commercial aircraft.'¹⁴⁶ Intelligence reports also talked of Iranian military aircraft using commercial flights as cover, by flying close enough to be within a single radar resolution cell and so appear as one track, so that even an identification of TN 4131 as IR655 would not remove the possibility of an attack.¹⁴⁷ They also discussed F-14 flying speeds of '350–400 KTS on patrol'; IR655 had a speed of 371 KTS at the time of the shoot down.¹⁴⁸

The problem here is that the ROE were clear, 'if in doubt, shoot', so the question becomes, what possible item of information was there available to the CIC that could eliminate sufficient doubt so as **not** to shoot? If we list the candidate items, we can see the dilemma:

- time of departure,
- IFF Mode,
- bearing,
- altitude,
- speed,
- position inside route Amber-49,¹⁴⁹
- response to MAD and IAD verbal warnings,¹⁵⁰
- the P-3's behaviour.

One possible indicator was the aircraft's response to being lit up by fire control radar, as IR655 was by the USS *Sides*. This is a standard means of warning off military aircraft and was used on a regular basis in the Gulf. Civilian aircraft do not have the means to detect being illuminated in this way and therefore a failure to react is seen as a sign the track is commercial.¹⁵¹ However, in the case of TN 4131, this was interpreted as yet another element of doubt.¹⁵² The reason again was the intelligence reports speculating on the possibility of F-4s or F-14s being reconfigured for Maverick air-to-surface missiles. This is an anti-tank weapon that is guided by television, so no radar emissions are necessary, allowing the attacking aircraft to fly with radars switched off, or 'cold-nose'.¹⁵³ So we can add a further point of:

- reaction to being lit up by fire control radar.

Each and every one of these items contained enough ambiguity that none of them could refute an intelligence-driven narrative in which the USS *Vincennes* was under attack. They did not have the persuasive power to prevent the order to launch missiles.

This is why the mistaken judgment that TN 4131 was descending in altitude, when it was, in reality, still climbing, is **not** of any major significance. This is Admiral Crowe's opinion too,

It is impossible to say with assurance how the decreasing altitude information bore on the Commanding Officer's final decision. Obviously, whether the aircraft was ascending or descending could, when taken in the overall context, be a 'significant indicator'. It should be borne in mind, however, that an aircraft even at a range of 9 miles and altitude of 13,000+ feet... was at sufficiently low altitude that it could attack Vincennes within the next 9 miles... It is unlikely that this one piece of information would have settled the issue one way or another.¹⁵⁴

This gives us another point:

- ascending or descending.

The admiral is correct; in fact, the issue was not settled by **any** piece of information, accurate or inaccurate, circulating within the CIC. It was settled in advance by the intelligence picture and the ROE, both of which were motivated to deliver a single outcome, 'whatever you do, don't be another Stark'. And they succeeded.

Captain Carlson comes to a similar conclusion, while suggesting a more cynical motive behind the intelligence reports.

You are inundated with intelligence messages projecting the worst case scenario possible every day of the week, such that if anything happened, whatsoever, they can go back to the file, pull out a warning, and say 'we've warned them about that'.¹⁵⁵

All of us were done grave disservice by an intelligence system that covered its six by forecasting every possible worst-case scenario.¹⁵⁶

How to Work with Narratives Effectively

The TADMUS project recognised this problem too and developed a theoretical framework to design training whose aim was to build the critical thinking skills needed to work effectively with narratives. These include the ability to recognise the difference between ‘cues’ which are **observed**, and ‘assessments’ which are **inferred**, alongside the expectations as to what will be observed next.¹⁵⁷ This creates space for a critique of the ‘arguments that support a conclusion’¹⁵⁸ against three known types of weaknesses, ‘incompleteness, conflict, or unreliability’.¹⁵⁹ The idea was to give participants in the training the intellectual tools to critically examine narratives, find problems and inconsistencies within them, and develop more plausible alternatives.

The outcome of this TADMUS research was the ‘R/M’ model, which was to inspire the ‘STEP’ training program later implemented by the US Navy.¹⁶⁰ This will be discussed in more detail in chapter 4. The program’s purpose was to avoid the uncritical acceptance of a narrative that did not assist rapid decision-making processes to achieve desired outcomes and avoid catastrophic error. Narratives that are not helpful include those that do not clearly identify the indicators that will confirm that the story is a good description of the situation, and the warning signs that tell it is not. In other words, what to look out for. This is a crucial requirement, as will also be explored further.

The value of this approach can be seen if we subject the intelligence picture summarised by Admiral Crowe and described in the Fogarty report to a critique, applying these basic principles of critical thinking to see if the ‘inferences’ were in fact supported by their ‘cues’.

Intelligence Report Inference	Critical Analysis of the Inference
The 4 July holiday weekend made an attack more likely.	There was no precedent for this. In fact, it is hard to find any cases of an unprovoked attack on a US warship by Iranian surface or air craft. Every major combat engagement between the two nations up to this point had been initiated by US forces. Captain Carlson made this comment, ‘Yes, there had been an alert concerning a possible attack during the July 4th weekend—and every other day—by every conceivable method (or so it seemed).’¹⁶¹ But no such attack had yet eventuated.

Recent Iraqi air attacks on Iranian shipping would bring retaliation.	The Iranians might well respond—against Iraq. There was no reason to anticipate a response directed at US warships whose main task was to escort merchant shipping safely through the war zone. Iran knew what to expect if it did carry out a major attack on a US warship. Following the damaging of the USS <i>Samuel B. Roberts</i> in April by an Iranian-laid mine, the US launched Operation <i>Praying Mantis</i>, striking at offshore oil platforms. When Iran's Navy accepted the challenge and responded, it ended up losing one frigate, a fast attack ship, several patrol boats and another frigate seriously damaged. This was a devastating blow to its sea power.
The F-14 deployment to Bandar Abbas increased the air threat.	This was a logical conclusion. However, since its arrival on 25 June, the F-14 unit had flown regular patrols of a 1 or 2 hour duration, setting off on the hour. There had been no significant incidents, no evidence of 'aggressive behaviour'. In any case, the increased threat was to air not surface assets—the F-14 has an air superiority, not a ground attack role. Identification of TN 4131 as an F-14 rather than an F-4 made an intent to attack the <i>Vincennes</i> less, not more, likely.
F-14s were being reconfigured for an anti-surface role.	This is possible but unlikely. Fogarty explains why. 'Following August 1986, Iranian fighter aircraft were rarely used in the ship attacks in an apparent attempt to conserve platforms.'¹⁶² A refitted F-14 might deploy a Maverick from a distance of up to 13 nm, but this anti-tank weapon was unlikely to inflict much damage, even if it did hit, which was by no means certain. To drop an iron bomb, an F-14 would have to close within 2 nm of the ship. In either case, the risk of being shot down was very high against the possible reward, and both F-4s and F-14s were precious assets to Iran. The last time an Iranian Air Force aircraft made an anti-shipping attack was on 2 February 1988 when an F-4 attacked a Liberian tanker. It fired two Mavericks both of which missed.¹⁶³
The most serious threat was a suicide attack.	In terms of consequences perhaps, but the likelihood was minimal at this stage of the war. It was even less likely given the high value that the Iranians placed on conserving air platforms. This was arguably the clearest example of the need for a critical attitude towards intelligence briefs.

In June 1988, 125 challenges were issued to Iranian military aircraft.

This included seven challenges made to F-14s in the two weeks leading up to 3 July. However, not a single one of these 125 challenges escalated into an incident—the aircraft heeded the warnings and changed course. It is possible that Iranian pilots simply did not know the locations of US warships as they patrolled the Gulf. There is no real indication of intent one way or another from the incidences of challenges.

The warning from the USS *Halsey* to an F-14 took place in the northern Persian Gulf, much closer to the Iran-Iraq theatre of operations. Behaviour in this region was not a reliable guide to intent in the southern Gulf.

The conduct of the P-3 on 3 July is equally ambiguous. The P-3 responded verbally to being challenged, stating its intent and willingness to steer clear of the *Vincennes*. Later, it changed course turning back to where the surface engagement was taking place. At the same time, the P-3 crew were aware of being lit up by the *Vincennes* fire control radar at regular intervals, and that they could be shot down very easily if they approached too close.

The P-3's actions are interesting when set against Captain Carlson's observation. 'My experience was that the conduct of Iranian military forces in the month preceding the incident was pointedly non-threatening. They were direct and professional in their communications, and in each instance left no doubt concerning their intentions.'¹⁶⁴

The P-3 course was consistent with a targeting profile.

Exactly why the P-3 changed course towards the *Vincennes* is unclear. One possibility was to assist with search and rescue (SAR) if a gunboat had indeed been hit. It is extremely unlikely the P-3 intended to attack the *Vincennes* itself—it was far too vulnerable. One suggestion was that it might be assisting TN 4131 to acquire the *Vincennes* as a target; however the ship had effective electronic counter-measures to deal with this eventuality if the need arose. Another suggestion was that it was playing a coordinating role for the 'swarm' of gunboats. This is even less likely, firstly, as there were few signs of any coordination between the boats, and secondly, the IRGC had a barge nearby that served as a command post. Any command and control role would have come from there. This ship had already been acquired as a target should it be necessary to take action against it.

Iran had launched F-4s during the surface engagement of 18 April.

18 April was not just any routine day; it was the occasion of Operation *Praying Mantis*, ‘the largest of the five major U.S. surface engagements since the Second World War’.¹⁶⁶ The Iranian Air Force joined the battle **six** hours in. There is little evidence of coordination between air force units and surface combatants.¹⁶⁷

In comparison, the surface combat on 3 July was minute in scale. It also involved the IRGC, a paramilitary organisation, as opposed to the official Iranian Navy, making effective coordination of sea and air operations even more of a challenge.

USMC Lieutenant Colonel Crist writes, ‘After Operation *Praying Mantis*, Iran backed off from engaging the U.S. military. Having lost its most capable ships, the Islamic Republic of Iran Navy kept its remaining combatants in port for most of the remainder of the Iran-Iraq War. Even the IRGCN’s enthusiasm was diminished. Attacks by small boats dropped dramatically over the next two months.’¹⁶⁸

Table 2-2 A critical view of the intelligence assessment in July 1988

‘Scenario Fulfilment’—Only One Way It Could Go

The Fogarty report raised the concept of ‘scenario fulfilment’¹⁶⁹ to explain the mistaken perception that TN 4131 was descending to make an attack run. The console operators saw what they expected to see. This is a well known ‘heuristic’ bias discussed at length in the NDM literature, a long understood failing of ‘intuitive’ thinking. The TADMUS R/M model was specifically designed to target this problem. Interestingly, Gary Klein himself is not convinced this is what took place inside the *Vincennes* CIC, nor is he persuaded by the ‘combat stress’ theory.¹⁷⁰ Neither was Captain Rogers, and the search for a better explanation of the crew’s error was the chief motive behind Dotterway’s research.

‘Scenario fulfilment’ however, does capture very well the captain’s own thought process, as described by Fogarty and Crist. Now that we have subjected this intelligence-driven scenario to our own critique, let us look again at how the captain took the decision to launch missiles. Fogarty’s list of contributing factors¹⁷¹ is worth reproducing in full, as we have by now touched on each of these points.

- The aircraft had lifted off from an airfield used jointly by military and civilian aircraft in Iran heading directly toward his ship at a relatively low altitude.
- Track 4131 was on a direct bearing to USS *VINCENNES* and USS *MONTGOMERY*.

- TN 4131 was flying at a reported altitude which was lower than USS *VINCENNES* observed COMAIR to fly previously. Additionally, it was not flying exactly on the airway centerline as USS *VINCENNES* had seen previous COMAIR consistently do.
- It appeared to veer toward the USS *MONTGOMERY*.
- Track 4131 was reported to be increasing in speed, decreasing in altitude, and closing range.
- No ESM was reflected from track 4131, however, the aircraft was not responding to verbal warnings over IAD or MAD.
- Track 4131 was reported by USS *VINCENNES* personnel to be squawking Mode II-1100 which historically correlated to Iranian F-14's.
- The aircraft appeared to be maneuvering into an attack position.
- Visual identification of the aircraft was not feasible due to the lack of combat air patrol.
- Iranian fighter aircraft had flown coincident with the surface hostilities involving US and Iranian Forces on 18 April 1988.
- Warnings had been issued for increased hostile activity for the 48 hour period which included the July 4th weekend.
- An Iranian P-3 airborne to the west of USS *VINCENNES*, turned inbound.
- The *Stark* incident.
- Iranian F-14s have an air-to-surface capability with Maverick missiles, iron bombs, and modified Eagle unguided rockets.
- TN 4131 could have been a suicide attack.

Crist condenses these considerations into this summary,

The first information given to Captain Rogers by the AAW TAO was that there was an inbound F-14 on a closing course which was not responding to challenges. He apparently was also told that the aircraft had veered from its route and appeared to be moving to an attack position. Such a scenario would not have seemed unreasonable to the Captain as he was well aware of the F-14 activity from Bandar Abbas, warning of possible Iranian attack over the holiday weekend, threat of suicide aircraft and the other background which is well described in the report.¹⁷²

As we have seen, not one of the ‘inferences’ taken from the ‘cues’ listed above is without problems. All are open to more than one interpretation, they can be combined to write more than one narrative. What was required was a more critically minded approach to these cues, an awareness of their possible setting within widely different narratives, and an understanding of what indicators would allow a decision maker to determine which ‘scenario’ was more consistent with the cues under observation.

None of this had to take place inside that short ‘time window’ IR655 was airborne. This was a process of building up an appreciation of the situation, a narrative, over the weeks and months of operations in the Gulf. Captain Carlson gives us an idea of how other commanders performed this task.

The briefings I received from two other commanding officers in the Gulf before taking command of the USS *Sides* in early June were invaluable. They essentially advised that I read the message traffic, absorb the contents, then go on deck and look around. Their message was clearly aimed at emphasizing the fact that - war or no war - life in the Gulf went on; fishermen fished; commerce continued; airliners flew. Caution was required.¹⁷³

This is why the intelligence picture did such a ‘grave disservice’. It generated a scenario that could only be fulfilled one way, no matter what cues appeared, a narrative where all possible evidence would point to a single conclusion—that the *Vincennes* faced an imminent threat of attack. And for this scenario, the ROE gave clear instructions. The fate of IR655 was sealed long before it lifted off the tarmac in Bandar Abbas.

It is worth mentioning that the HCD training delivered so far has been directed at junior officers and airmen in an intelligence role. Understanding the part played by the intelligence picture in the tragic events of 3 July is a key learning objective of the program.

There is also an interesting circularity here. In the opening chapter, we discussed the ‘changing role of intelligence’ where intelligence personnel are being drawn further into direct participation in operational decision-making, where more and more intelligence officers and airmen have to **act** like operations people. Here, we have been describing the opposite side of the same coin, operations personnel need to **think** like intelligence analysts, developing the intellectual and critical thinking tools to work effectively with narratives, and build these into their tactical decision-making processes. The best from both domains is called for.

Minimising the Risk of Catastrophic Error

Our discussion here differs from the Fogarty investigation in two essential respects. First of all, we have no interest in assigning blame. Secondly, our perspective extends well beyond the USS *Vincennes*

CIC. In fact, a key argument we are making is that events inside the CIC during the minutes IR655 was airborne were **not** the decisive factors behind the catastrophic outcome that took place.

This is a good news story. It is so because in widening our perspective we bring into our field of view a whole new number of means by which the risk of a similar catastrophic error can be reduced to a minimum. And it is this objective that motivates our study of the tragedy.

HCD's perspective on IR655 includes the following key insights.

Split-second 'weapon-employment' decisions, 'shoot/don't shoot' decisions produce unpredictable outcomes, even with top operators. A focus on improving performance in this confined decision space, through personnel selection procedures, psychological profiling or combat stress management training is worthwhile but not sufficient if the goal is to minimise the potential for catastrophic error. Something more is needed, a wider perspective.

The key is situational awareness. This is developed, not in the heat of combat, but over the days, weeks and months of operations.

Investigating all the background factors that shape high consequence decision-making removes the limitation of time compression and opens up a whole new range of possibilities for managing the potential for a catastrophic outcome. The key is situational awareness (SA). This is developed, not in the heat of combat, but over the days, weeks and months of operations. Good SA not only covers the operational environment, the capabilities, disposition and intent of an adversary (as in the IPB), but also a knowledge of other stakeholders, civilian actors and of the possible scenarios that could generate a catastrophe. SA also means an understanding of 'one's own situation'. This includes weaknesses, vulnerabilities, limitations and the circumstances where these can degrade decision-making capability and increase the probability of catastrophic error.

Situational awareness allows for the anticipation of high risk scenarios, so that these are not faced solely with 'either/or' 'weapon-employment' decision-making. SA makes 'don't be there' a viable planning objective and it creates new options by making additional resources available at the critical point.

HCD also sets decision-making in its organisational context, including the role of culture. This involves an understanding of where, how and who makes high consequence decisions. It takes into account the actions of a decision maker's subordinates and of higher command, how these can contribute positively or else hinder a desired result. Alongside interactions up and down the chain of command, HCD identifies the ideal team processes that provide effective decision support in high stress, time-compressed, combat conditions. It emphasises the leadership task of building high performance teams.

The intelligence picture plays a critical role in building situational awareness, and in how this is understood, **situation assessment**. It generates a narrative that structures the information available and sets the framework for how new developments will be interpreted. This alone can determine a decision outcome.

In a complex environment, items of information, or ‘cues’, will always contain an element of ambiguity; more than one narrative can be ‘inferred’ from them. They need to be approached with caution, with a critical mindset. Any appreciation of the situation needs to identify those indicators that will confirm its accuracy, and those warning signs that suggest an alternative narrative better explains what is happening. Without these, an assessment of the situation is likely to be ‘self-fulfilling’, and is dangerous for high consequence decision-making.

These insights establish the foundation for a wide-ranging program of actions and initiatives around organisational culture, management systems, team processes, leadership development, critical thinking and decision-making skills development. While they cannot guarantee another tragedy like IR655 will never be repeated, it can be said with some confidence that their application in the Gulf during 1988 would almost certainly have led to a different outcome that Sunday morning in July. And that at least, is a start.

CHAPTER 3

Decision-Making Made Impossible —the US Marines' Experience in Beirut in 1983

The longer we stayed there, the more we knew, the less we understood.

Major Christopher Arey, USMC, Beirut 1983

The mission changed, but no one changed the mission.

Colonel Timothy Geraghty, Commanding Officer 24th MAU, Beirut 1983

When faced with relatively clear problems, such as keeping the IDF out of certain areas, the Marines knew what to do. However when involved with more complex problems, such as how to handle the IDF after it had already fired into a Moslem town, the USMNF was bewildered. When the IDF withdrew, the 24th MAU lacked the prudence to change its own mission when it was apparent its higher headquarters would not. The 24th MAU continued to follow its original task instead of adapting to a changing situation that made its original task irrelevant.

Major Ronald Baczkowski, USMC¹⁷⁴

In the HCD training program, we present the following scenario.

You are in charge of a unit of US Marines defending the perimeter of an international airport. You have come under mortar fire, one Marine has been wounded already. You can see the mortar position where the fire is coming from, it is in range.

Do you return fire ? Yes or no.

By this stage of the training, participants have been exposed to a number of incidents that ended in a catastrophic outcome. Some are cautious as a result, suspecting a trap. Others have less hesitation. The answers are fairly evenly split, some say 'yes', some say 'no'.

Either way, the responses are irrelevant. More significant is the lack of consistency, for the goal of HCD is to reduce the risk of catastrophic error to its absolute minimum. This means that no matter whether the ‘correct’ response is a ‘yes’ or a ‘no’, almost half the participants will make the ‘wrong’ decision. This is clearly not an acceptable statistic from an HCD perspective.

The training then takes a turn that comes as a surprise to participants. We ask a very different question.

Is this an easy or a difficult decision to make?

In the low stakes training environment, most initial responses are ‘easy enough’. But the lack of a consistent set of answers in the room gives cause for doubt and some discussion. As participants get into the spirit of the scenario and accept the stakes that would really come into play, the difficulty this actually presents becomes more apparent.

In fact, it is not difficult; it is **impossible**. Deliberately so. There is simply not enough information provided to form the basis of a decision. This is why there is no ‘correct’ answer. All anyone can do if forced to choose between a ‘yes’ or a ‘no’ is guess, and deal with the consequences as they come.

High consequence decisions do not need to be hard. In many cases, they can be completely straightforward. The potential for catastrophe may increase stress levels, but if the decision between shoot and don’t shoot is clear then no matter how high the stakes, HCD does not really present any great problem

High consequence decisions do not need to be hard. In many cases they can be completely straightforward. The potential for catastrophe may increase stress levels, but if the decision between shoot and don’t shoot is clear, then no matter how high the stakes, high consequence decision-making does not really present any great problem. Many classic military situations are of this nature, the enemy is in your sights, shoot/don’t shoot, kill or be killed. The position of having to choose may be highly traumatic, but the decision-making process itself is simple enough.

Situations of this kind are relatively rare, which is just as well since the research shows that in real combat, most people make the ‘wrong’ choice, that is, they choose not to shoot.¹⁷⁵ Only after intense training, and under particular circumstances, does this pattern of behaviour change. But even where a situation seems to call for an ‘either/or’ ‘weapon-employment’ decision, appearances can be deceptive, as we saw with the USS *Vincennes* and TN 4131. Such choices take place in a wider context, and this means there are always alternatives posed along the way, for instance, ‘don’t be

there' or, 'call in help'. It is the absence of any such context that makes our training scenario so completely unrealistic. It also hammers home the point that even in those moments when a 'yes' or a 'no' is required, a decision that is more than just a blind guess is only possible when the context is taken into account. The situation drives everything.

This includes the level of difficulty. Some situations are clear, others highly complex, or ambiguous; some are familiar, others unprecedented; some may permit only one course of action, others an infinity of possibilities.



Map 3-1: Lebanon

LEBANON SEPT 1983 – THE POLITICAL SITUATION

Since ancient times, Lebanon has been populated by a diverse range of ethno-religious groups. Christian Maronites have been the largest group but a significant Muslim population also exists, encompassing Sunni, Shia and Druze faiths. As a result of Arab-Israeli conflicts from 1948 to the 1970s, several hundred thousand Palestinian refugees moved to southern Lebanon, thus increasing the Muslim population. The Palestine Liberation Organisation (PLO) represented these refugees and also carried out attacks on northern Israel. After an assassination attempt on the Lebanese president, civil war broke out in 1975 largely between Christian and Muslim forces. A Syrian force entered Lebanon ostensibly to restore peace. In 1978 and again in 1982, Israeli forces invade Lebanon to displace PLO fighters and prevent attacks on northern Israel.

In May 1983, the Lebanese Government signed an agreement with Israel to end the state of war between the two countries. The intention was for Israeli forces to withdraw from southern Lebanon. To prevent the Palestine Liberation Organisation (PLO) resuming its positions and continuing its attacks on Israel, the US, France and Italy agreed to provide a Multinational Force (MNF). The mission of this force was to supervise the withdrawal of all foreign forces from Lebanon and train the Lebanese Armed Forces (LAF) to restore the sovereignty of the Lebanese Government.

The agreement was widely condemned in the Arab world and inside Lebanon; the Government was seen as a stooge of Israel. Syria refused to cooperate and kept its forces in Lebanon. As a result, the Israeli forces only withdrew as far south as the Awali river and continued to occupy southern Lebanon. As the US had co-signed the agreement, it was seen to be responsible for it. Hostility to the MNF increased as a result.

The PSP, Hezbollah and the other Muslim and pro-Palestinian factions were not prepared to tolerate the LAF stepping into the shoes of the Israelis. Support for the Government was now confined to the Maronite Christians and there were signs of imminent large-scale defections of non-Christians from the LAF.

THE MAIN MILITIAS OPERATING IN BEIRUT 1983

Amal – militia mainly drawn from Shia community, based in southern Beirut, initially backed by the PLO, now supported by Iran, 10 000 strong

Hezbollah – Islamic Amal, a Shia-based militia that split from Amal, weak in Beirut, also operating under the name of Islamic Jihad when employing terrorist methods, backed by Iran. Forerunner of what was to become Hezbollah shortly afterwards

PLO Fatah – a militia under the control of the Palestine Liberation Organisation (PLO), severely weakened by Israeli invasion and expulsion from Lebanon, still controls Palestinian camps in South Beirut, uneasy relationship with Amal often breaking out into conflict

Lebanese Forces (LF) – militia drawn from Maronite Christian community, mostly led by the pro-Nazi Phalangist Kataeb party, largest Christian faction up to 30 000 strong, heavily armed with artillery, armour and a navy, previously backed by Syria, now by Israel, not to be confused with LAF

Lebanese Armed Forces (LAF) – the ground, naval and air forces under the control of the Lebanese Government

Al Mourabitun – Nasserite pan-Arabist, mostly Sunni supported and in control of West Beirut, 3000 strong

Progressive Socialist Party (PSP) – led by Walid Jumblatt, whose militia force consists mainly of Druze members, supported at times by Syria but is an independent player in Lebanese politics

LNM – coalition of left leaning secular forces, including the LCP's 5000 strong Popular Guards, the OCA, SSNM, currently in alliance with the Druze PSP

Smaller factions include Maronite Tigers, Armenian Dashnak party, Kurdish PKK, several Palestinian splinters and Ba'athists



Map 3-2: Beirut

Our training scenario is fictional, but it is drawn from a series of incidents that did take place over the summer and autumn of 1983, in Lebanon, where the US Marines were taking part in a multinational force (MNF) and whose task included maintaining a perimeter defence of Beirut's International Airport (BIA). This was in a context where Lebanon was sliding back into civil war.

THE MULTINATIONAL FORCE IN LEBANON

The Multinational Force (MNF) consisted of contingents from the USA, France and Italy. Each contingent had their own chain of command and area of operations (AO). The French AO was centred on West Beirut, the Italian on the Palestinian camps in South Beirut and the US AO was centred on Beirut International Airport (BIA).

US MNF MISSION STATEMENT

'To establish an environment which will permit the Lebanese Armed Forces to carry out their responsibilities in the Beirut area. When directed, USCINCEUR [US Commander-in-Chief Europe] will introduce U.S. forces as part of a multinational force presence in the Beirut area to occupy and secure positions along a designated section of the line from south of the Beirut International Airport to a position in the vicinity of the Presidential Palace; be prepared to protect U.S. forces; and, on order, conduct retrograde operations as required.'

US MNF RULES OF ENGAGEMENT

'The USMNF would not be engaged in combat.

Peacetime rules of engagement would apply (i.e. use of force is authorized only in self-defense or in defense of collocated LAF elements operating with the USMNF).

USCINCEUR [US Commander-in-Chief Europe] would be prepared to extract U.S. forces in Lebanon if required by hostile action.'

US MNF INTELLIGENCE POSITION

The US MNF has very few human intelligence (HUMINT) sources in Lebanon. It was heavily reliant on the French contingent for HUMINT.

The LAF provided intelligence on a regular basis. However, the reliability of this source had not been established. The LAF was often pursuing its own agendas.

The IDF also provided intelligence. It had an extensive network of informers; however the IDF is selective in the information it released to the US MNF.

The US MNF intelligence picture regarding conventional military threats such as artillery positions, bases and hostile forces' dispositions, was excellent.

Set against this background, we are able to provide our participants with the context they need to solve our 'yes' or 'no' dilemma. The information provided includes the following.

Artillery exchanges between Druze and (Christian) LF forces have been going on all morning. Several rounds have landed inside the BIA perimeter. Coordinates giving the positions of artillery and mortar units have been passed on to HQ. You have been informed that the Lebanese Armed Forces (LAF) are gearing up for a major thrust into the Shu'uf in the next hour; their main effort will take them through the firing positions you have identified.¹⁷⁶

This is enough to make the decision an easy one, the situation will resolve itself without any action being required by our unit. In this scenario, therefore, the level of difficulty is removed by information being on hand that allows us to determine no action is required, we have the situation covered. At this point, our initial learning objective is achieved, to demonstrate that situational awareness is the key element in high consequence decision-making, and that in many cases all that is required for a good decision is access to the right information.

The 'no' option in this case is to choose to wait and see if the LAF offensive materialises, and this is legitimate enough. On the other hand, the introduction of this option, not to take a course of action that once taken is irreversible, adds a new complication. It shows that contained within the decision-making process is a decision on whether to take a decision in the first place, or put it off, to keep the options open. In an ongoing situation, does incoming mortar fire change the position so as to require an active response; does the wounding of a Marine? If not, what would? This is not the only complicating factor; there is also the question of whether a decision is allowed. Military units sit within a hierarchy, the authority may be granted for a 'no' decision, not to shoot back, but a 'yes' might require permission from above, the two decision-making processes are not the same; one is more difficult than the other. Later, we will give an example from the same peacekeeping mission where a 'yes' decision came all the way from Washington.

Our 'easy' decision therefore quickly reverts to being a difficult one if the situation is evolving so that at some point a 'yes' decision will be called for, but exactly what this point is and who will make the call is unclear. It turns out this is much closer to the reality of the situation the US Marines found themselves in 1983.

Unlike our scenario, there was no LAF offensive. Instead, US Marines on the perimeter of Beirut International Airport suffered constant outbreaks of shelling and took a steady stream of casualties, including fatalities, as Lebanon sank back into civil war. On 10 August, for the first time, the Marines shifted from a 'no' to a partial 'yes' and responded with 81-mm mortars, firing four illumination rounds as a warning. On 28 August, the LAF were finally drawn into an engagement with militia elements in the high ground above the airport, but this resulted in even heavier fire on Marine positions. Benis Frank describes the circumstances that finally pushed the US MNF into a 'yes' decision to return fire.

The BLT's [Battalion Landing Team's] 81mm mortars fired six illumination rounds over one of the suspected firing positions at 0940 in an attempt to suppress the Druze fire. Minutes later, several 82mm rounds landed on a Company A rifle platoon position, killing one Marine and wounding four others, one of whom later died... Firing continued all morning... At approximately 1150, the guided missile cruiser Belknap (CG 26) fired two illumination rounds from its 5-inch gun. When this didn't stop the Druze, the Marine artillery fired in anger for the first time. A new 155mm howitzer of Battery C, 1st Battalion, 10th Marines fired six 155mm, high-explosive, point-detonating rounds with pinpoint accuracy on the position, reportedly killing three and wounding 15 Druze. The Druze position went silent.¹⁷⁷

This was a turning point in the mission. Artillery duels do not feature prominently in the manuals on peacekeeping.

This was a turning point in the mission. Artillery duels do not feature prominently in the manuals on peacekeeping. But was it the right thing to do? In seeking an answer to this question, we soon find ourselves faced with a level of difficulty that is close to the 'impossible' we began with.

Nevertheless, we will persevere, and explore the reasons why decisions of this kind are so hard, because they are exactly the same sources of difficulty that affect current military operations in the Middle East and elsewhere. This is why the experience of the US Marines in Lebanon during 1982 and 1983 is so useful to us today, more than 30 years later. If we can clarify the exact nature of the challenge that situations like this pose, then the hope is that this also unveils strategies for reducing this to a manageable scale. That is the aim of our discussion.

In the background, of course, is the tragedy of 23 October 1983, another Sunday morning, the day a truck drove into the Battalion Landing Team Headquarters of the 24th Marine Amphibious Unit (24th MAU) and detonated. Two hundred and forty one Marines died as a result of the blast. This is the catastrophic outcome that shapes our examination of the decision-making that surrounded the US Multinational Force (MNF) in Beirut and the fate of its mission.

Beirut 1983 is also instructive for the ways in which it differs from the USS *Vincennes* and Iran Air Flight 655, despite both ending in catastrophe. In Beirut, events unfolded over a period of 11 months before disaster struck, and while there were incidents that involved split-second decisions with lives potentially at stake, including one confrontation with the Israeli Defence Force which went to the brink¹⁷⁸, there was no four-minute period comparable to the events inside the *Vincennes* combat information centre (CIC) where all the factors played themselves out and the fate of hundreds was sealed.

THE SHU'UF MOUNTAINS & SOUK EL GHARB

The Shu'uf Mountains form the southern part of the Mount Lebanon range. They are located south east of Beirut and hold a dominating position over the city, its port and airport. At the town of Souk el Gharb, there is a commanding ridge that looks down on Baabda, where the Presidential Palace and Ministry of Defence are located. The town controls the main Beirut-Damascus road and has a dominating position over the whole Beirut area.

On 19 September 1983, an LAF brigade occupying Souk el Gharb is under intense pressure from Druze militia who are making a concerted attack on the town with clear intent to capture it. The militia have firm logistical support from Syria, and are deploying both artillery and armour in large numbers.

Without air or artillery support, it is unlikely the LAF will be able to hold their positions. Loss of Souk el Gharb will make defence of the Presidential Palace untenable and expose the whole of Beirut and the BIA to artillery fire. It will also surrender complete control of the Beirut-Damascus highway to Druze and Syrian forces. Souk el Gharb is a highly strategic position.

A Holistic Approach – How the Situation Evolved Over Time

There were certainly key moments during the life of the peacekeeping missions that stand out as turning points. The bombing of the US embassy on 18 April would be one, the 29 August artillery exchange another. If one event had to be singled out as decisive, then the 19 September decision to use US Navy warships to provide fire support to the Lebanese Armed Forces under siege on Souk el Gharb would be a leading candidate. However, even here, the significance of this decision lies not in its immediate result, which was a successful turnaround of the tactical position on the disputed hill, but in the consequences that were to follow indirectly. Here, the relevant decisions were those that were **not** taken in the face of these emerging consequences, and the new threat they posed.

Our interest therefore, is not in pinpointing the exact decision, or set of decisions, that led to the catastrophe of 23 October, with the intention of then analysing what went wrong with the decision-making processes at those critical moments. The position is more complicated than that. Instead, a holistic approach is needed, one that examines how the situation evolved over a period of time to create the conditions where a devastating attack on the MNF was a real possibility. From this perspective, our task is not to evaluate whether the decision over Souk el Gharb was correct or not, but to understand its impact on the situation, and the risks this created. This is similar to the way we approached the changes to the ROE in the wake of the USS Stark incident, where a desire to avoid a repeat of one type of catastrophic outcome increased the likelihood of a different kind of catastrophe altogether. No criticism was implied here, it was merely an acknowledgment of a changed situation that called for countermeasures to be put in place as a result of this new risk.

This approach is consistent with systems theory, as it is applied in the safety management field. A systemic-theoretic method is useful for our discussion because it represents an attempt to cope with complexity. In particular, it seeks to develop strategies for working with complex technical systems that defy linear modes of causality, where event A leads to event B. If we redefine for the moment 23 October as an 'accident', systems theory has this to say about it,

In a systems view of safety, the traditional conception of accidents as chains (or trees) of directly related failure events and human errors is abandoned. Chain of events models encourage limited notions of linear causality and cannot account for the indirect, non-linear, and feedback relationships common for accidents in complex systems... a systems approach takes a broader view of what went wrong with the system's operation or organization to allow the accident to take place.¹⁷⁹

Systems theory arose out of a safety engineering context striving to manage the risk of a catastrophic failure within a highly complex socio-technical system. Much of the pioneering work in this area was done around the NASA Space Shuttle program, in the wake of the *Challenger* and *Columbia* disasters. If we stretch the concept of 'system' and apply it to the operating environment within which the US MNF carried out its mission, and of which it was one component, a systemic-theoretic approach can provide us with a helpful way of understanding the challenges faced by the Marines during 1983.

It is not necessary to find 'what went wrong' or 'who stuffed up', for systems theory allows for the possibility that nothing did go wrong, no-one was at fault, and yet the outcome was still disastrous.

The advantage of this approach is that it removes the need to identify 'failure events and human errors' as a way of explaining how catastrophe could strike on 23 October. It is not necessary to find 'what went wrong' or 'who stuffed up', for systems theory allows for the possibility that nothing did go wrong, no-one was at fault, and yet the outcome was still disastrous. This enables us to recognise an important turning point in the situation, such as Souk el Gharb, without having to conclude that the decision to open fire with naval guns was a mistake. For when we examine the reasons why this decision was taken, then we can find a powerful logic behind it, one that is hard to argue with, even though its role as one of the contributing factors behind the barracks bombing is clear enough to see. This was Commodore France's view, when he stated, 'We felt the naval fire in defence of the mission ashore was a sound tactical move, but naval gunfire in support of the Lebanese Armed Forces was a definite change of mission.'¹⁸⁰ Colonel Geraghty made this comment,

I gave the orders... The MOD reported that the attacking forces broke and ran under the barrage, and the tide of battle turned because of the NGF support... As the sun set at the

end of a tumultuous day, I remarked to members of my staff that 'my gut instinct tells me the Corps is going to pay in blood for this decision'.¹⁸¹

'Local Rationality' – Actions That Make Sense at the Time

A systems perspective is able to accommodate this apparent contradiction. It does so through the concept of 'local rationality', or 'practically local' action. James Snook explains this idea in his investigation into another catastrophic event that forms part of the HCD training curriculum, the 1994 Black Hawk friendly-fire incident in Northern Iraq.

Most outsiders simply could not fathom how two experienced pilots could misidentify the Black Hawks and shoot them down so quickly—globally untoward action. However, to the F-15 pilots, their actions seemed perfectly natural, locally acceptable procedure. Given their training, and what they knew at the time, from their perspective, 'seeing' two Hinds and quickly shooting them down fell within the bounds of 'acceptable procedure'. Their actions were practical in the sense that they grew directly out of practice, out of the logic of the task at hand... they simply executed a locally efficient procedure, exactly as they were trained. When viewed in this context, from the fighters' perspective—which stands in sharp contrast to the orientation of puzzled outsiders—the actions of our two F-15 pilots were very practical indeed.¹⁸²

This analysis strikes a chord with our discussion of the events inside the *Vincennes* CIC. In both cases, it was a 'don't be there' situation. In other words, to see how tragedy could have been avoided a wider perspective is needed, outside the 'practical actions' as seen from within the cockpits of the F-15s or the CIC of the USS *Vincennes*. Beirut 1983 will turn out to be no different in this respect. On the other hand, the experience at Fukushima demonstrated that too wide a viewpoint, one too removed from the situation, is also not helpful. Getting the balance right and locating decision-making in the optimum position is a major theme of HCD that will be explored in more detail when we come to discuss the Black Hawk incident in depth during Part II.

Snook proceeds to develop his 'multiple levels of analysis'¹⁸³ of the incident, and demonstrate that all the actors involved, the helicopter pilots, the AWACS crew who watched the whole event unfold, and the task force elements that failed to integrate at an operational level, all acted in 'locally rational' ways, just as the F-15 pilots did, their actions made sense to them. The rest of us, put in the same position, would most likely have done exactly the same. And yet, the outcome was catastrophic. In order to understand how this was so, and to avoid a repeat, we have to turn our attention to how the various components interacted with one another, in unforeseen ways, to produce a result no one intended.

'Dysfunctional interaction'¹⁸⁴ is the name given to this phenomenon by systems theory. It is not hard to find examples of this in Beirut 1983.

‘Dysfunctional Interactions’ Creating a State of High Risk

A key aspect of the US MNF mission was to act as a buffer between the occupying Israeli Defence Force in Lebanon, and the local population. It was this peacekeeping role that gave the Marines’ presence legitimacy and saw them given a wide welcome on arrival, this taking place just a week after the notorious Sabra and Chatila massacres in which Israel had been complicit. Essential to the mission therefore, was the maintenance of an appearance of neutrality and independence from the IDF, even though historically Israel had been and was still a major ally of the US. The IDF on the other hand, had their own agenda in Lebanon, and were paying a high political price for their invasion and occupation of the country. As a result, the IDF had little interest in cooperating with the MNF, where this meant compromising their own operational objectives, while on the other hand they sought constantly to manipulate the Marines into playing a support role in their own actions. This stance led to some tense confrontations between the two forces, and in an effort to reduce the risk of this escalating into open conflict, an emergency communication link was established between the Marines and the IDF units based in the vicinity of the airport.

This led to the following set of events on 7 May,

The US came under fire from what appeared to be spill over fire from the mountains to the east. Additionally, several rockets landed between Black Beach and the amphibious ships just off the shore. The rocket fire was coming from just outside Marine lines from an area normally patrolled by the IDF. Colonel Mead... called the IDF and said if they did not clear that area he would send US forces out to do it. In a short time the IDF sent out a sweep but never found the gunner.¹⁸⁵

Backowski describes the implications of this incident on the perception of the Marines relationship with the IDF.

Viewed from the gunner’s perspective ... the gunner fires at US ships and Marines, but the IDF looks for him ... The US MNF cooperated with the IDF ... Colonel Mead was faced with a no win situation dealing with the Israelis. The hotline proved to be an in-extremis coordination net.¹⁸⁶

In the same way, seemingly harmless interactions with the Lebanese Christian community may also have led to misperceptions over the Marines’ impartiality in relation to the rival factions inside the country. Lieutenant Colonel Matthews recalls how this happened,

Marines were unconsciously manoeuvred into situations that made them look as if they were aligning with the Christian population. While the Marines felt they were being honoured at gala events and extravagant banquets, they often ended up on the pages of local magazines eating dinner with quite possibly the ‘same forces responsible for the Sabra and Chatilla

massacre just 90 days earlier'. When Marines realized their errors, they quickly stopped, but the damage had been done. First impressions are lasting impressions.¹⁸⁷

Another example was the training exercises in amphibious assaults conducted jointly with the French contingent of the MNF at Black Beach. These demonstrations of military power were

highly visible from the coastal road and especially from the hills surrounding BIA. Amphibious assaults are unquestionably offensive operations. With no formal announcements explaining the purpose of these exercises to the local populace, one can imagine what the Muslim militias thought as amphibious vehicles and helicopters stormed the beach.¹⁸⁸

The significance of minor events such as these is their cumulative effect on the overall situation. Systems theory again provides a useful means for capturing this process. Discussing both the Black Hawk friendly-fire incident in Northern Iraq and the Bhopal plant explosion, Marais and Leveson write,

Several decision makers, all striving locally to optimize performance may be preparing the stage for an accident... Safety defences therefore tend to degenerate systematically over time. When a larger view is taken, accidents in complex systems can be seen to result from a migration to states of increasing risk over time. Once a system has migrated to an unsafe state, accidents are inevitable unless appropriate efforts are made to bring the system to a safe state. The Bhopal accident is a classic example... the plant had been moving over a period of many years toward a state of high risk where almost any change in usual behaviour could lead to an accident.¹⁸⁹

Over 1982 and 1983, the Marines' mission in Lebanon steadily migrated from a 'safe state' to one of 'high risk'.

Over 1982 and 1983, the Marines' mission in Lebanon steadily migrated from a 'safe state' to one of 'high risk'. Viewing the evolution of the operating environment in this way, the focus shifts from the exact nature of the attack that eventuated on 23 October to a wider appreciation of the situation, just as an analysis of the Bhopal disaster looks beyond the immediate trigger for the explosion on the night of 2-3 December 1984.

Given the overall state of the Bhopal Union Carbide plant and its operation, if the slip disk had not been left out of the pipe washing operation that December day in 1984, something else would have triggered an accident.¹⁹⁰

From this perspective, the failure to boost the perimeter defence at the Battalion Landing Team Headquarters (BLT HQ) or disperse the personnel billeted inside is less important than the

recognition the situation was, by this time, one where a terrorist attack was highly probable. In fact, available intelligence did warn that something ‘spectacular’¹⁹¹ was on the cards, although exactly what was not specified. The point is however, that while preventative measures may have averted the catastrophe that did take place on 23 October, an attack of some kind would have almost certainly proceeded in any case. Rasmussen makes this point in the context of Bhopal,

Had this ‘root cause’ been avoided by some additional safety measure, the accident would very likely be released by another cause at another point in time.¹⁹²

Patrick Clancey makes this exact point in his commentary on the House Armed Services Committee investigation into the security arrangements in Beirut when he says,

the opponents had free will. Had the BLT building been well protected against a truck bomb, they would almost certainly have searched for a different vulnerability to attack.”¹⁹³

Terrorism expert Brian Jenkins of the RAND Corporation echoes this argument.

Security does work in reducing certain tactics, but not in reducing terrorism as a whole. Terrorists are nimble. If one set of targets is well-protected or one tactic becomes more dangerous, terrorists merely shift their sights or alter their tactics to obviate the security measures. Protection against car bombs may reduce car bomb incidents, terrorists will do something else instead.¹⁹⁴

A Long List of Vulnerabilities to Choose from

There was no shortage of vulnerabilities to choose from. At command level, the Marines had already identified a number of very real terrorist and military threats and taken steps to counter these. The first was the artillery fire falling on Marine positions in ever greater volume. In response, the MAU Commanding Officer, Colonel Geraghty, took the decision, ‘to consolidate my forces into hardened structures rather than leaving them in the open.’¹⁹⁵ This still left many units exposed at isolated checkpoints in what was now hostile territory, the village of Hay es Salaam and the Lebanese University, and by late September these had to be pulled back.¹⁹⁶

Transport and supply vehicles also presented an easy target as they travelled through Beirut streets, the ‘car bomb capital of the world’.¹⁹⁷

We moved convoys throughout the city to show our presence, to visit the embassy, and to reinforce and resupply our multiple locations. We received more than a hundred car bomb threats during our tour in Beirut. This threat became personal on October 19th, 1983, when one of our convoys was hit with a remotely detonated car bomb near the Kuwaiti embassy. As a result, we changed our times, trips, routes, and size of the convoys to make them as unpredictable as possible and not lucrative targets.¹⁹⁸

The bombing was not a random attack. Geraghty recalls, 'I had traveled past the same site of the explosion moments before the convoy did ... Bill (CIA Station Chief) called ... to inform me I had been the target.'¹⁹⁹

Movement around the city also exposed Marine personnel to the possibility of kidnapping. On 27 September, two Marines took a wrong turn and ended up at a militia checkpoint, where they were disarmed and held captive. Fortunately their captors belonged to the Shiite Amal political party, which was not interested in a confrontation with the MNF, and the soldiers were handed over unharmed to a French liaison officer. Amal leader Nabih Berri even apologised for the incident. Nevertheless, militia roadblocks could be deadly, as four Iranian diplomats had found on being stopped by Christian Lebanese Forces the previous year. The four have never been heard of since.

US diplomatic staff, now accommodated with a British embassy building on Beirut's Corniche, were another source of concern. Traffic along the four lane highway was blocked off to stop car bombings, but this could not prevent sporadic rocket attacks. The US Army soldiers assigned to this building were accommodated at a nearby hotel, which came under threat from Druze militia forces, forcing a negotiated withdrawal.²⁰⁰ Contingency plans for a full-scale evacuation by sea were in place should the position deteriorate further.

Threats did not end with the land surface of the city. Out to sea, the Navy task force remained constantly on the alert against an attack from a fast-moving small boat that could be loaded with explosives. On 30 October, the USS *Harlan County* had to open fire with .50-calibre machine guns to warn off rapidly approaching Zodiac boats. Defences were also prepared in the event of a suicide attack from the air.²⁰¹

In the airport itself, memories of Vietnam were brought back for veteran Marines on the discovery of a 'labyrinth of tunnels beneath BIA, where one passageway terminated in the basement of the BLT's headquarters. We eventually blocked it and posted a Marine sentry 24/7.'²⁰² An underground network discovered near the Sports Stadium in the Italian MNF sector had been used extensively by the PLO for operational support, storage, and arms smuggling.²⁰³

In the face of this wide spectrum of threats, security decisions at BLT HQ reflected a more linear approach being guided by an assessment that the main danger would continue to come from 'conventional small arms, mortar, rocket, and artillery fire'²⁰⁴, against which the four story building offered good protection²⁰⁵, and for this to change they required a clear indication of a different kind of threat.

Although deluged with daily threat information, the MAU Commander received no specific warning of the time, place or technique of the 23 October 1983 attack.²⁰⁶

The Long Commission highlighted two areas of weakness in the security arrangements in force at the BLT. Firstly, a failure to raise the alert level to condition 1, and secondly the continuation of ROE that stipulated magazines not be inserted in weapons. A systems theoretic approach, however, would not see these as decisive.

The Long Commission highlighted two areas of weakness in the security arrangements in force at the BLT. Firstly, a failure to raise the alert level to condition 1, and secondly the continuation of ROE that stipulated magazines not be inserted in weapons.

A systems theoretic approach, however, would not see these as decisive. The MAU had been at Condition 1 for most of September, but high-alert levels are difficult to sustain over a prolonged period. Over time, they take their toll in stress and fatigue, and inevitably degrade in their effectiveness. The Marines already had experience of this following the bombing of the US embassy in April. In Colonel Mead's words,

Initially after the American Embassy went, we went into a condition one-type situation. But then I began thinking . . . I'm wearing my men down, without more specificity of a threat.²⁰⁷

The ceasefire on 26 September gave a welcome opportunity to lower the condition level to 3.

Certainly a Condition 1 alert, and loaded magazines at the ready, might have allowed security guards to engage the driver of the truck before the vehicle reached the building. This may or may not have prevented detonation, the bombers had prepared for this contingency.²⁰⁸ The driver of the bomb that destroyed the French MNF HQ **was** shot and killed outside the building, and a 'noticeable amount of time... passed before the device was initiated'²⁰⁹ suggesting the use of a remote trigger. And as the Commission also noted, the bomb was of such a size that

significant casualties would probably have resulted even if the terrorist truck had not penetrated the USMNF defensive perimeter but had detonated in the roadway some 330 feet from the building.²¹⁰

The Commission also criticised the BLT commander for 'the concentration of approximately 350 members of his command in the BLT headquarters thereby providing a lucrative target for attack.'²¹¹ The MAU commander was likewise found at fault for 'condoning' this decision. 'Dispersal of forces' is a recognised military tactic, however in this case the position was not so clear cut. As Colonel Geraghty explains,

During the six months prior to the bombing, we suffered only one casualty in the vicinity of the BLT Headquarters. It is germane that during the same period, the French MNE, which utilized dispersed billeting in 36 locations, had suffered more than 50 casualties and, in fact, had consolidated its billeting just prior to the suicide terrorist bombing.²¹²

The judgment was made, therefore, that the benefits of concentrating BLT HQ functions and billeting in the one well-protected building outweighed the risks. There was a clear logic to this conclusion so long as the airport remained under a constant stream of conventional arms fire.

Nevertheless, the BLT HQ was clearly vulnerable. This was due to its location in the utilities and maintenance section of the airport, not far from the main terminal, an area accessed daily by large numbers of Lebanese nationals.²¹³ Running alongside the perimeter fence was the main airport road into the terminal. It was also the site of extensive repair and construction activity. As a result, heavy trucks and plant were permitted to park overnight within this area, even though access was restricted between the hours of 2100 and 0600. The sight of a large truck in the car park to the south of the BLT HQ at 0500 on the morning of 23 October was normal enough not to raise any concern among the security detail on duty at the time.²¹⁴ In fact on Sundays, the car park was a popular picnic area for local families.²¹⁵

Between the BLT HQ and this car park lay only a wire fence and roll of concertina wire, leaving the building vulnerable to an attack from a truck-borne bomb, such as the devices used to destroy the US embassy building on 18 April 1983 or the Iraqi embassy in Beirut two years previously. Defensive measures such as a berm, anti-tank ditch and other vehicle obstacles might have been able to deny a truck access to the building, however the main airport road and the car park were close enough for a large bomb to have a devastating effect without penetrating the perimeter. Furthermore, on 4 November in an attack on an Israeli military headquarters in Tyre, a truck carrying explosives did succeed in eluding many of the same defences that the US Marines were castigated for not having. The truck bomb detonated in the vicinity of headquarters, killing 60 and wounding another 30 soldiers.²¹⁶

When You Don't Have Control, You Don't Have Security

From a systems perspective, the real problem was not the presence or absence of this or that particular security measure, it was the lack of **control**. By October 1983, the 24th MAU clearly found itself in a 'state of high risk', including a threat from its immediate environment, the airport. However, the Marines lacked any means of controlling this environment, or even their own interactions with it. US Marines Commandant Gray put it this way,

Lebanon is known as a country of commerce, and the BIA was a symbol for this activity. There was therefore a major construction effort going on throughout the area, and the airport was extremely active. At least twenty big construction trucks were working there the

day of the bombing, and our Marine forces had no authority, rightly or wrongly, to interfere with their operation.²¹⁷

Colonel Geraghty likewise stated the problem in blunt terms, 'We had little control of civilian traffic coming to and from the airport complex, and when you don't have control, you don't have security.'²¹⁸

In the aftermath of 23 October, a number of control mechanisms were introduced. These included restrictions on vehicle and pedestrian access to command posts, physical obstacles placed at entrances, and the closure of two lanes on the airport road. These went some way towards solving the issue, but what was really needed was full access control over all airport traffic. Only the Lebanese Armed Forces had the resources to contemplate this, and they controlled the key checkpoint at the roundabout coming into the airport. Cooperation would also have been required from the airport authorities, and the industrial stakeholders who had legitimate business to conduct within the airport limits. A period of disruption to normal airport functioning would have been inevitable while IDs and passes were issued, procedures established, and new traffic arrangements set in place. For all of this to happen, both the political will and the resources, financial and technical, would have had to be available. There is no evidence that either did in fact exist.

Following the bombing, most of these measures were introduced, including 800 'dragons teeth', concrete blocks strong enough to prevent the passage of a large truck. The construction costs of fortifying the Marines position were scheduled to total \$7.5m, of which the Lebanese government was to make a contribution through the installation of street lighting. This never materialised.²¹⁹

The MAU commanders did not press the issue of airport access. The Marines' senior officers were reluctant to take any action that could be perceived as that of an occupying force. Imposing ID checks and access restrictions, causing inconvenience to travellers and airport staff, or complicating construction efforts could have generated a public relations backlash. After all, this was exactly how the Israeli, Syrian and Palestinian forces behaved. An important part of the US MNF mission was to assist with the re-establishment of Lebanese control over its own territory, and the Marines' conduct inside the area that was its responsibility was an important differentiator between the MNF and the other foreign militaries present in Lebanon.

The significance of the airport added political pressure to any decisions that might affect its day-to-day operation. 'The US Ambassador to Lebanon, and others in the State Department, saw an operational airport as an important symbolic and practical demonstration of Lebanese sovereignty.'²²⁰ Reopening the airport by clearing away the volumes of ordnance lying around had been the Marines' initial task on landing, and had cost the MAU its first fatality. On 27 October 1983, President Reagan made the following comment, 'Our Marines are not just sitting in an airport. Part of their task is to guard that airport. Because of their presence the airport remained operational.'²²¹ This suggested that the Marines had an 'implicit' responsibility 'for ensuring an open airport.'²²²

The problem was that the Marines' own security was dependent on the security arrangements in place at the airport, and the Marines were entirely reliant on the LAF for these... as the situation deteriorated, 'migrating' into a 'state of high risk', the absence of any control over this environment became a critical area of vulnerability.

This, however, was never made explicit. Colonel Geraghty was insistent on this point. 'The Marine presence enhanced the Lebanese Army's responsibility of providing security at the airport, but providing security for the BIA was never a mission of the US MNF.'²²³ And in practice, it was the LAF that did handle airport security.

The problem was that the Marines' own security was dependent on the security arrangements in place at the airport, and the Marines were entirely reliant on the LAF for these. In the early stages of the mission, while the environment was still 'benign', this represented no real cause for concern. But as the situation deteriorated, 'migrating' into a 'state of high risk', the absence of any control over this environment became a critical area of vulnerability.

Marines Manipulated by the Lebanese Armed Forces

It also distorted decision-making in other ways. The airport location was highly exposed to artillery fire from the high ground to the east and south—the Shouf Mountains. Dependence on the LAF for their own security led the Marines to look favourably on the LAF's intent to challenge the Druze militia for control of the Shouf, and to allow themselves to be drawn in to providing logistical and fire support for the LAF operations that followed, including the battle for Souk-el-Gharb. This made sense from a tactical perspective. Unfortunately, as we shall see, it did not take into account the realities of Lebanese history and politics.

The US MNF had no control either over the LAF's actions, even where these had a direct impact on the Marines' own mission and safety. Liaison elements did exist, but these were based in the Presidential Palace and as General Joy found, the Lebanese officers there

were a step behind the operational usefulness of the information that was passed to the MNF liaison officers. It was like a press debrief of the previous day's events and we didn't get anything in a timely manner or know exactly what was going on.²²⁴

This limitation was finally overcome in the closing days of the US MNF, but it remained the case that throughout the Marines' deployment in Beirut, the LAF's operational decision-making was driven solely by domestic concerns. These included an assault on the Shiite village of Hay

es Salaam, where the Marines had a checkpoint, on 23 September.²²⁵ This inevitably led to spill over fire endangering Marines, who were therefore drawn into the fight by the need to protect themselves. What the LAF's objectives were in this operation is unclear; Hay es Salaam was of no strategic significance in itself but was Amal territory and would be vigorously defended against any LAF incursion. The most likely explanation is that the LAF wanted to manipulate the Marines into active hostilities with Amal, the LAF being engaged in an on/off struggle for control of South Beirut with Amal during 1982 and 1983. Amal for its part, had no hostile intent towards the US MNF and had been content to leave the Marines in Hay es Salaam alone for most of 1983, until the situation deteriorated through the intervention of the LAF.

Manipulation of this kind was commonplace. After the Israelis had withdrawn from their base at Khaldeh, immediately to the south of BIA, the LAF drew up an operational plan for seizing the town. That plan had its line of departure extend from within C Company's positions at the southern end of the airport. Colonel Geraghty commented,

The LAF then mounted the main axis of its assault through Charlie Company's positions and into the adjoining town of Khaldeh. The returning fire from Druze and other Muslim positions was intense and accurate... Our responses were necessary, measured, and appropriate but were likely perceived by competing Muslim sects as offensive support to the LAF assault. The US MNF was caught in the middle of the assault, and there was little we could do to influence events. It would not be the last time I felt we were being used.²²⁶

This susceptibility to manipulation extended beyond the LAF. Colonel Geraghty gave another example of this,

Marine positions were occasionally the target of incoming artillery from areas under the control of Christian forces ... These events reflected the desire of selected Lebanese elements to deepen the Marines' involvement in their nation's plight. Their purpose was clear to me; they wanted to provoke us into unleashing our massive firepower against the Druze and Muslim militias.²²⁷

The ability to control events did not improve during engagements with other militia groups. Baczowski describes a common predicament that faced Marine artillery commanders.

The militia had the initiative. They fired first; the US MNF fired second. If the militia wanted to alienate the US MNF from the local population, the illumination rounds (fired in warning by the Marines) could be a sign that they had almost lured the Marines into engaging them. They could retain the initiative by firing one more indirect round on the Marines and then displacing. The Marines would return fire with high explosive rounds but would only do so based on the actions of the militia. Therefore, the militia had absolute control. If the illumination rounds were on target, the militias might not fire on the Marines. If the warning rounds were over an area they did not care about, they could fire with no fear. If they wanted

the rounds to hit civilians, they could even position civilians under the illumination rounds before they returned their second round.²²⁸

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As Baczkowski goes on to explain, 'a similar situation existed during patrolling activities'.²²⁹ Here again, dependence on the LAF was the cause of the problem. The Marines had made the decision to include LAF elements on their patrols and checkpoints, as these had the language skills and local knowledge to deal with potential sources of conflict, overcome any misunderstandings, and consolidate good relations with the population groups inside the Marines' area of operations. But this assumed that the LAF were acting in good faith on behalf of the US MNF peacekeeping mission, and not pursuing their own agenda, which was quite different. This was a particular problem in Hay es Salaam and other predominantly Shia districts, where the LAF was seeking to displace Amal.

The Absence of Feedback on the Impact of their Actions

Reliance on the LAF for interactions with Lebanese civilians and militia members denied the Marines any opportunity for receiving feedback on the impact of their actions and how they were being perceived by key stakeholders. According to systemic theory, feedback loops are an essential feature of any control mechanism,²³⁰ as they provide insight into how effective actions are in maintaining the stability of a system, into any dysfunctional interactions, unintended consequences and the overall 'at risk' state at any one point in time.

This deficiency was most visible when it came to intelligence. Frank gives this description of the problem.

According to Major Farmer, considerable disinformation was published or broadcast by warring Lebanese factions. On numerous occasions, he was told that the MAU was going to be attacked by mortars or artillery at a given time. Such information was even broadcast over the local Phalangist radio station, the Voice of Lebanon... The Marines could not go out to the countryside to confirm the threat reports.

Lebanese sources usually provided the best HUMINT [human intelligence]. It was impossible, however, to determine how much of this information was valid because the Marines had no feedback system for assessing the results of these actions. Marine response to HUMINT tips may have thwarted dozens of terrorists; or the Marines may have been batting near zero. They just couldn't tell which was the case.²³¹

If a civilian acted hostile to a Marine patrol, the practice was to call back to headquarters and a Lebanese liaison officer was sent to investigate. Marines had no feedback on what caused the hostility. While they were targets of aggression, they never really knew why.

As a result, Marines often had to act in the blind. Baczkowski describes a typical situation.

If a civilian acted hostile to a Marine patrol, the practice was to call back to headquarters and a Lebanese liaison officer was sent to investigate. Marines had no feedback on what caused the hostility. While they were targets of aggression, they never really knew why.²³²

The reality was that in many cases the reason for the hostility was the LAF itself, and the Marines' association with it. As the LAF wanted this partnership to continue, and sought to further draw the US MNF into providing as much operational support for its actions as it could, the LAF were not going to give the Marines an objective account of what was going on in the areas surrounding the airport and why local hostility was on the rise.²³³

The MAUs trained, patrolled, and manned checkpoints with the LAF even though common knowledge was that the LAF used 'strong-armed' tactics against the Muslim villages surrounding the airport. While numerous signs that the US MNF was targeted because of its association with the LAF existed, this lesson was not learned until after the BLT headquarters bombing.²³⁴

Frank provides an example with this incident that took place in a Shia district not far from where Colonel Mead had earlier witnessed 'what appeared to be heavy-handed tactics on the part of the LAF against the Palestinians and Muslim squatters living just outside the airport'²³⁵.

In response to a grenade attack on a 22nd MAU patrol, the LAF cordoned off an area and arrested over 100 people. One suspect was convicted of the crime and sentenced to death. The LAF reported the suspect was pro-AMAL. The LAF could have fabricated the story to justify their earlier actions.²³⁶

The trouble was the Marines had no way of knowing.

Who Is a Friend and Who Is the Enemy?

On 15 August, a general strike called by Amal over economic and social grievances escalated into an all-out confrontation as the LAF made a challenge for control of West Beirut and the southern suburbs that made up the Shia heartland in the city. It was during this period that the Marines came under increasingly intense fire at their outposts in Hay es Salaam and the Lebanese University.

This coincided with the bitter fighting taking place in the Shouf district between the Christian Lebanese Forces (LF), the LAF, and the alliance of militia groups that had coalesced around the Druze Progressive Socialist Party (PSP) and the National Salvation Front. Inside the Palestinian refugee camps, PLO militants were also attempting to reassert control, bringing them into conflict with both Amal and the LAF. Three separate contests were underway at the same time. None of these conflicts had any direct connection with the MNF, however all of them at one time or another put the Marines on the receiving end of gunfire, either by accident due to their proximity to the fighting, or because of their co-presence with LAF units. This unpleasant reality made the LAF appear to the Marines as their firm ally, and everyone else as the 'bad guys', an impression that suited the LAF's purposes fine.

All of them at one time or another put the Marines on the receiving end of gunfire ... This unpleasant reality made the LAF appear to the Marines as their firm ally, and everyone else as the 'bad guys', an impression that suited the LAF's purposes fine.

But such black and white terms are rarely appropriate, all the more so in the highly complex political and military situation that marked Lebanon in 1983. This can be seen clearly from the case of Amal, which the US MNF characterised as an enemy, and with which it got caught up in a long running battle on the perimeter of the airport and in Hay es Salaam, one that cost several Marines their lives.

The truth was, however, that Amal was a natural ally of the US MNF. Not only this, but Amal made persistent efforts to cement an alliance with the Marines, or at least come to an understanding that would avoid unnecessary conflict between the two forces. One example of this was Nabih Berri's prompt return of the two Marines captured at an Amal checkpoint and his apology for the incident. The obstacle to a rapprochement between the Shiite militia and the US MNF was the LAF, which was keen to take advantage of the power vacuum in southern Beirut created by the withdrawal of the PLO, an objective shared by Amal. This placed the LAF on a collision course with Amal, and the Shiite community it represented. It was in this context that the Marines relied on LAF liaison officers to mediate between themselves and the Shia of Hay es Salaam and elsewhere.

As with all the militia actors, Amal's motives were driven by local political considerations. This meant its major concerns were to consolidate and extend Amal's power base among the Shia, and to advance their interests in interactions with the other Lebanese factions. During this period, Amal faced a series of threats and opportunities on both fronts. The most important of these was the opening created by the departure of the PLO, whose bases had been located in the traditional Shia heartland of southern Lebanon, along the border with Israel, and in the Palestinian camps of the

southern Beirut, another predominantly Shia area. While Amal gave verbal support to the cause of Palestine, relations between the Shiites and the PLO had soured over the previous decade. This was due to the death and destruction brought to southern Lebanon by Israeli retaliation and occupation in the wake of Palestinian attacks launched from this region into northern Israel. In addition to its seemingly callous disregard for the consequences of its actions on Lebanese civilians, the PLO also alienated the local population by acting as an occupying force, controlling traffic movements and imposing order through the use of their armed power.²³⁷ A similar pattern took place inside Beirut around the camps.

When Israel invaded Lebanon in 1982 and expelled the PLO from both southern Lebanon and Beirut, this created a vacuum and Amal was determined to take full advantage of the moment and re-establish its authority over the Shia areas. For this reason, it adopted a pragmatic approach to both the Israeli occupiers, and the Christian Phalangist government installed with Israel's backing, putting up little resistance to the IDF and at times settling its own scores with the PLO. Amal opposition to the May 17 Agreement between Lebanon and Israel was muted in comparison to other factions, and Amal kept its distance from the Syrian-sponsored National Salvation Front that brought together all the major opponents of Gemayel's presidency.

Amal's objective was to win a seat at the table for the Shia, if necessary at the expense of other Muslim parties. In 1985, Amal effectively destroyed the predominantly Sunni Arab Nationalist Mourabitoun militia's hold over West Beirut and forced its leader into exile. It was able to do so in part because of an alliance with the LAF's 8th Brigade, a Christian army unit.

Within the Shiite community, this policy ran into opposition. Many saw it as a betrayal of principle. In part, the disagreements among the Shia reflected differences of social class and political orientation. Amal's strongest base lay in the more secular Shia middle class²³⁸, and its program was directed at winning a larger share of state allocations to infrastructure and development projects that would benefit Shiite areas. These had been neglected in the past by Lebanon's power structure, historically dominated by an arrangement between Christian and Sunni groups to share state resources between themselves. Amal's objective was to win a seat at the table for the Shia, if necessary at the expense of other Muslim parties. In 1985, Amal effectively destroyed the predominantly Sunni Arab Nationalist Mourabitoun militia's hold over West Beirut and forced its leader into exile. It was able to do so in part because of an alliance with the LAF's 8th Brigade, a Christian army unit under the leadership of Michel Aoun, the same brigade rescued at Souk el Gharb by US Navy fire support.

Amal's evolution made it appear, to many Shiites, as no different from the corrupt political bosses that had traditionally controlled politics in the south before the Shia awakening of the 1970s. Its opportunist conduct following the 1982 Israeli invasion generated a backlash and a split within its leadership that led to the formation of Islamic Amal. This new faction received material and spiritual support from Iran, which sought to counter Syria's influence among the Shia through Amal. Islamic Amal was to form the nucleus of Hezbollah when it emerged a year or two later.

Ironically, the destruction of the PLO as an effective military force in Lebanon generated a wave of sympathy for the Palestinians across the Shiite community, now that they no longer had to tolerate the presence of PLO fighters in their midst or suffer Israeli retaliation strikes. Islamic Amal was able to make political ground against Amal by returning to the Shia's traditional stance of support for Arab resistance to Israel.

The shifting balance of forces inside the Shia made it a matter of urgency for AMAL to consolidate its hold over South Beirut, where three of the largest Palestinian refugee camps were located—Sabra, Chatila, and Burj al Barajneh. The last of these lay just north of BIA, and so it was important for Amal not to have its freedom of movement restricted during operations in this area. For this reason, Amal was keen to come to an arrangement with the US Marines based at the airport.

US MNF perceptions of Amal were shaped by the information about the militia and its motives passed on to them by the LAF, and by the fierce fighting taking place in Hay es Salaam, presumed to be Amal territory. The Marines were surprised therefore, when Amal members from Burj al Barajneh with a grievance against the MAU walked up to a checkpoint and attempted to solve the issue through discussion.

Around this time, the AMAL in Burj al Barajinah seemed to think that they had a special relationship with the Marines. On the evening of 6 December, several AMAL appeared at the airport and complained to the LAF liaison officer that the Marines building bunkers on the eastern perimeter were impinging on AMAL territory. They said, 'that it was too close to them and they wanted it stopped. If we didn't stop it, they were going to shoot at us.'²³⁹

The Marines did not stop, and they were shot at the next day, returning fire in sufficient amount to suppress several known Amal positions in the area. In spite of this, Amal persisted with attempts at negotiations, this time raising their complaint with the US Embassy.

AMAL called the American Embassy to ask how they could arrange a ceasefire. They complained that the Marines weren't 'responding in kind, that they thought they had an agreement'. Well, they didn't have any agreement, but that had been the rules of engagement, and they were aware of them, I guess. Prior to this time, and certainly prior to the 23 October bombing, the rules of engagement decreed that Marines would respond proportionally to

any life-threatening fire from any quarter. 'Well, after 23 October, that made no sense'. And so the fire the Marines returned on 8 December was intense enough to destroy the positions firing upon them and lethal enough to cause AMAL casualties.²⁴⁰

When the Marines changed their mode of operating in the wake of 23 October bombing without telling anyone, Amal believed they had a right to feel aggrieved ... They also saw it as entirely appropriate to attempt to resolve a dispute through a combination of negotiations interspersed with gunfire. This was the normal way of doing business.

This was clearly the result of a cultural misunderstanding. Lebanon had been at war for eight years by this point, almost every faction had fought every other faction at some stage as alliances shifted and groups sought to gain advantage over their rivals or former partners. But while some horrific massacres of civilians had been carried out by all sides, it was rare for militia forces to seek to annihilate one another in all out war. More common were limited exchanges of artillery or small arms fire with strictly tactical objectives, conducted against a background of constant political manoeuvring and deal-making. In the meantime, everyday life went on with as much normality as circumstances would allow. This was the Lebanese way, as it tends to be in protracted civil conflicts everywhere. When the Marines changed their mode of operating in the wake of 23 October bombing without telling anyone, Amal believed they had a right to feel aggrieved, particularly so as the terrorist attack on the BLT HQ had nothing to do with them. They also saw it as entirely appropriate to attempt to resolve a dispute through a combination of negotiations interspersed with gunfire. No 'special relationship' was required here; this was the normal way of doing business.

Lack of Communication Channels with the Militias

The problem was that the US MNF had no lines of communication with Amal or any of the militia forces. This stood in sharp contrast with the emergency link to the IDF and the regular liaison meetings with LAF commanders and intelligence officers. In the case of the IDF, the availability of communication channels was essential in avoiding potentially serious incidents from escalating on a number of occasions. With the LAF, it was from this source that the Marines largely built up their picture of the current military situation and interpreted developments. Frank comments,

The inability to communicate with all the local parties led to an unclear situation. Unlike the situation with the Israelis that was very clear, the firefights between the surrounding militias were never clear. Major Arey said, 'the longer we stayed the more we knew, but the less we understood it because of the murkiness of Lebanese politics. Had the US MNF

been able to communicate with the local militias, they could have used less force, provided more accurate intelligence to their diplomats for negotiating, and accomplished their mission more effectively.²⁴¹

In a sense, it was even more important for the US MNF to have the ability to communicate with Muslim forces, as the cultural distance between them and therefore the possibilities of misunderstandings was much greater. In the early days of the tour, this was recognised by some senior officers.

Lt Col Anderson was concerned his Marines would naturally align with the Christian population because 'Christians speak the same language and wear Western clothes. Moslems dress differently and speak a different language. It is much more difficult to feel comfortable with them.'²⁴²

This problem applied with even greater force in the case of the French, with close historical ties to the Maronite community. The British on the other hand, were able to exploit their equally historic connections to the Druze, while the Italians worked hard, and with good success, to build relationships with the Palestinians in the camps they supervised.²⁴³ The US Marines were at a particular disadvantage, in that they lagged behind in the linguistic and cultural skills of their MNF partners. 'The dilemma for the Marines was that they had to deal with parties whose culture they knew nothing about.'²⁴⁴ This was a dilemma not shared by the 'parties' on the Lebanese side, many of who were highly educated, had travelled widely, and understood the American mindset well. Nabih Berri of Amal for example, had lived in Detroit during the 1970's and married a native of Dearborn, Michigan.

Recognising their weakness in this area, MAU commanders gave instructions that Marines were not to interact with anyone other than members of the LAF, and in all situations they were to follow the ROE and their orders to the letter, or else refer any matters up the chain of command. The intent was to avoid Marines being 'manipulated or tricked' into compromising their neutrality. Frank writes,

While this prohibition may appear to be a good solution to the problem, it severely handicapped the Marines, especially in situations requiring quick reaction. In effect the ROE and no-talk policy took decision-making responsibility away from the small units and placed it at the highest tactical level or even at times at the diplomatic level.²⁴⁵

It also gave the Marines no opportunity to learn from interactions with local players and develop a feel for the situation.

It also gave the Marines no opportunity to learn from interactions with local players and develop a feel for the situation. In the early period, when conditions were more benign, extensive foot patrolling in Hay es Salaam and other areas allowed Marines to gain a sense of the 'atmospherics', and were quick to note changes in the attitudes of residents towards them. Later however, when the only exchanges were bullets and artillery rounds, there were no such opportunities. In many of these gun battles, the Marines had no idea who was shooting at them or why. In his account of the 24th MAU experience, Colonel Geraghty mentions Syrians, Iranians, Amal and PLO fighters as all present in Hay es Salaam at one time or other during the intense firefights of autumn 1983.²⁴⁶

At the same time, he also recounts running into an Amal checkpoint on his way back to base after a meeting at the Ministry of Defence up the hill. The atmosphere was tense, and weapons were drawn, but the two USMC jeeps were waved through without incident.²⁴⁷ The colonel does not comment on the contradiction between this behaviour and his description of the fighting in nearby Hay es Salaam, but his disorientation is on display when he says, 'We came upon some makeshift barricades and an illegal checkpoint set up by a radical Amal militia. This was their territory.'²⁴⁸ Yes, it was, and it was just as well for the convoy that it was Amal's checkpoint and not a more hostile faction's.

The Contrast with How the US Embassy Security Detail Operated in Beirut

The US Marines' refusal to develop any kind of understanding with local forces not only set it apart from the other members of the MNF, but also from the US Embassy security detail. The temporary embassy building was in a highly exposed location in the business district of Beirut, which was contested territory occupied by a number of militia groups. The contrast between the way security was handled at the embassy and at the airport is so stark that Frank's account is worth quoting in full.

Surrounding the embassy area was a fairly large group of Druze PSP militia. They apparently had a good talking and working relationship with the American Embassy's Regional Security Officer, Alan O. Bigler ... Having been in one position for so long, [USMC Lt] Ettore and his men were able to recognize individual PSP militiamen personally and at times were able to deal with them through Bigler. Once, when Ettore needed some dirt to fill sandbags, he passed the word to Bigler, who, in turn, told Salim, the local PSP leader, 'and the Druze actually hauled us in some dirt'. Despite the heavy fighting which erupted in west Beirut in early February, the status quo between the Marines and the PSP remained in force, and the Marines were not fired upon by the locals. Several unknown assailants did, however, fire upon Marines unloading a helicopter at Landing Zone Oriole, near the embassy, without causing any casualties. According to Ettore, Salim told him that they were not his men, and that 'several times, when some of his people caused incidents, he would just simply offer to kill them to show his sincerity. He said, 'Do you want me to kill them?' And I would say, 'No,

no!' But all you had to do was just tell him, 'Look, this guy is bothering us, don't let him back here,' and you'd never see the guy again.²⁴⁹

This was February 1984, in other words **after** the US Navy's intervention against the PSP and its allies at Souk el Gharb. The relationship with Salim at the embassy had been strong enough to survive those events.

The Marines, on the other hand, continued to rely on the LAF for their security. Their hand was finally forced, however, when the Lebanese Army disintegrated completely in early February and their checkpoints around the airport were abandoned. It was Amal that stepped into the vacuum. Amal's conduct at this point would have come as a surprise to many Marines.

On the night of 5th February, the AMAL and the PSP went on the offensive all over west Beirut and the southern suburbs. LAF units along the airport road leading from Beirut to the terminal essentially laid down their arms and left quietly, with the AMAL just as quietly taking over the abandoned posts and terminal area that night. The only building they did not occupy housed the LAF liaison office. An AMAL leader, Dr. Salinas, visited the office, and asked that the Marines be advised that 'the AMAL does not want to fight the Marines!' He reportedly requested that the Marines not fire on the AMAL, and said, 'Even if the Marines attack us, we will not return the fire'.²⁵⁰

A few days later, Amal extended its zone of control to include Khaldeh, south of the airport. The Marines were now introduced to a second Amal figure.

One of the AMAL representatives, a man named Tylass, who was described as a young Muslim war chief, contacted the Americans and said, 'We are responsible for West Beirut, we are responsible for the southern suburbs,' and 'we will see to it that the airport is safe, we will see to it that the Marines are not attacked, we will ensure that only authorized vehicles will transit the coastal highway.'²⁵¹

Frank adds, 'The AMAL did what they promised to do.'²⁵²

The Marines' dependence on the LAF for all their interactions with Lebanese actors denied them the opportunity to cultivate a relationship with Amal that could have been highly supportive to their mission as peacekeepers, as Amal was in many ways a natural ally of the MNF. It may also have provided them with the actionable intelligence on the terrorist threat being prepared by Amal's rivals they so clearly lacked, or else have allowed the US Marines to maintain the same perception of neutrality that the Italian and British components of the MNF were able to do, and so avoid becoming a legitimate target in the eyes of marginalised elements within the Shi'ite community. This would have made Iran's task much harder when it sought out local agents to strike a blow against its enemy, the USA.

A False Estimation of the LAF's Capabilities

Without question, a dialogue with Amal would have given the Marines a much richer appreciation of the situation in Lebanon and informed some of the key decisions that led to the MNF's failure. This includes the decisions to provide fire support and hand over ammunition stocks to the LAF during its offensive in the Shouf, which was not only a political miscalculation, but also rested on a false estimation of the LAF's capabilities and even of the very nature of the Lebanese Army as a viable fighting force in the ongoing civil war.

This mistaken estimate of the LAF is apparent in Colonel Geraghty's repeated praise for the LAF, both in training and on operations. Since December 1982, the Marines had been involved in the creation and training of air assault units 'even though the Lebanese had no assault helicopters'.²⁵³ The 24th MAU commander attended the 3rd Company's graduation ceremony, and presented certificates to

the top graduating soldiers from a class of 280. I recall that the honor graduates represented all religious factions of the LAF; the Christians, Shia, Sunni, and Druze. During some later fierce battles, they held together as a credible national army, fulfilling General Tannous' dream.²⁵⁴

The real position was very different, as we shall see, but Geraghty never lost his positive opinion of the LAF, either as a non-sectarian force or for its performance in combat. After two weeks of intense fighting in Beirut's western and northern suburbs, the colonel wrote these words of praise for the LAF.

The fighting during this period had been the most explosive that had occurred since our arrival, but it also represented a significant positive step for the LAF. Almost all the LAF units were committed, and considering their religious integration and level of training, they performed surprisingly well. Their continued strong performance during the Mountain War was, in my opinion, one of the primary reasons that the leadership in Tehran and Damascus decided to move into the shadows and use terrorism after conventional attacks failed.²⁵⁵

Colonel Geraghty repeated this assessment in relation to the battle at Souk el Gharb, writing,

I had observed firsthand the LAF's training and its integration of the religious groups into the army. Although the majority of officers were Christian, they also had Druze, Sunni, and Shia field grade and company grade officers in their ranks. More than 60% of the enlisted ranks were Muslims. Overall, the LAF had made remarkable progress in a relatively short period. Its main deficiency was that it needed more time and training to develop the men's combat skills and mature into cohesive combat units. However, they appeared to be fighting together with determination in repulsing several fierce attacks.²⁵⁶

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The Lebanese Army had always been one of the few national institutions possessed by the state of Lebanon, and as such was viewed with pride by all the various religious communities. The Lebanese Armed Forces were integrated and included Lebanese of all faiths. However, as with other national bodies, the key positions were distributed according to a set arrangement. The Army Commander-in-Chief was always a Maronite Christian for example, and the Chief of Staff, a Druze.

The cement that held together the unity of the LAF consisted of its role as defender of Lebanon against external enemies. This meant its capacity to intervene in internal disputes was always limited. When the civil war erupted in 1975, Prime Minister Karami was able to resist a Christian push to deploy the Army in the fighting, a move that would have led to its rapid disintegration. The price for avoiding this, however, was that the Army was relegated to the margins and played no significant role. This reduced its prestige to a large extent.

On coming to power in September 1982, President Amin Gemayel launched a new vision for an expanded Lebanese Army of some 60 000, a central pillar of a new, post-civil war Lebanon. Gemayel introduced conscription, which guaranteed a cross section of the population would make up the remodelled Army, with Christians clearly in the minority. The Air Force and Navy remained predominantly Christian.

Gemayel's initiative was based partly on a Phalangist narrative that had blamed the outbreak of war on the presence of the PLO, who were seen as intent on taking over the country after failing to achieve the same objective in Jordan previously. Now the Israelis had removed the Palestinian armed groups from Lebanon, the nation was free to rebuild its national institutions, much as they had been pre-war. The President also counted on his new alliance with Israel, formalised in the May 17 Agreement, which was intended to deliver a withdrawal of Syrian troops from Lebanon as well as the IDF, and on the willingness of the United States to supply and equip his new armed forces.

This vision for the Lebanese Armed Forces contained many of the same weaknesses affecting Gemayel's broader political agenda. The Phalangist interpretation of the reasons for the civil war was itself tendentious and was not accepted by many of the key actors. The Lebanese National Movement, which brought together a range of Lebanese parties, mostly Leftist, in alliance with the Palestinians, had fought for an ideal of a non-sectarian Lebanon, no longer dominated by the Maronites or any other religious group. The Phalangists had defeated the LNM in 1976 when the

Syrian Army intervened on the side of the Christians during the siege of Tel al Za'atar, a PLO stronghold in East Beirut. In 1983, however, the Syrians rejected the May 17 Agreement and gave their support to the National Salvation Front. In part, this was because Gemayel made a crucial error in not responding to overtures from AMAL who wanted to be included in his government. This pushed AMAL and its Syrian backers into the arms of the NSF, led as had been the LNM by the Progressive Socialist Party of the Jumblatts.

As a result, Gemayel's resurgent LAF launched an offensive against AMAL across western and southern Beirut, followed immediately by its move into the Shouf as the Israelis withdrew. This in turn led all the forces making up the NSF, including militias from the Lebanese Communist Party and its allies, the Syrian Social Nationalist Party, the Nasserite Mourabitoun and others to coalesce for a decisive confrontation with the LAF and LF at Souk el Gharb, under the leadership of the PSP.

This was an ambitious operational plan on the part of the LAF, and it soon found itself overstretched. This was first revealed in ammunition shortages and it was only due to a large-scale airlift carried out by the US Marines' air component, drawing on US MNF stockpiles that the LAF was able to continue operations at all.²⁵⁷ Without this support, the LAF had no possibility of taking the Shouf, and would not even have contemplated such a move. The role of the US MNF was therefore an important planning element factored into the concept of operations devised by the LAF senior command in the Ministry of Defence, and led directly to the showdown at Souk el Gharb. The LAF commanders knew the US was committed to backing them up if they ran into real trouble, and so could pursue an aggressive course of action that would have been completely reckless under other circumstances.

Colonel Geraghty gives a flavour of how the LAF behaved towards the US MNF during this period.

Ammunition, training, intelligence, security, and logistical assistance have been provided on an immediate and priority basis. My intelligence and operations section act as sub-operations centres for the LAF and are required to respond in order to support operations over which they have no control and of which they are not even apprised... I have a perception that our assistance to the LAF is not only unappreciated and taken for granted.²⁵⁸

By surrendering control over operations in this way, the US MNF had already played a decisive role in the battle for Souk el Gharb, before the US Navy opened fire with its 5-inch guns, for the contest would never have taken place without the US' participation beforehand.

By surrendering control over operations in this way, the US MNF had already played a decisive role in the battle for Souk el Gharb, **before** the US Navy opened fire with its 5-inch guns, for the contest would never have taken place without the US' participation beforehand. The end result of the contest was a stalemate, as was also the case in Beirut, which paved the way for a negotiated ceasefire on 26 September. This froze a situation that was largely unchanged from before the LAF offensive and was a more accurate reflection of the balance of forces within Lebanon, without the distorting influence of the MNF that had led the LAF to overreach itself.

The Marines' actions in support of the LAF rested on the assumption that the Lebanese Army's drive to win possession of the strategic points in the Shouf was entirely legitimate. By this stage, both US foreign policy and the day-to-day conduct of the US MNF had evolved into a position of propping up the Gemayel Government and a strong commitment to the success of its political and military projects. As a consequence, the US Marines came, over time, to accept and adopt as their own the LAF and Phalangist narrative that explained and legitimised the LAF's actions. This narrative, however, did not reflect the reality of Lebanon, instead it articulated a program for the future of the country, one that suited and benefited the Christian minority.

This may or may not have been a worthwhile vision for the US to endorse. The problem for the Marines, however, was not its political merit, but the fact that a program for Lebanon's political future became the framework through which they understood military developments and assessed their tactical position. This was how Colonel Geraghty came to make such a false estimate of the capabilities of the Lebanese Armed Forces.

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The air assault battalion under training by US Marines was an elite unit²⁵⁹, and was not representative of the Lebanese Army as a whole. Members of the unit were selected from the top graduates of basic training²⁶⁰, and a deliberate effort was made to include a cross-section of religious faiths, possibly for the benefit of the Marines who were to train them. The rest of the Army was organised along classic sectarian lines, the 2nd Brigade for example was predominantly Sunni, the 1st and 6th Brigades Shia, and Aoun's 8th Brigade was 80 per cent Christians from the far north. Unlike the 7th Brigade, also Christian but loyal to a rival of Gemayel and friendly with Syria, the 8th Brigade was seen as the President's most loyal and reliable unit.²⁶¹

So long as deployments were carefully handled, the integrity of the Army could hold. Use of the 4th and 8th Brigades in operations across North Beirut and the port area did not present any huge challenge, as their opponents were not Druze and this was a Christian area. But as soon as the battle for the Shouf was underway, the strain quickly became too much. The 4th Brigade, which was almost 50 per cent Druze, collapsed with massive defections to the PSP and SSNP militias. General al Hakim, the Army's Chief of Staff, also deserted his post at the Ministry of Defence building.

This episode, and the general collapse of the Army that began on 5 February 1984, were both triggered by operations around Khaldeh, to the south of the airport. Frank describes what happened.

That night, the LAF pounded the southern suburbs and Khaldeh with tank main gun, artillery, mortar, rocket, and small arms fire. A backlash resulted from this heavy handed effort when LAF Muslim soldiers, whose families lived in these areas, refused to continue fighting. Some left their units, while others just remained in their barracks. Meanwhile, Nabih Berri called the Amal out of the Lebanese Armed Forces, in fact, he called all Muslims to leave the LAF.²⁶²

The significance of Khaldeh lay in that it was the home of the Arslan family, a prominent Druze faction at that time allied to the PSP and Amal. This was the last straw for any Druze members of the LAF who had remained after the disintegration of the 4th Brigade.

The 6th Brigade, on the other hand, held together as a unit. Under the command of Major General Kanj, it simply switched its allegiance to Amal and retained its base in the Henri Shihab barracks of South Beirut. Later, this unit became a magnet for defecting Shia members of other LAF units and swelled to 6000 in number. This brigade was to provide effective security for the airport during the final weeks of the US MNF presence at BIA.

There is a certain irony in this turn of events. The MAU ended its time in Lebanon under the benign protection of the one force it had kept at the furthest arms length, treated solely as an enemy, and which it understood least of all. But this twist of fate was nothing more than a reassertion of the underlying reality that was Lebanon's political and military context. Just as the United States failed to take Amal's constituency into account in its political calculations, the Marine's failure to incorporate Amal into its tactical assessment of the military situation led it to encourage the LAF into launching an ill-advised offensive whose end result was the LAF's own destruction. The presence of the US MNF, in other words, by taking on the role of a combat support element for the LAF, produced a distortion of the real position inside Lebanon, and the circumstances under which it was to withdraw in February 1984 were none other than a return to Lebanese normality, with Amal firmly established as the dominant power in Beirut's south.

No Reference Point to Base a Decision on Whether to Return Fire or Not

It is the tactical implications of this failure that interest us from an HCD perspective. What this meant for the firefights in Hay es Salaam has already been touched on. Without any means to understand why they were coming under fire or from who, the Marines had no other reference point apart from their ROE on which to base a decision on whether to return fire or not. This made their responses predictable and easy to manipulate; it also made it impossible to arrive at any evaluation as to whether returning fire had been the correct course of action. Hostilities increased, but this could have been as much a result of the Marines' actions in defending themselves as it might have been their opponents' original intent. There was just no way of knowing; only the self-seeking interpretations of the situation provided by LAF liaison officers.

The 24th MAU's XO held this view of the matter.

And while we weren't necessarily looked upon as either neutral or friends, it was apparent we weren't looked upon as enemies, either, that the AMAL and the Druze appeared to go out of their way to ensure that they did not list us as enemies ... by and large, they did not group us, target us as an enemy. Those factions that did finally target us appeared to be from outside Lebanon.²⁶³

Lieutenant Colonel Slacum's analysis is consistent with his commander's reports of 'Iranians' in Hay es Salaam being responsible for the instigation of hostilities.

In spite of these reports, the Marines continued to describe the village throughout as Amal territory, and assumed their opposing forces to be made up of the Shia militia, as they were told by their LAF advisors. There was a contradiction here, and with a proper understanding of the situation, an opportunity to exploit. Amal at this point had a complex and problematic relationship with Iran, which was backing its Shiite rival Islamic Amal. It was a real possibility, therefore, that the escalation of attacks on MAU checkpoints in the vicinity of Hay es Salaam marked a local shift in power away from Amal's central leadership towards its internal opponents among Lebanon's Shia community. If so, then official Amal militia forces formed a potential ally in efforts to secure the area and restore the previously permissive environment in the village by collaborating to regain Amal control.

The MAU had no insight into these dynamics, or the possibilities they opened up. As a result, tactical decision-making around Hay es Salaam remained two dimensional and lacked any reference to a wider MNF mission. The price for this was high. Between 22 July and 9 September alone, four Marines were killed in action during fighting that served no clear purpose, beyond self-preservation. By late September, the positions near Hay es Salaam proved untenable, and units were redeployed closer to the airport perimeter. This slowed the flow of casualties, but its overall impact on the objectives and goals of the peacekeeping mission was unclear.

It is worthwhile to dwell on the tactical difficulties posed by this situation. The MAU units found themselves in a position where their available courses of action were determined exclusively by their opponents. Contact was initiated by an unknown enemy, and served whatever objective they were pursuing, which might be simply to draw the Marines into an exchange of fire. The Marines on the other hand, had no idea what this objective might be, and no particular goals of their own beyond minimising casualties. Once the incoming fire was heavy enough, a response could not be avoided, even if this suited the enemy's purpose.

Without a coherent situational assessment, it was impossible to determine goals and objectives to aim for, or to predict the consequences that might flow from a particular course of action ... As a result, the Marine units located near Hay es Salaam not only lost the initiative completely during this period, the MAU as a whole found itself increasingly in a state of paralysis, hostage to events out of their control.

If we take the decision to withdraw from the checkpoints near Hay es Salaam as our example, the difficulty becomes clearer. If we ask, 'was this the right thing to do?', we quickly find that we have **no basis** on which to arrive at an answer. It is impossible to evaluate this decision. More important is the recognition that this is not just a retroactive difficulty, the same problem applied at the time—there was just no basis on which to determine an appropriate course of action.

From an HCD perspective, this is the key point. These were high consequence decisions, lives depended on them, but the decision makers on the ground lacked any real means of acquiring a level of situational awareness, and with this to form a realistic appreciation of the situation. And without a coherent situational assessment, it was impossible to determine goals and objectives to aim for, or to predict the consequences that might flow from a particular course of action. But these are the essential components of high consequence decision-making; without them, successful decision-making is impossible. As a result, the Marine units located near Hay es Salaam not only lost the initiative completely during this period, the MAU as a whole found itself increasingly in a state of paralysis, hostage to events out of their control. General Mead, the US Marines' Commandant, captured the MNF's dilemma in a presentation he made on 14 September 1983.

... with the situation that you find yourself in now, what options do you have? Withdraw? Attack? Hunker down? Do you attack? It's not a military problem. Who do you attack? Do you take on the Druze, the Shia, the Muslims? Who do you attack? Do you hunker down?

Isn't that a wonderful expression? Hunker down. Well, you remain on the defensive right now, being responsive to the political arena in hopes that some type of political solution can be arranged through Special Envoy Bud McFarlane.²⁶⁴

The general was correct to say a political solution was needed. In the meantime, however, there was a very real 'military problem' for the units manning their checkpoints and foxholes coming under constant attack from small arms in Hay es Salaam or artillery fire from the hills above BIA. What guidance was there for working out a suitable response to these immediate threats?

In the event, Special Envoy McFarlane did have a 'political solution' in mind, placing his hopes on a military victory for the LAF's offensive in the Shouf. Unfortunately, this did not help the position at Hay es Salaam, as none of the Shiite forces were involved in the battle for Souk el Gharb, and the connection between this contest and the firefights near the airport was tenuous at best.

This brings us finally back to the point where we first started our discussion, the Sunday morning of 29 August, with the Marines inside the BIA perimeter taking fire and casualties from incoming mortar and artillery rounds, and considering the choice of whether to return this fire or not.

... the MAU were in no better position to make a 'shoot, don't shoot' decision than are the participants in our HCD training scenario. The decision was an impossible one, ... the best anyone could do under the circumstances was to pick an option and hope for the best.

Our detailed description of the situation that confronted the US MNF by this stage of their mission in Lebanon now brings us to this main conclusion—**the MAU were in no better position to make a 'shoot, don't shoot' decision than are the participants in our HCD training scenario.** The decision was an impossible one, there was just no basis for determining the right answer, the best anyone could do under the circumstances was to pick an option and hope for the best.

For HCD, this is clearly an unacceptable outcome. It leaves us in a 'state of high risk' that we will make a potentially catastrophic mistake. However, if we are able to pinpoint the precise factors that made this decision so difficult, then the way is clear to set out the elements that can make high consequence decision-making both as easy as circumstances allow, and carrying the minimal possible risk of error. This is our goal.

Why Was a Decision So Hard to Make?

Several points stand out from our discussion so far, the Marines' tactical decision-making was hampered by:

- a lack of situational awareness, leading to
- an inability to make a reasonable assessment of the situation, and
- a lack of clarity in relation to their own situation, the mission and ROE.

It is worth examining these difficulties in more detail, as they highlight the key components of HCD that contributed to the MAU's impossible position.

1. Situational Awareness

Situational awareness is the result of effective information management processes. The Marines faced a number of difficult challenges in this area.

The MAU lacked sources within the militias; there were obvious gaps in their operating picture, including the nature of Amal's operation in Burj al Barajneh or the identity of hostile forces in Hay es Salaam. At other times, however, they were overwhelmed with information, as with the huge number of car bomb alerts. Information on hand was often out-of-date or overtaken by events, such as the situation reports coming in from the LAF HQ at Baabda. The absence of feedback loops meant that the reliability or integrity of sources could not be ascertained over time, and there was a constant risk of deception from Lebanese inputs running their own agendas. HUMINT suffered a major blow with the expulsion of the PLO from Lebanon, as the US had cultivated most of its networks among the Palestinian factions, and in the 18 April bombing of the US Embassy. At the time of the explosion, seven senior members of the CIA were holding a meeting in the building. All were killed, including the veteran Lebanon Station Chief Robert Ames. Reports were often conflicting and open to multiple interpretations, the military situation on Souk el Gharb being one example.

2. Situation Assessment

Setting aside these problems of information management, the nature of the situation itself added immense difficulty to the task of coming to an understanding of what was happening in Lebanon, making sense of the position at any one point in time and arriving at an assessment of its implications for the US MNF and its mission.

This was a dynamic situation with periods of intense change following the withdrawal of the IDF and later, the disintegration of the LAF. These events triggered major realignments in the balance of forces. The large number of actors involved in these shifts added enormous complexity to the

political and military position at any one point. Non-linear developments were also evident, as with the link between Souk el Gharb and the barracks bombing. Patterns were hard to pick out from the appearance of general chaos, and the significance of individual developments was hard to assess. Multiple assessments were often plausible, such as the disagreement over whether the loss of Souk el Gharb would mean the end for the Gemayel presidency. The MAU lacked the ability to shape the environment in any meaningful sense, and this absence of control made it harder to understand as well. There were few precedents to draw on, even from Lebanese history or the 1958 intervention by the Marines, as the situation was unique in all its key aspects. Nor at this time was peacekeeping an established discipline, with accepted doctrine, training manuals and guidance. The lessons learned from earlier Marine rotations were not much help to the 24th MAU. For most members of the US MNF, this was their first experience of either the Middle East or military operations other than war (MOOTW). Tactical decisions were often made under severe time constraints and could only be taken on the spot.

3. The Role of Other Forces and Actors

Forming an understanding of the various actors in the drama of Beirut 1983 was an important part of situation assessment. It was the number of players, and the intricacy of their inter-relationships, that created the high degree of complexity marking the situation. This is a key element that gives 'complex warfare' its complexity, which has also been the case in recent examples of counterinsurgencies and hybrid wars, including those of the Middle East and Afghanistan. For this reason, it is worth highlighting in detail the complexities faced by the US MNF in this regard.

First was the sheer number of actors; at least 13 major militias were active in the Beirut area alone. Forces from other parts of Lebanon would sometimes intervene in the city, in partnership with local allies. The Christian South Lebanon Army based in Marjayoun near the Israeli border, for example, participated in the Phalangist massacres of Palestinians in Sabra and Chatila. Many of these militia forces were supported by regional powers, in particular Israel, Syria and Iran. Relationships with these backers were complex, in some cases they acted as proxies, but in others they asserted their independence or shifted their allegiance. The PSP had an ongoing love-hate affair with Syria, as did most of the PLO factions. All of the militias fought each other at one point or another in the civil war, without exception, including those from the same political alliance or religious faith. Periods of cooperation also emerged between unlikely allies, such as AMAL and Aoun. The motivation for particular courses of action could be driven by internal considerations, the Phalangists being highly factionalised for example, to consolidate a base within their home community, or to apply pressure against another actor. Jostling for position in this way was constant and cut across larger scale developments, as with Amal's use of the Israeli invasion to strengthen its level of influence in southern Lebanon. For the MAU, its reliance on the LAF for intelligence and for interactions with the local population added a layer of complication to its own mode of operating, as did the high level of media scrutiny present throughout the life of the MNF, both local and international.

4. The Mission

A course of action (COA) is an intervention into a situation, in order to achieve a desirable outcome. Individual COAs sit within a wider mission, expressed either in a mission statement of some kind or a commander's intent, setting out a desired end-state, and this should establish a framework for tactical decision-making.

For the Marines in 1983, the US MNF's mission presented a huge problem. This was a major theme of the Long Commission's report into the barracks bombing. The initial entry of US forces into Lebanon had been to act as a buffer between the IDF and the local population, and to assist the Lebanese government reassert control over the Beirut area. But once the IDF had withdrawn, the rationale for the peacekeeping component of the mission evaporated. The country was descending into civil war, but the size and disposition of the MNF did not permit any serious effort to prevent this development. Furthermore, the key battleground did not lie inside Beirut, but the Shouf, beyond the MAU's AO, although in range of their artillery and naval guns. The original mission was rendered irrelevant by this turn of events and gave no guidance on how to proceed. What was a desirable end-state for the situation in Hay es Salaam? To what extent was the MAU responsible for the operation of BIA? Confusion on these questions was widespread. Furthermore, different interpretations emerged along the chain of command as to what exactly the mission was and the extent to which the MNF should respond to the shelling of the airport or provide operational support to the LAF. This was reflected in the final decision over Souk el Gharb, taken by the National Security Council in Washington, which argued naval fire support was necessary for the protection of the MAU at BIA. But if this was the reasoning, then a withdrawal to sea would have achieved the same purpose. Clarity over the MNF's mission was never achieved.

5. Constraints

The same confusion existed over the ROE. As the shelling of the airport grew in intensity, at what point was a return of fire authorised? Did the MAU need to take casualties first? This was a dilemma presented to Marine commanders throughout the month of August. In the opinion of the Long Commission, the ROE were an important factor in the catastrophe of 23 October, in particular, the orders given in relation to weapon readiness. From an HCD and a systems theory perspective, however, more significant were the constraints imposed by the small size and capability of the MNF, effectively confining it to BIA and its immediate vicinity, excluding any possibility of occupying the strategic high ground overlooking the airport and the city. The inability to control the airport security environment, and the refusal to develop communication channels with and intelligence sources inside the militias independent of the LAF, were also major restrictions on the MAU and contributed heavily to its ultimate failure.

6. Additional Elements

Other factors influencing tactical decision-making also play a role, such as the appropriate delegation of authority to commanders on the ground so that they can respond quickly to the demands of a situation without needing to seek higher approval. The extent to which such situations conform to those anticipated in training or covered by existing doctrine is also relevant, as do time constraints. Personal experience of combat, and human factors such as stress, fatigue, cognitive overload or the presence of distractions can all have an impact on decision-making capability, as do the stakes involved when there is an immediate threat to life or the potential for a catastrophic outcome.

What Makes High Consequence Decision-Making Easy?

In the case of the Marines in Beirut 1983, all of these elements combined to create a position where high consequence decision-making proved impossible. However, if we now turn these negatives into a positive, we can draw up a list of the key factors that drive high consequence decision-making and which determine how easy a decision will be and the likelihood of a catastrophic error. These form the ideal, against which the realities of a current situation can be measured and potentially catastrophic areas of weakness identified in time.

1	There is good situational awareness delivered by sound information management processes.
2	The SA includes a solid understanding of all the relevant forces and actors , their character, motives, objectives, capabilities and inter-relationships.
3	There is an assessment of the situation that makes sense of individual developments, is coherent, is set in its historical context and allows for some anticipation of the future course of events.
4	The mission is clear, relevant to the situation and projects a desired end-state that is achievable.
5	Constraints are understood and procedures are realistic.
6	There is no confusion over the decision-making process itself, whether certain actions are authorised or not.
7	The current situation was anticipated and prepared for, time has been available to consider options and refer to guidance.

8	The necessity for a decision to be made, the time allowed and the options available are all clear.
9	The consequences of any course of action can be foreseen with some confidence.
10	Human factors such as stress, fatigue and fear, which may degrade the decision-maker's capabilities, are not present.

Table 3-1: Ideal conditions for high consequence decision-making

The important point here is that all of these elements are set up in advance. Shoot/don't shoot decisions may well be taken in the heat of the moment, but their prospects of success, with a minimal risk of catastrophic error, are determined beforehand by the extent to which these factors have been taken into account and managed effectively.

This is HCD—**it is a management program**. Its goal is to avoid decision makers being placed in an impossible position, as were the Marines in Beirut, or set up to fail, as were the CIC staff of the USS *Vincennes*, by managing the context that surrounds the decisions they have to make.

CHAPTER 4

High Consequence Decision-Making

Doing the right thing is more important than doing things right.

Brigadier General Huba Wass de Czege

Decision making can not be decoupled from the continuous coping with complexity that characterizes human endeavours.

Decision making is less a question of choosing the best alternative than a question of knowing what to do in a given situation... this reflects the fact that the problems people have when managing complex and dynamic processes are not so much about what to do, but when and how to do it.

Erik Hollnagel²⁶⁵

*The important thing in a battle is not to make fast decisions, no enemy ever died from decisions.
The important thing is to deliver an effect on a target quicker than the enemy.*

B. Brehmer

Both of our case studies up to now contained critical moments where a shoot/don't shoot decision was posed. Both also ended in catastrophe—the shooting down of Iran Air Flight 655 in the one and the 23 October barracks bombing in the other. The decision over the identity and intent of Track Number (TN) 4131, whether to return fire from inside the perimeter of Beirut International Airport and the vicinity of Hay es Salaam, or to provide naval gunfire support to the Lebanese Armed Forces on Souk el Gharb, these were decision-making processes with the highest of consequences.

Traditional decision theory concentrates its focus on the point of decision. It seeks to mobilise the power of rationality in order to determine the best possible option under the circumstances. This involves the careful elaboration and consideration of alternative courses of action, and the selection of the most suitable. This is the 'rational choice' model that underpins classical military decision-making tools such as the military appreciation process (MAP).

Structured, analytical techniques such as the MAP seek to improve the quality of decision outcomes by ensuring the quality of the decision-making process. 'They try to improve process, regardless of content area.'²⁶⁶ As the US FM 6-0 states, this technique is 'methodical, ensures commanders consider, analyse, and evaluate all relevant factors'.²⁶⁷

This kind of approach to decision-making has its place. One of its useful qualities is that it can be taught in a classroom setting and that it 'gives inexperienced personnel a methodology to replace their lack of experience'.²⁶⁸ However, our two case studies highlight some important limitations in the extent to which a structured, rational thought process like the MAP is able to minimise the risk of a catastrophic outcome when it comes to high consequence decision-making.

The first limitation lies in the assumption that the main effort consists of developing and weighing up alternative courses of action. This concept of decision-making has come under intense criticism from the Naturalistic Decision Making (NDM) School. 'In the past, US military commanders were often trained to develop three courses of action for a tactical scenario. Then they were to estimate the advantages and disadvantages of each course of action and weigh those evaluations in reaching a decision.'²⁶⁹ But, as Grossman and Salas argue, this is often 'counter-productive ... when time is precious and when a single option is an obvious workable choice'.²⁷⁰ Instead, NDM School research has examined 'how experienced people actually make decisions in their natural environments'²⁷¹ and found that this differs from the 'rational choice' model in a number of key respects.

Decision makers are more concerned on sizing up the situation and refreshing their situation awareness through feedback, rather than developing multiple options to compare to one another.

Most traditional decision research has involved inexperienced people who are engaged in laboratory tasks where contextual or situational factors play a limited role. The traditional paradigm emphasizes understanding the back end of the decision event—choosing among options ... In NDM, the focus in the decision event is more front-loaded, so that decision makers are more concerned on sizing up the situation and refreshing their situation awareness through feedback, rather than developing multiple options to compare to one another.²⁷²

Studies of anti-air warfare operators in the US Navy have come to the same conclusion.

Most decisions concerned the nature of the situation. For those decisions about adopting a course of action, fewer than 5% involved comparisons between alternatives.²⁷³

In the case of shoot/don't shoot decisions, the reasons for this are obvious. The choices are clear enough; this is in fact the least problematic element in the decision-making process. As Hopple states,

‘For a closed decision situation, there is a straight-forward (and sometimes trivial) option-generation task.’²⁷⁴ This does not mean, however, that the decision-making challenge is ‘routine’ or ‘simple’. Hopple himself refers to the Cuban missile crisis as an example of a complex problem, requiring an ‘open’ rather than closed decision.²⁷⁵ But as Allison’s classic study shows, ‘Kennedy and his advisors never really considered any other options besides a blockade or air strikes, and initially, were almost unanimously in favor of the air strikes’.²⁷⁶ In spite of this early preference, air strikes were never a serious contender as they could not guarantee the destruction of the Soviet missile installations on the island; a blockade was always the obvious action to take. The crisis certainly presented a major challenge for the President, but the difficulty in decision-making did not lie in the development or selection of a suitable course of action from several viable alternatives. It lay instead in two areas of uncertainty—‘information input’ and above all ‘consequences of action’.²⁷⁷

To cope with this latter type of uncertainty, rational decision-making has turned to game theory. In fact, the MAP specifically calls for wargaming potential courses of action (COAs) in order to determine which is best. This can be helpful, but it quickly runs up against its limits. One of these is cognitive, the capacity to visualise mentally how events are likely to play out. According to NDM theory, this ability rests largely on experience and specific knowledge of the domain in question. A study of ships’ damage control officers has highlighted the differences between more and less experienced decision makers.

When confronted with a particular scenario, experienced officers ... made more predictions (consequences for nearby compartments) ... The predictions made by experienced officers could largely be attributed to their specific knowledge of potentially dangerous compartments near the calamity. Thus, if there was a fire in place A, the experienced officers could imagine what consequences this fire would have for place B (an ammunition depot for instance) ... Only the experienced officers mentally simulated the fire spreading to other potentially dangerous locations.²⁷⁸

Experience is of major assistance here, but even this can only be of use if the situation is not entirely novel. It also stumbles against the problem of complexity—the sheer number of possible outcomes a situation may contain. In some circumstances, technology can overcome this through raw computing power, but more often simplicity is restored by making a number of assumptions, at the expense of realism. A RAND study in modern decision science provides an example of this.

It is not uncommon to find problems, including important military problems, in which game theoretic approaches can be taken within computer simulations. It is well known that simulation outcomes of theater level conflict depend heavily on the tactics used by the combatants, greatly complicating the use of simulations to inform decisions about alternative programs. During the Cold War, this was addressed with game-theoretic algorithms that allowed one to see results if both Red and Blue sides used their air forces ‘optimally’ (or,

at another extreme, if one or both sides instead followed nominal doctrine). This greatly reduced the scatter of outcomes and allowed analysts to measure differences among investment programs.²⁷⁹

Complexity can only be held at bay if causal relationships are assumed to remain linear. As our case studies have shown, this is often not the case in real-life situations that call for decisions with a potentially catastrophic outcome. Examples of non-linear relationships include delayed effects, singularities and tipping points. Their effects are 'such that the problem situation changes over time in ways that are not easily predicted or anticipated'.²⁸⁰ Ill-structured or wicked problems of this nature require a very different approach, as they defy all efforts to apply rationality in the conventional sense. In a description that captures the US Marines dilemma in Beirut 1983 very well, Spector writes,

Complex, ill-structured problems may be considered wild and wicked, they are different from typical classroom and textbook problems... In many ill-structured problem-solving situations, the desired outcome state may not be well-defined and is likely to change as the problem situation evolves. In some cases, current conditions and problem constraints are not completely specified or known... It is not only the circumstances that impact a problem situation that are subject to change. Changing circumstances may be such that the nature of the problem situation is itself changed.²⁸¹

Act First To Gain Knowledge and Control

In the face of a 'chaotic context' such as this, Antunes et al argue the best line of attack is 'acting first and analyzing the consequences later ... the best decision making strategy consists in probing the system, obtaining feedback, and then deciding the most adequate course of action'.²⁸² Rouse likewise puts forward a framework in which 'execution and monitoring' come at the start of the process in order to 'observe consequences, evaluate deviations from expectations'. This forms part of an information seeking phase, followed by the generation and evaluation of explanations that make sense of the situation and define the problem. Only then are alternative courses of action considered.²⁸³

Action comes first because it is both a way of gaining knowledge and a means of imposing some control over the situation. Situational understanding and control reinforce one another. This approach has long informed military thinking on strategy and tactics. 'Military strategy is ... a method of imposing a modicum of control on the chaos of conflict.' It has the 'aim of imposing control on the enemy'.²⁸⁴

Peter Thunholm contrasts this kind of decision-making with the rational choice method.

The process perspective stresses the importance of taking all available information into consideration and being logical and rational to exploit force multipliers and refuse the opponent any advantages. The outcome perspective stresses the bold, unpredictable decisions that are made quickly and decisively and contribute to slowing down the opponent, and force them to react rather than act. In this way the decisive commander can turn a chaotic situation into a linear one that can be controlled.²⁸⁵

‘Military strategy is ... a method of imposing a modicum of control on the chaos of conflict.’ It has the ‘aim of imposing control on the enemy’.

The point here is that the problem at hand may simply not be solvable without some action being taken to change the ‘rules’ of the game. We are at the limits of what rationality can achieve on its own. In fact, a whole number of assumptions need to come into effect before a military situation can be successfully handled by rational or scientific methods. Lindstone lists some of these as ‘the implicit assumption that problems can be solved; optimization, the search for a best solution; reductionism ... reliance on data and models ... quantification of information; objectivity ... a view of time movement as linear’.²⁸⁶ Complex, ill-structured problems, however, resist these methods and require a different kind of response that may even appear irrational at first, as with Thunholm’s ‘bold, unpredictable decisions’, but in fact encompass a broader understanding of rationality. This includes the integration of thought and deed.

The same principle can be seen in the Adaptive Campaigning model used by the Australian Army. This model is described as ‘the art of continually making sense of dynamic situations and evolving designs, plans, modes of learning, and actions to keep pace’.²⁸⁷ This model consists of four steps:

ACT - based on a provisional theory of reality, in order to learn to develop the situation and to influence behaviours towards objective,

SENSE - to discern what changed, to gain feedback for adaptation, to study what to sense and measure effectiveness,

DECIDE - what the sensings mean, take decisions on techniques and COA, methods and modes of learning, problem hypothesis and strategy, and

ADAPT - to the new level of understanding.

Adaptive Campaigning rests on the theoretical insights contained in Systemic Operational Design. This includes an important distinction between the ‘complex’ and the merely ‘complicated’, where the latter ‘require mostly deduction and analysis (formal logic of breaking into parts)’, while

‘complexity requires inductive and abductive reasoning for diagnostics and synthesis (the informal logic of making new wholes of parts)’.²⁸⁸ This involves the use of narratives and conceptual maps, and its understanding of reality is always ‘provisional’.

Because operational reality is complex, dynamic, and opaque, military commands should act on provisional theories of reality that its key members share... The more comprehensive, relevant, and reliable knowledge is, the better the outcomes will be in two equally important respects; actually advancing desired goals, and gaining a more comprehensive appreciation of the situation.’²⁸⁹

In this conception, action serves not only to shape the environment, but to understand it better. This conception also rejects any naïve sense that reality is ever fully understood, that there can exist a ‘simple correspondence between ideas and facts, that the mind is the mirror of reality’.²⁹⁰ Instead of truth, the test of a mental map is whether it is ‘useful’, whether it helps practical efforts to understand and control a situation.

Developing a thorough understanding of the operational environment is a continuous process. Even though this process will never be perfect, attempting to comprehend its complex nature helps identify unintended consequences that may undermine well-intentioned efforts. Deep understanding reveals the dynamic nature of the human interactions and the importance of identifying contributing factors. Leaders can gain this understanding by capitalizing on multiple perspectives and varied sources of knowledge.²⁹¹

Are We Solving the Right Problem?

This concept allows for a significant shift in focus, once again away from developing possible COAs, towards testing how a problem is being understood.

Ascribing meaning and relevance to information leading to decisions about techniques and courses of action is not difficult. In this process, the Army can easily perfect ‘doing things right’. The difficulty is the question of whether we are actually ‘doing the right thing’ for the best outcomes... are we solving the right problem?... Doing the right thing is more important than doing things right.²⁹²

This is an important aspect of the challenge involved in complex decision-making, and can be seen in both our case studies. The question of whether to provide naval gunfire support to the LAF 8th Brigade on Souk el Gharb is an obvious example. A similar doubt can be raised in relation to the USS *Vincennes*’ decision to engage the IRGC patrol boats. Was this the ‘right problem’ to be solving?

The HCD training program tackles this issue head on in a scenario based on a real incident that took place in Shin Kalay village, Helmand Province of Afghanistan during 2008. Participants are asked to make a go/no go decision in response to a request for an air strike on a compound near the

village. The basis of the request lies in the International Security Assistance Force (ISAF) ground commander's assessment of the situation. Inside the compound are two Taliban insurgents who were responsible for the bulldozing of a school in the village the day before. ISAF forces are moving into Shin Kalay in order to restore government control over the village, and are meeting resistance from Taliban fighters.

Participants are told that there are no Law of Armed Conflict concerns, the air strike can proceed if they give the go ahead. But the lesson objective is 'just because we can, doesn't mean we should'.

Participants are told that there are no Law of Armed Conflict concerns, the air strike can proceed if they give the go ahead. But the lesson objective is 'just because we can, doesn't mean we should'. It turns out that the ground commander's understanding of the situation in Shin Kalay is wrong in almost every respect. The two men in the compound are not insurgents but Pakistan Inter-Services Intelligence (ISI) agents; the Taliban did not demolish the school, nor are they participating in the firefight with the ISAF force. In fact, the strongest links to the Taliban are held by the local police force standing by to enter the village once it is secured, as they collaborate closely with the insurgents in the transport and sale of the area's opium crop.

The episode is adapted from Mike Martin's *An Intimate War; An Oral History of the Helmand Conflict*, in which the author shows how different was the ISAF conception of Helmand reality from what was really happening in the province. Operating within a 'counterinsurgency' narrative, ISAF forces spent four years from 2006 presiding over a deteriorating situation in Helmand over which they had little control and even less understanding. It was only when they finally began to comprehend the local dynamics between key powerbrokers and redefine the 'problem' in more realistic terms, that ISAF was able to make some headway towards its objectives.

In the Shin Kalay scenario, situational understanding is the key. This turns out to be the case in all complex situations. Aligné and Mattioli apply identical reasoning to the management of disasters, incidents, crises and emergencies (DICE).

Crisis management functionalities are structured along three crucial steps: information gathering, situation understanding, and decision making ... The initial overall picture of the situation ... is then consolidated in the situation understanding step to provide meaningful real-time situation awareness. This provides the essential base to derive the final decision making step ... Therefore, the situation understanding issue is one of the cornerstones of the DICE management process.²⁹³

Antunes et al also emphasise situational awareness (SA) in business continuity and disaster recovery contexts. 'Situation awareness is deemed essential when tackling situations that are characterised by complexity, hard to define causal relationships, dynamic changes, and lack of information.'²⁹⁴ Following Endsley, they divide situation awareness into three steps, '(1) monitoring the contextual elements available in the environment, (2) diagnosing their meaning, and (3) projecting their near future consequences.'²⁹⁵ These steps all appear in the HCD model, however the terminology has been slightly altered, in part because in a military context they are often performed by different personnel and functions. Situation awareness in HCD is defined more narrowly as predominantly an information management task, the foundation for situational assessment, which includes an understanding of one's own situation, such as the commander's intent and constraints. This is because earlier models such as Endsley's were developed for an aviation context where these aspects are generally less problematic, unlike our two case studies where the rules of engagement played a crucial role in the lead up to catastrophe.

Superiority in situation assessment skills accounts for much of the ability of experts to make rapid decisions and contributes to their decision-making accuracy.

The underlying principle, however, is the same; SA is critical in decision-making. This is also born out in the NDM literature, a key aim of which has been to identify those qualities that mark out experts from novices. The idea is that expertise within a particular domain may turn out to be a better guide to effective decision-making than an emphasis on what a rational thought process might look like in general, irrespective of context. Experience, rather than rationality, plays the decisive role, and it is prior experience of similar situations that allows the expert to arrive at a sound situational assessment faster and with more depth. 'Superiority in situation assessment skills accounts for much of the ability of experts to make rapid decisions and contributes to their decision making accuracy.'²⁹⁶

NDM research identifies the means by which experts are able to achieve this superior level of ability,

Experts recognize decision making cues more quickly and completely than novices, recognize patterns of cues better than novices, and can detect important features of a stimulus more readily than novices. Experts also appear to be better able to frame decision problems so that they can detect the underlying structure of a problem. These skills all contribute to the decision maker's ability to perform effective situation assessment.²⁹⁷

Stokes makes the same point in relation to pilots.

Although experienced pilots are not necessarily characterised by any special cognitive advantages such as superior reasoning ability, they do differ from inexperienced pilots in terms of access to domain-specific (aviation relevant) knowledge ... Thus, when confronted with situations that could endanger the safety or efficiency of the flight, high time pilots may more readily recognize cues relevant to the problem and 'pattern match' these cues with situational schemata from long term memory.²⁹⁸

Essential Elements of a Training Program in HCD

The role of experience in the analysing of a situation has important implications for training, as it means the main focus should lie in efforts to reproduce the skills possessed by experts in any particular domain, above all those that assist situational assessment. Gary Klein, the leading figure in the NDM school, argues precisely this.

In naturalistic settings we will obtain a greater payback by helping people size up situations, either by training them to recognize cues and patterns, or by designing management information systems that help them quickly get a sense of the big picture... They do not try to prescribe a generic method for making decisions. Instead, the approach is to look at the ways experienced decision makers reason within their own domains. Rather than searching for general methods, practitioners can search for the decision requirements of the specific situation.²⁹⁹

On this basis, the essential elements of a training program in HCD begin to appear. In Janis Cannon-Bowers' words, these include:³⁰⁰

- **situation assessment** skills,
- **mental simulation** skills, and
- **domain specific problem solving** skills.

They also involve reasoning skills, including critical thinking. This echoes Design theory which lists its fundamental guiding concepts as:³⁰¹

- apply critical thinking,
- understand the operational environment,
- solve the right problem,
- adapt to dynamic conditions, and
- achieve the designated goals.

Critical thinking is also prominent in the TADMUS (Tactical Decision Making Under Stress) research, which has integrated this with the NDM's Recognition Primed Model of how expert decision makers function. Cohen explains the way this works.

Proficient decision makers are recognitionally skilled; that is, they are able to recognize a large number of situations as familiar and to retrieve an appropriate response. Recent research in tactical decision making suggests that proficient decision makers are also meta-recognitionally skilled. In novel situations where no familiar pattern fits, proficient decision makers supplement recognition with processes that verify its results and correct problems.³⁰²

As with Design, this centres on the use of narratives or stories. These are essential for making sense of a situation, identifying causal relationships and overcoming information gaps. In unfamiliar situations, a number of competing narratives may be present, as was the case in the USS *Vincennes* incident. This means that the crucial task is to apply critical-thinking techniques to these narratives in order to determine which is the most plausible and coherent explanation of the known facts. In response to this challenge, TADMUS proposed a systematic model which it named STEP—'create a Story, Test for conflict, Evaluate the story, develop contingency Plans'.³⁰³

The significance of the STEP model lies in that it shows how it is possible to work with narratives in a rigorous, analytical manner. For example, the discipline of logic in reasoning and argument can be applied to separate facts from assumptions, evidence from conclusions and assess how plausible these are. Critiques can be made on the grounds of 'completeness' (how well the narrative explains all the available information and supports a particular interpretation), 'conflict' (whether the evidence points towards two opposite conclusions), and 'reliability' (whether it is based on dubious assumptions). On the strength of these critiques, a decision maker can identify what further information will confirm or deny a particular narrative and seek this out, if time permits.³⁰⁴

A range of structured analytical techniques can, in fact, be applied during the situation assessment phase of decision-making. In his classic work *The Psychology of Intelligence Analysis*, Heuer described an eight-step methodology for dealing with 'competing hypotheses'.³⁰⁵ The methodology's main goal is to 'disprove' rather 'confirm' a hypothesis³⁰⁶, in line with recognised practice in the sciences.

Heuer was also one of the first to uncover the cognitive biases that often lead to error, and the weaknesses within the common kinds of heuristic, or interpretive tools, used by analysts and decision makers, including experts. Biases can distort the evaluation of evidence, the perception of cause-and-effect, the estimation of probabilities and hindsight.³⁰⁷ However, an awareness of these problems can help to minimise their impact, as can the use of 'zero gravity teams', 'red teaming' and other management systems, if applied skilfully.

How well such techniques can be deployed is determined by the situation, in particular the time and the resources available. This means that one of the key skills for decision makers is 'metarecognition'

which is the ability to decide what is the appropriate way to arrive at a decision. Cohen describes this further.

Metarecognitional processing occurs when the benefits associated with critical thinking outweigh the costs. This is likely to be the case when the costs of delay are acceptable (ie time available for critical thinking), the situation is uncertain or novel (ie recognitional conclusions are subject to improvement), and the costs of an error in acting on the current recognitional conclusion are high.³⁰⁸

The NDM research has confirmed that experts possess superior ‘metacognitive’ skills, among them, ‘the ability to select decision making strategies, to modulate strategies as problems unfold, to engage in effective resource management, and to self-assess and adjust accordingly’.³⁰⁹ As Orasanu has found, ‘metacognition’ is also a component of situation assessment, paralleling HCD’s inclusion of one’s ‘own situation’ in its framework. Writing in an aviation context, Orasanu puts forward a decision process model that begins with the questions, ‘What’s the problem, how much time is available, how risky?’ It then allows for a choice between different decision strategies.

Orasanu also includes a decision-effort model as part of this assessment, as HCD did in its Beirut training scenario, which asked ‘what makes this a difficult decision?’ ‘We have a model which allows us to predict which decisions might involve the greatest amount of cognitive work, and where decision errors might be most likely.’³¹⁰ Orasanu identifies the following factors that will determine the answer, ‘situation ambiguity, vague cues, conflicting cues, uninterpretable cues, response availability’.³¹¹ HCD takes this approach and expands it for more complex decision environments such as that which confronted the US Marines in Lebanon.

To Cannon-Bowers’ initial list of skills that can be targeted in a training program, we can now add ‘reasoning’ and ‘metacognitive’.³¹²

Decision-Making as a Process, Not an Event

We can also extend the same concept of self-awareness over the approach to decision-making to cover the entire process, not just the initial phase of selecting a decision strategy. This has the added advantage of taking into account dynamic decision-making, where not one but many decisions are taken as a situation evolves. This is an important shift in perspective, from understanding decisions as an event, to seeing decision-making as a process or activity.

Hollnagel goes so far as to argue that this is, in fact, the only way to understand decision-making. He says,

Decision making is not a discrete and identifiable event, but rather represents an attribution after the fact. In hindsight, looking back at a specific event or activity, we can identify points in time where a ‘decision’ must have been made in the sense that events could have gone

one way rather than the other. Yet this does not necessarily mean that the people who were involved made an explicit decision at the time, even though in hindsight they may come to accept that they did.³¹³

In fact, it was this conception of decision-making that informed our discussion of the USS *Vincennes* incident. Hollnagel continues,

A decision in most cases also requires actions to ensure that the expected outcomes obtain. It is therefore proper to ask whether the term decision making should be restricted to the 'moment of choice' or whether it should also cover what goes on before and after. Decision making is not usually a distinct event that takes place at a specific point in time, or within a certain time window and which therefore can be dissociate or isolated - even if ever so briefly - from what goes on in the environment.³¹⁴

Decision making can not be decoupled from the continuous coping with complexity that characterizes human endeavours.³¹⁵

Hollnagel also captures eloquently the difference between the NDM's understanding of decision-making, and the classical rational choice model. He says,

Decision making is less a question of choosing the best alternative than a question of knowing what to do in a given situation ... this reflects the fact that the problems people have when managing complex and dynamic processes are not so much about what to do, but when and how to do it.³¹⁶

This view sits well with Brehmer's discussion of dynamic decision-making. Here too the driving idea is the dynamic character of the subject's interaction with the environment.³¹⁷ For Brehmer, a dynamic situation is distinguished by the following four characteristics.

- It requires a series of decisions.
- The decisions are not independent.
- The state of the problem changes, both autonomously and as a consequence of the decision maker's actions.
- The decisions must be made in real time.³¹⁸

Brehmer puts forward his own Dynamic Decision Loop (DDL)—'decision, action, result, information' which he goes on to contrast with Boyd's OODA (observe, orient, decide, act) loop. 'The important difference ... is that the environment is part of the DDL, but not of the OODA loop.'³¹⁹ The significance of this relates to the factor of time. In OODA, designed for air-to-air combat, speed is of the essence, the goal is to

make faster decisions than the enemy ... However, the important thing in a battle is not to make fast decisions, no enemy ever died from decisions. The important thing is to deliver an effect on a target quicker than the enemy.³²⁰

The distinction is important because the impact of the environment is to impose delays. This means that speed of decision does not equate to speed of effect and this needs to be taken into account during the decision-making process. It may, in fact, be more effective to take more time over a decision rather than less. 'If there are other significant delays in the DDL, it may be much more useful to work on those and avail oneself of the possibility of using as much time as possible for making the decisions.'³²¹

This helps us to understand why dynamic environments are usually highly complex. This is because feedback is not immediate and the consequences of actions may be non-linear and unpredictable. For Brehmer, 'the ability to handle feedback in general, and feedback delay in particular, is the key to being able to cope with a dynamic environment... That the decisions are to be taken in real time has to be taken seriously.'³²² He goes on to note, 'in traditional decision theory, time is largely ignored.'³²³

This can present a major challenge when trying to bring a situation under control.

People have a tendency to extrapolate linearly even if the process is exponential. This means they are likely to commit too little of their resources to fighting the problem and they will, therefore, lose control... most control processes designed by men seem to be linear.³²⁴

Instead, what is required is,

a shift from control based on feedback to control based on feedforward. That is, the decision maker must rely on models of the system, models that enable predictions of its actual state, rather than relying on current information about the system.³²⁵

The NDM research reveals that this is what experts are able to do best. They are 'more accurate at inferences. They are able to see causality ... and how that affects a situation. Experts are better at anticipating problems.'³²⁶ With these skills, experts are better able to manage the time factor. A study of 'superior' fire ground commanders' performances highlighted the following elements.

[they] used dead time to study site plans and diagrams, prepared for 'worst case' scenarios early, took precautions, and called for additional resources, warned crews of likely developments and tasks ... at first indication of deterioration in the situation, raised the 'level' of the incident.³²⁷

Effective management of time, rather than speed, turns out to be decisive. This was also the conclusion of a study that simulated sea combat conditions.

Experienced commanders wait longer than inexperienced commanders before making their decision ... experts spend more time trying to understand the problem and construct a mental model of the task environment ... experts are more likely to engage in situation assessment whereas novices are more likely to engage in option evaluation.³²⁸

Aircrew simulator training has produced the same result.

The more effective crews ... gathered more information about several options, and took longer to make their decision than the less effective crews ... (a) they monitored the environment closely and appreciated the significance of cues that signaled a problem; (b) they used more information in making decisions and if necessary manipulated the situation to obtain additional information to make a decision.³²⁹

‘The Logic of Failure’ – The Decision-Making Patterns of Winning and Losing

These findings are consistent with Dietrich Dorner’s classic study *The Logic of Failure*. Like Brehmer, Dorner set decision-making inside the context of a dynamic situation, such as a bush fire, and evaluated the impact of an incident commander’s decisions as a whole, over the course of an emergency, rather than concentrating attention on individual actions taken. Dorner used an early computer game that simulated the fate of a civilisation in a precarious environment, and was able to detect the patterns of behaviour in participants that led either to the survival and prosperity of the population or its destruction.

Players of strategy games on a PC will be familiar with this. Every click of the mouse marks a certain decision or action taken, and these can run at a rate of several per second over hours if the gameplay is intense. Over time, the winning player gets the upper hand over their opponent, human or AI, creates more room to manoeuvre, is able to seize the initiative—they gain control. This affects the quality of individual actions, as these now have a greater positive impact, consolidating the position of advantage further, in this sense they are **better** decisions. **This is the key point. The player is not winning because they are making better decisions, they are making better decisions because they are winning.**

This is the key point. The player is not winning because they are making better decisions, they are making better decisions because they are winning.

Dorner’s study helps us understand further the difference between winning and losing decision-making patterns—the ‘logics’ of success and failure in a dynamic setting. Dorner found that, ‘the good participants made more decisions than the bad ones.’³³⁰ This turned out to be more effective

in the face of complexity, which constantly generates unexpected consequences that call for a further response in the pursuit of any single objective.

The good participants reached significantly more decisions per goal ... in the first case we have one decision per goal; in the second three decisions. The good participants acted more 'complexly'. Their decisions took more aspects of the entire system into account, not just one aspect. This is clearly the more appropriate behaviour in dealing with complicated systems.³³¹

Successful participants also identified the most important problems correctly and focused their attention on these, making the best use of their time and cognitive powers. They were able to anticipate non-linear developments, and they separated out the activities of inquiring about the situation from making decisions.

For the unsuccessful subjects the questions and decisions are mixed. This means that the subjects made immediate decisions for each of the states they inquired about. For the successful subjects, however, the question and decision behaviour was not mixed. This means that the successful subjects first gained an overall picture of all aspects of the systems before they began to make their first decisions.³³²

This focus on situation assessment, rather than action, continued throughout the exercise, whereas for the unsuccessful subjects 'as it went on, they focused more and more on decisions rather than analysis, and this led to failure.'³³³ This is an interesting finding, as it runs against common-sense intuition.

Dorner was able to identify a clear 'logic of failure', where those who were unsuccessful:

- acted without prior analysis of the situation,
- failed to anticipate side effects and long term repercussions,
- assumed that the absence of immediately obvious negative effects meant that correct measures had been taken,
- let over-involvement in 'projects' blind them to emerging needs and changes in the situation, and
- were prone to cynical reactions.

Another study into incident commanders has built on Dorner's work to investigate the psychological factors contributing to this same poor performance. It highlights four consistent patterns in that commonly occur in poor performance:³³⁴

- a preference for errors of commission rather than omission, a bias for action over delay, motivated in part by a need for self-protection, better to be doing something rather than nothing,
- an illusory sense of greater control via activity,
- an illusory sense of greater self-competence via activity, and
- an over-estimation of personal ability.

These insights are important because they create the possibility of monitoring the decision-making activity of a commander and checking for the known indicators that the position is deteriorating in line with a 'logic of failure'. This, in turn, means there is an opportunity to borrow a concept from crew resource management (CRM) and introduce a 'process guardian' into dynamic decision-making with the ability to detect the warning signs of impending failure and intervene before disaster strikes.

This practice already exists in some incident management contexts where an individual, often the deputy incident controller, is not given any specific functional responsibilities but whose task is simply to stand back, observe, and protect the integrity of team processes and the quality of decision-making. In CRM, this same principle is described as 'training crews to reduce pilot error'.³³⁵ This is achieved by addressing 'decision making strategies and breaking the chain of errors that can result in catastrophe'.³³⁶ Decision-making authority remains with the pilot-in-command, and the goal is not to challenge decisions after they have been made but rather to prevent any degrading of the decision-making process, for example, through loss of SA, distractions, overload or fatigue.

We can now compile our list of the key activities that make up high consequence decision-making.

ACTIVITY	DOMAIN	OUTPUT
Information management	Content specific	Situational awareness
Expert pattern recognition	Situation specific	Situation assessment
Catastrophic risk management	Organisation specific	Understanding of potential sources of catastrophe
Problem solving	Domain specific	COA development
(Meta)cognitive	Decision specific	Decision-making strategy
Dynamic decision-making	Process specific	Logic of success

Table 4-1: Key activities in high consequence decision-making

These are the main steps that make up the HCD process:

1. situational awareness,
2. situation assessment,
3. own situation,
4. the decision to be made, and
5. anticipated consequences.

We can see now how these activities and steps combine to provide the basis for both a management system and training program.

1. Situational Awareness

This is predominantly an information management challenge, and roughly sits with the intelligence functions of collection, processing, exploitation and dissemination. The challenge mostly depends on the nature of the information, its availability, volume, timeliness, reliability, integrity, consistency and ambiguity. The goal is not a complete picture of reality, but a workable model that permits situation assessment.

Pattern recognition plays a role here too, as experts are better able to determine their information requirements even at the outset, and separate signals from noise. Dynamic decision-making includes the option of taking action in order to gain feedback and build a better picture of the situation.

2. Situation Assessment

Pattern recognition is the critical activity, supplemented by critical thinking and analytical techniques if appropriate. Metacognitive skills are required to determine at what point an acceptable assessment has been made.

The main difficulties are presented by the situation itself, even if the information picture is good. This includes the extent to which the situation is dynamic, fast moving, complex, non-linear, chaotic, out of control, unique, without precedent, unfamiliar, or ambiguous. It is also shaped by the number and roles of other forces and stakeholders, as these are usually the source of complexity. These characteristics of the situation affect whether pattern recognition alone will be adequate, or more techniques are needed.

HCD follows the SMEAC (situation, mission, execution, administration, communication) briefing format in separating out one's own position and actions (M) from the situation (S). This is a purely cognitive step, as we will always form one part of the picture in reality, but it allows for such questions

as, 'what happens if we do nothing?'. This feeds directly into the COA development phase, ie the situation drives the mission.

3. Own Situation

This includes our existing mission, commander's intent, any constraints such as the ROE, the resources and capabilities available, our team processes and wider organisational context. These are assessed not only from the perspective of developing a suitable course of action, but as potential sources of a catastrophic failure, and can greatly complicate the decision-making process.

The kinds of problem include the possibility that the mission statement may be vague or irrelevant, the commander's intent may be unclear, as might be the ROE, all might have been overtaken by events, the desired end-state may not in fact be desirable, or achievable. Stated objectives may be contradictory and some have to be sacrificed for others. Organisational culture and practices may pull a decision in a direction that heightens the risk of catastrophe. New equipment, technology, personnel may mean the organisation's capability is an unknown quantity, or they may rule in options not previously possible.

4. The Decision to Be Made

This is mostly a metacognitive activity, as it includes a decision on whether a decision has to be made at all, and if so, what the decision-making process will look like. Organisational factors are relevant, such as the authority to make certain decisions but not others, chain of command, procedures, checks and balances that might exist and need to be followed.

Problem-solving skills also come in at this point, including how the problem has been defined through the situation assessment. Analytical techniques may be helpful and decision-support systems ready to provide assistance. On the other hand, there might have been a failure to anticipate, prepare or plan for the situation, meaning the decision maker has no choice but to improvise. Time is another factor; how urgent is the decision?

5. Anticipated Consequences

This is the place for dynamic decision-making, with interactions and feedback from the environment revealing the degree of control and grasp of reality. It includes pattern recognition and mental simulations, to generate expectations. Delays or the absence of feedback can present a major problem, as can positive feedback loops and non-linear progressions. Complexity may rule out any feasible ability to anticipate developments or gain the initiative. Metacognition is further needed if a particular point is reached where an action will become irreversible or will settle the overall outcome, and this may be catastrophic.

A process-guardian role might also be appropriate, in order to ensure the decision-making process follows a 'logic of success' rather than a 'logic of failure'.

Decision-Making from an Organisational Perspective

This model of decision-making fits well with the conclusions of the NDM school and the general research in this field. This is hardly an accident, as HCD started life as a literature review and its main components have been assembled from these same sources.

At the same time, HCD is not simply a framework for understanding decision-making, an aide to decision makers for minimising the risk of catastrophic error. HCD has a wider scope—it is better understood as a management program. The reasons for this become clear if we return to our two major case studies. In the example of the US Marines in Beirut 1983, there was no real decision that can be identified as the cause of the catastrophe of 23 October. The problem did not lie in faulty decision-making, but in the fact that decision-making beyond blind guesswork was made impossible. The position was similar to our PC strategy game player above, except in this case, they are losing, have no control and no real options. Whatever decisions they make will be wrong, or at best will make no difference to the outcome. The real question is how they got into that position.

HCD is first and foremost about organisational decision-making. Individuals may make shoot/don't shoot decisions, but they do so within not only a situational setting but an organisational context. This is why 'own situation' is such a crucial component within the HCD framework, because it is this element that is most under our control.

In the case of the USS *Vincennes*, there was a 'decision', a shoot/don't shoot judgment call, which ended in tragedy. But our analysis of this incident came to the conclusion that nothing which took place inside the combat information centre (CIC) once Iran Air Flight 655 (IR655) was in the air, was going to make any significant difference. The end result had been locked into place long before, and far away, should a commercial aircraft departing from Bandar Abbas find itself on a direct bearing towards the ship.

It is possible to re-establish the chain of decisions that each, in turn, led to the shooting down of IR655. Someone, perhaps three or four years earlier, decided not to kit the *Vincennes'* CIC with a second VHF radio, and it is plausible to argue that if this decision had not been made then things would have turned out otherwise. But this is a long stretch, and not particularly helpful. There is no idealised model of decision-making that can reach back so far and cover all the possibilities of this nature. In what sense was the decision over the radio a mistake? At the time, it no doubt seemed perfectly reasonable. It is much more worthwhile to see the problem in terms of a failure to identify a foreseeable risk once the *Vincennes* had been assigned to the Gulf, and to check whether its CIC had the ability to listen in on and if necessary talk to the Bandar Abbas tower.

This is because HCD is first and foremost about **organisational** decision-making. Individuals may make shoot/don't shoot decisions, but they do so within not only a situational setting but an organisational context. This is why 'own situation' is such a crucial component within the HCD framework, because it is this element that is **most under our control**. This means that if our goal is to minimise the risk of catastrophic error, there are countless possibilities that are open to us if we examine how our organisations might be setting up our people to fail, as in the case of the *Vincennes* anti-air warfare team, or putting them in situations where sound decision-making is all but impossible.

If we adopt this perspective, then every aspect of our organisation and the way it operates can be included in the HCD program; nothing is off limits if it has any impact on the potential for a catastrophe to take place. We can look inside the organisation, at its culture, its values, its leadership style, how it makes decisions, its existing management systems, tolerance of risk, communication flows, tactics techniques and procedures (TTPs), team processes, training programs and its learning ability. We can look at the way the organisation interacts with its environment, with allies and partners, civilians, third parties and its enemies. In our two case studies, every single one of these aspects played a role, and the key point is **they can be managed**; to a large extent, they are under our control.

Throwing the 'Kitchen Sink' at the Problem

Equally important, help is on hand. There is a vast source of literature to draw on that contains valuable lessons and resources to guide HCD-motivated management initiatives. The TADMUS project, for example, developed an intricate understanding of the critical-team processes required for good performance under high-stress combat conditions, and how to train in order to acquire the necessary skills for these.

Research into high reliability organisations (HRO) has highlighted the main features of an organisational culture that minimises the risk of catastrophic error. One of these is a 'preoccupation with failure'. Application of this HRO culture to an Air Force mission environment might look something like the following.

1	Elaboration of potential failure scenarios
2	Contingency planning and development of procedures for failure scenarios
3	Identification of the warnings and indicators that will signal the onset of a failure scenario
4	Recognition of critical decision points in the mission and allocation of extra resources to these
5	Cross checking by multiple sources of the situation assessment and operational status of the mission
6	Team input into and awareness of ongoing situation assessment and operational status
7	Shifting location of rapid decision-making authority to the relevant operator
8	Mission go/no-go status anticipating rapid high consequence decisions to come
9	Process guardian on hand to monitor the decision-making process
10	Problems and failures encountered, reported and acted on for continuous learning and improvement
11	Independent auditing and performance reviews of the process overall, including whether 'the right problem' was solved

Table 4-2: Steps to a high reliability organisation

Much of this involves the activities already established as essential to decision-making, except that they are implemented at an organisational level. Metacognition, for example, appears in points 4 and 8, dynamic decision-making in points 5, 6 and 11. Point 1 on the other hand, is taken from risk management, point 3 from crisis planning, point 4 from food safety management (HACCP), point 6 from TADMUS, point 7 from HROs and multi-agency incident management, and point 11 from systemic operational design.

The purpose of this simple example is to show the possibilities that exist, once HCD is understood as a management program directed at organisational decision-making. A wide range of established disciplines and recognised best practices can be brought to bear with a single overarching objective,

minimising the risk of catastrophic error. In some cases they will already be in place, point 2 above perhaps, as a component of mission planning. In others, they will not be appropriate, but HCD is something of a 'kitchen sink' approach—it will throw anything at the problem if there is a good prospect of it helping.

In a real sense then, HCD remains what it has always been—a research project, scouring the available literature for anything of relevance and transforming this into management systems, leadership initiatives and training programs. Much of this work is still in its infancy, but its ongoing value should be self-evident in a world that is still no stranger to catastrophic outcomes.

Shoot, don't shoot, make a decision, do what needs to be done, but let the rest of us ensure you can do it in the confidence that your organisation has done everything in its power to set you up to succeed, that your chances of making a catastrophic error have been reduced to their absolute minimum.

This is HCD.

Part II – HCD as a Management Program

CHAPTER 5

Introduction to The Black Hawk Friendly-Fire Incident in Northern Iraq, 14 April 1994

Shoot, don't shoot decisions are taken in the heat of the moment. They are dictated by the demands of the situation, but their prospects of success or failure are largely determined in advance. The High Consequence Decision-Making (HCD) program is concerned with these prospects, it seeks to set up decision-making in such a way so as to maximise the chances of success and minimise the risk of catastrophe.

The driving principle behind HCD is control, the aim being to achieve as much control over a situation as the circumstances allow. Each of the elements within the HCD framework contributes towards this single objective. Situational awareness, understanding, consideration of our 'own situation', careful manipulation of the immediate context surrounding decisions, the anticipation of likely consequences, all serve to increase the level of control over time.

Total control forever remains beyond reach. A live adversary always has some room left to manoeuvre, to pull out a surprise, to regain the initiative, to snatch victory from the jaws of defeat. A complex operation can throw up something totally unexpected; its component parts can collide disastrously; it can move onto a path that no one intended, or desires and yet no-one is able to correct.

A degree of control, on the other hand, is always achievable. This is so because in any situation, we form a part of it and we control our own actions within it. Even under the most extreme circumstances, such as on the combat information centre (CIC) of the USS *Vincennes* where the choice appeared to be between two potentially catastrophic outcomes, there are always options, there are always decisions to be made.

This is why HCD concentrates its focus on the risk of error. Catastrophe can strike from any number of directions. The enemy may overwhelm us, defeat may be unavoidable, the forces of nature may intervene but when it comes to error there is always an element of control. Errors and mistakes are the result of choices; they are **our** errors, **our** mistakes, and as such, they are avoidable. There is always another course we could have taken, another outcome we could have reached. There is no necessity at work, only decisions and their consequences.

The 24th Marine Amphibious Unit (MAU) in Beirut had very little control over their situation—that was precisely the problem. The Joint Task Force in the Gulf had more, but advantage of this was not taken and the *Vincennes* CIC crew was placed in a position where an error with catastrophic consequences was almost guaranteed. In our next case study, the degree of control is highest of all. There is an adversary in the background, but they play a minimal role in the events that take place. **All** the major factors that contribute to the tragedy are under friendly force control, in principle at least. This is the reason why we have chosen this particular case to discuss. As a friendly-fire incident, it is as clear an example of catastrophic error as it is possible to find.

The accident occurred because control was lost. It was lost over an airspace that friendly forces had exclusively to themselves, and it was lost over two friendly fighter aircraft. The obvious questions this throws up are ‘how and why could this happen?’ ‘at what point was control lost?’ and ‘why did the pilots behave the way they did?’

Control is the key to understanding this incident because it is the loss of control which makes the error that follows catastrophic. The pilots’ error, a mistaken visual identification (ID) of the target aircraft, only leads to the tragic outcome because by this point, the pilots are acting on their own, beyond the control of the organisation, including its checks and balances. If this had not been the case, then most likely, the error would not have been made, and even if it had, it would have had little impact on the course of events.

Two main controls were in place to maintain the safety of the airspace. These had been in operation for more than three years and, during that period, not a single major safety incident or near miss had occurred. On this day, however, the pilots decided to override both of these safety controls. This was the critical decision point—everything flowed from this act. This action on the part of the pilots was **not** a mistake; it was deliberate, pre-meditated, followed a logic that made sense to them and was carried out in good faith. It was consistent with what they knew about their operating environment, how they understood the position and what they believed to be their mission.

What interests us, therefore, is not the mistaken visual ID, but the decision-making process that led them to attempt it. This was the point where control was lost and the risk of a catastrophic outcome catapulted into the extreme range. What interests us are the **inputs** into this decision and the **line of reasoning** on which it was based.

The discussion that follows will describe these inputs and explain the pilots' logic. In doing so, we will show how each and every one of the inputs was not fixed, but a **variable**. Nor was the line of reasoning that was employed the only one that could have been used; others were available. Both, in other words, were **controllable**. What we will be identifying, therefore, are the **controls** that could have been applied to shape the pilots' high consequence decision-making, in order to minimise the risk of catastrophic error. We will be providing an illustration of what HCD can look like as a management program.

There are some important advantages to approaching the incident in this way. It allows us to widen our focus from the mistake the pilots made in relation to the visual ID, to cover **all** of their decision-making that morning, in the lead up to the accident. This provides us with a much larger range of controls we can apply. Furthermore, these controls are not specific to the tragedy that did occur; they help to minimise the risks of **all** the potentially catastrophic outcomes that could have taken place once control was lost.

We will consider decision-making not only from the pilots' perspective, but from the point of view of the operation as a whole. This opens up more possibilities for managing the process so that a desirable result emerges, including 'don't be there' and 'creating options'. These will turn out to be as viable as they were in the case of the USS *Vincennes*. We can ask such questions as, 'are we solving the right problem?' In addition, we can give careful thought as to where decision-making is to be located, if a shoot, don't shoot situation does arise, and how best to avoid the challenges of time compression.

In this way, we will demonstrate what we mean by the description 'HCD—a management program' and show the practicality and benefit from approaching the risk of catastrophic error in this manner.

CHAPTER 6

Not So Friendly Fire

Nothing broke and no one was to blame; yet everything broke and everyone was to blame.

Lieutenant Colonel Scott Snook, *Friendly Fire*

Two friendly fighters destroyed two friendly helicopters and we couldn't point to a single broken piece of equipment, ill-designed procedure, grossly incompetent operator, or act of God to explain the tragedy. What remained was an organizational mystery.

Lieutenant Colonel Scott Snook, *Friendly Fire*

'Did you know that the Army helicopters were flying that day?' 'Yes sir, I get their flight plans every day'. 'So why weren't they on your flow sheet?' Straightfaced the young airwoman just looked at him and said, 'We just don't consider helicopters to be aircraft'.

Scott Snook, *Leading Complex Organisations*, Harvard 2001

Now my total attention switches to climbing up over the top of mountains, which are right off my nose... because if I hit the mountains I wouldn't be able to continue.

Tiger 01, Testimony to the Accident Investigation Board Inquiry

Our case this time takes place on 14 April 1994, in Northern Iraq, on day 1109 of Operation *Provide Comfort* (OPC), an operation that had proceeded, up until this point, without any major accidents.³³⁷ On this morning, two F-15 fighters detected and identified a pair of Iraqi *Hind* helicopters well inside the No Fly Zone they were policing, followed through on the requirements laid out in the rules of engagement (ROE) and, in line with their mission, shot them down. All this occurred under the watchful supervision of a USAF E-3 Airborne Warning and Control System (AWACS) aircraft in control of the airspace north of Iraq's 36th parallel.

This was a successful intercept, except that the helicopters were not Iraqi, nor were they *Hinds*, the ROE were not, in fact, conformed to, and nor, as we shall see, were the F-15s carrying out their assigned mission or under the control of the AWACS. On board the two US Army Black Hawks

shot down that morning were 26 OPC personnel, including the Ground Force Commander and a number of VIPs who were central to peace and stability efforts in the region. They were conducting a flight that had been personally approved by the Commander Combined Task Force (CTF).³³⁸

The classic account of this incident is Lieutenant Colonel Scott Snook's *Friendly Fire*. This looks at the events from the perspectives of the F-15 pilots, the AWACS crew, and Operation *Provide Comfort*, each in turn. Drawing on many of the same sources that have informed HCD's analyses in the preceding chapters, such as high reliability organisations (HRO), Systems and Normal Accident theory, Snook sums up the dilemma surrounding the incident with these words,

In the case of the shootdown, no single cause was identified. Nothing broke and no one was to blame; yet everything broke and everyone was to blame... After almost two years of investigation with virtually unlimited resources, we still didn't fully understand why twenty six people had to die... Only one investigation went to court martial and even it resulted in acquittal. No culprit emerged; no bad guy showed himself; no smoking gun was found. Two friendly fighters destroyed two friendly helicopters and we couldn't point to a single broken piece of equipment, ill-designed procedure, grossly incompetent operator, or act of God to explain the tragedy. What remained was an organizational mystery...³³⁹



A USAF F-15 fighter (Source: USAF)

As Snook puts it, the central question that arises out of the incident is, 'How in the world could this happen?'³⁴⁰ And he quickly goes on to show that none of the usual suspects in cases of friendly fire apply. 'No significant enemy action had been detected in the TAOR (Tactical Area of Responsibility) in well over a year... There was little in the way of 'the fog of war' to blame. It was broad daylight with unlimited visibility and no fighting on the ground.'³⁴¹

An early training session in the HCD program picks up the same theme. Participants are asked to put themselves in the shoes of the F-15 pilots. The following is the first question they are set,

'You are an F-15 pilot flying on a mission to sanitise the airspace of a No Fly Zone. You have just conducted a visual identification sweep of a helicopter flying at 200 feet above ground level. You have identified the helicopter as a hostile Mi-24 *Hind*. You have 9 years flying experience, including three in F-15s. You have flown over 30 combat missions, including 18 protecting this No Fly Zone.

How confident are you in your visual identification?'

The required response is in the form of a percentage figure. While few participants are prepared to rate their level of confidence as 100 per cent, many are prepared to give their answer as 99 per cent. Almost no-one goes below 80 per cent, the average is around 90 per cent confident.

This is a perfectly reasonable response, and it is precisely the degree of confidence we would also expect from an experienced combat pilot. In fact, we would **demand** of such a pilot the willingness to back themselves under such circumstances and make the decision called for by the situation. This is how fighter pilots are selected and trained; it is in the nature of their role. In air-to-air combat, as Karl Weick puts it, 'The costs of being indecisive frequently outweigh the costs of being wrong'.³⁴²

Nevertheless, at this point, we inform our participants, '**you are wrong**' and we ask them, '**How could you make this error?**'

We now take our trainees step-by-step through the decision-making process carried out by the F-15 pilots that fateful morning. We begin with the training these pilots received in aircraft recognition, whose purpose is to ensure success in any attempt to make a visual identification (VID). Most of our HCD participants, up to now, have been through similar training so this is something familiar to them. We assume that the F-15 pilots went through a refresher-training course before being deployed in theatre and it turns out that this assumption is correct. Our pilots are well trained.

Or are they? We ask our participants, 'five months ago, you went through some refresher training in aircraft recognition. You prepared by looking through photos of 100 aircraft. How many of these aircraft were friendly and how many were potential threats? As an F-15 pilot, **how many of these photos were of helicopters? How comfortable are you with rotary wing aircraft recognition?** The photos of helicopters you looked at were all supplied by Army photographers, for use by Army personnel. **What is the problem here for an F-15 pilot?**'



Mi-24 helicopter (NATO designation Hind) in a paint scheme similar to that of Iraqi Air Force (Source: USAF)

The relevant training had taken place the previous December. Snook describes its content in this way.

This training consisted of viewing ‘beer shots’ of enemy and friendly aircraft projected on a screen from a 35-mm projector. Only 5 per cent of the slides depicted helicopters, almost all of the photos were taken from the ground looking up. Not only is this the most convenient angle to photograph, but it is also the angle of most interest to the Army - the service that supplied the photos, a service that generally does not see helicopters from above... None were taken from the above aft quadrant - the position from which the F-15s intercepted the Black Hawks, the position from which most fighters would view a helicopter. Also, there were very few slides of US Black Hawks in the ‘training decks’.³⁴³

In the light of this information, our participants’ level of confidence in their VID skills plummets from its initial level of around 90 per cent to ‘not very’; figures given can be as low as 10 per cent.

Snook agrees with this assessment and explains why it is to be expected,

In general, an F-15 pilot’s helicopter recognition skills are limited. This is primarily because most F-15 pilots consider helicopter recognition to be a relatively unimportant skill... Their primary mission is air-to-air combat against other fast movers... Hence, as a matter of survival, and as a result of having most of their operational training focused on high

altitude aerial combat, most F-15 pilots' attention during recognition training is focused on accurately identifying their most likely contacts, their most dangerous threats... not relatively harmless helicopters that fly low and slow.³⁴⁴

The assumption that our pilots are well trained for the task at hand turns out to be somewhat shaky.



Black Hawk helicopter with external fuel tanks fitted (Source: Sikorsky)

The assumption that our pilots are well trained for the task at hand turns out to be somewhat shaky. Next, we turn our attention to the question of experience. Our two F-15 pilots are among some of the most experienced in the entire USAF; they have flown numerous combat missions, including inside the TAOR; they know this airspace well.

Or do they? Once again, appearances are deceptive. We ask our training participants this question. 'In the past 3 years, as an F-15 pilot, how many missions have you flown where you have gone below 1000 feet AGL (above ground level)? **How experienced are you at low level flight?**'

The answer turns out again to be ‘not very’. Snook supplies the precise details,

Tiger 01 had flown only two air-to-air training sorties below 1,000’ AGL prior to the incident. This is out of a total of three and a quarter years of flying as a qualified F-15 pilot. Tiger 02 had not flown a low altitude sortie since 18 November 1993.³⁴⁵

In part, this was because the Airspace Control Order for Operation *Provide Comfort* (OPC) restricted fixed-wing aircraft from dropping below 1000 ft AGL. In order to make the VID, therefore, the F-15 pilots had to violate the ACO, a complication we shall return to in due course. Mostly, however, it was due to the F-15s’ role as an air superiority fighter, which meant that a typical F-15 combat air patrol would be flown at 20 000 ft or above, including on this particular day, where the designated transit altitudes were 27 000 ft out and 34 000 ft for the return.

We then relate this question of experience to the practicalities of making a VID of a helicopter flying in the TAOR of Operation *Provide Comfort*. We provide our trainees with this information, and ask, ‘To make this VID, you have to fly through a narrow river valley with steep mountains on both sides. Your airspeed is 450 knots, the helicopter is flying below you at 130 knots. It has an effective camouflage pattern for this terrain. **Where is your attention focused as you conduct this manoeuvre? How good a look are you going to get of the helicopter?**’

The lead pilot, *Tiger 01*, described the challenge with these words,

By this time the environment is very low to the ground, something that I’m not used to doing. I’m in a valley with the mountains on both sides higher than me, and the valley is actually getting skinnier. Its not a very wide valley; its more like a ravine. So, as I pull up over the top of this helicopter... now my total attention switches to climbing up over the top of mountains, which are right off my nose... because if I hit the mountains I wouldn’t be able to continue, but there was a lot of concern for low altitude environment, something we never ever fly in.³⁴⁶

Tiger 02 had a similar perspective, captured in a technical report on human factors that accompanied the accident investigation,

Being based in Germany, we don’t train below a thousand feet on a regular basis... That was a training limitation. I was uncomfortable getting down low altitude with that two ship. Primarily the reason was... I didn’t have both of them in sight... the type of terrain we were looking at and trying to get down there at a helicopter flying as low as they were is not something we routinely train towards... RTU which is the training flight for F-15s, used to have a low altitude checkout program... that was below 5,000’... They did not have that when I went through due to cutbacks... So, I did no training below 5,000’ until I got to

Bitburg. I've only had two upgrade rides in low altitude training... Those were the only two times I've ever gone below a thousand feet.³⁴⁷

By this point, we are a long way from our initial confidence scores of up to 99 per cent. Most participants now determine the probability of error to be higher than 50 per cent; the odds are we will get it wrong.

Furthermore, we have not finished with the problems thrown up by our training. As those familiar with aircraft recognition will know, a key training tool is the use of 'key recognition features' to assist with the process. For the Mi-24 *Hind*, its most obvious feature is the double canopy, but this can only be clearly seen from the side at level height so would not have helped our F-15 pilots as they approached high and from the rear. This left the Mi-24's ordnance carrying wingtips and its tapered fuselage as the most visible remaining key recognition features, and if the F-15 pilots remembered their training, as it seems they did, then it would have been on this basis that they determined the helicopters to be *Hinds*. This was confirmed in the official *Aircraft Accident Investigation Board Report*, which Snook goes on to cite,

'I (Tiger 01) knew this (that it was a Hind) 'cause it had a tapered empennage... the vertical tail is sloped so it goes backwards... He has sponsons on both sides.' During visual recognition training... pilots are taught that three distinguishing features of Hind helicopters are their tapered empennage, rear slanting tail, and ordnance carrying sponsons.³⁴⁸

The problem was, 'Black Hawks also have narrowing tail sections, back sloping vertical tails, and, from the top, UH-60 external fuel tanks resemble the ordnance-laden wings found on a Hind.'³⁴⁹

Even worse, the F-15 pilots had not been briefed on an essential piece of information, that the Army Black Hawks deployed in OPC carried external fuel tanks. They did so when flying longer-range missions beyond the Military Coordination Center's (MCC) Headquarters in Zakhu, just over the border from Turkey, and deeper into the No Fly Zone. In other words, on just those occasions when they were most likely to be intercepted by F-15s whose pilots had been trained to recognise *Hinds* by their wings. *Tiger 01* gave this testimony to the accident investigation board.

I've been on a Black Hawk numerous times. Never have I seen the wings on it. The first time I've ever seen that is when I came here and saw the Special Operations birds across the street on the other side of the runway here. To me a Black Hawk looks considerably different from a Hind when it does not have those sponsons and that was the impression of a Black Hawk I had. The Black Hawk did not even cross my mind when I made that visual identification.³⁵⁰

I think the main one is, the sponsons coming out of the side was a dead giveaway for me that they were Hinds. We don't carry - in our pilot aid, there's nothing - no silhouettes of Black Hawks. The training that I have done in the past has been very little, with silhouettes of Black Hawks, but the silhouettes we do have do not include sponsons or ordnance or anything of that sort.³⁵¹

The HCD training session now moves on to the events leading directly up to the shootdown. It begins with the same dilemma that confronted the anti-air warfare (AAW) team on board the USS *Vincennes*—how to identify an aircraft from a blip on a radar screen. It also serves to highlight the critical role played by background intelligence at this point in the decision-making process, where no other information is yet available. We give our training participants the following summary.

‘You attended a pre-flight intelligence briefing this morning. This stated that political tensions had increased over the past week, with the hostile nation leader denouncing the UN and the No Fly Zone (NFZ). There were also newspaper reports of up to 100 000 hostile nation ground troops about to move into the area below the NFZ.’

Does this intelligence briefing influence your assessment when you first detect an unknown aircraft on your radar? How?

It is not clear that the pre-flight intelligence briefing on that morning did in fact contain this information. However, *Tiger 02* provided this description of how he understood the political and military context that applied in Iraq at the time.

We had Intel briefs, an article was in the paper that happened earlier in that week that talked about the Iraqis moving a hundred thousand troops into Northern Iraq, including elements of the Republican Guard. We had Intel briefs that had taken place the week prior about a German journalist who had been assassinated in Irbil, and the word was coming through Intel channels that Saddam Hussein was very upset with the status of UN sanctions staying in position and so consequently he was interested in - in, I believe the term the Intel guy used was whacking a UN worker, they were fair game and he was willing to pay bounties on them.³⁵²

The significance of this intelligence picture is the expectations that it sets up. We ask our training participants to assess the likelihood that the contact on the F-15's radar is friendly or hostile, given this context. There is unanimous agreement that it is likely to be hostile, with at least a 70 per cent probability.

Seeing What They Expected To See

The problem with expectations of this nature is that they exposed the pilots to the risk of confirmation bias, that they would see what they expected to see. Snook examines this in some detail, and makes a strong case that this is what, in fact, happened, given the limited and ambiguous visual cues provided by the high-speed VID.³⁵³ This is how perception works, as has long been understood in the philosophical discipline of phenomenology, for example, the work of Merleau Ponty. As Snook puts it, ‘Believing is seeing. Expectations colour reality.’³⁵⁴ Human beings do not perceive in the way a radar or video scan does; they do not assemble a picture from raw data in a detached and objective manner. Instead they interrogate pieces of information with a view to finding meaning, an answer



Map 6-1: Northern Iraq showing the No Fly Zone of Operation Provide Comfort

to a question that is posed by their situation, what they are seeking to achieve, and the decisions they have to make. Following Karl Weick and Gary Klein, Snook correctly describes the pilot's actions as 'sense-making'³⁵⁵, and within this process the intelligence briefs were an important contributing element, only one among several, as we shall see, but there is little doubt as to their significance.

Confirmation bias may well have played a role in the catastrophe that was to follow and intelligence may well have been influential in generating the pilots' expectations as to what these radar contacts were. The difficulty is, however, as in the case of the *Vincennes*, that this is the **very purpose** of

intelligence assessments, to act as decision aides, to help pilots chart a course of action that is mindful of the most serious threats to their mission, and to their survival. In no way can this observation be cast as a criticism. In other words, if intelligence briefs do not set up expectations, then what is the point of them?

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if intelligence briefs do not set up expectations, then what is the point of them?

Furthermore, if we look at *Tiger 02*'s understanding of the context that surrounded his flight on 14 April, then it is not really subject to the same kind of critique that we applied earlier to the intelligence summary (INTSUM) given to the crew of the USS *Vincennes*. Without knowing the full facts of the matter, it is reasonable to take the 'one hundred thousand troops' on the move with a pinch of salt, as this would have triggered massive reporting with an accompanying level of detail. But at the same time, Saddam Hussein was capable of highly erratic decision-making which made all kinds of unlikely and not very coherent actions a serious possibility to take into account. Even though the NFZ had not been violated for over a year, the situation in Iraq remained tense and volatile. The F-15 pilots were entirely justified in maintaining a status of high alert. *Tiger 02* expressed their attitude in this way,

We come down here, we load up live ordnance, we fly in unfriendly skies, at times flying in surface-to-air missile rings... and its still – it's an unfriendly neighbourhood out there and you have to keep that in mind every time you go out there.³⁵⁶

Combined Task Force (CTF) Commander General Pilkington shared this view. His own assessment of the threat situation in northern Iraq included the following.

The week prior to the shootdown of the 14th of April, I had imposed a restriction. I had received some intelligence information that Saddam - this happened fairly regularly, I say infrequently, but not that often, infrequently, it happened at least a few times during my tenure - that Saddam decided to shoot down an aircraft north of the 36th, had directed his surface-to-air missile forces to attempt to do so, and might possibly use a decoy to try and lure our aircraft into the SAM envelopes.³⁵⁷

On the morning of the flight, the intelligence brief added some important detail to this general threat assessment. According to *Tiger 01*,

Our squadron intelligence officer briefed us on - first thing he briefs us on is the number of sorties flown the day previous by Iraqi fighters and helicopters... That day there was a Roland (surface to air battery) at a previous site that was no longer there. So it hadn't yet to appear at a different site, so we didn't know where it was.³⁵⁸



Map 6-2: Track of Eagle Flight from Zahku to Erbil

The threat was real enough. The pilots' understanding of the general political situation and its implications for their mission was not an exaggeration. It was not a repeat of the projection of 'worst case scenario' concerns or misapplied risk management concepts that we saw in the case of the *Vincennes*.

What Was Missing From the Pilots' Accounts

On the other hand, their account is interesting for what it leaves out. No mention is made of any friendly-force response to Saddam's posturing, whether military or diplomatic, by the CTF partner nations or the UN. But there was plenty of activity. In fact, the Black Hawks' mission was directly related to the same general context; the VIPs were being conducted to important meetings with Kurdish community leaders in Erbil and Salah ad Din. Political initiatives of this kind were part of the

normal functioning of the MCC in Zakhu and played an important role in promoting a sustainable political resolution to the question of Iraq's Kurdish minority. Unfortunately, considerations of this wider OPC mission do not seem to have played any role in the decision-making process of the F-15 pilots, and there is no evidence to show that they were even aware of what the MCC were doing on the ground.

It also appears that they had no knowledge of what their coalition partner, Turkey, was doing. On that very morning, the Turkish military were conducting operations against the guerrillas of the PKK, a Kurdish faction fighting inside Turkey for an independent Kurdistan. These operations included the aerial bombing of Kurdish villages not far to the north of the TAOR, and in General Pilkington's words, 'sometimes spilled into Northern Iraq'.³⁵⁹

Turkish military activity inside the No Fly Zone was recognised as a problem within OPC. As part of the response to this hazard, the AWACS crew had been tasked with obtaining hard evidence of air movements so that complaints could be made through command channels. Joan Piper gives this description of the scene onboard, based on testimony given at AWACS Senior Director Captain Wang's court martial.

Meanwhile, AWACS has almost approached its final orbit in southeastern Turkey, due north of the No Fly Zone. The Surveillance section has just finished tracking three special mission packages that have exited Iraq and flown into Turkey. The 'special packages' are flights made by the Turkish Air Force before the allied aircraft are allowed to enter the No Fly Zone. The purpose of these special packages is an ironic twist to the OPC mission. Early in the morning the Turks attack Kurdish sites they perceive as a threat to their country. Recently there has been a conflict. They have remained in the No Fly Zone with more frequency, when the AWACS arrive on station. This crew had been made aware of the problem and it has attached a video camera to an empty screen to record the missions.³⁶⁰

The F-15 pilots, in their testimony, never gave any indication that they had ever considered the possibility that the unidentified tracks might be Turkish, or of the catastrophic implications for Operation *Provide Comfort* if they were to shoot down a Turkish Air Force asset by mistake.

It is quite likely that this action was taken directly under the orders of the CTF Commander, who stated, 'my number one rule was to keep the coalition together, which was sometimes fairly difficult between Turkish customs restrictions and Turkish operations in Northern Iraq'.³⁶¹ However, this preoccupation does not seem to have reached the F-15 pilots, who in their testimony never gave any indication that they had ever considered the possibility that the unidentified tracks might be Turkish,

or of the catastrophic implications for Operation *Provide Comfort* if they were to shoot down a Turkish Air Force asset by mistake. The operation was already highly controversial within Turkey, with many political forces strenuously opposed to Turkey's participation in the coalition and its acceptance of multinational military forces operating from Turkish soil. It is extremely unlikely that OPC would have survived such an incident, and yet the F-15 squadron did not seem to have any awareness of this risk.

Making Certain, Step by Step

Our HCD training session continues with its reconstruction of the decision-making process of the F-15 pilots. At this point, we add the information to be gleaned from the radar track.

'The radar hit is flying low and slow. You are well aware from intelligence briefings that the hostile nation air force operates Mi-24 *Hinds*. How likely is it, in your estimation, that the aircraft on your radar is an Mi-24 *Hind*?'

The evidence is not yet conclusive; there is room for doubt, but the picture is building. Then we ask our training participants to take the following into account. 'According to the Air Tasking Order (ATO), you are the first friendly aircraft to enter the NFZ that day. This is consistent with your mission, to sanitise the airspace. How likely is it that the aircraft on your radar is friendly?'

As those familiar with air operations will know, the Air Tasking Order is a critical document. It lists all the planned aircraft movements through the airspace in question. If it is not there on the ATO, then it is not supposed to be there in the TAOR, and as this is a No Fly Zone, the implications are clear to everyone. The ATO plays an important role in our story. For the moment, we will leave aside whether *Eagle Flight*, the Black Hawks, were in fact listed on the ATO, or whether it was reasonable to expect that they were. We shall take the statement above at face value—according to the ATO, the F-15s were the only friendly aircraft in the NFZ.

When our training participants agree with this assessment, the likelihood that these are not friendlies shoots up, on average, to almost 99 per cent. This is not surprising; the ATO is 'the Bible'; everyone understands its purpose and its significance. If the information in the ATO cannot be relied upon, then any prospect of safe and orderly air operations disappears altogether; the system falls apart.

Nevertheless, in spite of our degree of certainty, there are some steps in the process we still have to take. 'You check in with the AWACS controller who confirms the hits on the radar. The controller makes no mention of friendlies. How likely is it now that the aircraft on your radar is friendly?'

The AWACS controllers understand the F-15s' mission; they know what is coming next. If they suspect friendlies were in the area, surely they would say something? Not only that, but as Snook points out, the controller's choice of words is significant.



Wreckage of the two US Army Black Hawks (Source: US Army)

The meanings attributed to the two responses from the AWACS controller are important. The TAOR controller's initial response of 'clean there' indicated that he had no radar contacts at all on his screens in the location reported by the F-15s. His response to the lead's second call was, 'hits there', indicating that when he looked at that location this time, he saw a simple 'blip' on his screen, representing an as yet unidentified radar return. Had he seen a green 'H' or a friendly identification number on his screen at that location, the appropriate response would have been, 'paint there'.³⁶²

For now, we will take this at face value too, and move on. The checks are not yet finished, they continue with this. 'You repeatedly interrogate the aircraft using both Mode I and Mode IV IFF (identification friend or foe) codes, as per procedures. There is no response from the radar blips.'

How likely is it now that the aircraft on your radar is friendly?

Once again, we will not question at this point whether this was, in fact, the correct procedure. Like all the major elements within this story, exactly why the IFF system did not work as intended will

turn out to be a complicated issue. But for the moment we are left with the fact that our attempts at IFF interrogation have not resulted in a friendly identification.

Our training participants have now arrived at a stage where, having traced the F-15 pilots' decision-making process up to this point, they are at least 99 per cent certain that they would determine the aircraft to be hostile. We next ask them to consider the probabilities of error that will surround the VID pass the pilots are about to make. We ask them, 'If the aircraft turns out to be an Mi-24 *Hind*, how likely are you to correctly identify it on your VID pass? How likely are you to misidentify it as a Black Hawk?'

'If the aircraft turns out to be a friendly Black Hawk, how likely are you to correctly identify it on your VID pass? How likely are you to misidentify it as an Mi-24 *Hind*?

The point is, of course, that the probabilities of error are not equal. If the aircraft are Mi-24 *Hinds*, the chances of mistaking them for Black Hawks are miniscule. But if they are Black Hawks, there is a strong possibility we will still make the call that they are *Hinds*.

The lead pilot makes his pass, identifies the targets as *Hinds* and instructs his wingman, to 'confirm *Hinds*'.³⁶³

This is an unfortunate turn of phrase, as it undermines the independence of *Tiger 02*'s VID attempt. In an already high expectation-laden context, the lead F-15's declaration the aircraft are *Hinds* makes it even more likely his wingman will falsely come to the same conclusion. Up to this point, the two pilots have been dealing with identical circumstances, but now *Tiger 02* has been given an extra condition and it is one that reduces his chance of making a correct identification. *Tiger 02* put it this way.

I came in on that ID pass - I saw the high engines, the sloping wings, the camouflaged body, no fin flashes or markings, I pulled off left, I called 'Tally Two'. I did not identify them as hostile - I did not identify them as friendly. I expected to see *Hinds* based on the call my flight leader had made. I didn't see anything that disputed that.³⁶⁴

Even worse, *Tiger 02*'s confirmation serves, in turn, to reinforce *Tiger 01*'s initial call. It gives him reassurance that he has made the right judgment; after all two pairs of eyes are better than one. How credible is it that two experienced combat pilots would both make the same mistake? *Tiger 01*'s account continues.

Then soon after that, there's this call that says 'affirmative'. I don't know if it was, 'affirmative *Hind*', 'affirmative ID' - but the gist of it, yes, they're *Hinds*. That was from *Tiger 02*.³⁶⁵

But in reality, his confidence is misplaced. The verification process has made the chance of an error **more** likely, not less, the exact opposite of the desired outcome. Snook makes the same point. Talking about the interaction between the two pilots, with the added factor that *Tiger 02* was also the more senior in rank, he states,

In addition to subtly encouraging *Tiger 01* to be more decisive than he otherwise might have been, the inversion might also have encouraged him to be less risk averse, to take a greater chance with his call, confident that if his call was indeed wrong, surely his more experienced squadron commander would catch any mistake. In the unlikely event that *Tiger 01* misidentified the helicopters, there is no way that such an error would slip by his boss. Remember, *Tiger 02* was ‘famous’ for being credited with the only confirmed kill of an Iraqi Hind during the Gulf War.

Ironically, we find *Tiger 02* similarly seduced into a dangerous mindset... ‘Its important to note that I had and still have a tremendous amount of confidence in my flight leader’.³⁶⁶

With confidence in his VID, *Tiger 01* is now set to go in for the kill. He calls in his intent to the AWACS up above, swings around and launches an AMRAAM missile at the trailing helicopter. Moments later, *Tiger 02* follows through and successfully takes out the remaining aircraft.

If we lay out the decision-making process that has led up to this point and place it within the HCD framework, we find it looks something like this.

SITUATIONAL AWARENESS	• two unknown radar contacts, no friendly aircraft is supposed to be inside the TAOR • much of the TAOR still to be sanitised, so possibility of an Iraqi trap remains present • Roland SAM whereabouts unknown • political situation is volatile
SITUATION ASSESSMENT	• only question that counts is the identity of the unknowns, intent is irrelevant • unknowns are hostiles, based on intelligence brief, ACO, ATO and flow sheet listings, Mode 1 IFF interrogation, and ‘Hits there’ call from AWACS • VID confirms Iraqi <i>Hinds</i>, ‘next step is to shoot’

OWN SITUATION	• OPC task is to enforce a NFZ • F-15s' mission is to clear the airspace of hostile aircraft before the day's package begins • ROE require a VID if electronic identification is unsuccessful • CTF Commander's 10 000 ft rule does not apply to tactical situations • opportunity is here to show F-15s can do anything an F-16 can do
THE DECISION TO BE MADE	• <i>Tiger 01</i> will make all key decisions • while there is no hurry, there is no reason to delay once the ROE are met and ID is complete • only options are 'shoot, don't shoot'
ANTICIPATED CONSEQUENCES	• NFZ successfully enforced • prestige gain for F-15 squadron • personal satisfaction and career enhancement for <i>Tigers 01</i> and <i>02</i>

Table 6-1: The situation from Tiger Flight's perspective

When we examine *Tiger 01*'s decision-making in this way, we find it contains a powerful logic. Even though we know the outcome, it is not easy to find fault with the process—it makes sense. Our HCD trainees agree. When asked whether they would do the same as *Tiger 01* and *02*, under identical circumstances, the response is unanimous—they would shoot.

If we wish to prevent a repeat, therefore, this presents us with a certain problem. If the logic is sound, then all we are left with is the VID as the error-laden input into the decision to launch missiles. This was, in fact, how the official investigation approached the matter, and its chief recommendation was a review and overhaul of the aircraft recognition training provided to F-15 pilots 'with particular emphasis on low and slow flying aircraft'.³⁶⁷

HCD's position, however, is very different. Not only do we disagree with this particular recommendation, for reasons we will explore below, but HCD argues that each and every one of the eighteen dot points listed above in Tiger Flight's perspective are open to alteration. They can be managed, and if this is so, then a whole new set of possibilities appears for intervening into the

decision-making process. Instead of just one variable, we now have a large number to play with, and not only can we vary the inputs, we can also shape the entire logic driving the pilots' decision-making.

Instead of just one variable, we now have a large number to play with, and not only can we vary the inputs, we can also shape the entire logic driving the pilots' decision-making.

Not only that, but as we shall see, the incident that morning created not only the potential for a friendly-fire accident, but no less than eight other catastrophic outcomes. The risk was in fact extreme. This alters our perspective in another manner. In the original investigations, the accident was seen as something of a freak occurrence in which all the various safeguards, checks and balances that existed to prevent a shootdown failed at once, in a totally unforeseeable way. If this was so, then reducing the risk of a repeat event would be a daunting task, it may be possible to prevent another combination of the exact same circumstances, but some other unlikely coincidence would still remain as a possibility, and would be just too hard to identify or eliminate.

In the discussion that follows, we hope to show that the difficulty is not as great as it appears. In this case, HCD will demonstrate how an accident of this kind could have been predicted, and therefore prevented. More than that, it will explain how the risk of all nine catastrophic outcomes posed on 14 April could have been minimised through an effective management program that addressed each of the problem areas identified above.

This is where the HCD framework can assist us. A number of areas stand out.

- By examining how the pilots' **expectations** of what to find in the TAOR were produced, we can understand the limitations of their situational awareness (SA) and pinpoint how a more realistic appreciation of the situation could have been generated before taking off on their mission that morning.
- By exploring the role played by the various aspects of the F-15s' '**own situation**' in shaping their decision-making, such as Air Force culture, the ROE and the pilots' understanding of their mission, we can see how critical elements of the **logic** that governed their thinking could have been channelled onto a more desirable path.
- By highlighting the ways in which Tiger Flight's thought processes **diverged** from other components of OPC and how their actions took everyone by surprise, we can see how these could have been better **aligned** on the day and the integrity of safety measures already set in place maintained in order to prevent tragedy.

Our wider perspective also includes this—the 1109 days of Operation *Provide Comfort* that were conducted safely, without a major accident. Any effort to minimise a repeat of 14 April 1994 has to take in this larger viewpoint, or else it runs the risk of closing one stable door only to open another, much as we saw in the aftermath of the USS *Stark* incident and the effect of the changes made to the ROE on the Iran Air Flight 655 incident one year later. It is essential that we understand both what made OPC air operations safe for that prolonged period and how specifically safety was compromised in this one case. We need to know what was different about this day.

On this basis, we will show that the critical decision taken by the pilots was not the mistaken identification of the unknown targets, or even to open fire, but the breach of vertical separation that took place when they decided to drop down low and attempt a VID of two helicopters. This was the single act that transformed the situation into a ‘state of high risk’ and it is this decision that forms the focal point for our management efforts. In the discussion that follows, we will demonstrate how and why this was so and the ways in which the pilots’ decision-making could have been managed so as to avoid such a state of affairs coming into being.

CHAPTER 7

Creating Expectations

Expectations played an important role in the accident, as our initial account has shown. The pilots did not expect any friendly aircraft to be in the tactical area of responsibility (TAOR), they had every reason to presume the unknown hits on their radar were hostile. This expectation turned out to be wrong. Not only that, it was in fact, completely unrealistic. Nevertheless, it must have come from somewhere. Snook provides an indication of how the pilots' expectations were generated,

Both pilots flew with a 'flow sheet' clipped to their kneeboard... However, because helicopters were not well integrated into OPC flight operations, they weren't included on the F-15's flow sheet. The F-15s ... were listed at the very top, as the very first flight of the day. The flow sheet showed all other aircraft following them into the TAOR, thus reinforcing expectations that no one should be out there in front of them, at least no one friendly. Order does matter. Based on information received from a series of coordinating mechanisms ... the F-15 pilots built a strong set of expectations. They expected to be first in. Unfortunately, they were not.

How could this happen? How could the helicopters enter the no fly zone before the sweep? And why weren't the pilots aware of their presence out in front of them?³⁶⁸

This last question is the critical one, and it is *Tiger 02's* testimony that provides us with the answer we need.

The source document for our planning is the ATO (Air Tasking Order)... Where I would really expect to find out, no kidding, what's happening with the Black Hawks would be in the ATO. If its not there, it shouldn't be happening.³⁶⁹

It was on this basis that the official Air Force investigation drew the conclusion that the problem lay in the failure to include the Black Hawks flight plans on the ATO, there was a lack of coordination or integration between rotary-wing operations and fixed-wing. Following the accident, this was corrected.

However, this analysis does not hold up under scrutiny. There were good reasons behind the way Black Hawk flights were handled in Operation *Provide Comfort* (OPC) and the system in use had been operating for almost three years without major safety issues. Instead, the problem lay in the F-15 pilots' understanding of the ATO, namely that 'if its not there, it shouldn't be happening'. The fact is that this expectation bore no relation to the reality of air operations in OPC. The real issue, then, was that the F-15 pilots had not been given important information in relation to the operating

environment they were flying within. It was not a question of failing to integrate Eagle Flight; it was a failure to integrate the F-15 squadron into the operation. This becomes clearer when we examine in detail how the ATO system worked in OPC.

In the first place, it is **not** the case that the Black Hawks were left off the ATO. Eagle Flight was included on the ATO, every single day it flew in Operation *Provide Comfort*. Because of the unpredictable nature of their flight movements, it was not possible to include them in the flow sheet. Nevertheless, they were on the ATO. Captain Nye, the commander of Eagle Flight following the accident, supplied the detail of how the system worked.

Eagle Flight was always on the ATO, but the lines were only block lines until late 1992. In late 1992, the MCC commander requested more flexibility in mission times. This request was granted by the CTF command and the ATO was changed to show all Eagle Flight lines 'as required'. There were no times or routes printed in the ATO.³⁷⁰

There were good reasons for this practice; these flowed out of the specific challenges faced by Eagle Flight during the normal course of their missions. General Pilkington gave an indication of these, in his discussion of the difficulty Black Hawk crews had in filing flight plans, one of the most basic tasks in any form of aviation.

It took me a while to understand exactly what was going on in terms of helicopter scheduling. My immediate thought was, after flying a few sorties, that the difficulty in getting airborne out of Diyarbakir, which was a Turkish air force base, made the takeoff time soft to the point that there was no reason to even put them on the schedule. I understood that problem, and that if takeoff times varied by more than 15 minutes from what was scheduled, then the crew would have to go back in and refile again, so I expected initially that there was some reluctance to have to get out and then this would complicate the operation.³⁷¹

In addition, there was a security aspect to the question of distributing Eagle Flight information. Pilkington continued,

Yes, there were security reasons why the details of Eagle Flight missions in northern Iraq were not provided to the pilots. The flowsheet was printed fairly early in the afternoon the day before the mission, between 12 and 1 o'clock, and distributed. The details of the mission of Eagle Flight in northern Iraq would not even be decided until some 10 hours later... when the four coalition senior officers in SACO would meet sometime between 9 and 11 o'clock at night and plan the next day's activities. The timing then of those activities would be passed by secure telephone and then only by secure means, eventually being given to squadron operations centers by a system we call the Sentinel Bite, which was the only really secure method we had.³⁷²

This meant that the ATO and flow sheet drafting processes were bypassed by the time frames involved in the Military Coordination Center's (MCC's) planning process. As a result, the ATO limited itself to a non-specific listing of Eagle Flight that stated the Black Hawks would be flying somewhere in the TAOR, at some time, but left it at that. More information might be available in the squadron operations centres, depending on Eagle Flight's exact status at that moment, if it was needed.

What Did the Pilots Need To Know in Order To Form a Correct Expectation?

But why would it be needed? Surely the flow sheet was enough? In fact, it **was** enough, certainly for the F-15 squadron, who normally had no interaction with helicopters. The reality was that the pilots had all the information they needed—Eagle Flight were operating somewhere in the TAOR and their movements were not on the flow sheet. That was all they needed to know in order to form a correct expectation when confronted with unknowns flying low and slow away from Zakhu—the strong possibility existed these were Eagle Flight.

This is why *Tiger 01* is wrong when he stated:

First it says in the ACO (Airspace Control Order) that all UN flights will be in the Frag (ATO) with specifics. They (Eagle Flight) were in the Frag but no—and it doesn't help to be in the Frag and just put the name, the call sign down.³³⁸

But it did help, which was why it was done, and there was no need to do any more. This becomes clearer if we follow through the logic of *Tiger 01*'s statement, which unravels his own argument. The fact is that he read the ATO, saw Eagle Flight was there and so knew that his information was limited to that level of detail. He had what he needed, which was **to know that he did not know**.

This is an important point about friendly-fire incidents in general. Situational awareness, rather than following procedures, is the key to avoiding them. This is even recognised in official doctrine.

Lack of positive target identification and the inability to maintain SA in combat environments are the major contributors to fratricide.³⁷⁴

Rasmussen picks up this theme, and states, 'Obviously, good SA—when an individual's perception equals reality—is preferred, more is better'.³⁷⁵ And, as with HCD, he argues the production of good SA is primarily a management function. 'Good SA is dependent upon planning, control measures and the expectations of participants, and can compensate for other shortcomings.'³⁷⁶ Rasmussen's key point, however, is that an understanding of one's position in relation to SA is even more important than good SA itself.

When an individual either never gains, or has and then loses, SA, that is acceptable so long as that individual realises his lack of understanding (eg I'm clueless and I know it). What is by far worse, is the individual who thinks he's got good SA when in fact he does not.³⁷⁷

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This worst-case scenario appears to have applied to the F-15 pilots, important aspects of their SA were missing, but they were left unaware of that fact. But this was not simply the case on 14 April; this was true day in and day out, because the same systems applied day in and day out. Eagle Flight were listed on the ATO but not the flow sheet, every day. Somehow, this gap in their understanding of how air operations worked in OPC was not picked up and was left uncorrected.

UN Flights Also Not on the ATO

The problem was not limited to the Black Hawks. We see this in *Tiger 01*'s statement above, in which he confuses Eagle Flight with the UN. In reality, the UN conducted flights of its own into the TAOR on a regular basis and these were often **not on the ATO either**. The usual practice was to staple a sheet to the ATO at the last minute listing what was known about UN flight movements. According to the testimony of the AWACS Mission Director, ‘a UN helicopter flight would be in the TAOR that morning at around 0555Z’. He had passed this information on to the airborne command element (ACE).³⁷⁸ This was the proper procedure and was even laid out in the ACO. Here is Eflein's description of the process.

The Airspace Control Order only mentioned Army helicopters in terms of altitude deconfliction. It contained one brief paragraph that mentioned United Nations helicopter activity in Iraq, and apparently no one saw the need to use this section as guidance for Army helicopter activity... It stated that the United Nations helicopter information would be published ‘in the ATO on the last page in plain language’ and that if the ‘flight information was passed too late in the day to be included on the ATO’, it would be passed verbally through the C-3/Joint Operations Center to the Mission Director, to the AWACS, and to the fighters.³⁷⁹

And yet, *Tiger* Flight seemed unaware that this was the way UN flights were handled in OPC. *Tiger 01* revealed another gap in his understanding when he asked,

I have a big question as to why the (helicopter) flight plans have been distributed to the F-16 squadron for a while, but the F-15 Intel Officer who's been here four months has never seen a flight plan on these flights.³⁸⁰

Later the F-15 lead pilot raised this point again.

I also know from talking to the intelligence officer that he made several requests to get flight plans on any unknown aircraft that were friendly and never got any type of response. His request included helicopters.³⁸¹

This is hardly surprising; friendly flight movements are not a matter for intelligence—they fall under operations. There is absolutely no reason why the squadron intelligence officer (IO) would be included on the circulation list for such information, nor would this normally fall within his pre-mission briefing format. The purpose of the intelligence brief is to provide the threat picture; friendlies come under operations. The officer concerned was a junior lieutenant with no authority to override operational procedures. His requests for flight plans would not have been given serious consideration by anyone. What is so strange about this episode is *Tiger 01*'s lack of understanding in relation to all this.

The Technical Report Human Factors picked up the same misconception on the part of both *Tiger 01* and *Tiger 02*.

'On the morning of 14 April, I met the flight leader... and we drove to the squadron operations building... we proceeded to the Intel section and received a briefing from the squadron Intel officer... there was no mention of any helicopter activity in the AOR'. The F-15C flight lead supported this with, 'Nothing at all was briefed about helicopters'.³⁸²

The real question is—why was there no briefing from ops? This does not seem to have been the normal practice in this squadron, which is odd, to say the least.

At the same time, the F-15 pilot's question over the flight plans does show that he was aware of Eagle Flight and that he did not have specific flight information about the Black Hawks. This may well have been the reason why the matter was left at that by operations staff at the F-15 squadron. No-one could fly in OPC and not have some awareness that there were Army helicopters carrying out their own assignments within the TAOR and that these were not handled in the same manner as fixed-wing aircraft movements. For F-15 pilots, that should have been enough, because no-one ever dreamt they would drop down low and attempt a VID of an unknown helicopter. It just never crossed their minds. 'F-15s don't fly down in the weeds'.

But F-16s do. This was the answer to *Tiger 01*'s question about flight plans being distributed to F-16 squadrons but not their own. The F-15 pilot later showed that he did understand this to some extent, when he testified.

I believe the reason it happened was twofold; one is the F-16s, from what I heard, had a fear of having a close pass with a friendly helicopter because they did low altitude training, something we don't do. They put a request in to get the specific flight plans of the helicopters.³⁸³

These requests would have hit the same obstacles that surrounded Eagle Flight's movements in general; sometimes they would be successful, other times not. But the big difference was that the F-16 pilots knew if they didn't know and could proceed with caution on the basis of this ignorance. In practice, this meant collaborating closely with the AWACS crew before descending into helicopter airspace. Vertical separation was the key safety control.

Vertical Separation—the Key Safety Control

This claim is central to our argument. F-15 pilots could be left with only a vague understanding of where the Black Hawks or UN flights might be in the TAOR because a number of controls existed to prevent any 'dysfunctional interaction' between fast jets and rotary-wing aircraft. Here, for example, is the procedure stipulated in the ACO, which stated clearly,

Fighters operating in the low altitude environment confirm with Cougar deconfliction with Eagle Flights (UH-60's) or contact Eagle on AOR primary.³⁸⁴

Furthermore, this requirement was only one of a series that tightly controlled 'Low Altitude Operation' which was restricted to specified low fly areas inside the TAOR. Only in these designated zones were fighters allowed to drop below 9000 ft AMSL, and only under certain conditions,

Low fly aircraft will be scheduled by CFAC/DO and published in the ATO. Only those flights scheduled/tasked will enter the low fly areas.³⁸⁵

The low fly areas were created in order to provide F-16 pilots with the opportunity to maintain their low-level flying currency while on deployment. In OPC, even F-16s normally flew high, so a skills-maintenance program was needed. The Turkish authorities did not permit this inside their airspace, so zones inside the TAOR were defined for the purpose, with strict controls in place.

Nevertheless, this loss of separation was met with a storm of protest from Black Hawk pilots. Captain Nye described his own reaction,

One issue I raised was why were Air Force jets suddenly flying so low in Iraq, thus creating the potential for a mid-air collision with Eagle Flight aircraft. The jets were restricted to above 10,000' in Eagle Flight's copy of the airspace control order. I learned that two months before a new airspace control order was issued authorizing low fly areas for jets in Iraq. The problem was Eagle Flight never received the revised order.³⁸⁶

Snook touched on this issue in a presentation given at Harvard University in 2001. Speaking informally, he stated,

The real rule that trumped all of them was that rotary wing aircraft were not allowed to fly above 2,500 feet, and fixed wing aircraft were not allowed to fly below 5,000 feet. So there's a zone of separation, and basically the Air Force controlled fixed wing aircraft. They were most worried about mid-air collisions. If you talk to AWACS controllers, they say, 'Its so hard to track rotary wing aircraft, but as long as they stay down below that deck and our guys stay up here, we just don't care.'³⁸⁷

General Pilkington also understood the importance of vertical separation, and issued explicit directions that left no room for doubt on the matter. As Joan Piper relates, from Captain Wang's trial,

'I regularly, routinely imposed altitude limitations in northern Iraq. On the fourteenth of April, the restrictions were a minimum of ten thousand feet for fixed wing aircraft. This information was in each squadron's Aircrew Read File. Any exceptions had to have my approval'. One of the defence attorneys consequently asks, 'Did Colonel May or Captain Wickson obtain your personal approval to fly below ten thousand feet on the fourteenth of April 1994?' Pilkington curtly replies, 'Negative.'³⁸⁸

Additional safety measures were needed if this key control was going to be compromised. This included providing F-16 pilots with greater situational awareness as to the likely location of Eagle Flight should they be considering dropping down low, either for training or as part of their operational role. Neither consideration applied to F-15s, in Snook's words,

F-15s are designed primarily for air superiority—high altitude aerial combat missions. F-16s on the other hand, are all-purpose fighters. Unlike F-15s, which rarely flew low level missions, it was common for F-16s to fly low. As a result, to avoid low altitude mid-air collisions, staff officers in F-16 squadrons regularly sought out and briefed details concerning helicopter operations; F-15 planners did not.³⁸⁹

This made sense. F-15 planners never imagined their pilots would break vertical separation, abandon the AWACS, ignore their threat brief, violate the ACO and risk their very expensive aircraft in order to chase helicopters through the valleys of northern Iraq. We will explore these elements within the pilots' decision-making in detail below, but the reality was that not even the F-16s would be expected to make such a move, not without being committed by the airborne command element (ACE) first after careful consideration of the situation. And yet, *Tiger 01* had made no secret of his intentions; he had clearly stated them during his pre-flight briefing and along the way, demonstrated the faulty assumptions on which his course of action was based. There is no reason to believe he was acting any differently from every other 'sanitising' flight he flew in the TAOR. It seems that Tiger Flight's planning process lacked both key information inputs from squadron operations and oversight to ensure the F-15s were aligned with the rest of OPC operations. An opportunity existed at this point to correct any unrealistic expectations the pilots might have had about friendly aircraft inside the No Fly Zone.

The same argument applies when we turn to the F-15s' interpretation of the ACO. This is how *Tiger 01* understood the position.

The second thing the ACO says, is that AI [airborne interception] radars will always be the first ones to enter the AOR. So, when you go in with that mind set that you're the first one in there, any types of hits out there tend to get your attention quick...³⁹⁰

The pilots' logic is faultless and the ACO did state that. Nevertheless, as we have seen, the situation with both Eagle and UN flights indicated the fallacy of expecting the TAOR to be clear of friendly flights until the F-15s had swept through. The truth was that the ACO's requirement for an AI fighter sweep of the TAOR at the start of each flying day had **never** applied to helicopters at any stage in the three year course of the operation. It was **always** directed at the fixed-wing aircraft listed on the flow sheet. Everyone in OPC knew that, or... almost everyone. The real question again is—how come the F-15 pilots were not in the loop? Why was this misconception not picked up and corrected? Here too was an opportunity.

The real position in relation to the radar sweep was given by Captain Nye, when he said,

It was common for Eagle Flight to operate anywhere in the No Fly Zone without any AWACS or fighter coverage up until September 1st 1993, and CTF commanders and senior staffers were fully aware of this fact.³⁹¹

On 1 September, the Combined Task Force (CTF) Commander issued a memorandum on UH-60 flight policy that read,

1. I have implemented the following flight policy for UH-60 flights supporting the Military Coordination Centre. a. All UH-60 flights into Iraq, outside of the Security Zone, require AWACS coverage.³⁹²

Captain Nye commented on how this change was understood by Eagle Flight.

General Pilkington's policy letter on 1 September 1993 required Eagle Flight to have AWACS coverage to operate outside the security zone, but it did not require fighter coverage. Neither AWACS nor fighter coverage was required for operations inside the security zone.³⁹³

The main consideration behind this policy was Eagle Flight's safety, not from fratricide, but from mechanical failure or hostile ground fire that might cause the aircraft to go down in Iraqi-held territory. Under such circumstances, it was imperative for any search and rescue effort that the precise location of the downed craft was known.

The F-15 squadron had arrived in theatre on 2 August 1993. There was no reason why their pilots would not have had access to the UH-60 flight policy, had their operations staff considered it relevant

enough to brief. Most likely, however, they didn't because there was no reason for F-15 pilots to have any interaction with Eagle Flight or any other rotary-wing aircraft—UN, neutral or Iraqi.

‘We Just Don’t Consider Helicopters to be Aircraft’

Within air operations, the distinction between fixed- and rotary-wing operations was widely understood, as was the differing relevance of the ACO and ATO for each. Snook demonstrates this when he relates the story of why Eagle Flight were not included on the flow sheet.

If you wanted to know why they weren't on the flow sheet, you would go to the horse's mouth; to the clerk who typed up the flow sheet that day. That's what they did, they went to a young airwoman and said... 'Now, have you read the airspace control order?' She said, 'Yes sir, I have'... Then the investigator opened it up and said, 'Here on page 223, subparagraph 111, bow-legs alpha two, right there, highlighted in yellow, did you know about the rule that says, 'All Coalition aircraft will be listed on the flow sheet'? 'Yes sir, I know about that.' Then he said, 'Okay, here's the big question. There are no helicopters on the flow sheet. Did you know that the Army helicopters were flying that day?' 'Yes sir, I get their flight plans every day'. 'So why weren't they on your flow sheet?' Straightfaced the young airwoman just looked at him and said, 'We just don't consider helicopters to be aircraft'.³⁹⁴

The young airwoman was not alone in this; it was the ACE's understanding too, as came out in his testimony.

122Q Earlier in your testimony, we discussed the fact that the ACO says that a fighter sweep, fighters with AI radars, will precede the Operation Provide Comfort forces to sanitise the airspace. You further testified that that did not apply to helicopter activity, to the best of your knowledge?

122A Correct.

123Q Can you explain to me the reasoning and rationale for that belief on your part?

123A I believe that it is not applicable to the helicopters because their job has so many variables involved—moving people not associated with the military and interacting with the Kurds, delivering people to designated areas. Its just kind of an autonomous operation is the way I've always viewed Eagle, above below and separate of the OPC mission.³⁹⁵

The Assistant Director of Operations, meanwhile, stated bluntly, 'Helicopters are generally not considered part of the package'.³⁹⁶

The problem here was that this policy was not applied consistently to **all** helicopters, rather just Army or UN flights, and no-one noticed the inconsistency because Iraqi helicopters had never

entered the NFZ. It was this double standard that created the loophole whereby unknown, possibly hostile, helicopters **were** considered aircraft, but friendlies were not. This set up the potential for a disastrous interception by F-15s.

Some awareness of this possibility did exist. The Mission Director (MD) personally intervened in the detachment commanders' meetings with a view to reducing the risk. Joan Piper provides this account of the MD's actions,

For as long as he's been down here, he has reiterated to the squadrons, 'Be very cautious about misidentifying aircraft over the No Fly Zone'. It's an important issue, with so many nations and so many aircraft. For instance, the French F-1s are identical to the Iraqi F-1s. Weekly, he brought up the issue and most recently had said, 'Anytime F-15s or anyone else there picks up a helicopter on radar, it is probably a US, Turkish, or a United Nations chopper. They are numerous and they are out there often... Use discipline. It is better to miss a shot than be wrong'. Sometimes he would say, 'It is better to let a bad guy through than to shoot a friendly'.³⁹⁷

This was good advice. Unfortunately, the Mission Director drew the worst possible conclusion from his assessment of the risk. He argued that it made a visual ID essential.

'Check with AWACS and then do a visual identification'. Then he would follow up with, 'Anytime you intercept a helicopter as an unknown, there is always a question of procedures, equipment failure, and high terrain masking the line of sight radar. There are numerous reasons why you would not be able to electronically identify a helicopter'.³⁹⁸

This opened the door for the F-15 pilots to make the critical decision to compromise the key safety control and drop down low for a look. It is quite possible that *Tiger 02* attended the detachment commanders' meeting where the MD made his comments.

Unfortunately, the ACO also contributed to the ambiguity surrounding helicopters and a visual ID, when it stated, 'Contacts will be labeled "slow" if they are below 300 KTAS'.³⁹⁹ This meant that a slow-moving track could be either rotary- or fixed-wing, as many general aviation craft will fly at such speeds. The significance of this lay in that it left open the possibility of the F-15s dropping down to investigate, even if a general ban on interacting with helicopters was in place. In his pre-flight briefing, *Tiger 01* laid out his contingency plan for dealing with a 'slow' contact, which included making a visual ID and this could have slipped through without being challenged as 'slow' did not necessarily mean helicopter.

Clear and Consistent Direction Needed

What was required, above all, was clarity. Support for this contention can be found in the actions of the CTF Commander the day following the accident. At this point, General Pilkington found

himself in a very difficult position; air operations needed to continue, both fixed- and rotary-wing, so how to avoid a repeat of the shutdown? The investigation into what had gone wrong was only just getting underway and would not be completed for weeks at least. Something needed to be done but what? The CTF Commander decided to implement just one single measure.

So the atmosphere of those in the chain of command was rather strained during this period, I would say, and rather uncomfortable, because we did not know what had happened because we were not allowed to talk to anyone. We resumed flying operations after I got all the pilots together in the auditorium, every crew member that flew, helicopter crew members, AWACS crew members, tank crew members, pilot crew members, and made sure they all understood the procedures and the rules of engagement.

We changed one rule. I changed one rule at the direction of General Boyd, and that was no one could shoot down a helicopter without my personal permission, and then we resumed flying.⁴⁰⁰

This was a sensible move. It removed any room for doubt over unknown helicopters in the TAOR and it set in place a further control—the CTF Commander’s direct involvement in any decision to shoot.

We can see from this how important clear and consistent direction was for shaping the pilots’ decision-making when faced with two hits on their radars, flying low and slow. The critical element of risk in this situation would arise if the pilots decided to compromise vertical separation and attempt a visual ID. Clarity was required, above all, in relation to this question. The opportunity existed, therefore, to minimise the risk by directing F-15 pilots that:

- for F-15 mission purposes, helicopters are not considered to be aircraft,
- this applies to all helicopters whether friendly or unidentified,
- vertical separation is the key safety control; do not violate it without permission from up the chain of command, and
- there is a strong chance any unknown helicopter flying inside the TAOR will be a friendly aircraft, even if it is not listed on the flow sheet and it is early in the day.

Better situational awareness (SA), more realistic expectations, consistent direction and awareness of critical safety measures are the factors that could have guided Tiger Flight during that crucial period when they were weighing up how to handle two unknown targets. It is possible that these alone could have prevented the single act that catapulted OPC into a state of extreme risk—the F-15 pilots’ decision to attempt a visual ID. Or these measures could have at least caused the F-15 pilots to hesitate long enough for the ACE on board the AWACS to assert his control over the situation.

The F-15 Pilots Were Out of Step with Every Other Component of OPC

Unfortunately, the problem with the pilots' expectations did not only lie in their unrealistic nature, but also in the fact that they were out of step with every other component of OPC. This is a major theme we will return to many times in our discussion of the incident.

We can see this in the thinking behind the decision to allow Eagle Flight to proceed with its mission on 14 April. This came out in the Senate hearing, in a question from one of the victims' family members.

Captain Wickson spoke of his fear of an Iraqi trap. I ask you this; if it was such a hostile environment where encounters with Iraqi helicopters were anticipated, why were Black Hawks loaded with high-ranking military and civilian diplomats allowed into the area by General Pilkington without an armed escort?⁴⁰¹

This was a fair point and another reason why the two F-15 pilots would not be expecting friendly helicopters in this part of the TAOR at that time of day without fighter coverage. Their expectation was shaped, in other words, not simply by the ACO or the flow sheet, but from the threat assessment given to them by intelligence. And yet, this same intelligence also formed the basis on which the CTF Commander gave his personal approval for Eagle Flight's mission. The two just do not line up.

Just how far removed from one another's mindsets the various components of OPC were can be seen in Captain Nye's perception of the 'trap' threat, when asked about this by Senator Dornan.

Mr Dornan. But was this not a dynamic mission to go that deep beyond the security zone, taking the risk of an incident. If the Air Force is worrying about traps, what about low flying Army helicopters worrying about traps, to where some Iraqi SAM-7 or something shoots down a helicopter with 13 people on it? ... And I am going to ask Captain Nye ... were the Army pilots ever afraid of a trap, suckering in your H-60s somewhere, and blowing them out of the air with a SAM-7? ...

Captain Nye. Sir, I mean there is always that possibility. Did we ever feel that there was ever a trap set up for us? No.

Mr Dornan. Did you ever discuss traps as a formal part of your briefings?

Captain Nye. No, we did not.⁴⁰²

The disconnect between this threat estimate and Tiger Flight's is crystal clear. And it seems it was the F-15 pilots who were the ones out of step. General Pilkington indicated this with his comment, made at Captain Wang's court martial, 'I don't understand, and will probably never understand, Captain Wickson's mindset.'⁴⁰³

An indication of *Tiger 02*'s 'mindset', however, was provided in this testimony to the accident investigation.

When asked by investigators what he thought was the 'highest threat in the AOR', *Tiger 02* didn't talk about Iraqi MiGs or enemy Surface-to-Air (SAM) sites; instead, he replied,

A. The unexpected. Something that you don't expect. The fact that it's routine, day, in day out, everybody goes out there with a certain blood pressure level, a certain expectation... That's, that's probably the biggest threat. And that kind of goes with complacency. It's still an unfriendly neighbourhood out there and you don't have to have that in mind, then you're setting yourself up to be surprised.

Q. Do you think there is a problem with complacency among the aircrews?

A. I think that the people down here doing this mission get very comfortable with the pace and what's going on ... there's a cookie cutter type of approach that we use ... I wouldn't use complacent, but comfortable with the pace and the tasking down here and I'm afraid that it may lead to assumptions that everybody knows everything they need to know about what's going on out there, when I'm not convinced they do.⁴⁰⁴

It is hard to criticise *Tiger 02* for maintaining an attitude of this nature, especially when we know the significant gaps that existed in his SA and how unrealistic were his expectations of what to find in the TAOR. To remain on high alert for the 'unexpected' was entirely appropriate given the circumstances, which made it almost inevitable that a 'surprise' would pop up sooner or later; in this case, Eagle Flight.

The trouble was that this tactical mindset was not shared by other elements within OPC and in the event, this meant that their expectations of what the F-15 pilots would do turned out to be totally unrealistic. They were caught out completely. This was true for the AWACS crew, the ACE, the Mission Director, the CTF Commander and, of course, the Black Hawk pilots and passengers.

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On the positive side, however, this problem was fixable. It was open to a management intervention directed at building a shared situational awareness of the operating environment, a better appreciation of what each component within OPC was thinking, and how they were likely to react to particular situations. The time existed to achieve this, as it was not a matter that arose out of the blue on 14 April 1994; it was a constant feature of operations. The possibility that Tiger Flight would encounter unknown targets flying low and slow inside the TAOR was not a remote one. Eagle Flight flew six days-a-week and regularly went beyond Zakhu. A program of preparation and rehearsal for such a contingency could have brought the issues surrounding this eventuality into open view and steps taken to resolve them.

In the event, the F-15s remained out of step with the rest of OPC and their decision-making process diverged from the other components in several critical aspects. One of these was the application of the IFF system and it is to this question we will now turn our attention.

Chapter 8

Divergence—The IFF Issue

The failure of the IFF (identification friend and foe) system was listed by Secretary of Defence William Perry as one of the four key causal factors in the Black Hawk shootdown accident, alongside F-15 pilot misidentification, AWACS crew inaction and the non-integration of Eagle Flight into Combined Task Force operations. Certainly, the IFF system did not prevent a friendly-fire incident, which was its purpose. But how significant was this failure?

To answer this question, we will adopt a different perspective, taken from cognitive systems engineering, which ‘suggests that we cannot understand what happens when things go wrong without understanding what happens when they go right.’⁴⁰⁵ In line with this approach, we will shift our attention away from the events of 14 April 1994. Instead, we shall ask, ‘how important was the IFF system for maintaining safe flying operations in the TAOR of OPC?’ As we will show, in spite of the general consensus around this issue, the answer turns out to be ‘not very’.

If we remember that by 14 March 1994, Operation *Provide Comfort* (OPC) had been in existence for 1109 days and had functioned safely over that period, then it follows that this safety was produced by a series of controls and practices. There were a great deal of these, as in any complex operating system such as that which controlled the relatively small but busy airspace above the 36th parallel in post-Gulf War Iraq. Some of these controls we have already come across in our account, for example, pilot training and experience, the Air Tasking Order (ATO), the presence of an AWACS and procedures that called for a visual identification (VID) before engaging any unknown aircraft. But this list is by no means exhaustive nor does it necessarily highlight what were in reality the critical controls that kept OPC air operations safe for more than three years. It simply reflects what was **thought** to be those controls, both by the actors involved and the investigating authorities.

Our argument here is that the IFF was **not**, in fact, a significant contributor to air safety during OPC. The main support for this claim comes from the fact that for two and a half years, **the system was broke and nobody noticed**. This detail emerged from Captain Nye’s testimony. In spite of the absence of a working IFF system, air operations continued without any incident, near miss or accident being attributed to problems with the IFF. No-one complained; no-one cared.

The same logic applies to the question of radio communication. The Accident Investigation Board identified the inability of the two flights of friendly aircraft inside the TAOR to talk to one another as one of the major causes of the accident. This was due to a lack of interoperability with their radios. The Air Force craft had been equipped with new *Have Quick II* systems with the latest frequency-hopping and anti-jamming capabilities. The Army had only partially installed these on some of their aircraft and as a result, they were not yet in standard use by the Black Hawks of OPC.

Identification, Friend or Foe (IFF) systems are used by military and civilian agencies to identify vehicles, in particular, aircraft. The systems use the following modes of operation for the purposes stated.

Mode I—used by military only to indicate type of aircraft,

Mode II—used by military only, transmits a code unique to that aircraft,

Mode III, also called Mode A—used by military and civilian aircraft, generally for air traffic control purposes,

Mode IV—used by military only, encrypted, identifies whether the aircraft is friendly or not, and

Mode V—used by military only, provide cryptographically secure information on aircraft altitude and location.

Following the shootdown, this situation was quickly rectified. But as with the ATO issue and the question of the correct Mode I IFF code, the absence of radio communications between Eagle Flight and the F-15s was **not** a significant cause of the accident. This was because, so long as vertical separation remained intact, there was no need for the two sets of pilots to listen in on each other's communications among themselves or with the AWACS, still less to talk to one another. Air operations ran smoothly day-in-day-out without anyone considering this a concern. Eagle Flight radio communications inside the TAOR suffered the same problems as did their radar and Mode IV IFF interrogations—they were intermittent at best on account of the terrain.

If the Black Hawk pilots had overheard Tiger Flight radio traffic, perhaps they would have raised the alarm when they caught the words 'engaged' and 'arming hot'. But in reality, we have the same problem as we did with the warnings going out to civilian aircraft in the Persian Gulf. It was never clear to the pilots that these warnings were addressed to them. Likewise, Eagle Flight would have had no reason to presume the F-15s had them in their sights.

It is true that once *Eagle 02* had been hit, *Eagle 01* may have been able to persuade *Tiger 02* to knock off the second shot through a direct appeal on the radio—maybe. In the event, *Eagle 02* did not have time to contact the AWACS, with whom he did have communications, being fully absorbed in taking evasive action. It is quite probable that the pilot had no idea who was shooting at him in any case; there was no reason to assume it was a friendly aircraft.

But once again, this is not the point. The real question to understand is what was it that produced safe air operations for over three years and to determine where and how the safety barriers that did

apply, every day, were breached in this instance. The fact was that radio interoperability did not contribute in any way to air safety—**because it didn't exist**—and so the absence of this factor on 14 April 1994 cannot be considered of any importance.

Turning to the IFF, this system presented unique problems for each of the modes (I, II and IV) that applied in Operation *Provide Comfort*. An examination of the challenges surrounding each of the modes is useful because the issues they throw up cast a certain light on the chain of events leading up to the accident. This will help us identify where the real problems lay and the opportunities that existed to intervene and shape the pilots' decision-making in a manner that could have prevented the tragic outcome.

If we begin our discussion with Mode IV, then our interest is not so much on whether the Black Hawks were or were not squawking the correct Mode IV IFF on that morning, but on the role that the failure to receive a Mode IV response played in the decision-making process of the F-15 pilots. How did they interpret this failure? This interpretation, in turn, rested on what expectations they had of the reliability of the IFF inside the TAOR and therefore the significance to be placed on the absence of a correct Mode IV reply. The position is somewhat similar to the question of the failure of Iran Air Flight 655 to respond to the warnings sent out over the distress frequencies. How realistic was it to expect a response from the civilian airliner and how was its silence to be understood?

The Mode IV IFF Interrogations—Dealing with Ambiguity

IFF interrogation in Mode IV was not an entirely straightforward process. Snook describes how the process was supposed to work.

Tiger 01 then reached down and flipped his interrogation switch from 'CC' to 'auto'. Set this way his radar would interrogate continuously Mode IV... If his target was squawking the correct Mode IV, the star would change into a circle.⁴⁰⁶

Snook then provides *Tiger 01's* account of what actually happened.

Initially, when I pressed down on the air-to-air interrogator, the star did turn into a circle. It lasted for about one second, then the circle just disappeared and went back to a star. Normally when we interrogate we hold the interrogation down 5 or 6 seconds to be sure that we're doing continuous interrogation. There are anomalies with the jet that cause the initial interrogation to come up a false reading. So right now I don't know for sure what that's telling me.⁴⁰⁷

The result of the interrogation, therefore, was ambiguous. Furthermore, it turns out that ambiguity of this kind was not unusual.

All I know is that I've seen that before in the aircraft, it's given me false information before, but I'm going to have to check it again. For the remainder of the interrogation, 4 to 5 seconds, it's a star and it's showing me that he's not squawking Mode IV.⁴⁰⁸

The technical evidence suggests, however, that the Black Hawks **were** squawking Mode IV, but this information was not coming through to *Tiger 01*. This was not a unique situation. Problems of this nature with Mode IV interrogations were widespread and well known among the OPC contingents. One complication that affected F-15s in particular was that their fire-control radar was set up to track high-speed targets at altitude, not slow-moving helicopters close to the ground. The technical report produced after the accident explains the significance of this for the Mode IV interrogation process.

The Fire Control Radar (FCR) used on the F-15C was the AN/APG-63. It is a multimode pulse doppler radar designed primarily for engaging high speed (ie narrow doppler spread) targets.

Testimony of one of the F-15C pilots indicated that at the range of the first interrogation of the Black Hawks, the FCR system was indicating a negative altitude for the helicopters, this is an indication of an unstable radar lock.

For slow moving, low altitude rotary wing targets, the doppler signature is dominated by the rotor doppler of the helicopter, not the body doppler caused by the aircraft motion. Moreover, when tracking targets close to the terrain, the FCR main beam will also pick up a doppler from the terrain... creating doppler clutter from which the FCR must pick out the slow moving helicopter... The problem is exacerbated by formation flight of the helicopters, because the rotors' doppler signatures tend to cancel in the center. The FCR computer will have difficulty identifying a single doppler target, which will result in a poor lock.

The APX-76 incorporates a Mode IV automatic evaluator which provides Mode IV reply information to the FCR computer. That information is correlated with the radar return of the target that the FCR and the APX-76 believe sent the Mode IV reply... if the IFF return and the radar return do not match within the 'correlation window', the APX-76 evaluator would present a no reply to the pilot (even though the transponder may have responded to an interrogation)... If the FCR had shifted to another target because it did not have a solid lock, it would declare that the reply did not come from the same 'doppler target' it had interrogated. The APX-76 reply evaluator would present a no reply to the pilot.⁴⁰⁹

A Mode IV interrogation of two low flying helicopters in formation by an F-15, therefore, presented particular challenges that significantly reduced its prospect of success—the fighter's radar was just not designed for such a task.

A Mode IV interrogation of two low flying helicopters in formation by an F-15, therefore, presented particular challenges that significantly reduced its prospect of success—the fighter's radar was just **not designed** for such a task.

Following the accident, a successful Mode IV identification (ID) was made a requirement for all aircraft entering the TAOR, including helicopters. This created new complications and called for some tricky decisions. Here is Captain Nye's discussion of the issue at the House hearings.

I want to show you that this system is not infallible. On one mission - and this is Mode IV I am talking of now - both aircraft were keyed by the exact same key. AWACS could pick up one aircraft perfectly good, no problems whatsoever. General Carleton was on board and we had to go have this mission. It was the day of a mission to inform the Kurdish families of the accident report, and he okayed and he has approval authority to go into Iraq without a good Mode IV. One aircraft could not do it, and one aircraft could. Both aircraft worked completely fine on all missions before that, and both aircraft worked completely fine on all missions after that. Can I explain that? No.⁴¹⁰

This was not the only time a problem had occurred with the Mode IV, especially with low level flights, but not exclusively so.

Another anomaly is one time I was flying at 7,500', not low now. We are high, there is no ground clutter. Neither AWACS could get a good Mode IV off either of our aircraft. We tried it for approximately 20 minutes. Finally, I said we are going home, because we could not cross into Iraq without a good Mode IV. As soon as I put the lead aircraft into a 45 degree bank turn to turn around, they instantly came back and said we have got you good on sweep on Mode IV, which means a good Mode IV, and they never said again we had a bad Mode IV. I can not explain it. I just know it has happened to me. We can not put lives on these systems, because they are not infallible, I have had it shown to me personally too many times.⁴¹¹

Another former F-15 pilot, Colonel Cox, gave his opinion to the same hearings on what this implied for the decision-making process when faced with these kinds of problems.

Colonel Cox. If everyone is squawking the correct modes and codes and you are interrogating the correct modes and codes, it is not unusual if people are not in the weeds to get intermittent signals, because

Mr. Dornan. Then if you got one friendly and then started getting no response, you are not about in your brain to compute I am going down there and knock this guy off?

Colonel Cox. Not normally, no.⁴¹²

Mode IV was not, therefore, always a reliable tool for identifying friends or foes. Mode III was not used in Iraq for security reasons,⁴¹³ which left Modes I and II. Mode I interrogation failed and the reasons surrounding this failure became a major talking point in the aftermath of the shootdown.

The Pilots' Choice of Mode I Instead of Mode IV

The Mode I IFF interrogation did not get a response because Eagle Flight used a different setting from the F-15s. This was seen as a critical contributing factor in the tragedy. However, this assessment is open to debate. The fact is that the Black Hawks on this day, did exactly the same as they did every other day—they used the Mode I code designated by Turkish air traffic control for the *en route* segment of the flight. This had never caused any problems up to this point.

Part of the reason for this lay in the fact that the Airspace Control Order (ACO) did not stipulate Mode I as a means for conducting IFF interrogations. Instead, it stated, 'Primary identification will be Modes II and IV'.⁴¹⁴ Of the two, it was clear that Mode IV would be used first, as it 'was encrypted, classified, and loaded during pre-flight. It should have been the same for all coalition aircraft whether they were in Turkey or Iraq.'⁴¹⁵

Mode II is a unique signature; it differs for every aircraft. When an individual believes that he has identified a friendly aircraft, he can dial in that aircraft's specific Mode II and interrogate it to confirm his identification. (It is primarily used so aircraft can find the proper tanker for air to air refueling).⁴¹⁶

The Black Hawks were transmitting the correct Mode II codes throughout their flight.⁴¹⁷ However, *Tiger 01* had made the decision earlier that, for this mission, they would use Modes I and IV, even though this was in violation of the ACO. It is not known if this was common practice by F-15 pilots, but it was certainly not picked up by any operations staff within OPC. The use of Mode I rather than II did make sense, when considered from the perspective of the pilots, as Efein explains.

Each aircraft had a unique Mode II, and each aircraft's Mode II code was listed in the ATO and on the flow sheet - except for helicopters. Because the ATO was incomplete with respect to helicopters, the flow sheet did not even list them. Thus, the F-15 pilots could not interrogate the Black Hawks' Mode II despite the ATO stating that Modes II and IV were the primary means of identification.⁴¹⁸

Unfortunately, there were complications surrounding the use of Mode I, as there were not one but **three** Mode I settings in force—43 for fixed-wing aircraft inside the Turkish airspace *en route*, 42 for rotary-wing aircraft and 52 for everyone inside the tactical area of responsibility (TAOR). This meant that a negative response inside the TAOR may have been due to a pilot error—forgetting to switch over once they had crossed into Iraq. This possibility does not seem to have crossed *Tiger 01's* mind, even though this was a task he also had to perform on entry into the TAOR.

As it happened, the problem was not pilot error, but a breakdown in communication between the components of Operation *Provide Comfort*. In the USAF's eyes, blame for this lay with the Army, who had failed to comply with the ATO. As the Accident Investigation Board Report stated,

Specific IFF codes were listed in the ATO. The ATO directed different Mode I codes for rotary wing and fixed wing aircraft while flying in Turkey, but required all coalition aircraft to be on the same Mode I while operating in Iraq. The Army did not follow this requirement.⁴¹⁹

The Army had a very different view and denied vigorously that they were ever informed of the requirement to change the Mode I setting on entry into the TAOR. Captain Nye conducted a long, personal investigation into what had happened with this issue.

The accident investigation report simply states Army UH-60's were on the wrong Mode I code in Iraq. I totally disagree with that conclusion and am convinced that my fellow Eagle Flight pilots were using the only Mode I code provided to them in their air tasking order... Eagle Flight daily message traffic copies of the air tasking order prepared by Air Force assets in Incirlik did not contain a separate code for Iraq until April 19 1994. This is unlike the Air Force's hard copy version that the AWACS and the F-15s used and contained a separate Mode I code for Iraq.⁴²⁰

Captain Nye was able to produce documentary evidence that two different versions of the ATO were in use during OPC, every day, with different instructions as to the correct Mode I IFF code. If this was the case, then it raised an obvious question. In Nye's words,

Never in two and a half years did AWACS or anyone else inform Eagle Flight they were on the wrong Mode 1 code. This includes 15 and 18 April when Eagle Flight flew to the accident site using the same flight profile and Mode 1 codes used by the UH60s the day of the accident.⁴²¹

'Never in two and a half years did AWACS or anyone else inform Eagle Flight they were on the wrong Mode 1 code. This includes 15 and 18 April when Eagle Flight flew to the accident site using the same flight profile and Mode 1 codes used by the UH60s the day of the accident.'

The answer to this question is that **nobody cared less about Mode I** inside the TAOR; Mode IV was the primary mode for IFF interrogations followed by Mode II. This was stipulated in the ACO and presumably was the day-to-day practice of AWACS crews. The Senior Director confirmed this during his disciplinary hearing.

196Q. What IFF Modes and Codes have - are checked during the IFF checkout by the enroute controller?

196A. Okay, we would check Mode IV and let them know if it was sweet or sour and also we would check Mode II and that's because that's what the ATO and the frag gives us and that's how we ID them. Then in the process we would all the other codes would be checked, I and also III.⁴²²

There is good reason to believe that this was also what occurred on 14 April. Eflein writes,

The AWACS used Mode I for identification purposes. When the Black Hawks departed Zakhu, AWACS already had identified them and they had no reason to check the Black Hawks Mode I.⁴²³

This is correct, but does not quite capture the process. Here is how Snook describes the sequence of events,

Five minutes prior to this radio check (as Eagle Flight approached Gate I into the TAOR), the 'friendly general' track symbology and track designator 'TY06' that the surveillance section had originally assigned to the Black Hawk flight was replaced by a more precise 'H' character, indicating friendly helicopter. After Eagle 01 checked in on the radio, the Senior Director changed the track designator from 'TY06' to 'EE01' - for Eagle 01.⁴²⁴

A green 'H' - symbol for a friendly helicopter - is programmed to appear at the Black Hawk's location on the Senior Director's scope whenever any IFF Mode I code 42 is detected by the AWACS.⁴²⁵

In a tactical AO, Mode I could not ever be the basis for an IFF assessment ... The reason is simple—Mode I was not secure; anyone could use it, including an adversary. In Turkish airspace, this did not matter but inside the TAOR there was always the danger of deliberate deception....

However, and this is the key point, a previously assigned green 'H' did **not** mean that the track was identified as friendly. This is because we were now in the TAOR and here the relevant word is 'tactical'. In a tactical AO, Mode I could **not ever** be the basis for an IFF assessment. This is also why the radio call from the AWACS 'hits there', as opposed to 'paint there', was in fact, the **correct** call in spite of the green 'H'. The reason is simple—Mode I was **not secure**; anyone could use

it, including an adversary. In Turkish airspace, this did not matter but inside the TAOR there was always the danger of deliberate deception, in which case the threat posed would be extreme. This is why a green ‘H’ was a helpful clue to a track’s identity, but no more.

In fact, even this does not exhaust the ‘hits there’ ‘paint there’ issue, for what was really on the screen were **neither** hits nor paints. This is what the indictment against the Area of Responsibility (AOR) controller revealed—‘hits’ means ‘radar contacts’. There were no radar contacts. Only IFF was displayed on the scope.⁴²⁶ Not Mode IV IFF, but Mode I. This put the controller in a difficult position, not covered in the procedure at all, which meant he had to make a judgment call. In this context, selecting the designation ‘hits there’, even though not strictly accurate, was probably the most sensible course of action to take. To have said nothing or ‘paint there’ would have been more misleading, given what was on his screen. It is only with the wisdom of hindsight that anyone can claim ‘paint there’ was the right call to make.

For an IFF determination, what was required was a successful interrogation in the encrypted Mode IV, the only mode that was

secure and provided high confidence identification of friendly targets. A compatible mode had to be loaded into the cryptographic system of both the challenging and responding aircraft to produce a friendly response.⁴²⁷

A successful Mode IV interrogation would reveal if the target was friendly. A subsequent Mode II inquiry would reveal the identity of the particular aircraft concerned, but not its Flight. For this, a radio check was required. This was why the process took so long. In the case of Eagle Flight, with its intermittent radar and radio contact due the terrain and its regular set downs on the ground, it just wasn’t worth the bother. Nor was it necessary, so long as the fighters stayed high and left them alone.

Within the TAOR, Mode I was of such little importance that key members of the AWACS crew had no idea what the correct code for the Black Hawks was. This came out in the accident investigation.

The Senior Director did not know if the helicopters’ Mode I was supposed to change upon entering the area of responsibility ... numerous other AWACS members did not know of a duty to direct the helicopters to change Mode I squawk.⁴²⁸

This ignorance was not due to a lack of professionalism or responsibility. The reality was that Eagle Flight’s choice of Mode I code inside the TAOR had never been an issue; it had never made any difference to anyone. In fact, it was even quite helpful that the helicopters were still on code 42, as this gave them a unique identifier as Eagle Flight which a code 52 return would not have done.

So, no-one was concerned, and there was no reason to be. **Until now.**

Mode I or Mode IV? Why the Divergence Mattered

The problem was—the **F-15s**. By adopting Mode I as their main method of IFF interrogation, the F-15 pilots moved out of step with the AWACS. There is no reason to believe that the AWACS crew had any idea that the F-15 pilots were basing their assessment of the IFF on Mode I returns, rather than Modes IV and II as laid out in the ACO. It is here that the divergence between the two units begins to matter. The AWACS crew were getting intermittent IFF Mode IV returns which they were attempting to identify positively. The senior director had an 'H' symbol on his screen but had not yet connected this to Eagle Flight's movements. Meanwhile the F-15 pilots had reached the conclusion, based on their ambiguous Mode IV returns and **negative** Mode I's, that the contacts were not friendly. The AWACS crew were not aware of the thought processes running through the F-15 pilots' heads. Their assumption would have been that the pilots were working with the same raw data that they were and so would be forming a similar picture. But they would have been wrong; the F-15 pilots were running ahead of them, getting ready to make a visual ID to confirm their expectation that the aircraft were hostile. The AWACS crew were still in routine mode, steadily working through their normal procedure. One crewmember was actually asleep at this moment, another was making a coffee, while unknown to them, the F-15s were preparing mentally to go in for a kill.

The significance of the use of Mode I by the F-15 pilots is brought out by Captain Nye.

There are discrepancies between Air Force and Army doctrine concerning how IFF interrogations are performed and how Mode I is used as an IFF mode. Why did the F-15 pilots use predominantly Mode I to try to electronically identify (EID) the UH-60s? By Army doctrine, Mode I is only for general information, like it was used in Turkey to differentiate between rotary and fixed wing. Yet, it is clear from this accident and from talking with fighter pilots that the Air Force uses it often as the primary EID mode. Capt. Wickson only interrogated Mode IV three times (one response was momentarily friendly) but he tried Mode I five times. Lt Col. May says he tried Mode IV once and Mode I twice (NOTE: All Mode IV attempts were made at 20 miles or more away. Maybe if they had tried Mode IV closer, they would have reduced all the possible interferences and received a solid friendly reply).⁴²⁹

It is unlikely that the Air Force did use Mode I in this way on a regular basis. AF doctrine in relation to Mode I is no different from the Army's because the security implications of relying on Mode I are so severe. Following the accident, the Chairman of the Joint Chiefs of Staff sent out a directive on 27 Oct 94 directing increased emphasis on Mode IV IFF.⁴³⁰

If the F-15 pilots were going to base their actions on the information from Mode IV, they would have remained open minded about the contacts and continued with their interrogations as they closed with the aircraft. The Mode I returns, on the other hand, from the pilots' perspective, were not ambiguous, they indicated clearly that the unidentified tracks were not friendly.

The point of interest here is the impact this practice had on the decision-making process of the two F-15 pilots. The Mode IV returns were inconclusive and this was consistent with past experience of using Mode IV inside the TAOR. No real judgment was possible, at this stage, one way or another on the basis of the Mode IV IFF. If the F-15 pilots were going to base their actions on the information from Mode IV, they would have remained open minded about the contacts and continued with their interrogations as they closed with the aircraft. The Mode I returns, on the other hand, from the pilots' perspective, were not ambiguous; they indicated clearly that the unidentified tracks were not friendly. This both encouraged them to drop down low to attempt a VID and reinforced their expectation that what they were going to see would be hostile aircraft.

Here was an opportunity for a management intervention, bringing the F-15 pilots back into line with the rest of OPC, so that at a crucial point in their decision-making would not diverge from other elements, such as the crew of the AWACS. An understanding was required that an ambiguous Mode IV was a better input into the decision on whether to engage, than an unambiguous Mode I that was much more prone to error. Ambiguity surrounded all the IFF Modes; the point was to recognise this as the reality of the situation and so provide both decision-making and the creation of expectations with a realistic foundation.

CHAPTER 9

Air Force Culture and the ACE

The divergence between the F-15 pilots and the AWACS crew is significant because in the event, the pilots' actions took everyone by surprise, above all, the crew on board the AWACS. This is why they failed to intervene; they simply did not see what was coming next, they had no idea what was going through the F-15 pilots' minds or the action they were about to take.

The airborne command element (ACE), callsign *Duke*, later expressed his shock at what had happened to his Mission Director, Colonel Cole, once he was back on the ground. The colonel related the conversation that followed,

As far as the Duke (the ACE) on that particular mission, I had to tell him that it was not his fault. That was not the reaction he was to expect from the F-15 pilots. That was the exact opposite reaction that he should have expected. What he was expecting was to be queried as to what they should do, what their course of action should be. He related to me that he did not really know what 'engaged' meant, so when they said 'engaged' he didn't really understand that they were going to go kill those guys.⁴³¹



A USAF E-3 Sentry AWACS aircraft (Source: USAF)

‘Engaged’ or ‘Committed’—Who’s in Control?

The use of the word ‘engaged’ was significant. What the ACE was expecting to hear was ‘commit’ or ‘committed’. This was the correct terminology as set out in the Operations Plan (OPLAN) 91-7, which governed Operation *Provide Comfort* (OPC), as it left the fighter aircraft under the control of the Weapons Director on board the AWACS. ‘Engaged’ was a brevity code word used by fighter pilots among themselves to mean that the F-15s were acting outside this control and were ‘manoeuvring with the intent of achieving a kill.’⁴³² *Tiger 02* would not have had any difficulty in understanding its meaning, unlike the ACE, as this was a familiar term in use where AWACS control was not a consideration. As Snook points out, F-15s did not usually train with AWACS, they were not really familiar with the way air-to-air engagements were envisaged when an AWACS was present in the battlespace.⁴³³

In relation to the question of control, however, the OPLAN unequivocally laid out the command and control (C2) arrangements that applied to OPC. ‘E-3B (AWACS) will provide air control for all fighter/helicopter aircraft operating inside the AOR.’⁴³⁴ In line with this, the airspace control order (ACO) also stated, ‘Direction from Duke/Mad Dog is final.’⁴³⁵

The regulations surrounding a commit were written down as follows. ‘Commit authority is subject to: OPORDS and OPLANS, command authority, ROE, commit criteria, and force commander direction.’⁴³⁶ The decision to commit would normally be given out by the weapons director (WD) on board the AWACS, taking into account the situation across the entire battlespace under their control. This included both the tactical area of responsibility (TAOR) and the larger area of responsibility (AOR) that included Turkey and Iraq below the 36th parallel—equivalent to the area of interest (AI) in the joint intelligence preparation of the operating environment (JIPOE). It was the WD’s role to ‘commit fighters to the highest priority target.’⁴³⁷

Under extreme circumstances, as in an air battle on such a scale that the abilities of the AWACS crew to provide tactical control were overwhelmed, or in self-defence, fighter aircraft were allowed to self-commit. ‘The flight leader also has the authority to commit for the flight’s defence or when Weapons Director saturation dictates.’⁴³⁸ Nevertheless, control still remained with the WD

in the circumstances when the flight initiates a commit, the flight will inform the WD and provide range and bearing to the target. When informed of a commit, the WD will check to ensure that it is an appropriate target and assist if necessary. If the commit must be terminated, the WD will transmit ‘SKIP IT’ and appropriate directions. The ‘SKIP IT’ call is directive.⁴³⁹

This was the theory. Unfortunately, the practice looked quite different. F-15 pilots did not take orders from a lowly Weapons Director; it was only the ACE who could make a ‘SKIP IT’ call with

any prospect of it being adhered to. This kind of situation was not an everyday occurrence but it did happen just one week before the shootdown, in an incident that took place on 7 April.

In that incident, F-15 pilots had initially ignored an Airborne Command Element's directions to 'knock off', or stop, an engagement with a hostile fighter aircraft they thought was in the No Fly Zone. The Airborne Command Element overheard the pilots preparing to engage the aircraft and contacted them to stop the engagement... After several unsuccessful attempts to call off the engagement during which the F-15 pilots did not respond to him, he ordered the pilots to return either to their assigned patrol or to base. The F-15s returned to their assigned patrol point.⁴⁴⁰

That was not the end of the matter. At the following detachment commanders' meeting, attended by commanders from all the flying squadrons and operations support, the F-15 representative made clear his displeasure at the ACE's actions, forcing the most senior officer present, the CFAC Director of Operations, to intervene.

At the meeting, the CFAC/DO listened to the complaints of the F-15 representative and then told him that the word of the Airborne Command Element was final. He also told the F-15 representative that the Airspace Control Order was very clear and must be followed.⁴⁴¹

And yet, just one week later, a section of F-15s that included the squadron commander, 'engaged' rather than 'committed'. Whether *Tiger 02* was the same 'F-15 representative' at the meeting is unclear, but what had happened there was 'well known throughout the Operation Provide Comfort fighter community.'⁴⁴²

This was not an isolated incident. Colonel Cole gave this testimony at the AWACS senior director's court martial.

In the area of operation, when they got over Iraq, the squadrons that were there basically wanted autonomous operations. They did not want to have close control, in other words, have AWACS controllers be in complete control of the intercepts or any of that stuff. They wanted basically to work on their own. We ran into this situation time and time again at different DETCO (detachment commander) meetings where the squadrons felt that AWACS controllers and the Dukes were trying to control the situation out in the AOR more than was to their liking.⁴⁴³

A Running Battle within Operation *Provide Comfort*

The control of operations was an issue over which a running battle was taking place within OPC. Cole continues, 'We hammered it almost continually about the Duke's word is final in the area of operations. And the reason we did that is because the squadrons were always whining about the authority of the Duke.'⁴⁴⁴ Unfortunately, this did not have the desired effect. 'We (Dukes) were

always at odds with the squadrons, because many times, almost at least once a day, they (fighter pilots) would come back and question a decision we had made in the DETCO meeting.⁴⁴⁵

In spite of the DETCO meetings and the Combined Force Air Component/Director of Operations (CFAC/DO) directive, the F-15 squadron was not prepared to let go of the matter. On the very evening of the knock-off incident, the squadron executives approached the ACE directly to continue the argument.

Several F-15 pilots, including the pilots whom he had ordered to cease their proposed engagement, approached him and questioned whether he was a 'combat player' and whether Airborne Command Elements were perhaps too conservative. According to CFAC officials, the F-15 pilot community was 'very upset' about the intervention of the Airborne Command Element during the knock-off incident and felt he had interfered with the carrying out of the F-15 pilots' duties.⁴⁴⁶

The language in this description is very polite. It is not hard to imagine what the conversation would really have sounded like. 'Very upset' fighter pilots do not as a rule hold back on their words. Underlying the argument lay not only a clash of cultures, but also a very different understanding of the mission and operating environment that applied to OPC and informed the most appropriate response towards incidents of this kind.

Despite a victory for the ACE in this one case, it seems that the F-15 pilots had the upper hand in this contest. Neither the AWACS nor the ACE on board were able to maintain effective control over the TAOR airspace. AWACS crew members described the conditions under which they had to work to the Human Factors Investigation Team, in a way that reminds the reader of the nursery school game 'Simon says'.⁴⁴⁷

The Duke is responsible for flight flow. If we don't say 'Duke directs', then the fighters normally will not obey the command. Fighters should comply with AWACS controllers' requests to terminate engagements. Whether they will or not is your guess as good as mine.⁴⁴⁷

Why the Position of ACE Was Created

It was precisely to help overcome this problem that the position of Airborne Command Element was created in the first place and occupied by someone with a fast jet background. The ACE had very little understanding of how the AWACS and its crew operated. When asked during the investigation whether he could tell if the contacts on the screen in front of him were Eagle Flight, he gave the memorable reply that for him trying to make sense of a radar scope was like 'a pig looking at a watch'.⁴⁴⁸ But this did not matter; it was not his function. Instead, the ACE and the Mission Director worked closely together to 'ensure operations are conducted in a safe and tactically sound manner IAW [in accordance with] ... applicable guidance'.⁴⁴⁹ The ACE served as the 'representative of the CFAC/CC/DO and CTF Commander both on the ground and airborne'. He also kept the chain

of command informed, provided tactical and local OPC experience on board the AWACS and provided OPC continuity for problem solving.⁴⁵⁰



E-3 AWACS crew members at their work stations (Source: USAF)

The motivation for having this dual position was stated as,

MD/ACE are high threat, know your s... ! OPC operations are conducted in an unstable part of the world. AOR is 'warm' on any given day with potential to get 'hot' with little if any warning. OPC is a 'high vis' multi-national UN operation with forces flying with live ordnance. The opportunity for fatal mistakes is prevalent... The opportunity for international incidents also abound.⁴⁵¹

It was the ACE whose position paralleled our on-scene commander, site superintendent and air support operations cell commander in having the highest level of situational awareness and sufficient authority ... It made perfect sense that it was the ACE who was given command and control over the battlespace.

Along with their access to decision support resources on the ground, the ACE also had available 'Quick Reaction checklists' for a range of contingencies, including, 'unknown tracks, origin, location, direction, actions.'⁴⁵² The presence of the ACE offered an invaluable decision-making aid to the single seater F-15s in any tactical situation, where the requirement to fly their aircraft safely remained the number one priority no matter what other cognitive demands were placed on them.

From an HCD perspective, it was the ACE that was best placed to make the key decisions that posed the greatest risk of a catastrophic outcome. It was the ACE whose position paralleled our on-scene commander, site superintendent and air support operations cell commander in having the highest level of situational awareness and sufficient authority to make the difference between success and disaster. It made perfect sense that it was the ACE who was given command and control over the battlespace.

Unfortunately, this was not properly understood. The perception existed, including among the AWACS crew, that it was the pilots who had the highest situational awareness and were therefore best placed to make the key tactical decisions. This was no doubt the pilots' own opinion, hence the 'engage' call that followed their visual ID. As Snook puts it, 'Because the fighters were right there, looking at the target, who was AWACS to question the fighters' ID call?'⁴⁵³ In the words of the senior director on the AWACS,

Look, the eyes have it. Those are fighter pilots out there. I'm sitting looking at a radar screen. There's a fighter pilot out there that put his eyeballs on the target, I'm looking at a blip on a radar screen. He said he's got it. At that point I shut up. I'm not going to screw up his engagement.⁴⁵⁴

Colonel Cole echoed the same thinking in his testimony to the investigation.

Q. So you are saying if you have a visual ID that you rely upon the pilot's ability at that point?

A. That is our last - in our decision tree as to what we do, when you know, in the identification process... our last, our bottom line is the visual identification.

Q. Not only the bottom line, but it would be the apex also in a hierarchy. Nothing comes higher than a visual ID?

A. That is right.⁴⁵⁵

Their situational awareness was in fact very poor. They did not have available to them critical items of information, such as the Turkish military activity that morning or friendly air movements. So poorly prepared were they for the task at hand, that they had no knowledge even of the camouflage pattern used by Iraqi *Hinds*!

This would appear to be common sense, irrefutable even. However, we can not leave it at that, because we know the final outcome. We know by now the visual ID was not only wrong, but doomed to fail under the conditions it was made. The F-15 pilots were conducting a manoeuvre for which they were not trained and had no experience of. Not only that but their situational awareness was in fact very poor. They did not have available to them critical items of information, such as the Turkish military activity that morning or friendly air movements. So poorly prepared were they for the task at hand, that they had no knowledge even of the camouflage pattern used by Iraqi *Hinds*!

The reason why they did not know this somewhat important detail is extremely revealing; in fact, it gives the entire game away. No-one thought to brief F-15 pilots about Iraqi *Hind* paintwork, because no-one ever imagined that F-15 pilots would drop down low and attempt a visual ID of a rotary-wing aircraft inside the TAOR. This included the members of their own squadron support staff, who also did not share information about Eagle Flight movements with the pilots for exactly the same reason.⁴⁵⁶ Senator Dornan expressed the same conclusion when he asked General Andrus at the Military Personnel Sub-Committee Hearing,

Was this mission of the F-15s not to sweep the area for helicopters but to clear the area for any threat to the AWACS? ... Is it AWACS protection? And if it is, then I understand why they were not told about the two Army helicopters, highly sensitive, going way beyond the security zone, deep down into the no fly zone.⁴⁵⁷

It was the same story with the camouflage pattern. General Pilkington gave this explanation for the loss of the significance of this piece of information across OPC.

Q The Iraqi Hind helicopters are painted in a light tan/brown colour scheme. Would the C2 (Intelligence Officer) be expected to provide that sort of information to the CFAC so the CFAC could, in turn, pass that information to the aircrews?

A I say yes, but—I'd have to jump back three years to say that—that that was—would have in my estimation, would have been something to highlight in April, May, June of 1991. The

operation having progressed for over eleven hundred days prior to this incident, where Black Hawks routinely flew almost every day, six days a week, and very often two to three to four days a week in the TAOR, the necessity for highlighting that information may have slipped out many C2s ago.⁴⁵⁸

F-15s just did not interact with helicopters; the information was of no relevance, so it faded into the background. This is in line with our central argument here, that separation, in particular vertical separation, was the critical safety barrier in force across OPC operations. So long as this control measure remained intact, other controls such as intelligence on the paint scheme of an Iraqi *Hind* could be allowed to lapse without any negative consequences.

On the rare occasions when fighter aircraft did descend into the airspace occupied by rotary-wing aircraft, there was an additional control. This was the command and control arrangements for OPC, in other words the presence of the AWACS crew and above all, the ACE. General Pilkington provided this description of how those arrangements applied.

The normal procedure was one of the fighter pilots communicated to AWACS that something was in the area that they did not expect. AWACS would then energise the chain of command and normally get back to me. Sometimes we would have to go down to Southern and watch them. Quite often we would find out that Southern Watch, the operation going on south of the 32nd parallel, we would be aware of something that they had failed to inform us of or someone had failed to post on the board or notify people of.⁴⁵⁹

Colonel Cole, himself a *Duke* (or ACE), described an incident involving Eagle Flight and a pair of F-16s that shows how the system normally worked, as related here by Joan Piper.

A recent incident he was involved in when he was flying as a Duke flashes through his mind. On board the AWACS he was overseeing a flight of two F-16s [that] were conducting an early morning sweep of the No Fly Zone. They had locked two helicopters down low, fifty miles south of Zakhu, and had radioed, 'We've got low fliers down here.' On the AWACS scope Cole could see IFF paints, but it still took him ten minutes to figure out they were from Eagle Flight. He had radioed back to the F-16s, 'We know who they are, leave them alone.' This is the sequence of events Cole would expect anyone in the same situation to follow, because since he has been at OPC, this is how it has worked on a daily basis. The F-15s—or whatever plane was investigating aircraft—would ask for feedback from Duke. Duke and the AWACS crew would then try to rummage around and find out whose aircraft it was and identify it specifically. If they were unsuccessful, Duke would then ask for a visual identification.⁴⁶⁰

So now we can identify the two main controls that did operate in practice to produce safe air operations—vertical separation and airborne C2 by the ACE. When the F-15s ... initiated their own low-level visual ID and then ‘engaged’ independently, they overrode these two critical safety barriers.

This last point is the decisive one—the fighters **stayed high** until told to drop down low by the ACE.

So now we can identify the two main controls that did operate in practice to produce safe air operations—vertical separation and airborne C2 by the ACE. When the F-15s on 14 April initiated their own low-level visual ID and then ‘engaged’ independently, they overrode these two critical safety barriers.

The problem with the decision to make a VID was not only a question of compromising vertical separation, it also lay in the VID process itself. The reality was, as subsequent events were to demonstrate, that this was not simply a matter of getting ‘eyes on’. As our discussion here has shown, the process of perception is not so straightforward. In order to make a correct ID, the F-15 pilots needed important information, such as the fact that Black Hawks flying out of the security zone would be carrying external fuel tanks. The pilots also needed to be comfortable with the demands of low level flying in steep terrain. The probability of a successful ID hinged on a number of variables; it was simply not correct to believe that a ‘visual’ trumped everything. The real position was—maybe, maybe not—the reliability of the VID depended on a range of factors and these needed to be **carefully** and **objectively evaluated**.

For example, it was clear that a VID made by F-15 pilots could, in no way, have the same status as one made by F-16s who flew low on a regular basis and were familiar with rotary-wing aircraft. The F-16 squadrons also had a much higher level of awareness as to the movements of Eagle Flight around the TAOR. It is extremely unlikely that a pair of F-16 pilots would have made the same error as *Tigers 01* and *02*.

This was why the position of the ACE was so important. What was needed was not simply ‘eyes on’; the accident was not just the result of a mistaken VID. The real error was an **incorrect assessment** in the validity of the VID that the two pilots had just made. It was **not an error in perception, it was an error of judgment**. A more balanced consideration of the difficulties in making a correct VID under those conditions would at least have led the two pilots to determine that another pass was necessary, or even two or three. If they had been willing to accept the authority of the ACE, then it is almost certain that this would have been his direction, provided that he decided that repeated low level passes by inexperienced pilots in a high-threat environment was a sensible thing to do. Most likely, he would have told them to get back high and stand by.

The Underlying Problem—Air Force Culture

The ACE's intended role was to act as a counter to an Air Force culture that put fighter pilots at the top of the food chain and in doing so made it very difficult to keep them under control once they were in the air. Other AWACS crewmembers stood no chance of this, no matter what command arrangements were stipulated in the OPLAN or ACO. The function of the ACE was to directly influence the tactical decision-making processes of fighter pilots, to ensure they remained in alignment with OPC's overall mission, its commanders' intent and the various layers of rules and procedures that embodied these. As we have seen, this was a role that contained a great deal of potential for conflict and called for a strong character to occupy the position.

The creation of this role was a sensible move—it addressed a serious C2 problem and provided a check and a balance. Unfortunately, Air Force culture was more resistant to this initiative than anticipated; control and alignment of decision-making was harder to achieve. Snook makes this argument too,

Fighter pilots sit at the top of the authority pyramid, in practice if not in design. Dukes, by virtue of their direct link to the command post and extensive cockpit experience, come in second—but according to witness testimony, it's a rather distant second.⁴⁶¹

The problem was that this was a concession to Air Force culture when what was really needed was a challenge to it. Fighter pilots in this theatre needed to understand that they were part of a wider mission. They needed to understand how their own decisions and actions impacted on the bigger picture that was OPC, including the role of the AWACS in maintaining a safe and secure airspace above northern Iraq.

This was a management challenge, responsibility for it cannot be placed on the fighter squadrons, they were just being themselves. The F-15 squadron in particular, was simply behaving the way F-15 squadrons do. More than that, they were behaving in precisely the way that in most contexts we want them to behave, with aggression, with initiative, with self-confidence, with attitude.

This was a management challenge; responsibility for it cannot be placed on the fighter squadrons—they were just being themselves. The F-15 squadron, in particular, was simply behaving the way F-15 squadrons do. More than that, they were behaving in precisely the way that, in most contexts, we want them to behave—with aggression, with initiative, with self-confidence, with attitude. We are talking about fighter pilots after all, selected and trained to operate \$100 million killing machines.

We fire them up and we send them out; it is up to us who do so to make sure they are on the same wavelength, to give them what they need to know as to who we want them to kill and who we don't.

The ACE was one of those tools, as was the AWACS crew, but when we come to the interactions between these control measures and our F-15 pilots we find ourselves back in the nursery world of 'Simon says'. The children didn't want to play with Simon, but that is why we have grown-ups to supervise.

The problem with Air Force culture in this context was that the ACE could never play the role intended for them, even with a fast jet background. This was why the culture needed to be challenged, not accommodated to. Realistically, what fighter pilot would ever give up their seat in an F-15 or F-16 to sit in an AWACS and watch the action from a distance? The ACE position was never going to be filled by active duty fighter pilots, the 'tip of the spear', it was always going to be occupied by someone else, someone lower down the shaft of the spear. In which case, they were never going to have the authority to give 'Top Gun' fighter pilots direction on how to conduct themselves in combat. It was just never going to happen, not within a culture such as this.

In his Harvard talk, Snook captured the dilemma surrounding the creation of the ACE role.

The Duke—the ACE, the airborne command element guy—was not in the original AWACS crew design... Why do you think they put the fighter pilot in the back of the AWACS?... To help with this judgment thing. One reason is 'You're going to be controlling fighters. Wouldn't it be nice to have someone back there who understands what its like to be out there?' The other is to give it some sense of legitimacy. The fighters wanted one of their own in back of the AWACS who also knew what was going on.⁴⁶²

This was an excellent idea in principle, the problem was the reality,

Do you think that's great duty? Do you think that a fighter pilot likes to fly around in the back of an AWACS all day? You're not going to get the best people. In fact the Duke and his counterpart on the ground who pulled these duties were, typically, at the end of their careers. This wasn't the best thing to be doing.⁴⁶³

Colonel Cole gave an indication of this problem in his account, pointing to the fact that the ACE in this case was a former F-111 navigator, well down the fighter pilot pecking order.

There is a sensitivity between pilots and back seaters and right seaters and navigators that basically that - an F-111 right seater does not necessarily know the mission of the F-15 or F-16 or of any aircraft that he is not assigned to.⁴⁶⁴

However, when we examine the events of 14 April, we find that both of these views are unfair to the ACE in question, who turned out to be 'a major with 19 years in the Air Force at the time of the

shootdown; had perhaps more combat experience than anyone else in the Air Force under the age of 40, maybe even 45... he had worked as a qualified 'Duke' for four months, with approximately 15-20 sorties as a 'Duke' prior to the accident.¹⁴⁶⁵

In fact, not only did the *Duke* have a much better knowledge of the mission that belonged to the F-15s that morning, he had a far superior appreciation of the tactical position.

And **it showed**. In fact, not only did the Duke have a much better knowledge of the mission that belonged to the F-15s that morning, he had a far superior appreciation of the tactical position. This was also true of the ACE who had made the 'SKIP IT' call the previous week, which may or may not have been the same *Duke*—this is not known. In both cases, for all their self-confidence, the F-15 pilots had, in reality, shown very poor tactical judgment and their actions gave powerful support to the argument that they really needed to be reined in, for their own benefit, as much as anyone else. This is something we will demonstrate below when we come to evaluate the pilots' decision to drop down low.

For the moment, however, our concern is with the management of decision-making. A critical component of this is where, during an incident or engagement, decision-making is to be located, or in other words, who is to make the key decisions. From an HCD perspective, the key criteria for determining the location of decision-making is situational awareness. This was the argument we made in relation to Fukushima, Anaconda and firefighting operations, and it was the same intent that lay behind the creation of the ACE position. Unfortunately, this ran into a powerful obstacle—air force culture and the mentality this produced among fighter pilots. A key management challenge, therefore, consisted of overcoming this culture and winning acceptance of the idea that the ACE was the point where key tactical decisions needed to be located, above all, any decision that involved compromising the critical safety control of vertical separation.

Here we have an example of HCD as a cultural program, striving to align an organisational culture with the goal of minimising the risk of a catastrophic error. In OPC it appears there was a broad understanding among senior commanders of the potential for a major accident arising out of fighter pilot behaviour, and efforts were underway to mitigate this, as we saw with the detachment commander meetings. However, this met resistance, and for reasons we will explore below, the F-15 squadron presented a particular challenge in this respect.

Cultural transformation is never an easy task, and in OPC it was made all the more difficult by the reality that this operation was part of a much larger organisation, where the heart of the problem lay. Pilots rotated in and out of theatre every few weeks and their attitudes towards the ACE and how

to run engagements were shaped by this wider organisational context. Nevertheless, the opportunity did exist to challenge some of the more negative features of this culture and ensure tactical decision-making was properly located where the situation demanded—in the hands of the ACE. There is little question that a successful campaign around this issue would have ensured the events of 14 April 1994 ran down an entirely different path.

What Motivated the Pilots?

Fighter culture made it hard for the ACE to properly assert his authority over airborne engagements. In OPC, however, the problem was made significantly worse by a misalignment between the motives behind the F-15 pilots' actions, and the requirements of the operation as a whole. If we are to understand why *Tigers 01* and *02* acted the way they did on 14 April 1994, then we need to introduce this question of motivation and investigate how it influenced their decision-making on that morning.

There is no denying that throughout their time in OPC, the F-15 detachment presented a major headache to their chain of command. They were, without doubt, the problem child of the operation. The F-15s brought an important capability to air operations through their powerful airborne intercept (AI) radars and their defensive counter air role, but they also came with an organisational culture that was difficult to reconcile with the pace and atmosphere of a long-standing military operation other than war (MOOTW) governed by a complex and volatile political context. Initially, the difficulties were masked by the events of 19 August 1993 when F-15s got a taste of the action and acted in concert with the F-16 squadrons. Things had got off to a good start. But it did not take long for signs of trouble to emerge.

When it came to air operations, OPC commanders ran a pretty tight ship. General Pilkington demonstrated this when he stated,

Over the course of my command, I made many changes to make the operation safer and to improve the integration of forces. When I noticed violations of rules or when violations were brought to my attention, I dealt with the cases quickly. I, in fact, sent numerous pilots and at least one AWACS crew member home for violation of rules or procedures or for lack of good judgment.⁴⁶⁶

Problems persisted however. According to an ACE,

So many flight discipline incidents had occurred that CFAC held a group safety meeting in late February or early March 1994 to discuss the need for more discipline. The flight discipline issues included midair close calls, unsafe incidents when refueling, and unsafe takeoffs.⁴⁶⁷

It is important not to draw hasty conclusions from reports such as these. OPC may well have been running exemplary flight operations and a high vigilance towards near misses and incidents is an

indicator of best practice in safety management. More worrying was the fact that the pilots being disciplined were not spread evenly across all the various squadrons that participated in OPC.

There was no tolerance for mistakes or unprofessional flying at OPC. I had regularly sent people home for the least violation in terms of rules. It turned out that the majority of the people that I was sending home were F-15 pilots.⁴⁶⁸

No details are available as to the nature of the incidents that resulted in F-15 pilots being sent home, but they are an indication of some kind of problem affecting this detachment in particular. This might have been to do with individual pilots' performance. It may also have been due to a clash of cultures between the combat oriented 53rd Fighter Squadron and the rest of the CFAC. Either way, a major obstacle in the way of resolving the issue lay in the command structure and membership in OPC. As the CTF Commander put it, 'All the chain of command flew F-16s'.⁴⁶⁹ This was acknowledged to be a deficiency.

The Combined Task Force Commander said that he recognized a potential supervisory problem with the F-15 detachment because no F-15 pilots were on the Combined Task Force staff.⁴⁷⁰

The CFAC Assistant Director of Operations... explained that an F-15 pilot was needed on the Combined Task Force staff to help communicate with the F-15 group because contentious issues involving F-15 actions had become common topics of discussion at Detachment Commander meetings.⁴⁷¹

We have seen the impact of this oversight failure on issues such as the pilots' use of Mode I IFF and in their pre-flight planning process, for example, the absence of an operations briefing. Nevertheless, it is interesting to note the way the CFAC Assistant Director of Operations (ADO) chose to describe the question, that this was a problem of downward communication and that an F-15 member was needed on staff in order to 'help communicate with the F-15 group'.

This was undeniable, but it was only half of the story. The F-15 detachment may have been the problem child of OPC, but children are not usually naughty without a reason. The F-15 pilots' perception was that the whole CFAC affair was run by F-16 pilots, for F-16 pilots. The ADO's formulation of the issue could be interpreted as confirmation of that state of affairs.

Nevertheless, efforts were made to correct the situation. The CTF Commander

had made several unsuccessful requests to the Commander, 17th Air Force to have an experienced F-15 pilot—on flying status—assigned to the Combined Task Force staff. According to the Combined Task Force Commander, the 17th Air Force Commander told him that the available number of F-15 slots was limited and one could not be spared for Operation Provide Comfort.⁴⁷²

Of course, after the accident, an F-15 pilot was found.

The detachment commanders' (DETCO) meetings were a crucial coordination mechanism within OPC, but for reasons that are not clear, this did not seem to have the desired impact. From the CFAC ADO's comment above, it is possible that the F-15 representative did not attend the meetings on a regular basis, as it reads as if F-15-related issues were being discussed in their absence. This may or may not have been the case, but the suspicion is reinforced by the fact that General Pilkington and Lieutenant Colonel May (*Tiger 02*) never met face to face.⁴⁷³ Perhaps the CTF Commander did not attend the DETCO meetings either, but it is still an interesting detail when consideration is given to how likely it would have been that the general, who personally flew no less than 65 F-16 missions while deployed to OPC, would have known well all of the F-16 squadron commanders that came through his command.

The F-15/F-16 Rivalry

The situation within the OPC CFAC was made worse by the wider rivalry between the F-15 and F-16 fighter communities. This went all the way back to the circumstances surrounding the development of the two aircraft. The F-15 was the Air Forces' favourite, 'gold-plated' in every respect, 'bigger, faster, better'. The F-16, on the other hand, was the brainchild of fighter legend John Boyd, developed in the teeth of fierce resistance by the Air Force hierarchy. The F-16 was smaller, highly manoeuvrable and it also cost a fraction of the F-15's price. Unfortunately for the F-15s' proponents, the F-16 had proved its worth in both Gulf War I and the various NFZ enforcement operations that followed it. This led to a great deal of resentment among F-15 pilots and fuelled an intense rivalry between users of the two platforms.

This need not have been a problem—unless it got out of hand. In OPC, it seems that it did. In the words of the GAO investigation,

The Combined Task Force Commander and other Operation Provide Comfort officials acknowledged that a rivalry existed between the F-15 and F-16 communities, including those in Operation Provide Comfort detachments. Operation Provide Comfort officials told us that while such rivalry was normally perceived as healthy and leading to positive professional competition, at the time of the shutdown the rivalry had become more pronounced and intense.⁴⁷⁴

The question is, why did it become more 'pronounced and intense'? The CTF Commander

attributed this atmosphere to the F-16 community's having executed the only fighter shutdown in Operation Provide Comfort and all shutdowns in Bosnia.⁴⁷⁵

As an explanation for the rivalry, this seems plausible enough, but it does not explain why the position deteriorated in OPC. The F-16 shutdown of a MiG-23 had taken place long before the

F-15s arrived in theatre; it formed part of the backdrop to their relationship with the rest of the operation. It would undoubtedly have spurred F-15 pilots on to prove themselves, to show what they could do. However, it does not tell us why things got so much worse over the following nine months.

‘All the aircraft shot down since the end of the war had been by F-16s, and that the F-15 community there felt discriminated against.’

General Pilkington does give us a major clue, however, when he stated,

All the aircraft shot down since the end of the war had been by F-16s, and that the F-15 community there felt **discriminated against**.⁴⁷⁶

The F-15 squadron were not happy. They were part of an air component that was dominated by F-16 people; one that was constantly finding fault in their pilots, taking disciplinary action against them, sending them home in disgrace. They were not represented on the command staff, were under a steady stream of criticism in the DETCO meetings and they had been given a task, sanitisation, that was least likely to generate a combat situation.

The significance of this can be seen in the context that surrounded the CTF Commander’s ‘discriminated’ comment. He was referring to the incident the week before the shootdown when the ACE had made the ‘SKIP IT’ call, forcing the F-15s to disengage.

It was this event that brought matters to a head and allows us to see what form the rivalry had now taken. The fact was that in OPC, this was not a competition between two fighter detachments operating different platforms, it was a running dispute **between the command structure and a disgruntled unit**. The F-16-dominated CFAC felt the F-15 detachment was performing poorly and the F-15 pilots felt they were being badly treated. This was a recipe for disaster.

Worst of all, the F-15 squadron interpreted the intervention of the ACE as **part** of this discrimination, the purpose of which was to make sure the F-16s continued to get all the glory and the F-15s got nothing. No wonder the F-15 community was ‘very upset’ with the ACE, nor that they had absolutely no intention of following the directive of the CFAC Commander that the ‘Duke’s word is final’ if they could possibly get away with it.

This was how the stage was set for the fateful events of 14 April.

In the opinion of the Combined Task Force Commander, the shootdown pilots’ haste was due in part to the planned entry of two F-16s into the TAOR 10-15 minutes after the F-15s. He said that if the F-15 pilots had involved the chain of command, the pace would have slowed down, ruining the pilots’ chances for a shootdown.⁴⁷⁷

‘Had the F-15s taken the time to fly an additional pass or attempted to further clarify the situation, there was a good chance that the F-16 pilots would have been called in for the kill.’

They were not wrong. Snook agrees.

Had the F-15s taken the time to fly an additional pass or attempted to further clarify the situation, there was a good chance that the F-16 pilots would have been called in for the kill.⁴⁷⁸

This will be true in our fictional scenario too, when we describe how the incident should have been run. From a command perspective, this is because it was the appropriate way to handle the engagement. But from a disgruntled F-15 pilots’ perspective, it was just **not fair**; it was another example of discrimination against the F-15s in favour of F-16s.

The issue came up in the House Military Personnel Sub-Committee hearing, in a question addressed by Mr Dornan to the CTF Commander.

Mr Doman. Now, I am told there is a friction between the F-16 community and the F-15 community... Is there any friction... even if it were one sided, that would make the F-15 pilots too hungry, fangs out, to get an aerial victory, even if it is a slow-moving helicopter? It is a tough question, but I would appreciate your being frank.

General Pilkington. Yes, sir, it is a very tough question and I hate to even attempt to answer it. Let me tell you, I have no first hand knowledge of that problem, I have second hand knowledge of it, but that did not come to my attention until many months, I would say at least 6, 7, or 8 months after I left Operation Provide Comfort, that there was a problem.⁴⁷⁹

The general was a highly astute and able commander and was very well regarded both before and after the shootdown. Whatever the level of his first or second hand knowledge of the problem however, one thing is clear—the matter was not resolved, not in time for the chain of events that took place on 14 April 1994.

Here we can see an important management opportunity. All the indications of a serious problem were there, weeks and months before the shootdown; there was time to intervene. These indicators were the disciplinary problems leading to a disproportionate number of F-15 pilots going home, they were the safety issues, and above all, they were the incident on 7 April 1994, leading to the shouting match between the ACE and the F-15 pilots involved. Other signs were the repeated discussions

at the DETCO meetings, the complaints raised there by ACEs and mission directors about fighter behaviour, and the repeated reminders from the MD of the difficulties surrounding interceptions of helicopters.

In spite of these warnings, the issue went unaddressed and this outcome had a significant influence over the F-15 pilots' decision-making process on 14 April 1994. This is the angle that interests us—how the unresolved conflict affected the pilots' high consequence decision-making. The evidence seems to suggest that *Tiger 01* disregarded the two key safety controls in operation during OPC, vertical separation and the role of the ACE, because he believed both were in place purely in order to prevent F-15 pilots from getting a fair crack of the whip. The only constraint he accepted as legitimate was the stipulation in the ROE that a visual ID was required. Once this was done, the next step was clear.

The pilots were angry and frustrated. They were sick of the constraints being placed on them by the command structure; they held the view these were unnecessary and illegitimate. The problem was that the two critical controls were necessary and legitimate.

Here we have a major problem of misalignment, in motivation. Rather than be aligned with OPC, its mission and commanders' intent, the F-15 squadron's motivation was directed in part **against** these. The pilots were angry and frustrated. They were sick of the constraints being placed on them by the command structure; they held the view these were unnecessary and illegitimate.

The problem was that the two critical controls **were** necessary and legitimate. Vertical separation was essential for safe air operations and C2 being placed in the hands of the ACE was crucial if an engagement was going to be run properly as an incident. But it seems the F-15 pilots did not accept this; they believed these restrictions were being imposed purely for the benefit of F-16 pilots, at their expense.

The appearance of the two unknowns on Tiger Flight's radar at 0722Z opened up a window of opportunity for the F-15s. But it would not remain open for long. The F-16s were not far behind; the ACE would wake up and impose his control soon enough. It was in this context that the ROE took on the role of being the main guide to the pilots' course of action. The objective was to shoot, to get one back for the F-15s, to show the F-16 command they did not have the upper hand they thought they did, and for this a VID was necessary to confirm the hostiles' identity. Once that was done, the way was open, so long as they moved fast.

Building an Understanding

The opportunity lay with the command structure to fix the problem and bring the F-15 detachment back under control. This did not simply involve cracking the whip, enforcing the rules, sending naughty boys and girls out of the room or shouting at them. It also meant addressing their grievances, winning their trust and creating the conditions where they could develop some understanding as to what was required in theatre if air operations were to be conducted safely and the operation achieve its mission.

This was the key to the whole situation—**building an understanding**. As we have seen, the F-15 pilots had significant gaps in their knowledge of the operating environment, how air operations worked in OPC, who was likely to be in the TAOR at any time, the critical safety controls. And they would not easily take instructions from the chain of command because they believed these were all about the F-16 pilots putting one over on them. The misplaced rivalry was an obstacle to building proper situational awareness. This was why it needed to be fixed, for the F-15s' safety sake as much as anyone else's.

Here we have HCD the management program in another guise. This time, our goal is to manage the pilots' decision-making by aligning their motivation with our own. As with organisational culture, in essence this is a leadership function and it calls for soft skills above all else, especially when confronted with 'problem children'. This can be an extremely demanding challenge, as is cultural change, but if the outcome is the prevention of a catastrophic error costing 26 lives, then our argument is that it is certainly worth the effort.

CHAPTER 10

Confusion over the Mission

By this point, we hope the picture is emerging that the pilots' decision-making was influenced by important factors that were set up well in advance of the incident. This is similar to our argument over the USS *Vincennes* and the shootdown of Iran Air Flight 655. Gaps in situational awareness (SA), unrealistic expectations, divergent thought processes, organisational culture and motivation, all played their part in the tragedy.

So did confusion over the mission. This happened on three distinct levels. First was the ambiguity over the word 'sanitisation' in relation to the task assigned to Tiger Flight. Second were the various interpretations of Combined Task Force's (CTF's) responsibility for policing a No Fly Zone (NFZ). Here, the F-15 pilots diverged again from the other components of the operation. Third was the problem CTF Commander faced in integrating air operations with the Army's Military Coordination Center's (MCC's) activities and objectives on the ground. All three made the question of the mission highly problematic and directly contributed to the chain of events on 14 April 1994.

This is an important theme within HCD and has already appeared in both our earlier case studies. Our claim is that this aspect of our 'own situation' is often glossed over. It is assumed to be straightforward, whereas in reality it is a major source of complexity within contemporary military operations, especially military operations other than war (MOOTW). This is also our position in relation to the rules of engagement (ROE) which will be the subject of the following chapter. Untangling the difficult and sometimes intricate issues surrounding the mission and how it was understood, forms a critical element within a strategy for managing high consequence decision-making processes.

What Did 'Sanitising the Airspace' Mean?

A good example of this type of problem can be found in the never resolved ambiguity surrounding Tiger Flight's mission to 'sanitise' the airspace. What did this word, 'sanitise' mean? General Andrus had no doubt what he thought it meant when he stated in the Report of the Accident Investigation Board,

The F-15s were tasked to perform an initial fighter sweep of the no-fly zone to clear the area of any hostile aircraft prior to the entry of coalition forces. Following the fighter sweep, the F-15s were to conduct their defensive counter air mission/combat air patrol in the area.⁴⁸⁰

Tiger 01's understanding appeared to be consistent with the general's.

The ACO [airspace control order] ... says that aircraft with AI [airborne intercept] radars will be the first people to enter the AOR [area of responsibility] each day to sanitise... the F-15s are primary air to air, so they're going to go with their AI radars.⁴⁸¹

In this version, however, the emphasis has shifted somewhat. The reason why the F-15s are to perform this task is because of their airborne intercept radars. Some ambiguity now creeps in as to the word 'sweep'—does this mean a radar sweep?

If we turn to the Government Accountability Office (GAO) report's description of Tiger Flight's mission, we find this.

F-15 fighters, as the first aircraft in the TAOR, were to search—'sanitise'—the area with radar and electronic measures to ensure it was clear of hostile aircraft and then fly orbit to provide air cover for the rest of the package.⁴⁸²

This wording reinforces the suggestion that a 'fighter sweep' of the TAOR was a search conducted by an airborne radar platform.

On a typical day in Operation *Provide Comfort* (OPC), that is precisely what it meant, because the sweep did not turn up any hostile aircraft, so the airspace could be declared 'sanitised' once the fighters had swept through the area. There was no ambiguity; everything was straightforward. 'And then after having confirmed that there was no Iraqi aircraft in the area, they were to establish their defensive cap.'⁴⁸³

What was going to happen if they did get hits? What did 'sanitise' mean under those circumstances? Did it mean 'drop down low and blow them out of the sky'? The F-15s clearly understood it to mean exactly that, but did it?

The problem was—what was going to happen if they did get hits? What did 'sanitise' mean under those circumstances? Did it mean 'drop down low and blow them out of the sky'? The F-15s clearly understood it to mean exactly that, but did it?

In reality, it was ambiguous and no-one picked up on this. The F-15s primary mission was to protect the AWACS but if they also had the task of dropping altitude and engaging hostile aircraft, then how were those two mission priorities to be reconciled? The question needed consideration and clarification; it needed to be managed. But it never was considered or clarified; in the event, it was Tiger Flight's interpretation that prevailed. Following the accident, the CTF Commander made it

clear that his understanding of the F-15s' mission was quite different to that of Tiger Flight and that his intent was always for them to remain high.

For F-15s, 'sanitising' was always meant as a radar function, not a missile one.

But this was never picked up, and until 14 April, that didn't matter because in the absence of any radar hits, the F-15s' interpretation of their 'sanitising' mission was a mute point—it never came up. The NFZ was policed from day to day, safely sanitised. All this time, the task force was unaware how ill-prepared it was should the situation shift from this happy routine and become tactical, should actual hits appear on Tiger Flight's AI radars.

At the same time, helicopter operations in support of the Military Coordination Center were conducted in parallel, and little consideration was given by the CFAC Commander to the security or support needs of the ground operation. This had a number of effects. Firstly, it reinforced the regular rhythm that settled over air operations enforcing the NFZ. Secondly, it isolated these from political developments inside Iraq. Thirdly, it was the cause of many complaints among Army aviators who felt neglected by the Air Force-centric nature of the operation. Captain Nye's testimony gave an indication of this.

Remember, Provide Comfort's mission was to assist and protect the Kurdish population of Northern Iraq. Unfortunately, over time I feel the combined task force's priorities became skewed to favour the Air Force's no fly zone mission. A mission planned in October 1993 demonstrates these skewed priorities within Provide Comfort.

The mission was planned south of the 36th parallel and was one of the highest risk missions ever for Eagle Flight. Without air cover, Eagle Flight and coalition personnel would be over 500 miles from any assistance. Accordingly, I requested air cover for the entire mission. The military coordination centre also made this request. Both requests were turned down by the combined task force. Eagle Flight was forced to plan the mission to fit the Air Force's schedule that day, and the plan for no air cover for at least 2 hours.⁴⁸⁴

This was not the only occasion Eagle Flight were left exposed in such a manner.

Mr Dornan. I want to ask you; did you ever request MiG cap going that far? Did you ever fly to Irbil?

Captain Nye. Yes, sir, multiple times.

Mr Dornan. Did you ask for a MiG cap, to have Air Force 'big brother' overhead, protecting you from MiGs?

Captain Nye. No, sir, because we have asked for air cover, like I testified in my opening statement, in certain missions, but were told we had—in that one statement, that I requested it, we had to—the Air Force is going to fly their mission the way they are scheduled, we had to fly ours however we could within that.

And we could not conduct missions to Irbil generally within the timeframe the Air Force would be on station. So we would be forced, by our mission—or by MCC's mission requirements to be in the no-fly zone longer than the Air Force would be, normally.⁴⁸⁵

Another Eagle Flight pilot expressed the same sentiment,

We got the impression that we (Eagle Flight) were like the little brother in the whole affair. They (Air Force) tolerated us only because they had to...

There were many occasions when we were on station, even outside the Security Zone—where we were—the MCC was conducting business on the ground, and when they had completed their business, when they climbed in the aircraft and we took off, AWACS was not on station. Nobody was there... Well, we joked about it among ourselves, that it was time for happy hour at the club and they (AWACS and fighters) were ready to go home. But we always felt like, like the little brother analogy again, that all the big kids had taken their toys and gone home and they left us sitting out there to find our own way back... It didn't sit well with us.⁴⁸⁶

The relevance of this was how little role of the MCC played in the decision-making process of the F-15 pilots. Should their VID of two Iraqi *Hinds* have turned out to be correct, it was... a matter of deriving a course of action that would meet the objectives of the MCC and would align with its political initiatives, including the mission being flown by the Black Hawks.

The relevance of this, for us, was how little role of the MCC played in the decision-making process of the F-15 pilots. Should their VID of two Iraqi *Hinds* have turned out to be correct, it was the MCC's mission requirements that needed to take precedence. For example, one of the main objectives of the MCC was to 'deconflict potential confrontational issues'. The appearance of two Iraqi Mi-24 *Hinds* above the 36th parallel would certainly qualify as a 'potential confrontational issue'. In such a situation, the question was a matter of deriving a course of action that would meet the objectives of the MCC, and would align with its political initiatives, including the mission being flown by the Black Hawks. This was not a simple matter.

Furthermore, the policing of the NFZ settled into a comfortable rhythm **because** it was divorced from the hectic and politically volatile situation the MCC was busy grappling with. As deliberate violations of the NFZ were few and far between, the fixed wing component progressively lost its combative character; one day in the sky looked pretty much the same as any other. Some flavour of this is given in Joan Piper's description of OPC air ops,

Gradually over the past three years the pace and excitement of Operation Provide Comfort has slowed to a more relaxed and often boring atmosphere. Pilots commonly refer to their peacekeeping flights over this No Fly Zone in northern Iraq as 'burning holes in the sky'.⁴⁸⁷

The contrast between this and the MCC's daily rhythm comes out in this passage,

Today is definitely not a routine day for the Black Hawks. They have been tasked to fly a high profile, two ship mission into northern Iraq. Earlier this week a change of command had taken place at the US Army Command Centre in Zakhu. Today the outgoing commander, Col Jerry Thompson, will escort his replacement into the far reaches of the No Fly Zone for the explicit purpose of introducing him to the two Kurdish leaders who exert control over this volatile political area. In addition to providing humanitarian relief and protection to the Kurds, another important function of the Army detachment is to establish an ongoing American presence in the Kurdish towns and villages by showing the US flag, the other main objective of today's mission.⁴⁸⁸

If the air component had shown itself more willing to take the MCC's mission and security requirements into account and factor them into their own planning, one result would have been that fixed-wing air operations over the TAOR would have lost some of their routine character. Assigning special missions to provide fighter coverage for MCC excursions out of the Security Zone would have done much to help flying squadrons build a better appreciation of their operating environment. This would not only have made it less likely they would mistake Eagle Flight for Iraqi Hinds, it also would have provided some context with which to evaluate two unknown aircraft when they appeared in the TAOR on 14 April, not only from the perspective of their identity, but also their intent. It could have given them the understanding that the response to such a development would depend on the political context down at ground level. This may have involved an interception, or it may not—it all depended on the political situation at that moment.

Handling Violations of the NFZ with Flexibility

Earlier in OPC, this understanding had prevailed. Violations of the NFZ were handled with flexibility, on the basis of a political calculation as to their significance. During the days that followed the imposition of the NFZ in April and May 1991, against a background of manoeuvring and tense negotiations with the Iraqi military, the following events took place.

Unsure of Allied resolve, Saddam instigated several provocative acts to test the waters. An American EA-6B Prowler was fired on twice during a routine reconnaissance flight. On 5 May, two Iraqi civilian helicopters spraying pesticides 'slimed' Company F while flying over the Marine lines. Although the Iraqi pilots claimed innocence, this incident appeared to be a deliberate provocation. The helicopters were quickly intercepted and forced down. A search of the aircraft revealed a camera and some film, but it was never determined if this was Iraqi intelligence equipment or the innocent tools of an Iraqi 'shutterbug'. The chemicals were tested but contained only normal pesticide toxins and the incident was closed.⁴⁸⁹

This followed an earlier incident on 23 April 1991 involving Iraqi *Hips*.

The second major incident of the day occurred that evening when a flight of Iraqi MI-8 helicopters headed for northern Iraq was intercepted by F-16 fighters from Incirlik. The incident was quickly resolved when the helicopters landed and offered no resistance.⁴⁹⁰

Flexible and pragmatic responses were not limited to incidents involving helicopters. OPC also applied judgment when dealing directly with Iraqi Air Force jets, for example, on 5 April 1992.

Iranian warplanes attacked rebel bases inside Iraq. Iraq responded by scrambling fighters and (unsuccessfully) pursuing the intruders. Combined Task Force Provide Comfort did not interfere. The Iraqis continued to fly on succeeding days, effectively overturning the ban on all their flying which they had observed since 22nd March 1991.⁴⁹¹

Decision-making of this kind was driven by the situation which was, above all, political in nature. This meant that an appropriate response to the presence of two unknowns in the TAOR was first and foremost a question of politics. It seems that this was understood well enough at the command level; however, it did not filter through to air operations which were conducted largely in a vacuum and so slipped into a 'comfortable' routine.

OPC was charged with enforcing a NFZ. This was fine, so long as no-one breached the NFZ; for the most part, no one did. This meant that operations took on much the form they do in civilian airspace. The major concern was managing coalition aircraft movements within an area of operations (AO) they had exclusively to themselves—that was under their total control. To this end, the ACO and related instructions, whose main purpose was the maintenance of safety parameters, constructed an orderly flow of air traffic. Vertical separation was one of the mechanisms that achieved this but it was by no means the only one. The flow sheet was another; this had the same objective, separation, but through temporal spacing. Yet another was the clockwise or counter-clockwise movement of air traffic, much as is done with road traffic management, to avoid the potential for head-on collisions. The AWACS policed this orderly flow in much the same way that air traffic control operations do everywhere, following the same principles that are successful in achieving an astonishing level of reliability. Air Traffic Control is **the** poster boy of high reliability organisations (HROs).

As is the pattern with military operations, this calm picture was punctuated dramatically at certain points in the lifetime of OPC. One episode took place between 15 and 19 January 1993, as described by Rear Admiral James Lair:

Throughout January and February 1993, the Government of Iraq continued a pattern of non-compliance with the UN resolutions. Coalition aircraft patrolling the northern no-fly zone were periodically subjected to anti-aircraft artillery fire and illumination by Iraqi radars. US Air Force F-4G, Wild Weasel, and F-16 air suppression aircraft responded to the radar illumination by firing high speed anti-radiation missiles and dropping cluster bombs on the Iraqi radar sites. Iraqi aircraft tested the no-fly zone. On the 17th January, 1993, an F-16 shot down a MiG-23 flying north of the 36th parallel.⁴⁹²

The tactical deployment of air assets and ordnance was dictated by the political situation on the ground. Under other circumstances, being illuminated by an Iraqi radar would not, in itself, be enough of an indication of hostile intent to warrant retaliation by kinetic means... It all depended on the context and, in this case the context, warranted pre-emptive strikes...

These events are a good example of how the tactical deployment of air assets and ordnance was dictated by the political situation on the ground. Under other circumstances, being illuminated by an Iraqi radar would not, in itself, be enough of an indication of hostile intent to warrant retaliation by kinetic means, as the justification for such an action under the ROE could only be self-defence. It all depended on the context and, in this case, the context warranted pre-emptive strikes, given the incidence of anti-aircraft artillery fire over the same period.

Two further engagements of a similar nature took place during 1993.

On April 9 1993, four coalition aircraft were fired upon by Iraqi artillery. In response, two US F-16s dropped cluster bombs on the site. Again, on August 19 1993, two flights of F-4G/F-16 aircraft again were fired upon by surface to air missiles. In response, the F-16s dropped cluster bombs on the site, along with two F-15Es putting laser-guided weapons on the site.⁴⁹³

Things went quiet after that, and air operations took on a day-to-day routine character for which control measures such as the air tasking order (ATO) were well suited. The situation remained tense but did not escalate into any tangible actions or incidents.

This was not necessarily the case on the ground, as Rear Admiral Lair described.

The last incident was on the 21st of December, 1993. A coalition convoy came under small arms fire while on a routine patrol inside the security zone. The small arms fire appeared to come from Iraqi Government held high ground southeast of the convoy's location. As they proceeded north toward a town called Faydah Camp, they came under fire again, this time from Iraqi held positions near the Faydah Camp. Local guards traveling with the group returned fire and the convoy exited safely and returned to Zakhu without injury.⁴⁹⁴

Going into 1994, the political situation remained volatile. Saddam was posturing, behind the scenes secret negotiations between Iraq and different Kurdish factions were going on, in the meantime, the Turkish/PKK conflict was escalating. What this meant was that the MCC were busy; they had a lot to do, situations to deal with, people to talk to, relationships to secure, and in addition, that week, they were in the process of a handover of commanders.

The air component, on the other hand, were in routine mode. Fourteenth April was just another day of air traffic, regulated by the ATO, captured on a shrunk-down flow sheet that would fit neatly on the pilots' kneeboard. The F-15s were going to zip around an empty sky for an hour or two, settle into their clockwise/counter-clockwise flight pattern and be home in time for happy hour—unless they got lucky and someone was stupid enough to wander into their sights. On board the AWACS, it was time for a coffee and a sandwich before the busy part of the day got going.

Were the F-15 Pilots Right to Maintain a Tactical Mindset?

However, the F-15 pilots did not share this routine mentality at all; they maintained a tactical mindset in line with their training as combat pilots and the culture of their squadron. For this, they were widely criticised. None other than General Norman Schwarzkopf weighed into the debate with these comments.

There is a considerable difference between the environment in which these people were flying and the high-intensity, kill-or-be-killed environment of a full scale war, where split-second decisions must be made. This tragedy did not happen in the heat of battle.⁴⁹⁵

Within OPC, the same sentiment was echoed.

The Senior Legal Advisor said that, in his opinion, the pilots had an unnecessarily aggressive attitude toward the intercept and shootdown.... the tactical environment did not warrant a rush to judgment.⁴⁹⁶

The Government Accountability Office (GAO) investigation picked up the same theme and explored the 'F-15 pilots' perceived urgency to engage during the shootdown'.⁴⁹⁷ This stood in marked contrast to the intent behind the provisions of the ACO and their commanding officers.

In the opinion of the Combined Task Force Commander... if the F-15 pilots had involved the chain of command, the pace would have slowed down... Further, CFAC officials stated that the Airspace Control Order was specifically designed to slow down a potential engagement to allow CFAC time to check things out.⁴⁹⁸

This criticism seems unfair, given the pilots' perception they were flying in 'unfriendly skies' and their wariness of complacency.

This criticism seems unfair, given the pilots' perception they were flying in 'unfriendly skies' and their wariness of complacency.

The real problem was twofold. Firstly, their mindset was not informed by any real awareness of what was happening on the ground, such as the mission Eagle Flight was conducting that morning and therefore they had no realistic basis on which to assess any unknowns that appeared on their radars. Secondly, they found themselves out of step with the Combined Force Air Component (CFAC) which was comfortably in routine mode and had its own idea of how the situation should be handled.

This was where confusion over the mission intervened into the situation. Ambiguity over the meaning of 'sanitise' meant that while the CTF Commander expected the F-15s to remain high and protect the AWACS even though they had unknown hits on their radars, Tiger Flight interpreted their mission in the opposite manner and dropped down low as a matter of urgency. This was reinforced by a lack of understanding in the way violations of the NFZ had been dealt with in the past and the main considerations that would determine a suitable course of action, namely the mission requirements of the MCC.

The end result was that no proper understanding of the mission, either their own, OPC's or the MCC's, had any significant influence over the pilots' decision-making. Instead, the entire process was short-circuited and determined instead by the provisions of the ROE. But this is never the intent or function of ROE; to employ the ROE as the key source of decision-making is both a misunderstanding and a misuse of the very nature of ROE. To explore this question is the subject of our next chapter.

Here too, we have a management opportunity. In this case, the reality was that the mission did not play the role it should have in guiding the decision-making of the F-15 pilots. This was due to the ambiguity that surrounded it on three distinct levels, as we have described. Our argument is, therefore, that a successful intervention at this point would have involved reimposing the mission, and of course, the commander's intent that is its practical expression, into its proper position as **the** main source of the pilots' decision-making. This would require untangling the often-intricate

issues that surround the mission, on all levels, and seeking to achieve clarity and alignment on these questions.

As with the other aspects of HCD that we have highlighted in this discussion so far, this is not a simple task; it calls for skill and ability. Nevertheless, in our opinion, the stakes are high enough to demand this. Above all, our goal is to drive home the message—this **cannot** be taken for granted, it can **never** be assumed that the mission is unproblematic and does not require attention. Just the opposite, this is a constant priority. In any complex operation, if we want the mission and our commander's intent to drive decision-making, then we have to work relentlessly at ironing out problems, confusion, misinterpretations and misunderstandings that inevitably arise along the way. If we ignore this challenge, then the reality is that other considerations will step into the driving seat of decision-making, some of which we have already encountered, and the consequences are unlikely to be ones we desire.

Chapter 11

The Role of ROE in the Accident

The rules of engagement (ROE) played an important role in the pilots' decision-making; in many respects, they were their main source of guidance throughout the incident. According to *Tigers 01* and *02*, it was the ROE that stipulated the need for a visual identification (VID) and this authorised them to make what was, in our view, the critical decision—to break vertical separation and drop down low. In their interpretation, it was also the ROE that stated once the VID was complete and the targets identified as hostile, 'the next step' was to shoot.

Given the outcome, this obviously raises some questions. To what extent did the ROE contribute to the tragedy? What part did they play in determining the logic behind the F-15 pilots' decisions and was this helpful? If there was a problem, did it lie in the ROE or the pilots' understanding of them?

The issues surrounding these questions are complex. Nevertheless, in our opinion, they are worth grappling with because it is our view that the ROE **did** make a significant contribution to the accident. They were very much a part of the problem on 14 April 1994. On the other hand, the challenge they presented was fixable. Here we can uncover another opportunity to intervene and shape the pilots' decision-making in a positive manner.

An indication of how the problem could be solved can be found in the changes that were made to the ROE following the shootdown. Of more interest, however, is an investigation of how the ROE in force at the time of the incident contributed to the outcome, there are lessons here that have a wider application.

Changes were made in the wake of the accident, according to Rear Admiral Lair:

The Rules of Engagement was modified. Procedures for engaging Iraqi helicopters were made much more restrictive and detailed execution of the entire OPC ROE was developed for dissemination to all OPC aircrew. A single source US tactical application decision document was developed to provide fighter and AWACS aircrew a step by step evaluation process and engagement criteria.⁴⁹⁹

This was understandable, and without seeing the tactical decision aid, this was clearly a sensible initiative, although it could never eliminate the complexities that inevitably surround ROE, as we shall discover.

At this point, however, we are at risk of hindsight bias and closing the stable door after the horse has bolted. The situation is similar to the aftermath of the USS Stark incident, where changes to the ROE with the intent of eliminating one kind of catastrophic risk ended up creating another. A friendly-fire incident was not the only potential source of tragedy inside OPC's tactical area of responsibility (TAOR), which is why it is misleading to measure any modifications of the ROE against this single measure. The position was always more complicated than that.

Prior to the shootdown, General Pilkington expressed his satisfaction with the ROE as they then stood and explained why he held this view

The rules of engagement of Provide Comfort were aggressive. They were known to be aggressive because this was Iraq. In a number of meetings, which I attended and normally sat on the back row, including a meeting with Secretary of Defense Aspin shortly after he became Secretary of Defense, the rules of engagement for Iraq were contrasted against those of Bosnia and just the point you made was normally said in those meetings... that these were the best rules of engagement we as a military community could hope for, probably never get any better, as compared to the rules of engagement in places like Bosnia where the no-fly zones were routinely violated and we were unable to do anything about it.⁵⁰⁰

The ROE in Operation *Provide Comfort* were relatively permissive. From a military commanders' perspective, this was a good thing as it appeared to make life simpler. There is no avoiding the fact that restrictive ROE complicate military operations, as do constraints and limitations in any sphere of life. However, the position is not so straightforward because **ROE are, in reality, not the cause of complications, they reflect them.** Restrictions on the use of armed force, especially in military operations other than war (MOOTW), are an attempt to navigate through complex and competing priorities and objectives, for example, between the needs of self-defence and own force protection on the one hand and the de-escalation of incidents on the other hand. OPC was no exception to this kind of dilemma.

Specific ROE may be successful as navigation guides, or they may not. They may be clear, but clearly wrong; they may be confused and confusing; conflicting, ambiguous, or irrelevant to the actual decisions that need to be made. The one thing ROE **never** are is **simple**—in fact simplistic ROE are almost certainly the most dangerous, particularly in MOOTW. Nor are the issues that surround them simple, no matter how well any ROE are written.

A good example from OPC is the missing Roland SAM battery. We can imagine the following scenario—the Roland sets up outside the Security Zone, launches off a missile, quickly reconfigures and scuttles off as fast as it can back into Iraq. The missile may hit its target but within minutes, the Roland is no longer a threat nor displaying any hostile intent. Did the OPC ROE authorise air-to-ground strikes in retaliation for a hostile act, or only in self-defence? Part of the ROE remain classified so it is possible these sections contained clear guidance for such a situation. More likely,

however, is the position that if we sat OPC's senior commanders down in a room and asked for their interpretation of the ROE on this question, we would get a wide spectrum of answers. And if we were to survey the fighter squadrons on this issue, no doubt we would broaden the range of responses even further.

This is the nature of complex warfare; situations continually arise that were impossible to anticipate in full and capture in a set procedure. In any case, set responses to a situation that does repeat itself are themselves highly dangerous, in a tactical context, predictability is not a sound principle of war.

This is the nature of complex warfare; situations continually arise that were impossible to anticipate in full and capture in a set procedure. In any case, set responses to a situation that does repeat itself are themselves highly dangerous, in a tactical context, predictability is not a sound principle of war. Retired F-15 squadron commander Colonel Cox captured this point in these words.

When you give someone a gun, a young airman, you do spend a lot of time ensuring that they know when to use that weapon. You are not always sure that they will do that and, trust me, I have had some that did not do that. They are amusing stories but they were not amusing at the time.

You spend a lot of time trying to establish rules, you might call them rules of engagement... because you have to remember these are young airman without any background or experience, so that is the kind of supervision you have to provide.⁵⁰¹

Supervision is the key word here. On 14 April 1994, it was the missing Roland surface-to-air missile (SAM) battery that was the issue. Later in the morning, it was the presence of two unknown helicopters inside the TAOR, set against a particular political context in Iraq and Kurdistan. Under these circumstances, could it be said with any confidence that the F-15 pilots 'knew when to use that weapon' and that the OPC chain of command could be 'sure that they will do that'?

Why Had the Procedures Worked Before?

The CTF Commander did have confidence on this point, as can be seen in this statement.

So the situation had occurred numerous times before; I will say at least every three months, possibly more often an unknown had come into the area. We had never even come close enough to having shot one down that it drove us to make a change to the rules of engagement, because the procedures had always worked.⁵⁰²

But here is one case where hindsight **does** apply, for the commander's confidence was clearly misplaced and the reason for this over confidence soon becomes obvious; it rests on a **misunderstanding** of why the procedures worked. We can see this if we look at the general's assessment of what went wrong on the day of the accident.

It is my firm conviction that there were rules and procedures in place which should have and would have prevented the tragedy, had those rules and procedures been followed.

Some of the rules and procedures, like the rules of engagement, have been in place for 3 years and six commanders before my arrival. In some cases, I imposed stricter rules than had ever been previously imposed. I believe that I had every reason to expect that the safeguards which were in place were adequate.⁵⁰³

The key factor ... lay in the 'supervision' that surrounded their implementation in a complex, ever changing environment, exercised through the medium of the ACE, and where necessary, the higher chain of command. It was a management success.

The expectation was wrong, but not for the reason the CTF Commander stated. The key factor that ensured the 'safeguards' had always been 'adequate' did not lie in the fact that 'rules and procedures were followed', but both **why** and **how** they were followed. It lay in the **supervision** that surrounded their implementation in a complex, ever-changing environment, exercised through the medium of the ACE and where necessary, the higher chain of command. It was a management success; this is our key argument.

In the case of the ROE, this means that the precise wording at any one point in time is not the main issue, but how the rules are understood and interpreted, to what extent the commander's intent and the operation's mission are transmitted to the pilots and troops on the ground who have to make the tactical decisions that count. This is especially so in a complex environment because, inevitably, rules will clash and conflict.

For example, the ROE stipulated that a visual ID (VID) was needed on any airborne object for which an electronic ID had been unsuccessful. At the same time, the CTF Commander had instituted an altitude restriction on fixed-wing aircraft not to go below 10 000 ft. VID's on low and slow targets are not possible from this height so which rule should take priority? If the decision was to attempt a VID, then another complication existed in the ACO's stipulation that it should be done at 'tactical airspeeds'. This was why the F-15's ID pass was carried out at 450 knots. It was later demonstrated

with near certainty, that at this speed it would be **impossible** for a fighter pilot to make out a target helicopters' markings. And yet the ROE were explicit that the VID was not complete without proper identification of the aircrafts' nationality and whether it was a medical flight. Once again, these two rules could not be reconciled; one would have to override the other.

Judgments of this nature are always going to be needed—to expect anything else in any kind of military operation is a dangerous delusion. Rules and procedures alone are never adequate safeguards, whether they are followed or not, and in some cases, it is the blind following of rules that is the direct cause of tragedy.

But this is just the way it is. Judgments of this nature are always going to be needed—to expect anything else in any kind of military operation is a dangerous delusion. Rules and procedures alone are **never** adequate safeguards, whether they are followed or not, and in some cases, it is the blind following of rules that is the direct cause of tragedy. In OPC, the ROE insistence on a visual ID, while well intended, set up a major hazard and did directly contribute to the accident. This meant that proper supervision was required for how any VID would be conducted; the process needed to be carefully managed.

There is no evidence that, in fact, it was, although this may be unfair to OPC air operations. All we have on record is the commander's statement.

And if a visual identification were required, that visual identification had been done correctly and had worked.⁵⁰⁴

But **why** had it worked and what was different about this time? For example, was it the case that previous VIDs had always been carried out by F-16s? Had they been confirmed by radio checks or successful IFF? Had they involved multiple passes? Furthermore, **how** is it known that they had worked? Because they did not end in an accidental shootdown of friendlies? This is no guarantee; they may have been Iraqi Hinds all along, misidentified as Black Hawks, routinely violating the NFZ. Perhaps they got away with it by squawking Mode I IFF code 52? Captain Nye quotes Captain Wickson as stating he had successfully interrogated Eagle Flight on Mode I IFF in the past. Perhaps it wasn't the Black Hawks at all on that occasion?⁵⁰⁵

These are legitimate questions and the underlying message we are trying to bring out is the same in all cases—**nothing here is simple**, neither the factors that contributed to safe operations for 1109 days nor those that led to disaster on 14 April.

Did the ROE Require a Visual ID?

Even the question of a VID is surrounded in ambiguity. Was it necessary? Was it part of a procedure laid out in the ROE? This is how the general understood the matter.

If an electronic identification (EID) failed to respond either positively friendly or positively enemy, the rules of engagement require visual identification to occur.⁵⁰⁶

This is not how Tiger Flight understood the position, at least if Captain Nye's testimony is correct.

Captain Wickson states in the AFR 110-14 that the lack of an EID confirmed the helicopters were not friendly, the VID was simply to confirm they were hostile... Is this Air Force doctrine that the lack of an EID confirms not friendly?⁵⁰⁷

The issue was not one of doctrine but the ROE in which case, who was right—General Pilkington or Captain Wickson?

In fact, it is possible to argue that **neither** were right, that both of their interpretations of the ROE were open to challenge. Both accounts appeared to rest on the assumption that the ROE laid out a procedure—EID then VID. But this is a **fundamental misconception** as to the nature of ROE which are not procedures but a set of constraints. Here is what the ROE actually stated.

Any unidentified airborne object... will be identified by any means available, including visual recognition, flight plan correlation, electronic interrogation, and track analysis.⁵⁰⁸

This is **not** a procedure; there is no order to be followed only the requirement 'by any means available'. For the AWACS, this obviously meant EID first possibly followed by the checking of flight plans with operations on the ground. A VID was not an option for obvious reasons. For Black Hawks on the other hand, a visual contact may have been their first indication of hostile Iraqi *Hinds*.

More explicitly, in relation to a VID the ROE states the following.

When feasible, airborne objects... that have not been satisfactorily identified by communications, electronics, or any other means will be intercepted for visual identification purposes.⁵⁰⁹

This certainly reads like a procedure, as ROE often do, and this is where the confusion sets in. In OPC, the ROE were written into a policy document providing guidance on how aircraft were to handle interceptions. Nevertheless, the fact remains that the purpose of ROE is to establish constraints surrounding the use of armed force. It just means that, in practice, this gets written down in the form of 'don't do this unless you have done this first'.

The difference is subtle, but decisive. In a procedure, it is presumed that once you start, you will continue until it is completed; you do not initiate the process without wishing to reach the end. Often, such as in flying an aircraft, it is downright dangerous to stop half way. But this is **not** the case when it comes to a constraint. In ROE, there is always an ‘if’ involved, whether it is openly stated or not. It is the nature of ROE; **‘if** you are going to complete the procedure, then you must perform the following’. The key word is the ‘if’. The ROE do not dictate that a VID must be performed; even if it looks as if that is what they are saying, there is still an ‘if’ contained within the formulation above. This ‘if’ means ‘if you are going to complete the identification process and both communication and EID efforts have failed, then you need to perform a VID’.

This is why the ROE do not stop at this point. They include what appears to be a contradictory clause which is, in fact, the ‘if’ component.

The intercepting pilot will, upon interception of an unidentified or suspected, report his observations to the controller. The controller will, with minimum delay, instruct the pilot whether the identification procedure is to continue.⁵¹⁰

As we have seen, the controller in this case was the ACE and the instruction was clear—it was the ACE who would determine the answer to the ‘if’ question, whether the ‘procedure is to continue’. Here is another example of the ‘if, then’ logic that governs ROE. In this case, *Tiger 01*’s misinterpretation is clear.

In order to shoot by the ROE, we have to confirm that they’re definitely not friendlies, and they’re positively hostile... in this case, we had to go in for a visual identification to prove that they were hostile.⁵¹¹

The VID is clearly understood here as a step within a procedure whose outcome was already predetermined—to shoot. But ROE do not tell you when to shoot, they tell you when not to shoot—this is the key point. Even when they allow ‘shooting’, as in cases of self-defence, we are still talking about a constraint; they do not say ‘shoot in the event of a hostile act’. They say shooting is ‘permitted’ in the face of a hostile act. There is a world of difference.

This might seem like pedantry, but it is not. It is **absolutely critical** to understanding the shootdown. Air Force lawyer and ROE expert Major Dawn Eflein explains its importance.

When the flight lead was asked why he needed to engage so quickly, and why he did not spend more time gathering information, his response was simple and straightforward: ‘Once I had no doubt that they were Hinds, I had met all the ROE and the next step was to shoot them down’... This statement can be construed to reflect the pilot’s belief that he had no other options. In fact, ROE are always permissive, and they mandate destruction only in a limited set of circumstances. They tell an individual when he may use force, but they do not dictate an obligation that he must use force.⁵¹²

ROE do not tell you what to do under any particular set of circumstances; they tell you what you cannot do.

This distinction is fundamental, as we said earlier in relation to Shin Kalay, '**just because you can doesn't mean you should**'. ROE do not, ever, provide 'the next step', whether that is to 'shoot them down' or not. This decision is determined by the requirements of the mission and the commanders' intent. **ROE do not tell you what to do** under any particular set of circumstances; they tell you what you **cannot** do.

In the event, it seems as if *Tiger 01* did not understand the ROE for OPC as he had, by no means, met all the requirements they laid out. Among these were the following,

If an intercepted airborne object... is unidentified, and radio contact cannot be established, International Civil Aviation Organisation (ICAO) visual signals will be employed... the interceptor will order it to land at a suitable airport.⁵¹³

It was for this reason, in addition to the failure of the VID to identify the aircrafts' markings, and the bypassing of the ACE as controller, that led General Pilkington to argue that the cause of the accident was the F-15 pilots' transgression of the rules. But this is only part of the picture. The problem with Tiger Flight's understanding lay not only in the fact that it was incomplete, that it missed out certain critical steps, it was also how the steps they did carry out were comprehended, how the ROE as a whole were understood. Major Eflein develops this point with a quote from Tiger 02 who we remember was none other than the F-15 squadron commander, hardly a 'young airman without any background or experience'.

The ID had said they were Hinds so it was an enemy aircraft, in our mind flying north of the thirty-six line and the ROE was pretty straightforward that we were cleared to go in, engage that helicopter, and destroy it.⁵¹⁴

Major Eflein adds her own comment,

The above statement, made by the wingman who followed his flight leader's direction, is chilling.⁵¹⁵

The problem was, this 'chilling' misinterpretation was not unique to Tiger Flight; it was commonly held across Operation *Provide Comfort*. This is a statement from the Weapons Director on the AWACS.

Q. Based on your understanding of the ROE, what aircraft could or should be engaged?

A. Any Iraqi military aircraft north of the 36th line can be engaged, with the exception of those with hospital or medical type markings... The Rules of Engagement were pretty clear that if it's a hostile, then, you know, they were clear on it.⁵¹⁶

This was reflected in the statement below, made by none other than the CFAC Commander.

If there is a helicopter, it's a slow mover, and its Iraqi, and we can prove its Iraqi, then its also fair game if its north of 36 in the No Fly Zone.⁵¹⁷

The impression from these quotes may be unfair; both AWACS crews and senior commanders within OPC may have understood the logical shortcut between stating Iraqi aircraft were 'fair game' and that the 'next step' was to shoot them down. But the ambiguity in their phrasing makes it easier to understand Tiger Flight's interpretation of the same provision.

On the VID issue, the ROE were, in fact, carefully worded in an attempt to counter the impression that they were describing a procedure to be followed. Here the critical wording was 'when feasible'. The ROE did not describe the basis for deciding whether an attempt at a VID was 'feasible' or not and it is proper that they did not. They had already said enough to perform their role as a constraint. They had stipulated that identification is to be by 'any means available', **if** it is to proceed and how far it proceeds is a decision for the controller.

This left the actual decision-making process surrounding attempts at VIDs open because in reality, the ROE were only one input among many as to whether this should proceed, whether it was 'feasible'. Other factors within OPC included both the immediate tactical and wider political situation at the time, the mission, the commanders' intent and an assessment of the risk factors involved in fighters dropping down low. Only careful consideration of every one of these inputs could determine 'the next step' as to whether the identification process should continue. Any 'tactical application decision document' given out to pilots would have to take all these into account; they would not simply be a distillation of the full set of ROE.

Were the ROE Helpful in this Situation?

Against this background, it can be seen that the test of any specific ROE was not whether they outlined a correct procedure to be followed but whether they assisted tactical units in combat situations to **make decisions** in line with their commander's intent, the mission and broader considerations such as their country's international reputation and the Law of Armed Conflict. Viewed against these measures, the ROE for OPC did not necessarily justify the CTF Commander's confidence. After reviewing the interviews held with Tiger Flight, the AWACS crew members and the CFAC Commander, Major Eflein points out the following.

It clearly demonstrates that the ROE were status based; in other words, Iraqi aircraft, whether rotary or fixed wing, could be destroyed on hostile identification alone.⁵¹⁸

Status-based ROE are 'the equivalent of wartime ROE (WROE)'.⁵¹⁹ This fits with General Pilkington's use of the word 'aggressive'. This may or may not have been justified by the situation that pertained to OPC three years into the operation. Major Eflein argues that they were not justified. 'Because of the reduced air activity north of the 36th parallel, much of the justification for

a status-based ROE had disappeared by 14 April 1994.' This can be debated, but support for Major Effein's argument can be found in the flexibility shown towards violations of the No Fly Zone over the previous period and in the changes to the ACO designed to 'slow down any engagement'.

The problem, however, was the F-15 pilots and the signal status-based ROE sent to the fighter squadrons. Major Effein commented,

Using WROE may have made the pilots think like 'combatants'. Because combatants usually see what they expect to see, this sort of an accident was foreseeable.⁵²⁰

... the ROE influenced the pilots' decision-making in a manner that ran counter to both their commander's intent and the rules and procedures in force that expressed this... Seen from this angle, the ROE were in fact part of the problem.

Effein's argument, therefore, is that the ROE influenced the pilots' decision-making in a manner that ran counter to both their commander's intent and the rules and procedures in force that expressed this—the ACO, the command-and-control arrangements, the altitude restriction and so on. Seen from this angle, the ROE were in fact part of the problem and not an 'adequate safeguard'.

Status-based ROE also slanted the identification process so that it focused exclusively on whether the unknown aircraft inside the TAOR were Iraqi or not, whether they were 'fair game'. This left out the matter of intent—what were they doing there? It also left out a consideration of the threat—to who or what did they present a threat? This could well have led to a catastrophic outcome of a different type, as the pilots' compressed thought process did not allow them to consider the tactical implications of dropping down low, straight into a trap, as we have seen. A richer formulation of the ROE might have been able to cut across the dog-fighting mentality of the F-15 pilots and brought their decision-making process more into line with how the ACE, the Mission Director, and the rest of OPC expected it to look like. There were risks involved in this too, but at least it would have been in alignment with their commander's intent and the broader organisation.

In addition, Major Effein makes a powerful case that the ROE failed to take up an option that would have assisted the pilots decision-making a great deal. This was the absence within the ROE of any distinction between fixed- and rotary-wing aircraft. This was a major shortcoming and can also be considered a significant contributor to the accident. Major Effein argues,

When the ROE are written too broadly, the result may be either an unintentional escalation of the conflict or the possibility of friendly fire. The difference between 'any Iraqi aircraft

north of the 36th parallel may be targeted' and 'any Iraqi military fixed wing aircraft north of the 36th parallel may be targeted' is substantial...

The Blackhawk helicopters were flying away from the security zone, toward the 36th parallel. Their point of origin may have been doubtful, but they were not an immediate threat to any Kurds within the security zone. Further, their speed of 130 knots per hour was so slow that there was no reason to destroy first and ask questions later. Discrimination in the permissible use of force between types of aircraft is essential.⁵²¹

To discriminate is, of course, a form of decision-making. If the OPC mission at that stage called for more discrimination in the use of force, then the test of any ROE that applied at that time was the extent to which it contributed towards that goal. Against this measure too, the ROE were a fail. Major Eflein goes on to build her case.

A ROE distinction between fighters and helicopters was nothing new in 1994. Shortly after the Blackhawk shootdown, Secretary Perry assured the public that 'allied pilots enforcing the no-fly zone over Bosnia already are operating under rules that make the helicopter-fighter jet distinction'.⁵²²

The mission should drive the ROE. If the mission was to protect the Kurds from hostile acts, a more conservative ROE would have required a hostile act or evidence of a hostile intent prior to authorizing the use of deadly force.⁵²³

Safety is a legitimate rationale for an ROE restriction, particularly when it provides a means to prevent 'blue-on-blue' engagements.⁵²⁴

Discriminating Between Fixed- and Rotary-Wing Aircraft in the ROE

OPC was therefore, lagging to some extent behind the other two NFZs in operation at that time, both of which had been established later. The ROE of the later NFZs did discriminate between fixed- and rotary-wing aircraft and incorporated additional safeguards such as the need for repeated warnings before opening fire and confirmation from AWACS before proceeding. Use of these ROE in OPC may have been less than ideal from General Pilkington's perspective as it would have made his life more complicated. However, it would have had the advantage of helping to bring the F-15 pilots' decision-making more into line with the commander's.

Support for this argument is provided by the views of F-15 pilot Captain Steve Neuser who stepped into *Tiger 01's* aircraft for the afternoon shift on 14 April. This is Joan Piper's account.

He remembers how shocked he was, during his first rotation, last December, to find out you could shoot down helicopters here at OPC. All of his past experiences flying choppers and F-15s had put all helicopters off limits. He had even had discussions with his flight leads

about this ‘I can’t believe they’re going to let us shoot helicopters. They don’t pose any big threat; if I’m smart, they can’t shoot me.’⁵²⁵

The position with fixed-wing aircraft, on the other hand, was quite different.

An enemy fighter’s crossing of the 36th parallel, heading in the direction of the security zone, could be deemed evidence of hostile intent towards the Kurds. There may not be time to ask questions first and shoot later; by then a fighter could have destroyed its target.⁵²⁶

Adversary fixed-wing aircraft presented the same threat to coalition aircraft. Major Eflein’s point is that wartime ROE were not necessary in order to ensure a prompt tactical response should an Iraqi MiG enter the TAOR. There need be nothing lost from discriminating in this way between fixed- and rotary-wing aircraft.

A clause placing helicopters ‘off limits’ would have helped prevent the F-15s going off mission as they did when they dropped down low. The ROE would have contributed positively to the pilots’ decision-making in this instance.

Furthermore, such a discrimination would have assisted to clarify the nature of Tiger Flight’s mission which was to provide defensive cover for the AWACS and tankers. Such threats could only be posed by fixed-wing intruders, so a clause placing helicopters ‘off limits’ would have helped prevent the F-15s going off mission as they did when they dropped down low. The ROE would have contributed positively to the pilots’ decision-making in this instance.

It would also have aligned the ROE with the critical safety factor in place during OPC—the vertical separation of aircraft.

From the perspective of decision-making, therefore, there were a number of advantages in shifting the ROE from a wartime focus ‘which places a premium on aggressiveness once the enemy has been identified’⁵²⁷ towards one more consistent with the actual challenges faced by OPC in the conduct of its mission. If the ROE had succeeded in this, still less would they have been confused with a procedure or a guide for ‘the next step’. Instead, they would have faded into the background, as defining the parameters of tactical situations and the use of military force. The actual decision-making of the pilots would have rested on considerations of mission, commander’s intent, assessment of the threat and risk—the same factors that applied to all units across OPC. They would have helped bring Tiger Flight into line with the ACE, the Mission Director and the entire chain of command.

This is the key point. It is not that the pilots failed to fulfil all the steps in the ROE; it is that they used the ROE as a procedure, as the source of their decision-making process, which, of course, had a predetermined end—to shoot. The use of wartime ROE encouraged the pilots in this misunderstanding of the nature of ROE and also drew them further away from the decision-making process they should have been employing. Far from being an adequate safeguard, the ROE in force during OPC were a direct contributor to the accident.

Misunderstanding the Nature of ROE

Furthermore, there was also a lack of supervision, in the sense that a profound misunderstanding in the nature of ROE, any ROE, was allowed to persist within OPC, not just among F-15 pilots, but across the board. Major Eflein argues this too.

One of the weakest links in the chain of events leading to the shootdown was poor ROE training. The Accident Investigation Board president addressed this issue in the report as follows, ‘OPC personnel did not receive consistent, comprehensive training to ensure they had a thorough understanding of the [United States European Command]-directed ROE. As a result, some aircrews’ understanding of how the approved ROE should be applied became oversimplified.’⁵²⁸

It is quite likely from the evidence above, that this ‘oversimplified’ understanding was not restricted to aircrew. At any rate, it was not addressed until after the accident.

The corrective measures that were taken following the shootdown are instructive. First was the restriction against engaging helicopters without the CTF Commander’s direct approval. This meant that the chain of command could not be bypassed in the way it was on 14 April. Second was an induction training program for all personnel on arrival in OPC so that all components of the operation would have some awareness of what the others were doing. This included a section on the ROE in force. Later in the year, the Joint Chiefs of Staff completely overhauled the basis for drafting ROE in operations other than war, producing the *Standing Rules of Engagement for US Forces*, to take account of the complexity confronting operations such as OPC.

All of these were excellent initiatives. They are supported by our analysis here, and in turn, they lend support to the argument we are putting forward. Questions surrounding ROE are always complicated. They reflect the complexity of modern military operations, they require constant ‘supervision’ or attention and they are a management challenge.

CHAPTER 12

Evaluating the Decision to Drop Down Low

The decision to drop down low and attempt a visual identification (VID) was the critical point in the incident—this is the central plank of our analysis. In our discussion so far, we have identified many of the key factors that led the pilots to take this fateful step. This has gone some way to explain why they behaved the way they did and reveals a whole string of management opportunities for shaping the F-15 pilots' decision-making in order to arrive at a different outcome.

At the same time, however, we have yet to make an evaluation of this crucial decision. It is true that we have shown how this action compromised the two critical controls that had kept OPC air space safe for 1109 days—vertical separation and airborne command and control (C2) by the ACE—but safety is only one consideration in air-to-air combat. There are many circumstances where it is necessary and legitimate to override safety controls in pursuit of mission objectives. It is quite possible that *Tiger 01* believed this was one such occasion.

We are also unable to evaluate the decision just because we know the final outcome. This would be an example of hindsight bias and is a trap accident investigations often fall into. We know that if the pilots had stayed high then the shootdown would not have occurred but this is no basis on which to make a judgment of their decision, as they had no idea at the time what the end result would be. If the F-15 pilots had known how it was going to turn out, there is no question they would have pursued a very different course of action.

This means that if we are to make a fair and objective evaluation of this decision, we have first to approach it as a **risk assessment**. In other words, we have to remove the outcome from the calculation, forget that we are looking at a friendly-fire incident and examine **all** of the possible ways it could have gone. This includes any other potentially catastrophic outcomes that could have arisen once the pilots dropped altitude, as well the positive results they were striving for; it involves a cost/benefit equation. It calls for consideration of alternative courses of action if these were available and if these promised either to reduce the risks or increase the potential benefits.

We also have to take into account any tactical considerations. This is because the situation that confronted the pilots once they detected two unknowns inside the TAOR was potentially a combat engagement. This means we have to bring the intelligence summary and threat assessment into the picture and consider the various combat scenarios that opened up if the F-15s were to attempt a visual ID of the aircraft flying low and slow.

Was This a Sound Tactical Decision?

A good place to begin is to include the possibility that the two unknown aircraft were, in fact, Iraqi *Hinds*, as the F-15 pilots expected. What if this expectation had turned out to be correct? Would dropping down low have been a sound decision if the outcome had been as anticipated? Put this way, the question calls for a tactical appreciation of the situation.

What were the key considerations at this point? One element was the potential threat posed by a Mi-24 *Hind* to an F-15. There is general agreement here that the threat was negligible. According to Phillips,

A Hind is only a threat to an F-15 if the F-15 is parked almost stationary directly in front of it and says 'kill me'. Other than that, its probably not very vulnerable.⁵²⁹

From this angle, the risk appeared negligible. But the main threat was not necessarily from the *Hinds*; the important question was 'what were they doing there?' To make this assessment, the pilots had the threat brief given to them by the squadron's intelligence officer before they took off. This clearly stated that if the Iraqis were going to attempt to shoot down a coalition aircraft in the NFZ, they would use a decoy to lure them into either a surface-to-air missile (SAM) envelope or an ambush by fast jets.

An Iraqi helicopter had not flown north of the 36th parallel since soon after the imposition of the No-Fly Zone in April 1991. The appearance of two *Hinds* one morning three years later called for some contemplation as to what their mission might be. There were a number of possibilities: they were lost, they were carrying defectors, they were conducting air-to-ground attacks, they were seeking to engage US, coalition or UN helicopters in air-to-air combat. The most likely explanation, based on the intelligence threat assessment, was that this was a trap. It is in this context that the decision to conduct a VID must be judged. From a tactical perspective, this is an action that is hard to justify.

Tiger 01 was not unaware of the risk and as a result, he hesitated before dropping altitude. The Government Accounting Office (GAO) investigation revealed the following:

The lead incident pilot told us he was concerned about going low to check out the unknown aircraft. His primary concerns at the time were (1) being fired on from the ground, (2) flying into the ground, and (3) a possible air threat. Because of these concerns, he remained high for as long as possible and dropped down briefly for a visual identification that lasted, according to the lead pilot, 'between 3 and 4 seconds'.⁵³⁰

Exactly why *Tiger 01* chose to ignore the risk is an interesting question. From his perspective, it was worth it; from our perspective, however, it most definitely was not. This is because the benefit side of

the equation was a personal one for the F-15 pilot and his unit but not for OPC which had other, less risky, options for dealing with the situation. Our view point here is that of Operation *Provide Comfort* as a whole. The reality is that these two cost/benefit calculations were not aligned with one another and alignment is a management challenge.

Left outside of *Tiger 01's* equation were other important tactical considerations. This included the F-15s' primary responsibility in the role of defensive counter air to protect the AWACS and refuelling tankers. This was, in fact, the purpose of the fighter sweep they were performing,

Left outside of *Tiger 01's* equation were other important tactical considerations. This included the F-15s' primary responsibility in the role of defensive counter air (DCA) **to protect the AWACS and refuelling tankers**. This was, in fact, the purpose of the fighter sweep they were performing; it was the very reason why F-15s had been deployed to OPC the previous August. Their powerful airborne intercept (AI) radars exposed to view those parts of the tactical area of responsibility (TAOR) masked from the AWACS surveillance by terrain. Their task was to ensure there were no nasty surprises lurking for the defenceless AWACS aircraft.

General Pilkington left no room for doubt on this point in his witness testimony at Captain Wang's court martial.

The mission of the F-15s, the first flight in on the fourteenth of April, was the same as the mission of the first flight in the No Fly Zone every single day for the last eleven hundred days prior—to make sure it was safe for the AWACS to enter the restricted operating zone. That was the only purpose of their mission.⁵³¹

This provides us with a twist to the trap scenario. If the two unknown aircraft were Iraqi *Hinds* acting as bait, could the target have been the AWACS rather than the F-15s? Once Tiger Flight dropped down low into the valley with its steep mountain walls, their radars lost much of their range and effectiveness. Situational awareness across the TAOR was compromised as a result. A well-timed run by an Iraqi fast jet could, in theory, now slip by the F-15s and get enough of a lead before being detected that they could not be caught before getting in striking distance of the AWACS. The fighter might not make it back to base but the pilot could eject and eventually come home to a hero's welcome inside Iraq. A MiG-23 for an E-3 AWACS was almost certainly a fair trade, from Saddam Hussein's point of view, and a humiliating defeat for the USAF.

This prospect came up in General Pilkington's cross-examination.

When the F-15s attacked and shot down the helicopters, did they expose the AWACS to other air threats?

Yes, when the F-15s went down to investigate the helicopters, made numerous passes, engaged the helicopters, and then made more passes to visually reconnaissance the area, AWACS was potentially exposed for that period of time.⁵³²

Mi-24 *Hinds*, on the other hand, in this part of the TAOR and flying in a south-easterly direction presented absolutely no threat to the AWACS or refuellers whatsoever.⁵³³ From this perspective, the risk equation was all cost and no benefit; it simply could not be justified.

Even this, however, does not exhaust the tactical dimension. A third possible objective of any trap was Eagle Flight itself with its high-value cargo of VIPs. But the whereabouts of the Black Hawks was unknown and they were out of radio contact. At this point, with unknowns detected inside the TAOR, the overwhelming priority was to ensure the security of Eagle Flight, before springing any trap. Given the contacts were moving slow and away from Zakhu, this meant the most sensible course of action was to hold off dropping down until Eagle Flight had been warned and given the opportunity to get out of the danger zone. This consideration does not seem to have entered Tiger Flight's minds, in spite of the ACO's explicit direction for such a contingency.

If unidentified tracks are observed north of 36-00N, all non-DCA/non-SEAD [suppression of enemy air defence] aircraft will retrograde north to security zone to orbit.⁵³⁴

The AWACS crew, on the other hand, acted promptly to comply with this directive and showed a much sharper tactical appreciation of the threat than the F-15 pilots. Immediately on receiving the reports of unknown tracks, the tanker controller recognised the implications for the aircraft under his responsibility and took the necessary action.

At 10.27am, he heard the F-15s radio that they were going to visually ID the targets. Then he heard Wickson call again with, 'VID Hind'. This was the call that had immediately piqued Fuller's attention, and he'd yelled over the weapons network, 'Turn on the video recorder. Something's happening down there!' It seemed as if seconds had just passed when he heard them call, 'engaged'. Fuller had known what this call meant, and he knew his tankers were very close to entering the No Fly Zone. Knowing the F-15s were too occupied to provide protection, he'd radioed the tankers, 'Hey, lets start working back to the West. Left turn, lets get back to the West'.⁵³⁵

Following the shootdown, the tanker controller retained his presence of mind. Joan Piper gives this description of his thoughts,

We've just shot down two helicopters. Maybe the Iraqis are going to come for our guys.⁵³⁶

The tanker controller was not alone. The ACE, too, showed a sound appreciation of the tactical situation and was busy working through its implications in a methodical manner. Unfortunately, this process was rendered irrelevant by the course of events.

As he was listening to the F-15s' radio calls, he had been trying to determine exactly what was going on and what was going to develop. More concerned about an Iraqi trap or set up, he had thought, 'Don't be lured into anything'. In his mind, he was trying to come up with a plan, confident he was not going to let the situation get out of control.⁵³⁷

In reality, the situation was already lost, because the F-15s were acting independently of the ACE—'engaged' not 'committed'. Nevertheless, this brief summary of the ACE's thought process is instructive, because it gives us a clue as to how the incident could have been handled, as opposed to how it was. Later, we will give our reconstructed version of 'what really should have happened'. At this point, we will restrict ourselves to the observation that had the ACE in fact been in control, as OPLAN 91-7 specified, then all the indications are that the incident would have been handled in line with the key principles advocated by HCD. This will become clear in due course.

This survey of the tactical picture now allows us to list all the potentially catastrophic outcomes that became real possibilities once the F-15s broke vertical separation and dropped altitude in order to conduct a VID. Of course, there were risks involved with staying high—the *Hinds* were free to conduct air-to-ground attacks, for example. However, their position was already outside of the Security Zone and their flight path was taking them further away from the Kurdish populated countryside inside the TAOR towards the Iraqi heartland. Furthermore, as we shall see, there were alternatives to the F-15s conducting the VID, if it was deemed necessary.

Here then, are the risks that opened up once Tiger Flight dropped down low, apart from the friendly-fire incident that we know to be the result of this decision.

1	ACCIDENTAL SHOOTDOWN OF A TURKISH AIR FORCE ASSET. This is the most serious outcome, as it would almost certainly mean the cancellation of Operation <i>Provide Comfort</i> on the insistence of the Turkish authorities. US Turkish relationship sours and future use of Incirlik Air Base by USAF is placed in question.
2	LOSS OF AWACS OR REFUELLING AIRCRAFT TO ENEMY AIR. Once F-15s descend, their airborne radars are unable to provide coverage of the TAOR leaving the AWACS and refuellers exposed to a pre-planned attack by enemy fast jets. USAF is humiliated in the eyes of the world, force morale and public confidence is deeply affected.
3	F-15 SHOT DOWN BY SAM OR ENEMY FIGHTERS. The F-15s are lured into a trap resulting in the loss of two aircraft and pilots, major blow to USAF prestige, fighter force morale plummets. The F-15 squadron is withdrawn from OPC reducing overall defensive counter-air capability.
4	ACCIDENTAL SHOOTDOWN OF A THIRD-NATION AIRCRAFT. The UN, Red Cross, Iranian, Syrian and Russian aircraft operating in the NFZ could have been shotdown. A major international incident would follow, causing loss of US prestige and the UN to debate the cancellation of OPC. Force morale is affected.
5	MID-AIR COLLISION WITH EAGLE FLIGHT. A mid-air collision results in major loss of life and assets, deep embarrassment for USAF, OPC is placed in question as public and political support for the operation fades. The UN suspends all its rotary-wing operations inside the TAOR. MCC is rendered ineffective for several months.
6	MID-AIR COLLISION WITH TARGETS OTHER THAN EAGLE FLIGHT. A mid-air collision results in major loss of life and assets, US prestige suffers, significant international incident follows. OPC comes under intense worldwide scrutiny.

7	F-15 CONTROLLED FLIGHT INTO TERRAIN. A collision with terrain during the VID causes loss of life and asset, major embarrassment for USAF, force morale suffers. The F-15 squadron is withdrawn from OPC reducing overall defensive counter-air capability.
8	ACCIDENTAL SHOOTDOWN OF IRAQI DEFECTOR. An important opponent of Saddam Hussein is lost, other potential defections are discouraged and the current Iraqi regime uses the event for propaganda purposes. Force morale is severely hit.

Table 12-1: List of other potentially catastrophic outcomes once the F-15s dropped down low to attempt a visual identification *(in rough order of consequence)*

It is on this basis that we can evaluate *Tiger 01*'s decision to attempt a VID, without falling into the trap of hindsight bias. It allows us to argue that this was a poor decision—**even if the outcome had been a success**. This is the critical point. The unknowns might have been Iraqi Hinds, they might have been Eagle Flight, the VID might have been successful, it might have been a failure but in **not one** of these cases was it worth the risk.

Furthermore, even if we accept for the moment that a VID was called for under the ROE, *Tiger 01* then made an assumption that is certainly open to challenge—that it was the F-15s who needed to perform this task.

This was the problem with the F-15s refusal to cooperate with the ACE and accept the command-and-control arrangements in place for OPC—they acted as if they were on their own... This meant that they never considered the possibility that there were other options open to the CTF commander for dealing with the situation

This was the problem with the F-15s refusal to cooperate with the ACE and accept the command-and-control arrangements in place for OPC—they acted as if they were on their own and not part of a larger organisation, the air component within a combined task force. This meant that they never considered the possibility that there were other options open to the CTF commander for dealing with the situation, or if they did, they chose to rule these out and act as if they were the only resource available.

In reality, there were a number of alternative courses of action available to the organisation as a whole that were not open to Tiger Flight. This is a similar position to the one faced by the anti-air warfare team on the *Vincennes* and the entire ship's combat information centre staff in fact. In the *Vincennes* incident, one option was a VID, which could have been carried out if the resources of the broader JTF in the Gulf had been brought into play. At the time of the shootdown, a flight of F-16s was just about to enter the TAOR and was a mere ten minutes away. There were also extensive assets on the surface that could have been utilised to identify the slow-moving, low-flying contacts.

An Example of Tunnel Vision

If we combine this with our earlier discussion of the range of potentially catastrophic outcomes that flowed from the F-15 pilots' decision to make a VID, then the picture emerges that their decision-making process was simply **too narrow**—it was an example of **tunnel vision**. *Tiger 01's* focus remained exclusively on the task of identifying the unknown tracks and, once determined to be hostile, on 'sanitising' the No Fly Zone by blowing them out of the sky. This was a very **compressed** thought process and it was this compression that was its weakness.

Each of the logical steps in the F-15s' decision-making appeared sound enough in itself—the problem lay in what was **left out**. This included no real consideration of the intricacies of IFF interrogation, of who else might be flying in the TAOR at that time, of their own mission priorities, of the risks involved in dropping altitude, in the likelihood of a successful VID under those conditions or alternatives to making the attempt, in the various options allowed under the ROE, or even their commanders' intent. As we will see later, the commander's intent was both explicit and reinforced through the wording of the ACO. Instead, the F-15 pilots demonstrated very black-and-white thinking, when what was really required was a safe navigation through many shades of grey. This was a lot to ask of two F-15 pilots, except that it **was never** asked of them. It was not even their job; it was the ACE's role—that was why he was there.

CHAPTER 13

How the Incident Should Have Gone

If Tiger Flight had remained high, how could the incident have been handled? What difference would it have made if decision-making had been located in the hands of the ACE instead of the F-15 pilots? It is at this point that we can apply the principles of HCD to the situation that confronted *Tigers 01* and *02* on 14 April 1994, in order to highlight the difference between what happened that morning and how it could have gone.

For everyone except the F-15 pilots, the speed of events caught them unawares. The incident was over before anyone realised it had begun. This included Eagle Flight who literally never saw what hit them and were denied any opportunity to influence the outcome. One aspect of this was the failure of Tiger Flight to attempt any radio contact with the unknown aircraft it was tracking, including on the military and civilian distress frequencies. In the ROE, this was assumed to have already been done before moving to the next stage, which was to communicate through 'International Civil Aviation Organisation visual signals' and 'order it to land at a suitable airport'.⁵³⁸

Carrying out these steps would have taken time but, in this case, time was our friend. If we reflect on the situation that applied once the unknowns were picked up on their radars by Tiger Flight, then the overwhelming priority at that moment was to alert Eagle Flight and provide them with some situational awareness. This was especially so if the unknown aircraft turned out to be hostiles flying low and slow. It was the Black Hawks they were most likely to run into. The F-15s, of course, had no idea that Eagle Flight were in the TAOR but this is only another way of saying that Tiger Flight lacked situational awareness. The AWACS crew also lacked situational awareness, having only an ambiguous green 'H' to work with from earlier in the day. At the crucial moment they were in the position of being unable to locate Eagle Flight, have any indication who the unknown hits were, or even what the F-15 pilots' intent was. Faced with this overwhelming absence of SA across the board, it follows that the first priority was to remedy this position. Only then could some appreciation of the situation emerge and an appropriate course of action be developed.

Faced with this overwhelming absence of SA across the board, it follows that the first priority was to remedy this position. Only then could some appreciation of the situation emerge, and an appropriate course of action be developed... What was required above all was a judgment as to how much time was available... and to exploit this window to the maximum.

This becomes clearer if we consider another of the potentially catastrophic outcomes on our list—a mid-air collision between an F-15 and a Black Hawk. If the unknowns turned out to be Mi-24 *Hinds*, then the risk of a collision between two friendly aircraft increased even further, as Eagle Flight had no idea what was going on and the F-15s' attention was exclusively focused on their targets. They may well have successfully engaged the *Hinds* only to fly straight into an unseen and totally unexpected Black Hawk.

What was required, above all, was a judgment as to how much time was available in order to build a better level of situational awareness and to exploit this window to the maximum. What was needed, in other words, was to hold off and **delay** as long as possible. This was the key to a successful engagement.

The Question of Time—From the F-15 Pilot's Perspective

Unfortunately, the F-15 pilots did not approach the question of time in this manner. This was not an accident; they were fighter pilots and in air-to-air combat, the only time consideration that counts is speed. This is the thinking behind John Boyd's famous OODA (observe, orient, decide, act) loop—having a reaction time that is quicker than your opponent, getting inside their decision cycle, is the key to victory. In this context, time is measured in fractions of a second and that is how F-15 pilots train; it is how they think; it is how they engage an enemy.

It is only from this perspective that we can understand the course of the incident and its rapid time frame. From the initial radar contact to shootdown of two Black Hawks took just eight minutes. For a fighter pilot engaged in combat, eight minutes is a lifetime. Eighty per cent of kills are won on the first shot; if this fails, a typical dogfight lasts less than 30 seconds. It is almost impossible to go for longer than 90 seconds because of the vast amounts of fuel burned when jets perform at their maximum.

Trained to make split-second decisions, *Tiger 01* neither dwelt on the difficulties of making a visual identification (VID) nor doubted his ability to do so. Instead, the F-15 lead described the challenge with a certain sense of achievement, a testimony to his abilities as a combat pilot.

Trained to make split second decisions, *Tiger 01* neither dwelt on the difficulties of making a VID, nor doubted his ability to do so. Instead, the F-15 lead described the challenge with a certain sense of achievement, a testimony to his abilities as a combat pilot.

Flying over the top of the helicopter at a speed of 300 miles an hour, I was trying to keep my wing tips from hitting mountains and I accomplished two tasks simultaneously, making a call on the main radio and pulling out a guide that had the silhouettes of helicopters. I got only three quick interrupted glances of less than 1.25 seconds each.⁵³⁹

But those glances were enough. In air-to-air combat, it is extremely unlikely that a pilot would ever get to view his opponent up close for as long as a single second, never mind a total of four. In this case, 1.25 seconds would feel like an eternity, much more than was necessary to observe, orient and decide. No wonder he pulled out something to read to fill in the time while he got ready to 'act'.

This was also why *Tiger 01* did not seriously consider going around again to confirm the VID in another pass. What was the point? 'I had no doubt when I looked at him, that he was a Hind.'⁵⁴⁰ In Snook's words,

He didn't require a second pass because his threshold—'the amount of time necessary for seeing or recognising' the aircraft—was so low; his low ID threshold was met or exceeded by the first pass.⁵⁴¹

Three prolonged stares at the helicopter were enough for the 'OODA-trained' F-15 pilot to make a host of decisions and communicate many of them over the radio while flipping through a book and flying his aircraft all at once. This is what skilled fighter pilots do. The description 'quick, interrupted glances' was most likely simply a concession to his investigative board audience, in the light of the mistaken VID everyone knew it had turned out to be. It did not necessarily reflect his actual thought process at the time. This would already have been running ahead to the next stage, a confirmation pass by *Tiger 02* while he, as flight leader, started to come round again to make the kill.

The four-second period was also more than enough, because a large part of the VID process had already been completed **before** *Tiger 01* made his high-speed pass. These were the steps that set up his expectations as to what he would see. Snook argues this convincingly.

Assuming that he entered the scenario believing he had only one pass to make the VID—you don't generally live to make second passes in the fighter business—then he only had a split second to receive input... Therefore, the powerful grip of expectancy ruled with an even stronger hand than it otherwise might have, had he had more time to make the call... He

expected to see a Hind; therefore his threshold was low—matching the very real constraint of the high speed pass; therefore, the Hind was ‘more easily seen’.⁵⁴²

Snook further draws attention to the effects of ‘stress and arousal’⁵⁴³ on the pilots. Here, his discussion echoes our own in relation to the challenge faced by the identification supervisor on the *Vincennes* when tasked with checking the airline schedules for departures from Bandar Abbas. The available mental capacity for analytical reasoning would have been severely limited for the F-15 pilots as they made their VID pass, their thinking mode would have been predominately intuitive. From this perspective too, 1.25 seconds is an eternity. In reality, it is highly unlikely that *Tiger 01* did stare at the helicopters for such a prolonged period, it is much more probable that his three ‘quick, interrupted glances’ lasted no more than some milliseconds each.

This also helps us to understand why the F-15 pilots’ thinking was so binary—the unknown aircraft were either Iraqi Hinds or they were not. A more objective consideration of the position would have taken into account the multitude of possibilities for the type and nationality of helicopter that could have been present in the TAOR that morning, not to mention their mission or intent even if they were Iraqi. But intuitive thinking does not allow for that kind of contemplation; it moves almost instantaneously and operates in black-and-white terms—yes/no, shoot/don’t shoot.

This is how Tiger Flight made their VID, as combat pilots, using OODA, thinking intuitively, making a snap judgment, the way they were expected to do, they way they were trained to do and, above all, the way we want them to.

This is how Tiger Flight made their VID, as combat pilots, using OODA, thinking intuitively, making a snap judgment, the way they were expected to do, they way they were trained to do and, above all, the way we **want** them to. Snook writes,

Tigers 01 and 02 were well trained and highly skilled in ‘dog fighting’—aerial combat against other jet fighters. They were not trained to intercept helicopters. Hence, they coded up the helicopter intercept to match up with the next closest thing—air-to-air combat—a task they understood all too well. Once they were convinced that their targets were enemy, they miscoded the helicopter intercept as a fighter intercept, and years of training kicked in. They executed an overlearned sequence of actions to shoot them down. The first pilot to make the correct call and engage, wins. The other one dies... Therefore, we shouldn’t be all that surprised by the speed with which the fighters engaged after making their VID. The dominant response for the situation encoded as air-to-air combat was to ‘engage’. And so they did—quickly, mindlessly, professionally, and successfully—just the way they were taught.⁵⁴⁴

Luckily for Tiger Flight, this was not air-to-air combat because if it had been, they would most likely have already entered a trap and be dead. This aside, Snook's account offers a good explanation of why the engagement went the way it did. The F-15 pilots acted... like F-15 pilots.

A Dog Fight or an Incident?

Our point is clearer if we remain with the question of time. As Snook rightly states, the F-15s conducted the engagement as if it was a dogfight. But what was really needed was to manage it as an **incident**. This included the management of time, in the manner highlighted by Dorner's research into the logic of failure, not speed. The optimal use of time was the key to a successful outcome.

And there was time available—lots of it. If we shift our perspective away from the cockpit of *Tiger 01* with its dogfighting mentality, then a very different view of the time frame surrounding the shootdown emerges. Here for example, was how CFAC staff viewed the matter, when interviewed by accident investigators,

They said that the presence of the helicopters, which were flying southeast away from the security zone, posed no threat to the mission and there was no need for haste. For example, the Mission Director stated that, given the speed of the helicopters, the fighters had time to return to Turkish airspace, refuel, and still return and engage the helicopters before they could have crossed south of the 36th parallel.⁵⁴⁵

The Mission Director stated that, given the speed of the helicopters, the fighters had time to return to Turkish airspace, refuel, and still return and engage the helicopters before they could have crossed south of the 36th parallel.

Snook echoes this sentiment, he says,

This was not an emergency. The F-15s had plenty of time to further develop and evaluate the situation. There was little chance that two slow moving helicopters could have physically 'escaped' the jet fighters, nor were they ever a serious threat to the F-15s.⁵⁴⁶

Viewing events from a distance, OPC staff on the ground could approach the situation with some objectivity, from an operational rather than a purely tactical perspective, as an incident rather than a dogfight. This was why the shootdown took everyone by surprise, not least the Mission Director who together with the ACE was supposed to be in charge of conducting air engagements inside the TAOR. According to Joan Piper,

Precisely at that moment he receives a radio call from Martin (the ACE) stating, 'We have just shot down two Hind helicopters', and then Martin gives the coordinates of the crash site.

Cole (the MD) is so stunned, he can manage only an ‘Affirmative’ in reply because he has no forewarning that an engagement was in process.⁵⁴⁷

As we have seen, the ACE himself was caught unawares by the speed of the shootdown, as was the entire AWACS crew. Lacking any appreciation of the seriousness of the situation or that a tragedy was unfolding below them, AWACS crew members were still gearing themselves up for the long day ahead, the working part of their shift had not really begun. General Pilkington defended the AWACS on this score.

The AWACS was not paying attention to the helicopters. I can understand, based on what was happening that day, why that is possible. AWACS was manned, trained, equipped and prepared to handle 30+ airplanes a couple of hours after the shootdown. But they only had two airplanes at the time, two helicopters and two fighters. So I think that because they were expecting the mission to ramp up fairly fast, to become active fairly rapidly, that they were just not at work yet, they were not on the job yet that day. That is all I can assume, and testimony that I have read indicates that is the fact. My Duke, my fighter pilot in the AWACS was not even on station at his post during this time period.⁵⁴⁸

And why should he be? The ACE was under the impression that there was no urgency, that even if the two unknowns were Iraqi, there was plenty of time to switch tempo, get the crew into gear and develop a suitable course of action in consultation with the Mission Director on the ground. When he heard the word ‘engaged’, the ACE started to realise that things were moving faster than he had anticipated but before he could establish any semblance of control over the F-15s, it was already over.

Managing Two Sets of Time Frames—At Once

In other words, we had two sets of time frames in play here. One was driven by the requirements of aerial combat with critical decision points measured in milliseconds; the other from an operational or incident management perspective where a situation could emerge, escalate into a crisis and find resolution over a period of minutes and hours. These two time frames were clearly out of step with one another and this was a major factor in the accident. **The dogfight was over before the incident even started.**

Snook makes a similar argument, employing the phrase ‘different orientations toward time’⁵⁴⁹ to capture the problem. He writes,

The shootdown dramatically illustrates this point as the fighter pilots—who live and die based on how quickly they react—moved from initial visual identification pass to engagement faster than the crew in the AWACS could even process what was happening. According to the Duke, ‘I know I was surprised when the ‘splash’ call was made’. According to the

Enroute Controller, 'I think we were all pretty shocked at the speed in which this would happen... They ID'd it as a HIP; then they ID'd it as two Hinds. Then all of a sudden they were engaged, and we were all surprised at how fast this all happened'. According to an Air Surveillance Technician, 'It was utter confusion. We didn't know—some of us didn't know that anything was happening until after it happened'.

While the folks in the AWACS were surprised at the speed, to the pilots in the F-15s the pace seemed normal. According to the wingman, 'The engagement was not rushed. That's the other part. I wasn't in a hurry to ... to shoot fast. I wasn't in a hurry at all'. When asked by an investigating officer, 'Why did you engage so quickly? In your thought process, did you consider spending more time with Cougar (AWACS) asking for more information?' the F-15 lead pilot replied, 'Not after I'd positively VID'd them as Hinds. Once I had no doubt they were Hinds... the next step was to shoot them down'. And so he did. When you're flying at over 500 knots, the rest of the world seems to move at a different pace.⁵⁵⁰

The question, however, is 'how to deal with this problem?' Throughout the investigations that followed the accident, the theme came up again and again as to why the AWACS crew were so slow to react and why the F-15 pilots so fast. The implication was that the solution lay in speeding up the AWACS and C2 functions while slowing down the F-15s to bring them into synch with one another. This sounds like common sense but here we want to argue that this is not a solution at all; instead of the best of all worlds, it would lead to the worst.

Once again, the issue is that the solution is directed at the wrong level, at fighter pilots and AWACS console operators. But this is not the HCD perspective; we want to address the problem from the next level up—as a management challenge. The reason for this is simple. From an operational perspective, we want F-15 pilots to make instantaneous, intuitive, judgment calls and to follow them through with a 'shoot, don't shoot' decision without hesitation. Combat pilots that do not act in this way end up dead. Likewise, we want airspace controllers to approach their task in a methodical, unhurried, unflustered manner; to pace themselves over long working shifts so that fatigue does not compromise their powers of concentration and cause them to make errors that can end in mid-air collisions or other catastrophes. If we accept this, then the question shifts to being a management problem—how to reconcile these two time frames when they merge in a single engagement.

If the situation is a dogfight, then it is clear which time frame has to take precedence, speed is everything. But if it is an incident, then the focus shifts towards making the best use of the time available. Often this means slowing things down as much as possible, precisely to avoid errors occurring from over-hasty actions taken before good situational awareness has allowed a proper appreciation of the situation to be made. Most incidents by their nature are unplanned, which means that the initial phase is the most difficult, control has been lost and the picture is unclear. Under conditions such as these, the priority tasks are to gain SA, make a sound assessment of the

situation, establish what the desired end-state will look like, regain the initiative and re-establish control. All of which takes time.

This is the real point about the two time frames. The F-15 pilots operated at the speed they were trained to do, in the way combat pilots are supposed to do. That was **not** the problem. Instead, the problem was that it was the F-15 pilots' mode of decision-making that determined the end result—**dogfight thinking decided the outcome of an incident.**

What was required was for the F-15s' identification of the unknowns as Iraqi *Hinds* to serve as an input into the incident management process being run by the ACE... Tiger Flight could make their VID pass and decision at lightning speed, but the actual identification process would proceed at a pace determined by the time and resources available to the ACE.

This was why we said earlier that the mistake with the VID was not an error of perception but an error of judgment. What was required was for the F-15s low-level pass and identification of the unknowns as Iraqi *Hinds* to serve as an **input** into the incident management process being run by the ACE. Here, it could be weighed up against other information inputs coming in at the time and its reliability objectively assessed given the terrain and lack of experience on the part of the F-15 pilots for a task such as this. Tiger Flight could make their VID pass and decision at lightning speed but the actual identification process of the two unknowns would proceed at a pace determined by the time and resources available to the ACE in charge of the overall incident response.

Our argument then is that this situation should have been run like an incident not a dogfight. The differences between the two include these elements:

- the location of decision-making—the one with SA has control,
- the optimal use of time available, not only speed,
- all threats and risks are considered, not just a single one,
- all the resources available are mobilised, not just the first on scene,
- assets are used in the most effective manner, their limitations are taken into account,
- thought is given to the desired end-state and all the possible courses of action, and
- constraints are respected.

Our discussion has now brought us to the point where we can lay out ‘what really should have happened’ on the morning of 14 April 1994. This will illustrate the difference between a well-managed incident and what actually took place.

Of course, this is cheating to some extent. It is one thing to invent a happy scenario on paper, quite another to deal with situations in real life. Nevertheless, this exercise is not so easily dismissed because the description that follows below is not arbitrary; it is based on the principles we have developed in the course of our analysis here. Furthermore, they are the same principles that guide effective incident management across the emergency services. Finally, there is nothing in the description that follows that does not conform with the controls and procedures in place during Operation *Provide Comfort* or the testimony of senior OPC officers given in the aftermath of the accident.

To avoid making it too easy for ourselves, in the scenario below we will begin from the same background and starting point—the identification of two unknown radar tracks by Tiger Flight at 1122 local (0722 Zulu). We will also encounter the same problems and difficulties that were blamed for the friendly-fire incident. These include the following.

- Eagle Flight plan is not on the ATO and flow sheet.
- The AWACS crew is relaxed; they are not following Eagle Flight.
- IFF interrogation will be unsuccessful on all modes.
- All attempts to contact Eagle Flight will fail.
- The VID will identify the helicopters as Iraqi Hinds.

Time	Event	Function
1122 local (0722 Z)	<i>Tiger 01</i> advises AWACS of two unknown radar contacts. AWACS crew notify the ACE who starts to take an interest in the developing situation.	First indication of a problem
1125	<i>Tiger 01</i> reports in—still has the same contacts on his radar, IFF interrogations unsuccessful so far.	
	The ACE recognises there is now a potentially serious situation, ensures the AWACS crew members understand its significance and are at their stations fully alert.	AWACS crew ramps up for an incident response
	The ACE takes control. All critical decisions from now on will be made by him. He notifies the mission director (MD) that there is an ongoing situation	Location of decision-making
	The ACE directs <i>Tiger Flight</i> to maintain altitude at FL 270 but close on the airspace above the targets and to continue with Mode IV IFF interrogations. <i>Tiger Flight</i> 's primary role is to provide situational awareness to the ACE through their airborne radars and DCA if needed	Situational awareness
	The ACE consults with the MD to assess the situation and consider options. Both refer to Quick Reaction checklists and other decision aides on hand.	Situation assessment
1127	<i>Tiger Flight</i> report they are in position but IFF interrogations still unsuccessful.	
	The ACE directs <i>Tiger Flight</i> to continue as they are, maintaining altitude and interrogating on Mode IV IFF	Optimal use of available assets

	As the targets are slow moving, they will remain inside the TAOR for a prolonged period and present no immediate threat on their current flight path; no interception is required at this stage. Building situational awareness is the key task for air assets.	Consideration of time factor
	The ACE's main consideration now is the security of Eagle Flight and other OPC assets against the threat of two unknown and potentially hostile aircraft inside the TAOR. This includes the refuelling tankers and the AWACS itself.	Situation assessment: priority concerns identified
1128	The AWACS tanker controller directs the refuellers to turn back and head west, away from the TAOR and the restricted operations zone (ROZ) to its north that is their current destination.	
	Urgent priority now is to make contact with Eagle Flight. At this point, they are presumed to be on the ground somewhere. If so, it is important they do not take off and that they prepare for a possible air to ground attack. All air movements listed under the ATO are suspended until further notice.	Anticipation of potential consequences
	The ACE requests the mission director to use all available means on the ground to locate Eagle Flight and warn both them and Kurdish civilians of the threat. The MD notifies the MCC which agrees to give these tasks their highest priority. Fighter squadrons and search and rescue (SAR) assets at Incirlik have been alerted.	Mobilisation of available resources

	CFAC, DO and CTF Commander have already been notified, they are following the situation closely together with the other senior OPC commanders	Notification
1128	AWACS senior director reports green 'H' symbol on his screen in the airspace below the F-15s. Its identity is unknown; all attempts at Mode IV IFF or radio contact are unsuccessful. Probability at this stage is it is not friendly. All AWACS crew members are alerted to its presence.	Situation assessment
1130	All available OPC assets on the ground are now mobilised to assist with finding Eagle Flight. This includes Civil Affairs, NGOs and community networks in the Kurdish villages. The JOIC is in contact with Operation <i>Southern Watch</i> and gathering all-source intelligence on Iraqi air movements and intentions. The MCC, UN and US Embassy staff in Turkey are now contacting all neighbouring countries to find out if they are operating aircraft in the area.	Mobilisation of available resources Situational awareness
1138	F-16 flight arrive at Gate 1 and enter the TAOR	
	The ACE directs the F-16s to maintain FL270, track the unknowns and close on the airspace above them. Interrogations in Mode IV IFF to continue.	Optimal use of available assets

	The ACE directs Tiger Flight to climb to FL340, maintain orbit above targets, break off radar locks and focus instead on scanning the surrounding airspace for any other threats.	Optimal use of available assets
1139	The MD reports to the ACE there are no third country aircraft in the area. It appears the unknowns are either Iraqi or Eagle Flight.	Situation assessment
	Reports have come in from numerous Kurdish villages that US Army Black Hawks are airborne and proceeding in a south-easterly direction from Zakhu. No other aircraft have been spotted from the ground. All efforts to locate Eagle Flight on the ground have failed.	Situational awareness
	The OPC senior commanders' consensus is that the Black Hawks are most likely airborne and en route to Lima, in line with the flight plan lodged before take off. This is passed on to the ACE.	Situation assessment
	The MCC has activated its official contacts with the Iraqi military and are attempting to uncover any intent on their part. USEURCOM have approved this action. JOIC are collating all current intelligence on Iraqi intentions and preparing a threat brief for 1200 hours.	Mobilisation of available resources
	Viewed from the AWACS, radar returns from the unknowns are still intermittent. All attempts at Mode IV IFF interrogation have failed.	Situational awareness

1140	The ACE considers the position, consults with the MD and makes the following assessment. The unknown radar returns are from one set of aircraft not two; this means that if they are in fact Eagle Flight, then no further action will be required. If the unknowns are Iraqi with hostile intent, then the most dangerous enemy COA is that they are setting a trap, with the aircraft as bait. This makes a low-level VID pass by fast jets a high-risk action to take. Is it worth the risk? The ACE takes into account the CTF Commander's intent which has set avoiding the loss of a coalition aircraft to be his highest priority.	Situation Assessment: consideration of all potentially catastrophic outcomes
1141	The ACE makes his decision. He will authorise a VID in spite of the risk. He informs the MD.	The critical decision point
	The ACE directs the F-16 flight to conduct a low-level VID and then return to FL270. F-16 pilots are the most experienced at low-level flight	Optimal use of available assets
	The ACE directs Tiger Flight to be on the highest alert for hostile fast jets entering the area or SAM launches.	Situational awareness
1143	The F-16s complete the VID, they report 2 Iraqi <i>Hinds</i> .	
	Tiger Flight report no unusual activity detected. No indication that this is a trap.	Situational awareness
	The ACE reports the position to the MD. The security of Eagle Flight is now the main concern.	Situation assessment

	The CTF Commander has directed all relevant OPC resources to locate and make contact with Eagle Flight by any means possible, including signalling from the ground for them to land.	Optimal use of available assets
	MCC directs all ground assets to track the <i>Hinds</i> from below and determine the armament they are carrying.	Situational awareness
	Kurdish villages placed on maximum alert against an air-to-ground attack. Opportunity is seen to test civil defence capability throughout the security zone	Anticipation of potential outcomes
	The MCC reports Iraqi commanders deny any knowledge of Iraqi Air Force or Red Crescent <i>Hinds</i> flying above the 36th parallel. The US Embassy in Ankara is asked to double check with Syria that all their Mi-24 <i>Hinds</i> are accounted for.	Situational awareness
	JOIC are assessing the possibility of an Iraqi defection being underway.	Situation assessment
	JOIC are tasked with determining where these aircraft have been inside the TAOR, if they have landed anywhere at any time and if they have conducted any ground attacks. What are they up to?	Situational awareness
1144	CTF Commander has reported up the chain of command. The NCA in Washington are informed and are preparing in case of a major international incident. They have authorised the MCC to propose the following deal to the Iraqi military, 'tell us where the missing Roland SAM battery is and we promise not to take it out unless, of course, it displays obvious hostile intent'. Negotiations are underway.	Anticipation of potential consequences Situational awareness

	CTF Commander and CFAC DO are discussing whether further fighter assets should be deployed to the TAOR.	Optimal use of available assets
1145	The ACE directs the F-16 flight to standby for a second VID pass.	Consideration of time and risk
1146	The MCC passes on numerous Kurdish eye-witness accounts of two fast jets conducting a low-level pass of two Black Hawks.	Situational awareness
1147	The ACE assesses the risk of a trap but decides to direct the F-16 flight to make a second VID pass. Tiger Flight to remain on the look out for threat activity.	Situational awareness
1148	The F-16 Flight again report two Iraqi <i>Hinds</i> .	
	Tiger Flight report no unusual activity detected; nothing to indicate a trap.	Situational awareness
1149	The ACE consults with MD. His intent is to send the F-16s down to force the two unknowns to turn around and land inside the security zone. This is consistent with OPC's ROE but it is high risk. His main concerns are still for Eagle Flight and determining whether this is a trap. He is not entirely convinced that the VID is correct. He asks the MD to get some guidance from the CTF Commander.	Situation assessment
1150	The CTF Commander approves the ACE's proposal. A suitable landing site for the unknowns is found.	
	The ACE directs the F-16 Flight to use the ICAO-approved signals to instruct the unknowns to land at the designated site.	Second critical decision point
	The ACE directs the F-15s to remain on the highest alert for threat activity.	Situational awareness

1151	The F-16s carry out the ACE's directive and discover the aircraft are in fact Black Hawks. They correct their VID and confirm it is Eagle Flight.	
	The ACE notifies everyone, the incident is over and normal flight duties resume. The incident has taken 29 minutes to resolve and can be considered a success given the possible outcomes. OPC response capability was given a good test. On the whole, the performance was satisfactory.	Closure
The main problem indicated by the incident was the difficulty in locating Eagle Flight. This led to the rapid escalation of the situation as the presence of unknowns in the TAOR suggested an immediate and high-level threat. An additional issue was the failure of the two initial VID passes. Given the high risk of this manoeuvre, the cost/benefit equation was not good. A task force is to be assigned to examine both of these problems and present recommendations to the CFAC DO.		After action review

Table 13-1: How the Incident Should Have Gone

The main benefit from providing this 'what should have happened' scenario is that it helps us to pinpoint exactly what was wrong with the way the real incident played out. This turns out to be quite a different issue from the ones identified in the official investigations. From our perspective, the failure of the IFF system, the mistaken VID, the inaction of the AWACS crew and the absence of Eagle Flight from the ATO all play a secondary role in the tragedy of 14 April. The real problem was something quite different and can be summed up in one word—**control**.

Control over the incident should have been in the hands of the ACE. If it had been, then it is extremely unlikely that events would have turned out the way they did. While the ACE may not have run the incident in exactly the way described by our fictional scenario, there is good reason to believe he would have acted along much the same lines. This contention is supported by his own testimony, by that of the mission director, and of General Pilkington, all of who made very clear how they expected and intended a situation such as this to play out.

It is with this in mind that HCD goes off in a different direction from many of the corrective measures that were implemented following the shutdown. For example, one of these was a review and overhaul of the aircraft recognition training provided to F-15 pilots ‘with particular emphasis on low- and slow-flying aircraft.’ If we understand the problem as a faulty VID, this makes some sense. From an HCD perspective, however, such an initiative is not only a waste of time and money—\$16m was allocated for a new PC-based software program—but actually dangerous, as it increases the likelihood that F-15 pilots will be involved in attempts at low-level IDs of rotary-wing aircraft. Seen from a risk management perspective, there is **no way** this can be considered a wise course of action, no matter how much money is spent on training aides; it is just not something we want F-15s to do. Better not to train F-15 pilots **at all** in rotary-wing recognition. That way, the message is clear—do not attempt this; you are placing lives in danger, including your own. Stay up high where you belong and have a role to play.

CHAPTER 14

Explaining the Accident

The benefit of presenting the issue as a problem of control is that it allows us to reframe the key question thrown up by the accident—**why** did the pilots act the way they did? The use of the word ‘why’ here allows the focus to shift away from the pilots’ themselves, towards the wider organisational context they were operating within. This is a move we want to make because this is the domain of command and control; it is where HCD can exert some influence.

There are alternatives to this approach. We can consider the main problem to lie with the pilots. We might, for example, follow many of the victims’ families and assert the issue raised by the accident was a lack of discipline on the part of *Tigers 01* and *02*. Or else we could take our cue from the CTF Commander who argued the cause of the tragedy was a failure to follow procedures. From our perspective, however, this does not help because our interest in this incident is not to assign blame. Our aim is to identify the levers of control that are available to commanders today if they wish to minimise the risk of catastrophic error that inevitably accompanies military operations.

Whether or not the victims’ families or OPC’s commander are able to make their case, we will concentrate on the ‘why’ because it is the answer to the ‘why’ question that opens the gate to HCD as a management program. If it is true that the pilots were ill-disciplined, then we still wish to raise the question ‘why were they ill-disciplined?’, and if they did not follow procedures, then the question remains ‘why did they not follow procedures?’. By this stage of our discussion, we hope two points have emerged. Firstly, that these are complicated issues and secondly, that an examination of these questions is helpful because it highlights those areas where a management intervention is possible, where control can be exerted.

Following the accident, the families of those on board the two Black Hawks were most concerned with holding someone accountable for the tragedy. This is totally understandable. The USAF, on the other hand, were placed in a difficult position. They needed to find out what exactly had happened and the price of a frank account from *Tiger 01* of the shootdown was the granting of immunity so that he would not hold back in fear of prosecution. This is standard practice in accident investigations. Unfortunately, this principle was not applied consistently and *Tiger 02* did find himself indicted at one point over an aspect of the decision-making process that had taken place that morning. Later those charges were dropped.

The AWACS crew were not so lucky. Senior director Captain Wang ended up as the sole individual facing a court martial over the accident. He was acquitted in the event and from the perspective of posterity, his trial turned out to be of significant value as it allowed important members of OPC,

including General Pilkington, to put their views on record. The CTF Comander had not been consulted in the original investigation. On the stand, General Pilkington's testimony went some way to reverse the damage done to the AWACS crew's reputation by the initial investigations into the accident and to provide a more balanced view over what had happened on 14 April 1994. This was a welcome development, as the impact of the incident on the AWACS crew ranks next only to that of the fate of those on board the Black Hawks. Friendly fire touches more than those in its immediate sights. This applies to Tiger Flight too, and to OPC personnel in general.

Accountability is a worthy goal, as taking responsibility is a value to be held in esteem. Anyone who enters the military sphere recognises the potential for error and the consequences that can follow. The stakes are high; the decisions we take matter. Being held accountable and being responsible for our actions are concepts that no-one can really argue with.

If our goal is prevention, however, the problem is not so simple. Much more helpful is Snook's observation 'Nothing broke and no one was to blame; yet everything broke and everyone was to blame'. This focuses our attention on the organisation as a whole and defines the issue as an organisational one.

This in turn allows us to transfer what we have learnt from this incident to other organisational contexts, where many of the same challenges apply. The exact circumstances surrounding the shootdown are unlikely to be repeated. However, problems surrounding situational awareness, aspects of 'our own situation' such as the mission and ROE, as well as questions of culture and motivation in a combined operating environment are present in almost every major military operation, as is the risk of a catastrophic outcome.

Our discussion has now brought us to the point where we can answer the critical question 'why'. If we adopt the HCD framework one more time, we arrive at the following set of explanations for the pilots' actions, placing them into three categories.

1. lack of understanding and awareness
2. a compressed decision-making process
3. questions of motivation

The last of these we have discussed already; they present a different kind of problem. It should be clear, however, that the first two are related to one another. The pilots followed a compressed decision-making process because, to a large extent, they lacked understanding and awareness.

Once we formulate the problem in these terms, it only takes a small leap to identify the key management challenges in high consequence decision-making for a situation such as this. We can summarise them as these.

Aspect	Management Responsibility
Situational Awareness	• Provide an understanding of the operating environment, including who all the different actors are, their missions and objectives. • Provide an understanding of how air operations actually work, how complex problems such as integrating rotary-wing movements onto the ATO have been resolved in practice. • Provide the basis for realistic expectations as to what to find inside the TAOR. • Allow pilots to 'know what they don't know', to appreciate the limits to their SA and to understand who will have the necessary SA during an incident, namely the ACE.
Situation Assessment	• Provide the basis for understanding what makes an adequate assessment and what doesn't, for example, the need to determine intent and not just identity. • Provide an awareness of the elements that go towards a situation assessment that are unavailable to the pilots in the air, such as the latest intelligence on Iraqi intentions or on third nations' activities.

Own Situation	• Provide an understanding of OPC's mission and the MCC's political objectives. • Ensure the pilots understand their own mission properly. • Ensure the pilots understand the ROE, including the concept, how it functions in decision-making and the specific ROE in force. • Provide the commander's intent which should clarify the priority of rules and procedures when they conflict with one another. • Provide awareness of the key controls that make air operations safe—in this case, vertical separation. • Monitor for 'practical drift' of the procedures actually used, such as the pilots adoption of Mode I IFF as their primary means of identification. • Ensure F-15 operations are integrated properly with the rest of OPC, including proper operations briefings before missions. • Ensure command-and-control (C2) arrangements are understood. • Ensure C2 arrangements are accepted. • Work to align the motivation of F-15 pilots with the rest of OPC, including the F-16 squadrons.
The Decision to be Made	• Ensure the pilots understand where decision-making will be located during an incident. • Ensure the pilots understand the scope of their own decision-making and their input into the incident as a whole. • Ensure that pilots understand the limits of their ability to make critical decisions, given their limited SA. • Ensure that pilots understand the significance of particular decisions they make, such as to drop down low for a visual identification. • Provide the pilots with an awareness of all the potentially catastrophic outcomes that can arise out of an incident. • Provide the pilots with an awareness of the range of options open to the CTF as a whole, which may not be open to the pilots themselves.

Anticipated Consequences	• Provide an awareness of the consequences of an incident, depending on its various possible outcomes. • Provide an awareness of the consequences of the pilots' own decisions, such as breaking vertical separation and how these can cascade into a catastrophic outcome.
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Table 14-1: HCD—The management challenge for this situation

Almost every one of the management challenges above are the 'provide/ensure' 'understanding/awareness'. The exceptions are those relating to motivation. The main point, however, should be clear. In complex situations, understanding and awareness are the drivers of success or failure and it is the key task of management to put these in place—this is how to maintain control.

In complex situations, understanding and awareness are the drivers of success or failure and it is the key task of management to put these in place—this is how to maintain control.

This is not a simple task. The entire purpose of the discussion we have conducted here is to demonstrate that this is not a simple challenge. In fact, if we look again at this accident, it is possible to reframe the entire problem in terms of gaps in awareness and lack of understanding.

We can see this if we take just one example—the decision taken by the F-15 pilots to break vertical separation and drop down low for a visual identification. It would have been revealing to ask the pilots after the event 'Knowing the significance of this decision and the role it would play in the tragedy, would you have taken this course of action?' We cannot answer for them here, but we can guess that it would be highly unlikely they would say 'yes'. The pilots were as horrified at the outcome as everyone else. Wickson himself said to Mrs Piper, mother of Lieutenant Piper who died in one of the Black Hawks, 'I wish I could change what happened.'⁵⁵³

If there was one decision to change, then surely it was this one. But to what extent was this recognised by the pilots at the time, by the ACE, by the CFAC, by the investigation board? Vertical separation was **the** critical safety control in force throughout OPC, but who understood this? There was some awareness, as we have seen, among AWACS crew members, for example, or the CTF Commander. Certainly Eagle Flight pilots understood it best of all but was this enough? Did the awareness exist in sufficient strength to influence the decision-making process of any of the key players on 14 April 1994? It appears not.

The position is similar to the USS *Vincennes* incident. There was some awareness in the Joint Task Force (JTF) of the problem presented by Bandar Abbas as a dual-use airfield. But so long as US warships were not on the centreline of route Amber 49, then this did not present a major complication; here was the critical risk control. What was needed was an awareness of this fact and preparation for a situation where it was compromised, as it was by the *Vincennes*' decision to engage the Iranian patrol boats. This was the moment for the JTF to move into high alert and compensate for the loss of this control through other measures, as in fact, aircraft carrier commander, Admiral Zeller, did when he launched two A-6 aircraft 'just in case'. However, this required airspace control arrangements to be set in place which hadn't been done. With the US Marines in Beirut, the key control would have been traffic access into Beirut International Airport, but this was something the 24th Marine Amphibious Unit never came close to having. Here we had the opposite problem—sufficient awareness but no means of acting on it.

When we review the gaps in awareness that played a role in this incident, we soon find that the vast majority were gaps in 'self-awareness' or awareness of our 'own situation'. The F-15 pilots lacked a proper understanding of their operating environment, who all the players were, how operations worked, their mission, their commander's intent, the ROE and the critical control measures that kept their skies safe. And yet, **all** of these elements were under the control of OPC; not one of them was dictated by an adversary action or external force.

This is a key point. Managing our 'own situation' turns out to be a major challenge. This also applied in the case of the USS *Vincennes* incident. If we posit the issue in terms of assumptions, a critical lesson to be learnt from the Black Hawk shootdown incident is how **few** of these are **safe**. Here are some examples of unsafe assumptions in this incident.

- Our pilots understand their operating environment.
- Our pilots understand how air ops work in this theatre.
- Our pilots understand their mission.
- Our pilots understand the ROE.
- Our pilots understand how critical vertical separation was.
- Our pilots understand the role of the ACE and its importance.

If we add in the question of motivation, then our list includes the following.

- Our pilots accept the command-and-control arrangements.
- Our pilots accept their commander's intent to slow down any engagement if circumstances demand.
- Our pilots accept that a rival unit might get the kill and they don't.

When we describe HCD as a management challenge, therefore, this is what we mean. None of these elements can be assumed to be in place; they have to be achieved and not once, but constantly, as crews rotate in and out of theatre and as the situation evolves. This is the way to gain control, or as much control as the circumstances permit. It is also the way to minimise the risk of catastrophic error.

CHAPTER 15

Concluding Remarks

Understanding and **awareness** turn out to be the key concepts in high consequence decision-making. When confronted with complexity, it is the specific situation that drives decisions and it is the extent to which a decision maker is aware of these complexities and able to understand their significance, that maximizes their prospects of achieving a desirable end-state.

Alongside these is the element of **control**. The critical task in any situation that contains the possibility of a catastrophic outcome is to impose some degree of control. This is an idea that is consistent with classic military theory and is often captured in such terms as ‘gaining the initiative’, ‘closing off options to an adversary’ and ‘achieving decision superiority’. The underlying principle is the same—control is the objective and with control comes predictability and the opportunity to chart a course for success.

Full control always remains elusive; just as understanding and awareness are forever incomplete. They remain ideals, goals to strive for and the challenge they present is constant. The task is always unfinished.

HCD strives for a single objective—to minimise the risk of catastrophic error. In military operations, this risk is not the only consideration. Furthermore, the risk is never solitary. In dealing with one potentially catastrophic outcome, often we have no choice but to increase the risk of another. We saw this in the aftermath of the USS Stark incident. The changes to the ROE and the guidance from senior commanders were highly effective in eliminating the chance of a repeat incident but, along the way, they increased the joint task force’s exposure to another catastrophic event—the accidental shootdown of a civilian airliner. Complications of this nature are inevitable; they form part of the challenge that is high consequence decision-making.

In warfare, catastrophe can strike from any number of directions. HCD restricts itself to just one of these—the possibility of a catastrophic error. Narrowing its scope in this manner is what leads HCD to place the question of control at its centre. This is because errors, mistakes and accidents are the result of our **own** actions and this means we have the potential to avoid them; we have the possibility of control.

This can be seen from both the USS *Vincennes* incident and the Black Hawk shootdowns. In neither case were the acts of an adversary decisive; the catastrophes that struck were the result of actions taken exclusively by one side—our’s. It is true that in both situations there was a real possibility of an enemy presence and the fact that the truth of the matter was unknown at the time was an important element. Nevertheless, the reality was that there was no adversary in the air; there was only us, trying

to cope with uncertainty, but still, only us. The experience of the Marines in Beirut reinforces this same idea but from the opposite angle. In their case, they lacked any means of bringing the situation under control and, as a result, were highly vulnerable to an attack that could come in almost any shape or form. From the perspective of controls, there was no 'us' in effect, only 'them'. All the cards were in the hands of the attackers.

It is from this perspective that the principles which govern high-reliability organisations (HROs) are most helpful. In a nuclear power plant, there is only 'us'; there is no adversary and the key question is one of control. At any one point in time, the system is either reasonably under control and behaving predictably within acceptable limits or it has migrated into a state of higher risk where additional measures are needed if control is to be restored and the possibility of a catastrophic outcome reduced to a minimum.

HROs achieve control through five main guiding concepts, all of which are relevant to HCD's central objective. They are:

- a preoccupation with failure,
- a reluctance to simplify,
- a sensitivity to operations,
- a commitment to resilience, and
- a deference to expertise.

If we take the case studies in this book as a reference point, it is not hard to see how these principles can be applied in military operations.

A Preoccupation with Failure

A preoccupation with failure means cultivating an awareness of the potential for a catastrophic outcome and taking risk management initiatives to minimise this. In the case of the USS *Vincennes*, this meant putting measures in place to deal with the problem posed by Bandar Abbas as a dual-use airport, recognising the difficulty that would arise if the ship was located along the centreline of route Amber 49, within minutes of the airfield's runway. For Operation *Provide Comfort* (OPC) it meant identifying the no-less-than nine catastrophic risks opened up if F-15s were to break vertical separation and preparing additional controls to deal with this contingency.

A Reluctance to Simplify

A reluctance to simplify can be summed up in the phrase 'complex problems require complex solutions' and was the basis of our criticism of an over-reliance on the simplifications involved in

the flowsheet, air tasking order and airspace control order within OPC. What was necessary was an awareness of the limitations of these controls. The F-15 pilots needed to 'know what they did not know' and so build more realistic expectations as to what they would find inside the TAOR. In the case of the Marines in Beirut, it meant recognising the insanely complicated nature of Lebanese politics and avoiding being manipulated by the Lebanese Armed Forces through a dependence on them for what was a tendentious and one-sided interpretation of the operating context surrounding the multinational force. For the USS *Vincennes*, it meant overcoming the handicap of an exaggerated and one-sided intelligence picture.

A Sensitivity to Operations

A sensitivity to operations requires an understanding of the critical safety controls that kept the operation in a state of safety and under what circumstances these would be compromised, transforming the situation into one of high risk. It also meant picking up on examples of 'practical drift', as we saw with the F-15 pilots use of Mode I IFF, or, on a larger scale, the Marines' being drawn into Lebanon's civil war. In addition, it involves the recognition of warning signs that the situation was slipping out of control. In OPC, these were the discipline problems with the F-15 detachment, the ongoing arguments surrounding their behaviour and, above all, the incident on 7 April 1994. In the Gulf, Captain Rogers presented a similar challenge, as could be clearly seen from the incident with the Iranian frigate on 2 June 1988. This gave advanced warning that the *Vincennes* Captain was likely to disobey a direct order and chase after Iranian patrol boats if the opportunity arose, just as Tiger Flight were going to drop down low and attempt a visual identification if unknowns appeared on their radars inside the TAOR.

A Commitment to Resilience

A commitment to resilience involves both the containment of errors so that they don't escalate into catastrophe and also the avoidance of situations where the risk of a catastrophic outcome is opened up. In OPC, this involved an interplay between vertical separation on the one hand and the role of the ACE on the other; should this first barrier be compromised. In the Gulf, it meant avoiding the centreline of air route Amber 49, if at all possible, and then creating the option of an aerial visual identification to deal with ambiguous departures from Bandar Abbas. In both cases, mindless and mindful controls could operate in inverse relation to one another, striving to create a default state that was safe and then stepping in to manage a high-risk situation and reassert control.

A Deference to Expertise

In the HCD framework, expertise is defined above all by situational awareness (SA), so that decision-making is located where SA is highest. In OPC, this was clearly the ACE and not Tiger Flight whose SA turned out to be miniscule in spite of having 'eyes on' the targets. We also saw the role of expertise in Operation Anaconda, in the person of the ASOC commander, who had a much greater

understanding of the challenges surrounding air operations in the Shah-i-Kot valley than did his commanding officer.

If control is the key to avoiding catastrophic error, then it follows that HCD concentrates its attention where control is greatest—**our own situation**. A central lesson of this book, and the cases we have examined in depth, is the importance of understanding and awareness in relation to our own situation. **This simply can not be taken for granted**. All of the catastrophic outcomes we have discussed here were almost exclusively the result of factors under our own control. We have seen the role played by complications surrounding the mission, the rules of engagement (ROE), the commanders' intent, command-and-control arrangements, intelligence, procedures, motivation and organisational culture. These played themselves out in tactical situations that led directly to catastrophe.

But none of them were produced by such a situation; they pre-existed them by weeks, months and sometimes years. This is why HCD is above all a management program. It addresses these controls, it seeks to set up tactical decision-making, 'shoot, don't shoot' choices, to give them the best possible prospect of success. And as we have seen, this is by no means a simple task, nor is it ever complete. Dynamic situations constantly throw up new challenges that call for a new interpretation, a revised understanding, of our own situation, of what a desired end-state will look like, of how to reconcile competing priorities and conflicting guidance.

This is our key message. **High consequence decision-making does not take place in the heat of battle—it is set up in advance**. We saw this most clearly with the anti-air warfare team on the *Vincennes*. There was nothing in the items of information they had to work with that was capable of over-riding the decision already determined through the ROE, their senior commanders' intent and the intelligence summary. It was much the same story with Tiger Flight whose chances of making a successful visual identification were severely reduced by the gaps in their information picture: the Black Hawks' external fuel tanks, the Iraqi camouflage pattern, by the ACO's directive that they fly at tactical airspeeds and the expectations they carried with them of what they would find in the TAOR that morning. We also illustrated it with the example of the Marines in Hay-es-Salaam for whom any meaningful tactical decision-making process was rendered impossible by the context they found themselves in.

This is why HCD has to be understood as a management challenge whose objective is to manage the 'control' element within command and control. For this, the full spectrum of management and leadership skills are required, above all the 'soft' or inter-personal skills. These are essential for overcoming the barriers that stand in the way of the understanding and awareness that is critical for minimising the risk of catastrophic error. We saw this, most of all, in the case of the F-15 pilots within OPC.

This becomes clearer if we consider the range of problems thrown up by this challenge.

Organisational culture. This played an important role in the decision-making on board the USS *Vincennes* and with Tiger Flight. In the case of the F-15s, it was a matter of reconciling their culture with the operating environment of OPC.

Team processes. This expressed itself in the ‘dysfunctional interactions’ between ships’ captains in the Gulf and between the AWACS crew and the F-15 pilots.

Discipline. Captain Rogers disobeyed a direct order in going after the Iranian patrol boats, his ship’s helicopter violated the ROE, most likely with his approval. The F-15 pilots in OPC refused to accept the authority of the ACE, or the legitimacy of altitude restrictions and other constraints placed on them by their chain of command.

Motivation. The crew of the USS *Vincennes* were keen to prove their Aegis combat information system in actual combat and justify their presence in the Gulf. This led their captain into a surface engagement whose merits were dubious at best, from the perspective of the task force’s mission in the region. The F-15 pilots were undoubtedly influenced by the history of rivalry between themselves and the F-16 squadrons and a sense of feeling ‘discriminated’ against inside OPC.

Oversight. F-15 mission planning drifted along its own path with the pilots making decisions that took them out of step with the rest of OPC, such as the use of Mode I IFF, or the plan to make a visual identification in case of a ‘low and slow’ target. There was little monitoring or supervision by operations staff to bring the F-15s back into line with the broader mission.

Alongside these, we have the two biggest challenges of all.

Ensuring understanding. The commander has to ensure the team understand completely the overall mission, the particular mission on this day, the ROE, the commander’s intent, relevant guidance and procedures, risk tolerance and if a mistake has to be made, which side to err on.

Providing awareness. The team need to be aware of the operating environment, the current situation, what to expect, one’s own situation, the limits to one’s SA, what one doesn’t know and the potential for catastrophic errors.

And finally, there is the **decision-making process** itself to manage, including:

- the **location** of decision-making and **who** will make the critical decisions,
- how **time** will be managed, as fast or as slow as possible,
- at what point decisions become **critical** and **irreversible**,

- making sure the **right problem** is being solved,
- the application of **meta-cognitive skills**, such as whether intuitive or analytical methods are appropriate, critical thinking is being applied,
- the use of a **process guardian** to protect the integrity of decision-making, against fatigue, distractions, failures in communication or any of the elements in a 'logic of failure', and
- the **anticipation of consequences** and the mitigation of negative implications from decisions taken.

None of these challenges are easy to overcome. Nevertheless, the stakes are high and they demand a commitment to do everything possible to minimise the risk of catastrophic error. This book has been written under the assumption that such a commitment does exist. Our hope has been to clarify the nature of the task and point the way for a management program that sets out to achieve this single objective.

Part III

Applying HCD in Real Time

CHAPTER 16

Airstrike on the Medecins Sans Frontieres Trauma Centre, Kunduz, Afghanistan, 3 October 2015

At that point in time it all added up to me.

Ground Force Commander, US Special Forces, Kunduz, October 2015

*If someone must be held accountable, let it not be the man who was
ordered to sky-dive without being given a parachute.*

Ground Force Commander, US Special Forces, Kunduz, October 2015

*Multiple commands failed to set conditions for success, maintain situational awareness,
apply the ROE, and adhere to Commander Resolute Support (COMRS) Tactical
Guidance when conducting operations during the period of darkness (POD) of 2-3 Oct 2015.*

Investigation Report of the Airstrike on the Medecins Sans Frontieres
Trauma Centre, Kunduz, Afghanistan on 3 October 2015

All of the case studies so far in this book took place several decades ago. Unfortunately, the risk of catastrophic error remains a fact of military life today. On 3 October 2015, an AC-130U Spooky gunship, flying over the city of Kunduz in support of US and Afghan forces, fired a total of 211 rounds, both 40- and 105-mm, into a trauma centre operated by the international non-government organisation (NGO) Medecins Sans Frontieres (MSF) over a period of 29 minutes.



MSF Hospital at Kunduz after the strike (Source: MSF)

MSF staff members who survived the incident described the scenes that followed.

The first room to be hit was the ICU [intensive care unit], where MSF staff were caring for a number of immobile patients, some of whom were on ventilators. Two children were in the ICU. MSF staff were... directly killed in the first airstrikes or in the fire that subsequently engulfed the building. Immobile patients in the ICU burned in their beds.

After hitting the ICU, the airstrikes then continued from the east to west end of the main hospital building. The ICU, archive, laboratory, ER [emergency room], x-ray, outpatient department, mental health and physiotherapy departments as well as the operating theatres were all destroyed... MSF medical teams working in the operating theatres ran out of the OT and sought shelter in the sterilisation room. The two patients on the operating table in the OTs were killed in the airstrikes... An MSF nurse arrived at the administrative building covered from head to toe in debris and blood with his left arm hanging from a small piece of tissue after having suffered a traumatic amputation in the blast.⁵⁵⁴

Inside the trauma centre were a total of 245 staff and patients, 42 of whom were to die as a result of the airstrike, with many more injured. The main buildings of the hospital were completely destroyed. All medical treatment provided by the facility ceased from that point on, while fighting continued throughout the city over the following two weeks and generated hundreds of casualties among the civilian population in urgent need of medical attention.

The airstrike led to accusations that the US had committed a war crime. These were raised in the UN. Calls continue for an independent investigation that could lay the basis for indictments against military personnel. The President of the United States issued a personal apology; the Afghan government launched its own fact-finding delegation and international confidence in the International Security Assistance Force (ISAF) and US mission inside Afghanistan was seriously undermined. Key Special forces individuals in-theatre were sent home personally traumatised, their careers shattered; morale across Operation *Resolute Support* was severely impacted and the ability of air assets to provide close air support (CAS) as and when needed by troops in contact (TIC) dealt a significant blow. Nothing good came of the incident.

On 29 April 2016, US Central Command (CENTCOM) released the report of its own investigation into the airstrike. This document was originally written at a secret level, as it concerns many sensitive operational details. As a result, the public version is heavily redacted in parts. Nevertheless, the report is an invaluable resource for anyone wishing to understand the event from an HCD perspective and is our main source in the discussion that follows.⁵⁵⁵

The description of the events surrounding the airstrike contained in the report allow us to judge to what extent the main elements that make up the HCD framework contributed to the tragedy. In doing so, they permit an evaluation of how useful this framework is for analysing exactly what went wrong in this case and its ability to pinpoint where and how a catastrophic error of this nature could occur. Indeed, we will see in due course the critical roles played by a lack of situational awareness, faulty understanding of the situation, confusion over key aspects of our 'own situation' and the decision to shoot. We will also see the potential consequences which went beyond the catastrophe that actually took place. Difficult as this may be to believe, it could have been worse.

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The report also allows us to assess where the HCD approach sits in relation to current thinking in official circles, in this case the investigation team headed up by US Army Major General William Hickman. As will become clear, the main thrust of the report, in particular its analysis of the incident and where the critical faults lay, overlaps to a large extent with the way HCD has sought to understand the other case studies that appear in this book. In particular, the report avoids an over-concentration on the actions taken by the AC-130's aircrew in the immediate run-up to the incident. It adopts a broader perspective to cover both the entire period of ground operations following the insurgent take-over on 28 September and the degree of input from higher levels of command located in the various joint operations centres (JOCs). In fact, the report reserves its harshest criticism for individuals among those that staffed the JOCs, reflecting HCD's insistence that the prevention of catastrophic errors is primarily a management, or command, function.

At the same time, the analysis we will present here diverges from the report in some important respects. These begin with our understanding of the role played by a central figure in the story, the ground force commander (GFC) who called in the airstrike and whose career is now in ruins as a result. The GFC was in error, that would seem undeniable given the outcome, but this simple fact does not exhaust the question. The real issue is 'why was he in error?' This forms the starting point for a more fruitful inquiry into the causes of the accident. Following on from this, HCD's approach will point to some quite different solutions as to how a repeat of this tragic event can be avoided. These concentrate on two key areas. First, the risk management methodology in use by both Army and Air Force which, we will argue, is not fit for purpose when it comes to the potential for catastrophic error. Second, we will make the case for a new role, located in the command structure, a 'process guardian', whose function will be to apply, during a mission, in real time, all the lessons HCD has drawn from our study of this and the other case studies that make up this book.

It is this 'real time' aspect that we intend to highlight in this chapter. Our earlier studies adopted a wider standpoint, one that applied above all on the operational or campaign level, whether this was the US intervention into the Persian Gulf during 1987–8, the MNF's peacekeeping mission in Beirut from 1982–4 or Operation *Provide Comfort*, starting at least from when the F-15 squadron arrived at Incirlik.

In the Kunduz AC-130U case, however, as the report itself demonstrates with great clarity, all the key factors that contributed to the catastrophic outcome arose during the five-day period of the operation itself. It was during this timeframe that a series of negative developments took place, all of which served to degrade the decision-making capability of everyone involved, but which also offered the opportunity to step in and introduce countermeasures to rectify the situation before it was too late.

On this point, HCD and the report are in full agreement. The investigation's findings emphasise the need for JOC staff to have intervened as the situation at Kunduz deteriorated. HCD, however, unlike

the report, is not concerned with judging any of those involved, but instead centres its focus on how operations can be run differently in the future. We do this first by assigning responsibility for the task of preventing catastrophic error to a ‘process guardian’ and then illustrating how this role would be performed during a mission, in real-time, taking as our example the events in Kunduz between 28 September and 3 October 2015.

What Went Wrong?—Everything

The airstrike on the MSF trauma centre is a classic example of ‘Murphy’s Law’ at work. Unlike the Black Hawk friendly-fire incident, where it seemed at least initially that ‘nothing broke and no-one was to blame’, this was a case where ‘everything that could go wrong, did go wrong’.

The context for the tragedy was an operation that began under the most adverse circumstances. The operation then proceeded to get worse as systems failed one after the other, and the tactical position inside the city turned critical. Again, in contrast to the Black Hawk accident where no adversary action made any significant contribution to the chain of events that occurred, in Kunduz the insurgent forces did play a central role in setting the scene for what was to happen on the morning of 3 October. They did so by creating the potential for a whole number of catastrophic outcomes to take place, not just the one that did. It was this that made decision-making so difficult and also caused decision makers to take risks that can only be considered as extreme. This was for a simple reason—**the risks from inaction were equally extreme**. If the convoy *en route* had been successfully ambushed and/or the governor’s compound overrun for the lack of close air support, then not only would this have meant a large number of friendly killed, captured or wounded but it would have prolonged the fight to regain control over the city by weeks if not months with a proportionate increase in the level of destruction and civilian suffering as a result.

A sense of how desperate was the position in Kunduz can be given from just two examples. The first was the 28 September diversion in mid-flight of two US Special forces detachments on their way to conduct another operation on the other side of the country. Their presence was urgently required at the Air Force base to the south of the city, which was soon to be in danger of being overrun. At the time, this base was serving as a rallying point for Afghan units who had been forced out of Kunduz itself by the insurgent assault. The loss of this position would have been a further disastrous blow and would have resulted in the complete rout of government forces in the area. Any possibility of a counteroffensive to regain a presence in the provincial capital would have been excluded for the foreseeable future, resulting in a strategic triumph for the insurgency.

The second example was the decision to launch the AC-130U 69 minutes early from its scheduled time of departure on 2 October. This meant the crew missed out on a proper pre-mission brief and were unable to upload the normal information products into their onboard computer including an updated no-strike list (NSL) for the Kunduz area of operations (AO). The reason for such haste was the intense assault underway at that point on US special forces and Afghan partner forces inside



Map 16-1: City of Kunduz showing the MSF facility (circled) and the airport (Source: OpenStreetMaps)

the Provincial Governor's compound (PGOV). The CAS platform on station was almost out of munitions just as the three-day-long firefight was reaching its climax and therefore needed to return to base, leaving the ground forces exposed at a critical moment.

The investigation report provides a detailed account of the events that unfolded following the insurgent take over of the city and as Operation *Kunduz Clearing Patrol* got underway in response. In this discussion, we will fit the more important developments into the HCD framework in order to highlight the factors that most impacted on the likelihood of a catastrophic error being made in the AO.

It is important to note, as was the case with the Black Hawk incident, that our analysis cannot only focus on the hospital airstrike. To do so would both fall into the trap of hindsight bias and also not do justice to the dilemmas that affected decision makers during the operation. If we consider the full range of potentially catastrophic outcomes that were possible on the night of 2/3 October as a result of CAS actions, we arrive at a list that includes the following.

EVENT		CATASTROPHIC OUTCOME
1	Failure to provide effective CAS to PGOV	PGOV is overrun, heavy casualties, city is lost to government forces for the foreseeable future.
2	Failure to provide effective CAS to convoy en route	Convoy is turned back, PGOV is left isolated and is eventually overrun.
3	Failure to provide CAS to friendly forces in firefight whose exact location is unknown	Friendly forces suffer casualties, Afghan forces withdraw from the city and refuse to re-enter: a US force is required to retake it.
4	Failure to strike insurgent C2 nodes and fire support points	Insurgent offensive continues and gathers momentum; the scale of effort required to retake the city increases.
5	Friendly fire on partner forces spread around the city	Afghan forces withdraw from the city. Insurgents hold Kunduz indefinitely until a US force can retake it.
6	Friendly fire on PGOV	PGOV defence is undermined, US SFs withdraw and PGOV is abandoned to insurgents.

7	Friendly fire on helicopter resupply units	'Black Hawk Down'-type scenario occurs. PGOV forces are not resupplied; PGOV abandoned.
8	Protected status building hit	Civilian casualties occur resulting in an international incident.
9	Civilian buildings and infrastructure hit	Civilian casualties occur and civil population suffers hardship from the loss of infrastructure and the cost of rebuilding.

Table 16-1: Potential catastrophic outcomes from AC-130U Close Air Support

As will soon become clear, every one of these outcomes was a real possibility. Afghan partner forces absolutely refused to maintain a presence in the city without the direct participation of US SF personnel, nor would they undertake any operation without the promise of CAS. Any action that undermined Afghan confidence in the effectiveness of CAS would leave the city in the uncontested hands of insurgents for the foreseeable future.

Decisions on whether or not to engage CAS therefore involved each and all of these possible outcomes and not just at the time when the AC-130U opened fire on the MSF trauma centre, but throughout the night for as long as the aircraft was on station. If we pose these in terms of a 'shoot, don't shoot' choice, then we can assess the risk of either alternative, using the standard categories of **likelihood**, which could not be discounted, and **consequences**, which were catastrophic.

Action	Level of Risk
Shoot	Extreme
Don't Shoot	Extreme

Table 16-2: The risk of each course of action

This evaluation of the risk is quite removed from the actual risk assessments that were conducted by both ground forces and aircrew at the time. For Operation *Kunduz Clearing Patrol*, the risk was assessed as 'medium', and for the AC-130 as 'low'. These judgments were not in error, according to the criteria against which they were applied, but from the perspective of evaluating the potential for a catastrophic outcome they were clearly well wide of the mark. This reflects a serious problem with the risk management methodology in use by both the US Army and Air Force, an issue we will return to in depth.

The risk was exacerbated by a whole series of factors that we can group under the by now familiar categories of the HCD framework, beginning with situational awareness.

What Was the Level of SA?—Minimal

As all our case studies have demonstrated, situational awareness is absolutely critical in high consequence decision-making. This applies above all in complex environments, such as a densely populated urban terrain and where a large number of actors are present including non-combatants.

The generation of good SA is first and foremost an information management challenge. Intelligence plays a central role in the process both supplying the sources of information and then transforming these into useful and usable intelligence products. Information technology networks then play an essential part by making these available to those who need them to inform decision-making. If we open our examination of the position inside Kunduz with an assessment of the awareness enjoyed by US SF of the operating environment, that is, the city itself and its surrounding areas, we find the following:

1	No joint intelligence preparation of the operating environment (JIPOE), a key intelligence input into the mission planning process, existed for Kunduz.
2	The ground force commander (GFC), his team members and his main Afghan counterparts had never set foot inside the city before.
3	The GFC was in possession of his team's only map. He was unable to distribute copies of this map as no copier or printer was available.
4	The GFC did not have the no strike list (NSL) for Kunduz, nor was he aware that such a list existed. He had nothing to indicate key points of the city's architecture, such as schools, mosques, hospitals, police stations or prisons.
5	The GFC was entirely dependent on his Afghan counterparts for setting key objectives such as the PGOV and the National Directorate of Security (NDS) prison compounds and had no independent means of assessing their strategic value.
6	Minimal information existed as to the insurgents' main supply routes, logistical infrastructure, C2 nodes or staging areas beyond a general sense that all of these lay 'to the west' of the PGOV.
7	No guidance existed to help predict civilian movements around the city during a prolonged conflict. Once households ran out of food, water and other essentials, they had to come out onto the streets to get supplies.

8	Little was known about Afghan and international NGOs, their locations and activities or their SOPs, including evacuation and resupply routes in and out of the city. MSF did provide this information to the JOC, but few others did.
9	Few details were available on the information infrastructure of the city, including TV, radio, internet, CCTV and cell phone networks or formal and informal media organisations present of which there were several.
10	The AC-130 took off without an updated situation map of the city or any of the usual graphic products for coordinating grid points with ground units.
11	The AC-130 was unable to receive the updated no-strike list for Kunduz due to an outage on the data communications link. They could not receive the email from MSF identifying their four locations in the city.
12	The Special Operations Task Force–Afghanistan Joint Operations Center (SOTF-A JOC) was unable to build a common operating picture (COP) of the position in Kunduz as it was dependent on Afghan sources for its information inputs, but lacked interoperability with the Afghan COP system.
13	All US SF levels depended on Afghan sources for their human intelligence but had little visibility into the nature or quality of these sources. They had no way of assessing their reliability or credibility during the fight for Kunduz.
14	The Afghan Government forces in Kunduz were highly factionalised, with several players cooperating to various degrees with insurgent forces. Information integrity from Afghan sources had to be in question.

Table 16-2: Situational awareness in relation to the operating environment

In the face of this long list of deficiencies, it is not hard to justify the claim that US SF situational awareness of the operating environment was minimal. A good example of the difficulty was given by the GFC in relation to the National Directorate of Security (NDS) compound that was to become the stated objective of the convoy on 2/3 October. It was this target that the AC-130U crew believed they were striking when they opened fire. The GFC described the position in this way, following an Afghan planning process for the upcoming operation,

He (the GFC's Afghan LNO [liaison officer]) came up, he showed me the plan, it was written on a piece of green write in the rain paper that he had torn out. It had a grid, said, I think it was the NDS prison was what the nomenclature was for it... There was actually two targets

they said they were going to hit, but they didn't even have a location for the other one, so we didn't concern ourselves much with it, they just said it was further north, like up around the market somewhere. So we focused on NDS prison.

When I plotted the grid, the NDS prison we were tracking... we were tracking a prison along (...) south of where the complex is right there and that was one of our objectives on the initial infiltration. The grid didn't plot there so I was a little confused and I was told by I think it was the (...) at that point, oh there's another one, there's a different one and this was a consistent theme throughout our time there. There were multiple things called the NDS headquarters, the NDS prison. There was all kinds of posts throughout a city of this size and even the (Afghans) I don't think fully appreciated it. I always assumed they were getting their information from the NDS, but I couldn't be sure. So, OK, fine, other NDS prison, that's fine.⁵⁵⁶

Meanwhile, the Special Operations Task Force–Afghanistan Joint Operations Center (SOTF-A JOC) was also in a state of confusion over which NDS prison was the objective. Their surveillance asset was observing the wrong one. Nevertheless, no matter what level of ignorance existed in relation to the operating environment, the mission had to go on. For reasons that will be explained shortly, under 'own situation', it was deemed to be essential that government forces regain a foothold inside the city as soon as possible and for this, leadership by the US SF advisors based at Camp Pamir (Advanced Operating Base–North [AOB-N]) would be critical. The commander AOB-N submitted a hastily drafted concept of operations (CONOPS), after consultation by video conference with the overall Commander US forces in Afghanistan (COMRS), General Campbell.

The ground assault force (GAF) launched on 30 September was successful in its effort to reinsert a government presence inside the provincial capital, recapturing the governor's compound early the following morning. The compound was the primary site for administrative institutions in Kunduz and therefore held a symbolic as well as a practical importance. As a result, the occupiers of this location, which included the US SF ground force commander (GFC) and his team, rapidly became the focal point for insurgents seeking to dislodge government forces from the city. A senior member of the US SF described the PGOV as 'the Alamo', as it came under intense rocket-propelled grenade, mortar and small-arms fire over the 48 hours that followed, culminating in a determined three-sided assault on the complex between 1700 and 1800 hours on 2 October.

This was the immediate context for the early departure of the AC-130U Spooky gunship which was tasked with providing CAS to the Kunduz AO. If we now turn our attention to the level of SA that applied once the aircraft was on-station and ready to provide fire support for the convoy departing from Kunduz Air Force base, we find the picture presented in Table 16-3 below. In this case, the key aspect of SA lay in the extent to which each of the friendly forces were aware of one another's location and could adjust their actions accordingly.

Unit 1	Unit 2	Awareness of Other's Location
GFC inside PGOV	Convoy departing AF base	The GFC had no means of knowing where the convoy was. He was unable to contact the convoy for a situation report at the crucial moment.
GFC inside PGOV	AC-130U providing CAS	The GFC believed correctly the aircraft was on-station but did not know that earlier it had adopted a defensive orbit at maximum stand-off distance following a surface-to-air missile launch.
GFC inside PGOV	Afghan units in the AO	The GFC was reliant on his Afghan liaison officer (LNO) for information on the disposition of Afghan National Army/ Afghan State Security Forces(ANA/ASSF) units inside the AO. This was patchy.
AC-130U providing CAS	Convoy departing AF base	Yes, at the moment of opening fire. The aircrew then concentrated its attention on the target and did not check the convoy's status until late into the engagement.
AC-130U providing CAS	GFC inside PGOV	Yes
AC-130U providing CAS	Afghan units in the AO	The aircrew had flown over the city two nights before and had a good idea where units had been located then. They were unaware of the many changes that had occurred since that time.
AC-130U providing CAS	Helicopter resupply into PGOV	The crew do not mention this but airspace deconfliction was being managed so it is likely this was not an issue, even though the AC-130U was engaged less than a kilometre away.
Helicopter resupply into PGOV	AC-130U providing CAS	No-one involved in the resupply refers to the airstrike taking place nearby but it is likely the helicopter pilots were aware of the AC-130U.
SOTF-A JOC	AC-130U providing CAS	The data link outage meant the JOC were unable to track the aircraft or its sensors.

SOTF-A JOC	Ground picture as a whole	The JOC had an ISR asset on-station that could have provided confirmation of positive identification and pattern of life of the target but in fact was looking at the wrong location completely.
JTAC inside PGOV	Convoy departing AF base	The joint terminal attack controller (JTAC) had no line of sight on either the convoy or the source of the fire believed to be engaging the convoy.
JTAC inside PGOV	AC-130U providing CAS	The JTAC did not know the aircraft had taken defensive countermeasures against a SAM, nor could he see what its sensor operators were looking at, for lack of batteries.
Everyone	The unit involved in the firefight	Somewhere in the city, at 0207 on 3 October, a unit was engaged in a firefight. Who this was, where it happened and the outcome are still unclear.

Table 16-3: Gaps in situational awareness in Kunduz

This poor level of mutual SA meant that the most likely catastrophic outcome was, in fact, a friendly-fire incident with all the consequences outlined above. That this did not occur was largely a matter of luck. Nor was this the only catastrophe that was avoided purely by chance. Equally fortunate was the convoy which ended up proceeding to its objective without any air cover whatsoever. The defenders of the PGOV were also without any air cover. As it happened, neither the convoy nor the ‘defenders of the Alamo’ had to endure any further serious assaults from the insurgents who had taken the decision to withdraw following the failure of their all-out offensive the previous evening. In other words, credit for this positive result can only be given to a failure by the enemy to exploit the opportunity presented to them by the disastrous engagement on the MSF trauma centre.

From any objective point of view, what happened on the night of 2/3 October could have been far, far worse. The human tragedy of the airstrike on the MSF hospital in Kunduz could well have been accompanied by a major military defeat, one that would have taken weeks if not months to rectify.

Any evaluation of the circumstances in play on that night has to take this wider consideration into account and any suggestions as to how things could have been handled differently has to take this broader challenge on board. Simply swapping one catastrophe for another, as happened with the USS *Stark* and Iran Air incidents, is hardly a productive solution. This becomes obvious if we take the argument to its logical extreme and make avoidance of a repeat of an airstrike on a hospital the only lesson that needs to be learnt, the only outcome to be avoided in future. If this is our only criterion then the answer is simple—don’t fly CAS missions over a city, or if you do, don’t shoot. The limitations of such an ‘answer’ should be obvious.

The absence of SA was made worse by a lack of comprehension as to how poor the position was in this respect. As discussed earlier in relation to the F-15 pilots, it is when people believe they have situational awareness, but in fact they don't, that the greatest level of danger arises. In Kunduz, this did apply to the following personnel.

	Belief	Reality
1	The GFC was confident he knew where the convoy was.	He didn't.
2	The aircrew believed they knew the location of friendly forces in the AO.	They didn't.
3	SOTF-AJOC believed their ISR asset was looking at the convoy's objective.	It wasn't.
4	The aircrew were totally convinced they were looking at the convoy's objective.	They weren't.
5	The GFC and the JTAC believed the aircrew were looking at the convoy's objective.	They weren't.

Table 16-4: Perceived situational awareness of some major players

The significance of these mistaken beliefs lay in how they shaped the situational understanding possessed by each of the major players in the drama. It is hardly surprising, given the position with SA, that the actual situation at the moment the aircraft opened fire was seriously misunderstood by almost everyone involved. Not only that, equally important was the reality that each of the various actors had their own, unique understanding that was quite different to how others saw the position.

Situational Understanding—Wrong and Very Different

Mutually shared understanding is a critical team task highlighted by the TADMUS research. Effective coordination of assets and unity of effort are impossible without a common appreciation of the situation at hand and an awareness of each other's position, capability, intent, actions in progress, goals and objectives. Such a shared perspective was entirely lacking as the convoy prepared to set off *en route* during the night of 2/3 October.

This becomes clear if we contrast the way in which the GFC understood the position with the aircrew on board the AC-130U and with the SOTF-AJOC.

The GFC's appreciation of the situation was constructed over the entire period that followed the re-entry of US SF and Afghan State Security Forces (ASSF) forces into the city and the recapture of the PGOV compound. SA in terms of the enemy, their order of battle, dispositions, capability and intent, was also very limited. Here is the assessment made by the GFC, as described during his interview with the team of Investigators.

Well, Sir, in terms of insurgent presence, everything west of route (...) was swarming with insurgents and that was confirmed over the previous 48 hours by (...). Squad sized elements maneuvering with heavy weapons, with HMMWVs that they had seized, it was something we knew, we knew from the reports that were furnished to me by AOB and SOTF going in that insurgents had seized everything in the city of value and were also present in various homes and non-government structures.⁵⁵⁷

The GFC was then asked specifically about the NDS compound and if he had considered the possibility that civilians were located there. On this question, the GFC had no specific intelligence available to him but, as is the case whenever information gaps exist but decisions are required anyway, the commander had no choice but to make a best guess, based on what he did know, sound reasoning and common sense.

Yes, nobody squats in an NDS facility. This is something I can safely say. An abandoned house, an abandoned old government building, maybe. The last place that you are going to decide to shack up whether, if you are a civilian or somebody who's not associated with the NDS, no one goes to the NDS to camp out. That's not the place you want to go. You're just going to have trouble if you do that.

His interviewer seemed to accept this logic, responding 'Yep, fair enough.'⁵⁵⁸

The GFC then brought in the AC-130U to assist him in building a picture of the NDS compound. At this point, the commander was unaware that the aircraft had earlier been forced to take defensive countermeasures following a SAM launch and adopt an orbit at maximum stand-off distance from the city. These two actions temporarily compromised the aircraft's ability to correctly locate the NDS facility from the grid coordinates supplied by the JTAC. The coordinates indicated instead an open field. This led to a long conversation between the ground and air, and among the aircrew themselves, as they attempted to sort out the disparity and determine exactly where the GFC's intended building lay.

No-one was aware that, from this point on, the aircraft's sensors, and later its weapon systems, were directed at the MSF trauma centre rather than the NDS compound.

On the assumption that the aircraft was monitoring the correct location, the GFC then sought corroboration of what he knew of the insurgents' mode of operating, in squad-sized units for example.

He also sought confirmation that the NDS compound was occupied by an insurgent force, mostly likely serving as a command-and-control node and fire support base. This was done by the AC-130U's sensor operators observing pattern of life (POL) in and around the buildings for well over an hour, a process that also stimulated much discussion and some disagreements among the crew.

Nevertheless, for the commander, both the positive identification (PID) and POL processes appeared to provide good support for his deduction that the NDS compound was a site of strategic importance and should be the first priority for an airstrike should the convoy come under fire as it approached this objective.

Everything correlated, the POL correlated, the building description, the (Afghan sources) were very clear that this is under insurgent control and that drove my thought processes going into it. This is definitely under enemy control.⁵⁵⁹

The GFC's use of the word 'correlation' is the key factor here. The commander was carrying out a classic case of what the literature describes as 'sense-making', pulling various items of information together to form a coherent picture, one that determines how future events will be interpreted and a platform for making decisions. This is exactly how the naturalistic decision making (NDM) school, the TADMUS project and all the sources that have informed HCD's analysis, describe decision-making as it is done in practice, in complex, dynamic, fast-moving and fast-changing contexts.

The commander was in a position where he had to derive some sense from a largely chaotic situation, in spite of the massive information gaps he faced and the degraded processes that were going on around and above him. This is what we want commanders to do.

This is significant. We know, with hindsight, that the GFC's understanding of the situation was faulty. However, the fact remains that the commander was in a position where he **had** to derive some sense from a largely chaotic situation, in spite of the massive information gaps he faced and the degraded processes that were going on around and above him. This is what we want commanders to do, to 'size up' or come to an appreciation of a situation and, on this basis, take resolute action, especially under circumstances where the risk of inaction is extreme.

It is not enough, in other words, to state that the GFC was wrong. The position is instead similar to our F-15 pilots where if we want a different outcome should the same conditions arise again, what we need to do is change the inputs into their thinking processes. As we shall see later, this will be a key task for the 'process guardian'.

The GFC, meanwhile, was building a picture that would prompt him to authorise the ill-fated airstrike. The final pieces of the puzzle slotted into place once he believed the convoy was inside the city and then under fire. The commander described his thought process in these words,

So my initial one was obviously the (Afghan forces) providing intelligence about where they were going and what its enemy disposition was, so that was the first one. That alone wouldn't have convinced me to strike it; however, when I had an (AC-130U report) that describes a target, the disposition of the target and the pattern of life on it that's completely consistent with what I've heard from the Afghans, so now I've got (...) saying, the same thing, so that reinforces it, but what it did for me in the end was when I believed the (Afghan) convoy to be at that parallel cross street.

I heard sustained automatic weapons fire...

Oh, you could hear it from your location

I could hear the fire, yes, Sir.⁵⁶⁰

The picture made sense, calling in a strike on the NDS compound seemed the logical thing to do.

Chapter 17

The Picture on Board the AC-130U – Total Confusion

For the aircrew on board the AC-130U, on the other hand, the picture did not make much sense at all. If we turn our attention to the understanding of the situation in the possession of the aircrew, then this can be summarised in a single word 'confusion'.

Up to this point, the infra-red sensor operator (IRSO) had been tracking the convoy and was fully aware of its location some 9 km away at the north end of the airbase. It was not under fire. It is not clear, in fact, whether the convoy was even underway. The IRSO now turned his attention away from the vehicles to the MSF trauma centre, which he believed was the NDS compound, where it remained until late in the engagement. His understanding was that firing should only cease once the convoy reached a distance of 300 m from the NDS compound; closer than this would be 'danger-close'. At the same time, the TV sensor operator observing the same target could see no indication of outgoing rounds from the compound.

Meanwhile, somewhere in the city, a firefight was in progress. Who was shooting at who, why and what the outcome was still remains unknown. Inside the aircraft, all eyes were now on the trauma centre.



USAF AC-130U aircraft (Source: USAF)

The crew's difficulty in making sense of what they were seeing, as compared with the picture they were receiving from the ground, was aggravated by a number of factors that come under 'own situation'. These included the question of what rules of engagement (ROE) they were operating under—a topic we will address in the next section. Aside from this, one major problem was the all-round lack of experience that affected everyone involved at this stage. The GFC had never called in close air support prior to the operation in Kunduz; the JTAC was new to his role in theatre, as were the aircrew who had never trained together before deployment and had flown as an intact crew only once in the previous 180 days.⁵⁶¹

This manifested itself in a number of ways. First was the failure to use proper terminology that was consistent with training and established procedures. Both the GFC and the JTAC employed language that threw the aircrew into confusion and generated intense discussion as to what was being meant. A flavour of the crew's discomfort can be seen in this set of exchanges that were reproduced in the investigation report.

Twenty two minutes later, (the Afghan CDR) passed to the (GFC) that the (Afghan Ground Assault Force - the convoy) planned to clear a second compound after the NDS facility. (The GFC or JTAC) added to this update by stating, 'and we will also be doing the same thing of softening the target for partner forces'. An internal discussion ensued in the AC-130U.

FCO[fire control officer]: 'So he wants us to shoot?'

Navigator: 'Yeah, I'm not positive what softening means?'

Pilot: 'Ask him'

Following this internal conversation, the navigator sought clarification from the GFC through (the JTAC) regarding his intent to 'soften the target'...

(The JTAC) answers after a 30 second pause; 'The GFC's intent is to destroy all targets of opportunity that may impede partner forces success. How copy?'

Unfortunately, this use of the phrase 'targets of opportunity' only provoked a new round of debate.

TV Operator: 'I know that he's being very vague, and I'm not sure if that's going to be people with weapons or just anybody, so we'll stay neutral as far as that goes'

Navigator: 'Yeah, I'll just keep painting the picture for this complex for him when he asks...'

FCO: 'See that's the thing I don't get is that, you see, yeah, targets of opportunity, stop anyone that might impede us, well there's a big enemy C2 complex that you know of...'

- Navigator: 'And you've already confirmed this prison complex is hostile'
- FCO: 'Yeah, so I don't want to tell you how to do your job but...'
- Navigator: 'Only slightly confusing'
- Navigator: 'I feel like - let's get on the same page for what target of opportunity means to you, and what target of opportunity means to me'
- FCO: 'I mean when I'm hearing target of opportunity like that, I'm thinking (...) - you're going out, you find bad things and you shoot them'.⁵⁶³

This was not a trivial discussion. The issue at stake was whether 'impeding' meant outgoing fire from the site itself or from its role as a command-and-control node in directing fire onto the convoy from elsewhere in the city. Either could justify an airstrike, under the right set of circumstances, with certain safeguards in place, but the two authorisation processes necessary were different in several crucial respects. Here, they appeared to be all mixed up.



An AC-130U air gunner loading 40mm ammunition (Source: USAF)

For the aircrew, however, this was not so much a question of whether the ROE or the Commander US forces in Afghanistan (COMRS) Tactical Guidance were being complied with. Instead, it revolved around a very practical matter—the selection of the right type of ammunition and fusing to use in any strike on the complex.

In CAS doctrine, it is the ground force commander, or in some situations the JTAC, who decides what effect he wants to create through the use of air-to-ground ordnance. It is the AC-130U aircrew's task to determine how to produce this effect. If the GFC is clear on his intent, and both he and the JTAC use the correct terms, then this should be a straightforward process. In this case, however, it was anything but, as can be seen in this radio dialogue.

(JTAC); 'Roger, be advised to do a PAX cocktail'

As the report states, this was 'non-standard terminology' and triggered the following responses on board the aircraft.

Navigator: 'What did he just say?'

Unknown: 'Something about confirming PAX cocktail'

Navigator: 'PAX cocktail?'

Unknown: 'I assume he is referring to MAM's, and as well, while you're at it, get a building that he actually wants to strike, confirm that it's a T-shaped building in the center of the compound...'

While (the JTAC) advised (the AC-130U) of the GFC's intent to prosecute both the objective building and personnel, engaging with (...) is a weaponeering solution for personnel targets. Thinking they were cleared on the building itself, (...) chose to engage with (...) in accordance with AC-130 TTP. (...) continued to clarify the GFC's intent within two minutes of engaging the target;

Pilot: 'Hey confirm that we are cleared on people in this compound and not just this (...) building'.⁵⁶⁴

The aircrew ultimately received the information they required and were able to make an appropriate selection of weapons in line with the GFC's intent. The pilot also got the confirmation he needed to open fire.

From the crew's perspective, therefore, the problem was solved; they were able to go about their business which was the provision of close air support. We, of course, from an HCD point of view, cannot leave it at that as we know a catastrophe was just about to unfold.

Quality of the Process—What It Can Tell Us

It is at this point that we want to make our first introduction to the concept of a ‘process guardian’ and explain the nature of this role in the context of the events described above. The crew was presented with a series of difficult problems but ultimately were able to find a satisfactory outcome, in line with their tactics, techniques and procedures (TTP) and their CAS mission. Our concern, on the other hand, is not with the specific challenges they faced, nor with the solution they arrived at, it is with the **process** involved. This is a crucial difference. The crew were tasked with finding a weaponising solution and with a precise aim point among the many personnel and buildings inside the compound. This turned out to be a tortuous procedure, far harder than it should have been and it is this aspect of the situation that interests us above all. This is because the **quality** of the process, the level of difficulty encountered, reveals something of vital importance – just how **high** was the risk of a catastrophic error at this point in time, the most likely outcome of which was either a friendly-fire incident or a failure to provide effective fire support to the convoy.

These risks were not the overriding concern of the crew and it is essential to understand why this was so, why it is **always** so under conditions such as these. **The crew was occupied** with the immediate task at hand; they were **busy** solving a series of problems, performing their roles and carrying out their mission. This continued once the engagement was underway. The crew’s focus at every stage along the way lay in the outcome, not the journey taken to get there. Once a solution had been found, the process became irrelevant. In any case, they were instantly faced with a new task—striking the target. This now demanded their full attention.

For the process guardian, on the other hand, the process, not the outcome, is what matters. The AC-130U was about to deliver its well-chosen weaponising solution on an MSF hospital, not an insurgent C2 node, and it was the nature of the process that had just taken place that most gave an indication that all was not well. This applied not only to the question of munition selection but all the decision-making processes that had taken place through the course of the mission, including the positive identification (PID) and pattern of life (POL). A question mark had to hang over all of these, in the light of what had just happened.

This is where the process guardian steps in. Their role is to pick up on the process that was taking place in the run up to the engagement and grasp the **significance** of the difficulties experienced by the crew, whether or not a satisfactory solution had been found to these. The deep flaws in the process, as earlier in the effort to locate the compound, conduct PID and POL, had the potential to set off alarm bells and to provide a clear signal that the risk of a catastrophic outcome was rapidly climbing into the extreme range. As with the Marines in Beirut, following the battle for Souk el Gharb, the opportunity was there to recognise that the system had migrated to a state of high risk. The focus of such a process guardian, therefore, is quite different from the other actors involved, who are busy grappling with and overcoming problems as they arise, one after another. It is a **systemic** perspective.

We can show this best by highlighting the contrast between the aircrew’s point of view (POV) and the process guardian’s.

Aircrew Point of View	Process Guardian Point of View
Problem solving	Why is there a problem here?
Task achievement	Process - is it working as it should?
Immediate issue	Overall mission status
Mission success	Risk of failure
Desired end-state	Likelihood of catastrophic outcome

Table 17-1: Comparison of Points of View of AC-130U Aircrew and Process Guardian

For the pilot-in-command, at 0208, all the problems and issues that had bedevilled the targeting process up to this point were now satisfactorily resolved and he could give his approval for the crew to engage weapons.

Pilot-In-Command Point of View		Yes	No
Problem solving	Have we been able to select fuses, munitions and a precise aim point?		
Task achievement	Has the process, tortuous or not, achieved a satisfactory outcome?		
Immediate issue	Are we ready now for the next step, to engage the target?		
Mission success	Can we now do our job, which is to provide CAS to ground forces?		
Desired end-state	Will the target be destroyed?		

Table 17-2: Pilot-in-Command’s Point of View

For the process guardian, on the other hand, assuming they had visibility into the radio traffic that had taken place, the assessment would look very different, focusing on whether the risk of error had increased or decreased as a result of the process.

Process Guardian Evaluation – Has the risk of catastrophic error increased or decreased?		Increased	Decreased
Why is there a problem here?	Weaponizing and setting an aim point should be straight forward; something is not right.		
Process - is it working as it should?	Clearly not. Why is it proving so hard for the GFC to communicate his intent clearly? Is there a problem with the CAS request itself?		
Overall mission status	Does the crew's current confusion throw into question earlier processes such as the PID and POL?		
Risk of Failure	Will CAS be effective? What are the chances of the convoy being turned back, risk of friendly fire or civilian casualties?		
Catastrophic outcome	Is the risk higher if we don't shoot? Can we improve the position somehow? What are the options?		

Table 17-3: Process Guardian's Evaluation

By being less burdened with the task at hand, the process guardian would also have the luxury of questioning the process from another angle—what was **not** happening that maybe should be? If we remember that tunnel vision is a key element within Dorner's 'Logic of Failure', the process guardian might also raise the following.

Process guardian: What are we missing here? Does this increase or decrease the risk?		Increase Risk	Decrease Risk
Who is watching the convoy ?	No-one. The IRSO was now focused on the target. The GFC did not have radio contact. SOTF-A had no SA on the convoy's status.		
How will we know if the CAS is effective?	The convoy was supposed to be under fire. Was this being suppressed? Who is going to tell us if no-one is watching the convoy?		
Can we locate the firefight ?	A firefight is taking place somewhere in the city. Fire is not coming out from our target. So where is it, who is involved, should we provide CAS?		

Table 17-4: Key Issues for Process Guardian

If we roll the clock back to earlier in the mission and take a look at the process that surrounded the initial identification of the National Directorate of Security (NDS) compound, we can see again the difference between the two perspectives. Doing so has more potential value, as in this case, several hours existed between this event and the engagement which would have allowed for corrective countermeasures to be applied in order to compensate for the deficiencies in the PID procedure.

For the aircrew and the JTAC, what confronted them was the task of confirming the location of the convoy's objective which the GFC also believed to be a C2 node and fire base for the insurgents. For reasons described earlier, the initial set of coordinates supplied to the aircraft, which were in fact the correct ones, led the crew to an open field rather than a security complex. Later, as the AC-130U re-established an orbit directly above the city, the TV sensor operator checked the original coordinates again and found this time they pointed to a compound which was in fact the NDS facility. However, by this stage, a convoluted process of checking back and forth between the JTAC and the aircrew had convinced everyone else concerned that what turned out to be the MSF trauma centre was the intended target. **The matter was resolved.** The TVSO's doubts over the matter were lost in the general conversation over POL and 'targets of opportunity'.

It was this episode more than any other that exposed the limitations of deploying a crew who had little experience of working with one another. The TVSO's voice was discounted against a description of the compound that was delivered **fifth hand** by an Afghan operator on the ground to the liaison officer, then through an interpreter to the GFC and from there to the JTAC and the aircraft's navigator. Given the tragic consequences that were to follow, it is worth reproducing in full the investigation report's description of how this happened.

At (...) radius orbit over Kunduz and continued observing the compound (Trauma Centre). During this time, the TV Sensor Operator questioned if the observed compound (MSF Trauma Centre) was the correct target. He understood the (...) would be inaccurate. He (...) for the NDS facility (...). Upon identifying the buildings at that location, the TV Sensor Operator provided the crew a description of what he was observing (the NDS facility). He stated the grid coordinates passed by (the JTAC) placed his sensor on this location (the NDS facility), not the previous compound upon which the crew was currently focused (MSF Trauma Centre). Despite this critical realization by the TV Sensor Operator, the navigator answered with 'Copy' and there was no response by the pilot. After this point, the crew relied solely upon target description from (the JTAC) which was the (LNO's) description to the GFC by way of an interpreter.⁵⁶⁵

The TVSO turned out to be correct in his understanding of the position. It is clear from the radio transcripts, however, that this was not shared by other members of the crew. In fact, each had their own appreciation which was quite different from one another, the FCO from the navigator, both from the TVSO, with the pilot having another perspective again. The team, in other words, did not arrive at a mutual understanding; nor had they learnt to trust each other's judgment.

Team Processes—Insights from the TADMUS Research

The AC-130U's crew dynamics is a classic case of team malfunctioning. Measured against the research findings of the TADMUS project, the crew's malfunctioning was far more serious than the anti-air warfare team on the USS *Vincennes* that inspired the research in the first place. This was not the aircrew's fault; effective team performance takes time to achieve, a conclusion that was in fact the first of TADMUS' seven key findings. Nor was it for lack of effort; the extensive conversations between the TVSO, FCO and navigator all demonstrated a desire to form a common view of the challenge they were presented with, to talk through the problem and arrived at an agreed solution.

The importance of having 'hard crews' is well known and was acknowledged in the report. In spite of this knowledge, however, the realities of military life mean that aircrews are often thrown together at the last minute and have to cope as best they can. The same applied to the broader 'team' that needed to emerge out of the components that were the ground force commander (GFC), his links

with Afghan units on the ground, the JTAC and the AC-130U crew. Unfortunately, the general lack of experience across the board, plus the critical lack of SA in relation to the operating environment, made this ‘team formation’ task very difficult to achieve in the timeframe allowed.

Nevertheless, the mission had to proceed. In this context, the role of the process guardian was not to stand in the way, but to take crew inexperience and team functioning into account in assessing the likelihood of error that now existed in relation to the initial PID of the target, and later the POL and weaponing procedures that were to follow. This would allow for corrective measures aimed at improving the position to be applied while there was still time, before the final ‘shoot, don’t shoot’ decision point was reached. Such measures were available, as we shall demonstrate.

The point being made is that the inputs into these processes provided by the GFC, the JTAC and the aircrew are **not fixed**; they are **variable**. This is so even though the individuals concerned are all capable people, have the noblest of intentions and are doing the best they can under the circumstances. It was the same with our F-15 pilots. A visual identification conducted by Tiger Flight just could not be given the same weight as would one carried out by F-16 pilots who were used to flying low and dealing with rotary-wing aircraft. Making such an evaluation was not a task for the pilots themselves, who quite naturally backed their own judgment, but it was essential for anyone whose task it was to make the final call on whether to open fire or not.

The same thinking applies here. A process guardian would have the opportunity to examine, as they occurred, the various inputs into the PID process and assess the quality of each of these, whether they served to increase or decrease the likelihood of error. We can see how this might look -

Factors in the process to identify the NDS compound.		Is the risk increased?	Is the risk decreased?
Aircraft sensors	Unable to track coordinates reliably following SAM launch		
JTAC experience	New to theatre, use of non-standard terminology		
Crew experience	First time flying together, diverging viewpoints among crew members		
GFC experience	First mission using CAS, use of non-standard terminology		

Operating environment awareness - ground	GFC/JTAC not familiar with the target, reliant on Afghan source		
Operating environment awareness - ground	No line of sight (LOS) to target		
Operating environment awareness - aircrew	NSL not considered, unfamiliar with the city, intelligence products absent		
Systems integration	JTAC could not see what aircrew was looking at due to battery shortage		
Systems integration	JTAC could not use laser designator due to battery shortage and no line of sight		
Systems integration	SOTF-A JOC unable to track aircraft, its sensors or assist in any real way		
Aircraft sensors	Re-establishment of orbit over the city and capability to plot grids		
Mutual understanding	JTAC and aircrew confident they have identified the NDS compound		
Mutual understanding	GFC's appreciation that everything west of PGOV is in insurgent hands		
Mutual understanding	SOTF-A JOC observing entirely different NDS compound		

Table 17-5: Process guardian—evaluation of the process

Not all the inputs are negative; this is important to note. The investigation report, employing standard risk management methodology, uses the term ‘emergent hazards’ to describe many of the same developments listed above. HCD’s approach, however, is multi-dimensional in that it takes into account not only failures, deficiencies, departures from procedure and setbacks, but also positive developments that allow for some confidence to be restored in the process. This is useful because we are not only concerned with the risk from a decision to open fire, but also from a decision not to do so. What emerges is a dynamic assessment of the system as a whole, of whether it is in a state of low or high risk, one that is constantly being adjusted in real time as new inputs are added.

The first output of this dynamic risk assessment is a simple ‘yes’ or ‘no’ to the question ‘if we have to make the decision right now, which carries the greater risk of a catastrophic outcome; do we shoot or don’t shoot?’. Our status is either go, or no go, green or red. In the course of a mission, this status may change back and forth repeatedly as the situation evolves and new inputs are added, either positive or negative in their impact on the system as a whole.

The advantage of this approach is that it allows for the active and continuous management of the risk status, right throughout the mission, long before any actual decision point is reached. Negative inputs can be countered, either by making additional resources available or optimising the use of time and positive developments can be exploited to the full. If the risk from a ‘shoot’ decision is escalating out of control, the equation can be altered by taking steps to reduce the risk from a ‘don’t shoot’ decision, by changing the variables on the ground and vice versa. The possibilities are many.

If we re-examine the episode with the TV sensor operator, we can see how this process orientation could have helped arrive at a different risk status. As we know, earlier in the flight, the aircraft’s sensors were unable to correctly locate the coordinates supplied by the JTAC. This was clearly a negative input. The crew and the JTAC then applied their problem-solving skills to find a way around this setback and believed they had achieved a satisfactory result after a period of time. Once the aircraft had returned to its orbit above the city, the solving of the problem with the sensors prompted the TVSO to query the building identified as the target. For the other crewmembers, on the other hand, reflecting their task focus, identification was a problem that had been resolved, the case was closed and they had other issues to contend with now.

A process guardian, on the other hand, would want to reinforce the TVSO’s instincts. The restoration of the aircraft’s systems would only be a positive input, **if it was exploited**, as the TVSO had attempted to do. This is why we have coloured this event above as orange, rather than green. Depending on what the systems, now back online, indicated, the risk could be increased or decreased, the process guardian would want to insist on finding out which was the case and in doing so, would have brought out the discrepancy between this and the result of the building identification process that had been undertaken earlier.

This alone, even without any determination as to which of the possibilities was the correct target, would have raised awareness of the elevated risk of error; **as at least one of the two had to be wrong**. It would have altered the 'shoot, don't shoot' equation in the direction of 'don't shoot', which would then have triggered further actions to reduce the level of risk to a more acceptable level before the target was engaged. The aircrew may well have remained focused on the wrong building but overall the chances of this leading to catastrophe would have been affected positively.

We can assert this because one of the implications flowing from the status of the aircraft's sensors lay in the selection of the kind of targeting process to be carried out, between 'bomb on target' (BOT) and 'bomb on coordinate' (BOC). Each entails a different set of risks, and therefore incorporates a distinct set of controls to manage those risks. Up to this point, a BOC had not been feasible but after solving the sensor problem, the option did exist. Many of the safeguards for a BOT strike had already been applied, with all the problems we have seen; a switch to BOC would have meant an entirely new set of controls be established, with perhaps a different end result. Another possibility was to run two parallel processes—one for BOT and the other for BOC—and then make an assessment as to which had generated a lower probability of error. Time was available for this, as were the resources, located above all in the JOC.

For the process guardian to intervene in this way, it is essential that they are **not** drawn into the task itself... The process guardian is not there to 'second guess' the GFC, JTAC or aircrew, to have a stab at the challenge themselves... The process guardian can only make a contribution of value if their process, its focus and priorities, is **different**.

For the process guardian to intervene in this way, it is essential that they are **not** drawn into the task itself, in this case identifying the NDS compound, or into making a judgment as to which of the two candidates was the correct building. The process guardian is **not** there to 'second guess' the problem solving and decision-making activities of the GFC, JTAC or aircrew, to have a stab at the challenge themselves to see if they can do better. To do so would not improve the chances of success in any meaningful way, more likely the opposite. The process guardian can only make a contribution of value if **their** process, its focus and priorities, is **different**.

We can see this if we take the position in relation to situational understanding leading up to the crucial moment, 0208, as our example. A process guardian would have found the following.

Major Players	Understanding of the Situation
GFC	Convoy is inside the city, under fire from the NDS compound. Urgent CAS is required and AC-130U is targeting the source of the fire.
AC-130U Aircrew	Convoy is 9 km away and not under fire. No rounds are coming from the target building and there is confusion over the GFC’s intent.
SOTF-AJOC	The convoy’s objective is another NDS compound altogether.

Table 17-6: Differences in the major players’ understanding of the situation

The most relevant point about these three understandings of the situation is that they are **different** and mutually exclusive. Faced with this, the process guardian’s task is **not** to attempt to determine whose understanding is correct or to arrive at a better understanding themselves. Instead, it is to assess the positive or negative implications of this wide divergence in understanding.

Implications Of This Divergence In Understanding		Positive	Negative
1	The different understandings are incompatible which means at least two are wrong.		
2	It is quite likely all three are wrong.		
3	Poor situational awareness is probably the root cause of the problem.		
4	Team processes are clearly not working well or else there would be a mutual level of understanding and better SA.		
5	If team processes aren’t working well here, then most likely they haven’t been working well during PID and POL.		

6	SOTF-A JOC is not playing any helpful role in the situation.		
7	Any decisions that are based on these situational understandings are not likely to be good ones.		
8	We need to rectify this position before something goes horribly wrong.		

Table 17-7: Implications of divergence in understanding

Alarm bells, in other words, would be ringing. At this late stage, of course, there may have been little prospect of rectifying the position in time. However, this unfortunate state of affairs could have been brought to light much earlier and countermeasures set in motion. Planning for the convoy operation began some 6–8 hours before the engagement and the chance that it would come under fire from insurgent forces were an **obvious contingency** to prepare for. For an understanding of why this was not done, we need to turn our attention to the group of factors that come under the heading ‘own situation’.

CHAPTER 18

‘Own Situation’–Messy

Operation *Kunduz Clearing* Patrol did not begin under favourable circumstances. The insurgent offensive that expelled government forces from the city on 28 September came with little warning, the first serious indications only being received one day earlier. A Combined Joint Operations Center (CJOC) staff officer recalled:

Prior to the 27-28 we, HQ Resolute Support (RS) CJOC, were tracking the security situation in Kunduz as being ‘secure’. Prior to the 27th we had not received limited reports of insurgent activity in the Kunduz area... We were focused on the Kajaki/Northern Helmand Area of Operations.⁵⁶⁷

One of the reasons government forces were caught out by the attack was the time of year, in a vague echo of the Vietnamese Tet holiday offensive of 1968.

There was no unusual reporting from Kunduz City on the 25, 26, or 27 September. However we were coming out of Eid and the Afghans had reduced reporting, reduced manning in their headquarters, and could have had reduced security.⁵⁶⁸

Such reporting, as there was, only contributed to a further weakening of the Afghan position, as units were

hastily deployed... into static checkpoints outside the city in places such as Khanabad District to deal with the initial indications of insurgent encroachment, and likely as pawns supporting the ethnic/political manoeuvres of some senior stakeholders as well.⁵⁶⁹

The UN Assistance Mission to Afghanistan (UNAMA) echoed this assessment in its special report into civilian casualties during the insurgent occupation of the city.

It appears that insufficient security measures were taken ahead of the 28 September offensive, allowing the city to fall relatively quickly. Part of the inability of security institutions to secure the safety of the civilian population in Kunduz stemmed from weak working relationships among provincial authorities in Kunduz, with well-publicized disputes between top provincial authorities in the months preceding the Taliban’s September offensive. In addition, there appears to have been a level of infiltration of the city by the Taliban in the period immediately preceding the Eid holiday.⁵⁷⁰

The assault also took the US Advanced Operating Base–North (AOB-N) commander by surprise. This special forces major will play a central role in our story here as the ground force commander (GFC) who was to authorise the airstrike on the trauma centre five days later. His intended role at Camp Pamir was to head up a train, advise, assist (TAA) mission in support of Afghan Forces rather than lead combat engagements himself. His pre-mission training had reflected this:

It was heavily weighted in favour of train, advise, and assist type operations. We were well aware of what the operational environment is here in the RS [Operation Resolute Support] context and we knew that it was, getting outside of the wire to do combat operations was mostly a thing of the past and we were really here to enable if that. We really wanted to improve Afghan capacity and their ability to do independent ops.⁵⁷¹

Against this background, the GFC had no intention of being drawn into operations inside the city, especially considering the political faction-fighting that was gripping the government side.

Ironically, I probably jinxed myself with this, I said, I did not believe that we should get involved in Kunduz any further than TAA, unless the provincial capital falls because structurally it is such a political and ethnic problem, its not something we can effectively weigh in on. The only thing that I said was a showstopper was we can't lose the provincial capital, because it had already been surrounded when we got here. We knew it was coming, but we didn't expect it until the spring and we sure didn't think they could take a provincial capital. I don't think anyone did.⁵⁷²

One consequence of this was that neither the GFC, his team, an Operational Detachment Alpha (ODA) nor the Afghan units he was advising had even been inside Kunduz itself.

ODA (...) had not executed any movements within Kunduz, which resulted in their lack of familiarity with the city. The ASSF [Afghan State Security Forces] partner units assigned to the mission were also unfamiliar with Kunduz.⁵⁷³

Unfortunately, the worst-case scenario, the GFC's 'showstopper', had eventuated by the afternoon of 28 September with insurgent forces in control of key points inside the city. These included the main NDS prison, where they secured the release of 700 male inmates. Also occupied was the Kunduz Provincial Hospital which was promptly transformed into a fortified strongpoint.

Afghan security forces streamed towards the Kunduz Air Force base, 12 km to the south east of the city and co-located with AOB-N. Government officials and other civilians also congregated here in their hundreds. In the chaos, there was no possibility of screening individuals already inside the perimeter. The air base now came under threat from forward detachments of the insurgency and the position was fast becoming desperate.

Reporting from Kunduz city indicated that all (government) GIROA [Government of the Islamic Republic of Afghanistan] infrastructure and MOD/MOI [Ministry of Defence/Ministry of Interior] checkpoints had been either abandoned or overrun, and there was an impending attack on the Kunduz Airfield, which is the lifeline for ODA (...), stationed at (Camp Pamir). The situation in Kunduz had deteriorated to the point that ODA (...) was preparing to secure a portion of the airfield to facilitate the potential extraction of designated personnel if needed.⁵⁷⁴

The situation provoked an emergency response. Some 450 Afghan ground forces were rushed to reinforce the base, senior commanders were flown in by the Ministries of Defence and the Interior to restore some cohesion. US Forces in Afghanistan (USFOR-A) did the same, diverting special forces (SF) units already *en route* to their staging area for an operation in a southern province. These US forces formed a pivotal role in consolidating the defence of the airfield and in preparations for a counteroffensive back into the city. Central to this was their ability to call in close air support (CAS) at moments when the danger was at its greatest, as captured in this eyewitness account.

On the evening of 29th Sep, the combined USSF and ASSF initiated movement from (AOB-N) yet never made it off the airfield. While the patrol was moving across the airfield to exit the outer perimeter and begin the operation, the airfield came under direct and indirect fire. The USSF and ASSF elements immediately moved to defensive positions to repel the attack. These elements continued to exchange fire with the enemy throughout POD [period of darkness] 29/30. During this fight... SOTF conducted four air to ground (ATG) engagements in defence of the ground force... SOTF also conducted an ATG engagement earlier on the 29th destroying a tank that had been captured by the INS [insurgents].

At 2324, USSF received effective ZPU fire from 4 x INS HMMWVs. In response US F-16s conducted strikes against the vehicles, destroying the ZPU and HMMWVs.⁵⁷⁵

Alongside CAS, US SF played a critical part in rallying and organising both the defence of the airfield and the forthcoming assault into Kunduz. It was the GFC who succeeded in assembling a makeshift volunteer force from various Afghan remnants prepared to return to the city they had just been ejected from. The measure of this achievement can be seen in this episode, which was to delay the departure of the ground assault force (GAF) for another two hours,

As like a final insult to injury no one on (the AF base) would provide the (GAF) with fuel for the vehicles even though the (GAF) were the only force that were willing to go fight in the city so they had to find a source of fuel before we could leave. We didn't end up SP'ing until about 2300 or so.⁵⁷⁶

Getting Back into the City, ASAP

CAS and leadership, these were the two indispensable contributions supplied by US SF personnel during the operation that unfolded over the following four days of intense fighting. This included conducting the mission planning and concept of operations (CONOPS) for the effort to re-establish a government presence inside the city. The GFC started on this task almost immediately on arrival at AOB-N, during the evening of 29 September, while the battle for the airfield was in full flow.⁵⁷⁷

The GFC set this as his highest priority because he understood the urgency behind the need to re-establish a military presence inside the city as soon as possible. Urban warfare favours the defender because the three dimensional and complex nature of the terrain provides an infinite set of possibilities for ambushes; only rarely is an attacker the one who initiates contact. This is especially so if the assault is 'from the outside in', where the defender also has the advantage from having internal lines of communication. Once a defending force is well entrenched, the danger exists that the contest will degenerate into a 'rubble and clear' slugfest, where overwhelming firepower becomes the decisive factor, causing widespread collateral damage and civilian casualties. According to the UNAMA report, the later stages of the battle for Kunduz, following the US SF withdrawal from the provincial governor's residence (PGOV) on 3 October, did, in fact, take on much of this kind of character. The official civilian death toll that resulted was estimated at 289, with a further 559 injured.⁵⁷⁸

The GFC himself put it in these terms,

The sooner we got into the city, the better because based on my experience with urban combat, from when I was a young Lieutenant, the more time an urban defender has to prepare, the worse its going to get for everybody. Any civilians left in the city the people on offense and everything else. Its only going to get worse and so we all agreed it had to happen fast and the only people who were willing to go in unfortunately were people who did not know the city of Kunduz.⁵⁷⁹

The latest thinking on military operations in urban terrain (MOUT), developed by the US Marine Corps, recommends an offensive approach that involves a fast-moving assault along a narrow frontage. It recommends the use of intelligence, surveillance and reconnaissance (ISR) assets and fire support to assist with the protection of exposed flanks, the capture of critical nodes and from there an 'inside out' plan of attack.⁵⁸⁰ The CONOPS developed by the GFC was consistent with this doctrine. The vehicle-borne ground assault force (GAF) was set three main objectives to clear one after another, until they arrived at their main goal, the provincial governor's compound (PGOV). This would become the nodal point for future operations inside the city.

A manoeuvre of this kind was not without its risks. Once inside the PGOV, the GAF would obviously become the main focus of insurgent efforts to remove government forces and consolidate their hold on Kunduz. If the PGOV was overrun, this would be disastrous—a small scale rerun of Dien

Bien Phu, the battle that resulted in the French capitulating in Viet Nam. The GFC was confident, however, that a bold strike to recapture the administrative hub of the city would restore the morale and self-confidence of the Afghan units previously routed and now assembled at the Air Force base, bringing them back into the fight and so tipping the balance decisively.

I believe this was a well-coordinated attack by a small group of dedicated individuals... they launched simultaneous attacks on a few weak check points and everybody had basically thought the Mongol horde is coming and abandon the city. I did not, I fully expected that we would meet some stiff but brief resistance moving into the city, and they would realize 'they're not going to let us have it', they would move back to their perimeter, and they would enjoy the spoils of what they came in to get, all the ammunition and vehicles that they had already plundered. That's what I expected. So I really thought that the Afghans would see that it wasn't that big of a deal and they would all come back in.⁵⁸¹

In the event, this is pretty much what happened. The GAF did meet some resistance as it moved through the city, but this was successfully overcome by the use of close air support (CAS), five missions in all. The objectives were each cleared in turn, occupied by follow-on Afghan National Defence and Security Forces (ANDSF) and the PGOV itself secured by 0430 on 1 October.

The GFC's instincts, developed from his experience years before as a junior officer in Ramadi, Iraq, had allowed him to develop a workable CONOPS, consistent with doctrine, that met the immediate demands of the moment. That he was able to do so, however, came in spite of some difficult obstacles and meant that the mission plan was quite limited in its scope. Once the GAF was inside the PGOV, the elements of the plan that had earlier contributed to its success came to play less of a role and other factors rose to the fore. The CONOPS, in other words, was steadily overtaken by events, becoming less and less relevant in the process.

This plan worked under the assumption that CAS by US assets would be available, but did not consider any of the practical aspects as to how this would be delivered to an Afghan assault force with no US personnel present and no possibility of terminal attack control from the convoy itself.

By the night of 2/3 October, the original mission plan no longer provided any useful framework for decision-making. This was all the more so once Afghan commanders had developed their own CONOPS for the convoy's movement onto the NDS compound. This plan worked under the assumption that CAS by US assets would be available, but did not consider any of the practical aspects as to how this would be delivered to an Afghan assault force with no US personnel present and no possibility of terminal attack control from the convoy itself.

At the crucial moment, therefore, US SF and the AC-130U flying in support, were operating under no meaningful CONOPS. This was an important factor in the accident. It meant that no advance planning had gone into the decision-making process that they were now confronted with. The CONOPS differed in several crucial respects from previous applications of CAS during Operation *Kunduz Clearing Patrol* and gave no guidance on the specific risks that existed or how to mitigate these.

The limitations of the original CONOPS, therefore, came back to bite the operation five days later. The investigation report, in its review of the mission planning process and the CONOPS that it produced, described the adverse circumstances that confronted its author, the GFC, as an explanation for the restricted scope of the plan. In a memorable phrase, the report delivered its judgment of the 'Kunduz planning process' with the words 'one dimensional' and assigned the blame for this on 'higher headquarters'.⁵⁸² In fact, the report's blunt verdict on the joint operations centre reads very similar to the description we had earlier of TEPCO's leadership and their relationship to front line operations inside the stricken Fukushima plant,

While ODA leaders developed detailed plans, higher headquarters provided little support beyond allocated CAS and ... ISR support. These headquarters did monitor the current situation and support in directing kinetic strikes in the city. But when most needed, these headquarters provided little support to monitoring current operations, providing a quality check to employment of AC-130U fires, and assisting in providing the one critical resupply need – batteries for the (JTAC's use). These headquarters also failed to react to the events that significantly degraded the AC-130U's abilities to provide fires. They didn't quality check the aircrew and showed little interest in assisting them in their mission.⁵⁸³

It is hard to disagree with the report's assessment. However, as is hopefully clear by now, our discussion here is not really concerned with what the joint operations centre failed to do, but instead with how commanders **can** successfully 'quality check' the employment of fires and provide support 'when it is most needed', that is, in real time. Our goal is to demonstrate that this **is** possible to do and to give an idea of what this might look like in practice, just as we did in our description of how the incident with the Black Hawks should have been run.

The Mission Planning Process—How Was Risk Dealt With?

For the investigation team, the 'one dimensional' character of the planning process could be seen most clearly in its treatment of risk. This included the original draft produced by the GFC,

a multiple slide PowerPoint presentation which addressed mission risk once. From slide 2 of CONOP (...) 09-001, "The overall risk for this operation is MEDIUM. Insurgent contact is INTENDED"... Nowhere are specific mission hazards identified, assessed or controls defined.⁵⁸⁴

At face level, this criticism has some force. However, in our view, this does not do justice to the way risk was actually handled by the GFC's CONOPS. Instead, it highlights a problem with the way risk is supposed to be dealt with in mission planning, in the risk management procedure itself, which we will argue is **meaningless**, despite the good intentions that lie behind it.

Support for this contention can be found in the reality that not only was risk treated in this manner by the CONOPS, it was, in reality, the way it was handled **every time** a mission planning process was conducted. The investigation report itself complains about this, arguing that throughout *Resolute Support* commanders at all levels repeatedly 'side-stepped' risk management, in the process 'short-changing' the military decision-making process.⁵⁸⁵ The report goes on to make an interesting claim, which almost certainly has merit, that the use of PowerPoint in place of proper operations orders contributes to the compression of decision-making processes.

In the case of *Kunduz Clearing Patrol*, however, or its initial version *Operation Kunduz City Foothold Establishment*, this critique misses something important, namely, that due consideration of the risks **was** factored into the very military decision-making process itself, in the development of a course of action (COA). This was why a separate 'risk management' procedure was 'side-stepped' by the GFC and given such token treatment in the PowerPoint presentation.

We can see how this works if we examine the adverse conditions that affected the CONOPS drafting, including those listed in the report under 'Initial Hazards',⁵⁸⁶ how these shaped the risks faced by the mission and then how the CONOPS took these into account.

The first problem encountered by the GFC was that he had no staff to assist him. 'Doctrinally, an AOB HQ's staff consists of (...) including (...). The (GFC), however, deployed to (Camp Pamir) without his staff.'⁵⁸⁷ He also had limited office facilities, lacking even a printer to reproduce his single paper map, or the improvised imagery created by the JTACs present.

Interviewing officer: 'So as you were departing, besides one over fifty map, did you have any other (visual aids) or anything going in?'

GFC: The controllers, Sir, they tried to make (grid reference graphics) for everyone, I can't call them truly (GRGs). They tried to make imagery with grids on them for some fire de-confliction purposes. It wasn't like we had numbered buildings. That would have been basically impossible on something this size especially in the time we had available. They tried to print imagery; however (Camp Pamir) infrastructure, being a cold base, on top of not getting as much love up there, they had one old printer and it was printing out these giant magenta blobs. They were worthless so nobody ended up using them.'⁵⁸⁸

The main handicap for the GFC, however, was his lack of experience or training for the task at hand, notwithstanding his time in Iraq a decade earlier. This was part of a larger challenge; US

SF in Afghanistan did not, as a general rule, do urban operations—they avoided them whenever possible. In this respect, the Kunduz operation was something quite unique. A staff member put it this way:

From the JOC perspective, the only unusual aspect of this engagement compared to previous engagements in Afghanistan was that it was conducted in an urban environment, which occurs on a relatively rare basis.⁵⁸⁹

The GFC himself contrasted the position in relation to Kunduz with an earlier deployment to Paktia province. Addressing his interviewers, he stated:

As General Jenkins knows there is plenty of fights to be had in Paktia, but it generally took place outside of the city... My experience in Paktia, we actually, we made it quite a point to avoid urban contact. It was a routine talking point in our Shurahs when we'd go into a village. You know, we're always ready to fight but we all agree let's do it outside the village.⁵⁹⁰

The commander was confident in his own ability to cope with the environment. 'I actually have quite a bit of experience in urban combat'. Such confidence was not misplaced, nevertheless, the issue before him was not how to fight, but how to develop a CONOPS for an operation his TAA mission had not anticipated, did not train for, and normally avoided, over completely unknown terrain, with troops and officers he had only just met. As he put it himself, 'This wasn't our normal operation.'⁵⁹¹

Against this background, it was clear that CAS would play a critical role, as it already was in the defence of the airfield. Unfortunately, here too the GFC's lack of experience came out in his interview.

Interviewing officer: 'So talk to me a little bit about your experience with AC-130 gunships in general, do you have you used them before in combat, in training, and if so where...'

GFC: 'No, I have not, Sir, I have had them overhead in Paktia on five, maybe six occasions, but it wasn't something I routinely got, for one thing, doing offensive half operations was still the exception to what we normally did in Paktia, we would do it, but it wasn't our primary focus... So there were a handful of occasions where I had it, Sir, but I never even employed it when I did have it. This was the first time.'⁵⁹²

Given the importance of CAS, it would have been ideal if the inexperienced GFC had an old hand for a JTAC to help him through. Instead, the JTAC turned out to be on his first tour in theatre.

The No-Strike List—Never a Consideration

It is only within this context that the absence of the no-strike list (NSL) from the mission planning process can be explained and its significance understood. As the report states, ‘The NSL was not considered in the CONOP development ... process’. The question is—**why not?**

For the GFC, the answer is relatively straightforward—the NSL was not available to him. In fact, not only was it unavailable, he had no knowledge of its existence. This was made clear by his alternate, the GFC who was also present in the PGOV on 2/3 October but who was off-shift at the time of the incident.

I was not even aware of the existence of a comprehensive Afghan ‘no-strike list’ until after we returned.⁵⁹³

This state of affairs was not unusual. There was no requirement in the standard operating procedures for mission planning that the NSL be consulted.⁵⁹⁴ Once the CONOPS had been drafted and submitted up the chain of command for review, ‘SOTF-A and SOTF-A staffed and legally reviewed the CONOP; the NSL was not referenced in the CONOP... approval process.’⁵⁹⁵ Nor was it referred to by the aircrew, who did have a version of the NSL uploaded onto their on-board computer from their mission two nights previously. The MSF Trauma Centre was on this list, as indeed it had been on every NSL produced since October 2014.⁵⁹⁶

The reason for this all-round failure to consult the NSL consisted of one simple fact—in 2015, at this stage of the war, US Forces Afghanistan **did not do urban combat operations**. They were not prepared for the extra degree of complexity that accompanies military operations on urban terrain (MOUT). It was this factor and not an unwillingness to conduct risk assessments that produced a ‘one dimensional’ mission planning and approval process.

Because we know the outcome of the operation, there is a tendency to understand the lack of visibility on the part of the NSL from the perspective of the airstrike on the MSF Trauma Centre. **But this is to miss its importance altogether.** The irrelevance of the NSL to the CONOPS development was a reflection above all of the lack of **any** situational awareness in relation to the operating environment. It is essential that this is understood. The problem was not that the GAF was unaware of the location of the Trauma Centre; the problem was that the GAF were totally unaware of **any** locations inside Kunduz. They knew nothing about the city whatsoever. The only partial exceptions to this were the key objectives chosen for the operation, among them the PGOV. In fact, there is good reason to believe that this is **why** they were chosen as objectives—they were the only known points of strategic significance.

The problem was not that the GAF was unaware of the location of the Trauma Centre; the problem was that the GAF were totally unaware of any locations inside Kunduz. They knew nothing about the city whatsoever.

The most important feature of urban warfare is its complex nature. A no-strike list is one tool for coping with this complexity, but it is not a magic bullet. Even the task of drawing up and maintaining an up-to-date and accurate NSL for a city the size of Kunduz during a large-scale insurgent offensive is a major challenge. It requires all-source intelligence collection and processing capability at a strategic and agency levels, as well as the capacity to conduct information operations, and the ability to operate across the full spectrum of warfare at a moment's notice.

If we take the problems raised just by hospitals, we can get a sense of the size of the challenge. MSF alone had a presence at four locations inside Kunduz, including an office within the PGOV complex. The city also contained two other large hospital sites, one of which was in the west of the city, considered the area where the insurgency had its strongest grip. The other, in the south, had been taken over by insurgents and was now a military strongpoint, not a medical facility. This hospital was, in fact, a key objective in the first draft of the plan to re-enter the city.

Complicating the issue further was the matter of markings on the roofs of these sites. The MSF Trauma Centre, for reasons that are still not clear, did not have an 'H' or other recognised symbol that would be visible from the air. The other two hospitals, being authorised facilities by the Afghan Health Ministry, most likely did have such markings. Nevertheless, only one of these maintained its protected status as the other was now occupied by combatants and transformed into a fortified strongpoint. Assuming this information is correct, an up-to-date briefing on 2 October for aircrew, if they had the time to receive one before take off, would want to have included the following -

	Medical Facility	Roof Marking?	Protected Status?
1	MSF Trauma Centre	NO	YES
2	Kunduz West Hospital	YES	YES
3	Kunduz South Hospital	YES	NO

Table 18-1: Hypothetical briefing on Kunduz medical facilities

The problem was no simpler when it came to pattern-of-life (POL). The MSF Trauma Centre was used by insurgents as a treatment station for their seriously wounded. This did not mean that the hospital lost its protected status. It did mean, however, that armed men could often be seen outside and, on occasion, inside the compound if they were bringing in one of their wounded for emergency treatment and there was no time to disarm as they came through the door, as stipulated by MSF rules as a condition of entry. On 2 October, it was believed that a patient in the facility was the brother of a senior Taliban commander who, accompanied by his bodyguards, was a frequent visitor. This meant that it could be quite plausible for a TV sensor operator, looking down from above, to see a large compound with what appeared to be an armed security detail outside the gate. Ideally, aircrew would also have been briefed on this possibility.

MSF’s policy of providing treatment to anyone, regardless of status, created another potential issue, in that the NGO’s presence was strongly resented by some elements within the Afghan security forces.⁵⁹⁷ Disgruntled security force members might, as a result, supply false information to US forces in a deliberate attempt to trick them into striking the hospital. Rumours that this was, in fact, what happened on 3 October persisted for months after the airstrike, although the evidence is overwhelming that this was not a factor in the accident.

Hospitals were by no means the most difficult cases. The NDS prison, for example, presented another set of complications. Prior to 28 September, the prison housed 700 male and 20 female inmates. It would have been on any NSL list. Once captured by insurgents, however, the male prisoners were released and quickly dispersed. From this point on, the site became a military strongpoint and would have been quite high on the priority list for government forces. The problem was, however, that nobody knew what had happened to the female inmates. According to the UNAMA report, they were also released but it was also quite possible that they were still on the premises while the insurgents were arranging transport for them out of the city to their respective homes.

A no-strike list that was of any use would have to take these kind of dilemmas into account. AJOC member gave this insight into the actual NSL that no-one had looked at.

Of note, our initial objective for the night 29/30 Sep was the actual Kunduz City Hospital (also known as the PRT Hospital) in Kunduz city... as it had been taken over by the Taliban. That mission was approved. Kunduz city is covered with schools, mosques, government facilities, private residences, businesses, and other locations to include the Provincial Centre, NDS Prison, and PSU HQ (...) which we understand are all on the NSL.⁵⁹⁸

None of this information was available to the original author of the CONOPS for retaking Kunduz on 2/3 October.

We are now in a position to list the factors that affected mission risk during the drafting process of the mission plan.

FACTORS INFLUENCING MISSION RISK DURING THE DRAFTING OF CONOPS		DEC 	INC 
1	Insurgent offensive unexpected, loss of provincial capital a major blow, quick response needed		
2	Afghan units at airfield disorganised and demoralised, most were unwilling to re-enter the city		
3	Intelligence unavailable on adversary units, capability or intent		
4	Neither Afghan nor US SF were familiar with the city		
5	Commander AOB-N deployed without staff		
6	No office resources, ability to provide maps or grid reference graphics		
7	Lack of personal experience in planning urban operations		
8	Previous experience of urban combat		
9	Absence of familiarity with urban operations on the part of USFOR-A as a whole		
10	Lack of experience in employing CAS		
11	Unavailability of an experienced JTAC		
12	GFC was newly arrived at AOB-N, did not know key US special forces or Afghan State Security Forces figures on a personal level		
13	Minimal SA of the operating environment, no JIPOE to draw on, no NSL list or any other intelligence products		

Table 18-2: Factors affecting risk on Kunduz mission

Factors 7, 11 and 13 are the most important of those listed above which is why they have been given extra weighting. The GFC was in no position to influence either of these, but did have to take them into account.

From this point, we can examine the mission plan that was produced and see how each of these risk factors was incorporated into the CONOPS.

Incorporation of Risk Factors into the Concept Of Operations		
1	Loss of provincial capital a major blow, quick response needed	Seizure of PGOV of symbolic importance, can be done inside 24hrs
2	Afghan units at airfield disorganised and demoralised	Volunteer force assembled under US SF leadership, provision of CAS
3	Intelligence unavailable on adversary units, capability or intent	Once the GAF was inside PGOV, the insurgents would focus their main effort there
4	Neither Afghan nor US SF were familiar with the city	PGOV and other key objectives easy to find, easy escape route to the east
5	Commander AOB-N deployed without staff	Plan limited in scope and complexity
6	No office resources, ability to provide maps or grid references	Convoy elements to remain within visual contact
7	Lack of personal experience in planning urban operations	Simplicity of plan, consistency with doctrine, narrow front, ‘inside out’
8	Previous experience of urban combat	Plan consistent with experience
9	Absence of familiarity with urban operations on the part of USFOR-A	Simplicity of plan, main role still training and assistance to Afghan forces, providing leadership and CAS

10	Lack of experience in employing CAS	Type 1 control – line-of-sight (LOS) to target, self-defence ROE
11	Unavailability of an experienced JTAC	Type 1 control wherever possible
12	Did not know key US SF or ASSF figures on a personal level	Best fighters to self-select by volunteering to join GAF
13	Minimal SA of the operating environment	Focus on PGOV and limited number of key objectives

Table 18-3: Mitigating risk factors

It was on the basis of this CONOPS, that the risk to the mission was rated as ‘medium’. This was nothing more than a statement of confidence in the plan that the GFC believed was workable. In fact, it is hard to see what else the formal aspect of the risk management process has to contribute, apart from passing a final judgment on the CONOPS in this way, given that the entire planning process is an exercise in managing the risk of mission failure.

From this perspective, it is hardly a surprise that the vast majority of plans are rated ‘low’ or ‘medium’ risk. To do otherwise would be to say in effect, that the plan is not yet ready, more controls need to be applied or else another course of action considered altogether. Under extreme circumstances, an exception might be made, but in the normal run of events, if the author believed the plan to be a good one, then the risk would be rated at the level needed to obtain approval from higher command.

Evidence that this was standard practice in theatre can be found in the investigating report which reviewed the worksheets submitted pre-flight by aircrews as part of the air component’s operational risk management (ORM) system. ‘ORM sheets (of the 41 reviewed, 5 were medium, none were high—the 2 Oct mission was assessed as low).’⁵⁹⁹

The investigation ascribed this to ‘complacency’⁶⁰⁰ across *Resolute Support*, a problem of organisational culture, in other words. In our view, however, the real issue is the nature of the risk management system itself, which **does not add anything of value** to the mission planning process. This is the reason why it is so often reduced to a ‘box ticking’ exercise.

The Standard Risk Management Method—Not Fit for Purpose

This is all the more so when we come to the potential for catastrophic error. For as we shall see, this category of risk **does not even fall within the scope** of the standard risk management methodology. This is why we argue that it is not suitable for our purposes.

The intent behind a formalised risk management process is a good one. Its goal is to interrupt the normal flow of activity, so that operators are forced to reflect on the hazards or circumstances that could cause them harm, before their attention is absorbed by the task at hand. Risk assessments of this kind, whether in the form of site safety or job safety analyses, are now standardised practices across a wide range of industries.

An important feature of these assessments is that they are documented in order to provide evidence that they have been carried out. This reinforces the disruptive character of the process; normal operations are held up for a period while a form is filled out. They then resume. The main benefit of this activity is an increase in awareness, although how long this lasts once work has restarted is an open question. The process is most useful when an unfamiliar task or environment is encountered.

It is important to note that, strictly speaking, what is taking place here is not risk management. The process does not have any significant impact on the level of risk. This is done elsewhere and falls on a spectrum between two extremes. At one end, as we saw with mission planning, developing a strategy to overcome the risk of mission failure is the main feature of the process itself. Mission planning, in other words, is risk management. At the other end, where operations are marked by routine, risk controls have already been put in place and it is simply a matter of noting their presence. We see this in the ORM worksheet which includes an item for the eventuality that the aircraft comes under attack from a surface-to-air missile. In spite of the severity of the threat involved, the risk is assessed as low, as the aircraft is considered to have adequate countermeasures on board to defeat any such launch.

In neither case, does the formalised ‘risk management’ process make any difference to the risk itself. Its core output is not a **reduction** in the level of risk, but a risk **assessment**.

In neither case, does the formalised ‘risk management’ process make any difference to the risk itself. Its core output is not a **reduction** in the level of risk, but a risk **assessment**, a documented statement of actual risk management efforts that have taken place somewhere else, for example, in the acquisition process for the AC-130U, where the requirement for defences against surface threats was first determined and tested.

Furthermore, when we look at the criteria against which risks are assessed, we hit another problem. These are copied in their entirety from the categories that make up the standard risk matrix, which was developed for use in a civilian context. If we look at the items listed under the 'consequences' level termed 'catastrophic', we find the following are included:

- death or permanent disability,
- major property or facility damage, or
- severe environmental damage.

If the probability of any of these outcomes is considered to be 'likely' or above, then the severity can only be rated as 'extremely high risk'.⁶⁰¹ The problem should by now be obvious—it is hard to imagine **any** military operation where a 'shoot, don't shoot' decision is involved, that would **not** score a risk value of 'extreme'. The rating exercise is futile, in military operations the risk is **always** extreme.

The problem is that, in a military context, what we require from a risk assessment is something quite different. In a civilian setting, unless we are in the demolition industry perhaps, the destruction of property is a negative outcome and is an unintended consequence of our actions. So too are deaths, permanent disability and environmental damage. For the military, on the other hand, these may not only be desirable, they are in fact the intended effect if we have taken the decision to 'shoot'. Nevertheless, the same outcomes can also be catastrophic in a military setting, **if they are the result of error**. What is needed, therefore, is an assessment of the probability that a catastrophic **error** will take place.

As the standard risk management methodology does not deliver on this requirement, it is not fit for purpose.

What If the Risk Controls Don't Work?

We can see this in the ORM worksheet. This evaluates a series of risks to the mission and to the platform. This is understandable. However, at no point in the ORM process, is there any consideration of the possibility that an AC-130U, performing its role of CAS, will mistakenly obliterate a civilian hospital run by an international NGO. This kind of catastrophic outcome, however, is precisely the category of risk that we wish to manage. The ORM system does not help us to do so in any way whatsoever nor does the formalised procedure added on to the end of the mission planning process.

At no point in the ORM process, is there any consideration of the possibility that an AC-130U, performing its role of CAS, will mistakenly obliterate a civilian hospital run by an international NGO. This kind of catastrophic outcome, however, is precisely the category of risk that we wish to manage.

It is important to understand why these standard risk processes do not include this type of risk. It follows from their very nature which is to interrupt the normal flow of activities in order to consider real or potential hazards and then state what controls are in place to mitigate their impact. The result should be a residual level of risk that is acceptable. For this to have any meaning, therefore, an assumption must be built into the process—that **the controls will work as intended**.

When assessing the potential for catastrophic error, on the other hand, it is this **same** assumption that is being put to the test. It is **the likelihood that our controls will fail**, or even that they have already failed, that we are seeking to evaluate.

We can illustrate this with another example from the ORM worksheet. Under the section ‘Human Factors’ which deals with risks to aircrew performance, the control crew resource management (CRM) is listed. This is perfectly logical, as it is the very purpose of CRM to mitigate the possibility of human error by a member of the crew. CRM, however, only serves as an effective risk control if it is applied properly and this, in turn, is a function of how well the aircrew is able to work as a team.

For this particular crew, on only their second flight together, the process of team formation was still in its early stages and therefore their ability to employ CRM techniques was limited. This might not have mattered except we know from the radio transcripts that it did, that the aircrew struggled to arrive at a mutual understanding of the situation and a consensus on how to proceed, as they grappled with the difficulties of understanding the GFC’s intent, the PID, POL and weaponising processes. At different points in time, depending on the specific challenge they faced and how their interactions were going, the impact of CRM, the extent to which it was acting as an effective risk control against the possibility of human error, would be varying greatly, sometimes working well, others not so well. In other words, the control is a **variable**. If we are to minimise the risk of catastrophic error, therefore, what we need to know above all, and in real time, is **the status of this control**—is it working, or is it not, and if not, what are the potential implications for the wider systemic risk?

In the course of the mission on 2/3 October, the status of CRM, or more broadly the aircrew’s ability to function as an effective team, would have moved up and down as the product of three further inputs. First was the aircrew’s formation into a team which would have progressed as the flight went on. Second were the demands placed on this capability as the crew were presented with

various tasks, such as the PID and POL. Third were the consequences of error, as the crucial and irreversible moment approached, the point of decision between ‘shoot, don’t shoot’.

If we were tracking this status in real time, over the duration of the flight, then our indicators may have looked something like this -

Event/time	PID			POL			0208	
AS INTENDED								
UNDER STRESS								
FAILING								

Table 18-4: AC-130U aircrew’s team processes coping with demands on them

The crew were well aware of this and fought hard to rectify the position as best they could. This is also evident from the transcripts. In this sense, the crew were directly managing the risk, through their interactions, seeking to work through the challenges thrown at them during the mission and achieve a successful end result. Risk management, in other words, was simply the task at hand, just as it was for the GFC during the mission planning phase.

This is why neither the aircrew, nor the GFC, are the appropriate personnel to conduct the type of risk management we require when it comes to the potential for catastrophic error. They are already busy with the prevention of such an outcome, simply by carrying out their normal duties. **What is needed, on the other hand, is an evaluation as to how well they are doing, and what this means for the overall status of the system, whether we are in danger of migrating into a state of high risk.** The only person or persons in a position to do this, are those who are not otherwise absorbed in the mission itself, but can stand back and gain an overview.

We are back, in other words, to the concept of a ‘process guardian’.

A good example of how this would work can be found in the aftermath of the SAM launch on the aircraft. The crew were successful in defeating this threat. However, in doing so, they also degraded the AC-130U’s capability to deploy its systems for locating grid points on the ground, at least temporarily. From the crew’s point of view, this was still a desirable outcome, for obvious reasons, and the correct course of action to take. From a systemic perspective, on the other hand, an important control mechanism had been taken out by this development. The risk of an error in any target identification process was now significantly increased.

What was needed was to recognise this and understand the implications. Any CAS would now have to follow a bomb-on-target (BOT) process, as a bomb-on-coordinates (BOC) process was excluded on technical grounds. This, in turn, meant that success hinged on the quality of communications between an inexperienced JTAC, his GFC, and an aircrew that also lacked experience. With this in mind, the use of non-standard terminology and the obvious confusion this caused would have signalled the likelihood that this now-critical control mechanism was also failing and that the risk of error was moving into the extreme range. As the developments we are describing here took place over a period of several hours, time was available to take countermeasures and improve the position.

This assumes that a process guardian would have had visibility into the radio traffic between air and ground, and among the crew. But this is a practical limitation that is not so difficult to overcome. A process guardian, located in a JOC and able to talk to both the aircraft and the GFC, would have had ample opportunity to form an impression as to how well things were going. For example, it would have been relatively easy under these conditions to compare each actor’s understanding of the situation to see if they were consistent with one another.

The reality was that, on the night of 2/3 October, a whole series of control mechanisms failed one after another. Each one of these failures increased the level of systemic risk. That they did so was no mystery. The problem was never a lack of visibility; it was that **no-one was watching**, no-one stepped in to prevent the situation deteriorating further. This is also the conclusion reached by the investigation report.

The simultaneous failure of several of the aforementioned mission command systems occurred the night of 2-3 Oct 15. Resolute Support and its subordinate commands did not institute procedures to work through these issues, severely minimizing the situational awareness of each command... As such, upon each failure of a mission command system, each level of command staffs should have exercised a battle drill to fill the gap created by a degraded mission command system,⁶⁰²

It is important to remember the AC-130 crew observed the MSF Trauma Centre for (...) minutes before they engaged the main building. This was ample time for other headquarters to provide critical oversight to the ground force.⁶⁰³

If we list some of the controls that failed during the AC-130U’s mission, we can see just how degraded was the decision-making capability surrounding the delivery of CAS, by the time of the engagement. In some cases, as when the aircraft returned to an orbit above the city, a control was restored, but as we have seen this was not exploited and the position remained in a state of heightened risk.

CONTROLS	0208									
Pre-mission brief intelligence products	■	■	■	■	■	■	■	■	■	■
Data link communications	■	■	■	■	■	■	■	■	■	■
SAM countermeasures	■	■	■	■	■	■	■	■	■	■
Standard terminology	■	■	■	■	■	■	■	■	■	■
Team processes (CRM)	■	■	■	■	■	■	■	■	■	■

Table 18-5: Degradation of selected safety controls on AC-130U

This was matched by a deterioration of the controls in force on the ground, since the launch of the operation on 30 September. Many of these were a result of the operation exceeding its original 24-hour time frame, combined with the intensity of the firefight around the PGOV.

CONTROLS	0208									
CONOPS mission planning	■	■	■	■	■	■	■	■	■	■
Alertness/ combat stress	■	■	■	■	■	■	■	■	■	■
Sleep/rest	■	■	■	■	■	■	■	■	■	■
Supply position	■	■	■	■	■	■	■	■	■	■
Situational awareness	■	■	■	■	■	■	■	■	■	■

Table 18-6: Degradation of selected safety controls on ground

Meanwhile, in the JOC, staff were hampered by the data link outage and their overall lack of situational awareness (SA).

CONTROLS										0208
Ability to track AC-130U & sensors										
SA of ground position										

Table 18-7: Degradation of some safety controls at JOC

This list is only partial and is mainly for illustration purposes—to demonstrate the principle that risk controls are a variable, their status cannot be taken for granted.

Our objective here is to show how a process guardian can evaluate, in real time, whether and to what extent the system, in this case the operation as a whole, was moving into a state of high risk, where the probability of a catastrophic error had risen to an alarming level. As we can see, the position did get steadily worse as the night of 2/3 October progressed. In order to assess the risk, however, another element is needed. We need to understand the baseline status of the mission, over the entire four days, so that we can appreciate to what extent the loss of key control mechanisms in the run up to the airstrike affected this.

Critical Safety Factors During Previous CAS Strikes

As our main risk of catastrophic error arose out of the provision of CAS, what is required therefore is an assessment of the likelihood of such an error throughout the entire course of the mission. Even more important than this, is a full understanding of those factors that decisively shaped this probability. This allows us to determine whether anything significant changed while the aircraft was in the air and, if so, what made the crucial difference. It is not hard to see how useful this information would be for anyone monitoring the risk level in real time.

Up to this point, we have limited ourselves to listing those control mechanisms that were either absent altogether or were degraded during the course of the mission. However, this is only one part of the picture—we also need to include those controls that **were** working, that did in fact keep the risk of error from a CAS strike to a minimum. We need to identify the **critical safety factors** that were in place.

For this, we need to take previous CAS events into account.

SOTF-A and the GFC directed 22 CAS strikes in the vicinity of Kunduz city in support of ground force operations between 29 Sep and the evening of 2nd Oct... The ground force conducted 13 strikes under [Operation *Resolute Support*] authorities using self-defence ROE... These strikes were conducted against insurgent troops, vehicles, command and control nodes, and buildings and is indicative of the level of contact the ground force was engaged in during this time period.⁶⁰⁴

This dry language does not quite capture the circumstances under which CAS was employed. A JOC member provides this description of the conditions on the ground.

The combined element initiated this operation on the evening of the 30th, and from the time they left the airfield, they were constantly engaged with the enemy. As they cleared north along the route, they cleared the PSU HQ and NDS compounds as they reached them. This element conducted at least 5 Air to Ground (ATG) engagements resulting in at least 31 EKIA as they pushed into the city and into the PGOV compound...

For the next 48 hours, the elements at the PGOV compound were engaged with the enemy so close that the US SF element were using grenades to defend themselves. I can personally say that every time I spoke with (the GFC) on the phone (approximately 6-7 times) during this period I heard constant gun fire and on a few occasions heard incoming mortars...

At 1546 on October 2nd, the ground forces conducted an ATG engagement on two compounds approximately 240m from the PGOV compound. Had (the GFC) not made the quick decision to conduct an ATG engagement on these buildings, I believe with relative certainty that US soldiers would have died that day.⁶⁰⁵

Another staff officer put the same strike as on 'an INS strongpoint approximately 175–200 m west of the SW tower', making it officially 'danger close'.⁶⁰⁶ The alternate GFC recalled that he 'called several danger close engagements up to within 20 m of our position'.⁶⁰⁷

Here is a good example of high consequence decision-making in action—the extreme risk of friendly fire from a danger-close strike was balanced against the even more extreme risk of a 'don't shoot' decision not to proceed with the strike. Of most relevance, however, is the fact that every one of the 22 CAS strikes was conducted **safely**, in spite of the potential for any of them to generate a catastrophic outcome. The fire was effective, avoided friendlies and did not lead to disproportionate civilian casualties.

How was this achieved? Our question here is the same as that which drove our analysis of the Black Hawk incident—**how was safety produced** and what were the critical safety controls?

It is in this context that we have to examine the question of the no strike list. Following the accident, investigators were tasked with examining how the NSL was not included in the CONOPS, nor referred to by the aircrew. A key recommendation was to ensure this did not happen again and SOPs were changed in due course. However, the situation in relation to the NSL is the same as it was with the Mode I IFF issue in Operation *Provide Comfort*. The reality is that the NSL played no part in Operation *Kunduz Clearing Patrol* whatsoever; it therefore made **no** contribution to the safe outcomes that marked the 13 CAS strikes conducted up until late on 2 October. The failure to upload the latest version of the NSL into the AC-130U’s on board systems **cannot**, therefore, be considered a significant cause of the tragedy, as it was also absent during every other, successful, CAS mission.

The reality is that the NSL played no part in Operation *Kunduz Clearing Patrol* whatsoever; it therefore made no contribution to the safe outcomes that marked the 13 CAS strikes conducted up until late on 2 October. The failure to upload the latest version of the NSL into the AC-130U’s on board systems **cannot**, therefore, be considered a significant cause of the tragedy...

Not only were CAS strikes conducted safely without the availability on hand of an NSL, they were also carried out in the absence of any meaningful level of situational awareness in relation to the operating environment, by an inexperienced GFC and JTAC. What, then, was the factor that ensured success in the case of the 13 strikes called in from the ground? It was this—**line of sight (LOS)**.

Line of sight operated along three dimensions. First, the JTAC was embedded with the unit requiring CAS, either the GAF convoy while it was *en route*, or the force defending the PGOV. This meant he could evaluate the effect of supporting fires and adjust accordingly, or call in further strikes. Second, the JTAC could see the target. This is often difficult in a built-up environment, but in the case of ‘danger-close’ strikes is less of a problem. Finally, the JTAC could see the aircraft. While this was not always possible, especially at night, when this condition was present it meant the strike could be conducted using Type 1 control, where the JTAC is able to talk the pilot onto the target. When BOT is being applied, this is the most effective means of control.

It was this reliance on LOS that overcame the limitations of SA over the OE, and the absence of an NSL. Any building that was a source of effective fire on the GAF, even a hospital, lost any protected status it might have had and could be targeted in self-defence, so long as the response was proportionate to the threat. This is how safety was maintained in practice.

The Shortage of Batteries

It is when we are able to understand the importance of line of sight that we are also able to appreciate the significance of the battery issue. By the night of 2/3 October, US SF inside the PGOV faced a critical shortage of batteries. This was the single most serious consequence of the operation's extension into its fourth day. A JTAC present described the situation.

There were (...) systems (...) device at the PCOP (a part of the PGOV complex), however both were inoperable due to a lack of power. Our battery situation was so dire that we were cannibalizing other ODA team members radio batteries in order to continue to power our (JTAC) radios in order to continue communications with aircraft.⁶⁰⁸

The lack of batteries compromised a series of controls that could have been applied to reduce the risk of catastrophic error. This was especially so once a BOT had been chosen as the means of delivery. The JTAC had the capability of viewing what the AC-130U was looking at through its sensors, including the intended target. If line of sight was an option, he could also use a laser designator either to direct munitions or more likely to assist with confirmation that the aircrew were looking at the right compound.

In this case, the navigator on board was aware of the battery shortage and therefore did not ask the JTAC to use his laser device. However, he was not aware that the JTAC did not have LOS to the target and was relaying a description of it that was perhaps fourth hand, through the GFC, his interpreter, the LNO and, hopefully, a National Directorate of Security (NDS) officer who was familiar with the building layout, though even this was not guaranteed. If he had requested a laser designation and been informed this was not possible due to the absence of LOS, this would have alerted the navigator and aircrew as to the actual position in relation to the target identification process and the chances that they were looking at the wrong compound altogether.

This information allows us now to conduct a risk assessment on the probability of error for a CAS strike carried out in support of the convoy as it moved towards its objective—the NDS prison. These can be set against the controls that were in place during the earlier, successful, employment of CAS during the mission.

Factor Affecting Safety of CAS Strike in Support of Convoy	Factor Present?		Impact on Risk	
	Yes	No	Inc	Dec
JTAC LOS to the convoy requiring CAS		■	■	
JTAC LOS to the target		■	■	
JTAC LOS to the aircraft, Type 1 control		■	■	
JTAC sees aircraft sensors observing the target		■	■	
JTAC/GFC ability to clearly describe the target to aircrew		■	■	
Option of using a laser designator to assist with PID		■	■	
Option of using aircraft systems to check coordinates		■	■	

Table 18-7: Probability of a catastrophic error from CAS strike

The bottom four controls had the potential to make up for the loss of the top three. Conversely, in the case of the earlier strikes, the presence of LOS made these secondary controls unnecessary. They could be dispensed with safely. In effect, what we have here are two tiers of safety factors, with LOS as the primary and the rest playing the role of back up. If we contrast the two sets of circumstances, therefore, we can display these in the following way -

Status of Critical Safety Controls	Tier One			Tier Two			
Earlier CAS strikes	■	■	■				
Strike in support of convoy	■	■	■	■	■	■	■

Table 18-8: Status of critical safety controls

The practical value of this exercise is that there was nothing preventing this risk assessment being carried out as soon as the CONOPS for the night's convoy movement was developed. From this point on, the conditions for any potential CAS strikes in support of the convoy were set and so could be evaluated. This was a full 6–8 hours before the airstrike; plenty of time in which to adopt countermeasures and mitigate the elevated risk of catastrophic error.

To understand why this was not done, we have to turn our attention to another aspect of our 'own situation'—the rules of engagement (ROE). These complicated matters, or more accurately, as we have discussed in previous chapters, they reflected the complexity of modern warfare, above all, the challenge of conducting fire support missions in a densely populated urban area.

Close Air Support - How Close Is Close?

The most obvious complication lay in the fact that not one, but two sets of ROE were in force during Operation *Kunduz Clearing Patrol*. This resulted from a further difficulty—CAS doctrine as normally applied by US SF. The problem stemmed from the use of one term 'close air support' to describe two quite different applications of air power. Both doctrine, and the procedures in use across Operation *Resolute Support* (ORS), recognised this difference by developing two sets of ROE, each with their own targeting and execution processes. Nevertheless, the ambiguity created by using a single phrase 'CAS' to cover both also caused confusion, as to which ROE and procedure applied in concrete circumstances, for a particular airstrike, when this fell into the grey area between the two.

It was this confusion that allowed the airstrike on the MSF Trauma Centre to go ahead, even though the critical safety controls that had governed CAS strikes up to this point in the mission were no longer in place. The rules for one type of CAS were applied when the rules for the other should have been used.

An indication of the two kinds of CAS can be found in the break down of the 22 CAS strikes delivered across the Kunduz AO in support of the operation. As we have seen, 13 were initiated from the ground, within direct LOS of the GAF. The other 9 were directed by SOTF-A 'under Operation *Freedom's Sentinel* (OFS) authorities using ROE ... against targets that were effectively and substantially contributing to insurgent ability to conduct operations against Coalition forces located in Kunduz city'.⁶⁰⁹ A member of the JOC explained the difference between the two, from the perspective of the ground force inside the PGOV.

We relied on our own intelligence from the ground within a given area ... from which you can see mosques and other notable buildings we would always avoid ... and any information coming from higher or our partner force. The other check in this check and balance is that if we are not engaging a structure in self-defense (which requires no approval from higher) then we always call higher and go through the chain of approval to the Target Engagement Authority (TEA) for structure.⁶¹⁰

The first sentence here means line-of-sight in other words.

Referring strikes to the TEA meant that all the resources of the JOC could be applied in targeting, including the selection of priorities and deconfliction of friendly forces, taking the entire battlespace into account. This was preferable even when strikes were being conducted in self-defence, so long as the time was available to employ this more rigorous process,

If the tactical situation on the ground permits, and the (GFC) or in this case (the JTAC) is able to communicate what he is going to strike in self-defence situations prior to the engagement, then we will cross-reference with our COP, intelligence picture and what SA we are provided through (ISR assets) and intervene if we identify something contrary to what he is seeing on the battlefield at the time. For example, if we could see an ASSF/ANDSF unit manoeuvring on the flank of an enemy formation attacking the PGOV compound, we would ensure that—at a minimum—he knew where they were prior to the strike to avoid fratricide.⁶¹¹

The key principle, as in our other case studies, was superior SA. Line of sight could provide this up to a point and if the urgency of the situation demanded it, or there was no better alternative, then this could form the basis for decisions on the use of CAS platforms. Under most conditions, however, it was the operations centre, with SA across the entire operating environment rather than the immediate space around the PGOV, that was in the best position to determine the most effective application of fire support. This was not a question of the ROE, but of practicality.

Unfortunately, the critical role of SA in decision-making on the provision of CAS was not widely understood. Instead, as happened with the F-15 pilots in the Black Hawk accident, it was the ROE that formed the main basis for decisions as to who called in a strike. But as we have argued earlier, this is not a correct use of ROE, which only stipulate what **can** be done, not what **should** be done. In this case, the difficulty lay in the definition of self-defence which did not provide a clear demarcation between those instances where a GFC or JTAC was the most appropriate person to direct a CAS strike, and those where this was better done from the JOC.

Line of sight, on the other hand, **did** provide a sound basis for choosing between the two options.

The problem arose when it came to incidents of indirect fire, from mortars and other heavy weapons beyond the PGOV or convoy's LOS. Self-defence did apply, in the sense that they were under attack. However, the ability to control a CAS platform onto the right target from the ground was clearly limited under such conditions. The risk of error, of civilian casualties or friendly fire, rose exponentially. Lack of SA over the operating environment, likewise not an issue while LOS existed, now came into play, including ignorance over the NSL. An airstrike in these circumstances was effectively being conducted blind.

This was the weakness in the way ROE were formulated and understood. The same applied to the tactical guidance supplied by Operation Resolute Support commander. The details of this guidance remain classified; nevertheless, its limitations as a decision aide for commanders during an engagement was noted in the report.

Throughout the investigation, it became clear that many commands have difficulty articulating an understanding of the Tactical Guidance, RS and OFS ROE, and the basic fundamentals regarding the use of force.⁶¹²

‘Which Mistake Do You Want Me to Make?’

Most likely this was a result of the training, advice, assistance (TAA) nature of Operation *Resolute Support*, combined with the complexity and unfamiliarity of conducting operations on urban terrain. The report itself concentrated on the format of the guidance and recommended it be ‘revised in a Bottom Line Up Front (BLUF) format that focuses the reader on priority points of emphasis within the Guidance’.⁶¹³ This might prove to be helpful; however it is not clear that it would fix the problem. We can see this from a PowerPoint slide also reproduced in the report that reduces the tactical guidance to six dot points. Of these, the final two are redacted, but of the four published, we can see where the heart of the matter may lay. They read:

- All persons are civilians until shown otherwise
- All structures contain civilians until shown otherwise
- Acceptable civilian casualties (CIVCAS) is 0
- Force protection is of utmost concern

These are fine statements; no-one could object to any of them. As a decision aide, however, they suffer from a crucial flaw—**they give no direction on what to do when the fourth point contradicts the first three**. However, it is in precisely such circumstances that guidance is needed.

When it comes to complex situations where multiple objectives and considerations clash with one another, a decision maker requires principles against which to prioritise competing demands. An example from firefighting is the term ‘RECEO’, where the first letter stands for ‘rescue’ and indicates the overriding priority for any fire ground commander. Putting out the fire, ‘extinguishment’, is in fact the second last of these priorities.

Another way of achieving this is to give a clear indication as to ‘which mistake do you want us to make?’ if the choice is between two bad options, or else we have a ‘shoot, don’t shoot’ situation where the risk is extreme in either case. We saw this in the ROE produced following the USS *Stark* incident, which amounted to an unambiguous ‘if in doubt, shoot’. This may seem an odd example to provide, given the tragic consequences for Iran Air Flight 655, but the reality is that the ROE achieved their purpose which was to tell US Navy commanders ‘whatever you do, do not be another *Stark*’. The failing lay not in this statement of intent, but in the failure to recognise how this direction created another risk—that of shooting down a civilian airliner by accident and to take preventative measures that met this new risk without compromising the original instruction.

The traditional method of 'if, then' procedure writing, which attempts to list out all the possible scenarios, 'if this', and from there to dictate the appropriate action, 'then do this'. The problem with this is that it breaks down in the face of complexity; there are just too many scenarios to anticipate and in any tactical situation, it is just too hard to remember which one applies...

This approach to supplying guidance has become widely adopted in recent times and is known as **principles-based decision-making**. It is an alternative to the traditional method of 'if, then' procedure writing, which attempts to list out all the possible scenarios, 'if this', and from there to dictate the appropriate action, 'then do this'. The problem with this approach is that it breaks down in the face of complexity; there are just too many scenarios to try and anticipate and in any real tactical situation it is just too hard to remember which one applies in the concrete circumstances.

It may be that the tactical guidance followed this traditional method, which was why it was considered to be 'overly complicated'⁶¹⁴. This is certainly a common complaint raised in relation to ROE training.

We can see how these factors played out if we follow the GFC's thought-processes in the lead up to the fateful airstrike. The GFC himself consciously sought to avoid a position where he would have to find the solution to an 'if this, then do this' problem, at a point in time where the convoy was already under fire. For him this was unacceptable.

If they were going to take contact, I did not want to play twenty questions while they were taking fire.⁶¹⁵

The GFC therefore sought to anticipate the problem, determine the correct course of action in advance and communicate this to his subordinates and the aircrew.

I wanted to make sure we were on target and everyone understood exactly what needed to happen.⁶¹⁶

The GFC took on this responsibility because he felt honour-bound to deliver on the promise he had made earlier to the Afghan forces, that CAS would be available to the convoy. Without this commitment, it is unlikely that the Afghan operation would have proceeded which, in turn, could have had serious consequences for the US SF inside the PGOV who were well overdue to be relieved. During the Afghan CONOPS development, the GFC asked this of his counterpart.

What do you need? He asked if they would have air support. It's been an ongoing concern even now, even once things are pretty stable up there, will we have air support? And I told him, as long as you're part of our integrated defense, then you're covered, so no issues, if you're part of our integrated defense, and the way I define it, I didn't spell it out to him, it wasn't really something he needed to fully understand, but if it was within a range where if they put up a DISKA or ZPU on a roof that they could shoot down into our compound, or effectively against our HESKO walls. I considered that to be our imminent threat/self-defense bubble because we knew they possessed those weapons, they had been employing them against us, and (...) and those HESKOs were basically what was keeping us alive, so I considered that to be an imminent threat.⁶¹⁷

It is interesting that the GFC did not seem to consider, as a viable option, that CAS could be provided by SOTF-A, through the JOC, rather than him and his JTAC. Quite possibly that was due to the lack of 'oversight' highlighted in the report—the commander felt that only he himself could be trusted to deliver on his word. Aside from this, however, what we see in the GFC's narrative is an example of the ROE being used as a basis for decision-making—we can do this, under the rules, so we will. This manifested itself in his use of the phrase 'integrated defense bubble'.

Unfortunately, this led to the devising of a method of providing CAS to the convoy that dismantled the critical safety controls that had been in place throughout the mission, above all LOS. The GFC now extended his zone of engagement out to a perimeter around the PGOV of 1 km, the effective range of direct-fire heavy weapons that might be employed against the complex. This brought the NDS compound, the convoy's objective, into the GFC's zone of engagement. The commander took the view that if the convoy came under fire, even if it was in another part of the city altogether, but the source of that fire came from within the PGOV's 'bubble', then the 'self-defense' ROE authorised him to launch an airstrike to suppress that fire.

When examining the logic of the GFC's thinking, we find ourselves in a similar position as we were when considering our F-15 pilots. His line of thought **made sense** and had the best of intentions behind it. And yet, this logic was fatally flawed, for much the same reason as was the pilots'—it used the ROE as its main guide for decision-making. However, when it comes to HCD, **situational awareness**, not ROE, is the only foundation for a decision-making process that can minimise the risk of catastrophic error. This is a key lesson of this book.

Approaching the question in this way allows us to pinpoint the key decision in the airstrike on the MSF Trauma Centre. It was the attempt to set up a situation where CAS could be provided, from the ground, without line of sight to either the convoy requiring air cover or the target.

It is worth laying out the GFC's perspective in full, taken from his interview with investigators.

GFC: The AC-130's overall purpose for the operation was self-defense of our perimeter, now in the case of where the (convoy) were going, it fell within what I considered to be our self-defence bubble...

Interviewing officer: Can you say that statement again. It fell within your perimeter for the self-defense.

GFC: Yes, Sir, I considered it to be within that. There were buildings where if a heavy weapon were placed on top of it, it could accurately engage us and pose a pretty significant threat. So, as ... its still a delay and we were talking about distances of city blocks here where dismounted insurgents with chest racks on cover distance very quickly and we knew that they had pretty significant numbers by this point in time so I wanted to make sure that any fire if it was required was going to be very responses, now the task and purpose I passed for those fires was that if the (convoy) were to take fire en route to the objective and they got fixed in place what I wanted to do was to reduce heavy weapons and strong points so that they would effectively be able to manoeuvre on to the objective...

GFC: I mean honestly, a (fortified police compound), I can't expect them to assault that"

Interviewing officer: Sure.

GFC: But they can't sit there and die on the road.⁶¹⁸

It was this thought process that led to the ill-fated PID attempt on the NDS compound. The GFC felt that if he could identify the critical C2 node and most likely source of heavy weapons fire as being at that location, he would be superbly placed to deliver effective CAS should the convoy come under fire.

The stage was now set for the tragedy to come.

Approaching the question in this way allows us to pinpoint the key decision in the airstrike on the MSF Trauma Centre. It was the attempt to set up a situation where CAS could be provided, from the ground, without line of sight to either the convoy requiring air cover or the target.

This decision was taken several hours before the airstrike and it is the one with the closest parallel to the F-15 pilots' decision to break vertical separation in order to conduct a visual identification. In both cases, it was at this point that the system migrated into a state of high risk and it was at this point that a process guardian was most needed to intervene and minimise the likelihood of a catastrophic error. In the case of the F-15s, the individual most suited to this role was the ACE, on board the AWACS. Here, it should fall to a member of the JOC.

Why Did the Airstrike Continue For So Long?

By focusing our attention on this decision, we are also able to understand one final issue—why the airstrike continued for so long, 29 minutes and 211 rounds. The reason for this lay in the absence of any **feedback mechanism**. The purpose of the CAS strike was to suppress incoming fire that the GFC believed was holding up the convoy. However, because neither the GFC nor the aircraft were observing the convoy, there was no way of knowing whether the CAS was being effective. Was it still under fire? Was it now on the move again? Was it under fire from another source? The GFC had no line of sight or radio contact and the aircraft infra-red sensor operator was focused exclusively on the target. The first indication something was not right came in the form of frantic phone calls and texts from MSF officials in Kabul to the JOC, some 12 minutes into the airstrike and when the IRSO shifted his attention to check on the convoy's whereabouts, 25 minutes in. Neither action had any effect on the strike which continued until the AC-130U's weapons overheated and ammunition stocks were almost out. The aircraft returned to base not long after the strike and the convoy proceeded to its objective without air cover. By any reckoning, the airstrike was a failure.

At this point, we are now in a position to list the key factors that contributed to the catastrophic error on 2/3 October, applying the HCD framework to do so and at the same time, identify how long these were in play before the final decision to open fire was taken.

HCD Framework Aspect	Key Factor	Lead Time Before 0208 3 October 2015	
Situational Awareness	Minimal SA of the OE, restricted to LOS and Afghan descriptions of key terrain features such as NDS sites	5 days	Start of the mission planning process
	Minimal SA of friendly forces in the AO, outside the PGOV, apart from the convoy which was visible from the air	2 days	Once US SF inside PGOV. Afghan forces conducting their own operations in Kunduz area
	No SA of aircraft and its sensors, from JOC, due to data link outage	8 hours	Data link outage
	Lack of SA of convoy, which was visible from the air but only if IRSO was looking in their direction and understood the importance of doing so	6-8 hours	Once convoy had departed from the PGOV for AF base and AC-130U on station
	No SA of aircraft and its sensors, from the ground, due to lack of batteries	4 hours	Start of the PID process

Situation Understanding	Afghans would only conduct mission if CAS was available, only GFC could or would provide this	6-8 hours	Afghan CONOPS development process
	SOTF-A understanding of Afghan objective, ISR asset assigned to wrong NDS compound	6-8 hours	Afghan CONOPS development process
	Confusion on board the aircraft as to the GFC’s intent, ‘softening’, ‘targets of opportunity’, why this target was selected	4 hours	Start of the PID process, and deteriorating over time
	Convoy under fire, source of the fire the NDS compound under observation by the AC-130U	2 mins	GFC hearing gunfire in the city
Own Situation	Tactical guidance ‘overly complicated’, unhelpful when choosing between competing priorities	5 days	Start of mission planning process
	No understanding that CAS strikes called in from the ground would only be safe if LOS applied	4 days	Once CONOPS finalised
	CONOPS declining in relevance, supply position deteriorating, above all batteries	2 days	Once inside the PGOV, relief force failed to arrive
	ROE unclear on ‘how close is close’, does an ‘integrated defense bubble’ extend beyond LOS?	6-8 hours	Afghan CONOPS development process
Decision	Intent to provide CAS without LOS to either the convoy or the target	6-8 hours	Afghan CONOPS development process
	TEA and SOTF-A/JOC resources not employed in targeting NDS compound	6-8 hours	Afghan CONOPS development process
	Option of BOC rather than BOT not considered, even though aircraft’s sensors restored	4 hours	AC-130U resumed orbit above Kunduz city
Consequences	No feedback mechanism to check effectiveness of CAS, or proportionality of fire	0+	Once airstrike had begun
	Convoy left to proceed without air cover	29+	Once airstrike over, AC-130U low on ammunition and returning to base

Table 18-9: HCD framework applied to Kunduz MSF event

This way of presenting the incident allows us to highlight the opportunities for a process guardian to intervene and minimise the risk of catastrophic error as it applied to this mission, during the entire five-day period of its duration. It also allows us to show that the prevention of a tragedy such as occurred on 2/3 October is a realistic objective.

Opportunities For A Critical Intervention by a Process Guardian		Point in time
1	Identify exactly where the risk of catastrophic error lies for this mission	CONOPS approval process
	For <i>Kunduz Clearing Patrol</i> , the most significant risk of a catastrophic error arose from the provision of CAS to forces on the ground. The process guardian would concentrate their attention on this process, specifically the possibilities that fire support would be ineffective, cause friendly casualties, civilian casualties or cause disproportionate damage to city infrastructure.	29 September
2	Identify the critical safety controls in place specifically for this mission	CONOPS approval process
	Given the lack of SA over the OE and partner force movements, this consisted of a restriction to Line of Sight for CAS engagements called in from the ground, and ideally type 1 control.	29 September
3	Ensure that the critical safety controls are understood and complied with	CONOPS approval process
	The GFC and JTAC needed to be absolutely clear on the limits to their ability to direct CAS strikes safely and when to refer targets to the SOTF-A and the TEA. Any confusion about the ROE or tactical guidance removed; self-defence applied only when there was LOS to the target	29 September
4	Anticipate the scenarios that could compromise the critical safety controls	CONOPS approval process
	If CAS strikes called in from the ground were restricted to the LOS of the GFC or JTAC, then how could CAS be provided safely to Afghan forces operating independently of the US SF inside the PGOV, but requiring air cover to achieve their objectives? This was the key problem that needed to be solved.	29 September

5	Explore the options and find a solution to the problem of providing CAS to Afghan forces	Mission start
	It was the failure to address this problem that led the GFC to believe he was the only one who could provide CAS to the convoy. However, if the time available had been put to use, other options could have been explored, such as embedding another JTAC from Kunduz AF base in the convoy, the Afghans delivering their own CAS, as they did later in the battle, or the bringing up of heavy weapons such as tanks or artillery to provide fire support.	30 September
6	Monitor the battlespace for indications the operation is migrating into a state of high risk	Mission duration
	The extension of the operation past 24 hours, the deteriorating supply position, the intensity of the firefight, the early departure of the AC-130U, the data link outage, the SAM launch, the interactions between air and ground. All these were indications that the risk of an error was escalating rapidly, systems were not functioning as intended.	30 September – 3 October
7	Introduce countermeasures in real time to restore the system to a state of low risk	AC-130U airborne
	SOTF-A had an ISR platform on station. This could have been reassigned to the target under observation by the AC-130U. A BOC process could have been initiated once the aircraft sensors were back online as a check on the BOT processes—PID and POL—and the TEA employed in the targeting process using all the resources of the JOC, the IRSO directed to track the convoy’s progress, not the target, liaison processes with Afghan high command to improve SA, build a COP. A ceasefire call made after the opening rounds of the strike, to see what effect they were having on the convoy’s situation.	2-3 October

Table 18-10: Opportunities for a critical intervention by a process guardian

Not all of these interventions would have been needed; the early ones removing the need for the later. At the same time, the list does illustrate how a process guardian, drawing on the main lessons of this book and with a sole responsibility for minimising the risk of catastrophic error, would have had ample time and opportunity to affect the course of events, in real time.

A process guardian would have placed the GFC at the centre of the incident in a very different position, changing both the inputs and the logic of his decision-making, by creating options and finding a better solution to the dilemma he faced over the convoy.

The GFC's counterpart inside the PGOV, who was resting at the time of the airstrike on the MSF Trauma Centre, expressed in his statement to investigators a deep anger at the treatment of his colleague in the wake of the accident. In part, this flowed from a recognition that he too could well have made the same set of fateful decisions, given the circumstances they both faced. In a moving plea, he asked,

If someone be held accountable, let it not be the man who was ordered to skydive without being given a parachute.⁶¹⁹

This, then, is the role of HCD's process guardian—to provide our GFCs with a parachute.

Part IV

HCD Training

CHAPTER 19

HCD Scenario-Based Training and Assessment Tool

HCD training is scenario-based and seeks to develop the key skills identified in the research as critical for making high-consequence decisions and minimising the risk of catastrophic error.

The scenarios place training participants in a number of situations where 'shoot, don't shoot' decisions are posed. These have been composed from real incidents. Activities are structured to help participants understand the challenges faced by decision makers in these circumstances, from where the risk of a catastrophic result arises and how best to navigate through these kinds of situation towards a desirable end-state.

Participants in the scenarios are asked to take on the roles of real actors who had the ability to affect the end result. No background military or specialist knowledge of these roles is assumed; all the information necessary to achieve the learning objectives is provided during the course of the training itself. This means all of the scenarios can be delivered to anyone, regardless of rank, service, or organisation.

Activities include small group work and facilitated general discussions. Although the subject matter is very serious by its nature, no attempt is made to simulate 'combat stress' conditions, as experience indicates a more relaxed, playful and cooperative environment achieves better learning outcomes.

Each of the scenarios highlights different aspects of both the decision-making activities and steps that make up the HCD process. These are indicated by reference to the following table. Training planners can select those scenarios that focus on the areas they believe are most relevant to their own organisation's needs. Expert pattern recognition is the least represented of the activities as this is specific to a knowledge domain, but HCD does provide a framework for the development of follow-up training to cover this area.

Shoot, Don't Shoot serves as the textbook for all HCD scenario-based training. Many of the scenarios are set in context and discussed in further detail in the book.

HCD steps		Decision-making activity
Situational awareness	1	Information management
Situation assessment	2	Expert pattern recognition
Own situation	3	Catastrophic risk management
The decision to be made	4	Problem solving
Anticipated consequences	5	(Meta)cognitive
	6	Dynamic decision-making

Table 19-1: HCD steps and decision-making activity

Scenario	Focus of learning outcomes		
Operation Anaconda — Air support operations cell	HCD steps		Decision-making activity
	Situational awareness	1	Information management
	Situation assessment	2	Expert pattern recognition
	Own situation	3	Catastrophic risk management
	The decision to be made	4	Problem solving
	Anticipated consequences	5	(Meta)cognitive
		6	Dynamic decision-making
Friendly-fire incident northern Iraq — F-15 pilots	HCD steps		Decision-making activity
	Situational awareness	1	Information management
	Situation assessment	2	Expert pattern recognition
	Own situation	3	Catastrophic risk management
	The decision to be made	4	Problem solving
	Anticipated consequences	5	(Meta)cognitive
		6	Dynamic decision making

Iran Air Flight 655 USS <i>Vincennes</i> combat information centre	HCD steps		Decision-making activity
	Situational awareness	1	Information management
	Situation assessment	2	Expert pattern recognition
	Own situation	3	Catastrophic risk management
	The decision to be made	4	Problem solving
	Anticipated consequences	5	(Meta)cognitive
		6	Dynamic decision-making
Beirut International Airport - US Marine Corps company commander	HCD steps		Decision-making activity
	Situational awareness	1	Information management
	Situation assessment	2	Expert pattern recognition
	Own situation	3	Catastrophic risk management
	The decision to be made	4	Problem solving
	Anticipated consequences	5	(Meta)cognitive
		6	Dynamic decision-making
Souk el Gharb - Air support operations cell	HCD steps		Decision-making activity
	Situational awareness	1	Information management
	Situation assessment	2	Expert pattern recognition
	Own situation	3	Catastrophic risk management
	The decision to be made	4	Problem solving
	Anticipated consequences	5	(Meta)cognitive
		6	Dynamic decision-making
Shin Kalay - Air intelligence PED crew	HCD steps		Decision-making activity
	Situational awareness	1	Information management
	Situation assessment	2	Expert pattern recognition
	Own situation	3	Catastrophic risk management
	The decision to be made	4	Problem solving
	Anticipated consequences	5	(Meta)cognitive
		6	Dynamic decision-making

Table 19-2: HCD training scenarios

ASSESSMENT TOOL

Level of difficulty posed by a situation for high consequence decision-making

Lack of information leading to poor SA

Information is not available, gaps exist, no sources
Information volume is overwhelming
Information is out of date, overtaken by events
Information is unreliable, sources are unproven
Information integrity is in doubt, suspicion of deception
Information is conflicting
Information is ambiguous

1	2	3	4	5

Information management—overall difficulty

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Difficulty in assessing that information

Situation is dynamic, complex, non-linear
Situation is out of control, minimal ability to influence events
Situation is unique, without precedent
Situation is unassessed up to now, and unexpected
Situation is unfamiliar, lack of personal experience
Situation appears chaotic, patterns are hard to find
The significance of information pieces is hard to evaluate
Multiple assessments are possible and credible
Time for assessment is limited and excludes structured techniques
Assistance with the assessment is unavailable

1	2	3	4	5

Situation assessment—overall difficulty

--	--	--	--	--	--

Role of other forces and actors

There are multiple other forces and actors to take into account
Other forces act as proxies for international powers
Interactions and relationships between other forces and actors are complex
Capabilities and dispositions of other forces are unknown
Mission, objectives, or intent of other forces are unknown
Behaviour of other forces is erratic and unpredictable
Use of deception by other forces
Presence of civilian actors with their own agenda
Existence of terrorist threat from within civilian population
Reliance on allied forces for certain tasks or information
Coordination with allied forces is difficult
Significant media presence and scrutiny

1	2	3	4	5

Role of other forces—overall difficulty

--	--	--	--	--

Mission is unclear or irrelevant

Current mission is vague or irrelevant
Commander has not stated their intent
Commander's intent does not address the actual decision to be made
Desired end-state is not clear
Desired outcome is not achievable, least worst options need to be considered
Objectives of other friendly forces are unknown
Military necessity clashes with need for political or public support

1	2	3	4	5

Mission—overall difficulty

--	--	--	--	--

Constraints are unclear or irrelevant

ROE are unclear or conflicting

Guidance on acceptable risk is not available

Boundaries of AO not set

Own capabilities are not fully understood, team or equipment is new

Availability of assistance if needed is unknown

1	2	3	4	5

Constraints—overall difficulty

--	--	--	--	--	--

Decision-making authority

Unclear whether authority to make a decision has been granted

Some options are authorized, others require permission

Contact with chain of command is broken

1	2	3	4	5

Authority—overall difficulty

--	--	--	--	--	--

Failure to anticipate and prepare

Situation was not foreseen

Warning signs were not picked up

Possible COAs not discussed in advance

Decision support, guidance, procedures are not on hand

1	2	3	4	5

Anticipation and preparation—overall difficulty

--	--	--	--	--	--

Consequences	1	2	3	4	5
Consequences are hard to foresee					
Reactions of other forces or actors are hard to predict					
Unintended consequences are likely to occur					
Consequences are difficult or impossible to reverse					
Consequences—overall difficulty					
Urgency	1	2	3	4	5
Immediate decision is needed					
One single decision will determine the outcome					
Urgency—overall difficulty					
Stakes	1	2	3	4	5
There is potential for catastrophic error					
There is an immediate personal threat					
Stakes—overall difficulty					
Stress, fatigue, distraction, cognitive overload	1	2	3	4	5
Decision-making ability is degraded					
All factors combined	1	2	3	4	5
Overall difficulty of the decision					

Table 19-3: HCD assessment tool

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