THE FOG OF DISASTER (FOD) ALLEVIATED THROUGH ENHANCED INTELLIGENCE AT QUEENSLAND FIRE AND EMERGENCY SERVICE (QFES)

This Thesis submitted by

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for the award of

Master of Professional Studies

2021

ABSTRACT

Queensland Fire and Emergency Service (QFES), has prioritised advancement in Intelligence within disaster management in the QFES 2030 Strategy. Disaster management has a bottom-up approach when requesting resources, therefore leaving strategic level decision makers in a reactive state. This, along with QFES' isolated approach to intelligence, without exploitation of the relationships between the three main systems of community, the event and QFES capability, means an appreciation of future scenarios is missed in the operational decision-making process. Entropy causes an expansion in energy which multiplies data points exponentially for QFES strategic personnel, which creates uncertainty and a compression of the intelligence cycle. By compressing the intelligence cycle, a belief intelligence is being distributed via display screens, is currently practised. This current practice supports decision makers rather than influencing the decision and therefore, falls closer to knowledge management than a pure intelligence product. The inability to harness strategic intelligence in full, through transferring the temporal dimension of information, leaves QFES staff and the community vulnerable from lack of clarity and an expansion in friction operationally.

The primary research question that guided this thesis is: "*What effect would an enhanced intelligence capability have on QFES interoperability and operational capacity*?" The research methodology was underpinned by constructivist and pragmatic perspectives, which allowed for an explorative approach, using semi structured interviews, document analysis, and observations which spanned 2019 – 2021. The methods outlined allowed a triangulation of QFES application of intelligence and provide a better understanding of disaster intelligence in reducing the Fog of Disaster (FOD). The research highlights a gap in the sequencing of a disaster event from entropy to critical decision maker. The research develops the importance of situational understanding and provides a framework to the disaster appreciation process, which could be applied by QFES staff. This thesis outlines inhibiting factors and challenges within the intelligence cycle and highlights the importance of a system based proactive process for QFES and community safety.

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CERTIFICATION OF THESIS

This Thesis is entirely the work of Daniel Rubens, except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

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Student and supervisors' signatures of endorsement are held at the University.

ACKNOWLEDGEMENTS

This research has been supported by an Australian Government Research Training Program Scholarship.

No thesis is achieved without the unwavering support of several individuals, who I'm sure have considered what is he doing? Firstly, I would like to thank my wife Carmen Rubens and our three kids (Charlotte, Piper and Billy), who have allowed me the time and supported me through the hard times.

Mr Ray Hingst and Associate Professor Marcus Harmes were without doubt, the two drivers behind keeping me motivated and guiding me through the process of conducting a research masters. Also, from the University of Southern Queensland (USQ), I would like to thank Dr Lee Fergusson; for co-ordinating the MPSR program and Dr Sophia Imran who provided required program structure.

I would like to acknowledge Queensland Fire and Emergency Service for allowing me access to all required personnel, documentation and provided higher level conversation which made this research possible.

Finally, I wish to also personally thank all those who participated in the research process, including South Townsville and Beenleigh Fire Officers, who I was fortunate enough to be on shift with for the duration of this research.

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ABBREVIATIONS, ACRONYMS AND INITIALISATIONS

AC	Assistant Commissioner
ADF	Australian Defence Force
AI	Artificial Intelligence
AIIMS	Australasian Inter-Service Incident Management System
BAU	Business as Usual
C2	Command and Control
C4	Command, Control, Coordination, and Communications
C4I	Command, Control, Coordination, Communications & Intelligence
CC	Critical Capability
CEO	Chief Executive Officer
COA	Course of action
COG	Centre of Gravity
COP	Common Operating Picture
CR	Critical Requirement
CV	Critical Vulnerability
DAP	Disaster Appreciation Process
DDCC	District Disaster Coordination Centre
DDMG	District Disaster Management Group
EM	Emergency Management
EMQ	Emergency Management Queensland
ELT	Executive Leadership Team
FBAN	Fire Behaviour Analyst

Firecom	Fire Communications Centres
FoD	Fog of Disaster
FRS	Fire and Rescue Service
GIS	Geographic Information System
IC	Incident Controller
ICC	Incident Control Centre
IGEM	Inspector General Emergency Management
IMAP	Individual Military Appreciation Process
IMT	Incident Management Team
IO	Intelligence Officer
IPB	Intelligence Preparation of the Battlefield
IPD	Intelligence Preparation of the Disaster zone
IPO	Intelligence Preparation of Operations
ISTAR	Intelligence, Surveillance, Target Acquisition, Reconnaissance
ISR	Intelligence, surveillance, and Reconnaissance
JDAP	Joint Disaster Appreciation Process
JIPOE	Joint Intelligence Preparation of the Operational Environment
JMAP	Joint Military Appreciation Process
LDCC	Local Disaster Coordination Centre
LDMG	Local Disaster Management Group
NATO	North Atlantic Treaty Organisation
Non Tech	Non-Technical Rescue
ODMP	Operational Decision Making Process

OE	Operational Environment
PPRR	Prevention, Preparedness, Response and Recovery
PSBA	Public Safety Business Agency
QFES	Queensland Fire and Emergency Service
QPS	Queensland Police Service
QRA	Queensland Reconstruction Authority
RFA	Request for Assistance
RFS	Rural Fire Service
RIM	Required Integrity Measure
ROC	Regional Operations Centre
SA	Situational Awareness
SU	Situational Understanding
SDCC	State Disaster Coordination Committee
SES	State Emergency Service
SIC	Strategic Intelligence Course
SOC	State Operations Centre
TOC	Transnational Organised Crime
TOM	Total Operational Mapping
WMD	Weapons of Mass Destruction
WOG	Whole of Government
WWII	World War Two

CHAPTER 1 INTRODUCTION

The notion of the 'fog of war,' was proposed by Prussian General Carl Von Clausewitz in 1832 and conceptualises how during fast paced situations such as a contact with the enemy, it is possible that military data, information and intelligence can be lost or misconstrued and create confusion to leaders who need to make critical decisions under pressure in terms of time and space. However, the military has a mature intelligence model which provides clarity around planning and operational uncertainty (Foryst, 2009). Von Clausewitz earlier described these intelligence needs in terms that remain relevant:

> "War is the realm of uncertainty; three quarters of the factors on which action in war is based are wrapped in a fog of greater or lesser certainty. A sensitive and discriminating judgement is called for; a skilled intelligence to scent out the truth" (Clausewitz, 1832 p. 101).

During disasters this same confusion applies, however given the setting is not a theatre of war, I have labelled this confusion the Fog of Disaster (FOD). The FOD is evident when hyper activities are creating big data and time and space are contracted for critical decision makers. The FOD is enhanced when information and intelligence of essential services throughout an area which as outlined by Allen, et al, (2013) and Snider, (1998) is not aligned with policy, procedure, hierarchal structure, technology, ideals and communication platforms. This enables an acceleration in entropy through gaps in data, with information not reaching critical decision makers who need clarity or ground truths. This is a break down in the process and therefore relies on commanders' judgement and experience with no real intelligence feeds. Consequently, this stagnation causes Commanders and disaster management teams to become reactive and lose operational momentum, which creates greater risk for staff and their communities.

This thesis will critically evaluate the ability of Queensland Fire and Emergency Service (QFES) to provide clarity in an environment of uncertainty and reduce the friction between strategic level strategy and operational actions. The objective will

be to outline the benefits for a fulltime intelligence capacity through defining the operational environment (OE) and reducing the difference in the paper plans and actual operations via a fully proactive appreciation process which encompasses necessary inputs from all stages of the intelligence cycle.

The main research question to be the focus is: How could a greater intelligence capacity affect operations and interoperability within Queensland Fire and Emergency Service (QFES)?

Within QFES there are four main services which amalgamated in 2013. While there was organisational amalgamation, the lines of communication / intelligence never aligned rank, policy, platforms, doctrine or created a central data base for information to be processed through an adequate intelligence framework. This misalignment does not allow a culmination of data, information and service capacity to be generated to create a multi-dimensional approach. The ability to only provide a one-dimensional approach leaves a siloed response for operations and does not allow support to influence critical decision makers and creates an unhealthy reliance on frontline experience to provide a satisfactory outcome. The outcome has been described as follows: "…currently for QFES success is an absence of failure…" (McNarn, 2018, p. 3).

In QFES, there is currently a reliance on frontline managers leaving a fragmented approach to disasters which enhances interoperability issues between services from a belief each commander has a better appreciation than other services and strategic level personnel. The inability to fully extrapolate the intelligence process to the extent other sectors have (Police, Military, Business,) is further accelerated as an appreciation process cannot be tailored to provide strong command and control (C2) and align a holistic end state by using intelligence to exploit data on QFES, the event and the community at risk.

This thesis intends to contribute to bridging these research gaps. This is done by studying the attributes that intelligence is provided to resolve and investigate why uncertainty and friction are still present in current disasters. More precisely the thesis investigates the qualitative methods of interviews, observations,

documentation, and shared beliefs connected to epistemological assumptions of current QFES intelligence within disasters. The principal contribution of this thesis is to establish and analyse a link between entropy and the critical decision maker. The thesis intends to render intelligence studies a necessity for QFES and the wider disaster management community by gaining knowledge in a systems-based approach which provides clarity and greater situational understanding through the outlined Intelligence Preparation of the Disaster zone (IPD) and Joint Disaster Appreciation Process (JDAP).

The structure of this thesis

Following this introductory chapter, Chapter two will provide a substantive literature review evaluating the problems intelligence solved through history and the advancements and expansion through the intelligence cycle. Chapter two will also outline the links between intelligence, appreciation, the decision maker and interoperability and currently used processes to mitigate the fog of disaster from other sectors and disaster management.

Chapter three discusses the theoretical approach and chosen methodology that was used to explore the research questions. Chapter three will highlight the approach, methods, permission and academic rigour required to complete the research.

Chapter four presents an analysis of QFES semi structured interview data, observations and internal documentation. The application of intelligence and relationship to the decision-making process within current disaster environments will be explored.

Chapter five outlines the semi structured interview data findings, documentation and observations to directly address the primary research question. Several critical elements of intelligence will be cross referenced against literature, current processes and a framework provided which incorporates a process from entropy to decision maker using intelligence and appreciation. The processes provided will be valuable to Intelligence Preparation of Disaster zone (IPD), Joint Disaster

Appreciation Process (JDAP) and a flexible solution to the arbitrary rigid current regional borders using proximity to the event.

Chapter six closes the thesis with a synopsis of the research process: literature review, methodology and research findings. The chapter also explores the research limitations and raises opportunities for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

In a world of growing population, climate change and political uncertainty, the ability for QFES to provide certainty and clarity within its own organisation is vital to formulate plans and execute in a resource efficient manner. First, this is a cost-effective approach and secondly, acting within a system keeps services and community safer in times of disaster. This literature review will critically evaluate current scholarship and professional literature across intelligence, appreciation, and disaster management to identify a gap in the disaster management sequence which would enhance critical decision making.

First Von Clausewitz's (1832) concept of the Fog of War will be analysed with similarities between what transpires in a theatre of war and what critical decision makers face in disaster management. Highlighting the causes of uncertainty and friction will be a focal point, which will enable a pivot from problem to solution, in this case being intelligence and appreciation.

Second this review will be defining intelligence from information and providing historical context of the importance of sound intelligence and intelligences expansion into other sectors, such as police and business via the intelligence cycle. A disaster intelligence definition will be outlined with current and future applications of intelligence being explored, particularly in strategic proactive initiatives such as the Intelligence Preparation of the Battlefield (IPB).

Third the intelligence intricacies the military use within the IPB will be extrapolated to provide the foundation of the greater Joint Military Appreciation Process (JMAP). JMAP is the process which compresses the current gap between entropy and critical decision makers by reducing uncertainty and friction by implementing a systems-based approach.

Lastly the literature review will evaluate interoperability and the characteristics from an organisation, military and disaster perspective and outline commonalities amongst disaster services and the streamlining of processes such as technologies and procedure to reduce friction by providing information clarity through an

Intelligence Preparation of the Disaster zone (IPD) and Joint Disaster Appreciation Process (JDAP).

2.2 Fog of war

Von Clausewitz, who was a Prussian general who fought against Napoleon, quite literally wrote the book on war. Published in 1832, a year after his death, *On War* is regarded by military experts even today as the definitive study of warfare. His ideas remain widely taught in staff colleges and are more than ever, essential to the modern strategist. Rodrick (2018) outlines how the Fog of War, while not the exact wording of Von Clausewitz, (1832), is attributed to this Prussian General. The fog of war concept suggests the elements of war which made the simple become difficult and which could not be replicated in training. These elements were: uncertainty, chance, and friction. This uncertainty creates a gap in process from what strategic level thinkers are seeing on paper and what is occurring on the battlefield. The dynamics that alter the 'paper war,' compared to the operational reality is called friction. Von Clausewitz outlines that confusion and uncertainty can only be alleviated through clarity; this clarity can only be provided by intelligence or absolute information within a strong strategy that works within the limits of finite resources. Von Clausewitz, (1832) in *On War* states,

> "This difficulty of accurate recognition constitutes one of the most serious sources of friction in war, by making things appear entirely different from what one had expected. Encountering the unexpected has obvious implications in a combat environment." (p. 109)

As the Fog of War requires uncertainty and friction through an acceleration of disorder; disaster management teams within a fast onset natural disaster event, face the same issues. The Fog of Disaster (FOD) contains similar characteristics as Von Clausewitz's concept, however it places less emphasis on chance as natural disasters dictate the temporal dimension which cannot be altered psychologically. Therefore data such as historical events, can be more useful information. Von Clausewitz, (1832) outlines three main dynamics which alter the status quo within war, he labels these the holy trinity. The holy trinity within war are the enemy, own forces and local government. Using Von Clausewitz context, the holy trinity within a

disaster event is; services, community and the event (cyclone for example). The change in the holy trinity places relevance on the three factors which can disperse energy and create disorder for disaster management personnel. While there are subtle changes from war to disaster, both concepts require high level intelligent inputs and outputs to reduce uncertainty, friction, and chance.

2.3 What is intelligence? (Information or Intelligence)

The application of intelligence is critical in taking information analytics into a different temporal dimension which predicts, as closely as possible, a reality for decision makers to act. In this sense, intelligence is influencing the decision maker, as opposed to simply describing data or information on a screen, such as a Geographic Information System (GIS), which would be a knowledge product to support a decision maker. The focus for disaster managers is understanding the difference between information and intelligence and ensuring the product is in fact intelligence and not information or knowledge being managed.

To a person unfamiliar with disaster management, information and intelligence can be confusing and blend into one appreciation, however the differences are subtle yet integral. Information flows from interpretation of data and intelligence requires the analysis of information and extrapolation into a different temporal dimension (predictive intelligence) (Betts, 2009). If data or information are incorrect, it is nearly impossible to provide good intelligence, so distinguishing between information and intelligence is essential in providing a reliable product.

Information is a message that contains relevant meaning, implication or input for decision and/or action. Information comes from both current, (communication) and historical sources (processed data or 'reconstructed picture'). In essence, the purpose of information is to support in making decisions and/or objectively answering problems or realising an opportunity (Liew, 2013).

Intelligence requires the ability to sense the environment, influence decisions, and control action. Higher levels of intelligence may include the ability to recognise objects and events, to present knowledge to reason and future plan. In advanced forms, intelligence provides the capacity to perceive and understand, to choose

wisely and act successfully under a large variety of circumstances; as to survive, prosper, and reproduce in a complex and often hostile environment (Albus 1991; Cavelty and Mauer, 2009). Fingar (2011) states that 'future-' or 'predictive-' type strategic intelligence assessments are often based on an incorrect conceptualisation of the role of intelligence and the nature of strategic decision-making. Quarmby (2009) and Fingar (2011) both argue that strategic intelligence should be focused on anticipating changes in the environment, in order that decision-makers can seek to mitigate risk or exploit opportunities to shape the future. In this way, the activity of strategic intelligence and strategic analysis is about anticipation and drivers for change.

Intelligence is an implicit function of the human brain which has been extended to a point which affects policy makers, political decisions, homeland security, business and essentially every facet of our lives where data and information get collected, analysed and distributed to outline a Most Likely Course Of Action (MLCOA) or prediction (Jung & Haier, 2007). While Intelligence encompasses a broad range of topics and sectors, the main concept still exists throughout; this is to influence decision making. Lowenthal (2008), is an influential thought leader on intelligence and sums up intelligence by writing about the lead up to the Iraq War:

> "The best the intelligence community could have done, and perhaps should have done, was to prepare an estimate that offered our most likely scenario, that Saddam had Weapons of Mass Destruction (WMD), and then offered a much more pointed discussion about our uncertainties (Lowenthal, 2008. P. 205)."

Lowenthal acknowledges that such uncertainty may be distasteful to decision-makers who want certainty to guide their actions, but is nonetheless more intellectually honest and one could add more expansive than a one dimensional approach. Lowenthal (2012) outlines the cultural flaws in the intelligence community and accepts that while intelligence still has its flaws, if intelligence is not implemented correctly, we will continue to see flawed decisions as seen throughout history (Lowenthal, 2003). Within a disaster, intelligence should be a collection of any amount of data or information which gets analysed, scrutinised and

disseminated via various products to create a vision as close to reality as possible, on which decision makers can act.

2.4 Application of Intelligence (History)

Intelligence has been present throughout military history, to gain a strategic advantage on an enemy or opponent. Whether it be cryptic or deceitful means, such as letter swapping or diverting attention or acting on a whole cultural belief (such as the myth of the Trojan Horse), intelligence application is now part of our thought and action (Coyne, 2014). In fact, successful intelligence has influenced critical decisions and actions which to this day still influence our way of life. Historical long term intelligence production includes the United States cracking of the Yamamoto code or JN25 (coded ultra) during WWII, which allowed America to know the Japanese Navy's strategic intent. The collation of information which enabled Alan Turing to crack Enigma, the German's WWII means for coded communication, allowed intelligence to dictate operations and influence the outcome of WWII (Agar, 2001; Muggleton, 2014, pp 3-12). As illustrated, intelligence has not only the influence to effect micro decisions; it has the power to influence humanity for decades and even centuries. Intelligence, whether intended or not, was a key element to determining the success of many historical events but it is important to know, not all information comprises intelligence; this distinction which highlights the need of a rigorous education in information analytics as a requirement to a competent intelligent person. This level of intelligence understanding within disaster management, could inhibit the uncertainty within the disaster holy trinity, by providing clarity around big data and information. Using and understanding existing models and processes such as the intelligence cycle to its full extent are essential.

2.5 The Intelligence Cycle

While intelligence evolved through the centuries to become an integral part of any commander's weaponry, intelligence was still confined to military and security purposes through to the twentieth century. Up until the middle of the twentieth century intelligence was simply a product of information with no process to an outcome (Lowenthal, 2008). While historically, intelligence was used to great effect,

it was not until the creation of the Intelligence Cycle, that a clear delineation between information, knowledge and intelligence was clearly represented. The Intelligence Cycle was outlined by Wheaton (2009) as being first used in 1948 and became vital thereafter, as it is the process required to expand intelligence from its military and security confines. The cycle was critical in the application of intelligence and allowed the expansion of a purely military function to become a cyclical process that could be applied to multiple industries. The cycle in its original format had four components, however, today is commonly practised using a variance of these six steps (figure 1.1) (Miller, 2017):

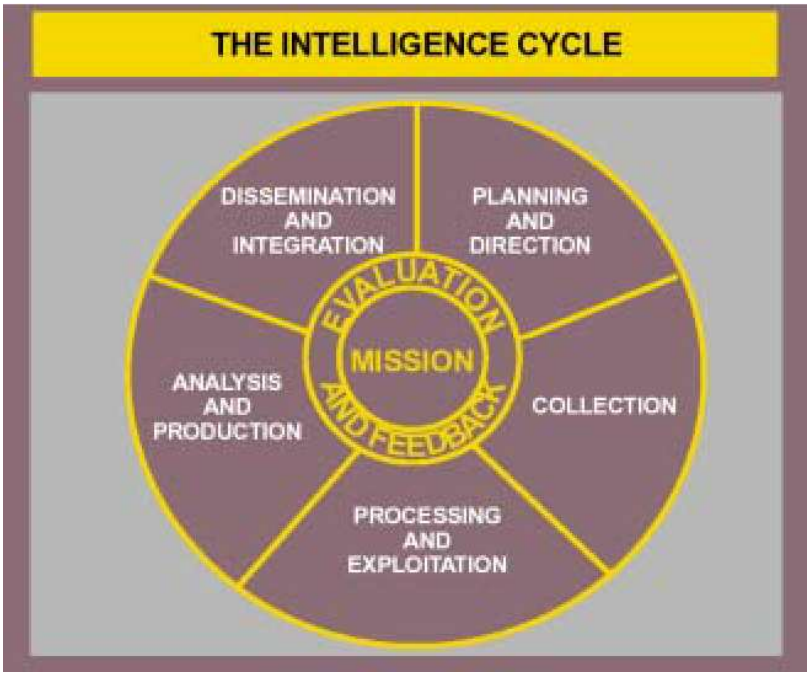

Figure 1.1 Modelling of the US intelligence cycle (Miller, 2017)

Figure 1: outlines a cycle which is broad enough to be fluid across sectors however logical enough to convert information to intelligence. The narrative for the 6 steps is:

1) Planning and Direction, where decision makers provide the intelligence requirements which inform the intelligence planning activities (Miller, 2017).

2) Collection, where intelligence systems and sensors amass the raw data required to produce the finished product (Lowenthal, 2006).

3) Processing and Exploitation, where the raw data is converted into a comprehensible format that is usable for further analysis and production of the finished product (Fingar, 2011).

4) Analysis and Production, where analysts integrate, evaluate, analyse, and prepare the processed information for inclusion in the finished product (Johnson, 1986).

5) Dissemination and integration, where the finished product is delivered to the user that requested it and to others as applicable (Philip & Davies, 2004; Liska, 2015).

6) Evaluation, where feedback is continuously acquired for each step of the Intelligence Cycle as well as the cycle to evaluate the effectiveness of the process (Evans, 2009).

While there are concerns in the literature about how accurate the Intelligence Cycle reflects intelligence production (Hulnick, 2006), it provides the needed frame of reference for this discussion. Throughout the decades, researchers have argued and modified the Intelligence Cycle to the point of exhaustion (Evans, 2009). The cycle has been streamlined to fit certain requirements, the cycle has had numerous alterations, with most authors agreeing dissemination and feedback are integral parts of the process. Warner (2015) suggests that the cycle is no longer valid and the intelligence community needs to look beyond the cyclical process and adopt a linear model which presents the intelligence process as occurring in four or five sequential stages; involving planning and direction, collection, processing and analysis, production and ending in dissemination. Warner (2015) also outlines the dissemination stage generates fresh intelligence requirements, so the linear process evolves and continues. Researchers such as Coats (2019) express varying degrees of reservation to the accuracy and hence, utility of this linear concept and outlines counterintelligence and covert action are the two components missing from most intelligence cycles. However, given the Intelligence Cycle within a disaster management setting generally would not require these components due to the collaborative approach, these functions should not be dismissed completely but

take a less important role, opposed to branches of intelligence such as: all source, human intelligence and signal intelligence.

Whichever process is used, whether it be linear or cyclical, the understanding of intelligence as a process has allowed intelligence and its uses to expand dramatically over the last few decades (Wynn & Brinkmann, 2016). Intelligence grew into business (Tan Tsu Wee, 2001) and the corporate world (Trim, 2004), with Chief Executive Officers (CEOs) trying to gain a competitive advantage (Liebowitz & Jay, 2006) and more recently expanded into technology with artificial intelligence (AI), which Copeland (2020), defines as "the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings". If implemented sufficiently, intelligence could compress time and space, minimise uncertainty through information analytics, which would identify Critical Capabilities (CC) and Critical Vulnerabilities (CV) within a community, outline the Operational Environment (OE), which would create decision points and timelines for resources to achieve, providing safety to QFES crews and alleviating critical decisions and friction through reliable, necessary intelligence products and appreciation of the disaster zone.

AI has been outlined above, it is computational power that compresses time and space in a disaster management setting and this power allows; interoperable layout, technology, and procedures to become the three focal points. AI is integral to synchronisation of information flows, common operating pictures (COP), situational understanding (SU) and situational awareness (SA), which is a necessity in reducing friction in the fog of disaster.

Intelligence is a key component of every decision we make as humans, so it's only natural that given the consequences of decisions made during a disaster, that a robust, fulltime, sustainable intelligence capability, is a focus of disaster management (Melligan, 2014).

2.6 Current Application of Intelligence (Military, other)

The focus of application is vital to disaster management as the literature will outline while the foundation of the intelligence cycle can be applied to any sector, the

nuances of disaster management will require a skilled implementation, which best suits the prevention, preparedness, response, and recovery (PPRR) principles currently practised. By highlighting military and police practices, the reader will gain an understanding of the critical aspects of each service and the differences such as the bottom-up approach and all hazards approach which would dictate a disaster management intelligence architecture. The military is advanced in its intelligence product, providing inputs strategically, operationally, and tactically. Military intelligence meets the needs of commanders through providing advice, current priorities or future analysis provided by thorough information analytics by specialist intelligence officers, on an ongoing basis (US Army, 2007). This analysis enables a nimble response to current events on a global level, essentially enabling operational momentum through pivoting with the OE. Military intelligence is based on a need to know or stove piped environment which is segregated into privacy clearances and specialist requirements. Military intelligence uses all forms of intelligence such as Human, All Source, Signal, and so forth and has expanded studies and application of swarm, collective and asymmetrical warfare intelligence (unmanned aerial vehicles for example). Current intelligence within disasters is generally a reactive process which is symptomatic of having to request for assistance (RFA) from the bottom up once resources are overwhelmed (McNarn, 2018). This reactive action allows minimal time for intelligence personnel to clearly define the OE and creates further uncertainty from the outset.

Law enforcement and Government also run fulltime intelligence functions, however they are quite different in the functions required for disaster management. Lowenthal (2006) points out, that to the average person, intelligence is about secrets and spying and fails to understand the important point that intelligence is ultimately information about anything that can be known, regardless of how it is discovered. More specifically, intelligence is information that meets the needs of a decision maker, and has been collected, processed, narrowed and offered to meet those needs. Law enforcement has evolved in recent decades from a purely human intelligence input to evidence-based intelligence which Fingar (2011) found to be reactive as Police were waiting on evidence. Quarmby (2009) and Fingar (2011)

highlighted that a fluid process that moves with macro drivers, is the framework required and apply this to the growing driver of Transnational Organised Crime (TOC). As outlined previously, intelligence can be considered a specific subset of the broader category of information. In addition, all intelligence is information but not all information is intelligence (Fingar, 2011). A key point is, that intelligence and the entire intelligence process responds to the needs of the decision makers. Lowenthal (2008) also points out that intelligence has spread across many industries, however the general public tend to consider intelligence in terms of government and/or military information. This is certainly a major use of intelligence but political, business, social, environmental, health, espionage, terrorism and cultural intelligence is also intelligence (Quarmby, 2009). Lowenthal (2012) states that intelligence is not about truth and it is more accurate to think of intelligence as a proximate reality. Lowenthal's concept broadly suggests intelligence analysts do their best to arrive at an accurate approximation of what is going on, but they can rarely be assured that their best analytic results are true. Therefore, intelligence products that are reliable, unbiased and free from politicisation need to be a product that is as close to the truth as it can be humanly possible to discern (Lowenthal, 2006. pp. 6-7).

While disaster intelligence can take attributes from all intelligence setups, it will have to establish a capacity incorporating its own principles, such as a collaborative approach (Melligan, 2014) which is different to military and not such a heavy reliance on human intelligence, such as the law enforcement. This will align an architecture which can be fluid for all types of disasters and provide intelligence within disasters that enables procedural interoperability. The ability for strategic commanders to always have an intelligence capability, would allow a combination of current macro drivers from the Bureau of Meteorology (BoM), resource capabilities within QFES and a continual threat assessment of Queensland communities, to be processed with products produced as required. During high tempo periods, a surge capacity (event dependant), can be formed to complete commander's mission analysis through Intelligence Preparation of the Disaster zone (IPD).

2.7 Intelligence within Disasters

Terminology and definition within disaster management are a clear necessity when delivering products across multiple services; these ensure standardisation and repetition for disaster managers. Intelligence in its purest form is one's ability to comprehend information and apply logic (Tirri, 2012), however during disasters Lowenthal defines intelligence in three ways:

Intelligence as a **process** - A means by which certain types of information are required and requested, collected, analysed, and disseminated, and the way in which certain types of action are conducted.

Intelligence as a **product** - A knowledge product resulting from analyses and intelligence operations themselves.

Intelligence as an **organisation** - Entities that carry out various functions for Intelligence. (Lowenthal 2006, p8).

The term intelligence in the military context relates to the collection of information that has military or political value. Within disaster intelligence, this is the collection of information that possesses value in emergency preparedness and navigating a crisis. Disaster information feeds need to be filtered, verified, analysed and disseminated (Quarmby, 2009) through a comprehensive product that influences decision makers but is not in itself a decision (Fingar, 2011). Intelligence is one important element of the broader appreciation process, which generates courses of action (COAs) for a commander and even then, relies on good critical decision making to be effective (Melligan, 2014). In a disaster context, the 'enemy,' is either a manmade or natural event that cannot be psychologically altered; consequently theory should be similar in its approach to historical events and therefore tacit knowledge is critical to extract for whole of organisational learning. The Event similar approach, highlights that COAs should be produced from similar historical events and furthermore outlines a deficiency through being reactive in disaster management, if these actions do not occur. Australian Emergency Management Institute (2015) data shows that over the past 30 years, some three million people have died as a result of natural disasters worldwide, and whilst there are no clear

figures available to show the numbers of injured and those made homeless over the same period, it is reasonable to assume they are enormous. Knowing the negative impacts incorrect strategy has on a community, it is imperative, decision makers have the correct tools to make better informed decisions at their disposal. The risk for intelligence, is validation may never be possible to determine what the 'correct' decision might have been in a particular disaster management event, as the alternative COAs were not implemented and therefore, their outcomes cannot be compared or assessed except by 'wargaming' prior to selection and implementation of a selected COA. Fingar (2011) highlights this paradox as an erosion in the intelligence function, as it is perceived to be inaccurate when in fact operations altered a predicted outcome. This will be a challenge for intelligence officers and could hinder maintaining the flow of credible information when coordinating a multi-faceted response to a disaster event.

It is the quality and analysis of the data, not the volume, which is important (Lowenthal, 2008). Decision-making needs to be based on a shared understanding of the current and pending situation. That understanding should be based on intelligence that is accurate, up-to-date and from credible sources (McNarn, 2018). McNarn (2018) outlines that it is important to note that intelligence may play an integral part in evaluating how effective incident strategies have been and by implication, whether previous intelligence production has met the needs of the Incident Controllers (IC).

As suggested by Warner (2015), the intelligence process functions are not necessarily sequential; the intelligence process provides a common model which guides one's thinking, discussing, planning, and assessing about the threat or event environment. The intelligence process generates information about the threat and the situation, which allows the IC and the Incident Management Team (IMT) to develop a plan, create the initiative, build, and maintain momentum, and ensure safety.

Miller (2017) outlines an approach to disaster intelligence which is symptomatic of a lot of confusion and friction within disaster management. This is to streamline communication channels (reduce friction) and clear unnecessary ambiguity (reduce

uncertainty). Miller (2017) highlights that the primary focus of disaster intelligence should be, to gather information pre-disaster (baseline intelligence) about options and courses of potential action, before disaster hits. Secondarily, the focus is to improve awareness of the situation as a disaster is forecast or comes to fruition (predictive intelligence). On a tertiary level, this information is then gathered to form and/or modify a response to the situation and dictating clear, most likely and most dangerous course of action (COA) and mitigation methods as a product.

Three of the hallmarks of intelligence are that it must be timely, constant, and reliable (Melligan 2014). Melligan (2014) defines timely intelligence as intelligence which allows for consideration, decisions and action to be possible, while constant intelligence allows commanders to enhance their appreciation of the disaster without being overwhelmed. Regardless of the Command and Control (C2) structures and the competency of individuals, if the intelligence is unreliable or data incomplete, it is impossible to make good critical decisions and therefore implement any viable strategy. This is true regardless of whether the intelligence is geared for military, political, preparedness or some other use. If these three elements are not present, the value of the information is decreased.

Miller (2017) states that disaster information can be complex and overwhelming to interpret when under pressure; therefore, it is better disaster data gatherers collect a manageable amount of information that can be comprehended and used effectively. Gathering an overwhelming amount of information that ultimately cannot be used in a beneficial manner will create ambiguity (Lowenthal, 2006). While information abundance falls in line with Miller (2017) philosophy, it takes trained data collection personnel and analysts to fully interpret and disseminate the data/information as useable intelligence (Alex, 2013). Fingar, (2011) while not directly with disaster management, suggests another alternative to mitigate overloading by intelligence sharing with other organisations that have significant interest in a similar space. Disaster management requires high intelligence capabilities and suitably qualified personnel to be integrated where required; a good example of applying this is adding inputs into the State Disaster Co-ordination centres (SDCC), police headed intelligence model.

As outlined by Miller (2017), a reaction to a disaster can be greatly influenced by having the right information to make the most informed decision in the face of a disaster. Miller (2017) and Lowenthal (2006) highlight that intelligence officers need to be well versed in everything intelligence and require high quality training to enhance an officer's intelligence synchronisation consideration. These synchronisation factors include a professional intelligence understanding of the product and process, through baseline, current and predictive intelligence and the application of a process which considers current demographic trends and macro drivers in the future.

2.8 Disaster Intelligence in the near future

While understanding the subtle differences in intelligence such as a product, process and determining the characteristics of a competent intelligence officer is vital, intelligence is evolving across sectors including in the disaster management sector. It is becoming increasingly clear that the advancements of social media, collective intelligence, swarm intelligence and an insatiable need for communities to help their own, that disaster management intelligence needs to evolve to adopt these technologies and provide an intelligence product to aid the community on how and where they can help. As outlined by Melligan (2014), outward facing intelligence is not only an evolution of disaster management, but also a unique intelligence product, which is a side effect of the disaster management's collaborative approach and enhancing resilient communities. Crowd sourced information is the possibility to rely on publicly available data shared on social media platforms which allows intelligent systems to extract knowledge that is increasingly important for monitoring and intelligence purposes (Coyne, 2014). Most crowdsourced emergency management systems, such as Earle et al. (2012), were designed to support decision makers, keeping in mind that final users would have expertise in responding to emergencies. As Melligan (2014) highlights, a centralised approach has drawbacks such as emergency responders are slow in the adoption of systems that differ from those traditionally used due to hierarchal issues. This position potentially hinders the amount of information available to decision makers and makes them not completely aware of the situation when reacting to a crisis. While relying on the crowds can permit task parallelisation, the

lack of a central authority may conversely deteriorate decision quality. Furthermore, citizens often lack technical skills and thus efforts might be inhibited by a lack of competence. Nonetheless, in the Brisbane (2011) and Townsville (2019) flood events, volunteer citizens converging to the disaster zone played a fundamental role in starting and maintaining grassroot initiatives, as it happened in Brisbane after a flood, where volunteers called “mud angels,” or “mud army” helped to remove mud from the streets without any external coordination (Adams, 2016), these actions could be considered swarm intelligence.

As highlighted above, affected communities are dispersing energy, thereby creating a form of entropy or inward confusion for disaster managers. While the community Brisbane initiative was in the recovery phase of the disaster management process, during the 2019 Townsville floods, ‘Good Samaritans’ were essential in the rescue and relocation, using their own private boats during the response phase (Garvey et al, 2019). In this light, opening emergency management systems to these volunteers would give them tools to improve their coordination efforts, which enhances their safety and allows intelligence to provide a level of interoperability among volunteers who are unlikely to have ever met, in a time of high tempo confusion.

These intelligence trends should be considered within a robust intelligence capability as the community forms one dynamic of the disaster holy trinity and predicting community COAs is one part of the holistic intelligence product. However the literature has highlighted that disaster management is immature in its product and the best intelligence is centralised, priority driven and has certain requirements in a greater process, which is appreciation of the disaster ground and containing multiple lines of disorder. Reactive solutions are a required form of achieving commanders’ requirements during the response phase of a disaster, however intelligence has a far greater role to play in the preventative and preparatory phase, through being proactive defining the OE and threat analysis which dictates scheme of manoeuvre through a comprehensive intelligence preparation of the disaster zone (IPD).

2.9 IPB / IPO (Intelligence Preparation)

The bottom-up approach within disaster leaves strategic level personnel in a reactive state from the out set of a disaster. This is where appreciation is vastly different from military as disaster appreciation is mainly at the operational level in the initial phases. Establishing a fulltime intelligence capacity would give strategic stakeholders an instant situational understanding through a preliminary analysis of the current situation and focus intelligence on information gaps which defines the complexity of the disaster. This focus using the defined policy, terminology and architecture can establish a proactive response by exploiting the information of the event, community and service.

Intelligence Preparation of the Battlespace (IPB) is a military and Intelligence Preparation of Operations (IPO), a counter terrorism concept which is time consuming but essential to enable commanders to garner as much appreciation of the coming events. The IPB process enables a reduction in uncertainty and enables the least amount of friction between strategy and execution. The Australian Defence Force (ADF) (2019) defines the Intelligence Preparation of the Battlefield (IPB) as

> "the systematic process of analysing the mission variables of enemy, terrain, weather, and civil considerations, in an area of interest to determine their effect on operations," (p. 34).

IPB evaluates the threat and environment in a specific geographic area (Thaden, 1986) within a disaster setting, exploiting possible risk the holy trinity or dispersion of energy would create, enabling a proactive scheme of manoeuvre by reducing uncertainty at the strategic level in the initial phases of a disaster. The IPB provides absolute information and assumptions for analysis and not only dictates immediate threats but outlines second and third order uncertainty the event presents. An example of second and third order effects could be a tidal surge after a cyclone or a panic within a community choking main supply routes. These hazards can pose higher risks than the obvious and can easily be overlooked, even from the disaster management all hazards approach.

ADF (2019) stipulates constructing services and communities centre of gravities, helps visualise and prioritise vulnerabilities from an environment, community and service perspective and enables proactive manoeuvres against the most likely and dangerous courses of action. From a disaster management perspective, an IPB (IPD) would enhance the clarity through a comprehensive analysis of the community, services and the event. The IPB gets broken down into four key steps with multiple sub steps which could be utilised within disaster management. An example of transferring from a military setting to a disaster could start by changing the word adversary (enemy) and using community (see Table 1); from this change a focus could be on the critical capabilities within a certain community, that factored against the event information, determine the requirement for the community to uphold these capabilities and outline vulnerabilities which could sever the community's critical capability. While this example is broad in nature, it highlights a need for a network of information to be analysed and disseminated by intelligence officers which could produce several probable outcomes acting as the catalyst for strategy amongst disaster management leaders and facilitates a proactive resource response and theoretical rehearsal.

IPB results in the creation of intelligence products that are used during mission analysis phase of the appreciation process, to aid in developing friendly courses of action (COAs) and decision points for the commander. Additionally, the conclusions reached and the products created during IPB are critical to planning information collection/intelligence collection and targeting operations (Purcell, 1989).

Disaster management could use an Intelligent Preparation of the Disaster Zone (IPD) and adapted this to the collate and synchronise data across service, event and community (the holy trinity of disasters). These critical capabilities and in turn critical vulnerabilities combined with defining the environment would highlight decisive areas to target for disaster resources which would be a substantial step in appreciation for strategic decision makers.

It is the initial phases of a disaster that Fog of War (Von Clausewitz, 1832) differs from the Fog of Disaster. Appreciation is likely greater at the strategic level in a military context when acting proactively, where the bottom-up approach in disaster

management has commanders at the operational level having greater clarity than strategic level thinkers, as there is no intelligence input (McNarn, 2018). For this reason, it is essential for QFES to establish a comprehensive fulltime intelligence capacity at the strategic level. An analysis of the operational environment, community and services, would enable a series of overlays produced by the intelligence cell to allow disaster visual representation of risks, hazards and vulnerabilities well in advance and allow timelines and lines of operations to be produced.

Intelligence Preparation of the battlefield (IPB)	**Intelligence preparation of the Disaster zone (IPD)**
Define Environment	**Define Environment**
Describe space effects	**Describe space effects**
Evaluate Enemy	**Evaluate community**
Determine enemy COA	**Define communities COA**

Table 1 – Major headings within an IPB and an IPD (ADF, 2019)

2.10 Intelligence within Appreciation process

QFES is exposed to big data during a disaster with minimal opportunity for competent analysis from an incident commander's perspective. The lack of structure causes a jump in process from entropy to critical decision, thus relying on an individual to ascertain a correct tactic, based off tacit knowledge (McNarn, 2018) opposed to a systematic action related to risk adjustment and probabilities.

The Joint Military Appreciation Process (JMAP) or Individual Military Appreciation Process (IMAP) Figure 1.2, is the overarching process, which allows sound intelligence to assist the commander's decision making, develop plans and ensure orders are communicated and executed effectively. As a result, mastery in decision making and planning is achieved by the commander understanding and employing common doctrine (Wing, 1997). JMAP is the planning process which identifies decision points and COAs for joint complex operations and is designed to alleviate phenomena such as The Fog of War, through allowing key stakeholders to share common logic and terminology to bridge the gap and allow joint planning.

Figure 1.2 outlines the integral part an intelligence preparation of the battlefield injects into an appreciation which produces rehearsals to contain uncertainty and reduce friction.

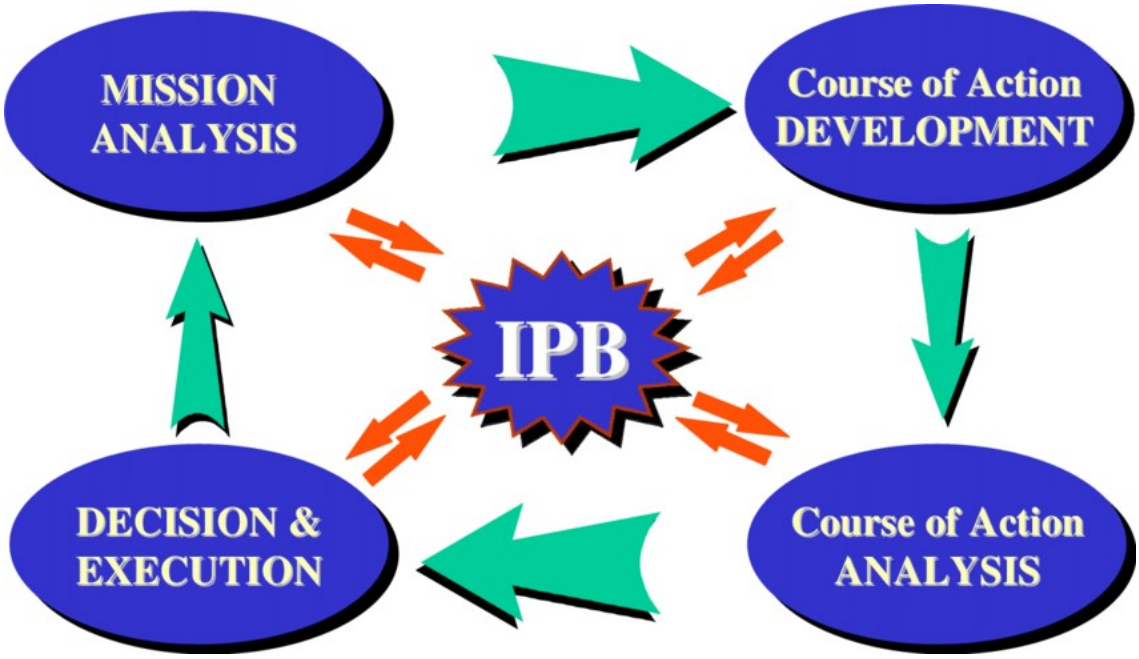

Figure 1 2 Joint Military Appreciation Process key steps (ADF,2012)

While the detail of JMAP is dependent on the time, space and scope required to achieve the end state, JMAP can be drawn down to five key steps, which can be applied to a disaster setting. These steps as defined by the ADF (2012) include:

1. Scoping and Framing - Understanding your timelines, the problem and where you need to get to (the end state).
2. Mission Analysis - Gather as much information as you can about the available resources, limitations, constraints, and risks.
3. COA Development – Develop options. Ensure they are appreciably different and developed with enough detail, so they can be tested.
4. COA Analysis – Test the options to determine the best approaches (War gaming)

5. Decision and Concept of operation development – Prepare and present to your command a number of suitable options so they can make a decision on which approach to take (p. 4).

The appreciation process is a flexible process which allows structured decision making to be applied to a complex situation, such as widespread disaster. The process does not explicitly include an IPB, however, the IPB is an evolving intelligence product, that is continual and gains focus and capacity during the scoping and framing stage. The IPB sets a foundation of intelligence which is utilised throughout majority of JMAP and clearly defines courses of actions (COAs), lines of operations (LOO) and decision points (DPs) for each working entity. This level of command and control (C2) has an end state of clarity and interoperability through enhanced situational understanding (SU).

2.11 Interoperability (friction)

The FOD or an examination of the broader (non-emergency/public safety and non-technical), literature reveals several interrelated factors that problematise real progress in terms of inter-organisational information sharing and interoperability. These problems are magnified as the number and type of information resources, technologies and organisations grow. According to Pardo and Tayi (2007), these non-compatibility or cohesion issues are a direct result of poor interoperability and highlight the need for an overarching process from intelligence to interoperability through a reduction in friction.

The European Interoperability Framework (EIF) identifies four dimensions of interoperability, which interact within a broader political interoperability context; organisational, legal, semantic and technical (European Commission, 2010). While these dimensions have been used as a basis for differentiation by several researchers, Scholl et al, (2012) notes that academic research has neglected the organisational aspects. The concerns from Scholl (2012) and the broad categories the EIF present, enhance Yang & Maxwell's (2011) factors which influence information sharing in the public sector. While Yang and Maxwell (2011) raise different dimensions from the EIF, such as cultural, incentives/reward vs risk, political and technical, they emphasise the complexity of the inter-related factors

that public safety organisations are likely to experience in trying to achieve interoperability. While all facets of interoperability are somewhat related, it is interesting to note the organisational element was emphasised by the EIF (2010) and Yang and Maxwell (2011), however as outlined by Scholl (2012), seems to be neglected in its literature. Under Lowenthal, (2008) intelligence definition organisation is critical as this dictates the critical service and focus of disaster resources such as QFES critical capabilities.

The EIF and Yang and Maxwell's (2011) characteristics of interoperability are complex and contradictory to what disaster management is trying to achieve which is clearing the 'Fog of Disaster', therefore a more simplistic view of interoperability could be adopting the military's optimisation of coalition interoperability, which narrows the focus of interoperability down to technical and procedural; this in turn allows a fluency of information to be relayed between organisations reducing friction within the operation. The literature states:

> **Technical interoperability** is achieved by having equipment that enables intelligence personnel to process information and to exchange information, data, and intelligence within a communications network.
>
> **Procedural interoperability** is achieved through processes and procedures that are the same, similar or, if different, sufficiently understood by each service to ensure that interoperability is still possible. (CIH, 2009)

A study conducted by Allen & Karanasios (2011), outlined several information sharing challenges; significantly the work emphasised that while the different emergency services had a common objective (management of the incident), they typically operate in an insular manner. Therefore, we see a fragmentation of the shared objective. Services undertook discrete processes or activities, which often did not require resource or involvement from the other services. This approach challenges the focus on interoperability at operational level or tactical level and increases the significance of interoperability at the strategic level. Allen and Karanasios (2013) conclude that interoperability is not merely a technological issue which has been presented in the literature but is an organisational and

informational issue intrinsically linked to norms and values. An alternative narrative arose from the analysis that differs from the typical calls for interoperability and rather explains that interoperability is underpinned by several information-sharing challenges that transcend technology issues. While Allen and Karanasios clearly believe technical issues are an effect of bad cultural practise it is important to understand the role of technical interoperability and the relation it plays between intelligence and interoperability, which starts at collation to a central point during the intelligence process (Figure 1.1).

An integral necessity of emergency management and applying sufficient understanding in technical interoperability, is culminating data into an information network, producing a Common Operating Picture (COP). COP is the unifying product of information and intelligence and is the primary tool for supporting the IC's situational understanding (SU). It is a single display of relevant information within an IC's area of interest, tailored to the user's requirements and based on common data and information shared by more than one management level and/or agency, which according to Allen and Karanasios (2011), is currently not featured during disasters. As outlined earlier, if the information has not gone through the intelligence process, these common operating pictures are information tools or knowledge products and not intelligence which influence decision making through comprehensive situational awareness (Fingar, 2011).

Appreciation for intelligence officers is situational understanding which can be called upon, however for decision makers situational awareness requires not such a deep knowledge of the data and allows span of control to be maintained and clarity of thought. Situational awareness can be regarded as "… the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future" (Endsley, 1988). According to Endsley (2003), it can be defined in three levels.

- Level 1 is the perception of the critical factors in the environment.

- Level 2 is the understanding of those factors and how they relate to the goals to be achieved.
- Level 3 is the understanding of what will happen in the near future.

All three levels of situational awareness are required for a commander to make adequate decisions regarding an operation and are facilitated by an intelligent input within the greater appreciation or C2 process. The purpose of the COP is to maintain a common situational awareness among all involved in the response to and resolution of the incident, and to support decision making and planning at all levels. In practice all IMT sections provide input from their area of responsibility to the COP and this information and intelligence must be shared with those beyond the IMT to enable intelligence personnel to build a situational understanding (SU) of the impact and consequence of an incident on agencies, communities and jurisdictions.

Robertson (2014) states that staff must be prepared to deal with the complexity of the operational environment. This is significant, as the amount of intelligence gaps defines the complexity (US Army, 2007) and if a disaster organisation has inadequate intelligence it is not clear how the OE can be defined?

Robertson (2014) hints at a systems-based approach in the commonalities, however trained personnel in information, analytics and a thorough education in system dynamics relationships would be a necessity. With the work to develop a COP there is a distinction drawn between the COP as a product (i.e. a picture of the state of the situation or a report) and as a process (i.e. an integral part of decision-making) (Lowenthal (2006); the requirement for a common understanding of the nature of the situation and the appropriate response over and above a superficial awareness of information.

McNarn (2018) suggests that effectiveness in multi-agency operations will continue to increase as a network enabled capability for using a COP, becomes a reality. This will enable information synchronisation through a network project which results in different organisations and resources being rapidly integrated into a unified response for major incidents. The major hurdle in enabling a coordinated response,

came in terms of achieving a common perspective or end state of the incident and the roles of each agency within the response. While the concept McNarn proposes is sound, the IC is already overloaded with information, so a natural filtering through intelligence would alleviate IC ambiguities (Miller, 2017). Miller, (2017) suggests for effective sharing of incident information through a COP, a level of standardisation of the terminology is required to be used in communications by the various services and agencies. Roles such as highly trained fulltime intelligence officers (i.e. communicating and facilitating the shared understanding of the situation and each agency's role in the response), that will ensure that complementary assessments of the situation will be communicated from the COP (US Army, 2007). Effective implementation of communications technology to facilitate a COP should account for social processes and accommodate them within the technological solution (Allen and Karanasios, 2011) for interoperability. A suggested product could be data collated in a central data base, analysis and exploitation of the holy trinity by intelligence officers, then utilising systems relationships visualised via the COP can be represented by a series of overlapping organisations using information feeds and deliveries in and out of their area of responsibility (Fingar, 2011) to ensure a network of intelligence with appropriate decision making and reporting (Evans, 2009; Danielson, 2013).

As literature suggests, the FOD can only be cleared through an amalgamation of all of the dynamics outlined thus far, the effects of intelligence on interoperability are not mutually exclusive and requires critical thinking, SU, SA, clear tasking, professional standards, terminology, COPs and communications to all be working cohesively. To achieve cohesiveness an overarching process such as Joint Military Appreciation Process (JMAP) is essential or at minimum intelligence preparation of the disaster zone produced by full time intelligence staff with surge and specialist capacity as required.

2.12 Conclusion

Identifying uncertainty, mitigating this with intelligence, applying a proactive appreciation of possible events and identifying a plan with clarity; essentially is the

current choke point within disaster management that stymie's proactive actions and slows operational momentum (friction).

This literature review has highlighted that entropy or dispersion of energy are the greatest factors in causing uncertainty during the fog of war. During a disaster, the holy trinity of disaster (entropy) is services, event and the community, uncontrolled failure of mitigating these three elements are the main reason for poor disaster management. In order to mitigate the holy trinity a comprehensive intelligence capacity is required to maintain operational momentum, starting with an Intelligence Preparation of the Disaster zone (IPD). According to the notion of the Fog of War concept, another major problem within disaster management is friction and this can be directly transferred to the Fog of Disaster concept. There are numerous methods to reduce friction, such as streamline communication, SU, SA, COP etc however, an agnostic term which covers all these micro factors is interoperability. While several factors make up interoperability from a broad perspective, technological and procedural synchronisation is critical.

The literature clearly signifies that these procedural and technological flaws are the primary cause of poor interoperability (CIH, 2009: Yang & Maxwell, 2011; Locatelli et al, 2012), and persist with having inputs / outputs from intelligence throughout a greater appreciation process (McNarn, 2018). Given the large flows of information created by the public and essential services during disasters, it is appropriate for a community to think that their emergency and essential services are working as a collective to achieve one objective free from duplication, political red tape and understand the importance of each individual service without cultural and value issues. However, literature suggests that this is a concern amongst disaster management personnel and while a fully functioning intelligence service is desirable, it can only influence cultural change and in turn the finer details of interoperability (Yang & Maxwell, 2011), through highly trained, fulltime managers who drive professional standard (McNarn, 2018).

With the evolution of collective behaviours (Dynes, 1994,Karasi, 2016), the age of information, political demands and community expectations, intelligence within disaster management is a function that should be evolving rapidly through the

collaboration of information sharing (Muhammed, 2015), the creation of a COPs, Geographic Information Systems (GIS) (Liu et al, 2010) and the academically researched theories such as Swarm Intelligence (Marshall et al. 2009; Seeley 2010) and the combination of human / signal intelligence (Nickel, 2012). However as defined by Melligan (2014) and McNarn (2018) information is disparate and ad-hoc without any real central point or overarching process. While the evolution of peer-2-peer sharing systems is progression, technology distribution through government can lag, therefore the core elements of intelligence which directs planning, operations, critical decision making, is human led (Alberts and Nissen, 2009) particularly amongst disaster managers who often are overwhelmed with information or shrouded in The Fog of Disaster. This phenomenon is enhanced if a professional intelligence person/s is/are not present to relay intelligence surrounding the decision makers main objectives (Sparks, 2007). Collaboration and transparency are critical at all levels and across all organisations, so having an appreciation process is essential for successful disaster management (McNarn, 2018), however a flexible process, which can create SU, SA, and link intelligence to structured courses of actions (COAs) (CIH, 2009) is the process in disaster management which is not trained or practised.

The purpose of this review was to view the trends and evolution of intelligence as a product and process within the past and see how intelligence has changed and moulded to the disaster management realm over centuries. It is clear from the research reviewed that intelligence is immersed and widely practiced throughout multiple sectors in society, however, remains a point of uncertain necessity within our disaster management practices. Whilst the views are varied, and the processes are expressed differently from each other, the core functions of creating a reality to best describe a future critical problem to aid in decision making still apply. Linear and cyclical literature is still being debated, however is not hugely problematic as the processes within run parallel and never truly branch one way or another. Cause versus effect commentary on uncertainty is within the holy trinity, however, is a gap in research. What is known is the term interoperability is agnostic and relies on a combination of intangible and tangible processes such as situational awareness,

common process and common operating pictures generated through modern systems such as GIS. Measuring the effect intelligence has on the micro functions of interoperability would take further research into each attribute outlined by Yang and Maxwell (2011) and the European Commission (2010). However critical thought and action should be attempted in aligning procedural and technological interoperability, as these would alleviate The FOD, particularly friction and allow for better decision making.

The literature suggests that creating an interoperable workplace at the strategic level certainly aids in greater efficiency and results at the operational level. Creating an intelligence product would allow input from vertical structures, however the literature acknowledges utilising highly qualified personnel, this could be from private or military sectors or within Queensland Fire and Emergency Service (QFES). The JMAP is a flexible process which should be taught and applied at all levels of management, this would create greater C2 and allow a clearing of The Fog of Disaster through common terminology and procedures. Given the heavy input from intelligence, an expanded intelligence capacity would have to be an objective of linking intelligence to interoperability through an appreciation process.

A greater intelligence product will aid reducing uncertainty and friction; however this literature review has demonstrated that the intelligence team would have to be advanced in their thinking and adopt cutting edge practices and even invent a product such as Melligan (2014) community outward facing intelligence. Government organisations would have to become less rigid in their procedures and allow a fluid process of testing and adaptation. To create a truly fluid process into a product requires high level values from the intelligence field and the operators on the ground. According to the literature these norms and values are not currently up to the standard required (McNarn, 2018). A strategic focused process, such as JMAP would have to be implemented to see the full effects a higher intelligence capacity could have on interoperability and in turn how this could reduce entropy (Fog of Disaster) within a disaster setting.

CHAPTER 3 METHODOLOGY

3.1 Introduction

The previous chapter introduced key literature on intelligence, its importance across history, and its expansion through multiple industries, through the creation of the Intelligence Cycle. While the literature clearly suggests that intelligence would be highly beneficial in a disaster, it also suggests that for intelligence to have value, it should have critical input into elements of a greater command and control process. The Joint Military Appreciation Process (JMAP) was a logical solution in the absence of such a process.

The JMAP showed a five-step process from initial warning order and setting an end state, to the execution of operations on the ground. JMAP has an objective of easing the amount of critical decision being made through strong command and control, courses of actions, lines of operation and decision points being determined, before being required. This is a proactive initiative which reduces uncertainty / friction through entropy or, as defined in the literature review, The Fog of Disaster.

Entropy is at its most disorderly during the response phase of a disaster, given disasters are high tempo dynamic periods in time. There will inevitably be some exposure to disorder, however the aim of disaster management and the key stakeholders is clearing that disorder and ensuring the smooth efficient system of actions to protect the community under threat. This is where intelligence, appreciation and interoperability are critical. Interoperability is a fluid word which can be applied to any situation, while the literature outlined many characteristics (Yang & Maxwell, 2012; EIF, 2016), most were extensions of procedure and technology. Procedural interoperability and technological interoperability are the two focal points of the military when working under a multinational coalition, therefore would aid as a great point of reference to disaster management particularly as intelligence is also mature within the military and disaster management is yet to see its real benefits.

This chapter will establish the methodological context and how the research is conducted to create rationale links between intelligence, interoperability and the

level of professional processes required to reduce uncertainty, friction and chance within disasters, this phenomenon is described as the Fog of Disaster (FOD). Chapter three will contain the level of approval required to conduct the research, the chosen approach, discussion of the methods used and highlight possible implicit or covert discrepancies in the data through reflexivity and researcher bias.

3.2 Bias / Reflexivity

Every researcher brings various biases to their tasks and these biases can manifest themselves at every stage of the research process (Fusch & Ness, 2015). Cresswell (2003) also notes the researcher's responsibility to expose their inherit influences which impact on the work they conduct, from planning through to reporting outcomes in the final product. While this research was conducted, every intention was made to eliminate bias, however bias will naturally occur and implicit actions or assumptions form because of the long-standing role the researcher has with every facet of this research excluding higher level research itself.

Reflexivity: this derives from personal reflection and consists of a deliberate mechanism of self-awareness and understanding one's characteristics to establish validity and truth within. Charlotte Davies (1999) defines reflexivity as

> "…a turning back on oneself, a process of self-reference. In the context of social research, reflexivity at its most immediately obvious level refers to the way in which the products of research are affected by the personnel and process of doing research." (Davies, 1999 cited in Pillow, 2003, p. 178).

There are numerous points within my background which could affect the data, from a bias or reflexivity perspective. For instance, I am a white 38-year-old male with an extensive operational military background. I come from a lower socio-economic upbringing on the West Coast of Tasmania, I have a sister, wife and three children. I am an atheist who is well travelled and culturally appreciative of others' backgrounds. Professionally I am an operational firefighter with technical rescue qualifications, including helicopter winch, vertical and swiftwater rescue. Lastly I have an undergraduate degree in disaster management. This is not an extensive list

but could distort the data, however the two points I would like to highlight are power discrepancy and insider / outsider view.

Power discrepancy: As a Senior Firefighter interviewing strategic management, a level of confidentiality or lack of information sharing could have been covertly evident, as the research to be published while benefiting QFES was still benefiting the researcher through obtaining a master's degree.

> "These motivations can be complimentary, overt or covert. Oftentimes, researchers 'motivations to initiate research projects include fulfilling their professional interests, such as publishing, earning an academic degree, or receiving funding." (Karnieli-Miller et al., 2009, p. 281).

Insider - outsider view: there are a number of ways of determining this view and which side of the argument affects the data being provided. Check table 2.1 for personal positions on insider, outsider views.

View	**Insider**	**Outsider**	**Result**
QFES	All QFES Staff	Other Key stakeholders, Military	Insider
Fire and Rescue	Fire and Rescue	SES RFS, EM	Insider
Technical Rescue	Vertical, Swiftwater, USAR, Confined Trench	Non Tech Rescue within Fire and Rescue	Insider
Education	Lower education AQF 5 and below	Degree holder	Outsider
Military	Army	Non Military	Outsider
SES, RFS,	Volunteer	Permanent Staff	Outsider

Table 2.1 Insider / Outsider Views

The views in conducting this research were relative to the question posed, the interviewees, and the perceived power balance. As the researcher has experience in all the views in Table 2.1, the data provided could be skewed by position and familiarity and carry the risks of blurring boundaries, imposing personal values,

beliefs and perceptions by a researcher and projecting of biases.' (Drake 2010 cited in Berger, 2015, p. 224)

Addressing these concerns about my dual roles as an 'outsider', while simultaneously claiming an 'insider' space, I have employed reflection and reflexivity as tools to identify limitations to engagement with research participants, that reduce the impact this may have on data collection and analysis, as well as presenting findings and conclusions from this work (Fine and Hallett, 2014).

The last consideration to highlight was the limitations put on interviews due to an ongoing COVID pandemic. While I do believe all interviews would have played out as they did, it is still worth acknowledging that the environment around the interview can influence the data. This was highlighted by Padgett (2008):

> "Reactivity refers to the potentially distorting effects of the researcher's presence on participants' beliefs and behaviours. Quantitative research uses distance and controlled conditions to protect against reactive effects, but the intensity and closeness of qualitative research relationships make this a constant concern." (Padgett, 2008, p. 184).

Padgett (2008) conceives this as a potentially distorting influence due to the trustworthiness of qualitative, in contrast to a quantitative research methodology.

3.3 Philosophy / Paradigm

Reflection clearly signals my background manifests itself in my world view, which is described as a set of assumptions about how knowledge is constructed, Creswell and Plano-Clark suggest that:

> '… researchers bring to their inquiry a Worldview composed of beliefs and assumptions about knowledge that informs their study. A term that is often used synonymously with -Worldview would be *paradigm*." (Creswell & Plano-Clark, 2011, p.39)

The core elements of a researcher's Worldview are:

epistemology (beliefs about the nature of knowledge);

ontology (beliefs about the nature of reality);

axiology (beliefs about values and ethics in the conduct of research). (Berger, 2015)

Onwuegbuzie and Combs have provided a taxonomy containing eleven Worldviews and their underpinning assumptions in relation to research (Onwuegbuzie & Combs, 2010). In relation to these, and the personal background of a Military and QFES member, the two paradigms with which I identify most closely are constructivist and pragmatic perspectives. The characteristics of these two views, in the instance of constructivist and pragmatic perspectives, are shown in the table 2.2 below.

Table 2.2 . Characteristics of Constructivist and Pragmatic Worldviews

Constructivist	**Pragmatic**
Understanding	Consequences of actions
Multiple participant meanings	Problem centred
Social and historical construction	Pluralistic
Theory generation	Real-world practice oriented

Table 2.2 Extract from Creswell's Basic Characteristics of Four Worldviews Used in Research (Cresswell, 2013)

It is acknowledged that researchers may not be bound exclusively to one perspective and may embrace the attributes of different perspectives (Onwuegbuzie & Combs, 2010; Creswell & Plano-Clark, 2011). Worldviews do provide the foundation upon which a research study can be developed. Resting on a researchers' intrinsic belief systems is the direction and focus through which the research will be framed, and that in turn, determines the methodological approach, methods and data collection techniques (Creswell & Plano-Clark, 2011).

3.4 Design

This research considered current and traditional processes across multiple industries, including police, military and verified the appropriateness within a disaster management framework. The research distributed analysis of QFES documents describing the current systems, policies, processes and lessons relating to intelligence, interoperability, appreciation (c2) process and the effects on the FOD. This analysis will form the foundation of highlighted debriefing issues such as relay of information, resource allocation and escalation of command structures and outline the current state of interoperability. These findings can then be used to identify gaps between the current state of intelligence and the benefits of a full-time intelligence capacity. Current practices, a desired future state, and inhibiting factors will be identified via semi structured interviews and informal observations representing regional, operational staff across all structures within QFES. Key stakeholder perspectives, including disaster management group member agencies and military personnel, were sought to express their thoughts and opinions on intelligence and decision-support capabilities required for disaster management, these inputs formed part of the observation data.

This pragmatic approach was taken to maximise the opportunity provided in terms of access to participants, efficient use of resources and the limited window of time available in each case, due mainly to current disasters and an ongoing pandemic. Johnson and Onwuegbuzie (2004) also endorse the pragmatic approach to research:

> "Pragmatism also helps to shed light on how research approaches can be mixed fruitfully; the bottom line is that research approaches should be mixed in ways that offer the best opportunities for answering important research questions" (2004, p. 16).

This research is qualitative, broken down into two phases. The first phase was a literature review, both academic and grey, to construct a thorough understanding of intelligence in the disaster management field, the required systems which support intelligence and inputs of intelligence through an appreciation process. Best practise and current methods will be identified and applied to QFES, to outline a sustainable model. The second phase to this research consisted of interviews,

observation and document analysis, to determine the current state of intelligence within QFES and outline if there is a perceived problem of information flow and interoperability amongst QFES vertical structures. A gap appreciation was then conducted between the current state of intelligence within QFES and what pivots or processes that would be needed to create a sustainable model for valuable intelligence inputs. Lastly a triangulation of current models, observations and interview data would be amalgamated to highlight intelligence necessity in reducing the FOD.

3.4.1 Interviews

Interviews generated the bulk of the data for qualitative analysis. The data was collected from individuals. There was limited opportunity to conduct individual interviews, due to shift requirements of the interviewees; as a result interview dates were changed on numerous occasions. Aside from this, few problems were encountered with findings, representing the individuals' perspectives of how QFES interoperability and operations could be enhanced through greater intelligence capacity within QFES.

Participants were advised in writing and verbally told of the purpose of the research and the intended outcomes in the process of data collection. It was emphasised that participation and involvement in the data collection process was voluntary and, further, that their stories were valuable and provided the basis on which the research was built. Availability for interviewees was determined by three practical considerations: 1. their voluntary consent to the interview, 2. the availability of the interviewer, and 3. shift or leave commitments of the candidate. While this was a limitation because of the availability of candidates to participate in the interview phase of data collection, it was also a reflection of the voluntary participation of subjects in data collection for this study. As discussed, the restrictions around an ongoing pandemic also placed more pressure on availability and interview techniques. The interviews provided a more intense engagement with topics and provided the opportunity for the researcher to ask follow-up questions and pursue relevant evidence that is often lost when quantitative techniques are used. The

interviews were semi-structured around key questions related to the research questions and followed:

> "… a logical order designed to create a conversation, put participants at ease, build trust and importantly – focus the discussion on the researcher's questions…" (Deterding & Waters, 2018, p. 7).

3.4.2 Data saturation

Data saturation is generally agreed to be the point in qualitative research, which is reached when no new data is obtained from respondents that adds to development of a concept, when nothing new is being revealed (Francis et al., 2010; Fusch & Ness, 2015).

While the definition or boundaries of data saturation is general, two independent groups of researchers estimate between six to twelve interviews will normally achieve a respective state of data saturation (Francis et al., 2010; Guest et al., 2006). Guest et al., (2006) established that in order to achieve a sound mechanism to research findings, data saturation is essential. Data saturation is generally stated when interviewees have no real further input to the required concept (Francis et al., 2010; Fusch & Ness, 2015).

Six interviews were conducted and from these a level of data saturation was achieved. The only cost was the time taken with each interviewee, in this case, between thirty and fifty minutes. The data was supplemented by observations and document analysis.

3.4.3 Observations

Observation in qualitative research "is one of the oldest and most fundamental research methods approaches. This approach involves collecting data using one's senses, especially looking and listening in a systematic and meaningful way" (McKechnie, 2008, p. 573). According to Werner and Schoepfle's (1987) there are three observational procedures for seeing. The procedure undertaken in this research was focused observation, given the researcher's position and biases as the required entities spanned a number of separate structures, however all observations were in the interest of QFES current practices. Observations required

prolonged engagement and persistent observations in the field of disaster intelligence, interoperability and appreciation (Lincoln & Guba, 1985), together with the ability of the researcher, which is often filtered by the bias and the lens through what is familiar or known. The observational journal covered initial observations, pivot or turning points, lessons, ethnographic differences (particularly QFES culture) and rich descriptions of research phenomena, reinforced by the interviews.

3.4.4 Document analysis

As a triangulating factor of the observational research, I used internal QFES policy, procedure, operational guides, reviews and training pamphlets throughout the research to provide descriptive depth to the data and enhance the reader's understanding of the organisational context. This internal focus is in addition to the broader, external review of publications such as military doctrine, handbooks and unclassified sources which provided themes that not only intersect and overlap between perspectives but outlined phenomenon such as the FOD and subsequent processes to reduce it. As highlighted, there are considerable advantages to the incorporation of document analysis within the research techniques used in this research summarised below by Bowen:

> "In sum, documents provide background and context, additional questions to be asked, supplementary data, a means of tracking change and development, and verification of findings from other data sources. Moreover, documentation may be the most effective means of gathering data when events can no longer be observed or when informants have forgotten the details" (Bowen, 2009, pp. 30-31).

With this pallet of research techniques placed within the methodology employed for data collection for this research, I will now provide a brief explanation of the collection tools and outline coding of the data into themes which is contained within and emerged from the various sources of data.

3.5 Data collection Method

Data collection consisted of qualitative data which was obtained from.

Internal QFES documents

- QFES gateway directives, and guides, particularly guide 14 as this document is the current standard for QFES intelligence.
- Queensland Emergency Risk Management Framework (QERMF) current processes and functions dealing with local authorities
- Analysis of QFES current documentation will enable scope or current boundaries to pursue the link between interoperability and a greater intelligence capacity.

Scholarly works

- USQ library and QFES disaster management library.
- Academic intelligence literature, current models such as military and benefits of full-time intelligence.
- Joint Military Appreciation Process (JMAP), will be outlined and moulded to fit a disaster setting, with key intelligence inputs and interoperability through strong command and control processes.
- Key points are also suggested from the coalition intelligence handbook which optimises interoperability through intelligence. This publication is for combining America, Britain, Canada, New Zealand and Australian intelligence products, processes and gives intelligence architecture on how to implement successfully.

Reviews and reports of QFES,

- Key points from debriefs outlined and the link between the friction identified and interoperability. This will also highlight information flow concerns.
- C4I Review is an internal review with key findings which will be highlighted, and relevant points extrapolated further.

Grey literature

- The rapidly evolving pace of intelligence and disaster management will require the latest grey literature to determine current practices and future

ideas or hypothesis. This will be mainly internet searches relating back to recent disasters and grassroot initiatives.

Interviews

The scope of this research required representatives across all Emergency Management (EM), State Emergency Service (SES), Rural Fire Service (RFS) and Fire and Rescue Service (FRS) and a mix of operational, tactical and strategic personnel. The interviewees had to have had a long-standing history with QFES and fulfilled the roles of critical decision maker during high and low tempo periods. The interviewees all had different but necessary specialist qualifications which provided separate dimensions to fully provide a holistic research approach to the primary research question. Therefore recruitment was purposive to recruit participants from whom the most relevant information could be gained. There were six interviews across SES, EM, RFS and F&R. The interviewees consisted of AIIMS instructors, FBAN operators, Technical Rescue instructors, Emergency Management Co-ordinators, Station Officers, LDMG core members, Military, business backgrounds and operational and strategic level personnel.

- The interviews were conducted by the researcher in a location convenient to the informant or via zoom.
- Interviews were transcribed using SONIX and themes generated, using concept mapping.
- The researcher was aware that unequal power relation between themselves and the informants may have been present, however the researcher experienced little discrepancies in the informant's interviews.
  Interviews were conducted with one main objective: To gain data saturation, triangulate and form the basis of the data on current practices, desired future states, barriers, and opportunities via open-ended questions. This determined if a problem is present and known within QFES and dictates the level of engagement required to enhance intelligence capabilities and fuse interoperable friction points which could reduce The Fog of Disaster.

Observations

- Personal Journal encompassing, sightings, informal conversations, actions during high and low tempo, experience, and learnings. Observations were logged in a journal over a two-year period spanning 2019-21.
- The Journal covered observations during high tempo and low tempo periods, such as BAU actions and the 2019 Australian fires, 2019 Townsville floods, Covid19 Pandemic, NSW floods 2021.

3.6 Data Analysis / coding

The data was analysed using thematic analysis, as outlined by Braun & Clark (2006), who suggests a six-step process to qualitative research. The process seeks to actively generate themes (Braun & Clark 2006 pp. 16-23), with the aim of chasing raw data that directly contributes to the research question To complete the process a breakdown of the semi structured interviews, document analysis and observations needed to be transformed into a meaningful form, some form of transformation needs to occur Braun and Clark (2006). Chenail explains the art and science of the process finds that:

> "Qualitative Data Analysis (QDA) as a form of knowledge management is a matter of managing analytical processes to transform data into information and information into knowledge… QDA combines both scientific rigor and artistic aplomb to produce a systematic and creative product" (Chenail, 2012, p. 248).

In order to achieve this in QDA, coding of text, for example, interview transcripts, which Chowdhury describes as the 'sorting and sifting of qualitative data' (Chowdhury, 2015, p. 1138). Further to this, Elliott goes on to explain that coding is an almost universal process in qualitative research:

> "It is a fundamental aspect of the analytical process and the ways in which researchers break down their data to make something new" (Elliott, 2018, p. 2850).

In my analysis of the interview data, codes related to themes which emerged from reading and understanding the data (Basit, 2003; Braun & Clarke, 2006; Chowdhury, 2015 & Belotto, 2018).

In the first instance, primary codes relating to standard disaster management between QFES vertical structures were amalgamated and used to form the basis of the open-ended interview questions. The secondary codes emerged which outlined the complexities in evolving cohesion and highlighted gaps or limitations in current practices. These themes are shown in Table 3.3. Several related codes were identified as data analysis of the interview sources progressed. In order to reduce codes, all themes were scrutinised and consolidated to maintain the relevance of each code (Basit, 2003; Creswell, 2013, 2014; Chowdhury, 2015 & Belotto, 2018).

Table 3.3 Data Themes

	Primary Codes	Secondary Codes
1	Uncertainty	Confusion Situational awareness / understanding Reactive Entropy Clarity
2	Intelligence	Understanding Architecture Organisation, process, product Type (base, current, predictive)
3	Chance	Tacit Knowledge Appreciation
3	Decision making	Systems C2 Position
4	Friction	Relay of Information Point of Truth Education / Training Culture Alignment
5	Interoperability	**Technical** Common Operating Picture (COP) Platforms / Communications **Procedural** Education / Training Doctrine Qualifications

Table 3.3 Data Themes from Interviews

Key personnel were identified and interviewed within QFES to confirm or adjust the researcher's perceptions of emergent themes in the data collection. From this qualitative data, the main findings emerged and where gaps in understanding remained, these were addressed using data from participant observation. Document analysis provided contextual information about aspects of the QFES and each of the services. The researcher used SONIX transcriptions to identify, code and analyse themes in terms of their location within the data and the strength of their representation of relationship to the research questions. The application of reflexivity, triangulation of data across all structures within QFES, provides a level of validity to the data and subsequent reliability of the findings. In this way the combination of reflexivity and its influence on research design, data collection techniques, research methods, coding and analysis and the findings and conclusions they produced, help to answer the question; What affect would a greater intelligence capacity have on QFES interoperability and operations?

CHAPTER 4 FINDINGS

4.1 Introduction

The objective of gathering data was to answer the research questions (appendix A), of how and where a greater intelligence capability would enhance QFES disaster management operations (appendix B). To conduct this, six people were identified as strategic people within QFES and provided with three documents (Appendix C, D, E), an email stating the purpose of the research, an information sheet outlining the nuances of the research and a consent form for each individual, highlighting their permission for the research to be completed with strict instructions. All participants agreed and conducted an informal interview with a standard set of questions as a focal point (Appendix B).

The participants were from all streams within QFES and had qualifications directly pertinent to the research such as Australasian inter-incident management system (AIIMS) educators, disaster co-ordinators, business experience, Urban Search and rescue (USAR), Fire Behaviour Analysts (FBAN), military experience, government knowledge and have all played various roles in recent disasters (Australian bushfires 2019/20, Pandemic 2019 – ongoing, Cyclones, Floods, Earthquakes).

The participants were very open in their response to the interview questions, which led to in-depth discussions surrounding the research questions, providing an appropriate level of data saturation required to gauge whether a greater intelligence capacity would enhance interoperability and operations within QFES. During the findings chapter, to ensure anonymity, the participants will be referred to as A1 – A6, for example interviewee four will be quoted as A4.

The findings outlined that natural disasters require a sequence of events that occur outside of all disaster management organisations control, however while QFES has done an outstanding job managing disasters within Queensland, the organisation could greatly benefit from enhanced intelligence, connecting operational design and disorder created by an event to critical decisions. The sequence incorporates the main topics behind this thesis and outlines the links and necessary steps and processes for higher probable desired outcomes (Appendix F). Furthermore, it is

advised that the reader look at Appendix G now, as this highlights QFES current sequence of events. The comparison helps outline the gaps within the QFES process that exacerbates uncertainty and friction.

The links from disaster (event), right through to the determined end state of commanders at the time will be outlined by the data. The analysis focuses on the links between operational requirements, appropriate current actions, and frictions in fulfilling system gaps validated by QFES documentation, observations and qualitative interview data. The findings highlight common themes within disaster management and clearly outlined the benefit intelligence could have on interoperability and operations; if an intelligence preparation of the disaster zone is appreciated and processed. While intelligence effects on operations and interoperability were mainly centred around networks, systems and processes, the data showed a change in the epistemological understanding of intelligence is required in most facets of the intelligence cycle, to shift current reactive perception to proactive response. By understanding intelligence benefits, a reduction in the fog of disaster through creating a rehearsal of outcomes and courses of actions, is a gap to achieve the missions and an overall end state QFES strives to achieve. While QFES follows the intelligence process a fundamental misunderstanding is evident, QFES current intelligence does not influence decisions and currently describes an information product with minimal exploitation of data.

4.2 Uncertainty and Intelligence

There are two main problems being researched which intelligence and appreciation is trying to reduce, they are uncertainty and friction. The findings and previous chapters highlight that the problem and solution are not always linear, however suggested a closer link between intelligence and uncertainty. So, before intelligence becomes a focal point within QFES, it is important to find whether these two dynamics are occurring within recent events. Also, QFES does have an intelligence capacity, so outlining that uncertainty still exists then poses the question: where are current QFES intelligence practices faltering?

Is uncertainty and confusion present within QFES modern disaster management?

The current bottom-up approach from disaster management leaves strategic personnel with accelerated entropy that creates an exponential growth in data points from the three main systems within the disaster network, which are community, services and the event (the holy trinity). Uncertainty is also enhanced with a stovepipe appreciation of the operational environment, leading to an inability to create clear direction for QFES. This confusion is exacerbated by a lack of clarity in Command and Control (C2), strategic priorities and sporadic intelligence inputs during disasters. A4 provided an explanation highlighting uncertainty, which essentially made an objective impossible through poor situational awareness.

> "During the Bushfires of 2020, a specific team was in control of the Scenic Rim Binna Burra area particularly, to cut a long story short there was all sorts of uncertainty with no intelligence inputs, which led to a complete misunderstanding of not only resource locations but capability. The lack of awareness was so bad, a high-ranking officer found out off the news that Binna Burra lodge had burnt down. This had happened eight hours earlier." (A4)

There were numerous examples of uncertainty throughout the data which suggested that uncertainty is inherent within disaster management, however there was discontent with current practices, processes and systems to reduce uncertainty to a manageable level. If uncertainty is still prevalent and a proactive initiative to inform disaster management teams is required, would intelligence fill this gap?

When questioned about the actions which ensues at all levels within the State Operations Centre (SOC) and Regional Operations Centre (ROC) A3 stated that:

> "It's relatively focused, however uncertainty is highly evident, not only from a what's going to be affected? But what are we actually doing? It feels reactive, so I think the identification and definition of clear roles at the strategic, operational and tactical levels, will enable clear mission statements at each level of command and provide both clarity for C4I and accountability." (A3)

A3 describes uncertainty within disaster management groups, this was further acknowledged by A5 who acknowledged that intelligence would enable an understanding of actions, which could mitigate confusion through a thorough plan.

> "Either from a strategic lack of intelligence or operational direction, a disconnect is present from the outset, therefore the ability for a clear direction and plan would enable a much better understanding of what other organisations are doing." (A5)

Uncertainty has been outlined by A4 and will be a constant theme through the findings, also A5 established a strategic intelligence enhancement is desired.

Does intelligence reduce uncertainty?

Gaining intelligence as quickly as necessary, again, enables disasters managers to gain operational momentum through consolidating and distributing Warning order, End state, Commander's intent and general strategy to be appreciated by managers from all QFES streams. Intelligence, while still supporting command and control (C2), if established correctly can become more focused on predicting probable vulnerabilities and COAs to mitigate them. The data suggested that intelligence within QFES would likely reduce uncertainty.

> "There is no doubt, with advancements in intelligence, would help clear uncertainty, however we (QFES) have good information gathering capability already, so I'm not sure how much it could help. Combine that with an inability to transfer(information) laterally and it makes it hard to provide a consistent product." (A1)

All interviewees expressed positivity towards intelligence however often got confused between information, intelligence and knowledge. This is also evident in what QFES staff call intelligence products, such as Total Operational Mapping (TOM) display screens, which simply display current information. This is good for commanders SA, however, does not help with SU which is normally known by intelligence staff.

Is Intelligence and information definition clearly delineated in QFES?

QFES currently has little to no policy, architecture or intelligence training packages, a gap which means there is little opportunity to explore the links between policy, intelligence and the decision maker. The researcher used Operational Guide 14 and the epistemological understanding of intelligence within the interview data, to designate whether QFES is applying a sound delineation of intelligence and has an understanding of intelligence capacity to influence the decision maker.

Documents: Operational guide 14 is the outstanding document in the absence of a comprehensive intelligence training package. Operational guide 14, describes the capabilities of intelligence for personnel within a disaster environment, however the probability of this being applied to its full capacity is low for several reasons, including process, scalability, definition, assumption and lack of terminology.

Scalability refers to the inability to acknowledge that operational intelligence, which is far more narrowed and should be working within the constraints of the commander's intent, differs from strategic intelligence which should be applying a whole of government system-based approach. A recommended approach would be Appendix H.

The definition between intelligence and information is outlined, however only applies the knowledge part of the intelligence meaning, which is to comprehend information. The second facet is to apply logic, this poor definition could be the fundamental misunderstanding of why intelligence products, in the pure sense, are not produced and current production fall more in the knowledge management category.

The document assumes that intelligence is supporting the decision maker who is applying the provided intelligence to the Operational Decision Making Process (ODMP), however further research and observations suggest that this ODMP is not trained or well known within QFES. Operationally commanders use a decision-making support acronym called PACT, which stands for Prioritise, Alternatives, Choose and Take action, however this model again does not scale to the strategic level, as this relies on a condensed process which is dependent on visual cues.

Terminology within the document, while sporadic, is quite good, however misses some key aspects of the intelligence process; the three that stand out are **exploitation** of the data, **influencing** the decision maker and the importance intelligence provides to **appreciation**. These three elements are critical to intelligence, decision makers and providing a logical process.

Operational guide 14 has all the elements to be a useful document, however the prioritisation of information and lack of logical sequencing, makes it very difficult to apply what it intends. The document is sporadic and never has a process which is sequenced in a way, that any intelligence officer could handover and immediately have a sound situational understanding (SU).

QFES is missing intelligence policy, architecture, officers, a training package and centralisation which is required to fully enable a thorough use of the intelligence process, including exploitation which influences decision making and provides proactive actions through a greater appreciation process.

A5 provided a view which highlights incapacities in the current system.

> "We already have an intelligence function which is a branch of planning in AIIMS, intelligence is good but is currently being sufficiently covered by planning to help find information requirements." (A5)

A5's quote, outlines a fundamental misunderstanding of intelligence, knowledge and information and highlights the lack of separation from intelligence, decision maker and in this case, planning. If QFES intelligence is not clearly defined and sits within planning in AIIMS, then how is information transferred to a different temporal dimension to become intelligence?

Does QFES have a current Intelligence capacity?

The interviewees were asked a series of questions which enabled them to outline the current processes, functions, capabilities and options moving forward, surrounding intelligence. While all interviewees had an understanding of the benefits and agreed that it's a necessity, the data gathered was varied and comprised of a number of differing views.

When asked are there any current advancements in QFES intelligence since the C4I review? The responses were all complimentary of steps taken.

> "There's definitely talk and actions being taken, we here in Northern Region speak to police and military on a weekly basis, however from a state level, the intelligence AIIMS package has not come out yet, so we sort of do our own thing." (A4)

While this is certainly a start, a consistent approach is hard to appraise when the training is isolated to one region, with teachings from external agencies who do not have the same depth of knowledge surrounding disasters. When asked; what can intelligence provide to QFES? All responses were different and majorly focused on current intelligence within a disaster event.

> "Intelligence is critical to find out possible impacts of river heights or to relay information that may be a necessity." (A4)

> "Intelligence is critical to operations and planning during disasters, however, is not currently trained enough, so essentially, we resort back to our directives or operational guides." (A1)

As outlined earlier, operational guide 14 is quite helpful in the setting up and basic principles of intelligence, however, is generally only utilised when an intelligence role is stated during disasters. This is again reactive and provides a surface level capability of current intelligence. QFES intelligence approach interviewees were asked; should a fulltime intelligence capability be established, with a surge capacity during high tempo periods? The data provided a range of responses.

> "I think at the regional level it's a good idea, have a number of key personnel trained within their area of expertise, I'm not sure having a state level approach would be that beneficial." (A1)

> "If its trained and implemented by the correct agency, I would say someone outside of QFES because of internal arguments and lack of buy into one stream providing it, intelligence is obviously good." (A4)

These answers again misrepresent the question, as a surge capacity to all interviewees meant subject matter experts in a certain field, instead of a heightened focus by intelligence officers towards an intelligence requirement or a swell in staff who are capable.

A differing view to A4's theory on intelligence training, was one element of the intelligence cycle which is collecting data.

> "Intelligence should simply be an extension of planning, except have information gathering crews on the ground. So, we would simply need to provide awareness to operational staff on the ground." (A2)

As outlined by A.2, intelligence, planning and operations work closely, however all have unique critical inputs to strategy.

> "I could see a combining of information at the strategic level being an advantage. However, a clear commander intent with objectives, tasking and allowable level of risk outlined. Intelligence would obviously benefit situational awareness and aid commanders in decision making. This would take high level training at the strategic end, by maybe a military member." (A5)

A5 provided a clear necessity and advantage intelligence could provide by supporting operations, however when asked, "have you ever seen a combination of service capability, community analysis, event analysis, directed by a clear intent and end state," all interviewees generally reverted to experiences with other services.

> "I was intelligence officer in the Victorian fires in 2009, I was nervous. However, when I got there, I was greeted with a full brief on what's happening, what we have (resource capability,) and was surrounded by a number of individuals who all went about their business and when a critical requirement came up, we came together and got the answer ASAP. This intense focus was something I have not seen in the QFES and would be a massive advantage if we applied it. Further to that we had numerous information gathering personnel on the ground who were our ISR assets directly." (A2).

A2 outlines the content in a single dimensional approach targeting one line of disorder. A6 outlines the flexibility intelligence can offer:

> "I was in Tasmania during the bushfires and their intelligence identified a significant tree, which we than supplied resources to, to protect it. I guess this was something that could be used for any objective." (A6)

A6 provided a prime example of targeting or a Named Area of Interest (NAI), which an intelligence preparation of the disaster zone (IPD) could exploit and provide resources as required. Each member certainly showed bias towards their stream and the disadvantages the current AIIMS system facilitates, however a network of capturing all the data of information was a uniform requirement for QFES. When asked what some of the information capabilities that can be processed, interviews and observations showed QFES has a substantial amount of data capturing capability.

> "We can utilise predictive services, FireCom, FBA (Fire behaviour analysts), TOM, Arc GIS, Air Observers, Rapid damage assessment teams, BoM etc. etc. There's a lot of moving parts in a disaster." (A3)

As outlined above, the ability to capture data is quite good. QFES has a number of product methods, but seemed to focus on sending information up the chain with little ability for operations to adapt after an initial brief.

> "We generally do twelve-hour shifts, unless we are way overwhelmed, then it blows out. We get an area of operations and tasks directed through the IMT during the day, however no real direction is given on best methods and foresight given to possible resource requirements. So we generally become resourceful and find ways to get the job done." (A5)

Outside of a reactive intelligence setup, the data suggests there is a focus on current intelligence with sporadic products of prediction, however, has no process or full analysis of the operational environment with several intelligence layers to aid COAs. The friction or interoperable issues became evident when asked, to the best of your knowledge what do you consider to be the Common Operating Picture (COP) or Point of Truth (PoT) during disasters?

> "It's an interesting question, I think TOM is our most used, however I'm not sure we use it to its full potential. Further to that I know other streams use different platforms." (A3)

Three interviewees stated TOM as the COP, two interviewees saying they are not sure and one interviewee suggesting not even knowing what a COP or point of truth represents.

> "That's why we give orders, so I know where everybody in the area of operations is, the COP tells everyone where they are going." (A2)

The focus on current intelligence, lack of a centralised information system and no dedicated intelligent officers, provides a surface level intelligence capability, which lacks depth to support decision makers, particularly as information gets described rather than exploited during the process.

> "It is very hard when you're a commander, you get a poor, out of date handover and are fighting internal politics and beliefs. Combine this with no situational awareness and communication and information platforms that don't talk to each other and it's hard to provide clear strategy and tasking for anything." (A4).

QFES does have great data gathering capability, however it is sporadic and generally reactive to a current event. The intelligence cycle is practised, however has flaws through each element, for example:

Planning does not explore the relationships between systems
Collation – there is no central data base for information
Analysis – there are minimal qualified personnel to exploit the data
Dissemination – is siloed with no comprehensive COP or POT designated
Product – represents information or a knowledge management product, which does not transfer information into a different temporal dimension.
The QFES lack of intelligence, has highlighted an exacerbation in uncertainty from the outset of an event, through an inefficient defining of the operational environment and analysis of service capabilities, community and the event.

> "As far as I'm aware, we have one qualified person in our region whose completed the old AIIMS intelligence package. However, I know for a fact they have not fulfilled that role, so I'm not sure how or who informs operations and planning." (A4).

A comprehensive overlay is not currently present to support decision makers, which leads to further confusion and an inability to provide clarity to operations through appreciation and a reduction in friction.

4.3 Appreciation and Friction

QFES data suggests little understanding of the term friction, from a fog of war perspective, however were aware of appreciation. If appreciation is the enabler to work cohesively across a number of functions and friction is the inability to work as one, then in a sense, friction is directly affected by appreciation application. The researcher used QFES appreciation issues and friction in the fog of war sense, to apply whether a problem is present within QFES and whether appreciation is being practiced supporting the decision maker.

> "I think QFES act [sic] independently from operations to state and deal with the environment as problems arise. It honestly feels like two wars, state is fighting one and operations are fighting another, they never really align." (A4)

Is there friction present within modern QFES disaster management?

The FOD outlines two distinct features, they are uncertainty from the outset of the disaster and the second is friction while trying to execute. Friction is the difference in planning and strategic level pictures, compared to what is happening operationally. As outlined by A2

> "The chaos surrounding the loss of Binna Burra lodge was caused by personnel not knowing what was happening outside of what they could see and the operations centre conducting handovers with minimal plans or accurate locations of resources. It was a combination of a thousand things." (A2).

Friction occurs operationally as well:

> "We had a body retrieval up near Mossman Gorge, neither us (Fire and Rescue), SES, RFS, EMQ Helicopter, Police or QAS could talk to each other. It was a shamble in resource allocation and planning." (A6)

As per uncertainty, friction cannot solely be fixed with one solution and requires appreciation, in turn, interoperability of people, communications, culture, technologies and procedures to align to create efficient operations to be completed as originally strategised.

> "I don't believe friction can solely be looked at from one perspective, it takes strong management, which we lack and clear direction across a multitude of functions, for example communications, training and even procedures." (A1).

The data showed clear understanding of the necessity of interoperability, however a sense of blame still seemed to be evident. A6 highlighted a problem with competence alignment and blamed Fire and Rescue:

> "When Emergency Management Queensland amalgamated with Queensland Fire and Rescue Service, Fire and Rescue essentially took all the management roles, even though I was more suitable for the role of Super Intendant" (A6).

Given it has been over eight years since the amalgamation, the blame outlines a cultural divide, which leads to inefficiencies in aligning technologies and procedures which is stymied out of self-interest.

> "We would rather work independently under our own procedures using our own platforms. I don't think there's a high requirement of interoperability. However, training could be beneficial." (A1).

The divide did not stop at QFES:

> "I find these sorts of groups (LDMGs) of key stake holders end up being motion rather than progress and eventuates in an oligarchic like decision process. It's the boss' opinion and we never really do scenario-based outcomes, well not to the level we should." (A1)

The acknowledgement of scenario-based training is important, as COA development and analysis is exactly this, in a more time pressured environment. While the data covered a range of issues from culture, people, education and the siloed bottom-up approach, most of these themes all fall outside the scope of this research, which is the links between intelligence and interoperability. The two primary themes which fit within the scope are technical and procedural interoperability. If intelligence provides clarity, which enhances strategic level direction, then appreciation is essential in connecting all dynamics and mitigating unforeseen circumstances through a comprehensive information network, which allows processes to manoeuvre assets appropriately. The appreciation process allows intelligence inputs to create scenario-based outcomes which provides a visual rehearsal of events and actions required to reduce friction.

Does Appreciation reduce friction

After clearly defining appreciation and friction with the interviewees the data found appreciation shifts from operational personnel at the beginning of a disaster, to strategic level once external resources are applied to a designated area.

> "I would say in the beginning of a disaster, operations has a clearer picture and understand what their options are, however as the disaster escalates, more and more dynamics are present and a shift of ground appreciation transfers to state. So, our (operations) constraints are probably narrower and easier to find." (A6).

Appreciation of the disaster appears to be diametrically opposed to uncertainty, which starts strategically and shifts to operational personnel.

> "Naturally we know what's going on, as we are there from the outset of the disaster, but once a disaster gets protracted, it feels like you are answering to anybody who wants to satisfy their curiosity." (A.6).

A6 was asked how could this be solved?

> "Well, I think managers could start reporting down, opposed to simply appeasing their bosses." (A6)

A6 outlines a current practice which is facilitated through the bottom up approach, which is regions and state are still a support mechanism for operations. Adopting a moulded appreciation process outlines each services objective, which falls within the overall mission. Appreciation allows clarity of task and reduces strategic level reliance on good critical decision making, by operations.

Reducing friction through knowledge of AIIMS

There is considerable confusion about what qualifies a person to hold an operational leadership position in QFES. It can distort the effective use of staff and the team cohesiveness. It is driven by two issues, first, the confusion of appointment versus rank and second, the conflation of AIIMS qualifications with leadership in unrelated environments.

> "I am extremely concerned of the AIIMS training, as there is too many inconsistencies between volunteers and permanent staff. Permanents do this (disaster operations) on an ongoing basis for years and conduct numerous courses which build their knowledge, where volunteers come in, conduct one AIIMS course and all of a sudden are suitably qualified to fulfil that role. It's dangerous and messy, particularly because they don't know our procedures, the guys' expertise and frankly, they don't have respect of everybody, which makes it hard for them to think critically. They are more worried about not looking incompetent." (A2).

While more relevant AIIMS technical training is required, it does not translate into a command qualification.

> "AIIMS is centred around disasters and not necessarily your stream's core function, therefore it's important to fulfil the role required, following the procedures in place. As this is role driven, while there is a commander, everybody else is simply playing their role." (A1).

This is a view shared by all interviewees, however when asked what qualified a person for these roles the data varied from experience, operations, precise managerial background, rank and identified competence, A2 outlines their concerns:

> "Fire and Rescue go through ten plus years of training and conduct this stuff operationally every day, however during a disaster get stuck in a ROC with a controller who does a one-week course in a certain position and we are expected to all; just trust them." (A2)

Opposing this was A1's response, which identified that experience or tacit knowledge outside of fire operations can be more valuable. A1 states:

> "I have highly educated people, with multiple businesses and vast man management skills, which simply get treated terribly when in the ROC / IMT environment. This issue is one of several problems why volunteerism is a dying thing." (A1)

Given the lack of a clear Command and Control (C2) role for the SOC, no doctrinal role for the ROCs, limited unity, clarity, or proper span of command, it is not surprising that the delegation of command is also a point of risk. When questioned on possible solutions, the consensus and limits moving forward, was funding to train personnel to an accepted standard across all internal structures and to unify the knowledge.

> "I tried to establish a permanent IMT, to travel to any region in QLD to allow consistency in our approach, however it got canned because of funding." (A2).

A point emphasised by A3:

> "Funding and qualified trainers are definitely our greatest barrier for training." (A3).

The span of control should provide a hierarchical control from the commissioner to operations, without any one entity co-ordinating greater than seven direct resources, however QFES likes to keep their DM vague as the QFES command structure is fragmented into seven regional stovepipes and the absence of a State Operations Centre (SOC) with a clear command role over the regions or an identified role for the Regional Operations Centres (ROCs).

> "The inability for state to have a sound 24-hour presence, means that firstly they are reactionary to form and secondly they are waiting on request from regions to assist which is also reactionary." (A3).

> "I'm pretty sure you will find that our boundaries are different, for example Fire and Rescue Northern Region is not the same as State Emergency Service Northern Region. This misalignment creates hierarchal confusion as well." (A1).

The span of command, roles and accountabilities provide no clarity and stability as the fulltime BAU presence is unavailable. With no ability to provide a comprehensive intelligence preparation of the area, or complete capability analysis, an alignment of resources is missing, which poses the question how does QFES reduce friction?

Does QFES have an Appreciation process (JDAP)?

QFES does not train a Joint Disaster Appreciation Process (JDAP), through career progression, as highlighted earlier, decision-making tools are established for front line operations, however, are not scalable (PACT). Strategic level personnel dictate their own career paths, while there are certain benchmarks, a formulated JDAP is not engrained in knowledge throughout the organisation, so only gets applied in a bastardised format. The documentation recognises ODMP, however the researcher could not find an expansion within the organisation other than a reference in operational guide 14.

During the preparation for an event, services are starting to form incident management teams (IMTs), as required depending on proximity to the event. When asked about the internal structure, scoping and framing of a possible disaster; A1 described QFES actions as:

> "A series of movements from LDMGs and services are moving to lean forward, which is an alert level for local, district and state government. The event is gaining intensity (Cyclone for example) and causing communities to start focusing their attention on appropriate actions."(A1).

Most level two and three disasters, cross multiple fixed regional borders, this demands a shift in C2 structures and creates friction, as operational staff need to learn a new set of parameters.

With no IPD or formulation of COAs, a system level of situational understanding is lost and each service's objectives are fragmented from other services actions.

> "The (Townsville) floods were all over the shop, we had SES, army, airport staff, RFS, swiftwater rescue, locals and council, all running everywhere. We were fortunate that; there were that many people to rescue it did not matter. My guess is there would have been some heated discussions on who was providing what to the operation." (A6).

A4 also describes the Townsville floods:

> "It was difficult, as a decision maker, as there was information everywhere, council were providing objectives and resources and the locals were either vulnerable or putting themselves in harms way. Not to mention the army who just do what they want, honestly, sometimes you're not prepared for the untrainable." (A4).

What A4 has highlighted, is uncontrollable friction which enhances safety to QFES personnel and the community. The JDAP eliminates a lot of these pressures, by relieving the decision maker of information overload through a systems-based approach.

4.4 System based Decision Making effects on Interoperability and Operations

The fundamental point of a system is to work as one, so applying such an approach to QFES operations, allows decision makers to synchronise their decision under a greater command decision. This approach provides a systemic level of safety to QFES personnel and enables a more fluent approach to protecting QLD communities. Given the rise in entropy through the holy trinity, it is intelligence role to compress information into a manageable format for decision makers to appreciate and decide.

Does QFES utilise a systems-based approach to the Disaster Holy **Trinity?**

The understanding of current members is QFES, do use a system-based approach, operational guide 14 mentions all systems of the holy trinity, however it is not logically sequenced into a process. Furthermore, each system attempt is limited by rigid regional borders which needs a handover of C2. Utilising the QFES centre of gravity and applying this to a proximity to the event, QFES will establish a main force element and everything else is support.

> "While there is definitely key stakeholders conducting various meetings across the service, a combining of all the information never goes through a consistent process which produces a brief or intelligence product to help ICs. So, what ends up happening is an analysis gets done of current actions, utilising known procedures and current resource allocation displayed by TOM or Arc GIS or whatever we are using" (A2).

The interviewees, observations and document analysis, suggest a surface level understanding of how intelligence could help operations, however, mainly focused on current intelligence, and lacked a bigger system thought process.

> "Intelligence is great if set up properly, with knowledgeable people. When operations, planning and intelligence work cohesively, I reckon this is the determining factor of the success of the mission, I have seen this firsthand in Victoria and Tasmania. Intelligence definitely helps QFES highlight information as required, but as it stands we currently have no AIIMS capability, so we just do our best; making good decisions." (A2).

The focus, when asked about operations and QFES interoperability, was centred on the organisation with no thought of how interoperability could be enhanced by overlaying event, community and QFES capabilities to support one another as required, dependant on mission requirements.

How does QFES system-based decision making currently affect interoperability?

> "During high tempo periods, each structure seems to work for its own interests only, with little trust in the other organisations. Even if, let's say, swiftwater rescue teams required the support of SES flood boats, there's no easy way to directly coordinate this and there's definitely no tasking or thought process on this action actually being required." (A3).

Procedural

A3 outlined that when the various organisations merged all existing doctrine, it appears to have been imported and dumped into one area within 'Bookshelf,' with no organisational alignment. Bookshelf was a QFES original internal computing system;, it is now referred to as Gateway.

Not only did QFES merge services which created confusion, but in this merging the accessibility changed for each organisation.

> "What I'm saying is; a complete transition from one system to another with no training on how to use the system. This created two problems: one, you could not find reference material easily and, two, a number of procedures did not align with each other, particularly our tactics and techniques. This misalignment becomes critical when working in the AIIMS structure, in time critical situations." (A3)

A critical element of intelligence is describing capability against a number of analysed threat layers, to best support operational commanders. QFES is unclear on the procedural requirements for operations.

> "I have very little clue in resource capability and strength of other streams. I'm not even sure where a lot of their facilities are, but saying that, is it my job as a member in a ROC to know all (of) this? Or should that be an information requirement for the int cell?" (A2).

This limited maturity in the development of strategic, operational and tactical capability levels and the lack of development of processes and roles, brings significant risk which again enhances uncertainty.

> "It is funny I have been incident controller at a number of IMTs and there's always a sense of calm, however, while its calm you can also sense a feeling of trepidation. This is caused by a lack of clarity and an overwhelming feeling of; have I reported everything up the chain I needed to? This is probably symptomatic of how we respond. We wait for something to happen, then react as necessary under our everyday emergency procedures." (A4).

It is interesting that while procedures do not align and some strong opinions on other streams were evident, majority of the data suggested, from a people perspective, that all QFES streams work quite well during disasters.

> "I think we generally work really, really well together. I do not believe there is any white anting or much negativity. I know this is the case at regional and state level as well." (A1).

> "It's funny because after conducting a number of training scenarios and disasters with the other streams, I found some very useful capabilities which I was unaware of, particularly from an operational perspective." (A5).

Not all streams within QFES have gone through a hierarchical operationally focused career, this widens the gap in knowledge, which requires a necessity around aligning doctrine. In recent history this has been covered over by networking, bonding and chance. If QFES cannot define the operations, it cannot document them in doctrine. As outlined by McNarn (2018), priority should be given to defining the operations role of the SOC, ROCs and ICCs, then detailing it in doctrine.

It appears that while there are some major flaws within QFES procedural interoperability, the culture and willingness to work as a cohesive unit is evident. Couple the positive advancements in management team interoperability and clear acknowledgement as a strategic objective (QFES 2030), there's been some real progress in these areas.

> "From the amalgamation we have come along way, particularly during high tempo periods. I think the want at the tactical level, is there just need some strategic know how." (A1).

However, an alignment in rank, education, procedures and clear C2 doctrine, which stems from the legacy systems, would provide a greater connection amongst vertical structures and understanding of operational capacity.

> "A lot of the interoperability issues could be sorted by strong management and some real clarity around decision making or priorities. Also, I believe, when we implement new technology, discard the old system completely to eliminate confusion. This is an area intelligence could be used for, the test and trial of new technologies before a full role out." (A4).

A4 acknowledges good decision making will help interoperability. Intelligence is the link between uncertainty and good decision making. A4 also acknowledges intelligence as a test net for technologies before a full role out, this may be a method of reducing technology costs and teething issues.

Technological

The three main systems that dictate the operational design within QFES in a disaster scenario; are the event, community and QFES (Holy Trinity). As these systems converge on each other, several moving parts start to provide more information (data), which if not captured, analysed and disseminated in a timely manner, enhances uncertainty, which effects operational momentum and enables a reactive response. Given there is no fulltime intelligence function within QFES, managers have done an exceptional job, given the jump from entropy to critical decision, without a lot of intelligence clarity (Appendix G). When asked about the platforms and communications systems within QFES, all data suggested the introduction of a number of methods, however, poor functionality, poor integration, or unclear purpose of the new system has bred a negative attitude to innovation.

A3 expresses a training gap in the current GIS system, which most interviewees believe to be the COP.

> "Total Operational Mapping (TOM) is a good system which allows a form of representation of the data being created. We have established Liaison Officers and certain personnel to gain training in use of TOM, however, very

> few people are proficient enough to provide intelligence value at the regional level." (A3).

A5 again outlines alignment issues with training and implementation from one stream to another:

> "We are using ESRI ARKGIS through the risk management framework within EM, this is a really good system however is not fully integrated through the whole of QFES because of login availability, training and funding. The capacity of GIS is phenomenal and really allows great situational awareness if implemented and interpreted at all levels. I've never been taught TOMs capacity, but I hear its slightly outdated." (A5).

Technology in general is evident, however seems to have only been implemented in differing regions of Queensland.

> "The problem is, systems get integrated in dribs and drabs across certain parts of the state, then sort of get left to linger if they don't work, or lack of training structure, if they do work. A classic example is why some of the state is utilising Greater Wireless Network (GWN) and the rest using analogue. You can't say our interoperability is good, when our dispatch networks and main form of initial information for response are not even aligned." (A3).

QFES has a lot of systems which are not interoperable and span outside the organisation, this creates friction at all levels.

> 'As far as I've learnt, Emergency Management use event management system to talk to state, SES use TAMS which Fire and Rescue have never learnt. Fire Rescue use Electronic Incident Action Plan (EIAP), which I know nothing about. Essentially, we have stuff going everywhere and not enough people if anybody who is proficient in all systems." (A6).

The legacy systems amalgamation has inhibited each stream's ability to adapt and the absence of failure, has allowed current systems to remain and create unneeded friction to disaster management. The lack of a common data base and point of truth

that intelligence could provide, enables misfocus when unforeseen events occur and creates uncertainty to all elements of AIIMS and at all levels. When asked, 'would intelligence help interoperability within QFES,' the general consensus was positive, however the links to how, were not so clear.

> "Intelligence is a must within QFES and interoperability is a must within QFES. Outside of relaying information to commanders, I think we have most needed systems implemented; they just need refining." (A4).

A4's response reflects that in some instances QFES has so many options and reporting platforms that it falls outside the span of control and therefore takes away from the operational objective. When asked 'what is the most appropriate way of combining these systems,' all data suggested a bias to fall back to what the interviewee knows.

> "I would just stick with TOM, a lot of data already goes there, quite a few people are becoming good at it and there's plenty of overlays." (A3).

A5 outlines the frictions of time, effort and cost.

> "I'm not sure, I think it is easier to just work with current systems. It's probably not the most efficient but the cost of starting again is just not going to happen." (A5).

A positive reaction to implementing, or putting in doctrine one system with less ambiguity is expressed by A1:

> "I think we have two main options, adopt a completely new system which is a one size fits all, which is fully tested before integration, unlike NEXUS, or apply a standard set of rules or procedures about which current system we will use during disasters and do away with the others." (A1).

It was clear that a single data capturing network is a requirement for QFES, however this requires personnel trained in information analytics which supports the whole organisation. There is currently an overabundance of systems which are not interoperable, understood or supported by clear doctrine. Intelligence could provide this focal point and allow clear operational movements within each stream,

which enables service interoperability down to the regional level, however allow independent operational flexibility directed through capability, missions and clear tasking.

How does minimal QFES system-based decision making currently affect operations?

Providing a system which becomes knowledge through career learning, enhances trust among the organisation and focuses QFES energy towards a dictated end state with missions, objectives and tasks, all supporting one another, however allows operational flexibility by working within outlined commanders intent and allowable levels of risk. Below is not an exhaustive list, however, are some of the current limits QFES could gain advancements if a system based decision making was applied. The data outlines common problems currently facing disaster management operations and decision makers which would be reduced through a fluid system-based appreciation process, with exploited intelligence inputs.

Command and Control (C2)

QFES strategic personnel need appreciation from the outset of a disaster, to determine a preliminary analysis and time space limits. A3 outlines the current systems are generally for reporting up and don't necessarily help execution of operations.

> "As an IC, you have multiple screens in the regional and state operations centres, to give you situational awareness and help control resources, however I would argue these are used to report up to state, media or used for data to inform the public". (A3).

Point of Truth (POT)

Through a thorough plan, operations can garner a clear Point Of Truth (POT), as appreciation shifts to strategic level personnel. This POT requires a central data base and situational understanding of the operational environment, which is provided by full implementation of the intelligence cycle..

> "With the flood of information provided these days, it is very difficult under time constraints to determine seriously the relationship in data. Therefore, TOM becomes the point of truth for at least Fire and Rescue to gain situational awareness." (A3).

A3 highlights the compression from collation to product in the intelligence cycle. A3 was asked did this abbreviation in the intelligence process occur with an intelligence capability at hand, where they replied

> "No". (A3).

Common Operating Picture (COP)

A proactive analysis of historical, current and future actions will enable clarity across all services and provide a natural convergence of technology, that provides the most efficient method of compressing information across time and space with a common information screen.

> "…there's a lot of reporting naturally during a disaster, however from my perspective it never equates to a fully transparent plan which is clear and concise to everybody, maybe a new model or process should be focused on." (A1).

Situational Awareness (SA)

Situational awareness is critical for all personnel, so by not providing a QFES capability analysis, personnel are often facing unnecessary ambiguities which would be highlighted through a COA development.

> "We rarely get maps and set objectives, it feels like operationally; that we get an area of concern and the stock standard resources then react as necessary to community concerns. While we have some guiding principles which enables logical decisions, these are only implemented in a reactionary moment and give prioritisation to your decision making." (A6).

Situational Understanding (SU)

Intelligence greatest asset is providing critical decision makers the ability to ask for clarity around a certain decision. This SU relieves the decision maker of information, which in turn keeps their span of control manageable. Intelligence systems provide a process which seamlessly hands over SU.

> "Our biggest issue is extended disasters end up with less competent, unqualified personnel, filling critical decision roles. Handovers are poor and there's too many systems and dynamics to simply step right in and take up

> the reins. You spend half your shift figuring out what the hell is happening." (A1).

A2 expresses frustration in a lack of a proactive process:

> "A fundamental problem within QFES, is a lack of clear relay of information or defined objectives; or even a wargaming process to visualise all the possible outcomes, problems and solutions. Its messy". (A2).

Relay of information

Relay of information was found to be missing when reporting to subordinates, an appreciation process will enable actions and outline communication methods to mitigate this problem. Furthermore, the inability for QFES to extract information from operational decision makers could fall in the responsibilities of intelligence, as they have the overall SU to provide knowledge to the current limits in extracting lessons. A5 provides the opposite example of platforms which report up within QFES.

> "This is the funny part, I report to LDMGs, DDMGs for example on behalf of QFES however, I have no idea how to use EIAP, TOM, ESRI, BART or any of the others I've been trained in; Guardian and EMS." (A5).

QFES have a lot of unnecessary reporting structures, communication methods and operation dynamics, which provide uncertainty at all levels. Couple this uncertainty with roles, ranks and responsibilities during disasters and friction is inevitable. SU gets lost at every hand over and critical decision makers are left to burden the responsibilities of containing a never-ending flow of information, that distracts from their primary objective, which is sound decision making. The lack of parameters to provide clarity seams symptomatic of the bottom-up approach and lost appreciation initially by strategic level personnel. This stymies solid C2 and expands the sequence between entropy and the critical decision maker.

4.5 Minimal system education means Chance is still a consideration

QFES have done exceedingly well in recent disasters, however this is not through a strong and established C4I. Without a strong intelligence capacity, using the relationships of the holy trinity, QFES is reliant on great operational decision

making, which is generally fractured from each other. Not establishing an overall system, diminishes appreciation which places unwarranted loads on critical decision makers, clouding clarity and leaves a siloed approach to operations. This siloed approach places QFES under more danger and leaves negligence on strategic personnel. Within the FOD, the third element is chance.

QFES (Tacit knowledge and competence)

Tacit knowledge and experience are two great assets for QFES, however, are reliant on the individual to have these attributes. Protracted disasters require rotation of staff and the likelihood of maintaining competent personnel with required experience, is diminished. Below are some extracts from the data which shows that QFES biggest strength is also a facilitator of false production during disaster.

A5 highlights an inability to use current display screens to their full potential and in turn do not provide government a holistic intelligence product to influence decisions.

> "Liaison officers to LDMG are only a new concept and the proficiency in GIS from QFES staff are not sufficient to make or change decisions, so TOM ends up as another display screen in the ROC and LDCCs." (A5).

A1 outlines the probable reasons behind intelligence misunderstanding and shares an opinion on current strategic reliance on chance.

> "Well the mere fact there's no intelligence courses; make you wonder how these intelligence reports are produced. Currently it's a few key stakeholders coming together, interpreting each service utilised platform. I honestly believe that State Operations Centre (SOC) believe experience is analysis." (A1).

A5 highlights the lack of system and clarity which can be a result of inadequate personnel not having a comprehensive structure and situational understanding to plan, after critical decisions are decided.

> "NSW was a cluster, the request process, the resources required, the area of operations the whole lot was a dog and pony show. There's a lot of people in

> disaster management trying their best, but lack the resources, training and in some cases, capability to fulfil their role, make it impossible not to be confused." (A5).

A2 provides the result of a reliance on chance and the result when SA, SU and a lack of intelligence supporting a flexible appreciation process, is not considered.

> "There had just been a handover, there was an inexperienced operations officer, confusion was everywhere and as a result the intelligence cycle got compressed to opinion and we lost Binna Burra." (A2).

The inability to provide a holistic system with clear tasking and understanding of each services role, allows gaps in the process and a fragmentation of effort between SES, RFS, EM and FRS and can be extrapolated out to other services and essential disaster managers.

> "The process we (QFES), use at the moment, is kept within each stream and I know from my point of view; that frustration in lack of learning or making the same mistakes over and over again, make it hard to believe that change will be implemented." (A3).

The findings suggest QFES may have relied on good fortune in recent years. While at face value disaster management looks good, the findings suggest; if a formal inquest into disaster management application was conducted due to an internal disaster (loss of personnel), QFES strategic management could be held negligible through not supporting the decision maker appropriately and failure to provide process in containing the FOD. QFES strategic staff could learn from the investigation in to the 1996 Blackhawk disaster.

4.6 Conclusion

The data in this chapter has shown three distinct links which fall in line with Von Clausewitz's (1832) conclusions on the Fog of War: they are uncertainty, friction and a reliance as outlined by McNarn (2018), which is tacit knowledge or experience (chance).

The data has shown that uncertainty is prevalent at all levels during a disaster and a clear gap in process from entropy to critical decisions. QFES current operations and execution seems to have friction and a reactive framework, this is symptomatic of poor appreciation, supported by intelligence to help decision makers at all levels.

Within all QFES streams there is a belief that intelligence is being applied to a reasonable capacity, however the data showed that a lack of policy, education and clearly defined documentation is providing information or knowledge products, which don't challenge the constraints of the operational environment. This epistemological misunderstanding has driven a belief the intelligence process is being applied correctly, when in fact the lack of collation of data and exploitation means that information is being described rather than defined.

The inability of condensing reporting streams, communication methods, GIS platforms has left confusion as to the basics of what is the COP or POT. The ODMP is virtually non-existent, which means appreciation is hard to enable good decision making.

The data proposes the sequencing from entropy to critical decision maker are not appropriately applied and therefore interoperability cannot contain friction across technologies, communication, reporting, resource allocation and task duplication and this breeds a siloed response with cultural disdain amongst services.

The findings suggest clearer process for intelligence, appreciation and the decision maker will be the enabler of interoperability between services through understanding of capabilities. These processes will allow a safer structure for QFES staff, however, will require a systems-based approach, an evolution in intelligence application and will encounter several inhibiting factors which are consistent within a mature framework.

CHAPTER 5 DISCUSSION

5.1 Introduction

The purpose of this chapter is to align the elements within the literature review which have identified the necessity for a strong intelligence and synthesise these elements with the data recorded within the findings. Further outlining of the intricacies within an intelligence system, will start to identify the relationship between systems that is required to create clarity. Current practices within QFES will be cross referenced against mature intelligence organisations, with limitations, inhibiting factors, gaps, barriers and possible solutions outlined to limit friction and reduce the fog of disaster.

5.2 Understanding the difference

A review of the literature and the original QFES hypothesis indicates that there is considerable confusion over the difference between intelligence products, analytical tools, disaster operational reporting and knowledge products (Pythian, 2006). The most systemic problem involves obtaining a description of analytical tools as intelligence products and analysis (Coyne, 2014). Mapping data points on a geospatial mapping system (TOM), can be argued to be an analytical or knowledge management tool. If the intelligence cycle is used as a model of the intelligence process, these types of analytical tools involve collation but little to no analysis or exploitation by QFES to operational decision makers. McNarn (2018), found the lack of centralisation of information nearly makes it impossible to create a consistent system when all QFES streams have multiple reporting channels that are not interoperable vertically or horizontally within the organisation. All interviewees had the sentiment that each communication or information gathering system was another services problem. As A5 noted:

> "This is the funny part, I report to LDMGs, DDMGs for example on behalf of QFES however I have no idea how to use EIAP, TOM, ESRI, BART or any of the others I've been trained in; Guardian and EMS." (A5)

A5 statement highlights the complex layers of technology, which in theory, should make disaster management more efficient, however is not serving the purpose of data transfer efficiency as outlined by Liddy (2005).

Intelligence studies theorists argue that there is a need for intelligence at all levels to be suitably distanced from operational decision-makers (Davis, 2007; Fingar, 2011). Intelligence has a long history within military and national security, of allowing decision makers to trust and enhance their capacity and culture through a strong strategic framework (Fingar, 2011; Lowenthal, 2012); this approach is evidenced within the Coalition interoperability handbook and the strategic corporal concept over the last twenty years (Liddy, 2005). Queensland Fire and Emergency Service (QFES) management have not (yet) seen the merits of, or applied to its organisation, an intelligence function to aid strategic decision making (Interviewees A1 – A6). A representative point by A2 highlighted this, when they explained the confluence of roles Incident Controllers (IC) at all levels manage.

> "While there is definitely key stakeholders conducting various meetings across the service, a combining of all the information never goes through a consistent process which produces a brief or intelligence product to help ICs. So, what ends up happening is an analysis gets done of current actions, utilising known procedures and current resource allocation displayed by TOM or Arc GIS or whatever we are using." (A2).

QFES arguably needs a new thought process regarding influencing decision makers, akin to the recent changes in the 'managerial and operating context,' which forced police into the strategic decision-making space. Coyne (2014) argues within Australian Federal Police (AFP) that the recent pivot has allowed a challenging of constraints, which breeds innovation and for innovation you need sound intelligence. This is pertinent if QFES adopts the same philosophy and implements a system which enables the critical decision maker the best chance of strategizing a plan free from unnecessary distraction. The challenging constraints would highlight mission complexity, breed initiative and allow a fluid plan within level two and three disasters (McNarn, 2018) (A1, 2, 4, 5).

Within QFES, the challenging of constraints seems inherent in operational staff, however is not evident at the strategic level which outlines a lack of process or education in information analytics.

> "I would say in the beginning of a disaster operations has a clearer picture and understand what their options are, however as the disaster escalates more and more dynamics are present and a shift of ground appreciation transfers to state. So, our (operations) constraints are probably narrower and easier to find." (A6).

A6 does highlight a transfer of appreciation and the necessity for a smooth transfer from operations to strategic critical decision makers.

> "As a service we support regions, districts and separate LGAs as required, therefore doing our primary role of protecting the community under the guidance of state and Local leaders. We obviously provide specialist advice as well." (A3)

A3 indicates an unwillingness to commit to a more influential role within disaster management and allows government to set missions and objectives. With no consistency across C4I and a fundamental understanding of intelligence as exploited information, a QFES opportunity to enhance trust and branding is lost; to local, district and state authorities. Melligan (2014) outlined a growing political focus on disasters and disaster management actions that will only get put under scrutiny when political pressure is prevalent or community trust is lost. This is the same for QFES, therefore it is essential that all necessary steps are conducted under strong policy, separated from decision maker by high functioning intelligence when managing disasters. The fact A5 provides advice, however is not savvy in a number of platforms and A3 states we provide professional advice, leaves a gap for government which is a QFES holistic intelligence product.

Doctrinally, strategic intelligence within the QFES is firmly focused on the dissemination of products to inform senior decision-makers (QFES Gateway, Queensland Emergency Risk Management Framework and Operational Guide 14). These documents and processes do provide a product, however the data suggested in reality is closer defined as knowledge management products, not traditionally complete intelligence products (Fingar, 2011). These products are consistently produced across all QFES streams (EM, F&R, RFS, and SES) (A1 – A6), which suggests

limits in the understanding or definitions of knowledge, information and intelligence. QFES does provide intelligence through FBAN and relies on the BoM, however lack qualified intelligence officers to provide a product which incorporates the disaster holy trinity of systems.

> "As far as I'm aware we have one qualified person in our region whose completed the old AIIMS Intelligence package. However, I know for a fact they have not fulfilled that role, so I'm not sure how or who informs operations and planning." (A4)

A4 questions, if no one is qualified; how can a thorough intelligence product be produced and furthermore, how can a plan be formulated?

> "As an IC, you have multiple screens in the Regional and State Operations centres, to give you situational awareness and help control resources, however I would argue these are used to report up to state, media or used for data to inform the public". (A3).

While Operational Guide 14 falls in line with Lowenthal's (2009) findings; that intelligence within disaster management can be classified as a sequence of organisation, process and product. QFES in practice, could enhance its capability through a deeper understanding of the relationships between systems. The data, as highlighted by A4 and A3, suggests strategic intelligence appears to be different in nature to that which was presented in the literature and QFES doctrine (Davis, 2007; and Lowenthal, 2008) and intelligence application of each service which (Ops Guide 14, QERMF, predictive services and the QFES strategic objective) for the most part, has become increasingly information-rich and analysis-poor (Howlett, 2009). The significance of this, lies in a culture of belief that QFES is creating intelligence products to a high standard, however data suggests the fundamentals of intelligence could be improved.

> "Well, the mere fact there's no intelligence courses; make you wonder how these intelligence reports are produced. Currently it's a few key stakeholders coming together, interpreting each service utilised platform. I

> honestly believe that State Operations Centre (SOC) believe experience is analysis." (A1).

A1 suggests, an over reliance on experience is currently present, which enhances risk (chance) by being subject to the competence of the person in the intelligence space. As there is no central data base, minimal intelligence personnel qualified and a limited system; QFES constrains itself to description of the information opposed to creating a thorough intelligence product.

5.3 Intelligence model for clarity and alignment

Observations of strategic intelligence products from 2018 – 2021, identify a strong information and knowledge management (KM) focus, as defined by Dean and Gottschalk (2007). This trend of substituting information products for intelligence reports, is consistent across each of the services and appears consistent across individuals when forming strategy in level 2 and 3 disasters (A1, A3, A4, A6).

> "…there's a lot of reporting naturally during a disaster, however from my perspective it never equates to a fully transparent plan which is clear and concise to everybody, maybe a new model or process should be focused on." (A1).

Analysis of a suitable model for disaster management intelligence, suggests a military model type approach regarding defining mission complexity through information gaps, however maintaining the disaster management collaborative approach. When interviewees were questioned about the modelling for a QFES intelligence capacity, all interviewees' default answer fell back to either; the intelligence cycle or which service should implement intelligence, at which level. A2 did highlight the QPS model not being fit, as they have too much secrecy and a heavy focus on human intelligence.

> "Disaster intelligence needs its own system or model; for example Police do a lot of drug investigations which requires human intelligence to be on a need to know basis, where disaster management is a lot more open." (A2).

What was evident was the lack of trust from each individual's stream, opposed to the others to implement a robust intelligence system, therefore A1 suggested a completely external implementation within QFES (McNarn, 2018).

> "I would suggest a completely external implementation, free from the culture and trust issues within QFES. I'm not aware of too many tertiary studies, but looking to the military or even business may be the answer for intelligence education." (A1).

As exploitation or analysis is perceived as weak (A1, A2, A3, A4), an approach such as the Australian national law enforcement community could be beneficial, as they have been conducting a Strategic Intelligence Course (SIC) which has been created to assist the development and needs of Australian law enforcement. SIC students are provided with practical knowledge of strategic intelligence, research methods, program management, data collection, analysis and intelligence (Dupont, 2003). Couple the SIC foundational course and apply JDAP (appendix H) and QFES would begin reducing the gap between entropy and decision maker (appendix F).

5.4 Misconceptions expanding friction

The surface level knowledge of intelligence and confusion between information and intelligence was apparent in the interviews which has bred a culture of distrust in the intelligence products. QFES senior management and experienced AIIMS instructors were not convinced of the benefits of strong intelligence and therefore broader in their description of intelligence needs and its relationship currently to planning; turning instead to their experience within disasters such as Victorian Bushfires and Tasmanian Fires (A2 and A6).

> "Currently intelligence is just an off shoot of planning, Public Information Officers do their bit, BoM and predictive services do their bit and operations and planning, implement the strategy and adapt as per the situation." (A6).

Intelligence, in a number of these interviews, was either misunderstood or described as an information service (A3 – A5). One respondent (A3) highlighted this with the example that intelligence was simply a relay of communications between services. Even the broadest of intelligence definitions, would indicate that this is

information, rather than intelligence (Dupont, 2003; Cavelty and Mauer, 2009; Davis, 2007 & Fingar 2011), however while not intelligence this was a common thread through interview data, doctrine and observations, which can be extrapolated to enhance friction between services (Von Clausewitz, 1832):

> "A fundamental problem within QFES, is a lack of clear relay of information or defined objectives; or even a wargaming process to visualise all the possible outcomes, problems and solutions. Its messy". (A2).

A review of Operations Guide 14, QERMF template and other QFES sources within gateway, highlight an understanding of the intelligence process, however with no central point of truth (A2 and A1) and no consistent intelligence training package from state, there are variations in each agency's application of intelligence, such as Northern Regions consistent liaisons with QPS, which is out of alignment with other regions (A4).

> "I've implemented some intelligence training for Northern Region through QPS as there is currently no state standards." (A4).

While each region is siloed in their approach, they all align, to varying degrees, with the contemporary intelligence cycle models used in academia (Dupont, 2003; Cavelty & Mauer, 2009; Davis, 2007; and Fingar, 2011). Interviews with QFES personnel (A1, A3, A4, A5, A6), identified that the intelligence cycle remains important to strategic intelligence. The intelligence cycle is still only a simplified model, used to develop understanding of the far more complex and flexibly applied intelligence practices (Dupont, 2003; Cavelty & Mauer, 2009; Davis, 2007 and Fingar, 2011). All the intelligence respondents (A1 – A6), indicated an acceptance of the cycle, but that its principles are loosely applied in practice and that they have experienced; there is a willingness to abbreviate the process when required, due to time constraints. This provides evidence for a process, which is flexible and can be applied as time and space dictates, such as a systems-based appreciation process which is designed to minimise friction.

> "With the flood of information provided these days, it is very difficult under time constraints to determine seriously the relationship in data. Therefore,

> TOM becomes the point of truth for at least Fire and Rescue to gain situational awareness." (A3).

A3 was asked: did this abbreviation in process occur with an intelligence capability at hand, where they replied

> "No". (A3).

Given the time constraints highlighted by A3, a rehearsal of possible scenarios seems important to build appreciation and reduce the confusion to decision makers, however during the stages outlined earlier (document analysis and observations), the only reference to an appreciation process was the word 'appreciation' within the QERMF handbook which is used as a risk analysis tool for local governments. During interviews with QFES staff (A1 – A6), questions about the theoretical relationship between strategic intelligence, the environment and the decision-maker were explored. When asked, A3, A5 and A6 were unable to provide a detailed description of their relationship with, and role in the support of decision-makers.

> " I think QFES act [sic] independently from operations to State and deal with the environment as problems arise. It honestly feels like two wars, State are fighting one and Operations are fighting another, they never really align." (A5).

This presents as evidence of a limited understanding of the role of intelligence in influencing strategic decision-making (George & Bruce, 2008; Fingar, 2011) and a lack of a systematic approach to appreciation with high functioning intelligence inputs.

> "I find these sort of groups (LDMGs), of key stake holders end up being motion rather than progress and eventuates in an oligarchic like decision process. It's the boss' opinion and we never really do scenario based outcomes, well not to the level we should." (A5).

A5 outlines that; operational decision-makers used intelligence through planning and demanded information as required, opposed to allowing analysis for

assessment. In comparison, senior managers observations, such as A4, often stated that their intelligence interests were in products that predicted problems before they arose (Lowenthal, 2009) and clearly indicated what tactics to mitigate this, however a clearly defined strategy rarely made it through to the regional level (A2).

> "As the disaster generally is within our region, state demands answers and provides some resources, however, they generally will leave the direction up to the regions." (A2).

This was often highlighted in the form of responses, concerned with the identification of risks and opportunities within disaster management and a lack of clarity from state authorities as they currently serve as a support mechanism for operations (A1, A2, A3 and A4) (McNarn, 2018).

Observations on the Australian Bush Fires of 2020, Townsville Floods of 2019, NSW Floods of 2021 and Cyclone Debbie of 2017 supports the research finding that information, intelligence products such as Total Operational Mapping (TOM), are being used to inform, as opposed to influence decision-making at strike team level right up to state (see also Carter & Carter, 2009; Fingar, 2011).

> "Liaison officers to LDMG are only a new concept and the proficiency in GIS from QFES staff are not sufficient to make or change decisions, so TOM ends up as another display screen in the ROC and LDCCs." (A5)

Analysis of each agency's intelligence models and products indicated that; operational documents describe, rather than interpret the operational environment (OE) and while arbitrary regional borders can be used, the OE is sensed to never be clearly defined and analysed across operational influence.

> "The whole disaster management border gets messy, when dealing with say a cyclone, which starts in Far Northern Region and travels South to South-East Region, however only has an influence area of a couple of hundred kilometres. There seems to be a messy transition as it crosses borders. This was seen during cyclone Debbie; where Bowen which is in Northern Region got transferred to Central region as Rock Hampton was being hit. This becomes confusing for staff and left a hole in the planning which was

> evident by the problems at Byfield National Park. The transition of regional influence was never clearly stipulated in a thorough scheme of manoeuvre or concept of operations or a simple acknowledgement of support capability. "(A5)

While A5 outlined limitations in fixed borders and regional friction at the district level, at state level, friction is evidenced via the lack of expertise of the relationship between, QFES, community and the OE. QFES strategists, are the subject matter experts in disaster management and should field media questioning, however these concerns are often left to the Bureau of Meteorology (BoM) to defend. Intelligence provides an opportunity for QFES to enhance its knowledge management reputation and provide clarity around a safer strategy. Lastly, QFES strategic intelligence reports, provide information rather than intelligence, in an intelligence studies sense (Lowenthal, 2012), which fills the objective of addressing the public, however falls short of proactive visualisations of reducing friction.

> "We rarely get maps and set objectives, it feels like operationally; that we get an area of concern and the stock standard resources then react as necessary to community concerns. While we have some guiding principles which enables logical decisions, these are only implemented in a reactionary moment and give prioritisation to your decision making." (A6)

A6 highlights reactionary and outlined the acronym RECEO (rescue, exposures, containment, extinguishment, overhaul) and PACT (prioritise, alternatives, choose, take action), that enables operational controllers, an ingrained system to recall if confusion arises at the individual level. Strategically, this same concept of reducing confusion through career long system is important. If QFES provided strong intelligence, they could formulate a clear plan starting with 'where we are' and ending with, 'where do we want be' (end state,) and outline a chronological phasing to achieve the plan and outline the options. The natural foundation of knowledge and system, will enhance trust and provide a stable vision for QFES, community, government and key stakeholders.

5.5 System or systemic

Analysis of the AIIMS structure, QFES intelligence capacity, appreciation process and feedback from QFES staff; indicates that within disaster management, especially at the strategic level, there is a distinct absence of direction for the intelligence process (McNarn, 2018). This was also observed in the 2021 NSW floods, so perhaps symptomatic of the disaster management bottom-up approach (A1, A5), as opposed to simply not having intelligence officers within QFES.

> "NSW was a cluster, the request process, the resources required, the area of operations the whole lot was a dog and pony show. There's a lot of people in disaster management trying their best but lack the resources, training and in some cases, capability to fulfil their role, make it impossible not to be confused." (A5)

The shortened intelligence process, highlighted a general list of priorities for QFES critical decision makers which is reliant on tacit knowledge or historical events, opposed to a thorough analysis using narrative and maps.

> "During the Townsville floods, we are running on the QANTAS never crashes theory (A6), as the flooding was an unforeseen event. However, the lack of clarity was countered by exceptional individual decision making and was probably the difference in the amount of criticism received. I'm not sure how we did it with no map, radios and fuel towards the end. The only brief we got was who we were replacing and a general AO." (A6)

The QANTAS never crashes theory (Braithwaite, 2017), suggests an unhealthy reliance on historical trends; such as Townsville has not had a catastrophic disaster since cyclone Althea in 1972 and a reliance on exceptional operational decision making, opposed to a robust decision system. In discussing the confusion issue with interviewees, feedback indicated that this is related to the fast onset nature of disaster management and the differences within the QLD Operational Environment (QERMF). The focus of these interviews (A1 – A6), regarding the implementation of strategic intelligence was uniformly on the location of resources through display screens and interpreted products. All interviews indicated that; at present there is

generally a one-dimensional system-based approach, with confusion from the outset of disasters which is compounded by crew rotations at all levels.

> "Our biggest issue is extended disasters end up with less competent, unqualified personnel filling critical decision roles. Handovers are poor and there's too many systems and dynamics to simply step right in and take up the reins. You spend half your shift figuring out what the hell is happening."(A1)

According to points made by the interviewees, trained intelligence officers free from the culture issues within each stream, would aid in reducing this confusion. Two interviewees (A1 and A4) indicated that there was an emerging need for strategic intelligence in disaster management to identify those areas where further or future capability is required (Appendix H). This would enhance QFES in the short and long term via the QFES capability analysis (Appendix H), in the short term and as highlighted by Miller (2017), advancements in innovation such as collective and swarm intelligence and the US military's use of Intelligence staff to gain a foundational knowledge in technologies.

Strong intelligence allows experts to provide disaster continuity. Fingar (2011) posits that an understanding of the wider context provides the strategic analyst with the capacity to reduce the uncertainty of decision-making. This intelligence expertise is achieved through providing an improved understanding of the implications of decisions and their impact on the wider complex environment (Davis, 2007). As the findings dictated; there was a notable gap in the sequencing of disasters (Appendix F), which starts at entropy and next gets picked up at decision maker, with little to no systematic intelligence input or appreciation process to support key personnel. This leads to confusion and friction such as Binna Burra Lodge (A2) and the Townsville floods disaster (A6, A1, A5 and A4).

A2 highlights some of the unnecessary ambiguities which a greater intelligence and systems-based approach would reduce.

> "There had just been a handover, there was an inexperienced operations officer, confusion was everywhere and as a result the intelligence cycle got compressed to opinion and we lost Binna Burra." (A2)

5.6 Intelligence Cycle

Intelligence studies (Dupont, 2003; Cavelty & Mauer, 2009; Davis, 2007; Fingar, 2011), argue that the intelligence cycle is still relevant for QFES and disaster management, particularly linking policies to strategic intelligence. Once implemented, the education and terminology is a driver of a theoretical distancing or clear delineation between policy, strategic intelligence and the decision makers (Fingar, 2011), during operations. This delineation and determination of disaster currently sits with emergency management within QFES when dealing internally and with local government areas and the Queensland state government.

A6 and A5 outlined a breakdown in the operational flow of information between EM Co-ordinators and valued input to the operational stream to QFES courses of action. A1, A2 and A3 also highlighted the lack of operational input from EMCs, however failed to acknowledge an understanding of the EMC role around policy and disaster management guidance to local, district and state governments (Lowenthal, 2003).

> "As an EMC I am an appointed role, however, still fall in the operational stream, but have none of the training in tactics" (A5)

> "They're (EMCs) not ideal in high tempo periods as they are not experts in disasters and their role is very grey at best." (A2)

Within the intelligence cycle, QFES focus for the direction phase was consistently revealed to be general in nature and stove piped to each stream in application, generally resulting in information products being the normal component of dissemination as opposed to being a specific issue for identification by decision-makers. The lack of exploitation is exposed, as there is no systematic use of a narrative supporting a visual such as a map, which again is supporting evidence that a visualisation of probable outcomes is rarely implemented and if it is, it is not taught through career progression and is one dimensional based off one or two

peoples personal experience. This was highlighted earlier by A6 with reference to the Townsville floods.

5.7 Inhibiting Strategic Intelligence

Analysis of the interview data and observations both individually and collectively allowed for the identification of a range of strategic intelligence inhibiting factors within QFES; organisational, technological, procedural, cultural and theoretical. The analysis of these influences were found by Coyne (2014) with major factors inhibiting strategic disaster intelligence effectiveness, relating to misunderstandings of intelligence uses and limitations by personnel, unclear links between intelligence products and decision making, and lastly the absence of an epistemological understanding of systems-based intelligence and influencing the decision maker.

> "I would be lying to say we do intelligence well that's why it's one of the strategy 2030 pillars for focus within QFES. However, I do believe we have the tools and knowledge to become more proficient in the intelligence space." (A4)

A4 acknowledges a difference in knowledge and intelligence, however QFES intelligence doctrine (Operational guide 14), did not adequately define the difference between 'information' and 'intelligence'. Whilst intelligence is described as value-added information, the terms 'information' and intelligence are applied inconsistently to a range of products (A2, A1, A4,) and intelligence professionals alike within QFES the best example being the 2030 QFES strategic plan guiding principles.

> " When I'm running a multi-agency operation, I consistently evaluate the intelligence given to me and make decisions utilising that information."(A4)

A4 highlights the easy misunderstanding of intelligence and information. The confusion is most often associated with the collation phase (as per A4), of the intelligence cycle (Walsh,2011). This is evidenced through the Survey 123 and IncSnap applications, which are a basic set of headings filled by operational personnel such as swiftwater rescue technicians, however decisions are made with no specific intelligence from these products. The collation phase shares many of the

same tools and sub-process as information analytics (Dean and Gottschalk, 2007). The inhibiting factor is that the exact nature and differentiation between intelligence and information remain unclear for operational personnel and not exploited by strategic analysis. As outlined by McNarn (2018) and the same point was reinforced by A2 and A4, the lack of centralisation of data, makes a point of truth, common operating picture and planning, virtually impossible without a competent intelligence input.

> "The closest we get to working as one service is when we (all QFES services) bring a current situation report to our local governments. At the operations centres, while we try to work cohesively; it's an uphill battle to get everyone pulling in the same direction." (A2)

The QFES interviewees (A1-A6) and their observations about multiple disasters, highlighted the impact of limited communication between strategic staff in regard to a community's centre of gravity and the QFES centre of gravity. Not acknowledging these two factors makes a concept of operations difficult by a break down in terms of knowing who is supporting whom and determining lines of effort, objectives and allowable levels of risk. A1-A6 all expressed they had very little understanding of these terms and how they benefit an organisation such as QFES. For example:

> "That's not part of QFES terminology as far as I'm aware." (A2)

> "I'm guessing they are military terms for co-ordination." (A3)

> "I'm not aware of these concepts, well obviously I know objectives." (A5)

This lack of clarity and communication was a major contributing factor to the perceived limited relevance of strategic intelligence, as it prevented the development of intelligence's understanding of the decision-making context that was being supported. Fingar (2011) and Kahn (2009) have both highlighted; understanding and predicting the community (customers) needs is vital to the successful production of strategic intelligence. In the case of the 2019 Townsville flood, a community's centre of gravity analysis would have dictated, as proposed by five of the interviewees, that the community housing was their critical capability,

and analysis of the event would have suggested that their next COA was risky and left them and QFES vulnerable. Further exploitation would have outlined amount and severity of vulnerable community members, inability to shelter vast numbers and a severe lack of QFES centre of gravity which were rescue boats and swiftwater technicians.

> "We worked 20 hours straight on that Sunday night, risked our lives on multiple occasions, never ate until 15 hours into the shift. It was mayhem! That was after 7 days of flooding elsewhere." (A6)

It is this exploitation that dictates courses of action and enables 20,000 threatened houses to be prohibited from acting against their best interests. Currently QFES has multiple communication and reporting streams which often can make reporting up and down confusing (A4), it is a confluence of these multiple streams and understanding of the operational environment that often enhances friction at the operational level and creates strategic confusion.

> "We had a body retrieval up near Mossman Gorge, neither us (Fire and Rescue), SES, RFS, EMQ Helicopter, Police or QAS could talk to each other. It was a shamble in resource allocation and planning." (A4)

One of the most substantial organisational inhibiting factors for strategic intelligence is alignment. Alignment is concerned with the link between strategic decision-making, functional strategies and operational activity within disaster management. As illustrated by the C4I review, one of QFES key strengths is the ability of individual members to act in a discretionary manner, to use Liddy's (2005) power of the corporal concept, within QFES its the power of the Station Officer or Incident Controller. This same power provides disaster management organisations with a number of decisions-makers capable of identifying and rapidly exploiting risks and opportunities to improve organisational outcomes (Von Clausewitz, 1832; McNarn, 2018).

> "No doubt you have a greater understanding initially of what's happening. Particularly if the disaster is in your region of response, so of course you make separate decisions and question some of the logic from above." (A1)

Often, as a result of experience and opinion, decisions are not aligned throughout the organisation. The model also results in a wider set of decision-makers at the bottom of the organisational structure. As stipulated by A1, the misalignment seems culturally linked through volunteers and permanent staff and each other's role and capacity.

> "Volunteers see permanent staff as encroaching on all areas of disaster management." (A1)

Where:

> "Permanent staff believe volunteers only do this as a hobby, therefore are not trained and invested to the level required to make critical decisions." (A4)

As such, there is an inability to or want to transfer information laterally to help the other services. While there was a varying array of responses into the level and stream, a fulltime intelligence capacity could be implemented (A1 – A6), for instance:

> "I believe it should be implemented around middle management to aid the bottom up approach; I would not leave it to anyone service." (A1)

> "I would leave it to regions to implement intelligence as they seem appropriate." (A4)

> "It has to be centralised and implemented at the strategic level to create some form of point of truth, but I think you need to have been in permanent operations for a substantial period." (A2)

While A2 sits with traditional intelligence models such as military, they still could not distinguish between intelligence expertise and knowledge management of operations. Given the cultural divide intelligence should sit horizontally across the organisation such as EM, with no immediate biases to any one stream. This would enable unbiased input into any disaster and create the link between EM as policy advisors and other operations (Fingar, 2011).

According to the interviewees, cultural factors comprise one of the major inhibiting factors to the effectiveness of strategic intelligence in QFES (A1, A5, A6). The literature review introduced the strong cultural issues facing interoperability (EIF, 2010) and was supported by McNarn (2018) and all data gathered. A2 and A3 reinforced the important value information has in the wider disaster management culture (Hughes and Jackson, 2007) particularly the professional opinion of governments. This importance makes the collection and collation of raw information difficult for strategic intelligence (A1 and observations). The information flows from operational to strategic level within the QFES are inconsistent at best (McNarn 2018). Currently the data suggest that organisational knowledge or information is not contained within any formal product but resides in the memories of individual officers, making the collection of this kind of information difficult (Dean and Gottschalk, 2007). This is evidenced by what A3 described as a lesson identified opposed to a lesson learnt process (McNarn, 2018), suggesting a feeling that lessons never actually get distributed through a trusted system.

> "The process we (QFES) use at the moment is kept within each stream and I know from my point of view that frustration in lack of learning or making the same mistakes over and over again, make it hard to believe that change will be implemented." (A3)

Coyne (2014) found an unintended consequence of good intelligence is the paradox some current QFES intelligence producers are experiencing. Currently through fire behaviour analysis within QFES the end state operationally is not necessarily what is presented in an intelligence product, as this would mean a lack of action somewhere in the system to mitigate a risk. Thus, accurate strategic intelligence will predict a future that will not occur because of strategic action, this is an unintended consequence of strategic intelligence (Fingar, 2011), this lesson or knowledge is seen as a fault in many QFES personnel's truths. When in fact this situation gives rise to a complex paradox whereby strategic intelligence, that is increasingly accurate, will eventually become increasingly inaccurate. This situation may inhibit the uptake of strategic intelligence given its perceived inaccuracies. When indirectly questioned on this paradox, four interviewees had not considered this, however A1

and A2 had varying thoughts which polarised the idea of intelligence being useful to planning. Nevertheless, this indecision gives credence to a visualisation of COAs supported by narrative (writing) for details to mitigate the erosion in confidence that this paradox enhances.

> "As an FBAN I understand the complexities surrounding perceived inaccuracies, however I'm not sure how you sell this to operations." (A1)
>
> "The behaviour analysts are only useful in fires however determining that they effected the outcome is very subjective and generally opinion lies on which side of the fence you work for." (A2)

A2 again highlights the cultural divide and shows a misunderstanding in the power of a visual COA process which eliminates the subjectivity and provides underlying logic and principles to critical decisions. This is influencing the decision maker through intelligence. The research indicated that within QFES, strategic intelligence needs to provide the strategic decision-maker with an understanding of the operating context through a defining of the OE overlayed with second and third order areas of interests to reduce uncertainty.

5.8 Evaluating Strategy

In the absence of fluid borders, the interview data revealed that the strategic decision-makers' context, should consider consisting of Coynes (2014) three very distinct areas when evaluating strategy; 'area of direct impact', 'area of influence' and 'area of interest' (Coyne, 2014). This scoping and framing in a preliminary analysis by intelligence is a similar framework used by the United States (US) military commanders (US, 2007; ADF, 2019).

Coyne (2014) stipulates a framework when applied to Transnational Organised Crime (TOC), which could be adapted to disaster management. Coyne (2014) proposes the '**area of direct impact,'** is the area which relates to the area that on shift operational personnel and resources have a direct impact on. The concept refers to more than a geographic area; the area of impact is a conceptual construct that can relate to a range of potential impacts including a geographical area, a specific threat or risk. Within disaster management, in the case of the Townsville

floods, Townsville city and surrounding suburbs would be the area of direct impact. However, during Cyclone Debbie, the area of impact may be a 200km radius from the eye of the cyclone. This means that predetermined borders are no longer a barrier and the OE is consistent.

The '**area of influence**,' refers to the wider operating environment, which QFES streams in tow with local and district government response is able to influence either directly or indirectly (ADF, 2019). In the case of disaster management this construct is extensive and can relate to any disaster and requires high level information analytics and intelligence response, as QFES covers a huge area which can span locations outside of State borders. Currently QFES describes the information and reacts accordingly to harms, risks or threats (Quarmby, 2009). Given the finite nature of QFES resources, the strategic intelligence challenge is contextualising this environment through a range of analytical lenses, including the comparing and contrasting of competing threats, risks and harms (Carter and Carter, 2009). McNarn (2018) suggested a state asset pool to determine capability and this approach was either skipped or compressed during recent disasters (A1, A2, A4, A6), which gives evidence to a lack of mission analysis which can enhance friction through resource allocation inefficiencies among other mission complexities.

> "We deployed to Port Macquarie representing the State of QLD, got to NSW and realised that we (QFES) were supposed to bring our own operational gear. This included boats, vehicles and technical gear. Two days later we had the right capabilities." (A1)

> "While there is some outstanding work completed by disaster managers, there is no doubt we could be a lot more efficient in our resource allocation and duplication in tasks which would cut our costs dramatically." (A6)

The arbitrary area for contextualising strategic intelligence is the '**area of interest**', which is concerned with the strategic decision-maker's wider intelligence requirements (ADF, 2019). The area of interest relates to information that impacts upon the areas of influence and direct impact but is unable to be currently

influenced within current operating constraints (Coyne, 2014). The comprehension of this 'area of interest,' provides the decision-maker with the detailed understanding of complex disaster, community and QFES threats (Fingar, 2011).

> "As stated earlier there is mass confusion trying to gain an understanding at state, the ability to understand a disaster district or LGA better than local crews is nearly impossible." (A3*)*

A fulltime intelligence preparation of the disaster zone, in conjunction to providing intelligence that is contextualised against this framework, strategic intelligence becomes more effective at supporting decision-makers' needs (Lowenthal, 2012). As outlined within the literature review QFES would benefit from a customised Intelligence Preparation of the Disaster zone (IPD) and implement it against this framework as disasters often span across multiple arbitrary regional boundaries. Another advantage of applying this structure is it enables QFES to fully define disaster complexity against a multitude of modern difficulties (Appendix J) when exploiting the data and creating separate service Lines Of Operation (LOO) (appendix K).

5.9 Conclusion

Strategic decision-makers within QFES are already receiving voluminous decision-support material for strategy development from operational areas (McNarn, 2018 and Fingar, 2011). QFES streams follow a multitude of reporting and communication channels which never truly centralise to get exploited. To avoid criticism for being just another voice amongst this multi-channel information flow, a fundamental shift in QFES philosophy needs to occur to ensure intelligence personnel understand what differentiates intelligence from other information decision support tools (Johnson, 2009). To improve this product differentiation, strategic intelligence's theoretical model must initiate greater intelligence capacity from a strategic perspective and garner an understanding of the value of appreciation through high level intelligence through career progression and AIIMS packages. A steady understanding and building of this foundational knowledge should have a clear end state to be increasingly valuable for decision-makers. The gap within QFES, from an organisational perspective; is strategic intelligence must synchronise system

information and provide a unified product (Quarmby, 2009; Walsh, 2011; and Fingar 2011). The product must also clearly identify, describe and change the temporal dimension through exploiting drivers such as emerging trends and issues (A1 – A6, Fingar, 2011).

Contemporary intelligence theory argues that all intelligence reporting should provide an answer to the fundamental intelligence question of 'so what?' (Fingar, 2011). The observations and analysis of current document findings, implied that disaster intelligence may need to take this 'so what' process even further. Coyne (2014) suggests in doing so, strategic intelligence should clearly answer the question 'so what does this analysis mean to the decision-maker,' (Howlett, 2009; Appendix H). The enabling of this process sets up support lines and operational opportunity which provides clarity and COAs when analysing centres of gravity. A3 and A4 suggested there was little situational understanding of other services actions, boundaries and objectives during recent disasters. If a greater intelligence capacity is implemented, it would positively assist operations through the expansion of the focal point, which allows the intelligence framework to anticipate future or emerging trends (Quarmby, 2009; Fingar, 2011). Previous chapters provided evidence of problems associated with the relay of information and its impacts on the reliability of sound command and control, through misunderstanding or implementation of a multi-faceted systems-based appreciation. Conducting this systems-based approach analysis of the known disaster environment and its interactions with the wider social and geopolitical context can improve the accuracy of extrapolations (Walsh, 2011). Furthermore, this level of analysis allows greater understanding of the operating environment, subsequently leading to the development of more accurate predictive intelligence.

The strategic intelligence capability operates in a two-way flow with regards to the present intelligence focus. Through intelligence collection, collation and analysis, strategic intelligence should be interpreting the current disaster environment, (Walsh, 2011). An understanding of the disaster holy trinity should then be conceptualised by acquiring data sets from LGAs, QFES and other essential organisations focusing resources on the drivers of community and QFES decisive

events (Fingar, 2011). The aim of this process is to develop a more detailed understanding of the problem and relationship of the holy trinity by engaging with its complexity. This level of analysis provides intelligence with a broader understanding of the drivers of exploitation efficiency and, together with the other processes, allows the strategic intelligence capability the opportunity to anticipate future and emerging trends with greater accuracy. A2 highlighted this necessity through uncertainty and friction when Binna Burra perished as QFES luck ran out and the Fog of Disaster was never appreciated.

CHAPTER 6 CONCLUSION

6.1 Introduction

This chapter will explore the importance of disaster intelligence as a strategic resource in keeping communities and QFES staff safe. In particular it will identify that a proactive environment, addressed through the adoption of the JDAP methodology, will ensure that intelligence can be used as an effective weapon alleviating information overload on critical decision makers. The study has discussed the gaps in current literature by providing an examination of the purpose, history and advancements in intelligence practices and its links to execution through interoperability. The understanding of the sequence of disasters outlines the weakness in the current QFES processes, which has allowed the research to move beyond the criticisms and concerns that underpin the majority of intelligence research regarding privacy and has sought to identify a collaborative approach which aligns with disaster management methodology. Furthermore, this study has offered a perspective that can help drive future research not only for QFES but disaster management worldwide.

QFES need a philosophical change in the direction of intelligence; currently the definition of intelligence within QFES doctrine, is insufficient to clearly delineate between intelligence, information and knowledge. With no clear definition, critical decision makers are expected to utilise an operational decision-making process, which is non-existent and comprehend information products which support their decisions, rather than providing situational understanding to influence decisions.

Within disasters there are three distinct systems which make up the operational design: event, community, and disaster management services. These three systems through climate change, population growth and DM expansion, are creating more data points than ever. This, coupled with technological advancements of data transfer, is enabling information to expand and create uncertainty for disasters managers and communities at all levels. The centralisation of information and trained intelligence officers are essential in seeing the signal through the ever-growing noise.

The literature found; intelligence is a critical aspect across multiple industries and needs to be moulded accordingly to suit each industries requirement. Von Clausewitz (1832) outlined the Fog of War having three main characteristics; uncertainty, friction and chance and require competent intelligence to scent out the truth, or as Lowenthal (2003) stated, provide a proximate reality of future actions.

The findings showed the bottom-up approach within disaster management, leaves strategic level personnel in a reactive mind set from the outset of a disaster; due to not having a fulltime disaster management capacity, to build a foundational level of intelligence, to support commanders (appendix G). While the masses of information enhance the uncertainty, the unavailability of intelligence to support decision makers, increases friction through a fragmented approach to event possibilities, community vulnerabilities and resource allocation, with little systematic command and control and a reliance on critical decision makers to have a high level of tacit knowledge and experience.

Establishing a greater intelligence capacity (appendix F) at state level would mitigate uncertainty, as C2 and the AIIMS structure escalate by establishing relationships between the event, communities and QFES. This works to gain operational momentum through foundational knowledge of all service capacity and beginning an intelligence preparation of the disaster zone, in line with the end state and commanders' intent.

Appendix H is an adaptation of the military appreciation process (ADF, 2012) titled the Disaster Appreciation Process (DAP). The DAP (appendix H) enables disasters managers to garner a fully proactive approach, through establishing a six-step process, which encompasses a preliminary analysis, intelligence preparation of the disaster zone (IPD), mission analysis, COA development, COA analysis and decision and execution. This DAP facilitates a proactive approach by allowing commanders to visualise all probable COAs from the event, community and highlight targeted decisive events to achieve the end state (appendix K). The visualisation of these movements is driven by intelligence inputs, which eases critical decisions and reduces the Fog of Disaster through appreciation, alignment and clarity.

6.2 Intelligence providing visualisation (Clarity)

As outlined by Lowenthal (2003), one of the objectives of intelligence is to provide a proximate reality of future actions or events. Given the QFES bottom-up approach, strategic management outlined by McNarn (2018) has become a support mechanism for operations and a liaison to other state and media stakeholders. Establishing a fully trained fulltime intelligence capacity enables timings, boundaries and a preparation of the disaster zone to be ascertained and an intelligence product distributed to the initial C2 established at state level. The IPD would encompass a process which considers the relationships between systems and highlight initial information requirements, which dictates mission complexity (appendix J). Several overlays (visualisations) supported by narratives would allow key personnel from each QFES service, to gain situational understanding (SU) and visualise probable hazards as the event, community and the operational environment evolve (appendix K). The IPD is a flexible but time-consuming process, however much of the IPD can be prepared in advance when the intelligence cell within QFES is not directly tasked with other work. For instance, there is a wealth of information about Bundaberg and flood planning available that could be accessed prior to an event and 'banked' for the next time there is potential flooding. Similarly, some of the other DAP sub-processes are time-consuming. The onset of the disaster will determine how much time you have for planning. The flexible DAP can be applied to any temporal or spatial limitations however the military utilise the 1/3 - 2/3 rule. Intelligence, orders and communication takes 1/3 of the available time – 2/3 of the planned timeline belongs to the operational units preparing for and conducting the disaster responses. The designation of the time allocation is outlined in the preliminary analysis, disasters dynamics can change rapidly so it is important for QFES to understand an 80% solution on time is better than a 100% plan delivered after the event. QFES intelligence would need to decide what are the critical steps in the process and where they can 'save' time. Establishing the DAP utilises several methods and resources to allow decision makers to gain a proactive appreciation of base, current and predictive intelligence to determine a desired end state (appendix H). In an operational disaster scenario QFES needs to understand that conducting and fulfilling every aspect of the DAP in its entirety would take a minimum of 48

hours with a well-formed team in a well exercised environment. This constraint means a smaller process may be adopted at the operational and tactical levels; a solution would be an adaption of the militaries individual military appreciation process (IMAP).

The clarity is provided by a fully trained intelligence capacity that is synchronised in information analytics and understands the nuances of disaster management and operations within QFES. The product presented is ongoing (appendix H), however encompasses a combination of overlays, which highlights boundaries, timings and number of decisive events, which will dictate the operational pace and outline priorities through a preliminary analysis.

The data showed uncertainty is prevalent from the outset of a disaster and particularly at regional and state level, as AIIMS teams are formed and government requirements are outlined. This reactive approach was highlighted by McNarn (2018) in the C4I review and was evident by several examples throughout the interviews (Townsville floods 2019, Australian bushfires 2019, NSW floods 2021 for example). While the C2 structure is highlighted as reactive, uncertainty is further compounded by QFES having numerous dispatch systems and no uniform reporting structures. SES, RFS, EM and FRS, all have varying systems they rely on during disasters. One result of the multiple systems is the inability to easily exchange key data with external organisations or establish a single Point of Truth (POT). It is not unusual to see different reports, including on QFES functions, originating at the DDMG for SDCC and from the ROC/SOC for SDCC. This does not assist credibility in the SDCC or the media. This lack of clarity has the potential for commanders to lose trust in the product, which is detrimental to intelligence and therefore becomes integral that a single POT product is delivered for consistent messaging and unforeseen possibilities. The interview data, documentation and observations all present no agreement on what or where to find trust in the operational plan, which again loses operational momentum through lack of appreciation.

The current system within QFES is a lost opportunity to not only allow C2 elements to formulate clear plans and allocate resources, but also misses the opportunity to provide high level professional intelligence products to local and state governments,

who do disaster management on an as needs basis. With technology expected to expand in capacity in the future, allowing increased information to be gathered and transferred exponentially as a disaster evolves, a greater intelligence capability is essential for QFES to centralise, process and distribute poignant information / intelligence from the beginning of a disaster to reduce entropy, uncertainty to disasters managers and allow the appreciation process to start.

6.3 Intelligence supporting operations / Planning (Appreciation)

Von Clausewitz (1832) describes friction as the difference between the plan and what happens operationally within a disaster, once entropy is evident and the three systems are starting to converge. The effect of not having exploited information, is the inability to formulate a sound plan to distribute to subordinates. This lack of system, leads to strategic personnel chasing the operational movements, opposed to monitoring a fully appreciated process, where the 1/3 – 2/3 rule has been applied.

While reactive in nature, AIIMS provides a structure which brings together key stakeholders in the field of disaster management. These leaders do provide a high level of thought; considering they are provided no time, IPD or formulation of decisive events. This break down in the system seems to irritate personnel at all levels, however QFES has not identified the gap in the system which is appreciation. The lack of appreciation has several second and third order consequences, which expand the difference between the theoretical plan and operational reality.

The opportunity for QFES, is to define the Operational Environment (OE), and the effects an event will have on the Area of Operations (AO). By overlaying this effect with a community analysis and their MLCOA and MDCOA, a number of decisive areas can be appreciated. This appreciation will outline targetable critical vulnerabilities within a community and highlight how they could intersect with the effected environment. Lastly, a QFES capability analysis will determine the amount of resources allocated to mitigate any mission complexities. The intelligence staff are integral through the DAP, as they not only provide the appropriate intelligence, but they also fill intelligence gaps as required and can provide the situational

understanding behind each overlay, which allows all QFES streams to gain better situational awareness and probable lines of operations.

The combination of these overlays allows a clear understanding of an area of interest that can be targeted against capabilities and allows a visualisation of COAs through wargaming the potential plan. The visualisation also outlines options for each service and locality of support elements. The benefit from an interoperable perspective is a trust between services; through capability knowledge which over time would enhance the cultural differences which were well highlighted throughout all QFES data and Lowenthal (2012).

6.4 Intelligence and Interoperability

As defined by Lowenthal (2006), intelligence consists of the organisation, the process and the product. QFES has great capability in data generation and gathering base information through Queensland Emergency Risk Management Framework (QERMF), or current information through relationships with the Bureau of Meteorology (BoM), which if centralised with qualified staff and overlaid with extensive data gathering capacity, suggests the most complex and expensive assets already exists. Interoperability issues within QFES, can follow the same two focuses as the military, which are procedural and technological, however as suggested by the European Interoperability Framework (EIF, 2010), culture issues were evident throughout the majority of the interviews. Culture is more a C2 issue (Lowenthal, 2006 & Coyne, 2014), however as intelligence enhances C2 this may be an opportunity for QFES to align and grow the cultural differences, outlined by McNarn (2018). Intelligence indirectly affects culture, however, could have an immediate alignment of technologies and procedures.

Streamlining Technology (Alignment)

There is no evident integration of intelligence or the potential value adding for decision makers. Elements of intelligence exist in areas such as: Modelling and Prediction Unit (Planning), Mapping (Planning), Information Coordination Unit (Logistics), Information Data Unit (Operations), Firecom (Operations), Capability Advisors (Operations), Information and Warnings (Public Information), Community Liaison (Public Information), Air Operations (Operations) and the Watch Desk

(SDCC), but not a holistic function. Furthermore, there is not a meshing or synchronisation of these elements which directly effects operations and alleviates pressure on critical decision makers. Each of these areas can benefit from the products of IPD (with the exceptions of planning functions which feed into the IPD) but the commander provides the direction and 'orders' the response, not intelligence, which only helps to influence decisions through situational understanding.

Consequently, information and intelligence inputs into the SOC or ROCs are inconsistent, with some intelligence feeds being directed through the SOC to regions, while units such as predictive services deal directly with Incident Control Centres (ICC). The absence of centralised control and discipline of intelligence as a specific cell within SOC, contributes to ambiguity and the lack of clarity as to who has the most accurate common operating picture (COP), or a single point of truth (POT).

By establishing an enhanced QFES intelligence capacity and implementing the proposed appreciation process (appendix H), QFES services could initially remain using their current technologies, as actions can be highlighted to contain any confusion or uncertainty. Furthermore, once technologies are upgraded or outdated, an alignment of technologies through implementation using intelligence, can begin to further strengthen technology interoperability, within QFES.

Appreciation by transferring current information through technology alignment reduces the current issues of risk or micromanagement by senior level or 'initiatives' by local commanders, contrary to direction in the belief that they have a better picture. Either situation exacerbates operational risk to QFES staff and the community. This friction between strategic and operational staff was evident in all interviews, however this is where a full-time intelligence capacity implementation would differ from the military.

The military is a top-down centralised approach where confusion settles at the operational level. Disasters are a bottom-up approach and escalate according to the size of the event. This leads to operations having a greater appreciation than

strategic management in the initial phases, therefore adds credence to implementing a fulltime intelligence capacity at the strategic level; to alleviate some of the friction. At this stage however, intelligence while identified, is still sporadic not centralised and lacks a conclusive centralised technological focal point.

Intelligence and procedural understanding (Connection)

The Coalition Interoperability Handbook (2009), suggests two distinct ways to align procedural differences through intelligence, one is to fall under the same procedures and the second is to ensure each service thoroughly understands other services procedures. QFES is an amalgamation of QFRS, SES, RFS and EMQ, which occurred in 2013, and never really became a unified structure, particularly technologically and procedurally. The opportunity for QFES and intelligence is to implement a definitive intelligence architecture, which could minimise friction between services procedurally, as friction was mainly evident at the operational level. Another option for QFES; is to benefit more from the implementation of the DAP and the outlining of service missions, objectives, tasks and support requirements. This appreciation would have immediate procedural benefits in limiting the current crossover of procedures, (vertical rescue or using flood boats / swiftwater craft for example,) until these issues are aligned.

6.5 Intelligence alleviating decision making

As highlighted throughout the interview data and by McNarn (2018), qualifications, rank, competency and depth in AIIMS positions, all outline a reliance on Von Clausewitz's (1832) third element of the Fog of War, which is chance. The fact that QFES has done so well during disasters is a testament to decision makers and the ability of operational personnel, more so, than a solid C4 structure supported by high level intelligence (C4I). An issue in longer duration disasters; is the sustainability to enable continuity and understanding across multiple handovers. The opportunity for QFES is the establishment of a sustainable intelligence team, in conjunction with updated versions of the DAP at state, regional and ICC levels. This step-by-step process would facilitate an understanding of what's required from strategic level personnel, down to the individual within each service. Furthermore, applying this model allows operational commanders flexibility for change if it stays

within the parameters of the commander's intent. While initially this will not rectify the sustainability issues across all AIIMS functions, the implementation would allow a focal point through intelligence and a proactive handover through the appreciation process, which will provide clarity, connection and alignment of QFES requirements. This proactive approach, supported by a competent intelligence officer, will enable critical decision makers to concentrate on unforeseen events and monitor the ongoing operations; as dictated by the formulation of the decision-making process.

The limitations are the time, training, and funding, needed to establish a competent intelligence capability at state and region and progressive training in the benefits of the DAP, starting at the junior levels and being enhanced as careers advance.

6.6 Other intelligence anomalies

Within chapter five, a number of inhibiting factors for implementing intelligence were identified from literature and other industries such as military, police and business. These factors were a consideration within the whole disaster management field. The advantage for QFES is the lessons learnt from other agency can be applied when integrating interoperable intelligence when creating a sustainable model and ensure integration into other disaster management services is considered.

Intelligence officers / Training package

While using the proposed template in appendix H, could provide benefits up to the ICC level with relative accuracy for the DAP. A greater intelligence capacity would need training to be effective at ICC and above. Highly trained intelligence officers would be required to provide intelligence products to C2 and have a foundational level of technical capability in QFES platforms and GIS, along with the understanding of meshing and synchronising information, through a thorough analytical process. Further research would be required into either; utilising the framework through Coyne's (2014) modelling of TOC, or structuring a new package tailored for QFES.

Centralisation of intelligence assets

As outlined by McNarn (2018) and indicated in the interview data, QFES has useful data gathering capability, however it has no central data base for information.

Confusion was evident on what is QFES, POT and COP. Through a fulltime intelligence function, 24/7 personnel, can not only validate the base and current intelligence but could provide critical predictive analysis when required. This allows the IC, operations and planning to complete their core functions within the AIIMS process. This alleviates critical decision makers of having to process all the information and allows a focus on mission efficiency. This would further delineate between information, knowledge and intelligence management and evolve the current epistemology of intelligence within QFES.

Implementation of technologies

With technology expanding rapidly and QFES having several data display reporting formats and communication platforms, that are not operationally interoperable. The alignment of such technologies, while a strategic objective within QFES, is currently not present. Intelligence integration of technologies allow the foundational level of knowledge required for intelligence officers, while testing the technology in a high tempo environment (training or operational). This consistency of implementation allows trust to be enhanced, knowing the viability of the new technology is serving the purpose of providing clarity before a whole QFES role out.

WoG reputation

The reputation of QFES is important at local, district and state government and each government have high expectations of QFES. The ability to provide situational understanding to key stakeholders and outline strategic tasking across all sectors, enables governments to gain trust of a thorough strategy and take a substantial role in the decision-making process. Situational understanding allows a comprehensive address of the media, on the effects the event could have on the operational environment (OE). Currently the BoM, while experts in weather get exposed when asked disaster management questions, particularly regarding second and third order effects.

Mapping / Terminology

Appendix H is the narrative of a two-part process of appreciation. The other is visualisation; QFES needs to encourage utilisation of correct map markings and terminology, ensuring every individual understands all markings, to understand

direction from authority and provide direction to subordinates. QFES needs to become efficient in map production for all personnel, down to a crew leader within a disaster. Hard copy maps or mud modelling is essential for COA analysis and predictive intelligence. A fulltime intelligence point of truth or common operating picture, could be a starting point for enhancing this skill, or at least a reminder within a disaster.

6.7 Modern Challenges in Intelligence

Understanding how many gaps in knowledge to complete a mission, outlines the mission's complexities. Appendix J outlines several challenges, intelligence officers face when applying the intelligence cycle. The highlighted issues within appendix J are growing exponentially and the longer QFES has no intelligent capacity, the more these complexities will expand.

Confusion between information rich and analysis poor products has often prevented strategic disaster intelligence's extrapolation of incomplete data sets. This lack of intelligence product has inhibited QFES to anticipate future risks and opportunities, especially with regard to cycle compression (Quarmby, 2009; Walsh, 2011). The unclear definition and cycle compression, prevents decision-makers from being able to exploit the advantages and limitations of both; information and intelligence. The challenge for QFES is providing a consistent intelligence training package, which clearly allows the application of intelligence, separate from planning, operations and the decision maker (Coyne, 2014).

The last modern challenge for QFES will be establishing policy and doctrine, which is framed towards disaster management and clearly stipulates the necessary objectives, practices and constraints for intelligence personnel.

6.8 Conclusion

This chapter has given a synopsis of the research and outlined the advantages QFES and the wider disaster management sector could gain by maturing the intelligence product. The importance of this research cannot be understated as it allows critical decision makers to gain a rehearsed situational scenario to be understood and applied at the operational level. The identification of uncertainty and friction allows a focus for QFES to implement strategy and not rely on competent operational

knowledge. As per strategy 2030 QFES should persist with intelligence being one of the five pillars, however, clearly delineate between intelligence, information, and knowledge. Once a fulltime intelligence cell is established and centralised at the strategic level, career progression using JDAP should be implemented and engrained into knowledge. The JDAP would allow situational understanding at a system level defining the holy trinity and options in reducing the Fog of Disaster.

The researcher recommends several fundamental shifts in QFES current intelligence practices. Intelligence should:

- Shift the temporal dimension of information
- Flip the current information rich, analysis poor product
- Influence the decision maker
- Provide situational understanding
- Be operationally refined
- Be strategically theoretically challenged
- Be independent from decision maker and other AIIMS functions
- Create a proximate reality of future events
- Define mission complexity
- Implement IPD and JDAP

A proposed method would be to train a fulltime intelligence team that could synthesise the relationships between the holy trinity, apply to an intelligence preparation of the disaster zone to reduce uncertainty and minimise friction through a JDAP.

As highlighted by McNarn (2018) QFES success is an absence of failure and there's enough research available now that QFES strategic personnel have no excuse for not supporting the decision maker with a competent intelligence capacity.

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APPENDIX A

Research Questions

What effect would a full-time intelligence cell have on QFES interoperability and operational Capacity?

- What can be the most appropriate model of an interoperable intelligence function within QFES for effective disaster management?

- How can this model be implemented to provide accurate data to commanders and staff for effective decision making?

- How and to what extent a full-time intelligence cell can affect the QFES interoperability and operational capacity?

- What are the resource and knowledge gaps within QFES interoperable intelligence real time data gathering and distribution function for disaster management?

APPENDIX B

Interview Questions

1. **What is your Name and Rank?**
2. **Do you consent to this interview?**
3. **How long have you been with QFES?**
4. **What's your primary role and responsibility?**

5. How would describe the amalgamation of F&R, SES, EM and RFS, in regard to communication platforms, tactics techniques and policy / procedures?

6. In what areas would you say interoperability within QFES is succeeding or lagging and in what ways could QFES improve or sustain these dynamics?

7. Do you feel information flows could be streamlined within QFES and if yes, what do you see to be the biggest issues with the relay of information?

8. During level 2 & 3 disasters, where do you perceive to be the single point of truth that allows critical decision makers to get a clear operating picture?

9. Do Critical decision makers receive priority information to achieve critical objectives within a timely manner and where generally within the AIIMS structure is this information sourced?

10. Major General McNarn conducted research in to QFES C4I capability and essentially found that QFES has major improvement across all these areas, do you agree with findings of this review? and how would you go about rectifying these deficiencies?

11. What is Intelligence? and What's your current understanding of intelligence within AIIMS and in particular Northern Region?

12. Is there a general lack of understanding of the importance of intelligence within QFES and what ways can we enhance our capability or improve intelligence to aid critical decision makers?

13. Intelligence within military, business and police operations generally has a fulltime capability and is conducted by trained professionals, do you believe

QFES could benefit from a similar fulltime capable intelligence cell / function? And in what ways?

14. QFES has multiple information gathering capabilities across all vertical structures however this information is disparate in nature, and normally confined to one vertical structure, do you perceive this to be a communication issue or should data be confined to each vertical structure? Baring in mind strategic objectives of enhancing interoperability.

15. How do you feel we can enhance our intelligence capability? And what operational areas would this improve? (Common Operating picture, Critical decision making, Point of Truth, information flows, interoperability).

16. If intelligence provides a clearer COP, do you feel that this creates a systematic level of safety to operational personnel? Why / Why not.

17. As an OIC of a ROC how would you setup an intelligence function within AIIMS and would you be confident your qualified staff could carry this out intelligence to its full potential?

18. If QFES had a proficient fulltime intelligence cell, do you believe we could enhance Whole of Government relations and provide a professional capability to disaster management through providing baseline, current and predictive intelligence? How?

19. Do you believe a higher intelligence capability could enhance interoperability between vertical structures within QFES and rectify MajGen McNarns C4I findings?

20. Why do you believe Intelligence has not been a focus in the past?

21. Should intelligence have bottom up or top down approach? Why?

22. Is the current state of Intelligence within QFES sufficient? Why / Why Not.

23. Would you consider cultural issues being a flaw within QFES? Would this relation effect interoperability?

APPENDIX C

To whom it may concern,

I am a post graduate student conducting research as part of my studies toward the Master of Professional Studies Research degree at the University of Southern Queensland. My research is supervised by Associate Professor Marcus Harmes, a lecturer at the university (Marcus.Harmes@usq.edu.au) and Ray Hingst (Ray.Hingst@usq.edu.au).

My research examines the topic of Intelligence within disaster management and the effects of a higher intelligence capacity on interoperability within QFES. My research is multi-faceted and includes an in-depth literature review and interviews within QFES to outline the current understanding and capabilities within QFES.

Participation is entirely voluntary, and participants are free to withdraw. The researcher will only approach people who are:

- 18 years or older
- Fluent in English language
- Currently work or formerly has worked as a QFES employer
  - Has played a pivotal role during level 2 and 3 disasters
  - Possesses an understanding of the AIIMS structure
- Lives and works in Australia

You have been identified as being a person whose knowledge will be greatly beneficial to this research.

The research will take about 45 minutes to complete. The participant will be provided with information about the study, asked to confirm their voluntary participation, and then asked to answer questions in a semi-structured interview.

The interview answers will be recorded and transcribed and a summary of the research provided on request.

For further information on the research study contact the researcher via the details provided on the PIS.

Please do not hesitate to contact me if you have any queries.

University of Southern Queensland

Consent Form for USQ Research Project Interview

Appendix D

The Human Research Ethics Committee of the University of Southern Queensland has approved this research (approval number: H19REA254).

Kind regards,

Daniel Rubens

USQ student ID 1120743

QFES 028068

This correspondence is for the named persons only. It may contain confidential or privileged information or both. No confidentiality or privilege is waived or lost by any mis transmission. If you receive this correspondence in error, please delete it from your system immediately and notify the sender. You must not disclose, copy or relay on any part of this correspondence, if you are not the intended recipient. Any opinions expressed in this message are those of the individual sender except where the sender expressly, and with the authority, states them to be the opinions of the Queensland Government.

All reasonable precautions will be taken to respect the privacy of individuals in accordance with the Information Privacy Act 2009 (Qld).

Project Details

Title of Project:	**Interoperability Through a stronger intelligence Capacity at Queensland Fire and Emergency Service**
Human Research Ethics Approval Number:	H19REA254

Research Team Contact Details

Principal Investigator Details **Supervisor Details**

Mr Daniel Rubens
Email: daniel.rubens@qfes.qld.gov.au
Mobile: 0410 362 283

Ass Prof Marcus Harmes
Email: Marcus.Harmes@usq.edu.au
Mobile:

Statement of Consent

By signing below, you are indicating that you:

• Have read and understood the information document regarding this project.	☐Yes / ☐No
• Have had any questions answered to your satisfaction.	☐Yes / ☐No
• Understand that if you have any additional questions you can contact the research team.	☐Yes / ☐No
• Understand that the interview will be audio	☐Yes / ☐No
• Understand that you can NOT participate in the interview without being audio/ video recorded.	☐Yes / ☐No
• Are over 18 years of age.	☐Yes / ☐No
• Understand that any data collected may be used in future research activities	☐Yes / ☐No
• Agree to participate in the project.	☐Yes / ☐No

Participant Name	
Participant Signature	
Date	

Please return this sheet to a Research Team member prior to undertaking the interview.

Participant Information for USQ Research Project Interview

APPENDIX E

Project Details

Title of Project:	**Interoperability Through a stronger intelligence Capacity at Queensland Fire and Emergency Service**
Human Research Ethics Approval Number:	H19REA254

Research Team Contact Details

Principal Investigator Details

Mr Daniel Rubens
Email: Daniel.rubens@qfes.qld.gov.au
Mobile: 0410 362 283

Supervisor Details

Ass Prof Marcus Harmes
Email: marcus.harmes@usq.edu.au
Telephone:

Description

This project is being undertaken as part of the Master of Professional Studies Research program

Purpose

The purpose of this research is to develop an intelligence model for gathering, analysing and distributing data that enhances critical decision making and systematic level of safety by providing a common operating picture to critical decision makers for disaster management.

Aims of project

Disasters, both man-made and natural, are predicted to intensify through climate change and population growth (IPCC, 2001; Nichol, 2004). As such it is critical to create a fluent system of intelligence which will allow for a holistic

common operating picture to be distributed to whole of Government and tailored for emergency responders to enhance critical decision making and provide a systematic level of safety. This research will provide an intelligence concept which will consolidate information from data and outline probabilities and predictions which will allow for accurate decision making and streamline the current problems of information distribution.

I, Daniel Rubens, extend an invitation to NAME to help fulfil my objectives in this research. You NAME have been identified as someone of importance in this area within QFES and if available, I would be grateful if you would consent to an interview.

Participation

Your participation will involve participating in a one-off interview that will take approximately 45 minutes of your time.

The interview will take place at a time and venue that is convenient to you.

Questions will include:

1. How would you describe the amalgamation of F&R, SES, EM and RFS, concerning communication platforms, tactics techniques and policy / procedures?

2. In what areas would you say interoperability within QFES is succeeding or lagging and in what ways could QFES improve or sustain these dynamics?

The interview will be audio recorded.

Your participation in this project is entirely voluntary and you are under no obligation to participate. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage. You will be unable to withdraw data collected about yourself after the data has been analysed. If you do wish to withdraw from this project, please contact the principal researcher (contact details at the top of this form).

Your decision whether you take part, do not take part, or to take part and then withdraw, will in no way impact your current or future relationship with the University of Southern Queensland or Queensland Fire and Emergency Service.

Expected Benefits

Participants will benefit by being part of a study relevant to their professional practice and gaining a shared understanding of information flows and the effects intelligence can have within QFES plans. As such they will have an insight into communications received and how these communications are perceived. Participants in the semi structured interviews can receive findings on the outcomes of the qualitative analysis on request. The participant will be asked to provide knowledge on current best practice and best practice moving forward for QFES interoperability. The participant will add valuable input to QFES gaps during level 2 & 3 disasters and aid in the findings and possible benefits of creating a fulltime intelligence cell.

Risks

In participating in the interview, there are minimal risks such as,

Risk – perceived damage to professional reputation

The participants in the semi structured interviews may feel they cannot be honest in their answers as they may face a social risk due to the fear of being seen to be recognizing that there is a need for future communications to staff to be modified.

Risk – perceived damage to professional networks

The participants may feel that the information or knowledge provided may cause damage to social networks or relationships with others, particularly between vertical structures.

Risk – Physical, psychological, economic or legal harm

No physical, psychological, economic or legal risks are anticipated.

However there is risk of time, as the participant will be required to commit about 45 minutes of their time.

Risk mitigation measures

All interviews will be confidential and can be conducted outside your workplace, and names and any other identifying comments will be removed before any information is used in this research. At the commencement of the interviews all participants will be assured about the importance of individuals being able to speak their views honestly and for the individual to be able to listen and ask questions where needed in a non-threatening, non-intimidating manner so that all participants are able to contribute in a comfortable environment. The possible inconvenience of taking time will be known in advance. The ability to withdraw prior to, during or after the semi structured interviews, will be communicated to the participants in the invitation, this participant information sheet, and

interview protocol. If a participant begins to feel uncomfortable during the interview for whatever reason, they will be able to immediately end the interview.

Sometimes thinking about the sorts of issues raised in the interview can create some uncomfortable or distressing feelings. If the participant needs to talk to someone about this immediately, they can contact:

1. Fire and Emergency Services Support Network (FESSN). FESSN provides a free 24 hour confidential telephone counselling service for all members and their immediate family members.

2. Peer Support: Peer - Support Officers are QFES colleagues who volunteer to assist with work related or personal difficulties.

3. Referred to a GP or other medical support as required

4. USQ Ethics office

Privacy and Confidentiality

All comments and responses will be treated confidentially unless required by law.

- The data provided by the participant will at no stage be able to link directly to the participant by a third party
- The participant is one of between 7- 10 interviews which will form the findings of the research
- The interview will be audio recorded and transcribed by a professional transcription service who will be requested to delete the transcriptions upon transfer to the principal investigator. The transcriptions will be provided for review only on request and only the principal investigator will have access to and safekeeping of the data source.
- This data will be securely stored on the principal investigator's password protected external hard drive with a backup stored on a secondary hard drive in a separate location. Access to this data will only be available to the investigator and can only be accessed with the investigator's personal password and login credentials. The external hard drives will be secured by a safe with the combination only known by the principal investigator and the second copied stored in a locked filing cabinet only accessible by key which is retained by the principal investigator.
- The data collected from participants will be collated and coded. The data will then form part of the researcher's Thesis and elements of the coded data used for two academic conference papers.
- It is NOT possible to participate in the project without being recorded.

The findings from this research may be used for similar research or education within QFES, however will be non-identifiable to any participant *in accordance with 2.5.2 of the "Australian Code for the Responsible Conduct of Research",*

research data should be made available for use by other researchers unless this is prevented by ethical, privacy or confidentiality matters.

This interview is voluntary, and the participant can opt out at any stage in the lead up, during and post the interview, however once the Thesis has commenced there will be no option for withdrawal. The participant's data will not be de-identified, during any stage of the research in accordance with 4.4.3 of the Australian Code for the Responsible Conduct of Research, researchers must where feasible, must also provide research participants with an appropriate summary of the research results.

This Master of Professional Studies Research was funded 100% by QFES at $3310 per unit and is being academically validated by the University of Southern Queensland.

$1250 was provided for the principal investigator for research tools such as transcription services.

Any data collected as a part of this project will be stored securely as per University of Southern Queensland's Research Data Management policy.

Consent to Participate

We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate in this project. Please return your signed consent form to a member of the Research Team prior to participating in your interview.

Questions or Further Information about the Project

Please refer to the Research Team Contact Details at the top of the form to have any questions answered or to request further information about this project.

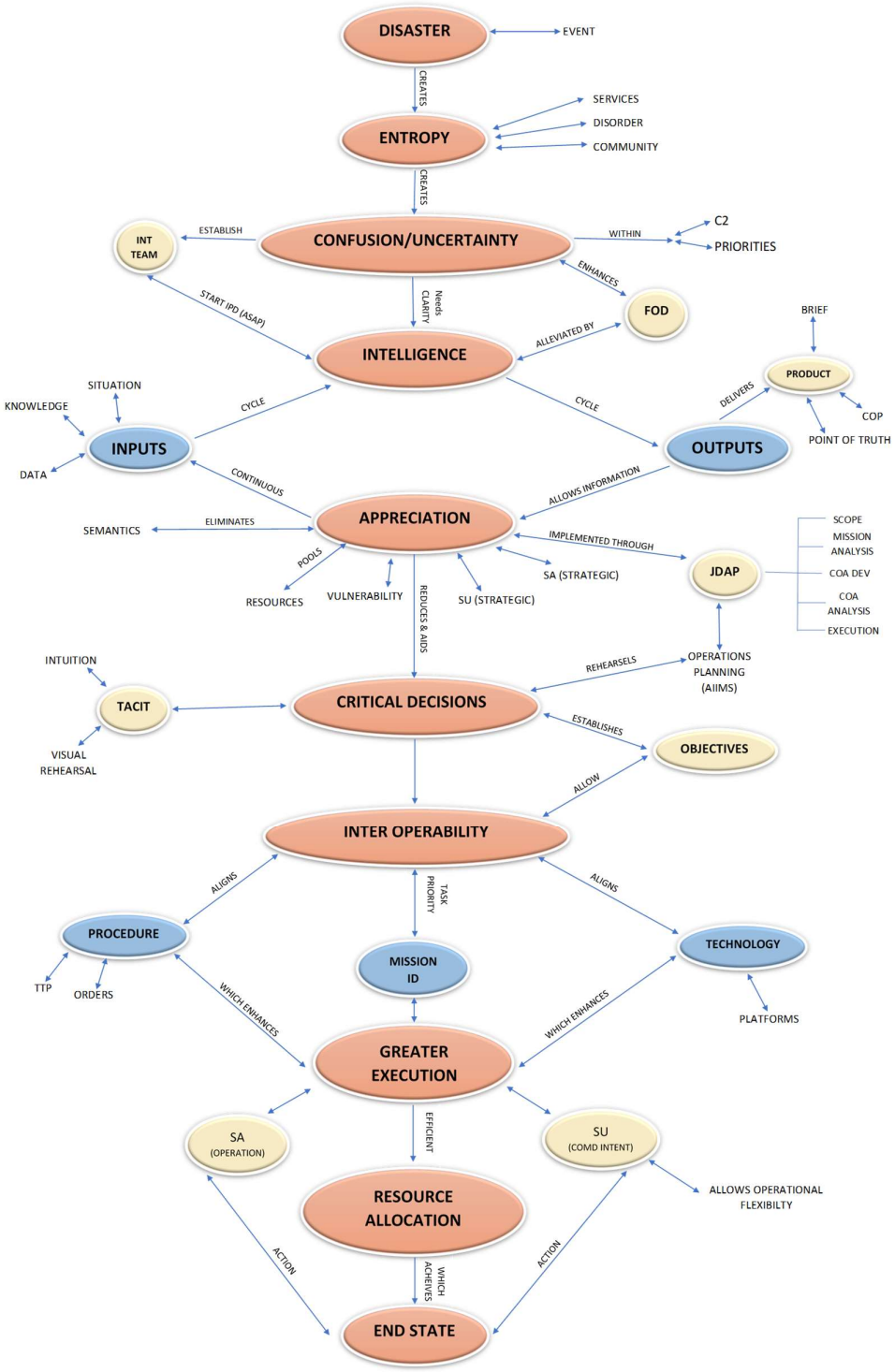
Concerns or Complaints Regarding the Conduct of the Project

If you have any concerns or complaints about the ethical conduct of the project, you may contact the University of Southern Queensland Manager of Research Integrity and Ethics on +61 7 4631 1839 or email researchintegrity@usq.edu.au. The Manager of Research Integrity and Ethics is not connected with the research project and can facilitate a resolution to your concern in an unbiased manner.

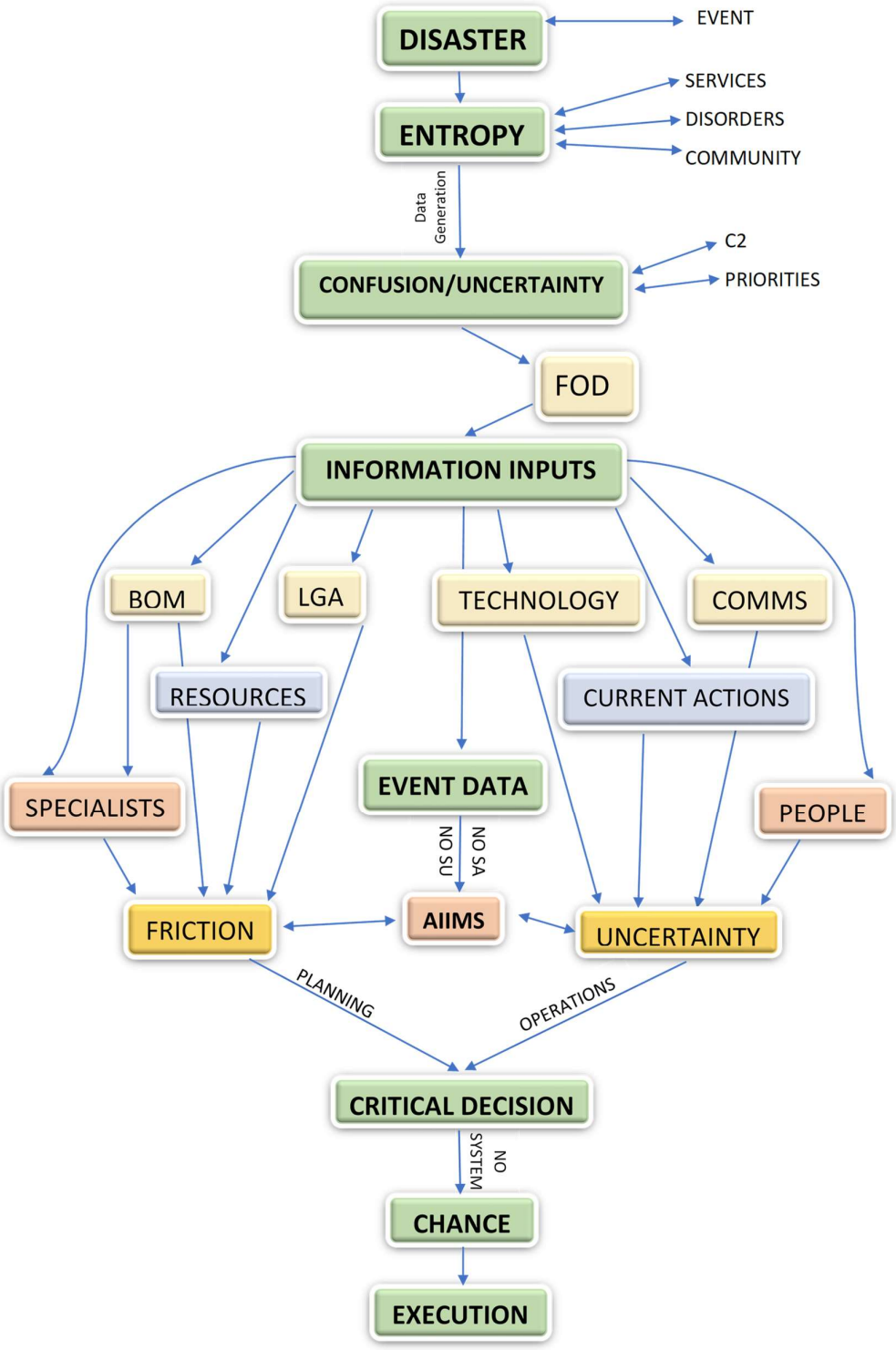
Thank you for taking the time to help with this research project. Please keep this sheet for your information.

Appendix F

Reducing FOD (Proposed QFES Set up)



Appendix G Origins of FOD (Current QFES)



Appendix H JDAP (IPD)

STEP 1 – PRELIMINARY ANALYSIS	
TIME NOW	TIME AVAILABLE FOR OWN PLANNING
IMPACT TIME	TIME AVAILABLE FOR SUBORDINATES
PLANNING TIME 1/3 UNTIL EXPECTED IMPACT MUST ALLOW TIME FOR RESOURCE MANOUVRE AND EXECUTION (2/3)	Prelim Analysis 10% IPD 20% Mission Analysis 20% COA Development 20% COA Analysis (10% Decision Execution 20%
Operational Timeline (from Resource movement to Mission Complete) Updated as Required	Define completion End State (COMD Intent) H-Hour Phase timelines
Event Timelines (example use BoM to estimate times)	Expected Timings on multiple areas of interest
Community Timelines (Intelligence analysis) Base intelligence (QERMF information)	Last possible Timings (Warnings) Reception options History Resilience
Stated Mission (State)	Who, What, Where and When (Given from Superior Commander)
Situation	Broad overview of the situation Initial Scope of Hazard Additional Stakeholders Operating Environment
Define Purpose / Higher Command End State	The mission, purpose and End State
Initial Information Requirements (What don't you know?)	Identified to aid further steps in the process

Initial Warning Order (Ensure Timings are adhered to, and Tasks for Operations are identified)		
Intelligence Preparation of the Disaster Zone		
Define the Environment (Environmental characteristics, threats, opportunities) Describe Disaster effects Determine Information requirements and make assumptions Outline unknown information to aid mission analysis		
Deduction	**So what - Describe effect**	**Therefore – what does this mean for QFES and Community**
Define Event - Strength - Speed Direction - History - Characteristics		
Outline second order effects - Rain - Landslide - Winds - Acceleration (Spotting) - Movement		
Outline Third Order effects - Psychological - Essential services - Change in Timings - Messaging - Relocation - Medical		
Key Areas - Rivers - Roads - Mountains **Decisive Areas** - Townships - Communications - Roads/bridges/tunnels - Ports/channels/berths - Railways/permanent way/rollingstock - Airfields/Airports - Medical services/Hospitals - Evacuation Centres - Dams - Water supply - Waterways - Power generation and distribution		

- Sanitation - Housing - Essential services		
Actions for event predictions to alter - Event slows or Speeds - Event Strengthens or Weakens - Multiple Disasters		
Obstacles - Impede or Channel movements		

Avenues of Approach - QFES Resources		
Weather - Visibility - Wind - Rain - Temperature First Light Last Light		
Intelligence Preparation of the Disaster Zone		
Event Dynamics Overlay Describe Event effects (ASCOPE) Community Determine Information Requirements and Make Assumptions		
Deductions	**So what – Describe Effect**	**Therefore – What does this mean? (QFES, Community)**

AREAS (Significant to the local population)		
Structures Determine if structures can aid QFES operations		
Capabilities Ability of local authorities		
Organisations Identify groups in area		
People Consider - threat - history - cultural - ethnic - religious - political - economic		

Events Routine, cyclical, planned or spontaneous activities that affect organisations, people or QFES activities.		

Combine Disaster Space Effects

Consolidate the understanding how the weather and terrain shape the communities Actions. Support this using

- Identification of the Area of Operation (AO)
- Modified combined Obstacle overlay (MCOO)
- ASCOPE overlay
- Weather Effects
- Answering IRs and assumptions for confirmation of reconnaissance

Stakeholder Evaluation

Organisation	Capability	Strength / Weakness (So What)	Deduction (Therefore)
Local Gov			
BoM			
Police			
Health			

Energy			
Military			
Rail			
Roads			
Air			
Housing			
Water			
Environment			

Communications			
Marine			
Other			

Information Requirements

Event movement / Community Course of Action

MLCOA (Against QFES mission) Task, Purpose, Method (COA description), End state	**HVT List**

MDCOA (Against QFES mission) Task, Purpose, Method (COA description), End state	**HVT List**

Community centre of Gravity Construct

Centre of gravity is the key characteristics, capability or locality from which the community derives its strength to survive

Community CoG:

Critical Capabilities are inherent overarching capabilities that underpin the CoG

Critical Capability	Critical Capability	Critical Capability

Critical Requirements are essential conditions, resources and means that a Critical Capability needs to operate

Critical Requirement	Critical Requirement	Critical Requirement

Critical Vulnerability that if destroyed will undermine the communities capability (TCV marked with T)		
Critical Vulnerability	**Critical Vulnerability**	**Critical Vulnerability**

The Community MLCOA Situation and Event overlay is completed at this point based on the information determined during IPD

STEP 2 Mission Analysis

Analyse QFES Intent

Command Level	Mission	Objective	End State
State		**Primary** **Secondary**	
Regional		**Primary** **Secondary**	

Identify Own Mission (Assigned Mission – Who, What, Where, When, and Why)

Identify Tasks (Essential designated with an E)

Specified	Implied
Determine Freedom of Action	
Limitations – Constraints (Must Work With)	**Limitations – Restrictions (Cannot Do)**
OPPORTUNITIES	
Identify Critical Facts and Assumptions	

Facts: Information known to be true. Includes QFES and stakeholder dispositions and Strengths	**Assumptions:** Information not proven. Must become PIR (Not additional equipment list to expand capability)

FRIENDLY FORCE EVALUATION

SERVICE	CAPABILITY	Strength / Weakness (So What)	Deductions (Therefore)

QFES	C2 Communication AIIMS Roles Technology Intelligence		
F&R	ISR People Manoeuvre Specialist Resources		
SES	ISR People		

	Manoeuvre Specialist Resources		
RFS	ISR People Manoeuvre Specialist Resources		
EM	ISR People		

	Manoeuvre Specialist Resources		

QFES Centre of Gravity Construct

Centre of Gravity is QFES capability or locality from which it derives its freedom of action or will to help the community

QFES Force CoG:

Critical Capability is the overarching capability that underpins the CoG

Critical Capability	**Critical Capability**	**Critical Capability**

Critical Requirement is the essential conditions, resources and means that the CC needs to operate

Critical Requirement	Critical Requirement	Critical Requirement
Critical Vulnerability if destroyed will undermine QFES capability		
Critical Vulnerability	**Critical Vulnerability**	**Critical Vulnerability**
Decisive Events		
Determine Community Success mechanism (Visualise how the community can survive)		
Success Mechanism (How can you protect the community's Critical Vulnerabilities?		

Targetable Critical Vulnerabilities	Essential Tasks	QFES CV to Protect
Decisive Events (Describe achieving the mission, effect on community, and protecting own vulnerabilities) **This is done Chronologically**		

Course of Action Development			
Create COA Concept:			
Circle COA use DE, ID Method, Develop under COA 1 or 2			
Decisive Events	**Method**	**Method**	**Method**

Describe How COA is FASSD		
	COA 1	**COA 2**
Feasible - Time - Space - Means - Describe How		
Acceptable - Mission Success - QFES Capable - Reputation - Describe how		
Suitable - Within Scope - Achieves community expectation - Achieves Intent - Describe How		
Sustainable - Can COA be supported - Shifts - Resources - Describe How		
Distinguishable - Different Sequence to achieve DE. - Describe how		
State which Concept has been selected and EXPLAIN WHY		

STEP 4 Course of Action Analysis

Test Critical aspects of intelligence plan. (The Intelligence should identify Community targetable critical vulnerabilities in a timely manner to allow assets to be triggered to achieve the desired effect against the CV. This should also be linked to NAI / TAI.

Community TCV	Indicator	Location / Time	Asset Task

Indication for MLCOA / MDCOA. (Identify Where and When the indicators for MLCOA / MDCOA are and Who (Asset) will ID

MLCOA / MDCOA	Indicator	Location / Time	Asset Task

COA Questions Must be answered

Question		What modifications were made
How does the COA mitigate the Communities Vulnerability?	**YES / NO**	
Can the Resource allocation counter all Communities COAs?	**YES / NO**	
Does the COA achieve all DE – is there enough Time to do so?	**YES / NO**	
Does the COA achieve all specified and essential tasks?	**YES / NO**	
Are Disaster control measures effective?	**YES / NO**	
Does the COA Target Community CV?	**YES / NO**	

Does the COA protect QFES CV?	**YES / NO**	
What elements (in time and space) are vulnerable to friction? Are the control measures effective in dealing with friction?	**YES / NO**	
Does Phasing support tasking of Operations?	**YES / NO**	
Can the COA achieve the States Commanders Intent?	**YES / NO**	
Does the COA position operational resources for future missions?	**YES / NO**	
Does the COA have an effective Extraction plan?	**YES / NO**	
What will happen if QFES CV is compromised?	**YES / NO**	
Is there redundancy to achieve mission or can Operations recover?	**YES / NO**	
Are contingency plans likely to be effective?	**YES / NO**	

STEP 5 Decision and Execution

The Following Should have been Produced

- Ground Brief
- Situation Brief
- Warning Order
- Event Dynamics Overlay
- MCOO (Modified combined obstacle overlay)
- Community MLCOA Situation / Event overlay
- COA Operation Overlay
- Written and Rehearsed Concept of Operations
- Written Explanation of how the COA was determined

Deliver CONOPS Back Brief

Develop and issue orders

Conduct Rehearsals

Execute and monitor the Mission

APPENDIX I

Linking the FOD to interoperability and operations through intelligence and Appreciation.

Uncertainty and Intelligence

- Is uncertainty and confusion present within QFES modern disaster management?
- Does intelligence reduce uncertainty?
- Is Intelligence and information definition clearly delineated in QFES?
- Does QFES have a current Intelligence capacity?
    - Collation (Central Data base, No Intelligence officers)
    - Analysis (Transfer Data to a different temporal dimension)
    - Exploitation (Epistemological understanding of Intelligence)
    - Dissemination (products produced)
- Does QFES Intelligence influence or support the decision maker?

Appreciation and Friction

- Is there friction present within modern QFES disaster management?
- Does Appreciation reduce friction
- Is Appreciation utilised and trained in QFES?
- Does QFES have an Appreciation process (JDAP)?
    - Scoping Framing
        - IPD
    - Mission Analysis
    - COA development
    - COA Analysis
    - Execution / Concept of operations
- Does Appreciation enhance decision making?

System based Decision Making effects on Interoperability and Operations

- Does QFES utilise a systems-based approach to the Disaster Holy Trinity?
    - Event
    - Community
    - QFES

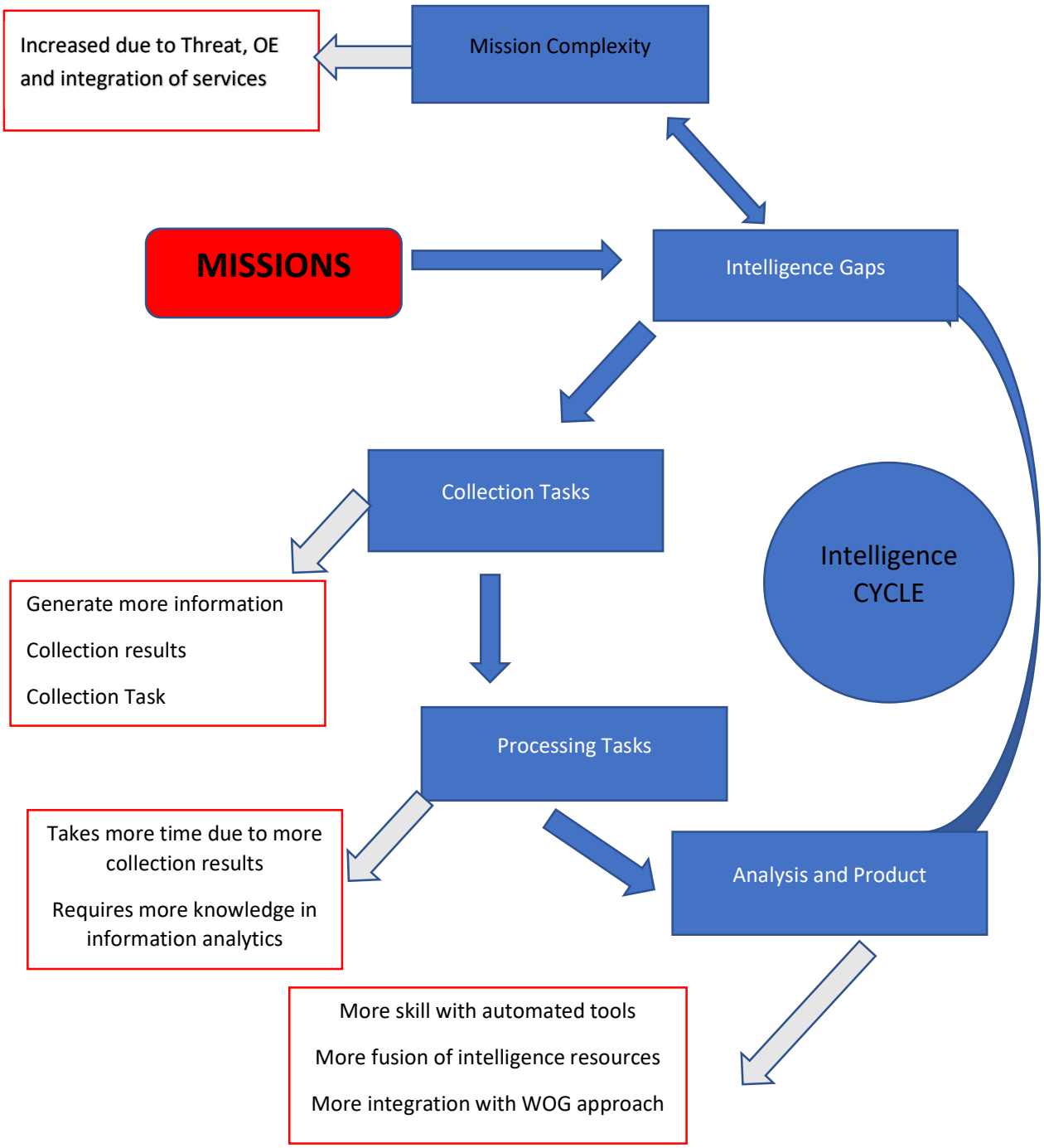
- How does QFES system-based decision making currently affect interoperability?
    - Procedural
    - Technological
    - Cultural
- How does QFES system-based decision making currently affect operations?
    - POT
    - COP
    - SA
    - SU
    - Relay of information

Minimal system education means Chance is still a consideration

- Event (Fast onset direct impacts)
- Community (resilience)
- QFES (Tacit knowledge and competence)

APPENDIX J

Modern complexities in the Intelligence cycle



APPEMDIX K

QFES Service, LOO, Mission and End State Format

Commanders 4Qs to Situational Understanding

Understand	Visualise	Describe	
What's the OE?	What's the End State?	Understand	Picture
What's the problem?	What's the Operational Approach?	Visualise	Narrative