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A Knowledge Elicitation Approach to Improving Security Management Systems in the Humanitarian Sector

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A Knowledge Elicitation Approach to Improving Security Management Systems in the Humanitarian Sector

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Abstract

Many humanitarian organisations adopt top-down systems to keep staff safe, which seek to quantify risk and avoid this by controlling the way staff operate. This limits the role of knowledge from experienced humanitarian workers, which weakens systems by providing training that is generic and procedures which do not match the reality of the ground. Knowledge management theory provides a solution and recommendations to effectively convert and share knowledge.

This thesis explores top-down knowledge and bottom-up knowledge to understand how they are similar and how they are different. The research focuses on identifying effective methods at eliciting different types of knowledge requirement. As security is a sensitive domain, it also discusses methods of accessing participants and eliciting information from those who may not want to provide it. The methods used as evaluated against how well they elicited knowledge, their practical application, the feasibility to be conducted by others and how well they accessed the sensitive domain.

The primary research was split into two parts. Stage 1 collected top-down knowledge requirements and Stage 2 collected bottom-up knowledge requirements. Participants were selected on their domain expertise from groups representing security experts and field workers. A critical comparison of the knowledge collected showed that knowledge between security experts and experienced field workers had more similarity than difference, contradicting what was stated in the literature. Two methods used are noteworthy because of their novel application- a systematic document analysis, combining both systematic review and document analysis and scenario-based discussions which use three specialist knowledge elicitation methods: Limited Task Analysis, Process Mapping and Critical-Decision Method. Both were effective at eliciting knowledge and produced usable findings.

The thesis contributes a new hypothesis to research: that a gap exists with the knowledge in novice workers, which the SECI model can fill. The synthesis of the requirements list from the two stages resulted in a combined list of 9 top-down/bottom-up, expert elicited requirements inventory. Recommendations are made on how this can be applied by humanitarian organisations. Two novel research methods have also been trialled and deemed effective for knowledge elicitation in sensitive domains.

Keywords: security, high-risk, risk, humanitarian, knowledge, explicit, tacit, requirements.

Dedication

This thesis is dedicated to my mother, Charlene, for instilling an appreciation and a quest for knowledge from a young age, and my late grandfather, Jim, for teaching me hard work and effort pay off. If it wasn't for them, I would have faltered long ago.

This work is also dedicated to the many people I have come across whilst working in the sector, here and overseas: those who work tirelessly to alleviate the suffering of others, often at their own peril. There will come soft rains.

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1. Introduction

This chapter provides background on the area of research and the problem as it has been identified. The aim of the thesis, which is to investigate knowledge on security, has been presented as well as the objectives necessary to meet this aim. An overview of the structure of the thesis is presented.

1.1 Background

Humanitarian workers provide a range of functions to alleviate the suffering of others, from emergency response after disasters, to the provisions of food and shelter, through to development work to build infrastructure or advocate for human rights (Davies 2012; Alexander 2012). Humanitarian organisations recruit a wide range of staff, from doctors and nurses to engineers, lawyers, and volunteers. However, the risk these workers face and the operational environment for many humanitarian organisations has been transformed dramatically since the turn of the century (DiDomenico, Harmer and Stoddard 2009). There is a marked rise in the number of humanitarian workers being injured, killed or kidnapped (Bolton et al. 2000; Buchanan and Muggah 2005; Harmer, Stoddard and Toth 2013; Harmer, Ryou and Stoddard 2014; Czwarno, Harmer and Stoddard 2017). This is especially notable in those countries termed-high risk (Harmer, Haver and Stoddard 2011a) which present a range of security risks-defined as 'danger in the operating environment resulting in harm from violence or other intentional acts.' (Harmer, Haver and Stoddard 2010: xviii-xix).

Humanitarian organisations largely implement systems-based approaches to managing security risks (Brunderlein and Grassmann 2006). This has largely replaced a community-based approach which emerged at the start of the century (Van Brabant 1998; Martin 1999; Van Brabant 2000) but was ineffective at preventing targeted attacks (Grassmann 2005) such as those which occurred in Iraq in 2003 (Kapp 2003; Ahtisaari 2003). The systems-based approach allows security as a functional entity within humanitarian organisations to be controlled, risks to be analysed and avoided (Schneiker 2015a; Neuman and Weissman 2016). Organisations put a focus on utilising security experts to design procedures, manuals and training for field staff (Barnett 2004). However, the approach devalues the knowledge of individual humanitarian workers (Brunderlein and Grassmann 2006; Bollentino 2008). This causes a conflict between the knowledge passed-down by organisations and what those in the field believe is correct (Daudin and Merkelbach 2011; Collinson and Duffield 2013).

The conflict between the system and experience is illustrative of a conflict between top-down and bottom-up knowledge (Adams 2003). Top-down knowledge is explicit, easily expressed, captured and shared with others (Nonaka 1991). It is usually conveyed through manuals, guidelines, and training (Nonaka and Takeuchi 1995). Bottom-up knowledge is tacit, built up through the experience of overcoming problems and doing work (Nonaka 1991). It is harder to express and communicate (Easterbrook and Nuseibeh 2002), and forms a collection of "highly subjective insights, intuition, and hunches of an individual" (Nonaka 1991: 164). Top-down systems often ignore tacit knowledge, which is too subjective to be utilised, so instead use explicit knowledge (Botha et al 2008; Johannessen, Olaisen and Olsen 2001). Mismanagement of this knowledge causes weaknesses in the overall system, and organisations lose their competitive advantage or problem-solving ability (Nonaka 1994; Nonaka and Takeuchi 1995).

1.2 Research Problem

Problems are likely to occur in a system where explicit and tacit knowledge do not align (Wilson 1995). In terms of risk management, staff will follow their own experiences and beliefs over that of the procedures put in place to keep them safe (Adams 2003). The systems-based approach implemented by humanitarian organisations often do not integrate tacit knowledge from experienced staff, so they are resisted at the field level. This is true in two key areas: procedures and training. Procedures, including guidelines and rules, are resisted because they are often ill-fitting to the actual environment they are designed for, so are ignored (Daudin and Merkelbach 2011; Collinson and Duffield 2013). Training is often introductory and inefficient (Brunderlein and Grassmann 2006; Bollentino 2006; Barnett 2004), being unstructured and lacking up-to-date information (Persaud 2014; Burns, Burnham and Rowley 2013; Evert and Mishori 2016),

Systems-based methods cannot always be effective (Daudin and Merkelbach 2011), so staff need to be trained with the necessary requirements to enable their own security (Claus 2015). Here, 'requirements' refers to the application of knowledge and is defined as the "condition or capability needed by a user to solve a problem or achieve an objective" (IEEE 1990: 62). The top-down approach has moved a focus onto the system for keeping staff safe, which has meant training is often generic, does not build upon experience and does not promote a growth in knowledge, but rather an introduction on how to follow systems-based methods (Barnett 2004; Persaud 2014), which does not allow staff to develop effective requirements for dealing with security issues.

Problem Statement

Knowledge is not effectively managed within humanitarian organisations security systems, being overly reliant on top-down, explicit knowledge. Training and procedures are ineffective as they do not utilise bottom-up, tacit knowledge. This fails to develop effective security requirements for humanitarian workers in high-risk environments.

Intended Contribution

During the literature review, no studies were identified which applied a knowledge management approach to understanding security management systems in the humanitarian sector. This thesis seeks to contribute to the knowledge base by applying such an approach to understand how top-down and bottom-up knowledge interact.

1.3 Research Aim and Objectives

The following research aim is proposed to investigate the research problem stated. This aim has been broken down into 5 separate objectives.

Research Aim

To investigate top-down and bottom-up knowledge requirements for operational security in the humanitarian sector.

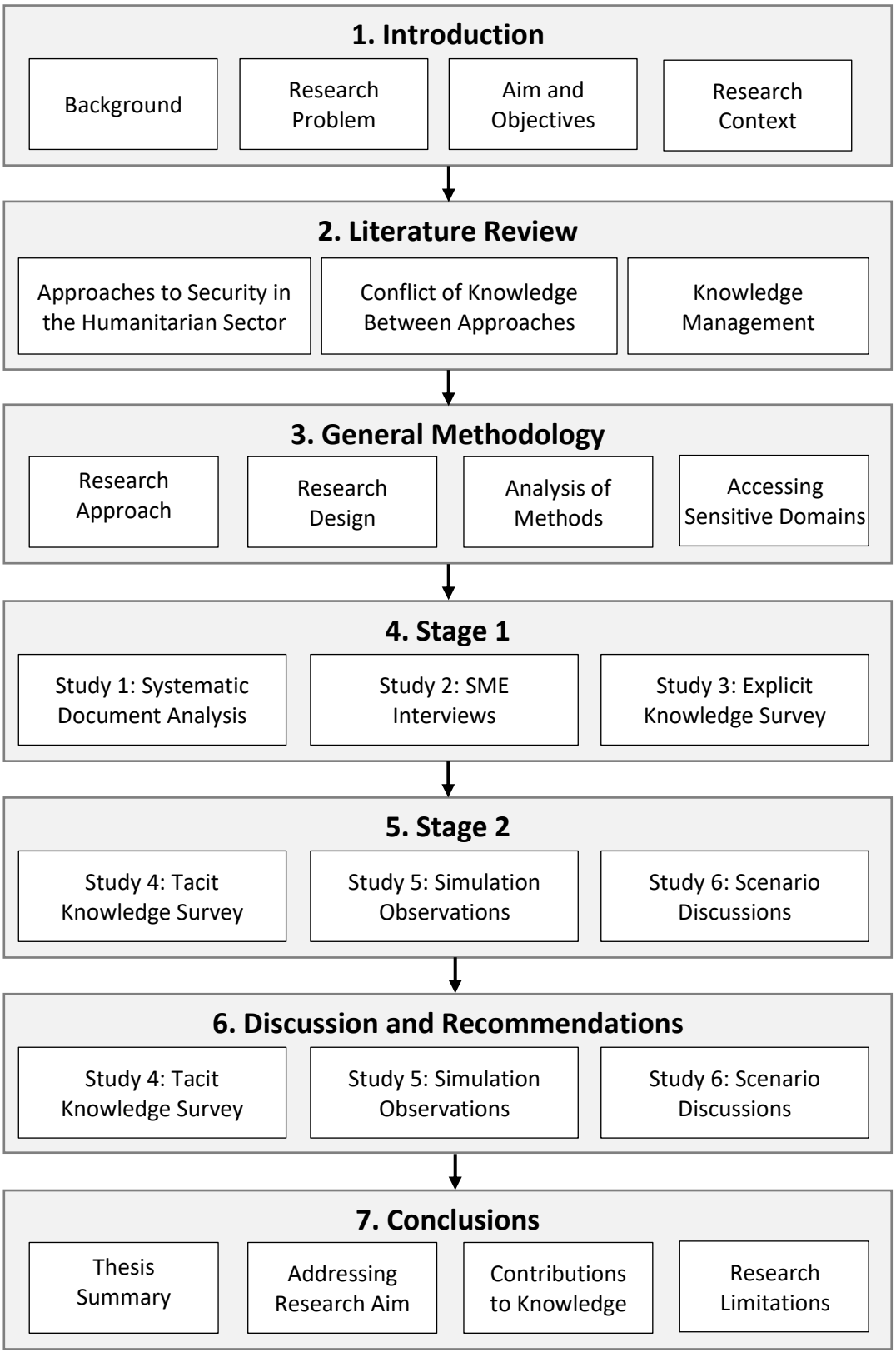
Research Objectives

Underpinning the research aim are the following objectives:

1. Review the academic literature on operational security to explore explicit and tacit knowledge and identify gaps to take forward in the thesis;
2. Identify a means of accessing and collecting data from a sensitive security domain;
3. Develop and test a method to identify aspects of explicit and tacit knowledge in operational security;
4. Conduct a systematic comparative analysis between explicit and tacit knowledge in operational security;
5. Formulate recommendations to bridge the gap between top-down and bottom-up knowledge in the humanitarian sector.

1.4 Structure of Thesis

The thesis is broken down into the following chapters and main sub-chapters:



The thesis is broken down into 7 chapters:

- Chapter 1: Introduction. Provides background and context to the problem as well as the research aim and objectives;
- Chapter 2: Literature Review. Examines literature on security management and knowledge management, and presents a conceptual framework between the two;
- Chapter 3: General Methodology. Describes the research approach and design, as well as the methods used to analyse the individual studies and how accessing a sensitive domain was achieved.
- Chapter 4: Stage 1 Studies. The first three studies investigate explicit knowledge using systematic document analysis, SME interviews and an explicit knowledge survey;
- Chapter 5: Stage 2 Studies. The last three studies investigate tacit knowledge using a tacit knowledge survey, simulation observations and scenario discussions
- Chapter 6: Discussion and Recommendations. An analysis of the studies used is presented and a systematic comparison between the knowledge identified in the two stages is made. Recommendations are presented from this;
- Chapter 7: Conclusions. The research objectives are answered, the contributions presented, and the limitations are discussed.

1.5 Chapter Summary

The thesis seeks to identify top-down and bottom-up knowledge on security in the humanitarian sector. There is a rise in attacks against humanitarian workers, and the systems implemented to protect them are different from what the workers themselves believe is important. This divergence in knowledge, if it exists, weakens the system overall.

This thesis seeks to approach the issue from a knowledge management perspective to investigate explicit (top-down) and tacit (bottom-up) knowledge. Knowledge management approaches have not previously been applied to the phenomenon and so the thesis seeks to make a novel contribution to the field.

The research aim (to investigate top-down and bottom-up knowledge requirements for operational security in the humanitarian sector) and objectives have been presented, as well as a layout of the thesis.

2. Literature Review

2.1 Chapter Overview

This chapter presents the investigation of literature conducted. First, it explores the literature on praxis on humanitarian security management. Secondly, it examines literature related to knowledge management. Links are made between the two fields as a basis for the research conducted, presented as a conceptual framework.

2.2 Approaches to Security in the Humanitarian Sector

The literature on security studies has traditionally focussed on states as the main actors (Browning and MacDonald 2011). Security studies as an academic field have neglected the individual as a viewpoint, attempting to understand broader security issues on why states go to war and how military power is projected (Buzan and Hansen 2009). A shift in this approach occurred at the end of the Cold-War in 1991 with the emergence of Critical Security Studies, which shifted the focus to individuals, considering human rights, effects of non-state conflict (such as terrorism) and the effects of criminal activity (Williams 2013). As a result, security literature within the humanitarian sector has only started to exist since the end of the 1990s (Harmer and Schreter 2013; Schneiker 2015a).

The first academic sources on security in the sector appeared in 1998 when three articles were published in the journal *Humanitäres Völkerrecht* (*International Humanitarian Law*), discussing security practices within the United Nations, the International Committee of the Red Cross and humanitarian non-governmental organisations in general (Connelly 1998; Dind 1998; Van Brabant 1998a, respectively). The articles addressed the changing nature of what they termed the 'humanitarian space', or the environments humanitarian programmes occur in, stating that there was an increase in attacks against humanitarians. This prompted the first statistical review into humanitarian worker deaths (Bolton et al. 2000). The study concluded that attacks against humanitarian workers were on a rise caused by an increase in conflicts between non-state actors, such as rival militias, and lawlessness is the main driver (Bolton et al. 2000). However, there were a greater range of risks workers were exposed to, such as being caught in the crossfire between warring groups, landmines, abduction and kidnapping and crime related to lawlessness, such as muggings and carjacking (Martin 1999; Bolton et al. 2000).

An important document was released in 2000 titled *Good Practice Review 8: Operational Security in Violent Environments* (Van Brabant 2000). This document built on work by Van Brabant (1998a) and Martin (1999), as well as through consultation with a range of humanitarian staff, to pose a new model for security management. This document was the first true work to draw together thinking in the sector (Harmer and Schreter 2013). It emphasised the need for humanitarian organisations to take more responsibility for staff security, provide training to ensure staff are prepared, as well as foster the acceptance of the organisation's presence and work with the communities they help (Van Brabant 2000). This created the community-based approach as a school of thought within the sector (Brunderlein and Grassmann 2006).

Though the work was considered ground-breaking (Harmer and Schreter 2013), there was little improvement in security practices in many humanitarian organisations (Van Brabant 2001). There was a reluctance to adopt practices for multiple reasons, including believing that the risk was part of the job, the risks were unavoidable or that the rise in risk was exaggerated (Van Brabant 2001). A lack of funding for improving security was also an underlying factor for a lack of change (King 2002). A catalyst for change occurred when the Iraq headquarters of the United Nations and the International Committee of the Red Cross were attacked, with multiple humanitarian workers being killed (Kapp 2003). The attack led to an investigation by the United Nations into both their practices as well as that of other humanitarian organisations (Ahtisaari 2003). The publicity of the attacks and outcome of the report prompted a shift to professionalise security as a discipline within the sector (Grassmann 2005; Fast 2013), with the implementation of standardised procedures, the hiring of security staff and an increase in security training (Burkle 2005; Harmer, Haver and Stoddard 2006). This established the systems-based approach which seeks to assess, limit and manage risks (Brunderlein and Grassmann 2006).

2.2.1 Approaches to Security

The impetus to change security management in the sector led to the development of the two aforementioned approaches- the community-based and systems-based approach (Brunderlein and Grassmann 2006). The community-based approach views security from the bottom-up, with the individual humanitarian worker and their ability as the focal point, while the systems-based approach is top-down, which puts the security advisors and procedures at the centre of the design and implementation (Schneiker 2015a). The next section presents a theoretical discussion of each approach before presenting a review of how they interact in reality.

Community-Based, Bottom-Up Approach

The community-based approach first appeared in literature at the turn of the century (Van Brabant 1998a and 1998b; Martin 1999; Van Brabant 2000). The approach relies on local communities to trust and support the organisation and their work, thus reducing risks to humanitarian workers (Martin 1999). As it relies on the community to accept the presence of the humanitarian organisation, it is also referred to as the 'acceptance' approach (Van Brabant 1998a). It takes a bottom-up view of security, which is effectively cultivated at the field level (Schneiker 2015a), with the organisational level providing support and resources (Van Brabant 2000). Successful acceptance also required organisations to gain acceptance from potential aggressive actors (Van Brabant 1998b), with organisations needing to "obtain credible security guarantees" (Brunderlein and Grassmann 2006: 71). Where strong acceptance exists, the community are likely to protect humanitarian workers if possible or warn them of potential danger (Van Brabant 2000).

The community-based approach placed the individual field worker at its centre (Brunderlein and Grassmann 2006). The role of the individual was not just to build trust with the local community but stay aware of potential harm and use their own judgement on when the situation was too dangerous to stay (Van Brabant 1998a). It is necessary for workers to meet with local community members, though doing this they are exposed to possible risks, such as being attacked by bandits or armed actors (Van Brabant 2001). The approach emphasises the need for workers training, such as on mine awareness, communications and how to survive an abduction (Bollentino 2006).

Brunderlein and Grassmann (2006) identified four weaknesses with the community-based approach:

- The approach relies on the community trusting the humanitarian workers;
- Communities can be unaccepting of organisations because of their resentment to the country they are from;
- Communities need to provide security for the humanitarian workers, but in some circumstances cannot provide their own security;
- Relies on individuals who have the necessary experience to build relationships with key stakeholders.

The approach is also reliant on strong humanitarian workers, who can develop relationships with others and build trusts (Van Brabant 2001). The approach requires humanitarian workers to have close relationships with the community and face the same risks they face (Martin 1999; Schneiker 2015a). This promotes 'emotional decision making' where risks may not be assessed realistically (Daudin and Merkelbach 2011: 7), resulting in workers staying with the community when they should leave (Neuman and Weissman 2016: 16). The context of decision making is therefore extremely complex and humanitarian staff represent a large area of risk themselves, who can take a "negligent attitude towards their own security" (Brunderlein and Grassmann 2006: 67).

Systems-Based, Top-Down Approach

The systems-based approach emerged out of the review of the 2003 attacks in Iraq, which emphasised the need for more organisational oversight into field security (Ahtisaari 2003). The approach favours 'top-down' management of security (Schneiker 2015a), focusing on enforcing standardised procedures (Brunderlein and Grassmann 2006), including manuals, guidelines and rules (Harmer, Haver and Stoddard 2010). Danger is seen as a quantitative measure, relying on mathematics to determine risk levels so that it can be avoided altogether (Neuman and Weissman 2016). In this way, it replaces the subjective nature of awareness with scientific methods supported by security experts to design and decide procedures (Brunderlein and Grassmann 2006), attempting to move away from the gut-feeling responses which were often relied on by the community-based approach (Harmer, Haver and Stoddard 2010). Training focuses on following these procedures, rather than helping staff develop risk awareness (Barnett 2004).

Unlike the community-based approach, the systems-based approach views security as a functional entity that can be modelled, predicted and controlled (Neuman and Weismann 2016; Collinson and Duffield 2013). In this way, the influence of the individual humanitarian worker is minimised or eliminated (Beerli and Weissman 2016), as individual decision-making is seen as too unpredictable to manage effectively (Daudin and Merkelbach 2011).

Brunderlein and Grassmann (2006) identified four weaknesses to the systems-based approach:

- It relies on the quality of risk assessments and therefore the security intelligence;
- It is reactive and based on generic risks and responses, which oversimplifies the complex nature of political, social and economic risks;

- To be effective, it needs an effective response capability, such as that provided by the military;
- It skews the long-term outlook for programmes, instead of putting more emphasis on immediate security.

This rigid nature of security systems, where experts are relied on to provide advice and staff are given rules and procedures to follow, creates a false sense of security where individual responsibility for security awareness is removed (Daudin and Merkelbach 2011; Barnett 2004). The role of security experts give staff the belief that the experts alone are responsible for security, thus "everybody's business becomes nobody's business" and overall security capability is reduced (Fast et al. 2013: 236). Furthermore, quantifying risk can answer where, when and how questions, but does not provide answers on why risks occur which further reduces general understanding and awareness (Brooks 2016).

Relationship Between Top-Down and Bottom-Up Approaches

The community-based and systems-based approaches should, in theory, be complementary to each other (Brunderlein and Grassmann 2006): effective risk-analysis can inform when community-based approaches are safe to implement, which allows staff to build acceptance which in turn provides greater access to information to inform risk-analysis (Bollentino 2008). However, the community-based approach has not been largely adopted by many organisations (Brunderlein and Grassmann 2006) and is poorly supported by literature or studies of how it works in practice (Grassmann 2005; Bollentino 2008). Not long after it was proposed the attacks in Iraq occurred, which prompted many organisations to believe that the community-based approach did not work (Grassmann 2005). The attacks revealed the difficulty in building acceptance, which is critical for the community-based approach, as it is required from all parties, including those who are potential aggressors (Van Brabant 2001). There are some countries where this is not possible however (Collinson and Duffield 2013)- in some contexts there are groups that promote anarchy and do not want humanitarian organisations helping the local community (Childs 2013; Egeland, Harmer and Stoddard 2011), such as the ongoing conflict in Syria with extremist groups wanting a lack of stability and promoting violence. Such conflicts are likely to continue worldwide, which are typified by guerrilla warfare, terrorism and a rise in lawlessness, meaning the groups acceptance is needed from are likely anti to humanitarian goals (Burkle 2005; Fast and Willie 2010; Kaldor 2012).

Arguably the community-based approach cannot be effective with humanitarian work, which has become increasingly politicised (Brunderlein and Grassmann 2006; Bollentino 2008; Fast 2013; Duffield 2014). Duffield (2014) discusses how many humanitarian organisations have started to move away from impartial approaches, in which assistance is given to all based on their need, even where such groups could be partial to and fueling conflicts. Organisations instead become peacebuilders, planning programmes to bring about an end to conflict (Duffield 2014). Programmes with such aims are often better funded by donors, which also include government institutions, which limits what community groups the funding can support and ultimately makes humanitarian aid political in nature (Egeland, Harmer and Stoddard 2011; Fast 2013), therefore limiting how effective the community-based approach can be.

Considering both the politicisation of aid as well as the perceived need to professionalise security, the sector has largely adopted systems-based over a community-based approach (Egeland, Harmer and Stoddard 2011; Claus 2011; Collinson and Duffield 2013; Daudin and Merkelbach 2011). The systems-based approach allows investment in a central system which can be implemented in other communities, whilst the community-based approach means investment is into one local area (Brunderlein and Grassmann 2006; Childs 2013). Investment into local acceptance is seen as financially risky as the approach does not always ensure security (Collinson and Duffield 2013). Furthermore, the systems-based approach also allows an organisation to document how it meets its legal Duty of Care obligations; or their obligations to take necessary measures to protect staff (Kemp and Merkelbach 2011). Organisations are becoming more aware of their legal obligations in comparison to before the 2003 attacks (Klamp 2007; Kemp and Merkelbach 2011) and implement systems to protect their staff and reputation (Edwards and Neuman 2016), which in turn allows them to compete for further funding (Bollentino 2008). Lastly, the systems-based approach is easier to achieve as a strategy (Neuman and Weissman 2016), where management can mark progress by identifying what measures have been implemented and how many staff have received training (Barnett 2004). The measures implemented are also more objective at keeping staff safe (Daudin and Merkelbach 2011; Schneiker 2015a), whereas community-based approaches are subjective in their effect on improving security (Brunderlein and Grassmann 2006). Therefore, the systems-based approach is preferred to the community-based approach in terms of finance, documenting legal obligations as well as management oversight.

Though the systems-based approach seeks to replace individual judgement with standardised procedures (Neuman and Weismann 2016; Collinson and Duffield 2013; Brunderlein and Grassmann 2006), intuitive decision making still occurs with field workers who undervalue the need to collect and analyse data on security (Buchanan and Muggah 2005). Several authors note that field staff often resist standards imposed from the top-down (Brunderlein and Grassmann 2006; Neuman and Weissman 2016; Daudin and Merkelbach 2011). One explanation is that security objectives are prioritised over programme activities, therefore hindering field staff completing their work (Fast et al. 2014; Daudin and Merkelbach 2011; Schneiker 2015a). The other explanation, and a focus of this research, is that there is a disparity between what field workers and security experts believe is necessary to ensure operational security (Adams 2003; Barnett 2004; Brunderlein and Grassmann 2006; Daudin and Merkelbach 2011; Collinson and Duffield 2013). Where this conflict in knowledge exists, staff are likely to follow their own knowledge and belief over the instruction of security experts, either passed through training or through procedures, which undermines the systems-based approach (Brunderlein and Grassmann 2006; Daudin and Merkelbach 2011). Issues in knowledge mismanagement can mean that systems implemented to keep staff safe are not followed, staff are ill-prepared for the environments they deploy to and the organisation is unable to achieve its goal. This conflict highlights an area of significance not yet fully explored in the literature.

2.2.2 Conflict of Knowledge Between Top-Down and Bottom-Up Approaches

The top-down systems-based approach emphasises the role of the security expert as the knowledge creator, responsible for designing the system and the supporting material for its implementation (Burns, Burnham and Rowley 2013; Brunderlein and Grassmann 2006; Barnett 2004). In doing so, the knowledge and experience of field workers is neglected (Buchanan and Muggah 2005; Bollentino 2008; Neuman and Weissman 2016). This section discusses three areas where the literature explains this conflict in knowledge has a negative impact: a conflict between procedures and what field workers know to be true, the inability to convert experience into knowledge to improve security systems and training being ineffective at improving staff security.

Conflict Between Procedures and Experience

Multiple authors note the disregard many field workers have for the security procedures imposed to keep them safe (Ahtisaari 2003; Van Brabant 2000; Daudin and Merkelbach 2011; Collinson and Duffield 2013; Neuman and Weissman 2016). Daudin and Merkelbach (2011) state

that there is a tendency for field staff to only follow rules that reflect their own beliefs of experience. Adams (2003) poses that this is a natural behaviour of people, using the everyday example of crossing the road to frame the issue: though the experts designed the system so that people wait until the red light shows before crossing, many people will use their own judgement to see if it is clear and cross even when the light is not red. Adams (2003) used this example to frame his discussion on how people ignore systems where they believe they have a better understanding of the solution.

Security procedures lose even more buy-in from staff when they do not directly reflect the situation field workers find themselves in (Barnett 2004; Collinson and Duffield 2013). One example of this is a rule commonly imposed that prevents those with weapons using organisation vehicles (for example, People in Aid 2008: 17), implemented so the organisation remains neutral. In reality, if an armed person wants to get into the vehicle the humanitarian workers have no way of refusing them carriage. Though such a rule ignores the local context (Barnett 2004; Collinson and Duffield 2013), Beerli and Weissman (2016) state that humanitarian workers are likely to face disciplinary action if rules are broken, rather than be commended for their individual judgement. In one study, such an approach was documented to reduce the reporting of incidents by field staff for fear of losing their jobs (Donnelly and Mazurana 2017). This reduces the ground-truth-reality of how many incidents occur, weakening a systems approach which is reliant on statistics for risk assessments (Bollentino 2008).

Field Experience is Not Converted into Knowledge

Underlying the disparity between procedures and experience is the inability for organisations to utilise staff experience effectively (Bollentino 2008; Buchanan and Muggah 2005). The systems-based approach downplays the role of individual knowledge, which is seen as too diverse and incoherent to be of use (Daudin and Merkelbach 2011). However, those workers who have amassed experience of working in high-risk environments are likely to be able to rectify procedural and training issues and help review the security systems in use (Barnett 2004; Collinson and Duffield 2013; Bollentino 2008; Darby and Williamson 2012; Buchanan and Muggah 2005).

None-the-less, there is an “inability to institutionalise staff experience” (Bollentino 2008: 265) and a largely ad-hoc approach to its use (Burns, Burnham and Rowley 2013; Persaud 2014). Where staff experience has been utilised to improve security, it has been at the expense of formal training: a study conducted on security issues in Darfur found that new workers had not

been given basic training and experienced staff has been expected to guide and look after novice workers, even though their experience was from other countries and not necessarily appropriate (Eckroth 2010).

The need to capture this knowledge is important for humanitarian organisations, which suffers a high-staff turnover compared to other lines of work (Richardson 2006). This has been identified as a general weakness in knowledge sharing across multiple areas in the sector, including security (Richardson 2006; Emmens, Hammersley and Loquerico 2006; Darby and Williamson 2012). In a study conducted on reasons staff leave, one of the reasons highlighted was not the risk itself but the lack of training and inappropriate preparations to face such dangers (Emmens, Hammersley and Loquerico 2006). Therefore, if experience is not effectively converted into knowledge it cannot be used by humanitarian organisations to improve security training and preparations, which will itself continue causing a high staff turnover and loss of knowledge.

Training is Ineffective at Improving Staff Security

The systems-based approach has reduced training so that it focusses more on how to follow the procedures, rather than how staff can effectively assess and respond to risks themselves (Barnett 2004; Burns, Burnham and Rowley 2013; Persaud 2014). As such, field-based training is largely replaced with classroom activities (Barnett 2004; Persaud 2014) and many staff deploy into the field unprepared (Barnett 2004), with many staff not receiving any training at all (Egeland, Harmer and Stoddard 2011). Furthermore, training has generally become focussed on hard measures, such as how to respond to gunfire, grenades or minefields (Daudin and Merkelbach 2011; Bollentino 2006) at the expense of soft measures, such as communication skills, situation awareness and leadership (Persaud 2014). This results in staff being unable to assess the likelihood of harm themselves, nor elicit information from local communities, therefore becoming reliant on organisations security experts (Barnett 2004). This further reduces the ability of those in the field to be able to think dynamically about risk and act themselves, instead being reliant on the system to protect or guide them (Daudin and Merkelbach 2011; Bollentino 2008). In this sense, security becomes seen as a technical problem which can only be solved with technical expertise (Daudin and Merkelbach 2011) and training becomes introductory in nature (Brunderlein and Grassmann 2006; Bollentino 2006).

The difference in view is often made worse when organisations use external suppliers for training, which is increasingly common (Collinson and Duffield 2013; Burns, Burnham and Rowley 2013; Persaud 2014). These external providers are only able to give generic training

which does not incorporate staff experience (Barnett 2004; Persaud 2014), and the training often excludes any focus on the specific risk's workers may face (Brunderlein and Grassmann 2006; Eastman, Evert and Mishori 2016). There has also been a critique of how effective such training is, with security experts varying in experience level, many of whom have experience from the military or police which do not necessarily translate into the humanitarian context (Persaud 2014).

2.2.3 Linking Security Management and Knowledge Management

The triad of the conflict between procedures and experience, a lack of knowledge conversion and ineffective training highlight mismanagement in knowledge. The shift to the top-down approach has minimised the role of the individual (Beerli and Weisman 2016) and has made field workers dependant on the security systems, rather than able to think independently (Barnett 2004; Daudin and Merkelbach 2011; Bollentino 2008). However, a lack of focus on the knowledge of humanitarian workers has had three marked impacts:

- There is a conflict between what workers know to be effective and the procedures in place (Daudin and Merkelbach 2011; Collinson and Duffield 2013; Adams 2003);
- Field experience is not converted into knowledge for use within the organisation (Bollentino 2008; Darby and Williamson 2012; Buchanan and Muggah 2005); and
- Training is introductory in nature and does not effectively improve security (Barnett 2004; Burns, Burnham and Rowley 2013; Persaud 2014).

This inability to utilise experience and knowledge of field workers weakens the overall system (Brunderlein and Grassmann 2006; Bollentino 2008; Buchanan and Muggah 2005). This thesis poses a solution by linking these issues with the academic school of knowledge management.

2.3 Management of Knowledge to Improve Systems

The previous section discusses how the systems-approach has removed the individual aspect of security, which has limited the input from experienced staff on procedures and training particularly. This lack of utilising experience shows a flaw in knowledge management. Therefore, this next section shall discuss the literature on knowledge management and how knowledge can be utilised effectively to improve systems.

Knowledge management is concerned with getting the right information, to the right people at the right time to effectively overcome problems or perform tasks (Shadbolt 2005). This requires the correct knowledge to be identified and utilised, which is directly linked with knowledge acquisition or creation (Burton et al. 1990; Roos, Slocum and von Krough 1994).

2.3.1 Types of Knowledge

All knowledge can be split into two broad categories: explicit and tacit (Nonaka and Takeuchi 1995). People can either use these types of knowledge in conjunction or separately (Eerikäinen and Puusa 2010). Effective knowledge management requires organisations to use them supportively. This section presents a definition of each as well as discussing how each type is traditionally identified and utilised.

Explicit Knowledge

Explicit knowledge is that which is easily codifiable; or can easily be collected, organised and shared (Nonaka 1991). It is often referred to as *know-what* knowledge (Brown and Duguid 1998) and is concerned with facts or truths, or premises which are known to be true (Botha et al. 2008). For instance, the ballistic effect of a rifle round is explicit knowledge, as is knowing what to do should you be shot at. Explicit knowledge is easy to convey, such as by writing it down or telling it to someone else (Hélie and Sun 2010), which is commonly shared through manuals, guidebooks or other technical documents (Nonaka and Takeuchi 1995) as well as training (Brown and Duguid 1991)

Organisations will attempt to make as much knowledge explicit as possible as it allows them to maintain their competitive advantage (Nonaka and Takeuchi 1995). By eliciting knowledge from others it can be shared across the organisation, increasing output, allowing improved problem solving and ensuring optimal performance (Easterbrook and Nuseibeh 2000). This is an important consideration for humanitarian security regarding sharing information from one location to another, or from the field to the organisation levels.

Organisations will have a preferential focus on explicit knowledge, even though Brown and Duguid (1998) argue that it is only the baseline of effective work practice. Explicit knowledge has a greater focus however because of ease of sharing it across an organisation (Nonaka 1991; Nonaka and Takeuchi 1995).

Explicit knowledge is not the complete picture however and only goes so far to effective knowledge management within an organisation. The importance of explicit knowledge is sometimes downplayed (Brown and Duguid 1998), as it is seen as incomplete knowledge, and needs *know-how* knowledge, or tacit knowledge, to be effective: Polanyi (1958) stated that all knowledge is either tacit or based on it. This view has largely been challenged since the work of Nonaka (1991; 1994) and Nonaka and Takeuchi (1995), with the view now that the two knowledge types can be independent and supportive (Eerikäinen and Puusa 2010). On its own however, *know-what* knowledge is not the most effective means of aiding workers in completing tasks, rather becoming more efficient when combined with *know-how* (Brown and Duguid 1998). Using explicit knowledge requires more development of 'attentional resources' (Hélie and Sun 2010: 997) such as reading and understanding manuals and guidelines or attending training or refresher courses, which are frequently neglected in the humanitarian sector (Persaud 2014). Here we can view explicit knowledge as the above water portion of an iceberg, with a large mass sub-surface which cannot be easily observed though is none-the-less present and important, which constitutes tacit knowledge (Sveiby 1997).

Tacit Knowledge

Tacit knowledge is developed by doing rather than learning and is referred to as *know-how* (Brown and Duguid 1998). It is based on "highly subjective insights, intuition, and hunches of an individual" (Nonaka 1991: 164) and is embedded with experiences that can only come with doing a job (Brown and Duguid 1998).

Tacit knowledge is often related to skills and abilities and applying knowledge to real-world problems to create solutions (Botha et al 2008: 24). It is wholly embodied by the individual, as opposed to explicit knowledge which can be organisational wide. Though this type of knowledge is difficult to identify, it can be observed when an individual shows skilful execution in a task (Fleck 1996). Building on Nonaka's description of highly subjective insights, intuition and hunches (Nonaka 1991; 1994), Fleck (1996) expands this by stating that it also refers to the perceptions of a situation and a level of understanding of subtle cues which are often difficult to articulate (Fleck 1996; Virtanen 2010).

Tacit knowledge is harder to articulate than explicit knowledge, and therefore harder to identify, analyse and record (Polanyi 1966a; Nonaka and Takeuchi 1995; Blackwell and Gamble 2001). This coined the well-used phrase in knowledge management: "We know more than we can tell" (Polanyi 1966a: 4). The reason this knowledge is harder to communicate is that the individual

possessing it is often unconscious to the fact; this is most apparent for knowledge that is well-learned and well-used, such as that used daily (Kujala 2003; Blackwell and Gamble 2001). For instance, drivers may possess a wealth of tacit knowledge, such as gut instincts on roads to take or not take, what the traffic tells them about the situation on the road, or even what gear to select when facing difficult terrain but because they act upon this tacit knowledge instinctively, it would be hard to pass this onto another person. Difficulty in sharing tacit knowledge is further experienced in fields where organisation activities and individual tasks are constantly changing; difficulties arise as new workers cannot learn from experienced workers, who are also unsure of how changes affect them (Eerikäinen and Puusa 2010). Such an example applies to the humanitarian sector, where both the security situation is constantly changing coupled with a high staff turnover creates issues in sharing tacit knowledge.

Tacit knowledge can be viewed on a spectrum of how easy it is to express. This knowledge can range from that which can be elicited using the correct techniques and context to knowledge that cannot be elicited and remains tacit (Polanyi 1966a). Ambrosini and Bowman (2001) defined the concept of 'degrees of tacitness', which moved knowledge away from just explicit/tacit, expanding it into different levels of 'tacitness' (see Figure 2.1).

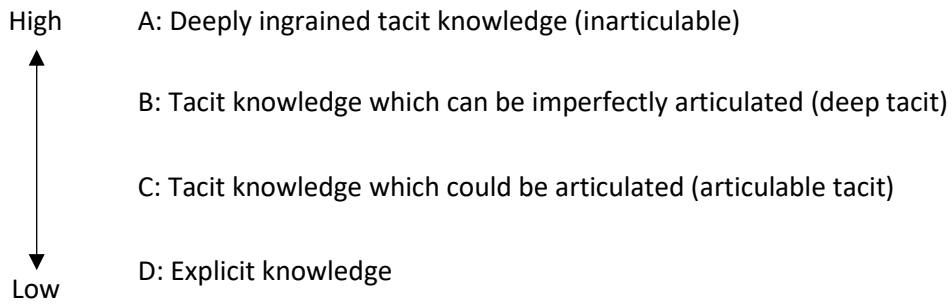


Figure 2.1: 'Degrees of Tacitness' (adapted from Ambrosini and Bowman 2001: 816)

Ambrosini and Bowman's (2001) work has been supported by other authors (Busch, Dampney and Richards 2002; Bloodgood and Chilton 2007; Milton 2007; Busch 2008; Tounkara 2013). Explicit knowledge can be elicited through straightforward methods, such as interviewing (Milton 2012). However, some knowledge remains tacit as the right questions are not asked (Ambrosini and Bowman 2001). This type of knowledge is known as 'articulable tacit knowledge' ('C' in Figure 2.1). To elicit this, questions need to relate knowledge to what Polanyi (1966a) stated as a 'context' or being able to link knowledge with an experience or problem (Busch, Dampney and Richards 2002). Busch (2008) conducted extensive research on the use of scenarios, which are effective at eliciting articulable tacit knowledge through both interviews

and questionnaires. The other type of tacit knowledge which can be elicited ('B' in Figure 2.1) requires alternative methods to elicit beyond interviewing (Ambrosini and Bowman 2001). Milton (2007) presents the most comprehensive review of methods to elicit 'deep' tacit knowledge, including the use of scenarios and process mapping, which are discussed further in Study 3 and 6 respectively. The last form of tacit knowledge ('A' in Figure 2.1) is knowledge which experienced individuals will never be able to articulate.

Tacit knowledge is often neglected by organisations however, both due to its subjective nature (Virtanen 2010), but also because of the time and effort it requires formalising it and become useful across the organisation (Johannessen, Olaisen and Olsen 2001). Eliciting tacit knowledge is often a long process, in which you first must make the individual possessing the knowledge aware of it in the first place; or make the subconscious conscious (Kujala 2003). Such a process cannot be done in traditional interviews, but rather takes time and investment, and sometimes observing subjects in their natural environments (as explored by Kujala 2003; Bly 1997; Wilson 1995). This is a time intensive process many humanitarian organisations cannot afford to take; organisations prefer to get staff in the field with minimal training so they can begin having an impact (Barnett 2004; Persaud 2014). Ready known knowledge is easier to train in this regard. This area should not be neglected however, and new knowledge should be created. Claus (2015) compared NGOs to other key sectors, such as the financial services, education and energy sectors. From her findings, she noted that NGOs are most likely to work in high-risk environments and have experience that could improve their, and others, security: "Because of the nature of their work and the countries in which they operate, NGOs have a wealth of tacit knowledge…that can be tapped into" (Claus 2015: 10). However, NGOs are less likely to utilise such knowledge effectively (Claus 2015).

2.3.2 Knowledge Sharing and Management

Organisations maintain their competitive advantage when they capture and share knowledge across the organisation (Nonaka 1991; Nonaka and Takeuchi 1995; Svieby 1997). Organisations which deal with changing conditions regularly should ensure that there is an efficient system to create and process knowledge regularly (Nonaka 1994). Knowledge is created when an organisation elicits tacit knowledge from experienced workers, converts it to explicit knowledge to be shared with others, who are then able to put this knowledge to work so that they then refine it to further tacit (Nonaka 1994). This formed the basis for the 'SECI model'.

The SECI Model

Nonaka (1994) developed a model to express how an organisation can create and convert knowledge between tacit and explicit. The SECI model is named after the 4 methods of knowledge conversion:

- Socialisation (from tacit to tacit): when one person who possesses knowledge passes this on to another, such as through observations, imitation and practice (Nonaka 1991). A prime example is the use of apprenticeships (Johannessen, Olaisen and Olsen 2001). Here, "knowledge is the by-product of experience and interaction." (Botha et al 2008: 28). Though this acts as a means of sharing knowledge, it cannot be captured, such as in writing, therefore the organisation cannot easily leverage this knowledge to benefit others (Nonaka 1991);
- Externalisation (from tacit to explicit): when experienced workers can communicate the foundation of their knowledge to others (Nonaka 1991). By capturing tacit knowledge and converting it into an explicit form, it can be "shared and exploited by others in the company." (Botha et al 2008: 28).
- Combination (from explicit to explicit): by taking separate existing knowledge and combining them together, individuals can create a new whole. Though this knowledge can bring a new perspective, it does not extend the knowledge base (Nonaka 1991);
- Internalisation (from explicit to tacit): when new knowledge, created from making tacit knowledge explicit, is shared throughout the company, such as in new training, manuals or guidelines. Workers will then process this knowledge into their own practices, and start to "broaden, extend and reframe their own tacit knowledge." (Nonaka 1991: 166).

  Figure 2.2 (overleaf) is a visual representation of this process (Nonaka and Takeuchi 1998). The arrows around the box represent processes undertaken by an organisation, which are specific processes. For instance, providing training allows workers to Internalise explicit knowledge so that it becomes tacit. The spiral in the middle represents the individuals' process, in which knowledge is constantly being converted refined through these processes naturally (Nonaka 1991; Nonaka and Takeuchi 1994 and 1998). Nonaka and Takeuchi (1995) posed that the SECI model overcomes the shortcomings of both top-down and bottom-up knowledge models, creating the term middle-up-down management.

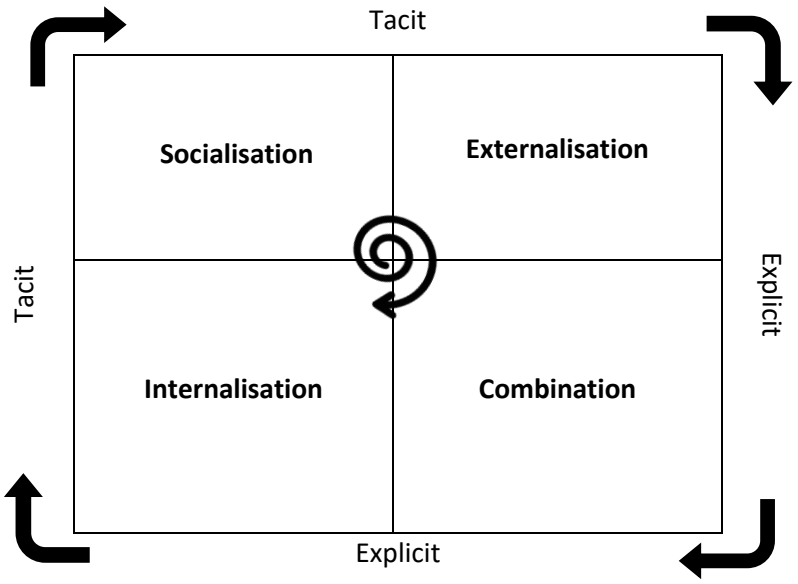


Figure 2.2: The SECI Model (adapted from Nonaka and Takeuchi's 1998)

2.3.3 Knowledge Elicitation

Implementing effective knowledge management using the SECI model means making tacit knowledge explicit; that is, "to convert tacit knowledge into explicit means finding a way to express the inexpressible." (Nonaka 1991: 166). This requires effective knowledge elicitation- the methods to identify, capture and code the knowledge (Shadbolt and Smart 2015; Milton 2007) and for the correct selection of participants who can provide useful and usable knowledge (Burton et al. 1990, 1995; Burton and Shadbolt 1995). This section examines the effective means of eliciting useful knowledge from domain experts and defines what this means in relation to top-down/bottom-up systems.

Expertise

Domain experts are the prime focus for knowledge elicitation projects because of the richness of the data that can be collected and their insight into the phenomenon (Shadbolt and Smart 2015). However, domain experts have different natures depending on their job roles, years' experience, the problem-solving environment they work with, as well as the state of knowledge they possess ("both its internal structure and its external manifestation") (Burton and Shadbolt 1995: 423). Understanding these characteristics is an important step as it allows both the selection of the appropriate experts and the use of the correct methods. (Shadbolt and Smart 2015; Shadbolt 2005).

Burton and Shadbolt (1995) posed the taxonomy of three levels of domain expert: the academic, practitioner and samurai expert:

- Academics regard knowledge in a structured and organised manner. They have a strong theoretical understanding of the domain and are often tasked with explaining, clarifying and teaching others. Their knowledge is explicit in nature and can easily be expressed. Though they are remote from the problem-solving, they believe that the solution is through the appropriate application of theory. Contrary to the common usage, academics here is not solely related to those working in academia;
- Practitioners develop expertise through facing the problem regularly, even day-to-day. Their knowledge is tacit and related to specific problems and events. Theoretical knowledge is lacking though practical, heuristic knowledge is strong. They are used to problem-solving within the constraints and resource limitations reality presents;
- Samurais are performance experts; whose responses are automatic are performed to achieve optimal performance.

The traditional view is that security managers and advisors, or Subject Matter Experts, are the domain experts (Brunderlein and Grassmann 2006; Barnett 2004; Persaud 2014). However, Burton and Shadbolt's (1995) taxonomy would allow the assumption that field workers can also be experts, because of their day-to-day ability to problem-solve and overcome issues (Cooke 1994). Therefore, this thesis shall assign the category of academic expert to security SMEs, because of their role training others, designing procedures and their ability to advise on the theoretical solution. Field workers who possess relevant experience (years' worked in high-risk environments) shall be classed as practitioner experts, because of their day-to-day problem solving and experience developed by overcoming issues on-the-ground.

Methods

Not all research methods are suitable for knowledge elicitation (Hoffman 1987). A reflection on the type of expert will define which methods are most applicable. For instance, those classed as academic experts will be able to clearly explain the theory as it is explicit in their knowledge, and therefore interviews may work best (Shadbolt and Smart 2015; Milton 2007). On the contrary, practitioner's expertise is routinised and internalised so is tacit, so it must first be identified before it is drawn-out with methods that allow an application, rather than description, of knowledge (Burton et al. 1995; Shadbolt and Smart 2015).

Knowledge elicitation methods can be separated between two categories- natural and contrived, or specialist (Milton 2007 and 2012; Shadbolt 2005; Burton et al. 1995; Burton and Shadbolt 1995). Natural techniques are those traditionally associated with research, such as semi- or un-structured interviews (Shadbolt 2005). Contrived, or specialist, methods are those unfamiliar to the expert, which probe the experts for deep tacit knowledge (Milton 2007).

There is a consensus between authors that traditional research techniques, such as semi- and un-structured interviews are best for eliciting explicit knowledge (Burton et al. 1995; Burton and Shadbolt 1995; Shadbolt 2005; Milton 2007; Milton 2012; Shadbolt and Smart 2015). Eliciting tacit knowledge is often harder however (Milton 2007; Johannessen, Olaisen and Olsen 2001; Botha et al. 2008). Hoffman and Lintern (2006) suggest methods to elicit tacit knowledge act as 'scaffolds' or frameworks in which the expert can convey their knowledge. The aim is not to 'pull' the knowledge from them but provide a means of them articulating the knowledge (Hoffman and Lintern 2006). One means of doing this is having the expert express the knowledge visually, rather than verbalising it, which is a more natural means of communicating complex thoughts (Barton 2015; Milton 2007). Milton (2007) provides a taxonomy of methods in relation to the type of knowledge it is suited to eliciting, illustrated Figure 2.2 below.

Figure 2.2: Techniques for Eliciting Knowledge Types (Milton 2007)

2.3.4 Knowledge Management Summary

For companies to maintain their competitive advantage, they must ensure they are continually creating knowledge (Nonaka 1991; 1994). This is done by managing two types of knowledge- explicit, which is easily express know-what, and tacit, which is harder to express know-how. The SECI (Socialisation-Externalisation-Combination-Internalisation) model presents an effective means of doing this. Several theoretical means to elicit knowledge have been explored. The chapter presents SMEs as academic experts and experienced field workers as practitioner experts (Burton and Shadbolt 1995). The methods best suited to these two groups differ- academic experts respond best to natural techniques such as interviews, whereas practitioner experts respond better to specialist, contrived techniques (Milton 2007).

2.4 Conceptual Framework

This chapter draws together concepts from two areas- humanitarian security management and knowledge management. Applying knowledge management theory to the humanitarian sector has not previously been done. The following section provides a conceptual framework of how these two could areas interlink, which provides a basis for this research.

Figure 2.3 (overleaf) shows how the two areas of literature studied can link together. Security systems are traditionally top-down, led by security experts, who have been defined as the academic experts within this research. Security experts conduct risk analysis, which in turn informs the security procedures and training for field workers. Field workers then conduct the work, engaging with locals' communities, working within the environment. Within the environment is an element of risk, which field workers must deal with on a day-to-day basis. This defines them as practitioner experts within this research.

The conceptual framework links security literature with knowledge management literature by showing the route in which knowledge can go from the bottom of the system to the top. By identifying tacit knowledge in field workers, this can be elicited using the correct knowledge elicitation methods and knowledge creation methods, to be utilised at the top of the system in updating risk analysis, procedures and training.

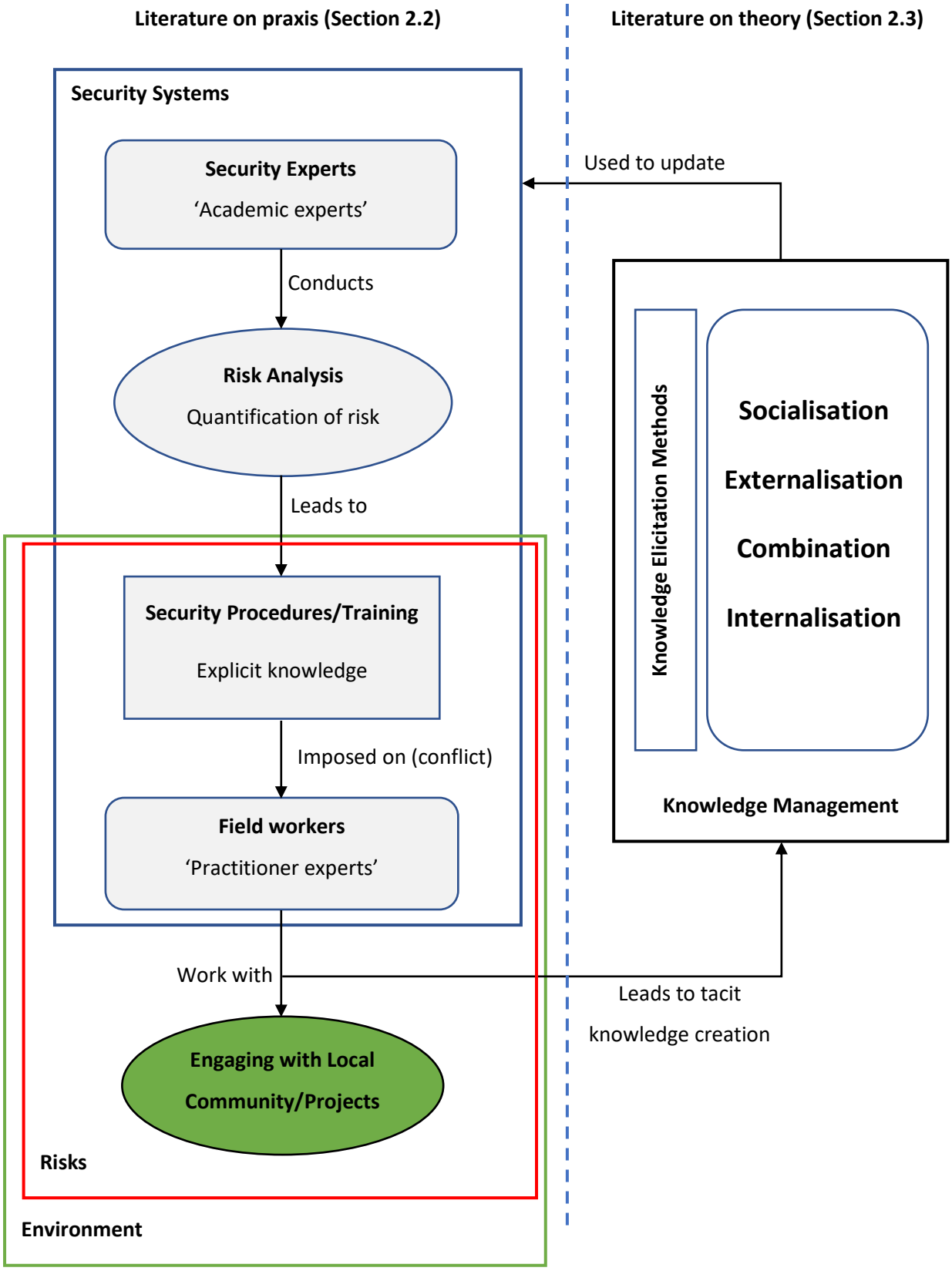


Figure 2.3: Conceptual Framework

This chapter presents literature from two different fields. The literature in Chapter 2.2 on security management in the humanitarian sector is largely on praxis, or what is done on-the-ground in high-risk environments. The literature from Chapter 2.3 on knowledge management is theoretical, based on the literature of the different types of knowledge (explicit and tacit) and methods for eliciting expert knowledge.

Top-down security systems do not account for the individual knowledge field workers develop by dealing with potential risk on a frequent basis (Daudin and Merkelbach 2011; Collinson and Duffield 2013; Beerli and Weissman 2016). As such, a wealth of tacit knowledge developed by field workers working in high-risk environments is not effectively converted into explicit knowledge to improve the system (Claus 2015; Bollentino 2008; Daudin and Merkelbach 2011; Darby and Williamson 2012; Burns, Burnham and Rowley 2013). Notably, this leads to conflict with security procedures (Barnett 2004; Daudin and Merkelbach 2011; Collinson and Duffield 2013; Beerli and Weissman 2016) and training being inappropriate to the operational environment and only introductory in nature (Barnett 2004; Brunderlein and Grassmann 2006; Bollentino 2006; Daudin and Merkelbach 2011; Burns, Burnham and Rowley 2013; Persaud 2014).

Knowledge management approaches prove a possible solution to this issue. Organisations which can utilise both explicit and tacit knowledge they are better placed to solve problems and improve work practices (Nonaka 1991). Nonaka and Takeuchi (1995) created a model for knowledge creation and sharing known as the SECI model. It poses 4 ways of eliciting, sharing and converting tacit and explicit knowledge. Applying this model to humanitarian security will allow better usage of individual tacit knowledge as well as poses an original contribution.

Effective knowledge management requires the identification and selection of experts (Burton and Shadbolt 1995; Shadbolt 2005; Shadbolt and Smart 2015). In this research, security experts are defined as ‘academic experts’; those that hold theoretical, explicit knowledge and can express it easily (Burton and Shadbolt 1995) which is best elicited using natural techniques, such as interviews (Milton 2007). Field workers are classed as ‘practitioner experts’; those who face problems daily and develop tacit knowledge through experience (Burton and Shadbolt 1995). This knowledge is best elicited using specialist techniques, such as mapping methods (Milton 2007).

Eliciting tacit knowledge from field workers allows it to be converted into explicit knowledge and used by security experts to update and tailor the system to the problems, or risks, faced by field workers. This latter group have a wealth of tacit knowledge which could be used by others and passed to less experienced workers through tailored training.

2.5 Chapter Summary

This chapter has examined two areas of literature. The literature on humanitarian security shows that the sector has moved to a top-down system which revolves around explicit knowledge. This neglect tacit knowledge of experienced field workers, which is undermining and weakening the system and therefore security overall. Knowledge management theory provides solutions for utilising this knowledge more effectively, and the SECI model provides a framework for tacit knowledge to be converted into explicit knowledge, as well as shared with others. This could potentially improve security management systems. The chapter has also discussed how knowledge is elicited, with the identification is SMEs and field workers as academic and practitioner experts respectively. The methods for each differ, which provides a theoretical underpinning for selecting the individual study methods in Chapter 4 and 5.

The chapter presents a conceptual framework, which links literature on security systems and knowledge management. In doing so, it presents a novel contribution by identifying a way the two areas can be supportive. Traditional security thinking has neglected the interaction between humans and systems. Linking concepts from knowledge management and applying them to weaknesses in current security management systems provides a possible explanation as to why such weaknesses exist. A failure to account for knowledge developed through experience causes staff to not follow procedures and training. Knowledge management literature states this is because staff will follow their own beliefs and experience if systems do not reflect what they know to be true. This is especially true with experienced workers who have had time to develop knowledge by problem-solving on a regular basis. Identifying and eliciting experience-based knowledge is challenging however, though several methods have been discussed. These methods often diverge from traditional research methods, utilising contrived techniques to draw knowledge from participants. No such techniques have been applied in the studies identified during the literature review, meaning such an approach would provide a novel contribution to the field.

3. General Methodology

3.1 Chapter Overview

This chapter presents the overall methodology of the research. Research design and approach are discussed as well as a rationale as to why they were chosen. As this thesis seeks to assess methods for knowledge elicitation, this chapter also discusses the criteria which will be used for ensuring trustworthiness as well as assessing the methods used. The approach taken to accessing a sensitive domain has been discussed. Lastly, the limitations of the research are stated.

3.2 Research Approach

The research took an inductive approach, over a deductive one. While there are warrants to choosing a deductive approach, it suffers from the weakness that the conclusion must lay within the statement and therefore the statement must be openly known by those that are making them (Wilson 2010). If a statement is not known by a subject, then it is deduced to be untrue. This is known as 'closed-world assumptions'; any statement which is true is also known to be true, and vice versa (Kelley 2014; Fox 2008). It is difficult to use deductive reasoning when all premises are not known (Babbie 2011), which is the case for this project looking at tacit knowledge on operational security where established theories and premises are lacking. Deductive research does produce very strong and reliable conclusions, best suited to quantitative research where variables and premises are already known and previously tested (Lewis, Saunders and Thornhill 2009).

Inductive research is better suited to new or unexplored fields, and as such its greatest strength is that is can generate theory where little original data exists (Babbie 2011). Though this theory may be disproven later, it provides a base for discussion and for new theories to arise, or for the original theory to be solidified by deductive reasoning (Kelly 2014). This process of generating theories, proving or disproving them and replacing them with rival theories allows the growth of knowledge (Fox 2008). As such, this makes deductive reasoning suited to this research where there is limited theory on knowledge management within security.

3.2.1 Inductive Research

Inductive starts with a narrow scope, often where little theory exists, and through gathering data identifies patterns and then generates a theory of why these patterns exist (Bell and Bryman 2011). In this way, general principles are developed from specific observations (Babbie 2011), which in turn allow the generation of a theory to explain why the principles exist (Wilson 2010).

The starting point for inductive research is collecting all relevant data around a specific topic, such as through interviews or observations (Fox 2008). This process allows the identification of patterns, as well as guiding further data collection (Babbie 2011). In this thesis, the initial data collection will be of explicit knowledge, which is easier to identify and research (Eerikäinen and Puusa 2010). Further pattern identification and data collection is conducted until a theory can be created to explain the patterns relevance (Fox 2008).

The main weakness of inductive reasoning is that it makes generalisations out of the specific, therefore meaning the conclusion, or resulting theory is a *likely* outcome, but the theory will not be true 100% of the time (Bell and Bryman 2011). This is because the theory is built upon non-exhaustive data, where such data is likely infinite or too large to be researched practically (Babbie 2011). It is therefore near impossible to collect exhaustive data on a specific topic, due to an overabundance of data. In this sense, inductive research creates a theory which is difficult to conclusively prove but very easy to disprove, as it only takes one case not conforming to the theory to cast doubt (Kelley 2014). For this reason, conclusions and theories from inductive reasoning are tentative and it can be argued that the only hold true for the setting the data was collected in (Babbie 2011). This is especially true when the theory may be applied in settings with several variables and factors (Fox 2008).

This thesis will follow an inductive research approach. The research seeks to collect data from both top-down security specialists as well as bottom-up field workers to ascertain as to whether security knowledge converges or diverges. This research is not testing a hypothesis but attempting to create one in order to fill a gap identified in the literature. As an inductive approach is being taken, much of the data collection will be qualitative (Babbie 2011).

3.3 Research Design

The research design outlined herein describes the overall approach to how the research was conducted, and how the different aspects were integrated together (Creswell 2009). This chapter does not describe the methods used however, which are described within each study.

3.3.1 Overall Approach

The research situates itself within Human Factors, which seeks to understand the interactions between humans and the systems they operate within (Stanton 2005). This makes it appropriate for studying the interaction between field workers and the systems design to keep them safe. A focus on the individual users allows the system to be improved from the bottom-up, or generally more holistically (Baber et al. 2013). The methodological approach and the methods chosen are aligned to a Knowledge Elicitation methodology, which allows the identification and capture of knowledge necessary for a system to work (Hoffman 1987). Knowledge Elicitation is not set within one academic field, though has a strong connection with Human Factors, each developing the others scope of practice and body of knowledge (Hoffman 2008).

The approach taken to the research followed the emergent designs approach (Given 2008a; Pailthorpe 2017). It was chosen as the literature provided no clear theory on knowledge which exists in the humanitarian sector, so the research would have to adapt to the findings from each level of inquiry. This would also allow the phenomenon to be viewed and tackled from multiple, complementary angles (Milton 2012). Emergent designs lend itself to qualitative research, with the need to be flexible being an important characteristic (Merriam and Tisdell 2016). This flexibility allows the collection of data, the selection of methods and even the design to change as the research progresses and as themes emerge (Marshall and Rossman 2011).

3.3.2 Qualitative Research

Data Collection

Qualitative research was chosen as it bests suits descriptive and exploratory designs (Creswell 2009). The collection of qualitative data is best suited to projects which investigate how a phenomenon affects people (Cochran and Quinn 2007), allowing the collection of data on experiences and thoughts of those involved (Harwell 2011). Whilst quantitative seeks to test or measure, qualitative research seeks to discover and make sense of a phenomenon (Denzin and

Lincoln 2005). Through such research, the data leads to thick descriptions and the generation of theory, rather than the testing of existing theories (Creswell 2003).

Qualitative research is considered more subjective than quantitative research, and therefore its trustworthiness is challenged (Guba 1981); it is argued that the research is tied to the researcher, who themselves is the central tool in the research (Denzin and Lincoln 2000; Creswell 2003). All qualitative research must acknowledge that another researcher can undertake the same study and produce different results (Silverman 2011). Measures to improve the trustworthiness, as well as provide a method to replicate the study in the way it was conducted in this research, is provided in Section3.4.

As a form of data, its main weakness is that it is difficult to measure in terms of importance (Cochran and Quinn 2007). Methods exist to reveal the order of importance of data however, such as thematic hierarchies (Bernhard and Ryan 2000; Boyatzis 1998). Furthermore, the unstructured nature of the data allows for misunderstandings between the researcher and participants (Cochran and Quin 2007), especially whilst studying security which is a subjective field (Rothchild 1995). The research must use complementary methods to triangulate data as well as utilising data collection methods which seek clarification and feedback from participants (Denzin and Lincoln 2005).

Thematic Analysis

Thematic Analysis is a means of analysing qualitative data through the identification of recurring themes (Braun and Clarke 2006) and then presenting them in a meaningful way (Delahunt and Maguire 2017). This analysis approach underlies most of the data analysis, both directly (Study 1, 2, 4, and 5) as well as more generally throughout; though each study describes the variety of thematic analysis used, it is discussed here more generally.

Thematic analysis is useful as an approach to qualitative research because of its flexibility in how data is analysed (Braun and Clarke 2006; Norris et al. 2017). This means it is highly suitable for projects which do not start with a theory or are exploratory in nature (Braun and Clarke 2013). It is also able to handle large data sets, which is expected in this research; thematic analysis follows a well-structured approach to synthesising data yet keeping its rich detail (King 2004). It does however have drawbacks in that it cannot be used to describe *how* things were said, only *what* has been said (Norris et al. 2017). Furthermore, its flexibility means it can be applied in an unstructured way (Norris et al. 2017). This will be limited by a detailed description of how the

thematic analysis has been conducted within each study; such an approach is seen as an effective method to improve replicability by other researchers (Holloway and Todres 2003).

Braun and Clarke's (2006) suggest 6-phases for conducting thematic analysis:

1. Familiarise with the data: this involves becoming immersed with the data, either through repeated read-throughs or listening to audio playbacks. Though a time-consuming process, it allows initial areas of interest to be identified;
2. Generate initial codes: this stage involves identifying recurring elements of the data. This process can either identify semantic codes (or explicit codes) or latent codes (those interpreted through by the researcher). This thesis shall look for semantic codes in Stage 1 and latent themes in Stage 2, which look for explicit and tacit knowledge respectively;
3. Searching for themes: once all data has been coded, it is sorted into different potential themes. This will naturally lead to the creation of different levels of themes, with main overarching themes and sub-themes beneath them. The end stage of this is a collection of main themes, sub-themes and the data segments which has led to their creation;
4. Reviewing themes: themes are refined, duplicates removed and those which do not have enough data to support them are removed. This also involves cross-checking themes with the data that has led to their creation and ensuring there is a logical link between them;
5. Defining and naming themes: themes are 'refined and defined' and named to give meaning to what they represent. It should relate to the data and make a meaningful contribution to the research;
6. Producing the report: the last step involves presenting the themes in a way that tells the story of the data. Trustworthiness can be increased by included relevant extracts of data.

Thematic analysis is inherently interpretive as the researcher controls what is and is not included (Braun and Clarke 2006). However, trustworthiness can be improved by including as much of the data as possible for the reader to understand how the themes have been generated (King 2004). This should be a balance between presenting enough information to show how themes have been created while not just presenting raw data, so the underlying themes are lost (Norris et al. 2017).

Each study uses thematic analysis differently, depending on the type of data collected. Details of how the thematic analysis was conducted is provided within the 'Method' section of each study.

3.3.3 Stage 1: Descriptive Design

Descriptive design seeks to describe a phenomenon as it exists (Creswell 2009). It is therefore well suited to describe explicit knowledge as it exists, which is easier to identify, research and analyse (Nonaka, Voelpel and Von Krough 2006). Though no studies currently exist specifically studying explicit knowledge, the literature review revealed that such knowledge is likely to exist: security is becoming systems-based (Brunderlein and Grassmann 2006) which require explicit knowledge to be readily transferable (Nonaka and Takeuchi 1995). Furthermore, there were multiple references to manuals, procedural documents and training in the literature review, which all form explicit knowledge.

Descriptive designs yield thick descriptions of the phenomenon being studied and can present recommendations for improvements (Merriam and Tisdell 2016). They also allow the identification of the important concepts and themes within the data, often paving the way for complementary types of research (Marshall and Rossman 2011). Furthermore, the depth of the data collected allows the identification of alternatives themes secondary to the main research focus (Creswell 2009). These warrants of descriptive research would allow a thick representation of the current explicit knowledge on security requirements.

3.3.4 Stage 2: Exploratory Design

Exploratory design aims to investigate a phenomenon where little is known (Creswell 2009), so is suited to investigate tacit knowledge, which is harder than explicit knowledge to identify and elicit (Nonaka and Takeuchi 1995). The focus of this stage is to explore the phenomenon so that knowledge or concepts can be identified and defined, which is suited to exploratory design (Merriam and Tisdell 2016).

Furthermore, the studies undertaken are designed to not only identify tacit knowledge but identify the knowledge that exists and its interactions and relationships with the system overall. This would develop a grounded picture of the phenomenon from an alternative perspective to Stage 1 (Marshall and Rossman 2011). Exploratory study design often uses smaller sample sizes so that researcher can be more focussed and go beyond the basic description of descriptive studies (Merriam and Tisdell 2016; Silverman 2011)

Exploratory research would allow more flexibility so that methods could be tailored to elicit tacit knowledge from the end-users and present these as new concepts to compare with Stage 1.

3.4 Analysis of Methods

Historically, the trustworthiness of qualitative research has always been challenged by positivist researchers (Guba 1981; Lincoln 1995). However, frameworks have been created to improve the trustworthiness and credibility, which are now becoming well respected and used by social science researchers (Lincoln 1995; Silverman 2011). This section outlines both the methods taken to establish credibility in this research and the methods taken to analyse the individual studies. Analysing individual studies not only increases the trustworthiness of the inquiry (Annett 2005; Wilson 2005) but is also necessary and useful for human factors research which sits between academia and praxis (Stanton 2005; Milton 2012). In this way, it allows an understanding of both how the studies contribute to literature as well as the real-world application (Stanton 2005; Annett 2005).

The importance of establishing trustworthiness is not just an academic one: Harmer and Schreter (2013) identified the current issue of a lack of rigour in the humanitarian sector which hampers the development of security thinking. The analysis of the studies will therefore help establish how the methods can be developed and used by both academic and practitioners. This will allow an understanding of their use in both future knowledge elicitation research as well as acknowledging the limitations of each method, allowing an identification of which domains they are best suited (Burton et al. 1990).

3.4.1 Establishing Trustworthiness

Several authors have posed methods of establishing trustworthiness in qualitative inquiry (Guba 1981; Lincoln 1995; Denzin and Lincoln 2000; Given 2008b; Silverman 2011). It has become a central pillar to any qualitative research, which is emphasised even more so in exploratory designs which are not guided by previous research (Lincoln 1995). This project uses the synthesis provided by Shenton (2004) to ensure trustworthiness, which condenses the 4 well-accepted constructs first posed by Guba (1981) and developed further by Guba and Lincoln (1985).

Credibility

Credibility is concerned with ensuring the findings are a true reflection of the research which has been conducted (Shenton 2004). Denzin and Lincoln (2001) state that credibility is central to ensuring trustworthiness in qualitative research. Several methods posed by Shenton (2004) have been adopted:

- Well established research methods have been chosen, and the specific formats followed have been documented. This has been followed through even in the latter studies which use less common methods to elicit tacit knowledge; well documented and proven techniques will be used throughout;
- A familiarity with the field under scrutiny has been developed, both through the researcher's professional involvement as a consultant but also academically through the studies. The build-up from descriptive in Stage 1 allows a deeper theoretical understanding to be developed to the exploratory design in Stage 2 where the phenomenon of tacit knowledge is explored in-depth;
- Triangulation has been used to understand the issue from multiple angles and compensating for weaknesses inherent to certain methods. Each stage uses three complementary methods which look at the phenomenon in different ways;
- Methods to promote honesty have been used, including the opportunity to those contacted to refuse to be part of the study as well as the ethical basis of the research being stressed from the start prior to data collection. This form of preventative measure reduces the possibility of participants lying during data collection. This is further supported with iterative questioning, in which the participants are asked to confirm information provided and information provided is rephrased later in the data collection session. This necessitates training and practice in the methods used but allows more transparent and honest data;
- Thick description has been used to provide detail on the results and how they have helped form the conclusions. Though this method is often lengthy, it allows readers to understand the way in which the data has been synthesised to create the findings.

Shenton (2004) suggests other methods which have not been deemed feasible for this project, namely:

- An analysis of past findings cannot be conducted as no similar projects have been conducted in the sector;
- Random sampling could not be achieved as specific samples were required to ensure appropriate data was elicited (i.e. for the latter studies, participant experience level was key to their recruitment);
- Though member checking was initially sought after, no achievable means were identified and was not used: it was not possible to convene a panel of experienced SMEs or Field workers who were not involved in one form of data collection.

Transferability

The ability to transfer results to groups wider than the sample studied is an important aspect of both qualitative research (Silverman 2011) as well as human factors methods, which are inherently practitioner focussed (Wilson 2005). In order to achieve transferability, this thesis aims to provide thick descriptions of the results, which allows the reader to draw their own conclusions of how the results can be transferred (Shenton 2004). It is also necessary to provide a full account of how the data was collected, and the approach taken, including inclusion criteria, the methods used to collect data, the number of sessions conducted and how long these took (Guba 1981; Shenton 2004), which will be included in each study.

Dependability

While quantitative, positivist research is concerned with quixotic and diachronic reliability, or how the data collection will yield the same results every time, even over time periods (Silverman 2001), qualitative research is mindful that the phenomenon under scrutiny is often constantly changing (Shenton 2004): when viewed through an interpretivist philosophy, the angle of approach will change the results further (Lincoln 1995). Qualitative research can only claim to present a view at the given time the data was collected (Shenton 2004). Instead, qualitative research aims to provide a 'prototype model', allowing the same methods to be employed by other researcher, understanding that the same conclusions may not be drawn (Shenton 2004).

In order to show dependability each individual study shall include detail on the methodological underpinning of the data collection method, an analysis of the data analysis method, as well as a review of how effective the method was (Shenton 2004).

Confirmability

Qualitative research cannot rely on the objective methods used by positivists as the collection and processing of data revolve around the researcher (Shenton 2004). Researcher subjectivity and bias can be the biggest effect on the trustworthiness of qualitative research (Denzin and Lincoln 2000). The use of triangulation in data collection is an important step in reducing bias (Shenton 2004). This thesis uses triangulation of methods, using a range of complementary methods within and between Stage 1 and 2.

As with the other sections, detailed descriptions of the procedure taken to collection and analysis of data improves confirmability and is found in the account of each study, which allows other researchers to scrutinise how the data was collected and analysed (Shenton 2004).

3.4.2 Criteria for Analysing Studies

Several authors have suggested criteria for analysing methods used in human factors inquiries (Wilson 2005; Dane 1990; Robson 2002). Stanton (2005) argues that analysis against criteria is an essential part of the methodological design and reporting. Wilson (2005) suggested 8 criteria for analysing methods used; not all will be applicable, and the researcher must make a pragmatic decision. The following 4 areas have been chosen for the discussion of each study, combining both Wilsons (2005) criteria as well as the above recommendations on trustworthiness.

Elicitation of Knowledge

Reviewing the knowledge elicited and how it related to SECI model's four forms of knowledge transfer (Socialisation-Internalisation-Combination-Externalisation) (Nonaka 1994) helps to fulfil research objective 1: 'Review the academic literature on operational security to explore explicit and tacit knowledge and identify gaps to take forward in the thesis.' It also allows a reflection of the appropriateness of the method used and whether it collected the data it set out to, relating to the notion of credibility (Silverman 2011; Denzin and Lincoln 2001).

Utility

Human factors methods are designed to not only produce academically relevant material but also that which can be used in or used to tailor practical solutions (Stanton 2005). This reflection will provide a review of how the study's findings can be used in praxis as well as how it helps develop the body of literature academically. Furthermore, by providing recommendations it is necessary to review the transferability of the findings beyond the sample studied (Shenton 2004), thus providing a reflection on trustworthiness.

An assessment of the application will also allow an understanding of how time and resource intensive the method is, which is a common reason tacit knowledge is ignored by organisations (Johannessen, Olaisen and Olsen 2001). This will cover the resources required and whether the cost (time and financial) was acceptable for the output (Wilson 2005)., as well as issues encountered and how these may differ in other research (Silverman 2011).

Such a reflection also reviews the notion of dependability, answering whether if the same methods, participants and analysis was conducted would the same results be reached (Shenton 2004).

Sensitive Domain Issues

A reflection on accessing the sensitive domain and the issues encountered helps answer research objective 2: 'Identify a means of accessing and collecting data from a sensitive security domain'. In doing so, it provides critical reflection on what Wilson (2005) termed acceptability and ethics: both whether the methods were acceptable to the participants in terms of time taken from them as well as how the method limited the potential negative impacts on the participants.

Accessing participants was identified as a potential issue in sensitive domains, which is discussed later in this chapter. A reflection on the effectiveness of recruiting appropriate participants will also be provided which aids future research.

Development of Method

Wilson (2005) stated that a critical reflection of the method applied allows the identification of how other methods can be used to complement it, as well as identifying how they can be developed to provide better results (Stanton 2005). This section reflects on how the method can be better utilised, areas where it can be improved, as well as providing a reflection on the shortcomings and their potential effect; the latter also improves the critical reflection on the dependability, and therefore trustworthiness, of the method (Shenton 2004).

3.5 Accessing Sensitive Domains

The lack of literature on security in the humanitarian sector is not only down to the relative youth of the field as an academic discipline, but also due to the way humanitarian organisations protect such information. Humanitarian organisations protect what information is available publicly both to ensure the security of their staff and operations but also because the reality of programming is far from optimal and would reveal potential failings in management and practice (Harmer and Schreter 2013). Such issues underpin border sensitive research, limiting the information available for secondary study as well as the data which can be collected through primary methods (Barnard, Gerber and McCosker 2001). The following chapter discusses the sensitive domain issues encountered during this research.

3.5.1 Sensitive Domain Issues in the Humanitarian Sector

Though sensitive domains are often associated with health research or that involving children (Sieber and Stanley 1988; Cowles 1998), Lee (1993) uses an extended definition to include any

domain which includes three characteristics: an intrusive-threat, where the research may cause strong emotional responses from participants; the threat of sanctions, where participants fear that in revealing information there will be repercussions on them, or a political threat, in its broadest sense where the information revealed can be used for negative purposes by powerful people or organisations. These will be discussed in relation to the literature on the humanitarian sector.

Intrusive Threat

An intrusive-threat is any subject which is highly personal to participants and has the potential to cause a negative emotional response (Cowles 1998). Such typology is fitting to topics in which death and traumatic experiences are discussed, especially if the participant has been directly involved or has emotional links to those involved (Lee 1993).

To highlight the prevalence of death and trauma, between 2007 and 2016 there was a mean of 104 deaths a year in the humanitarian sector (Czwarno, Harmer and Stoddard 2017). It is not just death itself or major attack against the participant themselves which can cause strong emotional reactions, but the experience of being in a developing country, hostile environment or post-disaster setting can have negative emotional effects as well (Brewer 2017). Such emotions can be brought up during research, therefore researching security is likely to pose an intrinsic threat as it deals with death and trauma by nature of the subject.

Threat of Sanction

Where participants feel they will face repercussion because of what they disclose, such as rules they have broken, or wrong-doings committed, Lee (1993) states this poses a threat of sanction, which limits what participants want to say openly.

As the humanitarian sector has moved to a systems-based approach, a greater number of rules have been imposed on field workers (Brunderlein and Grassmann 2006). These rules give management the power to impose disciplinary procedures on staff who go against the security measures (Harmer, Haver and Stoddard 2010). However, these remove the human aspect of decision making, meaning staff could face disciplinary for taking actions that were appropriate for the time and place but were contrary to the established rules (Beerli and Weissman 2016). This is even more likely, where those in the field have little input into the rules imposed (Daudin and Merkelbach 2011). Therefore, where participants admit to situations where they went against rules, there is the underlying threat of sanction in the form of disciplinary action.

Political Threat

A political threat takes the sense of the word in its broadest sense, referring to a threat posed by any large actors due to the findings of the research (Lee 1993). This is particularly the case where the research may reveal flaws in security measures which can then be exploited by aggressive actors (Brewers 1990). Therefore, participants are less likely to reveal information on operational weaknesses (Lee 1993).

The political threat comes in two forms for the humanitarian sector. The first is the potential weaknesses revealed through the studies which can be exploited by aggressive actors. This is particularly true with the rise in the kidnapping threat, where aggressive actors conduct surveillance against targets to identify weaknesses (Harmer, Stoddard and Toth 2013). The second political threat is the loss of funding from donors, for which many humanitarian organisations are dependant (Martin, Metcalfe and Pantuliano 2016). Humanitarian organisations limit the information they share about their capabilities and weaknesses; done so that donors are more likely to give them funding, which is generally considered scarce (Bollentino 2008). Such competition for funding means organisations often obscure the risks they are exposed to and are reluctant to be transparent in the information they do share (Caccuvale et al. 2016). Revealing information on security weaknesses can therefore cause a political threat, limiting transparency on operational security weaknesses.

3.5.2 Methodological Considerations to Enable Research

Several techniques have been applied to this thesis to access the domain and promote openness from participants. These have been selected to overcome issues researching sensitive domains.

Purposive Sampling

Clark and Kotulic (2004) suggest that limiting the number of participants involved in the research allows greater time to be spent developing relationships and trust. Purposive sampling is a common method in qualitative inquiry, where the quantity of participants comes second to the quality of the data they can provide (Cochran and Quinn-Patton 2007), with participants chosen because of their relevance rather than randomly (Bryman and Bell 2011). For each study, a selection criterion has been stated. This shows not only the purposive criteria but also acknowledges the participant's experience and expertise.

Recruiting Participants Through Snowball Sampling

One means of accessing participants in hard to reach domains is through a technique known as snowball sampling (Atkinson and Flint 2004). Through this method, participants are recruited through referrals made among a group that shares a similar setting or social network (Biernacki and Waldorf 1981). Each successive referral further expands the possible number of people reached by the researcher (Atkinson and Flint 2004). In this way, snowball sampling increases the possible sample size and accesses participants other techniques may not (Atkinson and Flint 2001). This method is predicted to be particularly effective in the humanitarian domain where there are strong informal networks (Schneiker 2015b; Kuhanendran and Micheni 2010).

One area of weakness with snowball sampling is that, due to the participants having a common connection, the results are of one interlinked group are not representative of the wider population (Atkinson and Flint 2001). To overcome this issue, the studies will use different snowball referrers so that different contact networks are accessed, acting as a form of triangulation among referrers (Biernacki and Waldorf 1981).

Ensuring Confidentiality and Non-Reactivity

The choice was made not to restrict this thesis completely, which would further exacerbate the issues around a lack of academically rigorous studies in the field (Harmer and Schreter 2013). Furthermore, this method does not alleviate participant fears and therefore limits the data they share (Clark and Kotulic 2004; Adam and Cox 2008). Instead, Kaiser's (2009) suggestions on how to ensure confidentiality whilst removing the possibility of deductive-disclosure (being identified from what participants say or their traits i.e. job title) have been followed. This allows the data to keep its rich description whilst ensuring privacy to those involved. Such an approach includes paraphrasing over verbatim transcribing if the data may reveal participant identities, allowing participants to decide what data can be used, and ensuring participants are fully aware of how their data will be used, who will have access to this, and how identities are kept confidential. These methods will be fully explained to participants prior to data collection starting (Adam and Cox 2008).

Building a Relationship

It is common for researchers to act as an external observer, staying separated and not divulging personal lives to participants (Creswell 2003). This builds into the concept of non-reactivity in that the researcher has as small an impact as possible on participants and the research (Wilson 2005). Sensitive domain research requires an alternative approach where researchers develop

trusting relationships with participants (Clark and Kotulic 2004). This is done by demonstrating a shared identify and purpose (Cowles 1998) and sharing personal accounts relevant to the area of inquiry (Lee and Renzetti 1993). In doing so, the participants can identify with the researcher which allows open and honest answers (Barton 2015; Dickonson-Swift, James and Liamputtong 2007).

The researcher can achieve this due to past work in the sector at the field level in insecure environments. This allows open sharing of similar situations and creates trust; it shows that the researcher is knowledgeable about the subject area.

Alternatives to Recording/Transcribing

Both Clark and Kotulic (2004) and Cowles (1993) state that the use of digital recording can often deter participants from feeling open to answer sensitive questions. Therefore, it is necessary for the alternative methods of recording data to be established should this occur (Clark and Kotulic 2004). Cowles (1993) suggests that alternatives be available, but that the use of the recorder explained fully to the participant, as well as making it known that the recorder can be turned off at any point (Cowles 1993). This allows the data to be captured for analysis, but also for the participant to feel open to state things 'off the record' where needed (Cowles 1993). Where such occurs, close written transcripts of the conversations should be written at the time, reflecting both what is said as well as the context in which it was said in.

Effects on Researcher

In order to protect the safety of the researcher, the protocol for researcher safety shall be used, in which the potential safety risks to the researcher are assessed prior to any in-person interviews or research being conducted (Gregory, Paterson and Thorne 1999). These details can be found in Annex 3. Furthermore, the process of researching sensitive issues can have an emotional effect on the researcher (Clark and Kotulic 2004; Lee 1993). Support networks within Coventry University as well as with the supervisory team will be used to limit this. Furthermore, training in Psychological First Aid will be undertaken.

Effects on Participants

Notably, discussing sensitive issues can elicit emotional responses, and may touch on subjects' participants have not previously recounted (Cowles 1993). Therefore, it is important that the researcher is fully ready to deal with these and provide support to the participants, especially feeling comfortable and having the training to deal with anxious responses (Clarke and Johnson

2003). Such training not only allows the researcher to take on a counselling role should it be necessary, which protects the participant (Barnard, Gerber and McCosker 2001) and allows access to information which participants may not have previously disclosed (Cowles 1998). In order to achieve this, the researcher shall undergo Psychological First Aid training prior to the collection of any data on sensitive topics.

Cowles (1998) mentions the need to protect researchers from the negative reactions from the research; Wilson (1995) discussed this as non-reactivity and ethics, in that the research should not negatively impact participants. Study 5 and 6 were the only two studies where there was a marked emotional response from participants. In Study 5, this occurred within the realms of the simulation course and was not caused by the research or researcher. In Study 6, this was caused by the recounting of past incidents. At several points in multiple discussions, the data collection had to be paused so that the researcher and participant could take a break, allowing them to collect their emotions (Cowles 1998). Had the researcher not undergone Psychological First Aid training, such a study would have been unethical and potentially had a long-term negative impact on the participants (Barnard, Gerber and McCosker 2001).

3.6 Limitations, Restrictions and Ethical Approval

The research was limited by the researcher's ability to only comprehend the English language, and therefore all searches, interviews and surveys were conducted with English as the primary language. It is recognised that this may have limited the research spectrum, with many humanitarian operations being carried out in non-English speaking countries, as well as many local field workers having a vast level of security-relevant experience.

The research was conducted within the parameters of Coventry University's Ethical Procedures. This ensures that research is conducted in an ethical and safe manner, to protect both the researcher but also the participants. Wilson (2005) states that any researcher should limit the effect research has on people and that they should be able to continue as normal after the research is concluded. Further, research should ensure the researcher themselves is not put in any danger (Gregory, Paterson and Thorne 1999). This limits some applications and research settings. For instance, research cannot be carried out in high-risk environments as there is a very real threat to life, but also the participants themselves are vulnerable. The Protocol for Researcher Safety is attached in Appendix 3.

All studies underwent ethical approval. As the research followed an emergent design, new methods were used in each study based on the findings of the last. To ensure that the study methods were still ethical, multiple ethical applications were made as the approach was updated. All ethics certificates are attached in Appendix 1. Each study shall reference the appropriate certificate under the sub-heading 'Ethical Information'.

3.6 Chapter Summary

The research takes an inductive approach, seeking to identify a theory through the collection of data, chosen as a lack of theory exists. To do this, the research situates itself within human factors and knowledge elicitation, using an emergent process so that each study builds on the other. Qualitative research design has been followed, which allows flexibility as well as the collection of rich data, which can be used to identify themes and assign a theory. A two-stage research design has been followed. Stage 1 uses a descriptive approach to explain the explicit knowledge as it currently exists in the sector. Stage 2 uses an exploratory approach to identify ground-up tacit knowledge.

As the thesis seeks to identify methods to elicit knowledge, the chapter presents the methods which will be used to assess each other, both on trustworthiness as well as a viable method. Though covered by other researchers, the criteria presented for analysing the trustworthiness of each study is also useful for the humanitarian sector, in which studies have previously lacked rigour and trustworthiness. Lastly, the practical limitations of the research have been stated.

A notable contribution to the research is presented in this chapter, identifying the means in which a non-traditional sensitive domain was accessed, and research was conducted within. Humanitarian security was first established as a sensitive domain. No previous studies researched have identified humanitarian security in such a way, limiting their research approach. Doing such allows a more structured approach to such research to be taken. Notably, purposive sampling was chosen with participants being selected through snowball sampling techniques. Issues around confidentiality, alternatives to recording data collection and the psychological concerns the research may present have to be considered before embarking on such research. This approach to the current research also presents further opportunities for other researchers to access both the humanitarian security domain, as well as other security domains in which information could be limited.

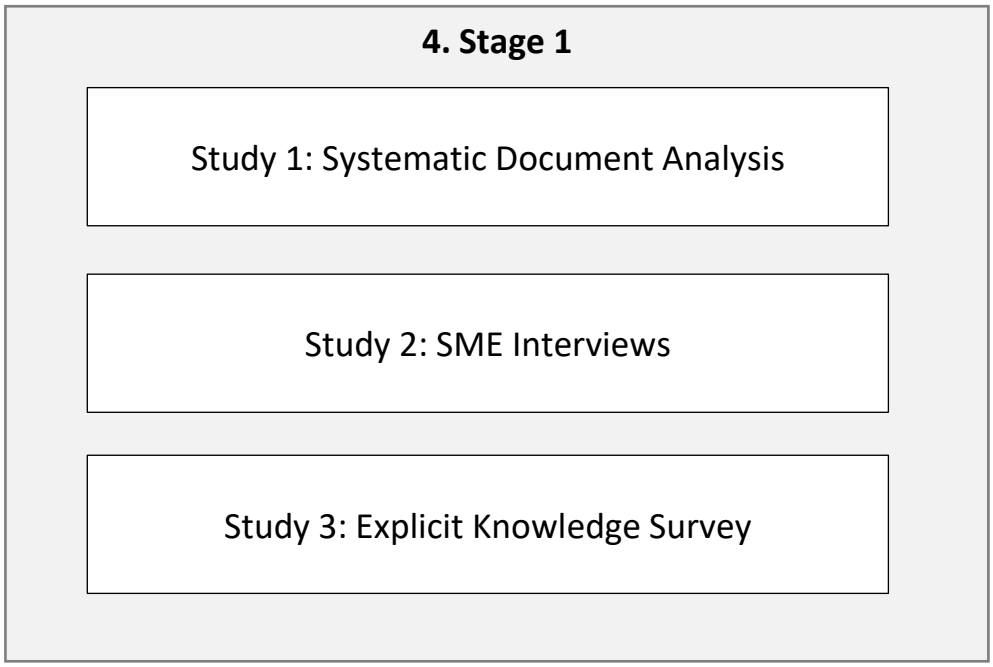
4. Stage 1: Descriptive Inquiry of Explicit Security Knowledge in the Humanitarian Sector

4.1 Stage 1 Overview

This chapter presents the studies conducted exploring the use of explicit knowledge in the humanitarian sector. The chapter identifies top-down, explicit knowledge.

Stage 1 is made up of the following studies:

- Study 1 uses a systematic document analysis on manuals used by humanitarian organisations. This method combines systematic review (Denyer, Smart and Tranfield 2003) to identify relevant security manuals and document analysis (Bowen 2009) to identify knowledge requirements within each manual;
- Study 2 contextualises the knowledge elicited from manuals through in-depth Subject Matter Expert, 'teach-back' interviews (Johnson and Johnson 1987). Knowledge from Study 1 is validated through the SMEs providing comments and corrections to the knowledge elicited (Milton 2012);
- Study 3 uses a quantitative survey where SMEs and field workers rate the explicit requirements against scenarios of likely security risks, adapting the work of Sternberg (1995) and Busch (2008).



4.2 Study 1- Systematic Document Analysis of Explicit Knowledge in Security Manuals

4.2.1 Introduction to Study

A key means of organisations passing on explicit knowledge is through manuals (Nonaka 1991; Nonaka and Takeuchi 1995). These are used frequently in the humanitarian sector to convey knowledge to those deploying overseas (Barnett 2004; Persaud 2014). To identify the explicit knowledge that exists in the sector a systematic review was conducted on key security manuals currently used. This step is also important in becoming more acquainted with the practice focussed literature on the problem (Milton 2007; Burton et al. 1990), and therefore working towards becoming an academic expert by Hoffman and Shadbolt's (1995) definition: one of the first steps in any knowledge elicitation research (Hoffman 1987).

4.2.2 Method

Systematic reviews and document analysis have been used in conjunction to conduct a thorough across and within source analysis of explicit security requirements, using a method described by Denyer, Smart and Tranfield (2003). Two similar methods to the systematic reviews are a meta-analysis, which seeks to present a mathematical synthesis of multiple sources (Greenhalgh 1997), and a document analysis which seeks to analyse documents (Bowen 2009). A systematic review was chosen because it combines the warrants of both methods, allowing both a structured selection and synthesis of material whilst allowing a thick description to remain (Denyer, Smart and Tranfield 2003; Mulrow 1994): in this way it adapts the work of Dennik-Champion, Peltier and Wiseniewski (2004) and later Arculeo et al. (2015). Systematic reviews allow a holistic across-case analysis. To identify explicit knowledge within sources it is necessary to conduct a within-case analysis. A document analysis has also been conducted on each source. Bowen's (2009) methodology on document analysis have been used to improve the analysis within sources: as the technique seeks to identify themes within sources it is an adaption of thematic analysis (Braun and Clarke 2006).

Systematic Reviews

Journalistic literature reviews seek to review literature relevant to a theory and is therefore selective of the sources it reviews. Systematic reviews, on the other hand, present an overview of the literature to answer specific questions in an unbiased, explicit and reproductive manner (Greenhalgh 1997; Cook, Davidoff and Mulrow 1997). Systematic reviews were originally

developed to bring about better evidence-based research in the medical profession (Mulrow 1994) but have since been adopted by the social sciences (Holt et al. 2005) and adapted to non-medical fields (Denyer, Smart and Tranfield 2003; Durach, Kembro and Weiland 2017).

A systematic review was chosen due to the following benefits: it limits bias in selecting or rejecting sources; large amounts of data can be quickly understood in a structured manner and the results of different studies can be formally compared to establish generalisability of findings (Altman and Chalmers 1995; Cook, Davidoff and Mulrow 1997; Denyer, Smart and Tranfield 2003).

Systematic reviews have also been used extensively in the disaster medicine field to assess competencies needed for effective disaster response, therefore being closely aligned to this study and thesis (see Casteel, Nocera and Williams 2008; Dennik-Champion, Peltier and Wiseniewski 2004; Costa et al. 2015). The suggestion to use one was also posed by Professor Burkle of the Harvard Humanitarian Institute, who later co-authored the guiding work of Arculeo et al. (2015) and has been a key author developing competencies for disaster medicine (see Burkle 2012; Burkle, James and Lyznicki 2013).

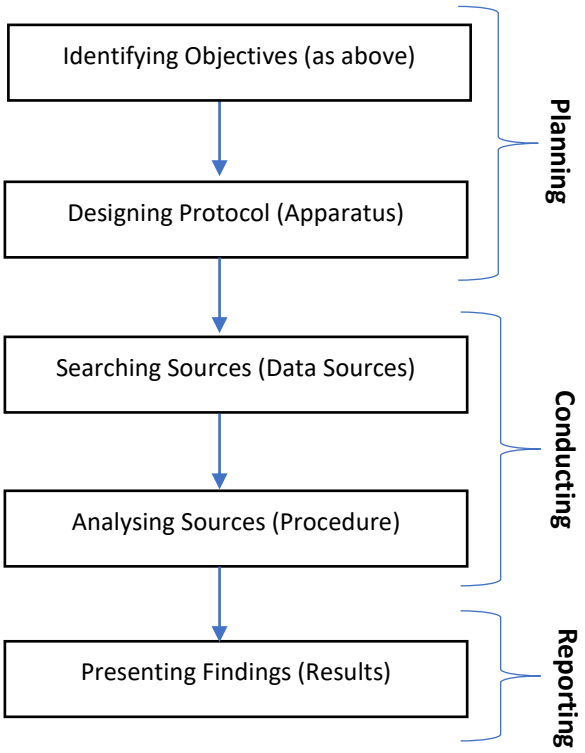
The systematic review in this Study follows the 3-stage approach adapted by Denyer, Smart and Tranfield (2003); Planning, Conducting and Reporting (Figure 4.1)

The need for a review was established in Chapter 2, which identified that no systematic and thorough review of explicit knowledge in security manuals in the humanitarian sector has been conducted. The review was also necessary as a starting point for further investigation into explicit knowledge.

Identifying objectives for the systematic review is a necessary step early on, which guide the researcher in developing a protocol and selecting relevant sources (Garfield and Tohiye 2017: 54). The objectives were:

- Identify explicit knowledge requirements related to operational security in humanitarian security manuals;
- Identify inferred requirements related to above;
- Identify means of gaining knowledge to meet the requirement;
- Identify possible performance indicators for requirements.

Figure 4.1: Overview of Systematic Review Process



(Adapted from Denyer, Smart and Tranfield 2003: 14)

Document Analysis

Systematic reviews present an overview of data across sources but not a thorough analysis within sources (Denyer, Smart and Tranfield 2003). Document analysis methods presented by Bowen (2009) were used for detailed analysis of each source, which uses thematic analysis to identify patterns within the documents (Braun and Clarke 2006). This allows the identification of relevant information and for this to be separated from irrelevant information (Corbin and Strauss 2008).

Document analysis consists of three stages: skimming (superficial examination), reading (thorough examination) and interpretation (Bowen 2009). King (2004) states that the coding stage (here the thorough examination) is not completed until done at least twice. Repeat examination improves trustworthiness (Braun and Clarke 2006; Moules et al. 2017). The analysis will be conducted three times on each source in order to achieve this.

Document analysis is useful as it provides an overall picture of the themes whilst keeping the richness of the data, whilst still providing some form of quantification through an indication of the frequency of terms (Bowen 2009).

Apparatus

Documents were reviewed electronically on a computer. A dual monitor set-up was used for ease so that tallying and analysing could occur without interruption. No other specific equipment was necessary for access. Security requirements were recorded onto a data collection protocol on the computer and separately onto a tally chart on paper three times (a summary is provided in Appendix 4).

Data Sources

The study collected data from English-language documents published from 1998 to date, from Google Scholar, Scopus, Eldis and the European Interagency Security Forum database (the latter being a key repository for humanitarian sector documents), as well as manual web searches resulting from references of identified documents.

The following BOOLEAN keyword search criteria were used in each of the databases: 'humanitarian OR NGO AND security OR safety OR protection AND handbook OR manual OR guide'.

The following inclusion criteria were used:

- All handbooks, manuals or guidelines (referred to hereafter as just manuals) directed at the individual field worker;
- Supporting literature produced by or for humanitarian organisations which are designed to advise on safety and security, which list key requirements.

The following exclusion criteria were used:

- Handbooks produced before 1998 or by non-humanitarian organisations;
- Documents designed for those responsible for security within the organisation, such as security managers (i.e. security management/crisis management manuals);
- Abstracts, references, or citations;
- Standard Operating Procedures, guidelines or technical documents, or handbooks designed to target specific threats, such as Mine Awareness or Counter-Terrorism;
- Where updated versions exist (in this case, the latest versions were used).

Table 4.1: Summary of Literature Chosen

Reference	Title (Source)	Year	Organisation specific?	Means of gaining knowledge explicitly stated?	Defines who is responsible for gaining knowledge?	Performance measurements stated?	Requirements presented as a list to meet?
1	ACT Alliance Security Handbook (Van Haren 2008)	2008	N	N	N	N	N
2	United Nations Field Security Handbook (UNDSS 2006)	2006	Y	N	N	N	N
3	ECHO Generic Security Guide for Humanitarian Organisations (Mayhew 2004)	2004	N	N	N	N	N
4	Save the Children Safety First: A Safety and Security Handbook for Aid Workers (Bickley 2010)	2010	Y	N	N	N	N
5	Church World Service Security Manual for NGOs Working in Insecure Environments (Westbrock and Westbrock 2000)	2000	Y	N	N	N	N
6	CARE International Safety and Security Handbook (Macpherson 2004)	2004	Y	N	N	N	N

Y = Yes; N = No; P = Partially

Table 4.1 (cont.): Summary of Literature Chosen

Reference	Title (Source)	Year	Organisation specific?	Means of gaining knowledge explicitly stated?	Defines who is responsible for gaining knowledge?	Performance measurements stated?	Requirements presented as a list to meet?
7	Irish Aid Guidelines for NGO Professional Safety and Security Risk Management (Irish Aid 2013)	2013	N	N	N	N	N
8	ICRC Staying Alive- Safety and Security Guidelines for Humanitarian Volunteers in Conflict Areas (Robert 2006)	2006	Y	N	N	N	N
9	World Vision Security Manual (Rogers and Sytsma 1999)	1999	Y	N	N	N	N
10	Good Practice Review 8 2000- Operational Security Management in Violent Environments (Van Brabant 2000)	2000	N	N	N	N	Y
11	Good Practice Review 8 2010- Operational Security Management in Violent Environments (Harmer, Haver and Stoddard 2010)	2010	N	N	N	N	Y
12	Core Humanitarian Competencies Framework (Rutter 2011)	2010	N	P	N	Y	Y

Y = Yes; N = No; P = Partially

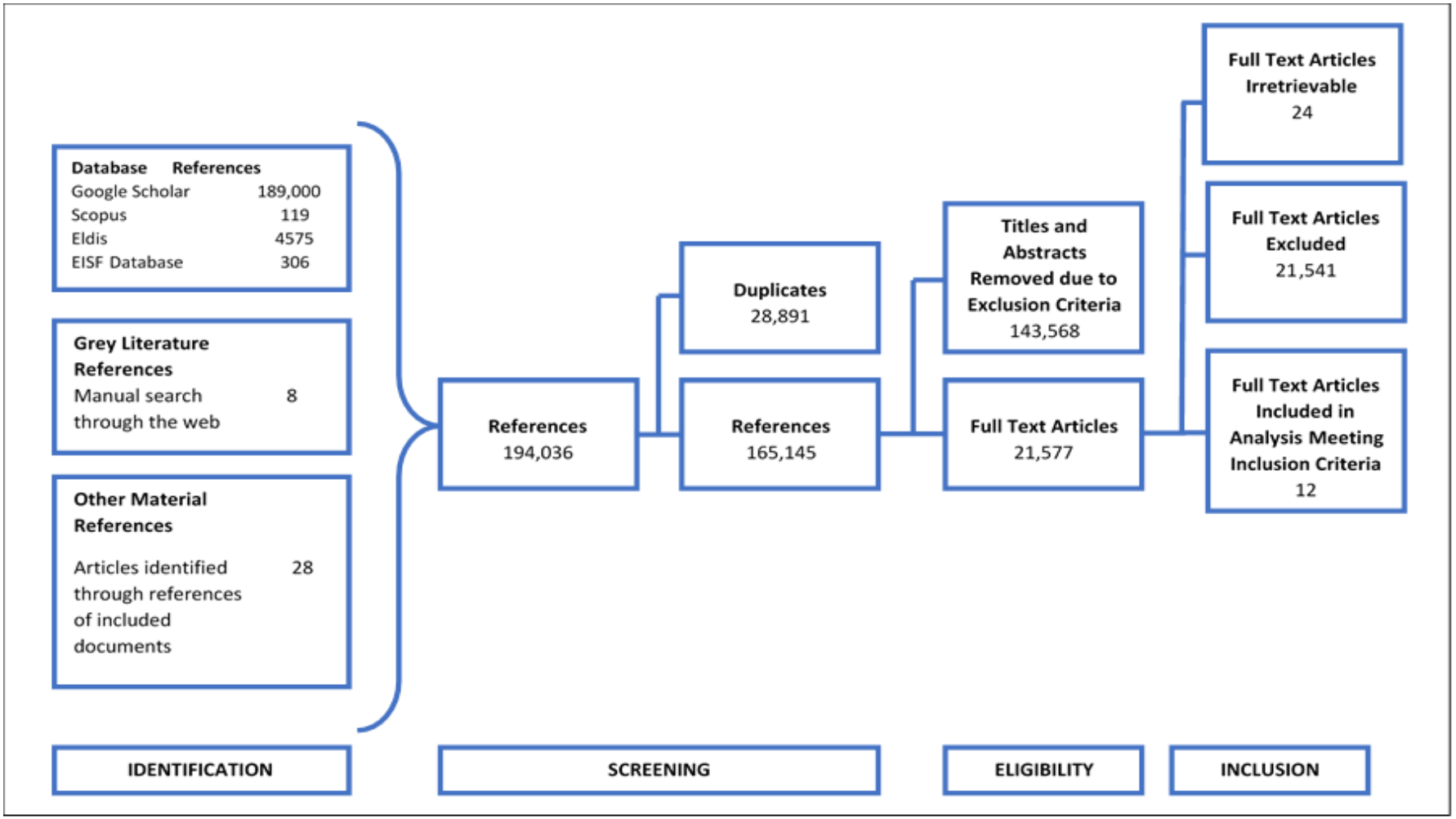


Figure 4.2: Results from Database Searches

With non-medical, qualitative systematic reviews there is less statistical imperative to find every source relating to the area, but rather find enough sources to achieve theoretical saturation (Harden and Thomas 2008). The initial database search yielded a total of 194,000 references. On top of this, 8 references were found through a manual search on the web (termed grey literature) and a further 28 were identified through bibliographies sections of the documents previously identified.

After removal of duplicates along with 21,541 sources not meeting inclusion criteria (or meeting the exclusion criteria), a total of 48 sources met the criteria. Of these, 24 were irretrievable, either on organisations intranets or protected by the organisations (the titles also allude that these were also likely specific Standard Operating Procedures or technical notes and thus would be excluded). The data sources selection process can be seen in Figure 4.2. This resulted in a total of 12 sources available for analysis (see Table 4.1).

Procedure

The study took place between October and December 2014. There were 6 stages to the data collection and analysis procedures (adapted from Bowen 2009; Braun and Clarke 2006):

1. Identification and selection of sources (as per *Data Sources* above);
2. Superficial examination: each source was read through in its entirety without recording any data. This acquainted the researcher with the material. Notes were made on sections that were irrelevant to the study (e.g. STAR Interview techniques (Rutter 2011: 64)) to speed up the rest of the process;
3. Thorough examination: Sources were analysed a second time. Whenever there was a reference matching the definition of a requirement, or an inference of the need for a requirement, it was recorded on a data collection protocol and a tally chart. Below is an example of an explicit and inferred requirement:

Explicit: "Maintain constant situation awareness: At all times you should remain aware of the context you are working in…" (Van Brabant 2000: 270);

Inferred: "Developing situation awareness is the first step in reducing the likelihood of a safety or security incident." (Macpherson 2004: 48).

4. The process in step 3 was repeated an additional two times and requirements were recorded on separate protocols and tally charts. A minimum of 2 days was left between read-throughs to reduce selection bias. This process confirmed all requirements had been identified and improved trustworthiness (Shenton 2004);
5. The three separate tally Tables were then checked for discrepancies. Where these occurred (i.e. tally numbers did not match) all 12 sources were searched again for a description of the requirement using the information from the protocol and the 'Find' (or CTRL + F) function;
6. Once the tally of requirements was finalised (list found in Appendix 4) similar requirements were grouped and given a general description to remove duplication.

The last two stages also represent the data analysis; a process which involves classifying, grouping, comparing, contrasting and/or summarising (Garfield and Tohiye 2017). It is noted that the classification and grouping process is "necessarily inductive and interpretive" and can only report on general trends or findings, which may be identified differently by different researchers (Holt et al. 2005: 261).

4.2.3 Results

From the 12 sources analysed, a total of 56 security specific requirements were identified as occurring in at least 2 sources. An additional 32 other requirements were identified appearing in single sources, unrelated to the other requirements. Further, several sources mentioned requirements that were not directly tied to security in the text, but rather good deployment preparation (for instance, having a health check). These were omitted from the final requirements list. Requirements that were related directly to security were recorded on a tally chart; where there were overlapping requirements, these were combined (shown in Appendix 4).

Out of the 12 sources selected for review, none of the sources identified who was responsible for ensuring staff had the relevant knowledge, nor did they describe a way in which the requirements were gained. Only 3 sources gave a list of requirements (termed 'competencies' in all three sources).

Recurring Requirements

A total of 12 requirements were identified as appearing in more than half of the texts analysed (Table 4.2):

Table 4.2: Recurring Requirements and Descriptions

	Requirement Descriptions	**Sources Found In**	**Count**
1	**Organisational security policy and procedures**	1, 2, 3, (4), 5, 6, 7, 8, 9, 10, 11, (12)	12
	To know the organisations' security policy and the relevant procedures.		
2	**Socio-political understanding**	2, 3, 4, (5), 6, 9, 10, 11, 12	8
	Understanding the social and political context of a country.		
3	**First Aid**	1, (2), (3), (4), (5), 6, 8, 9, 10, 11	10
	Having the ability to apply first aid to injured people.		
4	**Radio Communications**	1, 2, 3, 5, 6, 8, 9, 10, 11	9
	To be able to use radios to communicate effectively.		
5	**Security Awareness Training**	1, 2, 6, 7, 9, 10, 11	7
	To have attended security awareness training and know how to react to threats.		
6	**Situation awareness**	3, 4, 5, 6, 8, 9, 10, 11	8
	To always be aware of what is happening around you and alert to changes in your surroundings.		
7	**Stress management**	1, 3, 4, 6, 9, 10, 11	7
	To be able to effectively deal with stress to maintain a clear head.		
8	**Cultural awareness**	(1), 3, 4, (5), 6, 7, 9, 10, 11	9
	To follow key cultural norms and avoid offending people, knowing cultural norms including dress, greetings and behaviour.		
9	**Security conscious**	2, 3, 4, 5, 6, 9, 10, 11	8
	To understand how threats occur and how your behaviour can affect this.		
10	**Confidence**	4, 5, 6, 8, 9, 10, 11	7
	Able to stand up for yourself.		
11	**Team worker**	2, 3, (5), 6, 10, 11	6
	To work effectively within a team.		
12	**Common Sense**	1, 4, 5, 6, 8, 9, 10, 11	8
	To act sensibly and think through actions clearly and logically.		

4.2.4 Discussion

General Discussion

Competency is more generally used above requirement in non-human factors literature and was referred to more in the sources studied. Though there is a view that the humanitarian sector needs to professionalise its approach to staff requirements (Barnett 2004; Brunderlein and Grassmann 2006; Arculeo et al. 2015) only 3 of the sources mention the word competence or provide a list of required competencies. Out of all the sources studied, the twelfth source, the Core Humanitarian Competencies Framework (Rutter 2011), features the fewest number of competencies. This source, though not dedicated solely to security, only presents vague competencies (as seen in Figure 4.3).

> **"Security Context and Analysis**
>
> Identify and communicate risk and threats and minimise these for you and your agency.
>
> **Personal Safety and Security**
>
> Build and maintain a reputation in line with humanitarian standards and acceptance for your work. Take appropriate, coordinated and consistent action to handle situations of personal risk and situations of risk for others. Reduce vulnerability by complying with safety and security protocols set by your organisation and contextualise appropriately to local scenarios. Champion the importance of safety and keep the safety of colleagues and team members in mind at all times.
>
> **Minimising Risk to Communities and Partners**
>
> Take measures to do no harm and to minimise risks for your partners and the communities you work with."

Figure 4.3: Competencies Listed by Rutter 2011: 6

Though source 7's (Irish Aid 2013) fourth standard is 'Competent Workforce', there is no mention of what competencies staff should have. The source does state that organisations should refer to Rutter's (2011) competency list.

Currently, no set requirements list exists within the humanitarian sector relating to operational security. However, through a systematic review of the key texts, it was possible to identify recurring requirements. Though this study does not attempt to assign statistical relevance, it can be seen from the list of requirements and their sources (as per Table 4.2), there is a body of explicit knowledge in the sector on what security management identify as keeping staff safe. One possible explanation for this can be the development of much of the material post-Good Practice Review 8 (Van Brabant 2000) which provided a foundation of knowledge on operational security for many humanitarian organisations. As such, there is a possibility that most of the requirements have come, in some form, from Van Brabant's (2000) Good Practice Review.

Elicitation of Knowledge

The method was effective at eliciting explicit knowledge by Nonaka's (1991) definition. Manuals are a common repository for explicit knowledge and the most common method such knowledge is shared (Nonaka and Takeuchi 1995). This study only elicited knowledge from open-source documents though: explicit knowledge is also transferred through guidelines, procedural documents and through training (Nonaka 1991). Accessing these was not possible due to their protected nature and means the findings are only a partial exploration into the explicit knowledge in the domain.

As the study reviewed a range of explicit knowledge and refined the results into the requirements list, it is a form of Combination as per the SECI model (Nonaka 1994) in that it takes existing explicit knowledge and changes its form, though does not create tacit knowledge.

The study set out to identify the explicit knowledge available through open-sources and was able to achieve this. Trustworthiness was improved through triangulation of the results: three-sets of 'thorough examinations' were conducted, and transparency of identification and selection of requirements provided (see Appendix 4), per Shenton's (2004) recommendations.

Utility

The findings are important as they establish the explicit knowledge that is shared throughout the domain. This provides a foundation for future research during this thesis. However, the findings are also useful as it is the first cross-manual study of knowledge and the first systematic review carried out on the key security literature (in terms of manuals). This can be used as a basis for designing training, conducting knowledge audits and to guide human resources for selecting staff with the relevant pre-existing knowledge, an area which is currently lacking (Persaud 2014; Darby and Williamson 2012).

The findings are constrained to the humanitarian domain, with the sources all being specific to this sector. The use of a systematic review has allowed all open-access sources to be selected (Denyer, Smart and Tranfield 2003) and the triangulation of requirement selection has allowed all commonly occurring requirements to be selected: as such, the requirements list can be seen as a list of all common requirements for humanitarian field workers. However, the review was constrained to the English language, limiting the transferability of results to English-speaking humanitarian organisations.

The method was straightforward to apply and required no specialist training. Though systematic reviews are often associated with the medical field, the method outlined by Denyer, Smart and Tranfield (2003) allows its replication in non-medical fields. The combination with document analysis (Bowen 2009) provides rich data. The two together combine an across and within case approach and provides grounds for further use of this method to identify and review explicit knowledge across sources. This method could be particularly useful for organisations within consortiums looking to refine security knowledge across multiple organisations.

Identification and selection of the requirements is an inherently subjective process (Holt et al. 2005). Transparent reporting of the requirements selection, even those which were not included in the final list, improve the dependability of studies (Shenton 2004). The use of multiple sources is a form of triangulation (Bowen 2009), helping to counteract the effects of researcher bias on the study (Guba and Lincoln 1985).

The study required no special resources; it was time-intensive taking place over 3 months, though the output warranted the time spent. Burton et al. (1995) state that the document analysis stage is critical in any knowledge elicitation project as it allows the researcher to become acquainted with the current knowledge. Though the method could have been conducted in a shorter timeframe by reducing the number of 'Thorough Examinations', this would have reduced the trustworthiness of the results and is not recommended (Shenton 2004). As systematic reviews require all possible sources to be selected, the sensitivity of the method was set by the chosen technique (Denyer, Smart and Tranfield 2003).

Sensitive Domain Issues

The study presented no ethical issues as was wholly desk-based. In terms of access to sources, from the 48 sources selected the study identified 24 as being irretrievable, such as those contained on organisation intranets. The method can only access open-source documents: if the method is replicated in academic research this will hold true, though would not be the case where implemented by practitioners with access to organisation specific documents. Though the researcher had access to such documents through past work, these were not included in the study for ethical reasons.

Though BOOLEAN searches were effective at identifying the sources across databases, a more straightforward method would have been to start with grey literature searches instead: for instance, using the sources references in the Good Practice Reviews.

Development of Method

The study is subjective to the researcher and does not include a view from the organisational level: as such, there is no context to the sources. In order to achieve this, Subject Matter Expert interviews should contextualise the requirements identified. This was accomplished in Study 2.

The largest shortcoming of the method was the time take to undertake the study. A possible approach to overcoming this would be to utilise Qualitative Data Analysis Software (QDAS) which would speed up the process (Johnson and St. John 2000) by auto-coding data in the sources. QDAS is being used with more frequency (Primorac and Rodik 2015), arguably enhancing transparency and trustworthiness (Welsh 2002). Two downsides to this exist, however: it removes the familiarity with the content, which is a critical first step in knowledge elicitation projects (Burton et al. 1990), as well as potentially missing out requirements contained in figures, graphs and other graphics, which cannot be coded by QDAS. Therefore, where QDAS is used it should only be as an aid to data analysis, with the read-throughs still forming the central data collection method.

Any study of secondary sources removes the context behind the material, which is no different in this study. Furthermore, out of the sources identified 48 were inaccessible (those contained on company intranets for instance). This raised the possibility that the requirements list was not all-inclusive. Contextual information should be provided through primary research methods (Creswell 2003). Study 2 is therefore designed with this in mind, aiming to provide context to the requirements.

4.2.5 Study Summary

This systematic review examined the key explicit security knowledge within the humanitarian sector. The aim of the study was to provide an understanding of the current requirements identified in key documents used in the sector for future examination.

Combining both processes from systematic reviews and document analysis created a complementary method to identify explicit knowledge within security manuals. Though several authors have discussed methods on eliciting explicit knowledge from individuals, less literature exists on how to identify this in documents. The combination of methods used within this study was effective at identifying explicit knowledge across all open access sources and provides a broader method for future use. The systematic review allowed sources to be chosen in an unbiased manner; document analysis allowed a deeper within source analysis.

The result of applying this method was the identification and refinement of 12 security requirements. This is the combination and refinement of a total of 56 security requirements identified through the 12 sources selected for analysis. This is notable to the field as currently no comprehensive list of requirements exists. Furthermore, the study of the sources identified that security requirements for field workers are not explicitly stated. Each source identified ways in which security could be achieved by field workers, but none stated outright the minimum requirements necessary. This has implications for ensuring field workers are adequately trained and prepared to work in high-risk environments.

The following 12 requirements were identified, which will be studied further in detail in the next two studies:

1	Organisational security policy and procedures
2	Socio-political understanding
3	First Aid
4	Radio Communications
5	Security Awareness Training
6	Situation awareness
7	Stress management
8	Cultural awareness
9	Security conscious
10	Confidence
11	Team worker
12	Common Sense

The study also proved a meaningful way to start knowledge management research in a sensitive domain. As open-access sources were used no sensitive domain issues were encountered. The study also presented an opportunity to further acquaint the researcher with the current knowledge in the sector, which will aid further face-to-face research. Thoroughly understanding the knowledge in the sector is an important step when engaging with domain experts.

The requirements list will be used in the following two stages. However, they can also be used by practitioners as a starting point to identify basic requirements, and therefore training, their staff need when operating in high-risk environments.

4.3 Study 2- Subject Matter Expert Interviews

4.3.1 Introduction to Study

Security advisors have been hired by many organisations to act as Subject Matter Experts (SMEs) of security knowledge (Barnett 2004; Neuman and Weissman 2016). Where organisations do conduct pre-deployment training, this is often given by in-house consultants where they exist (Persaud 2014). This study is a form of 'teach back' interviewing (Johnson and Johnson 1987) where the SMEs are presented knowledge from the previous study, and through their comments and corrections, the knowledge is both expanded as well as validated (Milton 2007; 2012). Through this method, Study 1 requirements can be expanded, validated and missing requirements identified. The interviews also allow a further understanding of SMEs understanding of top-down/bottom-up conflicts in knowledge.

4.3.2 Method

Semi-structured, in-depth qualitative interviews were used to understand the perspectives of SMEs on the recurring requirements identified in Study 1. Semi-structured interviews are a common technique used in interpretive research as they allow participants to impact their own subjective perspectives (Hopf 2004: 203). A semi-structured design was chosen as there was a need to review the requirements, which may not have been achievable with unstructured interviews, which are more suited when they are the sole research method (Crabtree and DiCicco-Bloom 2006).6

Semi-Structured, In-depth Interviews

Interviews are a key method in qualitative research though equate to nothing more than directed conversations (Keegan et al. 2003). They help the researcher to understand the area under investigation from someone else's perceptive (Kvale 2006; Boyce and Neale 2006). The in-depth interview, a specific form of interviewing, seeks to uncover further meaning to 'phenomenon' (Cook 2008; Kvale 1996), in which the researcher tailor's certain questions and improvises others in order to further explore both meanings and perceptions, allowing a better understanding of the phenomenon and to create a hypothesis (Crabtree and DiCicco-Bloom 2006).

In-depth interviews allow the conversation to be dictated by the participant, rather than by a script, thus allowing more depth to the answers (Morris 2015; Hofisi, Hofisi and Mago 2014). It

also gives the researcher greater freedom to probe participants to expand upon answers in order to achieve the interview aims, as well as allowing clarification of meanings, explore areas in more detail and clarify inconsistencies with answers (Barriball and While 1994: 331).

The downside to in-depth interviews is they require the researcher to be confident in both how to conduct the interview, but also the manner in which questions are asked in order to keep a natural flow. By doing this, the researcher can get participants to fully open-up about their feelings and experiences (Boyce and Neale 2006: 3).

Some researchers argue that for in-depth interviews to be effective, multiple separate meetings are required to create an open atmosphere and more depth to answers (Grinyer and Thomas 2012; Cronin and Earthy 2008). However, this is often unachievable due to cost and time, both the participants and the researchers (Bogdan, De Vault and Taylor 2016). Studies can remain effective if the researcher creates an atmosphere that is relaxed, open and honest (Morris 2015).

The role of the researcher is important with in-depth interviews; not only does the researcher need to make the participant feel at ease and comfortable answering questions, but to develop rapport and allow the conversation to flow naturally the researcher needs to have a deep understanding of the subject and questions to be asked (Morris 2015). In this regard, it is often important to fully understand the practical application of the literature studied rather than just the theoretical, academic importance (Boyce and Neale 2006).

Cochran and Quinn Patton's (2007) 8 rules of thumb were used during the interviews to develop quality data. Notably, use of open-ended questions, neutralising the way in which they are asked and asking the more sensitive questions towards the end of the interview once a rapport has been established (Cochran and Quinn Patton 2007: 13). Boyce and Neale's (2006) guide on structuring interviews was referred to also; the interview guide can be found in Appendix 5.1.

Apparatus

Interviews were either conducted face-to-face or online, using video-conferencing software. Video rather than call conferencing was used so that the researcher and participant could see each other to both build rapport and so facial expressions could be viewed Face-to-face interviews were conducted at the participants place of work (the option for outside places of work was given, in-line with recommendations from Chapter 3.5.2) or at a private meeting room at Coventry University. Only the researcher and participant had access to the rooms used. Online interviews were conducted in a conference room at the University. All interviews were given the

option to decline to have their interviews recorded. For those that agreed, a digital recorder was used for this. For both sets, a separate sheet was used to write down key points from the interviewers.

Pilot

A pilot interview was conducted with a neutral participant. Pilot interviews are an important step, especially where there may not be access to participants after the interview (Yin 2003). After the interview, they were asked to provide feedback on the questions asked, the style and overall flow. The feedback also allowed changes to logistical issues, such as timing, backups for digital recorders, interview guide layout.

Ethical Information

Ethics was approved by Coventry University under certificate P24596 (Appendix 1.1). All participants were sent both a Participant Information Sheet which contained key information about the project as well as a Participant Informed Consent form which they were required to sign and return (either physical or electronic).

Participants were also sent a list of the requirements identified in Study 1 which they were asked to read and annotate for discussion during the interviews (see Table 4.3 below).

Supporting Materials- Requirement Descriptions

To contextualise and provide meaning to the requirements, the requirements descriptions from Study 1 were used. For ease of reference, this is repeated in Table 4.3 below:

Requirement		**Description**
1	Organisational security policy and procedures	To know the organisation's security policy and the relevant procedures.
2	Socio-political understanding	Understanding the social and political context of a country.
3	First aid	Having the ability to apply first aid to injured people.
4	Radio communications	To be able to use radios to communicate effectively.
5	Security Awareness Training	To have attended security awareness training and know how to react to threats.
6	Situation awareness	To always be aware of what is happening around you and alert to changes in your surroundings.
7	Stress management	To be able to effectively deal with stress to maintain a clear head.

Table 4.3 Descriptions of Recurring Requirements

Requirement		Description
8	Cultural awareness	To follow key cultural norms and avoid offending people, knowing cultural norms including dress, greetings and behaviour.
9	Security conscious	To understand how threats occur and how your behaviour can affect this.
10	Confidence	To be able to stand up for yourself.
11	Team worker	To work effectively within a team.
12	Common Sense	To act sensibly and think through actions clearly and logically.

Table 4.3 (cont.): Descriptions of Recurring Requirements

Participants

Purposive sampling was used to get the required subject matter knowledge. To ensure that the participants would be able to bring relevant knowledge to the study, the following inclusion criteria were used:

- A minimum of 5 years of work experience in the humanitarian sector specifically;
- Working in a security expert role (director, manager, advisor, consultant);
- Security as their primary responsibility, not an additional responsibility;
- Must have the responsibility of training deploying staff;
- Working for an organisation with a footprint of at least 100 staff overseas.

To recruit the specific type of participants, as well as to ensure there would be an adequate response, snowball sampling was used (as discussed in chapter 3.5.2).

Two SMEs (01 and 02) acted as snowball refers. They were presented with the selection criteria and asked to refer the project to relevant people. They would then act as link person to make an introduction between the potential participant and the researcher. The chain of referrals can be found in Figure 4.4 below.

Through the sampling method, a total of 12 additional participants were identified including the original 2 referrers. From the 14 total participants, 12 met the inclusion criteria. SMEx1 did not have the required years specifically in the humanitarian sector (being ex-military and working for a news company afterwards) and SMEx2 worked for an insurance assistance company. SME10 was included in the group though had only worked specifically with a humanitarian organisation for three years, the two years prior he had worked with a UN agency on the delivery

of humanitarian aid. As such, it was deemed this made him eligible. Though the two snowball referrers knew each other well and were in communication, SME 07 was referred to the study by two people.

From the 12 selected, the lowest number of years' experience in the sector was 5 and the highest 26: with a mean of 13.75 years' experience. Participant breakdown can be seen in Table 4.4. The order represents when the participants were added to the study. Some job titles have been changed slightly so participants are not identifiable.

Most of the participants started their careers in the military (SME 02, 03, 04, 05, 06, 08 and 09) and police (SME 07 and 10). Only 3 of the SMEs had a background in programming in the humanitarian sector (SMEs 1, 11 and 12). Out of those with a military background, only one was not a commissioned officer (those with commissions being classed as a senior manager). The two SMEs with a police background started as what was described as 'beat' officers (started as normal constables on the streets) though were both in positions of leadership by the time they finished and moved to the humanitarian sector. The three field workers all started in the field.

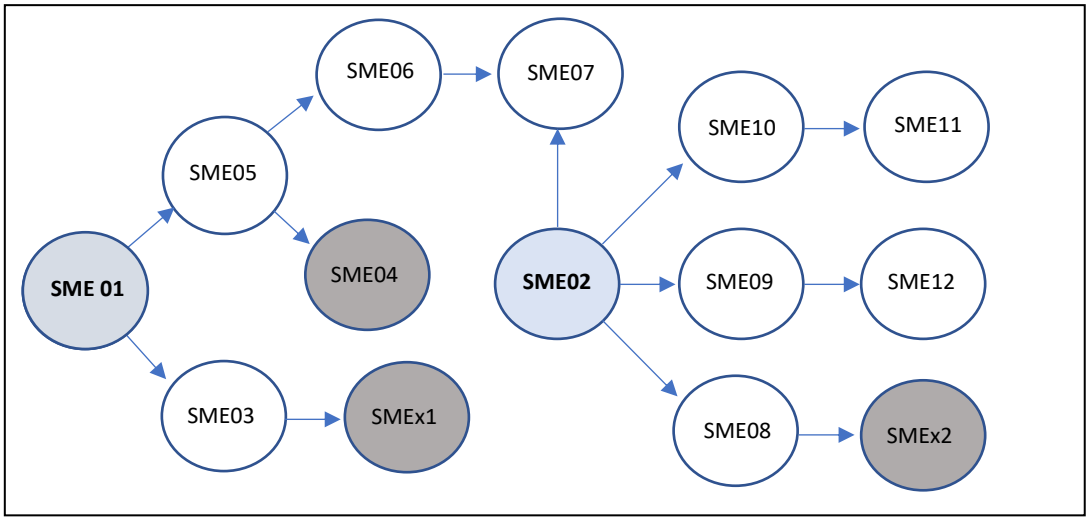


Figure 4.4: Visual Representation of Snowball Chain of Referrals

Table 4.4: SMEs Interviewed in Study 2

Ref.	Job Title	Location	Organisation Type and Size	Years' Exp.	Type	Length
SME01	Security Training Coordinator	UK	International NGO security training company, N/A	15	F2F	52.45
SME02	Organisational Security Manager and security trainer	Iraq	International NGO, 500-1000 staff, freelance	17	Online	58:06
SME03	Global Head of Security Unit	Switzerland	UN Organisation, 1500-2000 staff	26	Online	1:12:26
SME04	Regional Security Advisor	UK	International NGO, 1000-1500 staff	16	F2F	1:05:26
SME05	Head of Global Security	UK	International NGO, 2000-2500	7	F2F	58:37
SME06	Regional Security Director (Asia)	Thailand	International Humanitarian Response, 1500-2000	24	Online	1:19:40
SME07	Deputy Director Security Unit	Afghanistan	International NGO, 1500-2000	21	Online	1:46:39
SME08	Roving Security Manager	Syria	International development organisation (Construction), 500-1000 staff, freelance	13	Online	47.34
SME09	International Security Advisor	UK	International financing organisation, 500-1000 staff	7	F2F	52.57
SME10	Security Operations Coordinator	UK	International monitoring organisation, 100-500 staff	5	F2F	1:22:18
SME11	Security Coordinator	UK	International NGO, 5,000 + staff (consortium)	6	F2F	1:25:12
SME12	Security and Safeguarding Lead	Jordan	International NGO, 1500-2000	8	Online	2:13:09

Procedure

Interviews took place between 20th June and 15th August 2015. There were 6 stages to the data collection:

1. Participants were emailed a copy of the Participant Information Sheet and the Requirements List from Study 1. A time and place were agreed, and they were asked for a 1.5-hour window to complete the interview in;
2. On the days of the interview but prior to arriving at the venue, the interview guide was studied in detail. This would reduce the need to follow this during the interview and allow for a natural flow of conversation;
3. Introductions were made prior to the interview. For the face-to-face interviews, this was done in a social, relaxing setting such as a café or the organisations break room. The purpose of this was to make the participant feel more at ease and therefore more likely to open up during the interview (Rubin and Rubin 2011). The introductions for face-to-face and online also allowed the researcher to establish common ground and credibility, allowing the participants to feel a shared identify and answer more honestly (Clark and Kotulic 2004);
4. The formal part of the interview took the following format:
    a. Introduction to the research, discussion of ethical implications and an overview of the interview about to take place,
    b. Background questions of the participant's career and relevant experience in the field, as well as anecdotal stories (build rapport);
    c. Participant asked if they are happy for the interview to be digitally recorded;
    d. Questions about security practices;
    e. Questions about the relevance of the identified requirements;
    f. Questions about any missing or incorrect requirements;
    g. Conclusive questions with the participant given the opportunity to raise questions and issues following the interview; or to answer questions with the dictaphone turned off;
    h. Interview closed and participant is given contact details for any follow-up information.
5. Interview notes were checked on the day of the interview. Non-recorded quotes (those said prior and when after stage ‘g’ above were checked and corrected;
6. Participants were contacted after and thanked for their involvement.

Template Analysis

Template analysis is an iterative approach to analysing data and is a form of Thematic Analysis (Huberman and Miles 1994). It is useful for large datasets or data where specific information is being searched for (King 2004). Unlike some other forms of thematic analysis, template analysis approaches data analysis in a highly structured manner, though at the same time remains flexible enough to adapt to the results of the data and the research aims (Brown et al. 2015).

Template analysis was chosen over Interpretive Phenomenological Analysis (IPA), which is another common means of analysing similar data (Brown et al. 2015), because it has the flexibility to use pre-defined (*a priori*) codes which have been developed from other studies or within the literature (Wainwright and Waring 2008). As such, template analysis is a much faster process than IPA and allows the researcher to look at the across the data set relatively early on, rather than IPA which requires looking in detail at individual cases first (King 2004). Template analysis was suitable for this study, as the aim was finding out the view of SMEs on pre-defined themes, rather than identifying themes within the data.

Template analysis allows flexibility in application and does not require a complete transcription of interviews (Braun, Clarke and Rance 2014), which is important for this study where portions of the interview are designed to build trust and rapport rather than to answer research questions (Clark and Kotulic 2004). Milton (2012) suggests that when engaging with SMEs, general questions are used to frame the specific questions on knowledge, though do not provide usable data- in this way, SME interview analysis should start with listening to recordings and then making notes only on the usable sections (Milton 2012). Rather than transcribing everything said, the template analysis allows verbatim quotes to be used (Corden and Sainsbury 2006a) and only data relevant to the study aim is coded (Crabtree and Miller 1999). Not only does this save time, but it means that interviews can be allowed to progress in a naturalistic way, even though the conversation is not directly related to the study (Crabtree and Miller 1999). This technique allows the researcher to focus on building a relationship and allowing naturalistic conservation, which in turn improves data collected (Morris 2015; Clark and Kotulic 2004), without having to worry about the need for excess transcription. Thus, template analysis "encourages the researcher to develop themes more extensively where the data is richest in relation to the research question" (Brooks et al. 2015: 203). Further, the template analysis allows readers to understand what direct quotations were used to inform the results, which is often lost in complete transcription (Corden and Sainsbury 2005).

Brooks et al. (2015: 203-204) suggest the 6 following steps to conducting a template analysis, which has been expanded further:

1. Become familiar with the data collected. In this study, this included relistening to the recordings of all 11 usable interviews to become reacquainted with the data. Though computer software can be used, Wainwright and Waring (2008: 92) argue that in using these the researcher cannot immerse themselves with the data. King (2004: 263) agrees, stating: "commonly most or all of the texts will have been read through at least three or four times" which allows the researcher to become comfortable with the data;
2. Carry out preliminary coding. Template analysis often starts with *a priori*, or predefined, codes (King 2004). Issues can arise here on having a coding template that contains too many pre-defined codes as to limit the analysis or too few codes as to render a template useful in the first place (Auerbach and Silverstein 2003). These codes can be derived from previous studies, the literature and the interview guide. Though these codes are often defined at the start of the analysis, they are not set and can be refined, removed or others added as dictated by the data (King 2004; Brooks et al. 2015). The initial *a priori* codes in this study were based on the 12 recurring requirements;
3. Organise emerging themes into meaningful clusters. This includes defining how the themes relate to one another, and sorting themes hierarchically- level-one and level-two codes, or broad descriptions above detailed descriptions (King 2004);
4. Define an initial coding template. This involves carrying out the 3 above steps on a subset of the data. Brooks et al. (2015: 204) suggest selecting a varied subset- for this study, SME02, 03 and 12 were chosen as they represented the first, middle and last interviews conducted. This resulted in the creation of further templates (version 2 and 3);
5. Apply the initial template to further data and modify as necessary. This requires applying the revised templates to a broader data set. This identified further themes which were not included, resulting in further editing of the template (version 4). There is no set point in which the template is finalised, though "development of a template cannot be seen as sufficient if there remain substantial sections of data clearly relevant to the research question(s) that cannot be coded to it." (Brooks et al. 2015: 204);
6. Finalise the template and apply it to the full dataset. The template was revised one final time. A 'researcher comment' column was added so more detail could be given to how the quotations were selected, transcribed and edited (Corden and Sainsbury 2005: 4).

The templates went through 5 iterations, starting with an initial template with 12 *a priori* themes corresponding to the 12 requirements. On initial familiarisation with the data, it became clear that there were further themes relating to knowledge management in security management. The final template used on all data sets can be found in Appendix 5.3 which used 18 *a priori* themes.

Though many methods exist on when to create the initial themes, a commonly accepted method is to create this after each data set has undergone analysis (Brooks and King 2014; Braun, Clarke and Rance 2014). In following this approach, key areas of the data set are transcribed against set codes and as familiarity with the data is gained, further codes may be developed (Moules et al. 2017). As codes are developed from the data, rather than from prior research, this method is referred to as Inductive Coding (Braun, Clarke and Rance 2014; Boyatzis 1998). Though this approach is time-consuming, with the potential of focussing on areas unrelated to the research, it allows greater familiarity with the data both within and across cases (Brooks and King 2014).

There are limitations to the use of template analysis. The method focuses on across case rather than within case analysis, therefore losing some understanding of the individual's accounts (Brooks et al. 2015: 218). A method of adding more depth to individual cases is to provide direct quotations or passages of quotations, which gives a greater understanding of the original responses (King 2004): selective quotes have been added to the presentation of the themes found in the Results section, with further quotes per theme presented in Appendix 5.3. Quotes used to develop each requirement have been provided in Appendix 5.4.

The process undertaken in this research follows Braun and Clarke's (2006) 15-point checklist for a good template analysis. Template analysis emphasises flexibility so that data can be approached from multiple angles to understand deeper meanings (King 2004). However, there is a need to increase credibility and transparency in qualitative research. A selection of quotes per theme is also found in Appendix 5.3 and 5.4, as per suggestions by King (2004) to increase transparency.

4.3.3 Results

A total of 12 interviews were conducted, 7 of which were face-to-face, 5 online. After the interviews were conducted, one participant requested to be withdrawn (SME04). No reason was given. Their data was discarded in line with the Data Management Plan (Appendix 2).

A thematic analysis was chosen as the means of understanding the data in more detail. Research of qualitative interviews is often dictated by the data collected, rather than being set in stone prior to data collection; the chosen analysis method needs to balance time, available equipment and human resource against likely output (Schmidt 2004). Transcribing the interviews completely would have taken a considerable amount of time with little return. As the aim was to contextualise and validate the 12 requirements identified in Study 1 and identify any missing requirements, a thematic analysis was chosen instead. This would achieve the aim and take less time.

4.3.4 General Themes Relating to Security Requirements

A total of 6 top-level themes were identified during the thematic analysis of the data relating to the security requirements in general. These were then condensed further into 3 top-level codes. Each of these will be discussed briefly below.

1. Conflict between Security Management and Programming
    - 1.1 Negative security culture
        - 1.1.1 Lack of buy-in
        - 1.1.2 Lack of understanding between programmes and security
    - 1.2 Security seen as a limiting factor
        - 1.2.1 Security is too procedural
        - 1.2.2 Security procedures take extra time
2. Simplicity is key to effective adoption
    - 2.1 Number of requirements should be limited
        - 2.1.1 Staff have a limited capacity to learn
        - 2.1.2 Effective list needs to be condensed
        - 2.1.3 Foundation requirements can be built on
    - 2.2 Training can be effective
        - 2.2.1 Requirements are trainable
        - 2.2.2 Requirements should be split into preventative and responsive
    - 2.3 Lack of requirements put staff in danger
        - 2.3.1 Staff currently unlikely to meet all requirements
        - 2.3.2 Set requirements would make staff safer

3. Attaining requirements must go beyond just training
    3.1 Current Training is Ineffective
        3.1.1 Inadequate training methods are used
        3.1.2 Learning should focus on key points
        3.1.3 Need to be aware of staff capacity to learn
    3.2 Training for preventative and reactive measures should use different methods
        3.2.1 Simulation training is effective for reactive requirements
        3.2.2 Preventative requirements can be trained in the classroom
        3.2.3 Training should focus on training basic abilities rather than general awareness
        3.2.4 Requirements should be assessed, not just trained
    3.3 Training should be a starting point for attaining requirement
        3.3.1 Training is a foundation, not a solution
        3.3.2 Training should be built upon with practice
        3.3.3 Critical reflection is important to ensure requirements are still valid

Conflict between Security Management and Programming

The interviews revealed that there was a conflict between the function of security management and programming. This echoes what was identified in the literature review in Chapter 2, discussed by Brunderlein and Grassmann (2006), Ahtisaari (2003), Van Brabant (2000) and Daudin and Merkelbach (2011).

Within this theme there are two Level 2 themes which work against each other, resulting in a conflict between security management and programming (depicted in Figure 4.5 below).

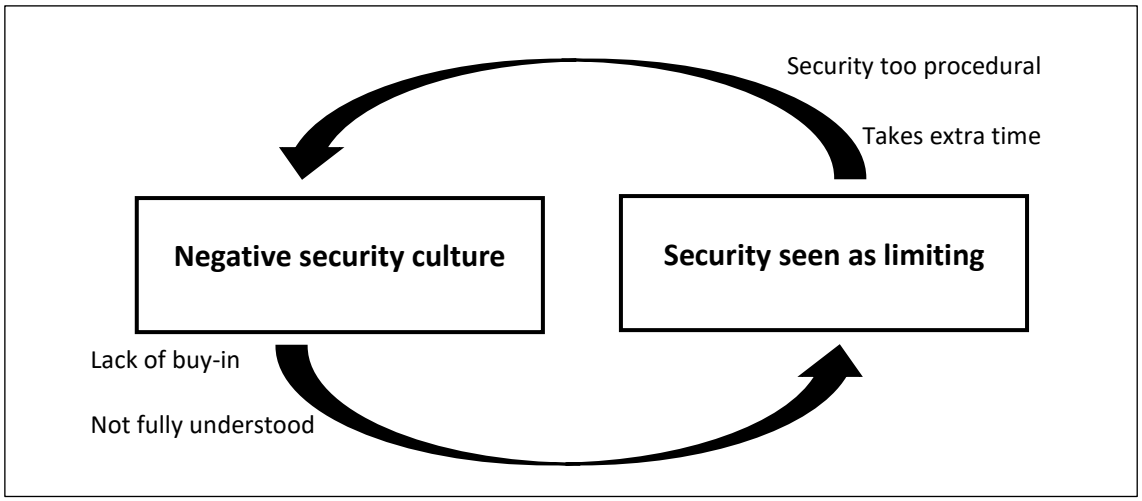


Figure 4.5: Causes of conflict between security management and programming

The interviews revealed that there is generally a negative security culture, made up of a lack of buy-in from both management and field staff, but there is also a general misunderstanding between security and programming as departments. This means that security is not often prioritised, which undermines it as a process. A reason for this is that security as a process has changed 'dramatically' (which was also highlighted in the Literature Review in Chapter 2) and those who have worked in the field across this change have been used to a different approach:

> *"There needs to be more buy-in to security, to give it emphasis and importance. We don't see that. What we see if people who are used to doing something in a certain way and don't want to change. But they're often no longer travelling or in the field. They've done their time, but when it was a different ball-game." (SME 02)*

> *"I think the issue is more a lack of appreciation from senior management. Security is rushed, and not enough time is given to actual programme managers or officers to complete key tasks- risk assessments first and foremost. It shows you that there is a change, in the way it was done in the past and the way it is done now. Not a small change, but quite a dramatic one. We try and follow international standards now, and that is a different approach than before." (SME 09)*

A highlighted issue here is that previous field workers move into positions of management, and though the field of security within the sector is advancing it is not being emphasised as important by those used to a more relaxed way of operating. This results in management not seeing security as important. This is also interlinked with a lack of understanding between security and programming. When asked what causes conflict, many of the SMEs were quick to point out that it was not conflict but rather a misunderstanding, in part because the SMEs were not able to spend time with programme staff other than for training.

> *"There wouldn't be misunderstanding if you got to spend time just telling them programme staff what exactly you do. The only time you spend is when you're telling them a new process, a new risk assessment, or new training everyone is hyped about. Rarely do we just get to say, 'here is what we do'. Yes, it's part of the training itself sure, but not the way we want it to be. We don't want to be the baddy, we want people to understand there is method to the madness." (SME 12)*

Being able to promote what the department does in general is important to fostering a positive security culture, though currently SMEs only get to do this when presenting training. One SME had suggested two ways in which they overcome this:

> *"What I would like to see if more programme staff attending the security events, like the forum. (Context: the researcher and SME were at a security forum together). Organisation [name of different organisation] often have programme staff there when their security guy is travelling. I forget his name. But they end up networking and learning so much. I really think it means they build up an appreciation. I make sure that our staff attend general security training now. We have*

> *programme officers who are just UK based. I make sure they come along to pre-deployment stuff. It allows them to understand more about what we want people to do." (SME 02)*

Approaching security culture in this way allows non-security staff to build up a greater appreciation and prevents what SME 06 stated as a "disconnect between organisation levels" in which the importance of security gets lost the closer you get to the field. A greater focus on security culture will also stop the view that 'Programmes see security as a hindrance, we see programmes as risk takers' as SME 05 stated once the interview was over.

Negative security culture is detrimental and interlinked to the other 2nd level theme in that security is seen as limiting. In the current legal climate, many security procedures need to be documented so that they can evidence the steps an organisation is taking to meet its Duty of Care. However, in doing so reduces the flexibility field workers once had and asks them to follow procedures they once would not have had to:

> *"You have to realise the legal fuel has really changed security management. For the better, yes. But it takes more time and more administration. It is less ad-hoc than I was used to. Before we would get in a truck and I'd say to a driver we need to go here. They would then just go. They know the roads and the best way and how to read the locals. If we got stopped, we'd find a way out of it. You cannot do that now. Someone needs to know where you are and what you're doing, and you have to plan for likely events." (SME 11)*

SME 12, who previously worked as a Field Programmes Coordinator, talks reflectively about the experience of seeing security as prohibitive when in the field, though can now see its benefits, saying "I had this misnomer about security being prohibitive. It's not. It's procedural. It may impose restriction, but ones that keep people safe." They still acknowledged however that they can understand how it is prohibitive when field staff get "lost in doing paperwork than actually making impact."

There is a reference to the other sub-theme in that security procedures also take longer to ensure they are compliant, both with the organisation's guidelines but also to ensure that the organisation is meeting legal obligations. This is not factored in by senior management however, linking back to the first theme of a lack of buy-in, especially from management who are used to a different period. SME 09 was quoted above saying that not enough time is given to programme managers or officers in the field which results in security being rushed. One possible reason for this is captured while SME 07 talked about some of the issues between those in head offices and those in the field:

> *"In London, you look at a spreadsheet and assume there must be time to do the jobs you set. We have heads of streams [term used for senior management] doing this. You often hear them complaining why hasn't someone done something. There is this oversight of how long things can take in the field. I'm guilty here. But not as much as heads. I've known them to give country leads a day to review all risk assessments. That could be 12 40-page long documents, some of them for level 4 to 5 locations [context: a well-used scale on risk, 1 being the lowest, 5 the highest]. That is both unrealistic and also dangerous." (SME 07)*

Within this theme, there is a strong link between all sub-themes. We see that a lack of buy-in, mainly from senior management who have worked in the field prior to recent focuses on improving security management, which in term creates a disconnect and misunderstanding between programmes and security. This is not bridged by senior management, causing further issues when security is seen as limiting. This is especially hard to understand for those used to a more flexible way of working. Furthermore, procedures often take more time, which is not always allocated from senior management to those in the field who must follow the procedures, especially administrative ones such as risk assessments. Pressure on field staff to follow procedures within the time necessary then links back to a negative security culture, reducing buy-in and creating misunderstanding between security and programming.

Simplicity is key to effective adoption

The second theme to emerge from the data was that the list of requirements necessary for improving operational security should be kept simple to aid learning as well as for it to be adopted by the sector.

This sub-themes under this theme were concerned with how a list of requirements could be effectively adopted, as well as looking at barriers to their current adoption. The data collection revealed some currently unknown truths about the sector that had not been identified during the literature review and research design.

For the requirements list to be effectively adopted, there is a need for the overall list to be succinct, focussing only on the key requirements. The SMEs identified that the current list was idealistic on paper, though would unlikely be trainable to all staff as there is a limited capacity to learn:

> *"Is it realistic? I think on paper, yes. Training covers these areas. In reality, most staff lack many of the skills. Security is only one part of the job and often the last thing addressed. So when we talk about ensuring staff are trained, competent maybe, you have to assess how much do they really need to know and how much will they remember. Train the need to know first, everything else is additional." (SME 12)*

The sub-themes captured the need to both refine the list of requirements in general, creating a condensed list which would be easier to remember for field workers, but also highlighting a set the key requirements which could act as a foundation for effective operational security. By taking this approach, a set of foundation requirements could be utilised across the sector to increase interoperability, ensure staff have the base knowledge and skills to operate in high-risk areas and this can be continually assessed. Alongside this theme was the need to separate the requirements into preventative and reactive, stressing that good operational security is not just responding to potential threats but also ensuring that they are prevented, which is captured by SME 01, stating: "Realistically, good skills can prevent any danger occurring. And in the field, the, 80% is avoiding risk. Maybe even 90%. The other 10% is just responding to the really bad."

In reflection to the list in general, the SMEs related the requirements to the current situation, believing that most staff did not possess all the requirements presented to them. There was an acknowledgement that the job of the SMEs would be easier, however, if they did. There were various reasons for this:

- Security is a tool required to operate in high-risk environments, though should not take all the focus and therefore training needs to be proportional;
- Organisations deploy staff who lack requirements as there is pressure from programming;
- Staff have a limited capacity to learn and therefore are unlikely to be able to possess all requirements.

Overall, the lack of a requirements focussed approach causes security issues. Parallels were drawn between a lack of staff meeting the requirements and the difficulty it causes the SMEs in meeting their legal obligations. SME 08 stated: "Staff competence if we're calling it that, is critical to operating in those highest risk areas." Currently, however there is a limited competency, or requirements, based approach. Study 1 evaluated the current competency framework, which lacks greatly on security, providing the fewest number of requirements when compared with the other sources. As training does not focus on a model in which staff have to meet set requirements, or competencies as was originally stated in this study, it only focuses on awareness, differs between providers, as well as stays basic in the depth staff are trained to. SME 02, who also works as a security trainer in the sector, states:

> *"What is really important is the sector becomes more realistic about what training can achieve. If you try to get people trained in everything, they'll only have a basic understanding. Unless you have*

> *2-week courses. If you focus on some key areas, some key competencies that are critical to mission success or keeping people alive, then training providers can have a better go at ensuring staff are trained to a minimum level. A level of ability, not just understanding. That way we can say 'this person is competent in these 5 or so skills' and the courses can become pass or fail, rather than attend and pass." (SME 02)*

Therefore, it is necessary to identify those requirements which are key and act as a foundation for better operational security. This can then be used with training providers to assess field workers attending HEAT courses as well as allow content to be tailored so that the most important requirements are focused on in more detail.

Attaining Requirements Goes Beyond Classroom Training

The third theme relating to security requirements in general was that the current approach to security training needed to be changed and go beyond just classroom training.

The third theme concerned with the list of requirements in general focussed on how they could be obtained and the effectiveness of training. Though the previous theme identified that the requirements were trainable, there was also an acknowledgement the currently employed methods were not effective. This links back to the previous theme in which the SMEs described how some training is outsourced, especially Hostile Environment Awareness Training, which is harder to run in-house due to logistical difficulties. Training itself attempts to cover too many topics, only ever covering basic awareness of a range of topics, rather than being more focused on fewer key areas.

Though all requirements can all be trained, they only become effective when they are assessed, which is something lacking from training. Current training, namely HEAT of which the sector has largely turned to ensure staff are prepared for operating in high-risk areas (Persaud 2014), does not assess staff and none of the SMEs reported courses that passed or failed participants. One of the SMEs contrasts the way in which humanitarian workers deploy into dangerous areas the same way in which a firefighter is trained to enter a burning building to highlight the issues with training:

> *"So relate it to a firefighter. They wouldn't be allowed into a burning building without first training and then assessments. It's not a 'turn-up and pass' course, as my colleagues call it. If organisations are prepared to send their staff into dangerous areas, then why aren't they assessing their capability to operate in them? Why aren't people being turned away if they don't meet the criteria? The assessment needs to be rigorous and it needs to be realistic. HEAT courses are great at the training, but really, they should also make it a passable event. An assessment." (SME 11)*

Here, the SMEs agreed that a standardised list would give training providers a means of assessing staff which could be passed back to the organisation and allow an assessment of whether staff are ready to deploy. This would be helpful as many organisations contract HEAT courses out to external suppliers (Persaud 2014). Further, it would allow a means of continual assessment of staff in the field and when managers identify staff are not meeting set requirements, they can intervene, providing additional training or pulling them out completely. Both Good Practice Reviews make references to negative stress in staff causing them to make bad decisions and act in a reckless manner (Van Brabant 2000; Harmer, Haver and Stoddard 2010); having a list of requirements staff need to meet would give field management an additional means of assessing the ability for staff to operate in high-risk environments, on top of training prior to deployment.

Further to simulation training such as HEAT, there is a need for preparing staff to go further than a one-off course. Currently, training courses can be seen as a complete solution to ensuring staff are prepared, failing to neglect further methods:

> *"What you have to realise is training is the start of a process to equip staff. That has to be followed on, such as through field exposure, continual training and ensuring staff know the Standard Operating Procedures and Contingency Plans inside and out. We have this unhealthy tendency to see a course as a golden rooster, the answer to all our problems and a one-hit-wonder. But it really isn't." (SME 12)*

Rather, training should be a foundation in which key requirements can be built on. Simulation courses such as HEAT provide a means to develop requirements which relate to responding to threats, such as first aid and utilising communications systems, as well as being able to respond to pressure. SMEs contrasted responsive requirements with preventative ones, which they believed were better trained outside of the courses, such as at offices. Breaking down the requirements into reactive and preventative would allow simulation training to focus on developing ability rather than awareness, with preventative requirements being trained over longer periods in offices. Further to training, there needs to be a focus on assessing staff over a longer period, both whilst staff are in the field as well as on return. One of the SMEs also alluded to training methods that are not well used, such as mentoring (interesting, mentioned by Nonaka (1991) as a means of transferring tacit knowledge), in which a list of requirements could provide a means of structuring a mentoring approach. This could allow a structured approach of transferring tacit knowledge at the same time as improving understanding of explicit knowledge from less experienced field workers. Further development and discussion are needed on how Nonaka and Takeuchi's (1998) SECI model can be used to enhance training.

4.3.5 Themes within Each Requirement

The data collection in Study 2 identified further themes within each requirement. This allowed the descriptions for the recurring requirements from Study 1 to be refined and validated with SME input (Milton 2007). The individual themes within each requirement are presented in Figure 4.5, with quotes per theme provided in Appendix 5.4; final descriptions are in Table 4.5 below.

Table 4.5 Updated Requirements List with Descriptions in Study 2

Requirement		Description
1	Organisational security policy and procedures	A sound understanding of an organisation's Security Policies and a working knowledge of the procedures to be adhered to in the specific country of operations.
2	Socio-cultural and political understanding	A knowledge of the key area of the country's history and its impact on safety and security, including religion, culture and government makeup.
3	Trauma first aid	The ability to treat the most common forms of traumatic injury sustained in insecure locations, including those from gunshots and blast/explosions.
4	Communications	The ability to use an organisation's communications means (radios, phones, Sat-phone), and the ability to effectively relay critical information accurately in a timely manner.
5	Incident response	A knowledge of the recommended procedures and methods to respond to common threats and ability to follow them under pressure.
6	Common Sense	Having a good level of practical knowledge and the ability to make sound judgements and decisions in real time.
7	Situation awareness	Having a good sense of what is happening around you, in your immediate surroundings, and noticing changes in normal patterns of behaviour.
8	Stress management	Being able to deal with negative stress, both that built up over time as well as that experienced in intense and stressful situations, both during and after the event.
9	Cultural awareness	An ability to integrate yourself within the culture you are visiting, acting appropriately and without drawing attention to yourself or causing offence.
10	Security awareness	Understanding past threat history and being constantly aware of any potential threats or future threats that might affect yourself/your group and how these may develop.
11	Confidence	Being ready to speak up for yourself, your team and your organisation and understand when not to.
12	Team worker	The ability to cooperate and work for the benefit of the team, often putting team goals before your own, both with international and national staff.

Figure 4.5: Simplified View of Themes Relating to Requirements

1. Organisation Security Policy and Procedure
    - 1.1 A critical requirement
    - 1.2 Needs to be known by everyone
2. Socio-political understanding
    - 2.1 Understanding how context affects individuals
    - 2.2 Does not prevent risks occurring
    - 2.3 Not a key requirement
3. First Aid
    - 3.1 Basic first aid is not effective
    - 3.2 Less important than people believe
    - 3.3 Medical training on trauma, not just first aid
4. Radio Communications
    - 4.1 Radios are being less used
    - 4.2 Communication in general is important
    - 4.3 Technical skill on the most up-to-date method
5. Security Awareness
    - 5.1 Need to know how to respond to threats in their context
    - 5.2 Needs to be instinctive
6. Common Sense
    - 6.1 lack of common sense causes incidents
    - 6.2 Common sense is about decision making
    - 6.3 Common sense cannot be defined
7. Situation awareness
    - 7.1 Maintaining situation awareness is challenging
    - 7.2 Understanding atmospherics affects security
8. Stress Management
    - 8.1 Good stress management is key for responding to incidents
    - 8.2 Better understanding of unhealthy than of healthy coping techniques
9. Cultural Awareness
    - 9.1 Lack of cultural awareness causes threats
    - 9.2 Cultural awareness is not complex
10. Confidence
    - 10.1 Confidence at the right time
    - 10.2 Confidence to question management
    - 10.3 Overconfidence is dangerous
11. Security Conscious
    - 11.1 Consciousness needs to be translated into practical actions
    - 11.2 to be up-to-date of current risks, not historical ones
    - 11.3 Complacency opposes security consciousness
    - 11.4 Awareness is easier in highest risk environments
12. Team Worker
    - 12.1 Being able to work in multicultural teams
    - 12.2 Team work improves awareness

4.3.6 Discussion

General Discussion

There are several underlying issues with operational security identified by the SMEs, not all of which had been identified during the literature review. Theme 3, 'Attaining requirements should go beyond just training', covers some areas brought up by Persaud (2014), though highlights that SMEs are aware of this issue. The participants identified that they are under pressure to ensure staff meet training needs, even though the approach is not ideal. None-the-less, SMEs were aware that there are humanitarian workers deploying overseas who they deem are not suitable to go to high-risk areas, though there is no current framework for identifying suitability.

One key area that needs to be developed into the recommendations is that for any requirements list to be effective it needs to be simple and cover the basics, or the 'need to have', with additional requirements being identified as the 'nice to have'. The initial view of several of the SMEs was that the list was reaching too far and that it would be unachievable for most field workers to possess all the requirements, even those who had been working in the sector for a long period of time. Participants themselves commented on the need for further research in this area.

Though none of the participants identified that humanitarian's workers resisted security knowledge, they did identify that there was a misunderstanding that, along with a negative security culture, created a conflict between security management and programming. A connection can be made between this misunderstanding and what Daudin and Merkelbach (2011) identified when stating that field workers resist standards that differ from their own. Many of the SMEs wanted the opportunity to better explain the role of the security department to staff but felt this was not prioritised by senior managers.

The study provided a good opportunity to expand the definitions of the requirements even though this was not the studies primary aim. This provides a further expansion on explicit knowledge, utilising the SMEs build up knowledge to enhance what is recorded in books. In almost all instances, expect the shorter interviews in which the participant was rushed, the SMEs expansion of the descriptions went beyond what was recorded in the key texts in study 1. This highlights that not all explicit knowledge is captured in texts and a good proportion resides within experts.

Elicitation of Knowledge

The aim of the study was to validate the list of requirements as a realistic interpretation of the explicit knowledge on security in the sector. The study was both effective at validating the list, with no requirements being selected as inappropriate or unlikely to have come from the data sources, but also at refining the definitions of these requirements. The themes which emerged from the individual requirements allowed a better understanding of the data from Study 1 on how they are viewed by the SMEs, who are the most likely group who will be training deploying staff.

Though the study collected data on SMEs views of the requirements, which has not been conducted before, the knowledge can still only be classed under Nonaka's (1991) definition of explicit as it was easily described and therefore transferred; the refinement process does not produce tacit knowledge and is still classified as Combination (Nonaka 1991).

Utility

The study provides useful findings for practical applications on how the requirements list from Study 1 can be operationalised in the future. These findings form a central theme for the overall recommendations in Chapter 6. As the SMEs came from a range of organisations across the sector, the view they expressed can be generalised across the domain and as such the results transferred to the broader sector. The SMEs selected also came from non-UK based organisations, broadening the transferability of the findings from Study 1. However, only English-speaking SMEs took part, therefore excluding the transfer of results to national humanitarian organisations who do not have such staff.

In-depth interviewing requires a greater amount of skills and practice, compared with other forms of interview research such as structured interviews (Hofisi, Hofisi and Mago 2014). It cannot be assumed that anyone is able to undertake a successful in-depth interview. Furthermore, a strong understanding of the domain is required. This was built up both through previous work experience, but also through Study 1. A key future research recommendation is to ensure academic knowledge on the subject is built through systematic document analysis prior to conducting in-depth interviews. With the appropriate preparation, it is possible for even novice researchers to conduct successful in-depth interviews (Morris 2015).

As no set list of questions is followed, the way in which the researcher follows up points with further questions is inherently bias and subjective which effects replicability (Hofisi, Hofisi and

Mago 2014). To provide transparency on this the templates contain transcribed chunks of text to provide context to the themes, found in Appendix 5.3 and 5.4. These present an overview as it was not possible to include all transcribed text.

The only resources required were the interview guide and a Dictaphone. The study did not require face-to-face interaction, with video messaging used to conduct remote research.

Sensitive Domain Issues

Though the interviews took longer than initially planned, the pace and length were dictated more by the participants than researcher; participants were able to close the interview when they felt fit. The results were a deep understanding of the phenomenon and were therefore acceptable in terms of the researcher's time also. Though some authors suggest informal interviews be conducted over multiple sessions (Gringer and Taylor 2012; Cronin and Earthy 2008), doing such would not have been deemed acceptable in taking up participant time. Single session interviews with 11 SMEs was deemed to provide a good saturation of the issue and more reliable than single-expert interviews (Burton et al. 1990).

No personal ethical issues were present as the participants were not asked about their personal experiences. However, over the course of the interview's participants did reveal shortcomings in security generally as well as reciting specific incidents. There was a need to ensure the chunks of text transcribed did not reveal this, with several participants stressing the need for the accounts to stay confidential: many participants referenced the 'Chatham House rule' when recounting actual experiences rather than generalisations.

Snowball sampling worked well. This is likely due to the close professional connections SMEs keep, both formally and informally (Kuhanendran and Micheni 2010). The snowball referrers were able to promote the research and allow access to participants who would have otherwise been inaccessible (especially those not based in the UK).

Most of the SMEs had a military or police background and were in a management role. The way in which humanitarian organisations look to ex-police and military has been discussed in the literature review, first identified by Brunderlein and Grassmann (2006). The implications of this are that the knowledge possessed by SMEs are specific to their previous domains and shaped by the role in management. This potentially means that the understanding of SMEs of the knowledge base, as well as the way in which they attempt to pass knowledge on, is not reflective of the way in which field workers understand this knowledge (Asger and Yousef 2015).

Development of Method

As with Study 1, if time permitted having the interviews transcribed and coded using Qualitative Data Analysis Software would have provided a further level of transparency and trustworthiness (Kaefer, Roper and Sinha 2015). The limitations previously mentioned- removing familiarity with the data, a focus on breadth rather than depth of analysis, as well as competence in using the software- would still exist (Silverman 2013), alongside the time taken to transcribe the interviews. Though there are established methods for ensuring anonymity to participants and organisations when transcribing (Corden and Sainsbury 2006b), such a process takes time and requires the transcripts to be scrutinised to ensure identifying details have not been leaked. Further, a large portion of the interviews focused on security in general and designed to establish trust and rapport between the researcher and participants (Clark and Kotulic 2004), which provided very limited benefit to the study aim.

4.3.7 Study Summary

A total of 12 in-depth interviews were conducted with Subject Matter Experts. These fitted the definition of 'academic expert' and fulfilled either roles as security advisors or security trainers within the sector. The study validated and provided context to the list of requirements from Study 1 and provide further depth on their meaning, as understood by the SMEs. The use of a template analysis provided further depth and an expansion to the requirement descriptions.

Methodologically, the interviews were a successful means of conducting face-to-face research within a sensitive domain when engaging with experts. Snowball sampling worked well in this context, where experts have both formal and informal networks between themselves. Knowledge developed both through practical application outside of the research as well as that developed academically in Study 1 was crucial in ensuring openness from the research participants.

This study also emphasised the importance of building a relationship with the participants, as recommended in Section 3.5.2. This included asking general security questions not related to the research aim as well as allowing the participants to talk around subjects they felt most passionate about. This method resulted in large amounts of grey data, however. Issues in transcribing this grey data were overcome by using template analysis rather than complete transcription. This also involved multiple listening's of the data, resulting in a much deeper understanding of what was said.

Strong knowledge, shared personal experience fostered trust and building a relationship with participants created stronger trust and rapport between the researcher and participants. This resulted in participants being open about flaws in the system which were not identified in the literature studied in Chapter 2. Three notable themes were identified.

First, there is a conflict between security and management. This leads to a lack of buy-in from management and negative security culture. These undermine security, which is not taken seriously. The participants echoed conclusions drawn from the literature in that security systems are seen as limiting by field staff and that the rigidity of procedures causes staff not to follow them. None of the participants stated that this was down to a disparity between the top-down and bottom-up knowledge, however.

Second, the key to the adoption of security requirements is simplicity. Previous attempts to improve security training within the sector have been over complicated and thus viewed sceptically by the participants. Attempting too much is counterproductive. Instead, a basic list of requirements would be more useful. This could then be used by both training providers as well as organisations to ensure staff are trained in the basics. Furthermore, the participants agreed that training was an optimal means of equipping staff with a foundation set of requirements. Simplifying any resulting list would also allow training to be more focussed, rather than general in nature; an acknowledgement that staff need to fully demonstrate a requirement rather than a simple acknowledgement of it.

The third theme acknowledged that training was a useful means of equipping staff with the requirements, but that in its current form it was ineffective. Most notably for this research, participants stated that the current training conducted should only be a starting point for ensuring staff possess the requirements, with additional methods being used in conjunction with this, such as mentoring. This creates a link between what was discussed in the face-to-face interviews and the conceptual framework as presented in Section 2.4. Further training could potentially utilise the SECI models processes on how knowledge is transferred between experienced and non-experienced staff, as well as how such knowledge is refined to be used to adapt security systems.

4.4 Study 3 Explicit Knowledge Survey

4.4.1 Introduction to Study

Where explicit knowledge passed down from the top of an organisation to those in the field do not match, there is the potential for the system to be weakened (Wilson 1995). Barnett (2004) stated that there was little input from the field level in security guidelines, which Daudin and Merkelbach (2011) stated meant those in the field resisted such standards. The aim of the study was to identify whether SMEs and field workers held the same importance for the requirements, which were applied to 6 scenarios developed from data on attacks against humanitarian workers (Humanitarian Outcomes 2016a). The study adapts the work of Sternberg (1995) and Busch (Busch, Dampney and Richards 2007; Busch, Flax and Richards 2006; Busch and Richards 2003) in using a quantitative survey to rate requirements of experts (SMEs) and non-experts (Field workers) against possible workplace scenarios.

4.4.2 Method

A survey was conducted with SMEs and humanitarian field workers by utilising an online and paper-based questionnaire. Questionnaires are often preferred in quantitative studies due to the ease in which participants can understand, interpret and complete them (Adams and Cox 2008: 19). However, due to their ease, they are sometimes of poor quality which affects the value of the results (Brown et al. 2003); effective design can eliminate this and offer an effective and objective way of collecting quality data (Boynton and Greenhalgh 2003).

Quantitative, Self-Completion Questionnaires

Questionnaires are a common data collection method used in surveys, offering a way of objectively collecting data on participants "knowledge, beliefs, attitudes and behaviour." (Boynton and Greenhalgh 2004: 1312). Quantitative questionnaires seek to gather data related to numbers and are often analysed using methods relating to statistical analysis (Creswell 2003). This study represents a *casual-comparative* form of research, where two or more groups are compared in terms of how they view an independent variable (Creswell 2003: 12). Questionnaires are best used to complement other methods (Adams and Cox 2008) and well suited to build upon and quantify the findings from exploratory research (Boynton and Greenhalgh 2004): in this case, the explicit knowledge identified in Study 1 and 2.

Questionnaires are relatively easy and cost effective to administer (Gallhofer and Saris 2007). They and are an objective way of understanding people's beliefs, knowledge or attitudes (Boynton and Greenhalgh 2004), presenting a view at a given time and space (Brown and Harris 2010). A key weakness of questionnaires is that the validity of the data depends on response rates (Baxter, Jones and Khanduja 2011). Several reasons can affect low response rates, such as design and question length (Baxter, Jones and Khanduja 2011; Boynton and Greenhalgh 2004). Though these are within the control of the researcher and can be reduced through good design (Boynton and Greenhalgh 204), there are also factors outside the control of the researcher, such lack of incentive to complete the survey (Blanke et al. 2004) or lack of interest in the topic (Arber 2001) but also if the questionnaire is on a sensitive subject (Arber 2001). Ultimately, "it is rare that everyone asked to participate in the survey will reply." (Brown et al. 2003: 264).

Where non-response occurs, there is a potential that sample size is compromised (Faber and Fonseca 2014). Where the non-response rate is high, the validity of the survey will be questionable; a significant difference from those responding to those not will create a bias in the results in which those taking part are more interested or vested in the topic and may not represent a complete sample (Arber 2001). Questionnaires are therefore undermined by sampling and non-response, which can be out of the researcher's control (Brown and Harris 2010).

Quantitative questionnaires should not be used on their own, especially when looking at a problem in-depth, as they often miss out context behind participant's answers (Adams and Cox 2008). This is important when dealing with a sensitive area; in a study on unauthorised access to systems using a mix of interviews and questionnaires, Adams and Cox (2008) concluded that participants were more likely to respond to interviews than questionnaires.

Though questionnaires are often believed to be objective (Adams and Cox 2008; Boynton and Greenhalgh 2004; Brown et al. 2003), Brown and Harris (2010) argue that there is still a degree of subjectivity on behalf of the researcher and their selection of the data.

Apparatus

A questionnaire was created in Bristol Online Surveys (BOS), the online survey platform used by Coventry University. It also provided an intuitive and easy to use platform, which required very little training prior. Further benefits included the ability to perform basic data analyse on the platform, which was ideal for speed and efficiency, as well as cost.

The questionnaire was kept simple in design as participants are likely to avoid aesthetically overwhelming surveys (Baxter, Jones and Khanduja 2011). Design of the questionnaire also considered the length of questions (less than 12 words), the ease of language and contained a visual guide of competition (percentage bar) (Boynton and Greenhalgh 2004). Further good practice from Brown et al. 2003) was followed to aid design and promote responses.

A layout diagram can be found in Figure 4.6.

Page 1 contained a short introduction: this contained the Participant Information Sheet containing all the key details about the project and the Participant Informed Consent form which explained how the data would be used. There was a single statement in which they had to click stating they gave their consent. This page was kept short to promote response (Boynton and Greenhalgh 2004). Page 2 gave instructions for completing the questions, as well as a description of each requirement. A downloadable summary of these was also provided as well as being provided as an expandable box for each question. Only basic instructions were provided to promote responses (Blanke et al. 2004).

Pages 3 to 8 contained the main questions. This included a short scenario blurb, and then a single matrix in which participants had to rate each requirement using the following 11-point Likert scale: 0 (not applicable) to 10 (highly applicable), 5 as the middle option (see Figure 4.7 below). Larger scales are better suited to understanding opinions on multiple factors (Gallhofer and Saris 2007; Abascal and Díaz de Rada 2014; Aiken 1996), with 7-points being the recommended minimum (Foddy 1994). Though untypical, 11-point scales increase reliability and validity over the frequently used 5-point scales (Pearce 2011). Participants could assign the same rating to more than one requirement, but every requirement had to have only one rating.

Page 9 contained 5 short demographic questions. The final page contained a thank-you message. Along with the snowball referrers selection process, this was used to determine if the participants met the inclusion criteria.

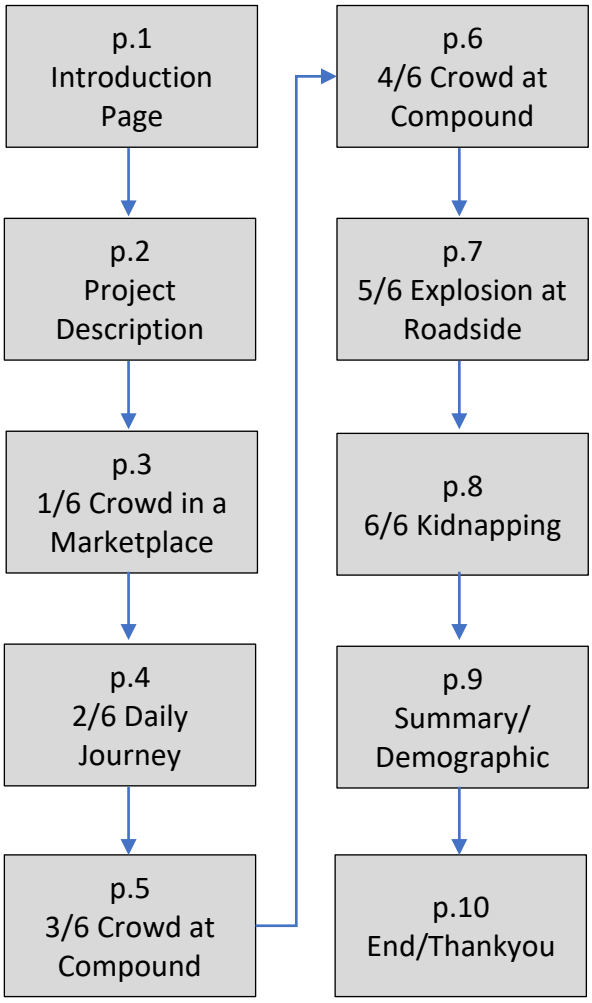
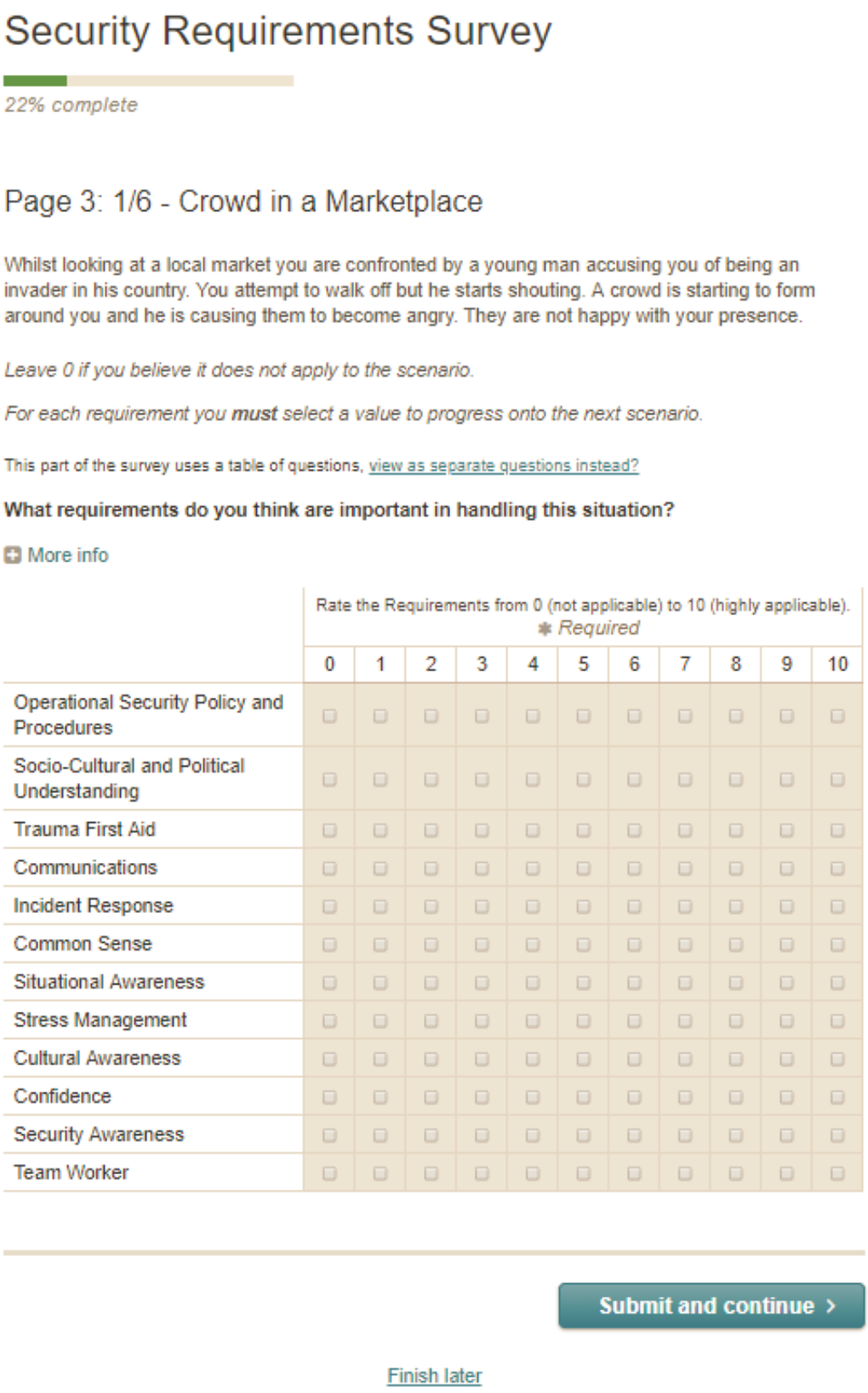


Figure 4.6: Layout of Study 3 Questionnaire

For the statistical analysis of the data (conducting the descriptive statistics, the Wilcoxon and T-tests), both SPSS and Microsoft Excel were used. Though statistics software such as SPSS is often preferred for research (Cavaliere 2015), Excel and other spreadsheets can be utilised to the same effect (Robson 1994). For this study, both Excel and SPSS were used, though Excel was found more intuitive: as the statistical analysis was relatively basic it was able to handle the tests performed (Robson 1994).

To create the Concept Lattices for the Formal Concept Analysis the software FCART was used (https://cs.hse.ru/en/ai/issa/proj_fcart).



Security Requirements Survey

22% complete

Page 3: 1/6 - Crowd in a Marketplace

Whilst looking at a local market you are confronted by a young man accusing you of being an invader in his country. You attempt to walk off but he starts shouting. A crowd is starting to form around you and he is causing them to become angry. They are not happy with your presence.

Leave 0 if you believe it does not apply to the scenario.

*For each requirement you **must** select a value to progress onto the next scenario.*

This part of the survey uses a table of questions, view as separate questions instead?

What requirements do you think are important in handling this situation?

More info

	Rate the Requirements from 0 (not applicable) to 10 (highly applicable). * Required										
	0	1	2	3	4	5	6	7	8	9	10
Operational Security Policy and Procedures											
Socio-Cultural and Political Understanding											
Trauma First Aid											
Communications											
Incident Response											
Common Sense											
Situational Awareness											
Stress Management											
Cultural Awareness											
Confidence											
Security Awareness											
Team Worker											

Submit and continue >

Finish later

Figure 4.7 Scenario 1 Question showing Rating Matrix in Study 3

Pilot

Prior to the questionnaire being distributed it was tested with two pilots, one a humanitarian field worker (and one of the snowball referrers and participants) and one not related to the humanitarian field or taking part in the survey. For both, the pilot and the researcher were sat side-by-side, which is a preferred method so notes on usability can easily be taken (Baxter, Jones and Khanduja 2011). The pilot tests aimed to identify usability and functionality (Blanke et al. 2004: VI). Usability considers whether the questionnaire is intuitive to use, and participants can complete the questionnaire correctly (in terms of the data input) and efficiently. Functionality concerns whether the questionnaire performs as expected, including the input of unexpected and unlikely entries to see if the platform works.

Pilot tests were split into two parts. First, they were asked to complete the survey as normal and the ease in which they answer questions, whether they had to reread instructions and if they were able to input the correct data naturally. This tested usability. The researcher observed this process, taking notes to make improvements. A second test was then carried out to test both the functionality as well as ask for feedback on specific researcher notes, such as feedback on questions they hesitated or struggled with. The pilots were also asked to identify spelling errors or ambiguous questions (Baxter, Jones and Khanduja 2011). Several functionality issues were identified, such as being able to leave questions unanswered or being able to enter multiple ratings. Several issues were identified and subsequently rectified. These were then corrected. The two pilots fed back that the instruction page was too long and complicated and would have put them off attempting. It was cut down to a few lines, with additional information provided in downloadable PDFs instead. Both pilots agreed this was a better option when presented with the edited version. The pilots stated the questionnaire was a good length and flowed well. The first pilot reported it taking (roughly) 16 minutes and the second 15 minutes, 34 seconds.

Ethical Information

Ethics was approved by Coventry University under certificate P31340 (Appendix 1.2). The Participant Information Form and the summary of the Participant Informed Consent were included on the first page of the survey (Appendix 1.2a). They could not proceed further in the survey unless they checked the statement 'I agree to my responses being used as described in the Participant Informed Consent form.' Therefore, by clicking on the box and clicking 'Submit and continue' they demonstrated their informed consent.

Supporting Materials- Security Scenarios

The requirements themselves demonstrate a study into explicit knowledge. To contextualise these, they were rated against 6 scenarios. Scenarios are an effective way of relating performance indicators (in this case requirement) against a likely situation (Alifantis et al. 2004).

Figures were taken from the Aid Worker Security Database on the 21st March 2016, which had been verified by the platform up to December 2014 (Humanitarian Outcomes 2016a). This identified the number of attacks, where they occurred and to whom. Figures were then compiled from the most up-to-date year (2014), as below:

Killed	121
Kidnapped*	120
Wounded	88
*Live release or escaped (if killed counted in killed statistics)	

Table 4.7: Humanitarian Workers Killed, Kidnapped or Wounded in 2014

Types		**Forms**	
Kidnapping	54	Individual Attack	50
Shooting	50	Ambushes	48
Bodily Assault	32	Raids	18
Explosives	16	Other	36

Table 4.8: Types and Forms of Attacks on Humanitarian Workers in 2014

Note: The data of the tables do not match. The total recorded number of attacks against humanitarian workers is documented as 152. Where Table 4.8 and Figure 4.8 state 'Other', this denotes they were undocumented on the Aid Worker Security Database.

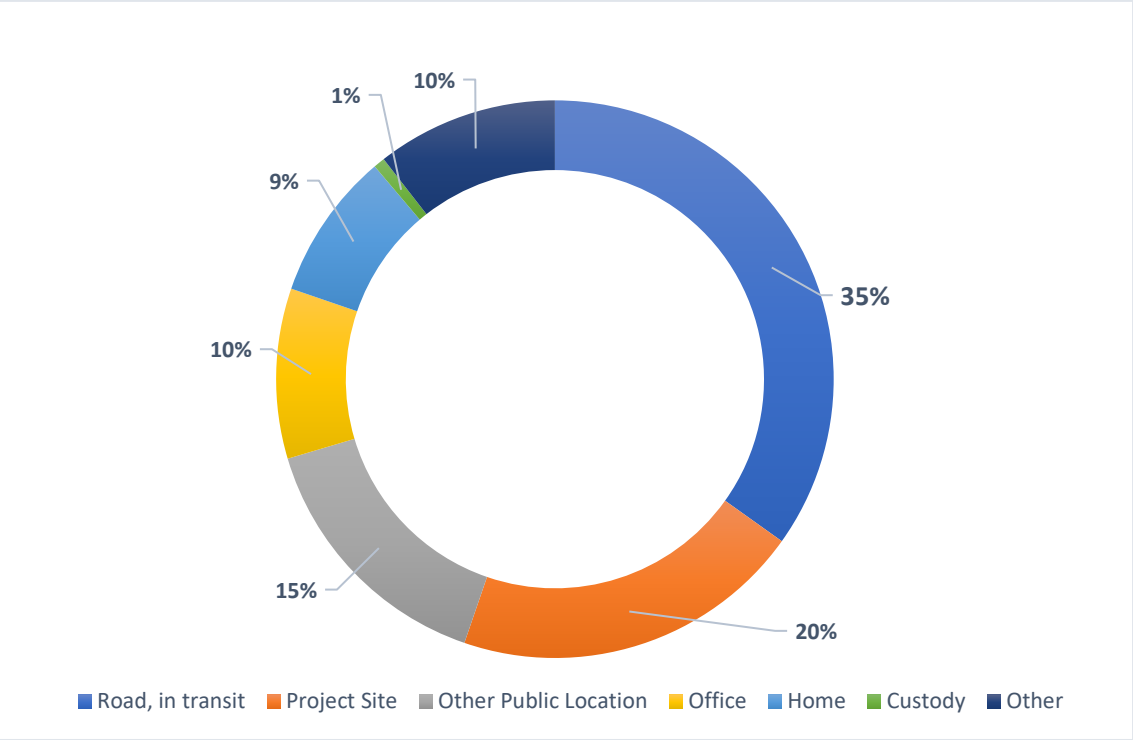


Figure 4.8: Locations of Attacks Against Humanitarian Workers in 2014

From compiling the above information, 6 scenarios were created:

Scenario 1: Crowd in a Marketplace

Scenario 2: Daily Journey

Scenario 3: Crowd at Compound

Scenario 4: Attack at Project Site

Scenario 5: Explosion at Roadside

Scenario 6: Kidnapping

Narrative of attacks was taken from the available *Aid Worker Security Reports* from 2013 (Harmer, Stoddard and Toth 2013) and 2014 (Harmer, Ryou and Stoddard 2014). This allowed a picture to be built of the types of attacks that occurred, how they occurred and when. Further, supplementary narrative was provided by first-hand accounts through the Aid Worker Security Database (Humanitarian Outcomes 2016a) and the associated news articles (for instance, BBC 2010).

Through this narrative detail, descriptions were given to the scenarios:

Scenario 1- Crowd in a Marketplace:

Whilst looking at a local market you are confronted by a young man accusing you of being an invader in his country. You attempt to walk off, but he starts shouting. A crowd is starting to form around you and he is causing them to become angry. They are not happy with your presence.

Scenario 2- Daily Journey:

You have been travelling to a project site for two weeks. On the journey, you often pass through a bustling morning village market place where your team sometimes stops to buy provisions. Today as you approach the village, the marketplace is very quiet. There are some men and women in the street going about their daily activities, but a local playground is empty.

Scenario 3- Crowd at Compound:

You are in your compound after a day on project. A large group of people have gathered at the main entrance gate of the compound. Some are armed with guns and machetes. You cannot understand what they are saying but they are becoming more aggressive to the gate guard.

Scenario 4- Attack at Project Site:

While working on a project site two 4x4s drove by your position firing assault rifles and throwing grenades. You have several casualties, both your own and locals.

Scenario 5- Explosion at Roadside:

You are travelling in a convoy of three organisation vehicles along a secluded strip of road some miles from your base of operations. You are in the last (third) vehicle in the convoy. Suddenly there is a large explosion, which detonates between the first and second vehicles. After this explosion, you hear screaming.

Scenario 6- Kidnapping:

While travelling along an outlying city road you are ambushed by a large group of armed assailants. They get you out of your vehicle and bundle your team into two separate trucks and speed off. You are in one of the open back trucks with a few members of your team. You are guarded by two armed but young gunmen.

The scenarios gave context to the participants, allowing the requirements to be measured against potential and realistic security incidents rather than by themselves; this method allows experts to provide a greater depth to answers (Milton 2007).

Study 1 showed that many of the requirements are concerned with preventing danger or be able to perceive when a situation could be dangerous, which was also corroborated during the SME interviews in Study 2. The thematic analysis brought out that the requirements should be split into preventative and reactive. This has been built into the scenarios, with 1-3 presenting a situation which could be potentially dangerous though have not resulted in harm. Scenarios 4-6

present a situation in which the participant's life is in direct danger after a security incident has occurred.

This mix of pre-event and actual events in the scenarios will allow a broader understanding of how the explicit requirements support operational security.

Participants

A similar approach to participant recruitment was used in Study 2. A purposive sampling technique identified field workers with enough experience to add valuable knowledge to the research, who were engaged with through snowball sampling. Brown et al. (2003) state that purposive sampling suffers when collecting quantitative data as it limits the sample size, and therefore it will give a reduced estimate of the whole populations view and affect the accuracy of the results. Though this would be an issue, with the sample size being small generally due to the inclusion criteria, the experienced of the participants would be able to contribute valuable data, in line with recommendations from Chapter 3.5 on researching sensitive domains. Further, as this study formed part of larger research, the fact the sample size would not be representative of the whole population was deemed less significant than identifying how views differed.

The following inclusion criteria were in place for the Study for the Field Workers:

- At least 5 years experience in the humanitarian sector;
- Working, or have worked within the last year, in a field role;
- Not have direct security responsibilities;
- Have worked in at least one of the following insecure environments in the last 2 years:
    - Yemen;
    - Central African Republic;
    - Kenya;
    - The Democratic Republic of Congo;
    - Somalia;
    - Sudan;
    - Pakistan;
    - South Sudan;
    - Syria;
    - Afghanistan.

The above country list was selected as it resembles the countries with the most attacks on humanitarian workers in 2013 (Harmer, Ryou and Stoddard 2014: 2). The list for 2014 and 2015 only listed the top 5 countries, which would have likely limited the potential sample size dramatically.

Snowball sampling was used. Five snowball referrers were identified who matched the above and engaged with. The project was explained to them, its aims and how the research will be conducted. The considerations in place surrounding the sensitivity of the research were also explained. Potential snowball referrers were then asked if they would want to take part, as a participant as well as to refer on eligible candidates. Participant Information Leaflets were given out. They were also taken through the inclusion criteria and told only to select those who matched exactly.

As snowball sampling was used, the exact number of field workers contacted by the referrers to take part is unknown. Between the five snowball referrers, the estimated number of potential participants the survey was sent to was 130-150 people. With 39 responses, this equates to a 26-30% response rate. 3 participants of the 39 did not meet the inclusion criteria (or did not clearly show they met the inclusion criteria during the demographic questions) and were excluded. The final number of field workers meeting the inclusion criteria is 36. Of those selected for analysis, they represented experience from across all the identified high-risk countries, with 17 respondents having more than 6 years' experience in the field, including 6 with 11-20 years' experience and 3 with more than 21 years' experience in the field.

There is no effective means of identifying the maximum possible sample size of humanitarian workers matching the inclusion criteria. High staff turnover, often on short-term contracts, mean organisations themselves do not always have a clear understanding of the pool of workers they have (Richardson 2006). Further, Caccavale et al. (2017) state that insecure countries attract a smaller number of humanitarian workers than elsewhere, meaning the pool of humanitarian workers who have experience in the highest risk countries (those as part of the inclusion criteria) is relatively small.

The same inclusion criteria from Study 2 was used for the selection of security SMEs. The original SME snowball referrers were contacted, as well as 6 of the SMEs who were engaged with the research. They were all asked to complete the questionnaire and send to two other SMEs matching the inclusion criteria (this step was done after the collection of field worker questionnaires, and therefore this method aimed at matching the field worker sample size). On

top of the 23 questionnaires completed this way (only 1 less than expected, a response rate of 95%), an additional 15 were handed out in paper form at an NGO Security Forum held in October 2016, with 11 being returned (a 73% response rate). A total of 34 SMEs responded completed the questionnaire; these were transferred to Bristol Online Surveys manually.

Procedure

Data collection took place between the 26th August to the 15th October 2016, hosted by BOS. The data collection was split into 3 stages:

1. Snowball referrers were contacted by phone. The study was reintroduced, and the inclusion criteria were explained (as per *Participants* above). It was explained how they should distribute the questionnaire. After the call they were emailed a survey link;
2. The questionnaire went live on the 26th. It was only accessible through the link provided and would not appear in the BOS search results, therefore preventing anyone not chosen by the referrers (and therefore unlikely matching the inclusion criteria) completing the survey. The survey closed on the 15th October 2015 to allow time for data analysis;
3. Once the survey was closed a thank you email was sent to the snowball referrers for them to forward onto those they selected.

Wilcoxon Signed Rank Sum Test

The Wilcoxon signed rank test (herein, Wilcoxon test) was carried out, both because of its suitability for ordinal data (Cleophas and Zwinderman 2011) but also because of its statistical power on small samples with extreme skews (Bridge and Sawliowsky 1999). The method was also used in one of Busch's studies (Busch, Flax and Richards 2006) and was deemed suitable for understanding whether the way in which experts and non-experts rate certain factors.

Nonparametric methods are useful as they can be conducted with no assumptions about the format of the data; in this case, assumptions required for parametric methods were not valid (notably that there was no normal distribution and no homogeneity of variance) (Siegel 1956). Nonparametric methods are also a simpler form of statistics, which are suited to small sample sizes and can be carried out with limited statistical ability or software (Ball and Whitley 2002).

The Wilcoxon test permits two-tailed tests of statistical significance between two groups, where there are two nominal variables and one measurement variable (Hawkins 2014). In this case, the two nominal variables was the participant (SME or Field Worker) and the requirement, and the measurement variable was the requirement rating.

The Wilcoxon test required the computation of the W-statistic. A benefit of the method is that this can be done by hand and does not require statistics software. Ball and Whitley (2002) provide a procedure for doing this. The test was performed in Excel, using the following formula: $W=min\{W+, W-\}$. W refers to the test statistic, which is the smaller of the two ranked sums (W^+ the higher, W^- the lower) (Siegel 1956). The five-stage approach suggested by Ball and Whitley (2002) was followed. For the analysis, the alpha value (α) is set at a significance of 0.05.

Though Wilcoxon tests are able to identify statistical significance based on the median values and provide a simplistic statistical analysis means, the possibility of Type I errors still exist. Conducting posthoc tests also allow a more stringent analysis beyond the conventional $p<0.05$ (Perneager 1998). Where statistical significance is noted, a Tukey Test will be conducted (Tukey 1949). A Tukey Test was chosen as it allows an analysis where significant differences lie within the dataset through an analysis of the means. Though this requires more work, using statistical analysis on both the medians cross the scenarios and means within the scenarios providers analysis from multiple angles (Montgomery 2013; Benavoli, Corani and Mangili 2016).

Wilcoxon tests are conducted using the following process (as stated by Ball and Whitley 2002):

1. State the null hypothesis: there is no significant difference in the medians of SMEs and Field Workers ratings, or the difference in the median will be 0; there will be no difference or an equal number of values above and below 0;
2. All observations are ranked in increasing order of magnitude. Where two or more observations have the same value, they are given as an average;
3. Values assigned either + or – depending on whether it is above or below the hypothesised value;
4. The following are calculated:
   W+: the sum of all positive ranks;
   W-: the sum of all negative ranks;
   W: the smaller value of W+ and W-.
5. Calculate appropriate p-value.

Formal Concept Analysis

Though surveys are often analysed through quantitative methods (Creswell 2003), the study of knowledge is often ill-suited to numerical analysis (Busch, Flax and Richards 2006). Due to its atypical nature, purely quantitative analysis on knowledge can reduce results to the extent the

meaning of the data is lost (Busch 2008). A solution posed by Busch throughout several research projects on explicit and tacit knowledge (Busch and Richards 2003; Busch, Flax and Richards 2006; Busch, Dampney and Richards 2007) is analysing quantitative data on knowledge using a qualitative method, which creates a more meaningful analysis of the data (Busch 2008).

Formal Concept Analysis (FCA hereafter) is a mathematical framework based on lattice theory which presents the relationship between concepts (Kumar and Singh 2014). It was chosen in this study as it models the knowledge relationships in a visual format (Busch, Flax and Richards 2006), as well as allows an identification of formal concepts (Ganter, Stumme and Wille 2002): in this case, a relationship between requirements and scenarios, which can be compared between Field workers and SMEs. Though FCA started as a mathematical tool it is now being used widely is a variety of other fields (Bělohlávek 2008), including the study of knowledge (Busch and Richards 2003).

The basic language for Formal Concept Analysis (as stated by Willie (1982), originally in German) is as follows:

Objects (G);

Attributes (M);

The relationship between G and M (I).

The combination of (G, M, I) is referred to as a formal Context (K). This also represented a single-valued context, where attributes are yes/no values. Where attributes have a fuzzy value (i.e. numerical), it is referred to as a multi-valued context with the addition of Attribute-values (W). Thus, a multi-valued context is expressed as K = (G, M, W, I).

To create the concept lattices, the many-valued context (G, M, W, I) that the survey questions create need to be reduced into a single-valued context (G, M, I) (Ganter, Stumme and Wille (2002). This is often done by means of conceptual scaling (Ganter and Wille 1989). However, there is growing use of logical scaling: scaling which applies logic over mathematical processes, where data is reduced because of its meaning to the study (Prediger 1997). Though there is no automatic to convert multi- into single-valued context (Prediger 1997), the reduction must still represent the data in a meaningful way (Busch, Dampney and Richards 2007). For this project, rather than a conceptual scaling a logical scaling was chosen in which the top 3 (top quarter, using the mean as the quantifier) of the requirements chosen were selected and plotted onto

context tables (Kumar and Singh 2014). An analysis on the top 6 attributes/requirements was conducted but proved too complicated to present the findings clearly, overruling the benefit of using FCA on quantitative data (Busch, Dampney and Richards 2001). This method of scaling is subjective and requires some insight into the field to know what is important and what is not (Prediger 1997): here, the exclusion of the bottom 9 requirements allowed a reduction in the total number but left enough for a valid analysis. It is noted that in converting the many-valued context, which is a qualitative measure, to the single-valued context means the data loses its statistical meaning: this process is a necessary step (Busch and Richards 2003) which is negated by the benefit FCA provides in allowing a more 'meaningful' interpretation of the data along non-mathematical lines (Prediger 1997).

The minimal use of equations is purposive in this study to focus on the qualitative analysis of the findings: most of the computations are carried out by the software used (FCART), but Bělohlávek (2008) provides detail on calculating FCA manually.

FCAs two primary outputs are concept lattices, which are a visual representation of the formal concepts (K= (G, M, I)) and attribute implications, which describe a dependency derived from the data (Bělohlávek 2008). In this study, attribute dependencies would highlight the attributes (M, requirements) the participants felt were most important.

4.4.3 Results

A total of 70 questionnaires were returned: 34 from Field workers, 36 from SMEs. A total of 420 rating matrixes were completed. Low sample sizes (typically, less than 300 (Kline 1986)) challenge the reliability of questionnaires (Samuels 2015; Faber and Fonseca 2014). Due to the low sample size, not all quantitative analysis methods are suitable (Siegel 1956): the Wilcoxon nonparametric statistical test is suitable for small sample sizes (Bridge and Sawilowsky 1999; De Winter and Dodou 2010). It can also identify where there is a statistical difference in ordinal data (Cleophas and Zwinderman 2011), such as the scale rating used. It has been used herein to identify if there is a difference in the way Field workers and SMEs rated the requirements per scenario. Tukey Tests were run where statistical differences have been identified.

Descriptive statistics were run on the data sets, following the method outlined by Ali and Bhaskar (2016). This allowed the identification of the medians across scenarios for both SMEs and Field Workers. An example of this is provided in Figure 4.9 below. Further details of the descriptive statistics are provided in Appendix 6.1.

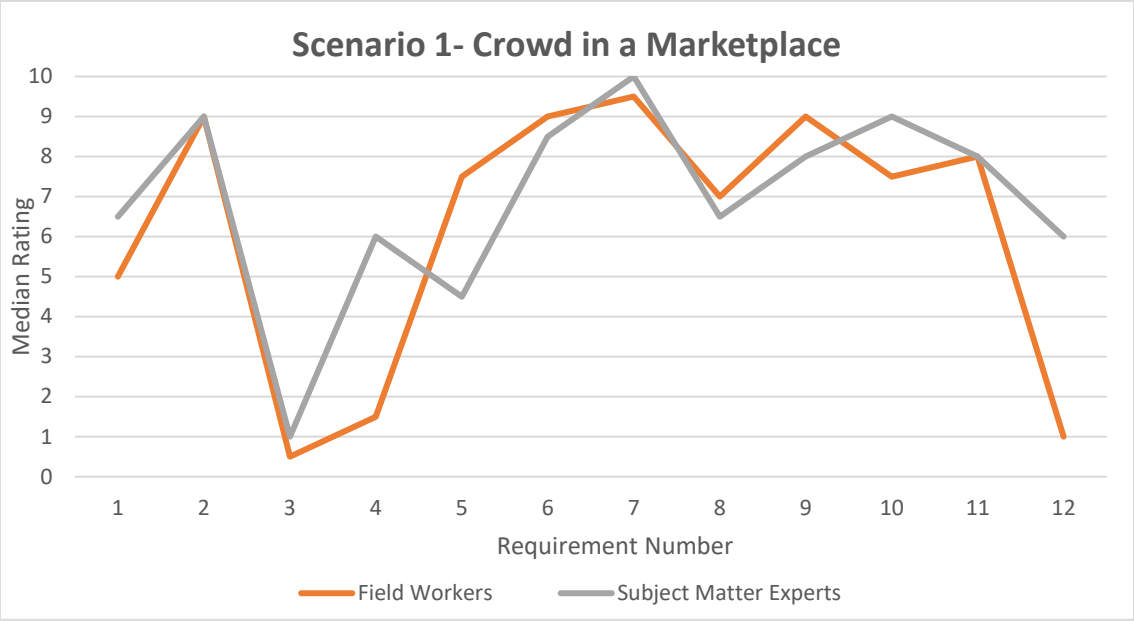


Figure 4.9: Comparison of Medians for Scenario 1

Wilcoxon tests were carried out across all 6 scenarios comparing the median ratings of SMEs and field workers. Table 4.6 shows the results of the test. The number of observed pairs (N) refers to non-zero ranked differences; where the W^+ and W^- equal zero, they are excluded (Hawkins 2014). For observed pairs above 20, normal approximation is used. Critical Values for the W statistic use the values established by Far (1999: A101). The values provided in Table 4.6 below relate to 2-tailed tests with a 95% confidence rate ($\alpha = 0.05$). The tests allowed the identification of the W values. Where these are equal or less than the Critical Values, a statistically significant rating is observed. P-values have also been provided for comparison.

	Number of observed pairs (N)	Critical Value for observed pairs (N)	Wilcoxon Signed Rank Test W-value	p-value
Scenario 1	10	10	18	0.3329
Scenario 2	12	17	37.5	0.9063
Scenario 3	10	10	22.5	0.6103
Scenario 4	10	10	8	0.0469
Scenario 5	10	10	7	0.0367
Scenario 6	8	5	7.5	0.1415

Table 4.9: Results of the Wilcoxon Signed Rank Sum Test

There was a significant difference in ratings in two of the scenarios: Scenario 4 (W (10) = 8, p > .05, two-tailed) and Scenario 5 (W (10) = 7, p > .05, two-tailed). No other significant effects were observed in the other scenarios.

Post-hoc tests were run using the Tukey procedure (Tukey 1949). Though it is acceptable to only run posthoc tests on observations where a statistically significant difference was identified (Perneger 1998), they were run on all scenarios to identify where the differences lie. A summary of the means identified between ratings for SMEs and FWs is shown in Appendix 6.2. Though post-hocs reduce the number of Type I errors, they do risk increasing the number of Type II errors (Perneger 1998).

Application of the Tukey Test to each of the requirement per scenario highlighted that there are statistical differences between requirements within scenarios. An example of this is provided in Table 4.10 below. However, this does not provide enough evidence to show that there is, on a whole, a difference in the way in which SMEs and Field Workers rate the requirements. In such instances, qualitative and graphical analysis can often be more useful in identifying deeper meanings within the data (Busch, Flax and Richards 2006).

A logical scaling approach was used to select the number of attributes. As discussed, this method of scaling loses the statistical meaning in order to provide a more meaningful interpretation of the data.

Scenario 4				
Requirement		**FW Mean**	**P-value**	**SME Mean**
1	Organisational security policy and procedures	8.277	0.539	8.029
2	Socio-cultural and political understanding	4.555	8.941×10^{-4}	2.029
3	Trauma first aid	8.972	0.764	8.882
4	Communications	8.416	3.4×10^{-4}	9.676
5	Incident response	8.222	0.231	8.676
6	Common Sense	8.666	8.901×10^{-6}	6.411
7	Situational awareness	8.805	0.509	8.558
8	Stress management	9.166	9.004×10^{-5}	7.411
9	Cultural awareness	4.5	0.004	2.323
10	Security awareness	5.611	0.042	3.970
11	Confidence	7.972	0.232	9.029
12	Team worker	7.722	0.266	8.235

Table 4.10: Statistical Differences between Means of Requirement Ratings

Table 4.11 and 4.12 below show the Context (K) Tables depicting the relationship between G (Objects), M (Attributes) and I using the top 3 requirements for Field workers and SMEs.

		Attributes (M)											
Objects (G)	Requirement	1	2	3	4	5	6	7	8	9	10	11	12
	Scenario 1		X				X	X					
	Scenario 2						X	X				X	
	Scenario 3						X	X				X	
	Scenario 4			X				X	X				
	Scenario 5			X				X	X				
	Scenario 6							X	X				

Table 4.11: Context Table for Field workers

		Attributes (M)											
Objects (G)	Requirement	1	2	3	4	5	6	7	8	9	10	11	12
	Scenario 1		X					X			X		
	Scenario 2				X			X				X	
	Scenario 3				X			X				X	
	Scenario 4			X	X							X	
	Scenario 5			X	X							X	
	Scenario 6	X							X				X

Table 4.12: Context Table for SMEs

As can be seen from the Table, the following common formal concept clusters exist:

($\{G_1\}\{M_2\}$), ($\{G_4, G_5\}\{M_3, M_4\}$), ($G_1, G_2, G_3\}\{M_7\}$), ($\{G_2, G_3\}\{M_7, M_{11}\}$), ($\{G_6\}\{M_8\}$).

The algebraic equations above show that the two groups agree on 5 different formal concept clusters, though there is no strong agreement. An example of a strong agreement would be a large number of G and M values per cluster, such as ($\{G_1, G_2, G_3, G_5\}\{M_1, M_3, M_4, M_5, M_6, M_{10}\}$) (Bělohlávek 2008). No attribute implications existed with each or between both datasets.

Though a brief analysis to search for concept clusters shows that there is a weak similarity (less than 4 formal concept clusters), an analysis of the concept lattices allows the identification of hidden concepts that are not easily visible (Ganter, Stumme and Wille 2002). Figure 4.9 and 4.10 show the concept lattices for Field workers and SMEs respectively. To read the lattice, it is necessary to start at the top and read downwards: objects/scenario (green) flow down, while attributes/requirements (red) flow up. As can be seen, when comparing the two lattices there are no strong or evident correlations. The visual nature of the lattices makes it preferable for qualitative analysis (Busch and Richards 2003), though in this case there are no interesting results identified through the lattices that were no evident from the context Tables. The extent of the disparity in rating is shown on the combined lattice diagram shown in Figure 4.11.

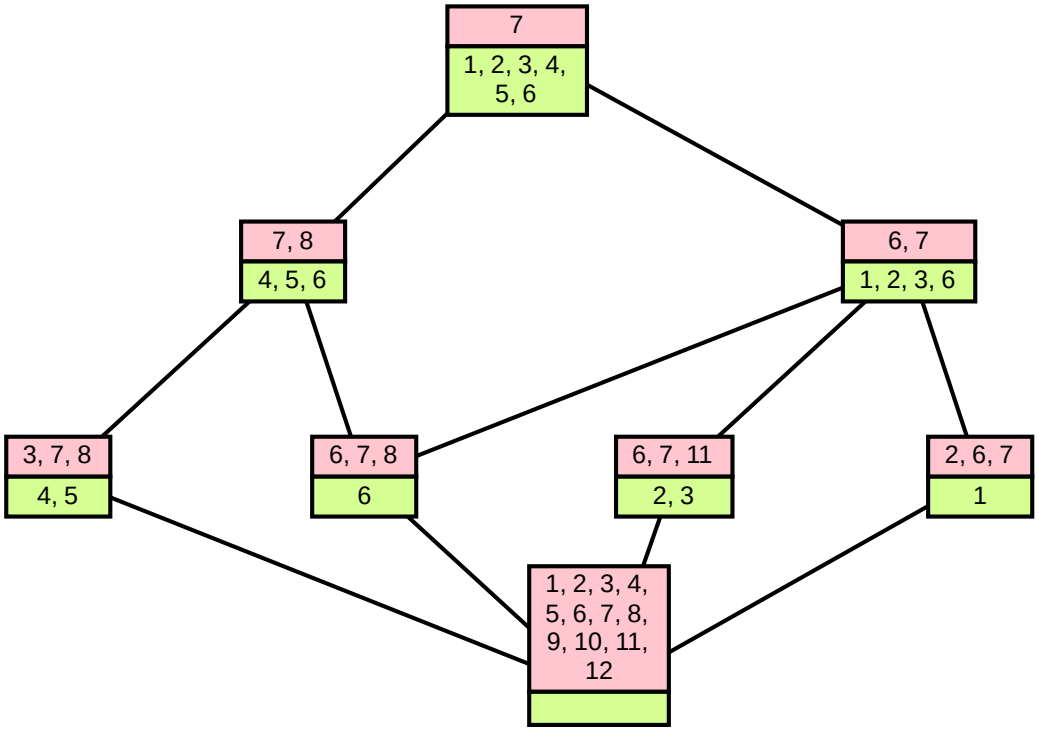


Figure 4.9: Lattice Diagram showing Relationships between Scenarios (Objects, green) and Top-3 Requirements (Attributes, red) for Field workers

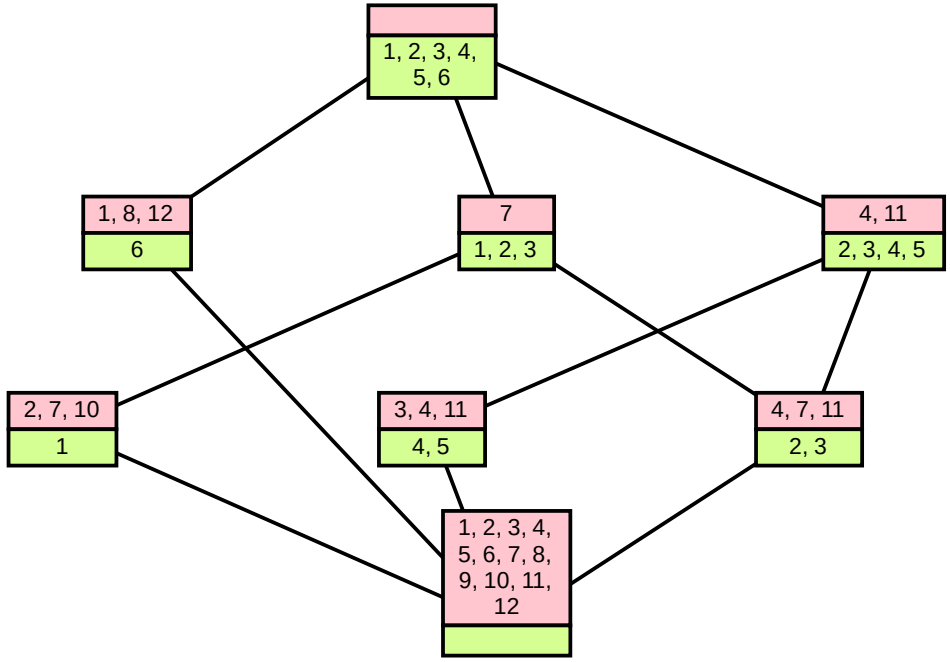


Figure 4.10: Lattice Diagram showing Relationships between Scenarios (Objects, green) and Top-3 Requirements (Attributes, red) for SMEs

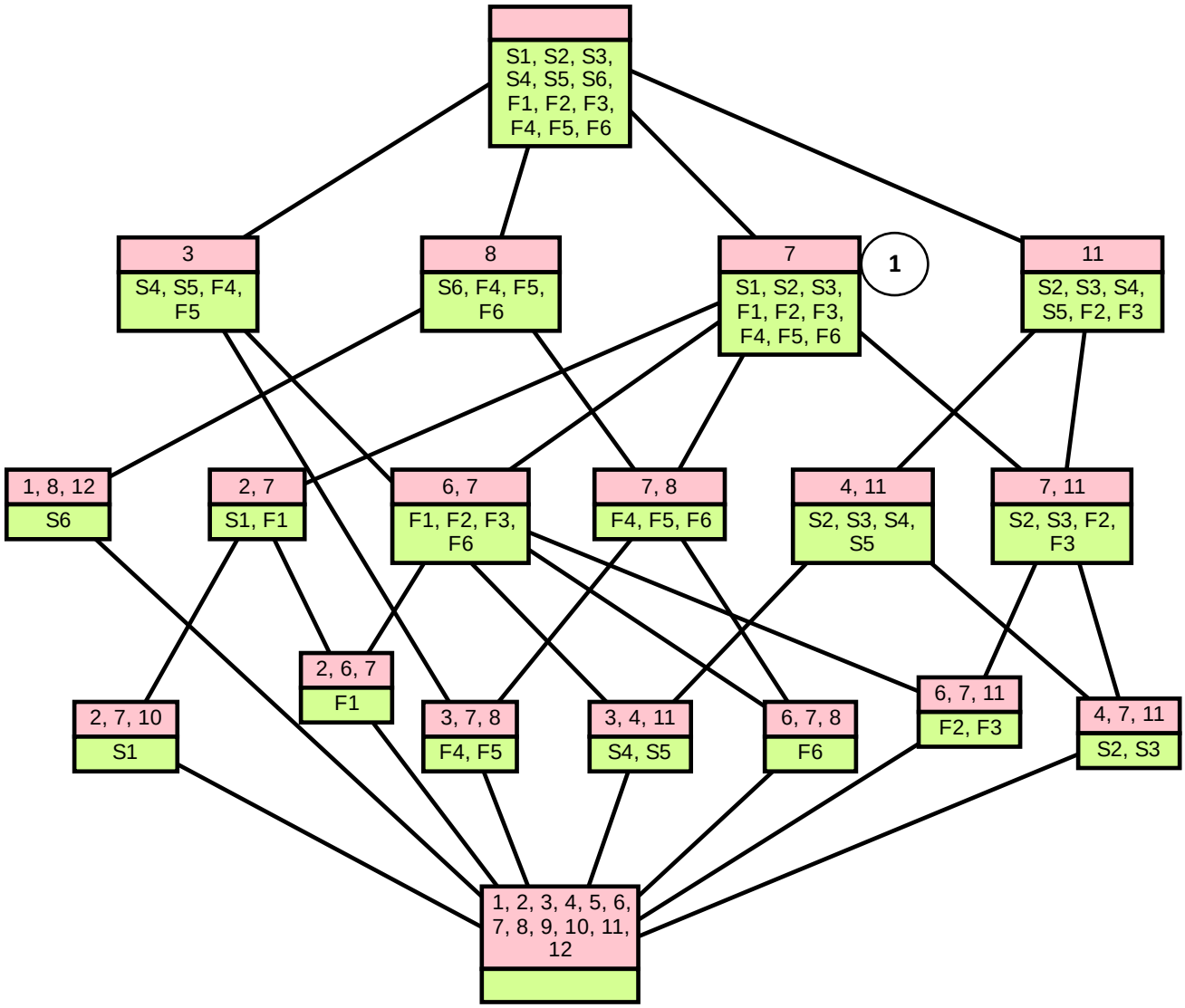


Figure 4.11: Lattice Diagram Comparing Ratings of SMEs and FWs of Top-3 Requirements (Attributes, red) per Scenario (Objects, green, S=SME, F=Field worker).

As can be seen in Figure 4.11, there are few links between the ratings of SMEs and Field workers. The only Attribute (requirement) that had a strong connection between the two groups is Requirement 7 (Situation awareness): this appeared as a top-3 requirement across all scenarios for Field Workers (expressed through the algebraic equation FW =O_1, O_2, O_3, O_4, O_5, O_6, =>A_7), and a top-3 requirement for SMEs in the first three scenarios (SME = O_1, O_2, O_3, =>A_7).

Though the Wilcoxon test proved that there was no significant difference in the ratings (and thus importance) between the two groups across all requirements, the FCA shows us visually that there is no strong linkage either, bar the view that Situation Awareness is seen as important by both groups.

4.4.4 Discussion

General Discussion

Lower than expected responses challenged the validity of the study and necessitated a change in the analysis methods. Two methods recommended by Busch and Richards (2003) were used. The authors' recommendations were chosen both due to their research on knowledge engineering but also due to similar circumstances with small samples sizes.

The Wilcoxon test was inconclusive in general terms: it identified that there was a significant difference in the ratings given by Field workers and SMEs to two scenarios (4. Attack at Project Site and 5. Explosion at Roadside). For the other 4 scenarios, there was no significant difference.

A Formal Concepts Analysis was run on the top 3 ratings for each scenario. Busch, Dampney and Richards (2001) utility of the method is the first that could be identified on tacit knowledge, and there is therefore insufficient information to compare it to. Furthermore, the authors applied FCA to their questionnaire results individually, which was deemed too time-consuming for this project: they applied theirs to under 150 questions, whereas there would have been 420 questions to apply the test to. Though software was used to aid the method (FCART), most of the calculations are done by hand. FCA was able to qualitatively show that the relationship between scenarios and requirements between SMEs and Field Workers was different however, with the concept lattices showing no similarities of note.

Though the study is not claimed to be proof, it does allude that the introspection and passage of knowledge from SMEs does not necessarily reflect the understanding of the users, which is often encountered when experts are from different fields than users (Asger and Yousef 2015).

A useful output of the study was the creation of 6 scenarios, created from a combination of both statistics from the Aid Worker Security Database (Humanitarian Outcomes 2016a) and the reports produced on this (Harmer, Stoddard and Toth 2013; Harmer, Ryou and Stoddard 2014) as well as news articles related to the database. Such does not exist openly and provides both a good research tool as well as a tool for scenario-based discussions, which can be implemented by HR managers when hiring those likely to deploy to high-risk countries (Persaud 2014).

Elicitation of Knowledge

The study collected data on how SMEs and Field Workers rated explicit requirements. No new knowledge was identified but insight into explicit knowledge ratings was provided.

The Wilcoxon nonparametric rank test is considered to hold more validity over its parametric alternative, the T-test, where sample sizes are small and contain extreme skews (Bridge and Sawilowsky 1999; De Winter and Dodou 2010). The Formal Concepts Analysis was able to identify the connections between the knowledge (the formal concepts) for each individual group, though comparing the results of the two groups showed that there were no similar connections. The test is non-statistical but shows there is a qualitative difference in how the two groups rated the requirements for each scenario.

Though scales with 7-points or more are argued to produce more statistically valid and reliable results (Foddy 1994; Pearse 2011) and are often preferred to scale which rate perceived importance (Aiken 1996; Abascal and Díaz de Rada 2014), they require a large sample sizes of 300 or more responses (Kline 1986). In this study, the 11-point scale was chosen to provide the participants with a greater array of options in their ratings in order to increase the statistical output.

Utility

Improving trustworthiness in qualitative projects requires an honest reflection of results (Shenton 2004). It is acknowledged here that the results provide an insight into the phenomenon under scrutiny but cannot provide a statistically sound answer to whether the ratings between SMEs and Field workers are significantly different. Low responses mean the results cannot be transferred to a different setting. As such, the results of the study are frozen in time and space: they provide only an insight into one possible explanation.

To conduct the Wilcoxon test requires some understanding of statistics, though less so than some other methods. Furthermore, the test can be carried out using spreadsheets and is not dependant on statistical processing software, which makes it a viable method for those outside of research institutions who cannot afford the license fees of programmes like SPSS. Formal Concept Analysis requires very little statistical knowledge (descriptive statistics function in Excel is adequate). Software is not necessary for the construction of concept lattices, though does speed the process up.

Low participant numbers affected the validity of the study. The recruitment method using snowball sampling limited the number of respondents. Future studies will need to use more snowball referrers to target a larger audience or use an alternative means. Larger samples could present different results than those found.

In terms of time and resource, the construction and administration of the survey did not take long. There is a requirement for a survey creation platform however and statistical analysis software aided the analysis, though was not crucial.

Sensitive Domain Issues

The questionnaires to field workers had a lower response rate than expected. Questionnaires where the researcher does not have a relationship with the participants have low response rates generally: only around "20%, depending on content and length of the questionnaire." (Brown et al. 2004: 262). Arber (2001: 61) on the other hand suggests that 60% is a more realistic figure, though does not state for what type of questionnaires or what type of sampling. This is likely exacerbated in sensitive domain research, where relationships are seen as important (Cowles 1998)

Small sample sizes challenge the internal and external validity of the study (Faber and Fonseca 2014). Bristol Online Surveys shows the number of participants who started the survey and did not complete and the stage they dropped out at (see Figure 4.12):

p.1	p.2	p.3	p.4	p.5	p.6	p.7	p.8	p.9	p.10
59	8	8	4	2	1	0	0	0	39

Figure 4.12: Screenshot Showing Breakdown of Participant Competition and Drop-Out

This shows that a total of 121 participants accessed the survey, which is an initial response rate of between 80.67-93.8%, which is higher than what Arber (2001) suggests as achievable. However, there is a dropout rate of 67.77% of those who started, which is significantly high. Where there is a significant difference in respondents to non-respondents/drop-outs, the sample itself will be biased (Arber 2001).

In contrast, surveys with those in security management positions had a better response rate, with 39 questionnaires being sent out and a total of 31 being returned, representing a 79.49% response rate. Further questionnaires were not sent out so that the sample size for SMEs matched that of field workers.

As snowball sampling was used, there was no way of approaching those who did not respond or those who failed to complete, as suggested by Brown et al. (2003). Drop-outs are often affected by aesthetics, as well as questions, and how long questions are. Boynton and Greenhalgh (2004)

recommend 12 words or less; for the actual question, this was followed, though proceeded by a short paragraph describing the scenario. However, when looking at the information provided on when participants dropped out, there is a significantly higher number who stopped participating after the first page than those who did not start or those who completed. Page 1 provided information on the study and included no questions. As such, the layout of questions and time taken to complete can be eliminated as causes of drop-out. The most likely reason for those dropping out after page 1 likely relates to the focus of the study, with the 59 dropping out unlikely interested in the topic. This rationale relates to the literature reviewed in Chapter 2 in that there is a conflict between security and programming, with the former being a restriction on the latter (Daudin and Merkelbach 2011). Security is seen as the responsibility of security experts within the organisation and therefore is of little interest to field workers (Barnett 2004). There is also a generally negative view of security from those in the field (Neuman and Weissman 2016). This issues between security and programming could be a possible reason for such a high drop-out rate. It will also account for a higher response rate from security SMEs in comparison.

Development of Method

The largest shortcoming is the low response rate which challenges the trustworthiness of the study's findings. A survey is planned in Study 4; alternative recruitment methods will be used as well as the survey being wholly qualitative. Qualitative surveys require fewer responses to have credibility when compared to quantitative ones (Silverman 2011), aiming for rich description over statistically significant ones (Denzin and Lincoln 2000).

Scale development is an important step when creating questionnaires, especially those which require respondents to rate variables (Clark and Watson 1995). Though an 11-point (0-10) scale was used due to recommendations from literature on rating surveys (Gallhofer and Saris 2007; Abascal and Díaz de Rada 2014; Aiken 1996), larger Likert style scales are both cumbersome for the respondents and create reliability issues when analysing the data of smaller samples (Enz, Hinkin and Tracey 1997). In this study, the large amount of data produced by an 11-point Likert scale resulted in a considerably longer period of data analysis though had no effect on validity (Clark and Watson 1995). Instead, development of this study should focus on a shorter scale, making the questionnaire easier to respond to as well as easy to analyse; Enz, Hinkin and Tracey (1997) state that there is no set number for this, but should attempt to identify the minimum number of variables when developing the questionnaire to yield significant data. Common Likert scales consist of 5 or 7 points, which are easier to answer and analyse (Clark and Watson 1995).

4.4.5 Study Summary

A total of 70 rating questionnaires were returned, 34 from Field workers and 36 from Subject Matter Experts. Statistical analysis on the ratings from the two groups did not provide conclusive proof that there was a statistically significant difference in how they rated the explicit knowledge requirements. Formal Concepts Analysis provided a richer picture and understanding of the differences in how the requirements were rated between Field Workers and Subject Matter Experts. Though this analysis looked at the top 3 requirements for each group per scenario, the exclusion of the other 9 requirements was seen as necessary in order to provide a deeper understanding. The visual nature of the Lattice Diagrams provide a more intuitive means of analysing links which are not obvious from statistical outputs.

The only top rated requirement which had strong links between scenarios and between groups was Requirement 7: Situational Awareness. This was rated as important by Field Workers in all scenarios and as a top requirement by Subject Matter Experts in the first three scenarios.

Methodologically, the study shows a general weakness in quantitative surveys on understanding requirement ratings. The Wilcoxon Signed Rank Sum Test was appropriate as a method above other statistical tests with the low number of responses and extreme skews between the two groups. However, it was not able to present a meaningful analysis. Only two scenarios showed a significant difference in how the two groups rated the requirements. A deeper investigation into individual scenarios for the posthoc tests provided no further understanding of why a difference existed. This could have been expected, however, occurring in previous studies consulted to create this studies approach (notably research from Busch referenced throughout this section). The appropriateness of Formal Concepts Analysis was proven during this study, however. Applying the method to the analysis visually depicted the difference in what each group rated as a top 3 requirement. This form of analysis puts the need for a richer interpretation above the need for statistical significance. This qualitative analysis of quantitative data is recommended for future research.

The method lastly highlights the importance of how sensitive domain research is approached. No way of establishing a relationship with participants was practised, which likely undermined the response rate. This was against recommendations from Section 3.5 as it was believed the non-intrusive method would overcome sensitivity issues. Further studies will focus on establishing trust and rapport with participants to promote responses.

4.5 Chapter Summary

Stage 1 resulted in the identification of 12 security requirements (Table 4.13). These present a synthesis of explicit knowledge which has been recorded in open-access security manuals and guides used in the sector. These have further been contextualised and confirmed through Subject Matter Interviews with security advisors and trainers. The requirements represent a top-down view of the requirements needed to ensure staff security in high-risk environments and those the systems-based approach emphasises. This is important in the context of this research as it allows a basis for comparison with bottom-up requirements from tacit knowledge examined in Stage 2. Though this stage does not present 'new' knowledge, the identification of recurring requirements across sources has not been attempted before. The systematic document analysis and the interviews with security staff allowed knowledge to be synthesised and refined, acting as a form of Combination under the SECI model.

The identification of such requirements within the sector is useful for practitioners. It can allow more directed training towards specific requirements, rather than the general training that currently occurs. It also allows security staff within organisations to identify requirement gaps and provide solutions to these. Interviews conducted in Study 2 led to a deeper understanding of issues that currently exist in ensuring staff security in high-risk environments. A notable theme that emerged from the data analysis relates to current training. The participants stated that in its current form, training is inappropriate and not deemed sufficient in ensuring staff are equipped to deal with the risks they face. Training was also seen as the end state, rather than a basis for further learning to build upon. This provides a grounding for the Conceptual Framework in Section 2.4 to be applied to improve knowledge management within the sector.

Stage 1 also presented methodological contributions which provide a new method for researching explicit knowledge requirements. Study 1 presents a novel and a new way of identifying explicit requirements within key texts. Combing techniques from systematic reviews and document analysis allowed a holistic approach to identifying requirements in manuals and key texts. This approach to identifying and synthesis explicit requirements presents a more structured approach- systematic reviews allow selection of sources without bias whilst document analysis allows deeper analysis of requirements within texts. The literature on the identification of explicit requirements was lacking during the creation of the literature review and methodology or recommended basic methods which challenged the trustworthiness of the results. This method provides a possible solution to this.

The studies in Stage 1 also provided evidence on how the methodological considerations for researching sensitive domains worked in practice. Study 1 allowed the development of subject matter knowledge without facing sensitivity issues. Subject matter knowledge is an important step in establishing researcher credibility, which forms a basis for establishing relationships with participants. Quantitative surveys were concluded to be ineffective at research in sensitive domains, where participants lack the ability to expand upon their responses.

Table 4.13: Final List of Explicit Security Requirements from Stage 1

Requirement		Description
1	Organisational security policy and procedures	A sound understanding of an organisation's Security Policies and a working knowledge of the procedures to be adhered to in the specific country of operations.
2	Socio-cultural and political understanding	A knowledge of the key area of the country's history and its impact on safety and security, including religion, culture and government makeup.
3	Trauma first aid	The ability to treat the most common forms of traumatic injury sustained in insecure locations, including those from gunshots and blast/explosions.
4	Communications	The ability to use an organisation's communications means (radios, phones, Sat-phone), and the ability to effectively relay critical information accurately in a timely manner.
5	Incident response	A knowledge of the recommended procedures and methods to respond to common threats and ability to follow them under pressure.
6	Common Sense	Having a good level of practical knowledge and the ability to make sound judgements and decisions in real time.
7	Situation awareness	Having a good sense of what is happening around you, in your immediate surroundings, and noticing changes in normal patterns of behaviour.
8	Stress management	Being able to deal with negative stress, both that built up over time as well as that experienced in tense and stressful situations, both during and after the event.
9	Cultural awareness	An ability to integrate yourself within the culture you are visiting, acting appropriately and without drawing attention to yourself or causing offense.
10	Security awareness	Understanding past threat history and being constantly aware of any potential threats or future threats that might affect yourself/your group and how these may develop.
11	Confidence	Being ready to speak up for yourself, your team and your organisation and understand when not to.
12	Team worker	The ability to cooperate and work for the benefit of the team, often putting team goals before your own, both with international and national staff.

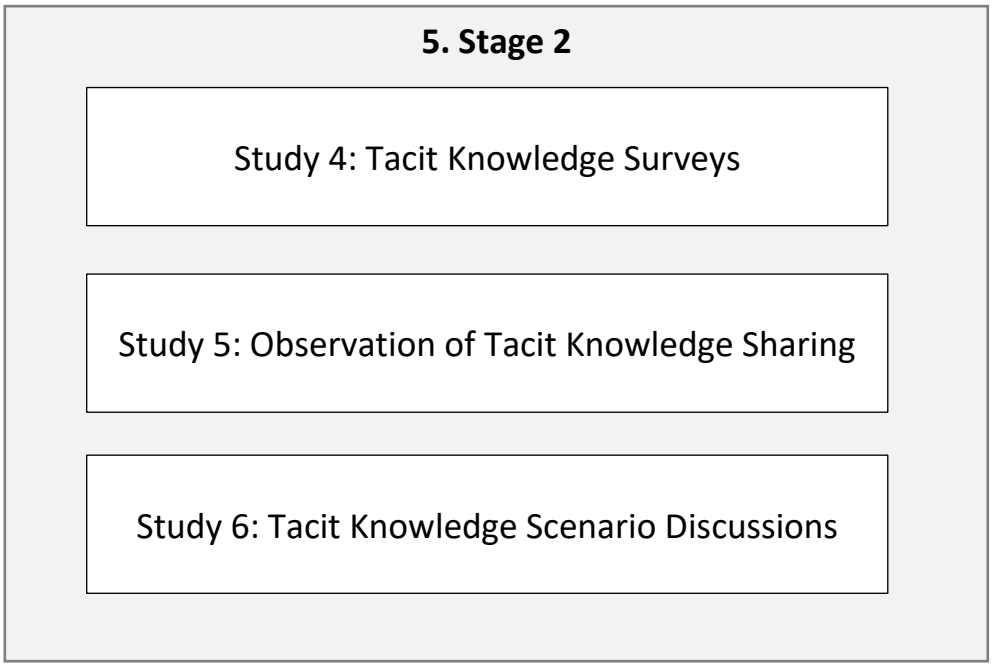
5. Stage 2: Exploratory Inquiry of Tacit Security Knowledge from Humanitarian Workers

5.1 Stage 2 Overview

Stage 2 presents the studies conducted to identify bottom-up, tacit knowledge from experienced humanitarian field workers, or those classed as practitioner experts.

The following studies are conducted in Stage 2:

- Study 4 uses a survey approach, adapting the work of Sternberg (1995) and Busch (Busch 2008) to elicit tacit knowledge from experienced field workers through a scenario-based questionnaire;
- Study 5 used observation research methods to observe three Hostile Environment Awareness Training courses run in the UK, attempting to understand how experienced field workers decisions differ from those with less experience (Johannessen, Olaisen and Olsen 2001), using security simulations to create an environment as close to reality as ethically possible to allow research into natural responses (Andreeva and Gavrilova 2012);
- Study 6 uses a triad of data collection methods to elicit tacit knowledge, combining approaches suggested by Milton (2007) to elicit deep tacit knowledge.



5.2 Study 4- Tacit Knowledge Surveys

5.2.1 Introduction to Study

Real world experience allows humanitarian workers to develop tacit knowledge (Botha et al. 2008). This knowledge, based on subjective insights and intuitions (Nonaka 1991), gives them the necessary know-how to overcome the challenges they face on a day-to-day basis (Brown and Duguid 1998). Due to the high-risk countries humanitarian workers often travel to, they naturally build up a great deal of tacit knowledge that has not yet been understood (Claus 2015). This study seeks to identify the knowledge experienced workers believe are both appropriate. It also compares novice and experienced workers, which allows a deeper understanding of knowledge necessary for optimal performance (Burton et al. 1990; Hoffman 1998; Chi 2006); therefore, identification of the necessary security requirements for high-risk environments. A questionnaire was chosen due to its ease of administering and as a basis for future research.

5.2.2 Method

Qualitative, Self-Competition Questionnaires

The warrants for using a questionnaire for this study are the same as presented in Study 3: they are relatively easy and cost-effective to implement (Adams and Cox 2008), they present a view at a given time and space (Brown and Harris 2010) and are an objective way of understanding peoples beliefs, knowledge or attitudes (Boynton and Greenhalgh 2004). While Study 3 used a quantitative questionnaire, this study used a qualitative one in order to collect more detailed answers to elicit tacit knowledge: Busch's extensive work on tacit knowledge identification (Busch, Dampney and Richards 2007; Busch, Flax and Richards 2006; Busch and Richards 2003) concluded that qualitative research is better suited to the study of tacit knowledge, which is atypical in nature and is difficult to approach from the quantitative perspective (Busch 2008). However, surveys are rarely used to elicit tacit knowledge (Ambrosini and Bowman 2001) as respondents can only describe what they readily know; therefore are only likely to describe explicit knowledge by Nonaka's (1991) definition. They have however been used effectively in projects to provide insights into knowledge alongside other more appropriate methods to identify tacit knowledge (Dzekashu and McCollum 2014).

Apparatus

As in Study 3, Bristol Online Surveys (BOS) was used to create and host a qualitative answer questionnaire. A layout diagram can be found in Figure 5.1.

Page 1 contained a short introductory page, which had links to PDF's of the Participant Information Sheet and the Participant Informed Consent form, as well as some basic information. Participants checked a single statement at the bottom of the page to progress and provide ethical agreement. As with Study 3, the page was kept short to promote responses.

Page 2 opened Section 1, which contained three open-ended questions comparing the difference between experienced and novice field workers (Figure 5.2).

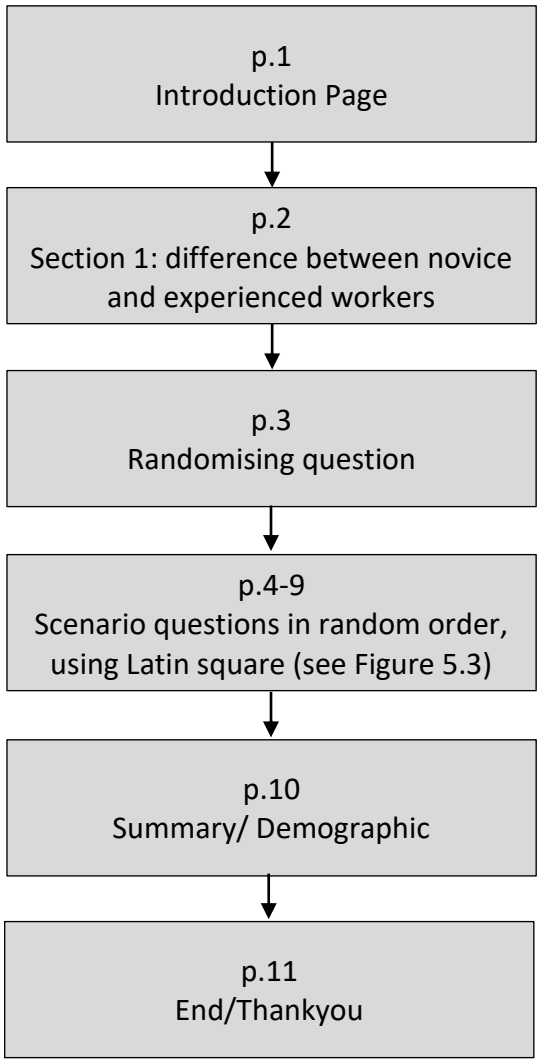


Figure 5.1: Layout of Questionnaire in Study 4

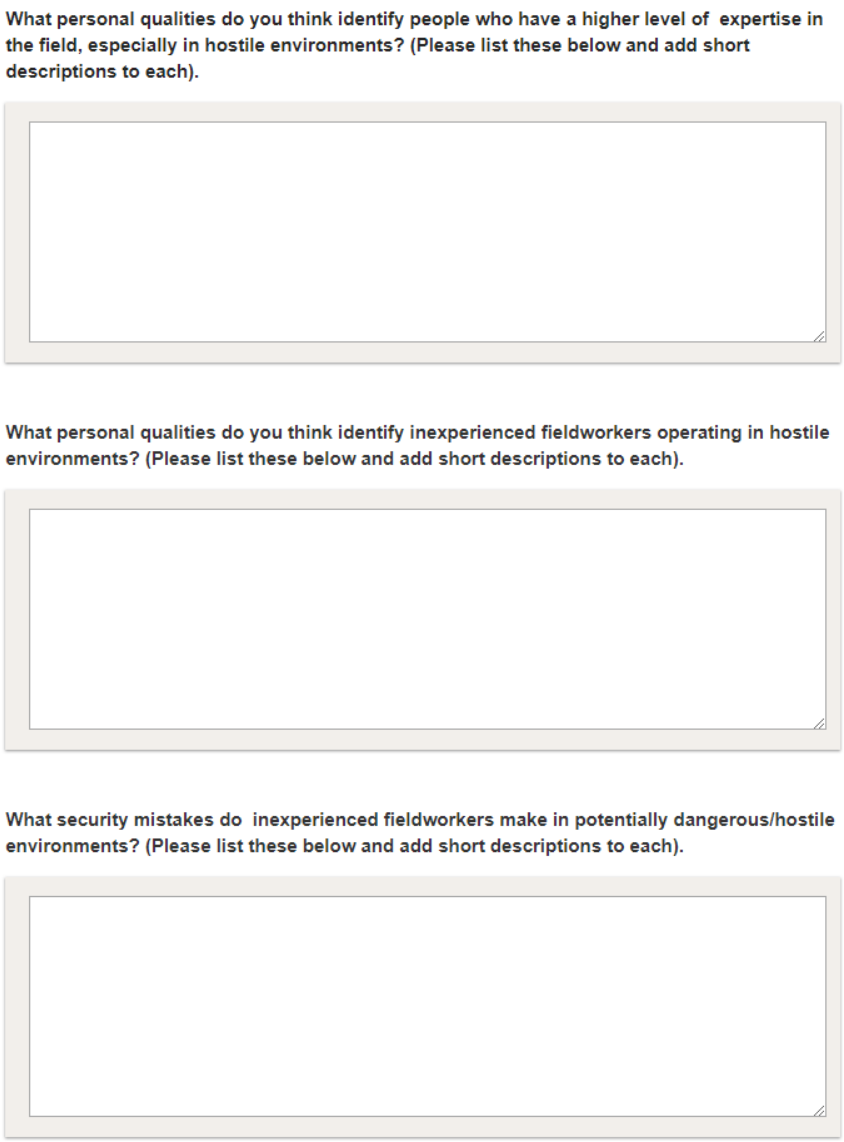


Figure 5.2: Screenshot of Section 1 from the Tacit Knowledge Survey in Study 4

The next section presented the participants with the 6 scenarios, asking them (open-ended question) to list the personal qualities which would be useful to people in the scenario; there was also a closed-ended question to answer whether they had been involved in such as an incident, as well as an optional open-ended question where they could provide more detail on the incident as well as identify the qualities which helped and/or hindered (see Figure 5.2).

For longer questionnaires, the ordering of questions can have an impact on the results: those that appear first will have the most detailed answers, those last the least (Blanke et al. 2004).

To avoid this form of response bias, a Latin Square was used to randomise the order questions would appear in on Page 3. Participants selected a country they would like to work in next from 6 randomly chosen countries. This would then present the scenarios in a random order, as per the Latin square (Figure 5.3 below, scenario order below each corresponding Option):

	Option 1	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**
Page 4	1	2	6	3	5	4
Page 5	2	3	1	4	6	5
Page 6	3	4	2	5	1	6
Page 7	4	5	3	6	2	1
Page 8	5	6	4	1	3	2
Page 9	6	1	5	2	4	3

Figure 5.3: A 6 x 6 Latin Square used in Study 4

Page 10 contained 5 short demographic questions. The final page contained a thank-you message.

As the responses were collected electronically and could be exported, this study built upon the discussion of using Qualitative Data Analysis Software (QDAS) from Study 2. QDAS allows data analysis to be streamlined and aided by computer software (Silverman 2000; Kaefer, Roper and Sinha 2015). This study used the NVivo (QSR International), a popular and intuitive QDAS package (Welsh 2002): https://www.qsrinternational.com/nvivo/nvivo-products/nvivo-12-plus. The study used both NVivo 11+ and 12+ versions of the software.

As with Study 3, the six security scenarios were used again. The scenario descriptions were kept the same. Busch, Dampney and Richards (2002) discuss that the use of scenarios in studying tacit knowledge provides context, which Polanyi (1966a) stated was necessary for the articulation of tacit knowledge as it effectively links the knower (the participant) with the focal target (the scenario).

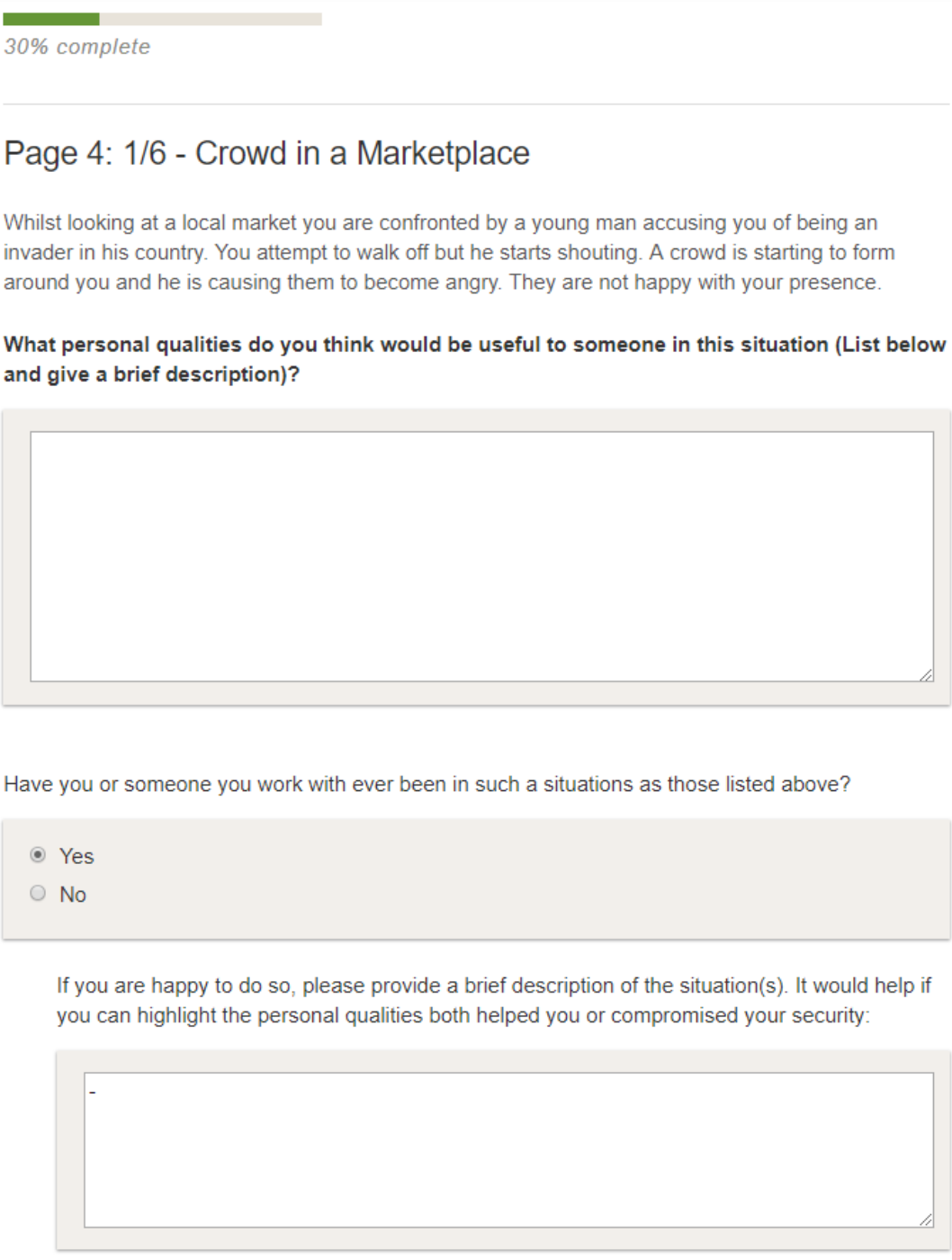


Figure 5.4: Screenshot of Section 2 from the Tacit Knowledge Survey in Study 4

Pilot

The same process was used for pilot testing. As the questionnaire was longer and more complex than the one used in Study 3, an additional pilot was used. Three pilots were chosen, one related to the field, a researcher and an independent pilot. They piloted the survey to identify usability and functionality issues as recommended by Blanke et al. (2004) and Baxter, Jones and Khanduja (2011), as in Study 3. The same approach was taken in that the pilots tested the questionnaire with the researcher. Unlike in Study 2, only one test was completed for each pilot as an additional one would have been too time-consuming.

The pilot tests identified several areas of concern. The first was in timing: the three pilots identified that the questionnaire was taking them too long to complete, with one pilot stating they would have stopped after 47 minutes. The pilot stated that most staff would have done the same and the majority would likely only complete surveys 20 minutes in length or less. They agreed that if the survey was sent to a small group and the project well explained then extending this to 30 minutes in length was possible. Secondly, the term 'requirement' was misunderstood by two of the three pilots. Unlike in Study 3, a list of requirements was not provided to prompt participants and therefore the meaning was unclear. The term 'requirements' was changed to 'qualities', which would elicit the same data though was easier to understand.

Ethical Information

Ethics was approved by Coventry University under certificate P42883 (Appendix 1.3). The Participant Information Form and Participant Informed Consent forms were explained to the participant during the screening call. They were also emailed to participants when they were sent the link for the survey.

Both forms were also included on the first page of the survey (Appendix 1.3a). They could not proceed further in the survey unless they checked the statement 'I agree to my responses being used as described.' Therefore, by clicking on the box and clicking 'Next' they demonstrated their informed consent.

The language used was changed from Study 3 to shorten the amount of information to read, which had already been explained to the participants prior. Participants were also informed of the support services they could access if any responses to the survey triggered emotional responses.

Participants

As in the previous studies (2 and 3), a purposive sampling technique was used to identify staff with relevant experience.

The following inclusion criteria were in place for the Study for the field workers:

- At least 10 years' experience in the humanitarian sector;
- Working, or have worked within the last year, in a field role;
- Not have direct security responsibilities;
- Have worked in at least one of the following insecure environments in the last 2 years:
    - Yemen;
    - Central African Republic;
    - Kenya;
    - The Democratic Republic of Congo;
    - Somalia;
    - Sudan;
    - Pakistan;
    - South Sudan;
    - Syria;
    - Afghanistan.

As before, the country list above resembles the countries with the most attacks on humanitarian workers in 2013 (Harmer, Ryou and Stoddard 2014: 2).

Due to the small sample size issue encountered during Study 3, for this study snowball sampling was used to identify the participants, but not to administer the questionnaire. Two snowball referrers were identified who worked with two humanitarian forums, both in the UK and Europe. They were contacted with the project explained as before; due to a presentation at a security forum, both referrers had heard of the project prior. They would then link the participant with the researcher.

The email sent to the referrers for them to forward onto potential staff also included the Participant Information Sheet as well as the project brief. This was kept short to promote interest. Potential participants would then contact the researcher if they were willing to take place. A short phone call or Skype was arranged. This provided an opportunity to 'sell' the benefits of the project, give more detailed instructions on how to complete the survey (which

would have been too much information to include in the actual questionnaire) as well as vet the participants a final time against the inclusion criteria. It also allowed the researcher to establish commonality and credibility to promote openness and completions (Clark and Kotulic 2004). Due to the researcher's involvement with training in the sector, several participants knew of the researcher and were keen to be involved.

As before, snowball sampling makes it difficult to identify how many participants were initially engaged with by the snowball referrers; they estimated that they each engaged with ~25-30 people each. This gives us an estimated reach of ~50-60 potential participants. From those, 35 contacted the researcher, all of whom met the inclusion criteria. Out of the 35 who were sent the link to the questionnaire, 19 completed it, equating to a 54% response rate.

There was a broad range of experience levels. The majority (12) of the participants had between 10-15 years in the humanitarian sector, with 5 having between 16-20 years and 2 having more than 21 years' experience as a humanitarian field worker. Most (6) of the participants worked with a response NGO (ones who respond in the immediate aftermath of a disaster), followed by reconstruction (3 participants, rebuilding infrastructure and completing development work) then by relief (2 participants, delivering food aid and supplies). A total of 8 participants worked in other organisations, including funding agencies and assessment teams. Across all 19 participants, there was experience in all but two of the countries- CAR and Yemen.

Procedure

Data collection took place between 17th September and 14th December 2016; again the survey was again hosted by BOS. The data collection was split into 5 stages:

1. The snowball referrers were contacted through phone and the inclusion criteria were explained. Rather than distribute the link, they would refer participants onto the researcher. After the call they were sent an email for them to forward onto eligible staff;
2. A screening call/Skype was arranged with those who contacted the researcher willing to take part, checking legibility (per the inclusion criteria) but also creating a shared connection and establishing credibility, which could improve competitions (Clark and Kotulic 2004);
3. Those meeting the inclusion criteria after the screening above were emailed a link to the questionnaire. The first link was sent out on the 17th September and the last competition

was on the 14th December. As before, the survey was only accessible through the link sent out and would not appear in BOS searches;

4. Once the questionnaire was closed a thank you email was sent to those who completed. Those who agreed to take part but did not complete were also sent a thank you email and asked if they felt comfortable to give comment on what prevented them completing. The snowball referrers were also sent a thank you email.

QDAS Aided Thematic Analysis

Though Stage 1 identified the explicit knowledge requirements, the aim of Stage 2 was to identify tacit requirements: as such it was important not to let previous findings shape the codes (Creswell 2003). However, as with all qualitative research, especially in studies which follow others, there is a degree of subjectivity and researcher bias (Braun and Clarke 2006).

As text responses are automatically captured by Bristol Online Surveys, they can easily be exported into spreadsheets for analysis. This process can be greatly aided by utilising Qualitative Data Analysis Software (QDAS) packages, which speed up the initial coding stage and can provide an overview of the data, including visually representing possible codes, automatically conducting keyword analysis and automatically generating potential themes (Silverman 2013). NVivo 12+ was selected as the preferred QDAS, both because of its availability through Coventry University (removing the financial limitations of using QDAS (Kaefer, Roper and Sinha 2015)), but also because of the relative ease in which it can be used (Welsh 2002; Silverman 2013).

Though QDAS speeds up the coding process, a common mistake made it over-reliance on the software to finish the step (Kaefer, Roper and Sinha 2015). QDAS by nature will often miss context behind participant answers, as well as miss-code words that have contextual meaning (Welsh 2002): for instance, the term ‘aid worker’ is largely used to describe a specific set of humanitarian workers, which was auto-coded as ‘help’. Therefore, as Welsh (2002) suggests, QDAS should be used as a tool to aid, not a method.

Braun and Clarke’s (2006) 6-phases approach was used again:

1. Familiarise with the data: data was exported to excel. Basic condition formatting and functions were used to understand the data and highlight interesting results (Figure 5.6). Data was read through without coding;
2. Generate initial codes: data was exported into NVivo, which runs algorithms to identify the occurrence of specific words;

3. Searching for themes: the keyword analysis provided a starting point to search for themes. Rather than using NVivo to create themes, a cut-and-paste approach in excel was found to be easier and kept the context (Delahunt and Maguire 2017; Bree and Gallagher 2016). It also provided a visual representation of themes emerging (Bree and Gallagher 2016).
4. Reviewing themes: once all data had been grouped under themes this was checked against the original data to ensure context had not been lost (Braun and Clarke 2012). Themes only mentioned by one participant were not adequately supported and therefore excluded (King 2004). Duplicate themes were combined (e.g. 'Effective Communication' and 'Being Able to Talk with People');
5. Defining and naming themes: relevant names are applied to the themes. The benefit of using excel meant that all chunks of text which mentioned the theme were clearly and easily visible, allowing coherent names and descriptions of the themes;
6. Producing the Report: the results from the analysis are presented in the next two chapters: 5.2.4 presents the different requirements identified for experienced vs novice workers, and 5.2.5 presents the requirements identified per scenario.

5.2.3 Results

A total of 19 questionnaires were returned. From the 19 questionnaires, a total of 171 base questions were answered (questions that were mandatory). An additional 28 optional questions were answered, consisting of accounts of the following scenarios: 8 accounts of scenario 1, 5 accounts of scenario 2, 5 accounts of scenario 3, 4 accounts of scenario 4, 4 accounts of scenario 5 and 2 accounts of scenario 6. However, these accounts did not provide usable data to allow the eliciting of requirements due to their unstructured nature (see *5.2.6 Discussion: Elicitation of Knowledge*).

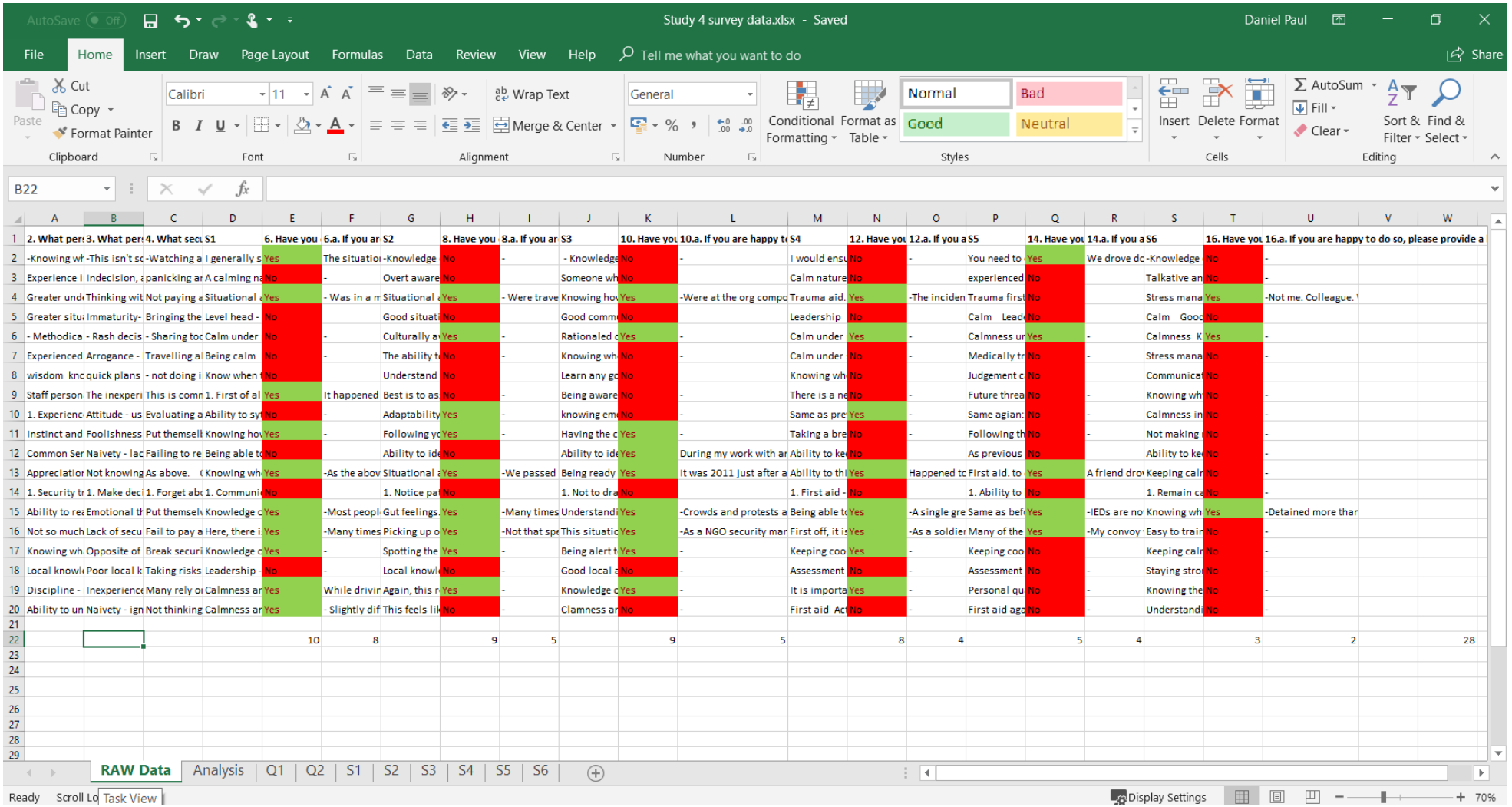


Figure 5.6: Using Excel to Familiarise with Data in Study 4

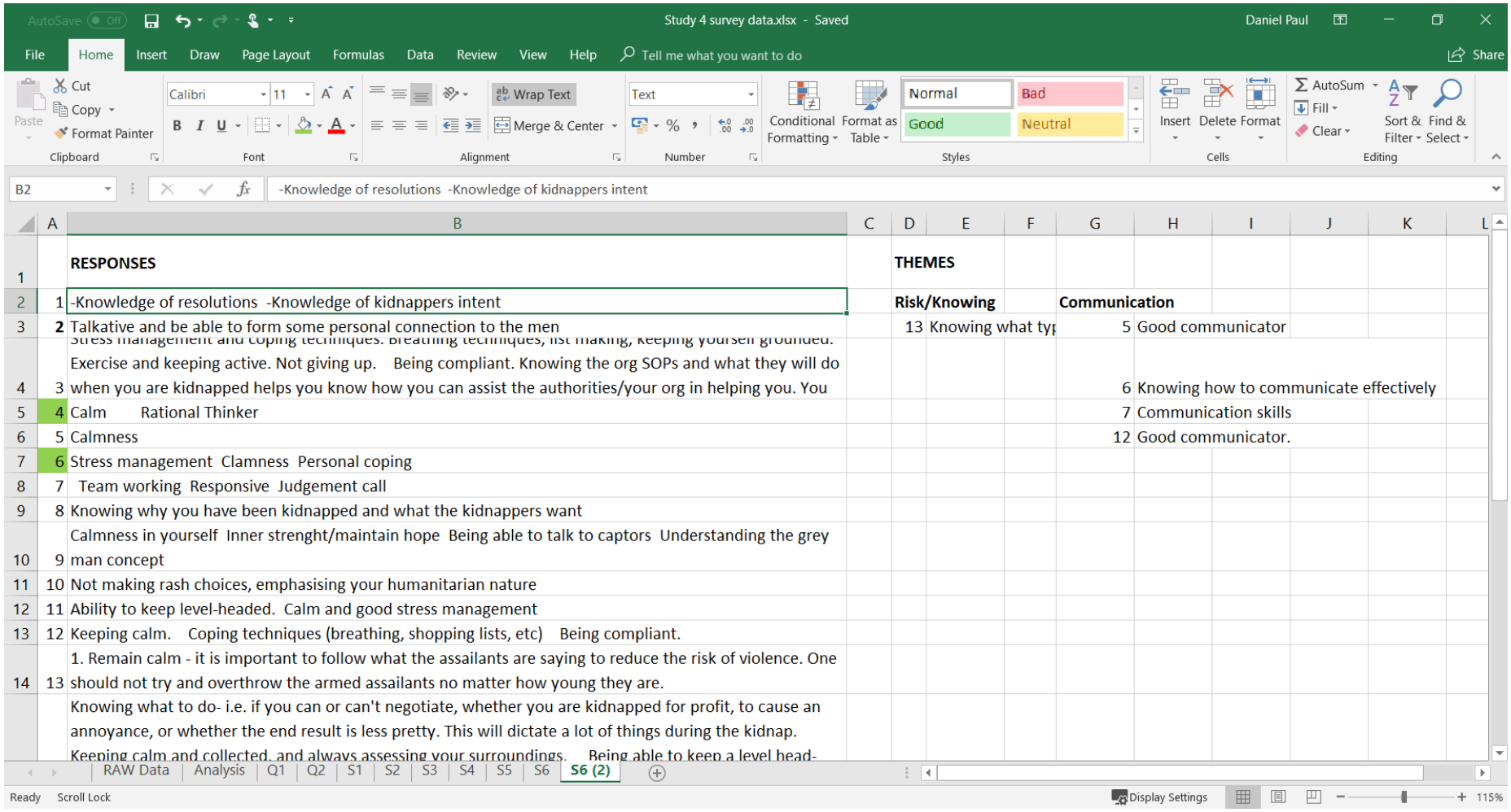


Figure 5.7: Using Excel to Conduct Thematic Analysis in Study 4 (Responses are placed in Column B, with Respondent No.'s in Column A. Two Initial themes from NVivo are seen in Column D and G, with cut-paste responses below).

5.2.4 Qualities in Experienced vs. Novice Field Workers

Section 1 of the questionnaire asked participants to identify the differences between experiences and novice (novice) field workers. It tests the theory that experienced workers (experts) will be able to identify the qualities they possess that enable them to overcome problems and those that novice workers (novices) lack which cause them problems (Burton 1987; Chi 2006).

Experienced

The below themes were constructed from the analysis of the following question:

1. *What personal qualities do you think identify people who have a higher level of expertise in the field, especially in hostile environments? (Please list these below and add short descriptions to each).*

A total of 8 themes were identified:

Theme/Requirement	**Count**	**Description**
Logical decision making	9	Can collect relevant information from a range of sources and make decision unaffected by emotions
Aware of their surroundings	8	Maintain an awareness of the situation occurring around them, including changing factors and different people
Communication	7	Are able to communicate effectively with each other as well as other stakeholders (especially the local community)
Calmness under pressure	6	Are able to react under direct pressure, calm themselves and think clearly, as well as not overreact where there is no direct threat.
Networking	5	Understand the importance of and are able to develop networks of local contacts they can call upon
Risk awareness/ understanding	4	Have a general understanding of the risks present and take notice of security briefings and similar communications
Quick reactions	2	Can react quickly without thought or freezing
Training	2	Have a higher level of training and understand the importance of it.

Novice

The analysis of novice workers was done on the following two questions:

2. *What personal qualities do you think identify novice fieldworkers operating in hostile environments? (Please list these below and add short descriptions to each).*

3. *What security mistakes do novice fieldworkers make in potentially dangerous/hostile environments? (Please list these below and add short descriptions to each).*

The answers to question 4 provided further detail on the answers to question 3; this identified no extra themes, showing a weakness in the wording or layout of the question.

A total of 10 themes were identified:

Theme/Requirement	**Count**	**Description**
Immature	9	A range of displays of immaturity, both lack of life experience in general to drinking too much or not taking the situation seriously
Poor/emotionally driven decision making	7	Decision making revolves around trying to 'do good' in the moment and not thinking about safety, as well as decisions being made on feeling not logic
Lack of situation awareness	6	Not understanding or being aware of their surroundings nor how dynamics can change
Lack of risk appreciation	6	Risks not understood, believed not to be serious as they haven't witnessed them, or security information and briefings not taken seriously
Unpredictable/ irrational behaviour	4	Can be both extremely blaze to risks or overly cautious, or can become aggressive to teammates due to stress
Overconfidence	3	Can be arrogant and believe they will not get hurt, if have been in an incident and have been unhurt believe they will never get hurt
Lack of cultural awareness	3	Fail to interact with locals and understand local cultures, norms and expectations
Indecisiveness	3	Often freeze during incidents, or do not realise when they should leave
Bad stress management	3	Cope with stress badly, becoming unpleasant or utilising alcohol as a coping strategy
Bad communicator	2	Not listening to others

Comparison

7 of the identified themes of novice field workers were directly opposed to that of experienced field workers. The cross-analysis of these was able to derive the effect a lack of experience could have on novice workers.

Novice	**Effect**	**Experienced**
Poor/Emotionally driven decision making	Actions are taken without fully thinking through	Logical decision making
Lack of situation awareness	Not understanding surroundings hinders awareness of changes or risks	Aware of their surroundings (situation awareness)
Lack of risk appreciation	Understanding of risk not achieved	Risk awareness/ understanding
Bad communicator	Is not able to communicate with the team effectively	Communication
Unpredictable/Irrational behaviour, and Bad stress management	Unable to cope with the stress of high-risk environments or actual incidents	Calmness under pressure
Indecisiveness	Is not able to act instinctively to remove themselves from danger	Quick reactions
Lack of cultural awareness	Is not able to grow their network with locals	Networking

The only requirement identified in experienced field workers that did not have a direct opposite was 'Training'. Two qualities of novice workers, 'Overconfident' and 'Immature', did not have direct opposites identified in experienced workers. 'Calmness under pressure' was the opposite of two qualities of novice workers- 'Unpredictable/Irrational behaviour', and 'Bad stress management'.

Through comparing the differences between novices and experienced field workers, and the effect it has on operational security, it is therefore possible to identify the requirements which would improve operational security, or the key requirements that novice workers as per Burton (1987) and Chi's (2006) position that the difference between experienced and novice workers is the identification of the key knowledge necessary.

5.2.5 Identification of Security Requirements

Section 2 of the questionnaire used the six scenarios as a means of identifying knowledge requirements. It builds on Busch's (2008) work expanding Sternberg's (1995) use of scenarios to elicit and test tacit knowledge.

A total of 15 requirements were identified across all 6 scenarios from the following question:

3. *What personal qualities do you think would be useful to someone in this situation?*

Requirement Descriptions

By using excel to develop the themes, participant descriptions of the requirements were easily accessible, which were used to develop a requirement description. This uses the same method Braun and Clarke (2006) suggest for developing thematic descriptions.

Table 5.1 shows the requirements, the total times they were referenced across the scenarios (highest-lowest) and the collective descriptions.

Requirement	Total	Descriptions
Calm under pressure	39	Able to remain calm during stressful situations and able to calm others around them
Risk awareness/ understanding	35	An understanding of both the risks that are likely to be faced, how they progress as well as characteristics of each risk, such as being able to identify mines or understanding bullet effects
Communication	29	Utilising a range of communication skills, to both convey messages clearly but also communicate with a range of stakeholders, including community members and potential aggressors
Logical decision making	28	Able to make decisions under pressure, but through logical conclusions after collecting enough information from a range of sources and having alternative decisions
Trauma first aid	24	Able to assess different battlefield type wounds and provide effective medical attention
Knowing security procedures	16	Having a good knowledge of the organisation's security procedures and what you are expected to do in different situations

Table 5.1: Requirement Descriptions from Study 4

Requirement	Total	Descriptions
Aware of surroundings/situation awareness	13	Able to understand what is occurring in the immediate surrounding as well as what that tells you about the situation
Stress management/coping skills	13	Able to employ effective coping mechanisms after incidents, or during kidnappings, avoiding unhealthy ones such as drinking
Leadership	12	Able to give appropriate instructions to others clearly in a non-imposing way as well as identifying strengths of individual team members
Local knowledge/cultural knowledge	11	A good understanding of both the local area (geography) as well as local culture, customs and key dates
Scene safety assessment	10	Ability to assess a scene to ensure it does not pose a further risk of harm, or to identify areas which are protected, such as from gunfire
Networking	9	Using positive interactions with local community members to build up
Knowing when to leave	7	Understanding when the risk is too high, and it is time to leave a situation
Teamwork	6	Able to work together effectively in a team and support each other, building on each other's strengths and weaknesses
Following gut instincts	3	Able to identify and follow gut-instincts which tell you something is wrong rather than ignoring them

Table 5.1 (cont.): Requirement Descriptions from Study 4

Requirements Per Scenario

The importance of each requirement can be highlighted by how many times it was mentioned by the participants in each scenario, as in Figure 5.8. This shows that different requirements are required for different incidents. The results of this will be discussed briefly herein but will be utilised in Chapter 6 to compare with the results from Study 3.

Requirement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Calm under pressure	9	4		14	12	
Risk awareness/understanding	6		9	4	6	10
Communication	8		8	4	3	6
Trauma first aid				14	10	
Logical decision making	6	7	5	5	5	
Knowing security procedures			7	3	3	3
Aware of surroundings/situation awareness	4	9				
Stress management/coping skills						13
Leadership				6	6	
Local knowledge/cultural knowledge		8	3			
Scene safety assessment				4	6	
Networking		9				
Knowing when to leave	7					
Teamwork				3	3	
Following gut instincts		3				

Figure 5.8: Frequency of Requirements per Scenario in Study 4

In the above figure, the green shaded squares show the requirement that appeared the most in the scenario, orange the second most and yellow the third most.

5.2.6 Comparing Section 1 and 2

To apply the identified requirements to general environments it is necessary to condense the list: this was a key theme identified in Study 2 (Chapter 4.3). This is done by comparing the themes and identifying those which recur and appear the strongest (Braun and Clarke 2006) and removing those which are unsupported (King 2004). For this study, the process of refining the requirements list is through comparing the requirements from chapter 5.2.4 and 5.2.5. The requirements have been ranked on how often they occur from each participant, which provides a basic appreciation of their importance: this measure is not statistical but provides a relative assessment of their strength within the dataset, following Bernhard and Ryan (2000) and Boyatzis (1998) use of theme hierarchies.

8 requirements were identified as qualities possessed by experienced field workers. Of these, 7 were the opposite of qualities identifying novice field workers: though they oppose each other, this is a way of supporting the themes strength (Braun and Clarke 2006). Furthermore, the identification of the difference between novice and experienced workers is argued to provide insight into improving the former to attain the skills of the latter (Burton 1987; Chi 2006). From the 7 requirements that were corroborated by being opposed, 6 of these appeared in the scenario specific list. This set of 6 security requirements is therefore presented as the general list of requirements deemed important for high-risk environments.

Table 5.2 below compares the requirements, showing their ranking from the individual analysis.

Experienced vs. novice requirements		**Scenario specific requirements**	
1	Logical decision making	Logical decision making	4
2	Aware of their surroundings	Aware of surroundings	7
3	Communication	Communication	3
4	Calmness under pressure	Calm under pressure	1
5	Networking	Networking	12
6	Risk awareness/understanding	Risk awareness/ understanding	2

Table 5.2: Condensed Requirements List for High-Risk Environments in Study 4

5.2.7 Discussion

General Discussion

The study was able to identify a set of requirements which can be applied to high-risk environments in general. The study's findings provide a foundation understanding of requirements from the perspective of those who utilise them: field workers represent the requirement users and therefore provide a unique and valuable perspective in understanding knowledge management (Brown and Duguid 1998; Burton et al. 1990). Requirements were identified through comparing experienced to novice field workers, and through identifying the qualities needed for each of the six scenarios. These were then compared to refine the list. The result was a list of 6 security requirements. This list can represent the requirements experienced field workers deem important for operational security.

Though deeper comparison and analysis will be conducted in Chapter 6, a brief reflection on the top-down, organisation explicit requirements show that there is some divergence. A notable example is Requirement 1 (Organisational Security Policy and Procedures) from Study 1, which though appears throughout the scenario requirements in Chapter 5.2, does not appear at the top of the list nor is it included in the refined requirements list in Table 5.2. This shows us that there is a difference in what organisations list as the required knowledge and what experienced field workers list as the required knowledge. Such a divergence is likely to cause issues operationally (Daudin and Merkelbach 2011), with field workers following what their experience tells them is important (Adams 2003).

Elicitation of Knowledge

The study elicited requirements from Field workers, therefore presenting a view of bottom-up knowledge. It is arguable what type of knowledge has been elicited, however. Multiple authors follow Nonaka's (1991) view that simplistic techniques, such as questionnaires or even standard interviews, cannot elicit tacit knowledge (Andreeva and Gavrilova 2012; Ambrosini and Bowman 2001): tacit knowledge is must be coaxed out, which such methods cannot do (Virtanen 2010). Other researchers have claimed that such studies have elicited tacit knowledge, however (Dzekashu and McCollum 2014): Johannessen, Olaisen and Olsen's (2001) concluded that tacit knowledge can be studied empirically. Busch has utilised questionnaires to identify tacit knowledge in several studies (Busch and Richards 2003; Busch, Flax and Richards 2006; Busch, Dampney and Richards 2007). Ambrosini and Bowman (2001) identified this type of knowledge as articulable tacit knowledge: that which has been learnt through experience but has not been

elicited because the right questions have not been asked. Scenarios provide a means to ask such questions. These were first used to study tacit knowledge by Sternberg (1995), providing the basis for Busch's extensive research, the use of which is discussed in Busch, Dampney and Richards (2002) and Busch and Richards (2001).

Though the optional questions would have provided a deeper understanding of knowledge necessary within incidents from reflective experience, which would provide a greater claim that the knowledge elicited was 'true' or deep tacit knowledge (Milton 2012), the study still elicited articulable tacit knowledge through framing questions around likely scenarios (Ambrosini and Bowman 2001). The use of scenarios to frame the questions around relate to what Polanyi (1966a) described as 'context', in that the knower cannot describe the knowledge without having a focal target (the scenario) to apply it to.

Though the method did not elicit true tacit knowledge, it did achieve the aim of identifying articulable tacit requirements from Field workers. This presents a bottom-up view of security knowledge and can be compared with that of Study 1 and 2.

Utility

The sample size was relatively small however: only 35 participants were selected by the snowball referrers, with only 19 completing the survey. Those who completed the questionnaire were selected by the snowball referrers due to their experience and ability to bring useful insights into the research. Both the screening calls as well as the demographic questions showed that they came from a range of organisations, with a varying amount of experience (12 with 10-15 years, 5 with 16-20 years and 2 with over 21 years' experience). Their view is therefore developed through experienced (Botha et al. 2008) and can be considered transferable to the broader domain.

The study was simple to implement. Online survey creation tools are designed to be intuitive and simplistic to use. Though the use of QDAS has its drawback, especially in terms of financial cost if licences are not available, the software used (NVivo) is intuitive and aids the researcher in the initial stages of data analysis (Kaefer, Roper and Sinha 2015). Excel was chosen as a means of coding, grouping and theming data, as discussed by Bree and Gallagher (2016), which proved effective and more intuitive than NVivo. This may not be the case for larger sample sizes, however. The simplicity of the study does mean that it could be applied to other samples however, by both academics and practitioners. The questions presented are short and can be

easily translated into other languages, and participants only need access to the internet to complete the survey. Where this is not possible, responses can be captured on Excel spreadsheets for convenient analysis or captured through writing, to be transcribed by the researcher later, though this process makes the method more time intensive.

The method required little resources, though as with Study 3 a survey creation platform was necessary. Again, Bristol Online Surveys was used. The study was also time effective, taking very little time to design and test the questionnaire and then administer it, comparative to the other methods. Data analysis was also a straight forward and short process, both due to the use of QDAS and Excel, but also because of the simplicity of the answers provided which aided analysis.

The process of coding is subjective, though methods suggested by Braun and Clarke (2006) were followed to reduce this. However, the process of cutting and pasting results rather than coding them on computer software means that the coding thought-process can easily be followed, removing subjectivity and bias in the creation of codes.

Sensitive Domain Issues

Though surveys are non-intrusive and do not force participants to provide answers they do not want (Lee 1993), they fail to develop a constructive environment in which the participant wants to share their personal experiences (Clark and Kotulic 2004): as seen by the number of participants who answered 'Yes' to being in incidents but did not provide accounts of them. From the reflection of this study, they are not seen as an effective means to research sensitive topics in detail, rather providing a general overview.

Snowball sampling was used again to identify the participants to take part in the study. Unlike in Study 3, which suffered high drop-out rates, a more personal approach was taken during this study, allowing the researcher to establish credibility to promote responses (Clark and Kotulic 2004). Participants were engaged with both through email and over the phone. Out of the 35 participants who were sent the questionnaire, 19 completed it: a 54% response rate. This is higher than Brown et al.'s (2004) estimate of 20%. It is also higher than Study 3, which had a 32.23% response rate. The lower drop-out rate improves the internal and external validity of the study (Faber and Fonseca 2014; Arber 2001).

Development of Method

Questions 3 and 4, relating to novice (novice) field workers, did not produce different themes (see Fig 5.9). This was either because they were on the same page, with some participants copying and pasting answers, or because they were worded too similarly. This could have been overcome by changing the wording further or by separating them on different pages. In the interest of keeping the questionnaire short, removing the question would have been optimal.

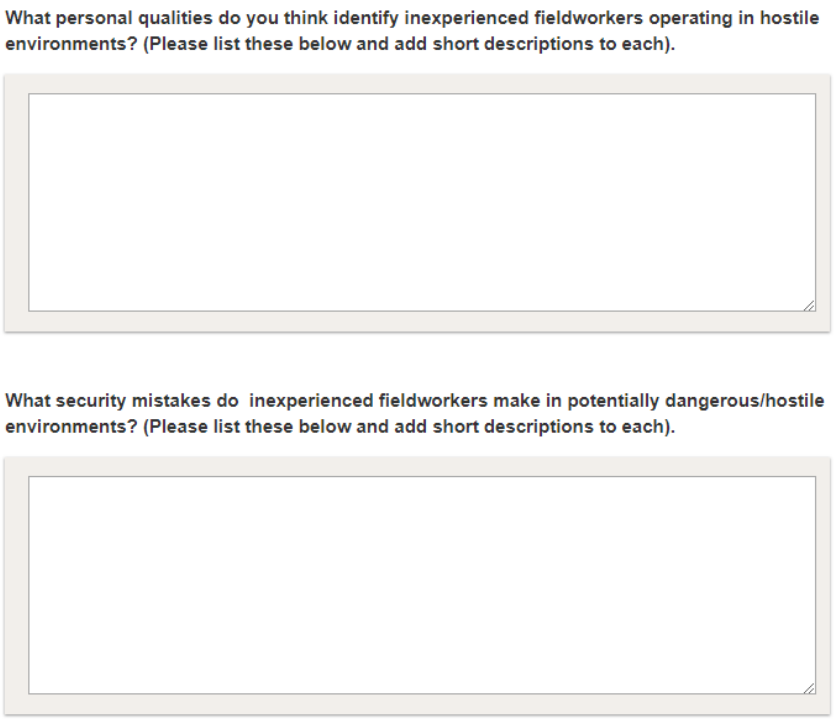


Figure 5.9: Ineffective Question-Wording in Study 4

The screening calls should have been used to discuss the optional questions. This could have promoted responses to the questions which asked participants to provide accounts of incidents they had been involved in. However, Clark and Kotulic (2004) state that the impersonal nature of questionnaires rarely prompts participants to share personal, sensitive experiences.

This study situated itself between Hoffman's (1987) position that experts can define what novices need to know and Chi's (2006) proposition that studying experts and novices independently allows the identification of what makes experts perform better. Studying these two areas allows both the identification of the end state (knowledge utilised by experts) (Hoffman 1992) as well as the learning processes needed to achieve this (Chi, Glasser and Rees 1982). Study 5 seeks to view the phenomenon from Chi's (2008) perspective in observing actions of experts and novices, and Study 6 takes Hoffman's (1992) that experts can identify knowledge necessary for optimal performance.

5.2.8 Study Summary

A total of 19 questionnaires were analysed, which collected data on what requirements experienced field workers deemed important for security. The participants matched the definition of 'practitioner experts', having considerable experience both in terms of years as well as first-hand experience working in high-risk environments. This is important as this is one of the first identified studies which establishes those who work in the field as experts by warrant of them facing the risks on a frequent basis. Furthermore, this study is the first identified which seeks to understand what requirements field workers believe are necessary for effective security. This presents a bottom-up view of security requirements.

Though qualitative surveys are frequently used in many social science research projects, this study improves upon the method to ensure tacit knowledge is identified. Arguably surveys are only useful for eliciting explicit knowledge. However, by framing questions around scenarios and by drawing out knowledge indirectly it is also argued that surveys can elicit 'articulable tacit knowledge'. This study utilised two methods to do this which are useful for future research. The survey contrasts qualities of experiences and novice field workers: by identifying qualities of novice workers, or those who would be most at risk, it can be identified that the opposite will represent qualities those least at risk possess. Furthermore, by framing requirement questions around realistic scenarios participants can frame responses around a problem. Utilising such techniques allows surveys to elicit articulable tacit knowledge, rather than explicit knowledge as traditional surveys would.

A total of 6 requirements identified as important. These were identified by comparing contrasting qualities of experienced and novice workers, combined with the scenario specific requirements field workers identified. The list presents the first enquiry into bottom-up requirements for effective security in high-risk environments.

1	Logical decision making
2	Aware of their surroundings
3	Communication
4	Calmness under pressure
5	Networking
6	Risk awareness/understanding

5.4 Study 5- Observation of Tacit Knowledge Sharing

5.3.1 Introduction to Study

Through apprenticeships and observations, experienced workers can pass on knowledge they have learnt through experience to others (Johannessen, Olaisen and Olsen 2001). By working with more experienced workers, those new to the field or to high-risk environments will be able to develop their own knowledge further and apply it to real-life situations (Easterbrook and Nuseibeh 2002). Observations are an effective way of witnessing tacit knowledge, especially when subjects are witnessed in their natural setting (Bly 1997; Wilson 1995): Ambrosini and Bowman (2001) state that observations allow researchers to enrich the ethnographic methods by viewing real-world interaction. Though it was not possible or practical to observe this occurring in a natural setting for ethical and safety reasons (Barnard, Geber and McCosker 2001; Clarke and Johnson 2003), it was possible to observe these interactions during 3 Hostile Environment Awareness Training (HEAT) simulation courses. Observation of simulations is useful where observations of the real-life application are impossible (Andreeva and Gavrilova 2012). The aim of the study was to both observe how experienced field workers performed during simulated security incidents and whether in such observations it was possible to identify tacit knowledge.

5.3.2 Method

Three observational studies were carried out during HEAT simulations with a training organisation specialising in the humanitarian sector. Observation research is a qualitative method and is often preferred when the research wants to understand how experience and culture interact within groups (Creswell 2003). Observations have often been used in human factors research to identify the interaction between people and systems or tools; it provides insight to the researcher on what makes the task being observed difficult or easy as well as capturing information on how people perform (Barber, Staton and Young 2014). Observations are particularly useful when observing group interactions, as in this study, and have been used previously to understand the role of tacit knowledge (Leonard and Sensiper 1998).

The HEAT simulations were chosen as an apparatus to conduct observations as it was unethical to conduct these observations in actual high-risk areas, where participants and the researcher could have been seriously injured or killed. The observing of the simulations arose

opportunistically; though it does not provide the most complete picture, it allowed research into how tacit knowledge affects the ability of more experienced field workers.

Observation Research

Observational studies seek to understand and measure the world around the researcher and the interactions of those they are observing (Driscoll 2011; Marvasti 2013). Observations, unlike other research, allow the researcher to fully understand the complexities of the phenomenon first hand (Cochrane and Quinn Patton 2007). For this reason, the method is sometimes preferred by social researchers as it allows full immersion into the phenomenon and the context it occurs in (Neuman 2014). For this research, it was chosen as it allows observation of the theoretical claims made in the literature review; namely, it allows the observation as to whether those with a wealth of relevant experience can pass on tacit knowledge to others (Nonaka 1991; Johannessen, Olaisen and Olsen 2001; Easterbrook and Nuseibeh 2002). Though the context of a simulation course is not a naturalistic setting, it provides the most appropriate and setting to conduct research in whilst following the appropriate ethical and safety guidelines. As such, it presents the truest to life context available for this research project.

The process of observation research involves the researcher watching participants, their interactions, routines, reactions and behaviours (Cochran and Quinn Patton 2007). It is important to note that observation research is not merely watching something happen. Instead, it is a complex combination of recording not just the action, but also the context and likely evaluation of its meaning (Gray 2009). Simply watching what is occurring is a common pitfall of observational research (Mulhall 2003). To provide structure, an observation protocol was created, discussed in Supporting Material.

Three types of observational research process exist: descriptive, focused and selective (Angrosino 2005). Writing descriptive observations, the observer notes down everything that occurs, not all of which is relevant to the study; for focussed observation the researcher will only record what they deem relevant guided by pre-study research, and for selective observations the researcher sets out to study specific activities only rather than a prolonged observation period (Schoepfle and Werner 1987; Kawulich 2005). Though ideally used as three supporting processes used in conjunction, becoming more specific each time (Angrosino 2005), most observational research now uses the processes independently and supports this with other research methods (Emerson, Fretz and Shaw 2011). Observations can be structured or unstructured; that is, the researcher can either observe without having a list of predetermined

measurements or have a set list of behaviours they are looking for (Mulhall 2003). Interpretive-constructionist research often relies on descriptive and follows an unstructured approach (Emerson, Fretz and Shaw 2011). Angrosino (2005) sees selective observations as the most systematic, being focussed on activities rather than general events and allows both comparison and replicability. A combination of approaches was therefore most suitable- general observations made about the situation, with selective notes made when participants demonstrated possession of tacit knowledge. The selective areas observed are discussed under Supporting Material below. Selective observation also allows replication of the study, with a large weakness in descriptive, unstructured observations being the researcher will see what they want to see, meaning the observation is highly subjective and is unlikely to be replicable (Emerson, Fretz and Shaw 2011).

There are also different roles the researcher can take during the observations, often following Gold's (1958) standard typology of roles: the complete observer (no interaction with those observed, role concealed); complete participant (interacts with others, role concealed); observer as participant (observations not as part of the group, role known) and the participant as observer (prolonged observation as member of observed group, role known). There have been criticisms of sticking to this typology though which constrains the possible ways in which observations can be carried out as well as the possible ethical issues, especially regarding the first two types where those being observed do not know as such (Mulhall 2003). This study follows what Gold (1958) referred to as an 'observer as a participant': the groups being studied knew they were being observed and for what purpose, but the researcher was not doing so as part of the group. It does not fit this typology exactly as described, as the researcher was also involved in the training prior, so the observations were not completely independent, though neither was the researcher a complete participant. This was the only way of conducting the observation, however: in Mulhall's (2003) article, the author describes that often there needs to be practical changes made to Gold's (1958) typology to fit the reality of the situation and capitalise on opportunities presented. Marvasti (2013) backs this up, stating that the choice of how to conduct the observation is also based on structural necessities and personal choices.

Observations have several strengths, one of which is allowing the researcher to observe life-like reactions of the participants; this allows an understanding of what participants do, rather than what they say they would do (Cochrane and Quinn Patton 2007). For this reason, observations are often used to supplement interviews to corroborate research findings (Jamshed 2014). A

primary reason for choosing observation research was to compare the findings with those identified in Study 6 which uses interview techniques to understand participants reactions to scenarios.

A downside to observations is that there is little opportunity to ask for feedback from those observed, as doing so will disturb their natural reaction to the situation (Andreeva and Gavrilova 2012). Furthermore, in this study stopping participants during the simulations to ask questions would have disturbed their experience and value of the course. Tsoukas (2005) also argues that dissecting tacit knowledge itself is difficult or impossible: while explicit knowledge is systematic, and each part of the action can be broken down, tacit knowledge is often instinctive, and the user rarely understand why they took the actions they did. Therefore, stopping the participants and asking for feedback on why they took certain actions may not yield any relevant or usable data.

A further disadvantage of observation research is the time-intensive nature of the data collection and the complexity of analysis (Baber, Stanton and Young 2014), especially when recording descriptive, over-focussed or selective, observations (Emerson, Fretz and Shaw 2011). It was observed in this study that though the observation itself was more time intensive, it was more engaging that interviews and less demanding of the researcher. However, the data analysis was more complex and not as straight forward as that of interview data.

Apparatus

No specialist equipment was needed to complete the study. Though observations are best recorded with video (Barber, Stanton and Young 2014), this was not possible during this research as it was both unethical and not allowed by the hosting organisation. Observations of the three courses were recorded in a single field notebook; this allowed reflection on past observations for each new course so that the notes taken followed the same logic and layout. This aided review and analysis. These were also recorded electronically post-course.

The HEAT Course

A well-respected training organisation the researcher works with agreed to observation research being conducted on their HEAT courses; the reason was because of their commitment to the development of the field but also because of a future possible benefit from the research. The courses were run within the UK on a specialised training establishment which allowed the use of firearms (weapons) and the use of pyrotechnic explosions. The course has been running

for over 15 years. The researcher had no control over the design or running of the simulations, so could not be tailored to the research conducted. The course is explained here though specific details have been omitted to protect the organisation's competitive advantage.

Three simulations courses were observed, taking place in October 2016 (Course 1), February 2017 (Course 2) and October 2017 (Course 3). The simulations took the form of a 4-day training event, in which the 3rd was a day-long simulation. Prior to the start of the course was an optional first aid course covering basic first aid concepts. There were then 2-days prior to the simulation which included training on basic personal security concepts being mainly classroom based. On day 3 there was outdoor elements, including identification of mines and explosives, reacting to grenades (explosive devices thrown by hand) and how to exit a vehicle being shot at.

A brief timeline of the course is provided below (Table 5.1) overleaf.

During the course, the researcher acted as a co-trainer with one other trainer and one Simulation Director. The researcher delivered training content on days 1, 2 and 4. This approach is not well documented in the literature, which often focuses on the researcher as an outside observer or observer as a participant (Gold 1958; Kawulich 2005). In this case, observing as a trainer was the only approach achievable; this did have the benefit of allowing the researcher to understand how the novice and experienced within the group were understanding of the topic prior to the observation day.

Day	Content
0	(Optional) first aid for the field.
1	Introductions, why is security important for humanitarians, understanding your own security, context assessments, assessing risk, security strategies and mitigation approaches, radio communications.
2	Briefing on explosives, weapons and mines, reacting to grenades, identifying cover from weapons and exiting a vehicle under gunfire), security planning.
3	Simulation day starting at 0900 and finishing at 1800.
4	Simulation review, debriefing, stress management, sexual violence, close.

Table 5.3: Overview of HEAT simulation course in Study 5

The simulation day is designed to put participants in stressful situations they may potentially face in high-risk environments. The simulation takes place on a specialist training venue, often used by the military and police forces. The group is split into two smaller sub-groups, who each

progress around a 'circuit' of scenarios independently. The sub-groups drive around the site in a minibus driven by site staff. They can keep in touch with a notional 'base' through radios but have no contact with each other. The simulation takes place in a fictitious country based loosely on Afghanistan; the participants are given country guides, maps and other assorted documents to immerse them in the simulation and learn more about the risks.

The trainer's role on the simulation day was to follow the participant groups but not input into their simulation; rather, to observe their actions for the review on day 4 and ensure their safety. As such, the researcher would not be impacting on their role as a trainer while conducting the observations for this research. The organisation and co-trainers were also happy for this to occur as it structured the review on day 4, more so than usual. Observations were also taken during the training days to identify experienced field workers during break times and co-trainer sessions.

Semi-professional actors play a range of characters to give the simulation realism and put the participants under pressure. They rehearse the roles and have realistic backstories- many have also worked in the humanitarian sector. There is the use of Blank Firing Weapons (weapons that discharge a loud sound but no projectile), imitation firearms (weapons that look realistic) and pyrotechnic explosions (explosives designed for theatrical effect rather than destruction). There is also simulated wounds the actors use to provide life-like injuries. As the actors can observe both groups, they were also asked to provide pertinent observations. Though they usually do this to form part of the Day 4 simulation review, they were specifically briefed on the project and asked to provide relevant observations to the research as well.

Though the simulation was not organised by the researcher, and therefore the responsibility to ensure the ethical and safe running of the course rested with the organisation, the below safeguards were in place:

- Minimum of two members of staff were trained in Psychological First Aid;
- A full health and safety brief was given to all actors and participants;
- Participants could step out of the simulation at any point if they felt uncomfortable;
- All actors were briefed on the safeguarding measures to limit negative stress reactions;
- trainers would step in if they became unsafe/too emotionally distressing.

The layout of the simulation scenarios and a summary of the learning outcomes is provided in Table 5.2 below (changed slightly to protect intellectual property but reflect overall course):

Table 5.4: Overview of the HEAT simulation and learning outcomes

Scenario	Description	Learning Outcome
Scenario 1: Military Checkpoint	Participants arrive at a checkpoint manned by International soldiers from a coalition army. The checkpoint is marked and displays formal logos and soldiers dressed smartly. Participants are questioned and searched. There is limited hostility though the process is overly bureaucratic.	• Dealing with formal but unknown processes; • Compliance; • Understanding of role and humanitarian principle
Scenario 2: Landmine Explosion at IDP Camp	Participants come across an IDP[1] camp (not their main task). They must exit the vehicle and engage the locals to assess their needs. After 10 minutes, an IDP woman walks away to collect firewood and steps on a landmine. They are injured and the other IDPs want the participants to take the injured person and her husband to hospital.	• Dynamically assessing the security situation; • Reacting to explosives; • Calmness under pressure; • Rationale thinking under pressure.
Scenario 3: Informal Checkpoint	The vehicle approaches a makeshift blockade in the road. As they draw closer, participants are stopped at an informal checkpoint manned by a local rebel faction. They are pulled out of the vehicle, questioned and have valuables stolen. There is a large amount of hostility unless the participants can diffuse this.	• Calmness under pressure; • Dealing with aggression; • Deescalating hostility; • Stress management; • Interpersonal skills to prevent escalation.

[1] IDP: Internally Displaced Persons are those who have been forced to flee from their homes but have not crossed an international border; if they had, they would be referred to as Refugees.

Table 5.4 (cont.): Overview of the HEAT simulation and learning outcomes

Scenario	Description	• Learning Outcome
Scenario 4: Crossfire at Village Meeting	Participants attend a meeting with a local tribal elder. After a while, a new group of locals arrive. They are from a different tribe, denoted by the traditional clothing they are wearing. After an argument between the two tribal groups, there is a crossfire event in which the locals shoot at each other. The participants are not directly targeted, but the locals are either side of the group.	• Reaction to gunfire; • Awareness of surroundings; • Awareness of build up; • Calmness under pressure; • Rationale thinking; • Communication and teamwork.
Scenario 5 Ambush	The two teams join up and proceed back to base in convoy. Along the route the lead vehicle hits an Improvised Explosive Device and the convoy is attacked by 12+ aggressors. The team are bundled out of the vehicles, are taken aside and have all valuables, radios and shoes removed. There is a high level or aggression, weapons and gunfire throughout.	• Stay calm in an extreme stress situation; • Situation awareness and not running away; • Compliance in the face of extreme aggression.
Scenario 6: Kidnapping	Participants are ambushed by an armed group and abducted. The reason for the abduction is not clear. The participants are overwhelmed by force and there is no room for escape. The participants are taken to a rebel 'base'. Here they subject to torment, humiliation and eventually an interrogation. They are moved several times throughout the scenario though within the same compound. Again, there is little room for escape.	• Be calm and compliant in the face of hostility; • Practice stress management during a kidnapping; • Practice interpersonal communication.

Each sub-group follows the same circuit, though are separated by 20 minutes so that actors can reset props such as pyrotechnics and fake wounds. The groups then linked up after scenario 3 and go through scenario 4, 5 and 6 together. Minor scenarios also take place along the route- such as the vehicle encountering engine problems, or the 'country manager' asking the group to take measurements of plots of land- though these are ad-hoc and not experienced by all groups, designed to stall the groups and as such have not been noted or observed.

After the final scenario, the course is simulation is concluded with a short debrief exercise where they complete an incident report form. Participants are given the opportunity to return to their accommodation, change and shower. They then return for a brief debrief where they recount the day. At this point, the participants are dismissed for the evening. The actors then have their own debrief where they feedback what they witnessed so the trainers can compile feedback points for the following day.

Ethical Information

Ethics was approved by Coventry University under certificate P42883 (Appendix 1.3). The Participant Information Sheet included further information on what was being observed, but also stressed the participants right to withdraw and have any observations about them removed after the simulation. This was in acknowledgement to the potential for strong emotional responses which some participants may not have wanted recording. Rather than have individual Participant Informed Consent forms a single form was created per course with space for 20 participants to sign; this made storing the forms easier and reduced unnecessary paper as per the Data Management Plan (Appendix 2).

Observation Protocol

Two observation protocols were developed for the study. Observation protocols, sometimes referred to as observation guides, provide a tool for the researcher, or those supporting their research, to refer to guiding their observation (Kawulich 2005). This was important in this study as the observations were spread over a year-long period; the guide allowed the same areas to be observed.

The first protocol was designed to assist the researcher when making observations, split into three sections: pre-simulation observations, during simulation observations, and participant reflections. The simulations observation prompts were also given to the co-trainer who would observe one half of the group when they split up on the simulation.

On top of general descriptions, the observation protocol looked for the following demonstrations of tacit knowledge:

- Tacit emotion: powerful social responses, such as people becoming anxious, confused, laughing nervously, expressing irritation, anger (Neuman 2014) or strong control of one's natural emotion (Piperopoulus 2010). Becoming defensive and aggressive when questioned is an example of this;
- Tacit influence: there is a link between recognition of a situation (or stimulus), the resulting response or influencing actions taken and a successful outcome which can reveal tacit knowledge (Eerikäinen and Puusa 2010; Virtanen 2010). Being able to be subservient to a power-hungry aggressive actor would be an example if this;
- Tacit knowing: the ability to join what we observe directly (focal awareness) and what we perceive about a situation and act accordingly (Polanyi 1966b). This perception is further broken down into marginal clues (events occurring around us but not being directly observed) and subliminal clues (non-observable, such as past experiences or background information) (Virtanen 2010). These insights concerning the future of an event are a good indication of tacit knowledge (Eerikäinen and Puusa 2010). Here an example could be recognising others joining the group whilst in a conversation and assessing escape routes.

Identification of the above not only shows that the participants actions are shaped by tacit knowledge but will also allude to what that tacit knowledge is.

To explore the literature further, the observation protocol sought to identify the following:

- Explicit/tacit divide: observations of experienced participants following their own instinct and experience rather than the training given, as stated by Daudin and Merkelbach (2011) and Adams (2003);
- Experience/novice interactions: Barnett (2004) and Persaud (2014) both state that mentoring is effective at improving the knowledge of novice workers. Identifying how this occurs in reality will allow for recommendations on how it can be implemented.

The second observation protocol was designed for use by the actors, so they could record their observations, and was less complex.

The templates for the Observation Protocol for the researcher and actors can be found below in Appendix 7.

Participants

There was no control over the selection of the participants in this study. Participants were attending a privately-run course for which they (or their organisation) would pay to attend. However, there was a large range of experience levels for each course. Prior to the course, the researcher was provided with an experience list which covered the following:

Name	Role	Organisation	Countries worked in	Sector experience	Objective for course

This allowed a pre-sorting of the participants into those with more experience and those with less. In order to identify those with more experience, the following inclusion criteria were used:

The same inclusion criteria as used in Study 4 was used here:

- At least 10 years' experience in the humanitarian sector;
- Not have direct security responsibilities;
- Have worked in at least one of the following insecure environments in the last 2 years:
    - Yemen;
    - Central African Republic;
    - Kenya;
    - The Democratic Republic of Congo;
    - Somalia;
    - Sudan;
    - Pakistan;
    - South Sudan;
    - Syria;
    - Afghanistan.

As it was not possible to determine from the experience list whether the participants had a recent field role the following inclusion criterion from Study 4 was removed: 'Working, or have worked within the last year, in a field role'.

Those matching the inclusion criteria were deemed *Very Experienced*. Those with less than 10 years but 5 or more years' experience and having worked in one of the above countries were deemed *Relatively Experienced*. For this study, those with less than 5 years' experience or who had not worked in one of the countries were deemed *Non-Experienced*.

A summary list of participants is provided below (Table 5.5; mean values have been rounded to one decimal place):

Course	Participant breakdown	Very Experienced	Relatively Experienced	Non-Experienced	Range of years/ Mean	Total Countries of Experience
1-October 2016	4 males; 11 females.	4	3	8	0 – 20 5.8	South Sudan, Sudan, Afghanistan, Ethiopia, Jordan, Turkey, Lebanon, Syria, Iraq.
2-February 2017	7 males; 10 females.	5	2	10	0 – 13 5.7	Palestinian Free Territory, South Sudan, Kenya, Thailand, Ethiopia, Sierra Leone, Uganda, Zimbabwe, Somalia, Democratic Republic of Congo, Mali, Burkino Faso, Afghanistan, Kyrgyzstan, Jordan, Lebanon, Iraq, Tanzania.
3-October 2017	3 males; 11 females.	4	2	8	1 – 26 6.8	Ukraine, Syria, Iraq, Zimbabwe, Kenya, Somalia, Uganda, Yemen, Afghanistan, Turkey, Jordan, Israel, Lebanon.
TOTALS	46	13	7	26	6.1	24 countries

Table 5.5: Participant Breakdown for Study 5

Most of the participants were on the course to gain a better understanding of personal security. Three people were taking the course as a refresher with most of the others undertaking the course of the first time, including those who fell into the Very Experienced category. Most of those in the Non-Experienced category had between 0- and 2-years' experience. There were 4 people undertaking the course who had never worked in the sector before, or overseas, but were doing so to help them secure employment (interestingly this approach was mentioned by one of the SMEs in Study 2). All bar two of those who fell into the Very Experienced or Reasonably Experienced category were either based in the field or travelled to the field monthly.

Interestingly, though there is no reasoning why, all three courses were attended more by females than males. Anecdotally and only for interest, the female participants also had a more acute awareness of the risks faced in high-risk environments than the males, who were often unaware of possible risks even having travelled to the countries listed as most dangerous (Yemen, CAR, Kenya, DRC and Somalia).

Procedure

The data collection took place on three occasions between October 2016 and October 2017.
The data collection procedure was split into 8 parts:

1. The observation protocol was studied prior to the course to allow naturalistic observations. This was also briefed to the co-trainer, so they could input observations prior to the simulation;
2. When the participants arrived on Day 1, the research was introduced during the first session 'Why is Security Important for Humanitarians', including detailing the information on the Participant Information Sheet. A physical copy was also handed out. During this session, participants completed the course disclaimers for the organisation and signed the Participant Informed Consent form. It was stressed that the research was not linked to the course and that the participants will still get post-course certificates even if they did not want to be recorded for the observations;
3. Pre-simulation observations were carried out during the training sessions on Day 1 and 2. These were to understand how the three categories of participant engaged with the material and whether this allowed identification of tacit knowledge;
4. An actor and co-trainer briefing was carried out on the night before the simulation, covering the research focus, what they should be observing for and how to use the observation protocol to assist them;

5. The simulation was conducted, and observations made by the researcher, co-trainer and actors as per the observation protocols (Appendix 7 and described above under *Supporting Material*);
6. At the end of the simulation a back-briefing occurred with the researcher, co-trainer and actors in which observations were shared;
7. On Day 4, the observations were briefed to the participants as part of the simulation debriefing. They were given the opportunity to make comments on any of the observations, as well as ask for any observations to be removed from the study;
8. At the end of each simulation, notes were reviewed, expanded where lacking and researcher commentary added.

Thematic Analysis

Thematic analysis was used to analyse the observations. The analysis took an inductive approach, both because doing so fits with the research approach of this thesis but also because of observation research's suitability for inductive reasoning (Marvasti 2013). By collecting and analysing general observations, it is possible to draw logical and plausible conclusions (Babbie 2011; Marvasti 2013).

Braun and Clarke's (2006) 6-phases were used again:

1. Familiarise with the data: the summaries of the 3 observations were re-read; by recording these at the end of each course the time to become familiar with the data was reduced;
2. Generate initial codes: recurring codes were then recorded onto post-it notes, with different colours for the three levels of experience;
3. Searching for themes: post-it notes provided an effective means of visualising the creation of themes and what participant group they belonged to. Themes were classed under the five areas observed: Explicit/tacit divide, Experience/Novice interactions, tacit emotion, tacit influence and tacit knowing;
4. Reviewing themes: once all observations had been re-read, the codes were then combined into a matrix so that themes could be identified under the respective areas;
5. Defining and naming themes: themes were given representative names;
6. Producing the Report: themes were depicted onto thematic grids to easily portray how themes differed between participant groups.

5.3.3 Results

All three observations were completed as per the procedure. In total, there were 46 participants across the three courses (E = 13, RE = 7, NE = 26). Across all participants there was a mean of 6.1 years' experience, spanning across 24 countries; though not all participants had experience, this represents a good spread across the sector which should support the transferability of the data. The researcher was able to observe 25 of the participants directly (VE = 8, RE = 6, NE = 11). Where possible, the researcher was given a greater proportion of Very Experienced and Relatively Experienced participants to observe to support the data collection. A total of 16 actor surveys were collected and build into the analysis (with at least 1 survey from scenario 2, 3, 4 and 5 per course).

5.3.4 Themes during Training

The below themes were observed during the training on Day 1 and 2. They are important to note as they show the relationship between how participants engage with explicit knowledge passed over during the training, and whether this is followed during the simulation. A brief overview of the training given is provided to give depth to the themes in the following sections also.

Scenario	Overview of Training
1	Participants create Standard Operating Procedures for dealing with both formal and informal checkpoints, including developing set scripts and communication roles.
2	On day 2, participants go through an outside instruction session where they are taught the recommended way to respond to a range of risks, including mine awareness. Should they find themselves in a mind-field or suspected mine-field they should stay still, assess whether there are mines around them, and call for help. If they are in immediate danger, they should attempt to retrace their steps back to safety.
3	SOPs for dealing with checkpoints are developed by participants. They are taught about responding to aggression by being subservient and not antagonising the aggressors.
4	During day 2 sessions they are taught that should there be shooting not directed at them (i.e. crossfire) they should get low to the ground and protect their head. If possible, they should crawl to put effective cover between them and the shooter. They should then stay low to the ground for a period after the shooting stops.
5	The participants are taught that they should comply with demands of any aggressors, that they should resist attempts to escape where
6	Coping techniques are covered on day 4 so they can reflect on their experience, but they are taught that they should avoid negotiating and get their abductors to call the organisation.

Table 5.6: Overview of Training Specific to Scenarios in Study 5

The following general themes were identified during the pre-simulation training:

- VE participants were able to understand the topic very quickly, as well as utilise past experiences to share with the group;
- Contrary to literature (Barnett 2004; Daudin and Merkelbach 2011) VE and RE participants were still engaged with the training, often writing notes and asking clarifying questions, showing that they do in fact learn from explicit content;
- RE participants were confident in the material they knew and willing to learn from the areas they did not fully understand, showing understanding of their own knowledge;
- Discussions revealed that several parts of the taught content were not practised by VE and some RE participants, namely risk assessing, SOPs and contingency planning;
- RE participants identified that they needed to make improvements based on the training content, whilst VE participants understood the content but stated that they were unlikely to change their practices, corroborating what Daudin and Merkelbach (2011) stated in how experienced workers are unlikely to change their ways;
- During the outside simulations on day 2, VE participants were slow to respond to some of the risks. This is highly likely down to age and the physical nature of the training (VE participants being older). However, during the theoretical injects after the exercises they were no wiser than RE and NE participants as to what had happened, showing experience does not necessarily mean knowledge to actual threats and the response;
- NE participants were able to quickly understand the theory elements of the training and apply this to group discussions. They were more receptive than VE and RE participants, who fell back on their experience more so than the content being delivered;
- Several VE and RE participants had attended HEAT courses previously, though were still unsure of what procedures to take during the day 2 outside training, showing a lack of refresher training with skills being forgotten over time;
- NE participants asked most of the questions, preferring for theoretical material to be linked to real-life examples from the trainers or other participants;
- NE participants used informal learning techniques more so than VE and RE participants, asking questions after sessions, asking for further support and utilising social time to go through material they did not understand with the trainers or other participants;
- VE participants were the only group to stay after sessions on day 2 to go over the material, including the SOPs they develop and the (fictitious) country information packs.

5.3.5 General Themes

Themes were created per serial which were synthesised to produce the following themes:

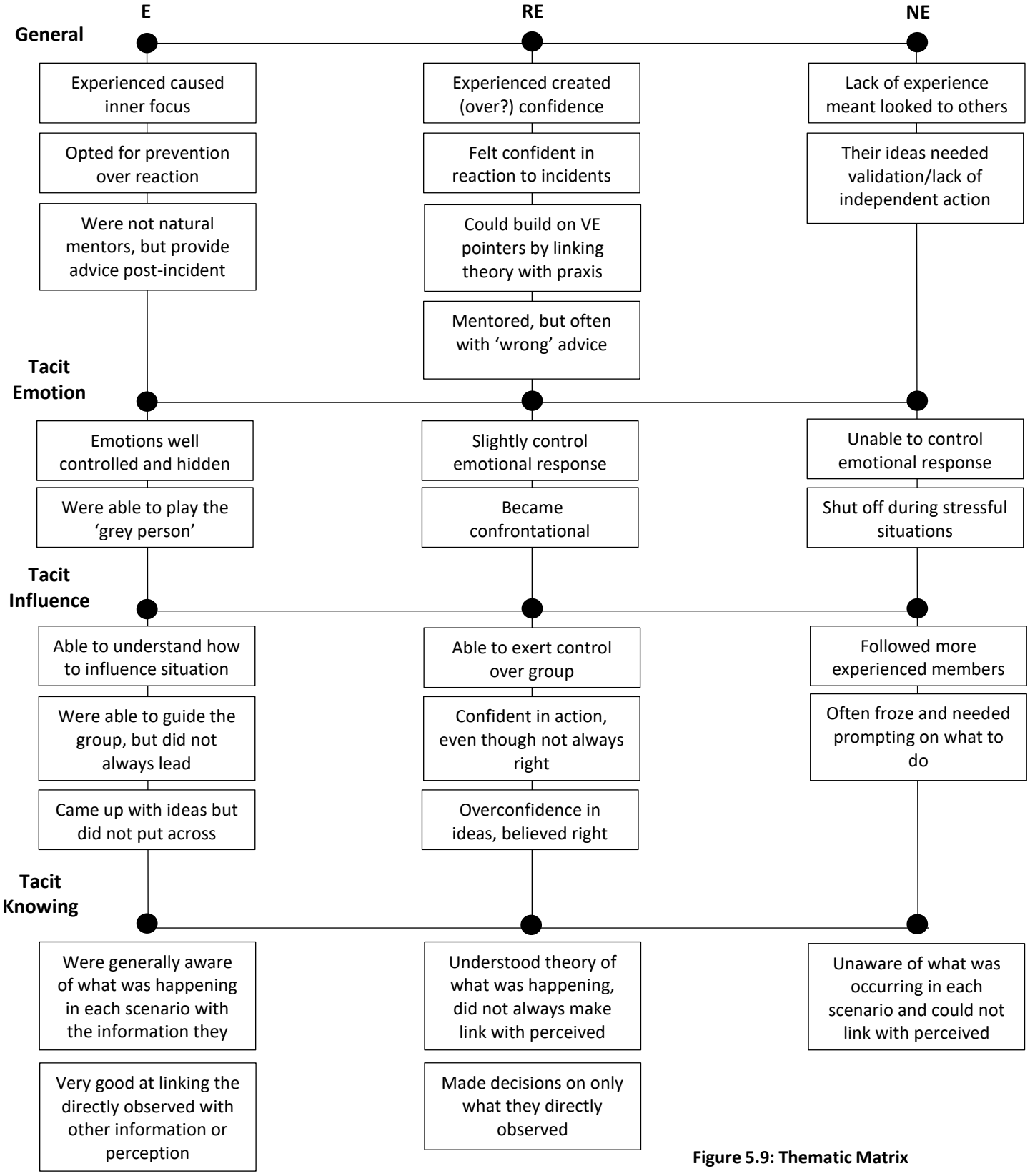


Figure 5.9: Thematic Matrix for Study 4

- RE participants often took a leadership role. On Day-2 they self-elected team leaders; in all cases RE participants were selected over the VE participants, regardless of experience (years and countries worked in). Furthermore, VE participants were more prone to adopt a self-preservation stance and focus on looking after themselves rather than the team (especially in Scenario 2 and 4), whereas RE participants (even those not elected as team leaders) were group orientated, attempting to look after others as well as themselves;
- Very Experienced participants were able to help those categorised as Non-Experienced (and to a degree Relatively Experienced), but only after the event. One example of this is after the official military checkpoint (Scenario 1), Very Experienced participants would then explain the procedure within the group should they come across another checkpoint. This occurred with all three groups directly observed and two of the groups observed by the co-trainer. However, though the group knew they would be passing through a military checkpoint the Very Experienced participants did not give pointers prior to arriving at the checkpoints. This contradicts the premise put forward by Barnett (2004) and Persaud (2014) stated about more experienced workers being used as mentors. Though the dynamic may be different when experienced participants are instructed to mentor, the observations show that this is not a natural action and only done in response to incidents;
- In terms of approach, those classed as VE were more likely to want to avoid the possibility of an incident all together (such as wanting to avoid the IDP camp (Scenario 2) or leave the village meeting immediately before any sign of hostility when the new group arrived (Scenario 4)). Such an approach could be limiting to a humanitarian organisations mission, with VE participants wanting to take an overly cautious approach. This was contrasted by RE participants, who were less cautious are had confidence in their ability to respond to a security incident if it occurred. However, the observations showed that this may have been a result of overconfidence, not fully understanding their lack of power. Such examples include trying to negotiate access by leveraging power at the informal checkpoint (Scenario 3), trying to intervene during the village crossfire (Scenario 4) as well as trying to negotiate their release during the kidnapping (Scenario 6);
- RE participants, despite experience in high-risk countries, were still prone to making snap decisions and convincing the remainder of the group to follow. A key example of

this is the attempted escape in Scenario 3. These decisions were made only on information directly observable, such as the sight of gunmen, and showed an inability to tacitly know by linking the observable with perceived information, such as that read in the scenario material (such as the country guides). VE participants were much more capable of linking what they observed and what they perceived, which allowed them to approach the situations in different, and in most cases more effective, ways;

- RE participants showed a good ability to link theory (especially what they had covered on Day 1 and 2) with application during the simulation, often advising others also. An example of this was during Scenario 2 after the landmine had exploded. In all three observations, NE participants were keen to rush towards the injured local IDP to assist them, which would have exposed them to the danger of stepping on a landmine themselves. However, in each case RE participants stopped them going forward, identifying the explosion as a landmine. They further corroborated this by asking the locals if there were mines present;
- In all scenarios, NE participants were unable to positively influence the situation, highlighting issues with sending untrained or underexposed staff to high-risk countries. However, a contrast was with VE participants, who though have a wealth of experience, were often less vocal in expressing it. During the post-simulation debriefing, VE participants were quick to state what they would have done, often said during the scenarios but without conviction. This point was brought out by the other co-trainers also. Though VE participants often knew what to do, or more appropriately what not to do, they did make themselves heard to the wider group. One example of this was during Scenario 3 when the group escaped into the forest. The VE participant that went with the group made it clear of their disapproval of the plan in the woodblock but did not protest whilst still in the vehicle;
- In terms of tacit influence, VE participants were able to understand the situation presented to them and how best to influence the situation in Scenario 3 and 6. They were also able to understand situations they could not influence (Scenario 4 and 5) and avoid making themselves a target. This ability was not possessed by RE and NE participants.

5.3.6 Discussion

General Discussion

Both Barnett (2004) and Daudin and Merkelbach (2011) discussed the role tacit knowledge played with experienced field workers, stating that those with experience in the field were more likely to follow their own beliefs, experience and common sense over what was being taught to them by their organisation. This was observed during the simulations, with VE and RE field workers acting on their own instinct for most of the scenarios rather than the way in which the explicit knowledge taught them. This is illustrated in Table 5.6 below:

Scenario	VE Participants	VE Participants Actions	RE Participants Actions
1	Followed SOPs, used SOPs as justification	Took a lead role	Tried giving the 'right' answer
2	Stayed still, assessed situation, called for support or backtrack steps one-by-one.	Moved immediately to the vehicles, looked after self	Moved around, tried controlling group, organised treatment of injured.
3	Followed SOPs, complied, gave up possessions	Played 'grey person', complied, gave up possessions.	Tried negotiating, resisted giving up possessions, became aggressive.
4	Laid down immediately, got to cover if possible	Darted to vehicles through crossfire.	Moved around trying to assess situation and gather group.
5	Complied, did not try to resist or escape	Played 'grey person', complied.	Tried negotiating, tried escaping.
6	Practised stress-management, referred to organisation, acted as 'grey person'	Played 'grey person', complied.	Tried negotiating and leveraging power/influence.

Table 5.6: Explicit Knowledge vs Action During Simulations

NE participants actions did not follow the explicit knowledge, not because they followed their own experience, but because their actions were wholly influenced by fear. The effects of stress, or control of emotion, played a big role in how participants reacted to their scenarios. This is both linked to what has been termed tacit emotion in this study (or a strong emotional response or control of one's emotional response) (Neuman 2014; Piperopoulus 2010) but also related to the literature on Acute Stress Response.

VE participants were able to stay calm throughout and act in a rationalised manner, often observed practising breathing techniques during stressful scenarios (especially Scenario 3, 5 and 6). This showed tacit emotion in the form of being able to understand their emotional response and take active steps to control it and avoid the effects of the Acute Stress Response. This was in stark contrast to NE participants who were unable to control their emotions, which often resulted in them 'shutting off' and experiencing both the freeze and the tonic immobility stages of the acute stress response (stage 1 and 4 as shown in Figure 5.10 below).

Figure 5.10: Acute Stress Response (Brand and Myrick 2015: 47)

The freeze response is a natural instinct, allowing humans to build up a situational picture before acting (Brand and Myrick 2015). However, where the senses are overwhelmed our body is not able to respond in the natural 'fight or flight' way, and we stay frozen- a phenomena known as 'tonic immobility' (Maner et al. 2008) (see Stage 4 on Fig 5.10 above). Tonic immobility could be witnessed in NE participants in Scenario 3 and 5. In both occasions, when participants were met with direct aggression they froze and were unable to act. It was commonly observed that NE participants would be instructed by the actors playing rebels to move from one spot to another but not be able to comprehend the simple instruction. In Scenario 4, after the direct threat of the local shooters had moved away from them, they were stuck in the position they took cover in and would not move until instructed to do so by the more experienced participants.

RE participants, on the other hand, were less prone to freezing but were more commonly observed reverting to a 'fight' response (Stage 3 on Fig 5.10). Though they were seen acting in a rational way in Scenario 2, being able to control their emotions to the initial explosion and prevent the 'flight' response seen by VE participants or the 'freeze' response seen by NE participants, in the scenarios where there was direct confrontation (Scenario 3, 5 and 6) they often became aggressive or confrontational. This could be down to the possibility that though RE participants have experience working in high-risk environments, they have not experienced these events first hand and therefore not build up a tolerance, which limits their ability to control how they respond (McFarlane, Van der Kolk and Weisaeth 1996) – they have an awareness of the event, so do not freeze or face tonic immobility, but are unable to control whether or how they fight or flight (Maner et al. 2008). This personification of fight was not in the traditional sense of physical engagement, but passive aggression such as answering back, trying to threaten the actors with potential backlash, or the instance of the participant spitting in the rebels' hand after handing over jewellery.

Due to their ability to control their emotional response, VE participants were seemingly able to prevent the 'uproar' or sympathetic activation (Stage 1, 2 and 3 on Figure 5.10), keeping a level head and practising a range of coping techniques, from breathing to taking visible pauses prior to answering. These coping techniques demonstrated good stress management skills, but also allowed them to stay in control of their emotions and prevent the 'shut-down' or para-sympathetic activation effects that were witnessed from RE and NE participants during the final kidnapping (Scenario 6). The only instance of VE participants experiencing one form of the Acute Stress Response was during Scenario 2, whilst after the explosion they immediately moved

towards the vehicle and did not consider the wider team, which could be a 'flight' response (Stage 2, Figure 5.10). However, the way in which the VE participants did this was clear and calculated, and therefore does not fit with the traditional definition of 'flight' which is far less controlled or calculated (McFarlane, Van der Kolk and Weisaeth 1996; Maner et al. 2008).

Tacit emotion and the way in which participants were able to control their Acute Stress Response was also related to how they were able to influence the situations they encountered (Virtanen 2010), which was observed as 'tacit influence' during the study. There was a clear distinction between NE and RE participants and VE participants in how they were able to control their emotional response and react in a constructive way. NE participants, who were less in control of their emotional response and often froze, were unable to react and therefore could not positively influence the situation. RE participants emotional response to direct threat caused them to act in a (passively) aggressive manner, which did not allow them to positively influence the situations; rather, in Scenario 3, 5 and 6 their response negatively affected the situation. The exception was Scenario 2, in which there was no direct threat and the RE participants were able to take control over the situation and control the response of NE participant. VE participants in comparison were able to control their emotional response and therefore act in an appropriate manner to the situation at hand. This could be observed in Scenario 3, where VE participants took a subservient persona in reaction to the power dynamic of the rebels at the checkpoint, or in Scenario 6 where they played the 'grey person' to avoid unwanted aggression. The study showed that VE participants had greater tacit influence than RE and VE participants in how they were able to understand a situation and act in the most appropriate manner.

Positive tacit influence was dependant on how well participants were able to link what they directly observed (e.g. rebels at an informal checkpoint) with that they could perceive about the situation (e.g. type of uniforms, likely intent). This was termed 'tacit knowing' during the study and relates to how well participants could use non-observable, perceived information to understand the bigger picture (Eerikäinen and Puusa 2010). In this case, the perceived information was also related to the information they knew about the context, gained from reading the scenario material they were supplied on day 1 and 2, as well as prior experience of the situations first-hand. NE participants were unable to do this, both in terms of linking scenarios to information they read, but also not being able to link this to experience. One possible reason for this is their inability to control their emotional response which caused them to freeze, in which tonic immobility hinders memory recall (Maner et al. 2008). RE participants,

from the observations, were able to use tacit knowing to a limited degree. An example of them using tacit knowing positively is during Scenario 2 where they were able to understand the explosion was from a mine, not an attack due to the mentioning of mine risks in the scenario documentation. However, during Scenario 3 they were unable to understand the intent of the rebel checkpoint which caused them to become passively aggressive in their responses, showing a lack of tacit knowing. VE participants overall were able to demonstrate a good level of tacit knowing, linking what they observed with what they had read from the scenario content. This was a theme identified prior to training, with VE participants being the only group to stay behind after sessions to go over the material, especially in the evening on day 2. The one example where VE participants did not demonstrate a good level of tacit knowing was Scenario 2, where they quickly moved to the vehicles after the mine explosion. Interestingly, where RE participants showed a good level of tacit knowing, VE participants did not; likewise, where RE participants did not show a good level of tacit knowing VE participants did.

Background information about a situation was also able to reduce the stress an event caused, and therefore helped in controlling emotions and the Acute Stress Response. The simulation debriefing revealed that those participants who had read the scenario information, including the Country Briefing, were less worried about the outcome of events as there were accounts of previous incidents. Two examples of this are Scenario 3, the Informal Checkpoint, and Scenario 6, the Abduction. In both, VE participants mainly were able to understand what they were witnessing and link it to what information they knew- in both scenarios, they knew that they were unlikely to be harmed if they cooperated and that the main motivation of criminal and rebel groups in the fictitious area was financial gain. This knowledge stopped them panicking at the aggression they faced.

Though the observations did not identify a list of tacit knowledge requirements itself, it did show that there was a connection between the tacit elements observed (emotion, knowing and influence). Tacit influence itself is a key requirement: those that were able to effectively change the outcome of a situation, whether to diffuse the aggression from the rebels at the checkpoint or act in a way which reduced attention towards them during the abduction, were able to adapt their actions in the most appropriate way.

The observations show that there is a connection between the three areas of tacit knowledge (see Fig 5.11).

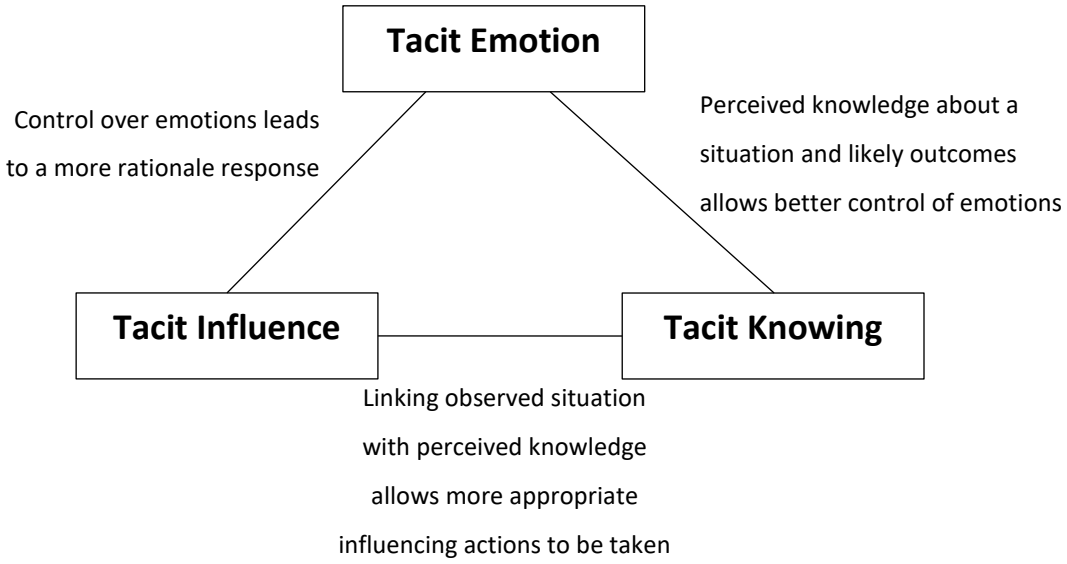


Figure 5.11: Nexus between Tacit Emotion, Influence and Knowing

The study was also a chance to observe what the SMEs interviewed in Study 2 stated about security training being introductory and that it did not assess the knowledge participants gain (Study 2 'Training should focus on training basic abilities rather than general awareness'). Out of the 20 VE and RE participants, a total of15 had previously attended some form of HEAT course (9 VE and 6 RE). However, during the outside exercises on day 2, those that had previously attended HEAT courses were not able to identify the correct responses to the range of threats discussed (shooting, grenade attacks and being caught in a minefield). This shows that though HEAT training allows the development of knowledge, without practice this is forgotten over time. This also goes some way to show what Barnett (2004) and Persaud (2014) discuss, showing that security training is seen as a solution rather than a starting point, with very little follow-on or refresher training being conducted. This area was highlighted by the SMEs in Study 2 as being a key weakness in current operational security.

Furthermore, delivering the training corroborated the view from SMEs that HEAT courses do not assess competence, but merely trains procedures (Study 2 theme 3.2.4 'Requirements should be assessed, not just trained.'). At the end of the course all participants who completed passed as there no individual reports written on each participant by the trainers. This study does show that it is possible to conduct individual observations which could be used to create a course

report at the end of course. One potential use of this research could therefore be compiling a requirement list which could be assessed on HEAT courses allowing for trainers to compile individual course reports.

Another theme which was identified through the observations was that VE participants did not naturally 'mentor' those with less experience. This contradicts several recommendations from literature which states mentoring is a means of improving security (Barnett 2004; Persaud 2014). Persaud (2014) states that mentoring is a "process in which a person with more knowledge and experience supports someone with less experience in their career and professional development through informal, face-to-face communications" (Persaud 2014: 135). Though the study does not conclude that mentoring would not work, it did show that mentoring was not a natural action for either VE or RE participants. VE participants did provide a level of mentoring to the others *after* the incidents providing critical reflections and suggesting what they could do should it happen again. Therefore, a key takeaway would be that should a mentoring relationship be set up, it should be clearly stated to those with experience on what they should be mentoring on.

Elicitation of Knowledge

The aim of the study was to observe the interaction between experienced and in-experienced participants as well as to see if through these observations it was possible to identify tacit knowledge, as was posed by Chi (2008). The observations viewed what Nonaka (1991) termed 'socialisation' in the way experienced staff who possessed tacit knowledge shared this amongst their team, both from VE participants but also from RE participants. Socialisation itself is an ineffective means of turning tacit knowledge into explicit knowledge (Nonaka and Takeuchi 1995), as discovered during the study.

The study did meet its aims, identifying how tacit knowledge informs decision making. It was also an opportunity to witness the interaction between participants tacit knowledge built up through experience and the explicit knowledge taught on the course. In this regard, the study confirmed the premise put forward by Daudin and Merkelbach (2011) and Barnett (2004) that experienced participants are likely to follow common sense and their own experience over training. The study was less effective at identifying specific tacit knowledge, however. The study itself different from Chi's (2008) descriptions, which were focussed on single expert observations, rather than of a simulation in which there are multiple experts and novices of varying levels.

Utility

The mix of participants, in terms of their experience, countries they are from and work in, as well as their organisation type means that they are a good representation of humanitarian field workers. The data is only reflective of western humanitarian field workers who work overseas however, as the main demographic were European and American nationals.

The observations themselves required very little training, though preparation was key. They present a useful means of observing interactions between different experience levels. With the observation protocol, it was straight forward to train the co-trainers in conducting the observations themselves, requiring only a brief 30-minute explanation. As such, they can be conducted by both academics and practitioners alike. However, the study relied on a relationship between the researcher and the training organisation. This is a potential problem for replication by other researchers, though is less likely to hinder replication by practitioners, both who run courses within their organisations or have links with training organisations who run such courses. However, where access is gained the method can be applied to any sample if the researcher has the relevant language skills to understand the interactions. The observation protocol allows both generic observations to be collected as well as specific observations on the role of tacit knowledge.

Observations themselves are not objective, being shaped largely by the researcher's relationship to the field (Marvasti 2013). In this instance, there was the potential for researcher bias as the researcher was a trainer on the course- bias may occur when looking for 'correct' courses of action stated in the material, and not being open to seeing the participants actions objectively. Recording all observations and using the observation protocol, as well as collecting observations from co-trainers and actors was a means of reducing researcher bias so that the observation and results reflect the truth of what occurred.

Running the observation required very little material resource; an A5 notebook was used throughout. However, they were time intensive, covering both the pre-course training element of 2 days as well as the day-long simulation. It is also noted, as discussed by Baber, Stanton and Young (2014), observations require a great deal of effort and focus from the researcher and is thus labour intensive and emotionally draining. This is even more so on a HEAT simulation where there is imitation gunfire and explosions. There are practical constraints for researchers who cannot access such courses, also.

Sensitive Domain Issues

The method was deemed acceptable, as it allowed observation of how field workers interacted in a simulated high-risk environment. The observation of this on a simulation course was the only effective means of doing such, with limited impact on the participants themselves.

Comment cannot be made on the recruitment of participants, as this was set by the course. However, an interesting point to raise here is that out of the 46 participants, none were against being observed and many of the participants were interested in the research, making conversation with the researcher during breaks and evenings. This contradicts what was noted in Study 2 and during the literature review (specifically Daudin and Merkelbach 2011) in that field workers are unwilling to engage with security research. There is an element of bias here however, in that those on the course are likely to be more vested in their security; the fact they are on the course shows that they understand its importance.

Development of Method

There are many ways in which this study can be developed and built upon, though as with this research this is constrained by external factors. If further research time was available, it would be possible to use this opportunity to interview experienced field workers (using the process in Study 6) and then to conduct observations on participants responding in a realistic environment; the comparison will be useful to compare what people say they will do, and what they do in reality. This angle of research is described in greater detail by Neuman (2014).

An interesting angle to take here would be to have participants complete a Systematic Self-Observation (SSO); a method in which participants are trained to observe and report their own experiences. This method is discussed in detail by Rodriguez and Ryave (2002). This method can be used alongside the traditional observations conducted, providing both observation of what occurred but also how the participants perceived the situation. However, this method would have been impractical and would have interrupted the participants learning experience on the course: this highlights a key weakness with observation research (Milton 2007; Trafton and Trickett 2008).

The effects of stress on the participant's dependant on their experience level was an interesting observation in the study. Researchers with a psychology background could conduct further research into this area to understand exactly why VE participants were better equipped to control their Acute Stress Response and whether this can be replicated in training.

5.3.7 Study Summary

A total of 3 observations were conducted on a Hostile Environment Awareness Training courses, observing 46 participants of differing experience levels. The aim of the study was to observe the relationship between experienced and non-experienced field workers during simulated security incidents and to identify tacit knowledge from these observations.

A notable finding from the observations is that knowledge itself is not a sufficient indicator of effective security. Explicit knowledge taught during the teaching phase of the course could not be effectively operationalised by those participants classed as not experienced and was inappropriately applied by those with a relative amount of experience. This corroborates literature from Chapter 2, which states that explicit knowledge is not the complete solution and requires tacit knowledge to be effective. This challenges the usefulness of such simulation courses, which cannot be seen as a complete solution to ensuring participants are equipped to work in high-risk environments. This corroborates responses from the security advisors and trainers who took part in Study 2. Those participants with more than 10 years' experience, classed as Very Experienced, were also not natural mentors. This further challenges the literature on praxis reviewed in Chapter 2 on using more experienced staff to act as mentors for those who are less experienced.

The observations proved in ineffective means of identifying tacit knowledge in experienced staff. However, they did allow a deeper understanding of how experience shapes responses. Rather than knowledge itself being a key influence on how workers reacted, it was how this knowledge was applied to the three key areas observed. Experienced workers were able to relate the situations they were in to previous instances and use this to control their emotional response. This emotional control lead to more rational actions, which contrasted less experienced workers who acted on emotional impulse. Tacit knowing related how workers linked what they saw in front of them to knowledge they had and used this to create a more detailed situational understanding. Lastly, tacit influence related to how workers were able to understand a situation and how they could influence different actors to create a positive outcome.

This study presents a new link between the three areas of tacit emotion, knowing and influence not yet identified in the literature. Figure 5.11 (page 164) shows how the three areas are complementary and how experienced workers demonstrate these characteristics. In doing so, they are more effective in high-risk situations presented during the simulation course.

5.4 Study 6- Tacit Knowledge Scenario Discussions

5.4.1 Introduction to Study

Study 5 identified that eliciting knowledge from observations of security simulations was ineffective at building a tacit knowledge inventory. Experts apply their tacit knowledge instinctively and without thought (Nonaka and Takeuchi 1995): such can be witnessed during observations (Milton 2007; Study 5) but does not provide detail on what tacit knowledge is being utilised.

This study uses a triad of approaches suggested by Milton (2007) to elicit tacit knowledge from field workers, who develop this deep knowledge over time in high-risk environments (Claus 2015). The study uses the basis of Burton and Shadbolt's (1995) definition of practitioner class of experts, or those who deal with problems on a day-to-day basis, to identify true tacit knowledge, and therefore the selection criteria have been refined to ensure participants have a deep understanding of operating in high-risk environments.

5.4.2 Method

In order to elicit data on tacit knowledge, it was important to let the participant lead the discussions as much as possible (Shadbolt and Smart 2015). In this regard, many of the skills developed and theory applied which allowed the SMEs interviews in Study 2 to open-up and answer freely were used in this study. However, it was also important not to provide too rigid a structure to the interviews and ensure that researcher bias did not creep into the study design. A common approach employed is Verbal Protocol Analysis (Trafton and Trickett 2008), in which participants describe to the researcher how they accomplish a task (Shadbolt and Smart 2015). However, verbal protocol research can become distorted as the participant changes the natural way they would accomplish a task when explaining it to the researcher (Bainbridge and Sanderson 2005). Milton (2007: 10) suggests a list of what he describes as 'specialist' or 'contrived' techniques for eliciting tacit knowledge through task analysis. The study uses an experimental design, which uses concepts from Limited Information Tasks (Hoffman 1987), Process Mapping (Milton 2012) and the Critical-Decision Method (Calderwood, Klein and Macgregor 1989) techniques were also used. Process mapping was chosen to replace protocol analysis after the pilot interview due to the time intensity of the latter; Burton et al. (1990) argue

that protocol analysis can often be replaced by methods which can collect similar data which are less time intensive to collect and analyse.

The method used the 6 scenarios from the previous studies as the talking point. During the data collection, the researcher and participant sat side-by-side, rather than the traditional format in which the two face each other. Barton (2015) puts forward that the researcher should create an open forum by removing the hierarchy in data collection, with Shadbolt and Smart (1995) stating the researcher should position themselves as learner with the participant, rather than a researcher; alternatively, the researcher and participant are collaborators or co-investigators on the project (Burton et al. 1990). Sitting side-by-side remove the hierarchy and allow greater feedback from the participant and clarification from the researcher, promoting collaboration (Creswell 2003; Neuman 2014). For this reason, the data collection sessions were called discussions, rather than interviews.

Limited Information Task

This method presents the participants with a problem they are required to solve but provides limited information about it (Hoffman 1987). The method allows the researcher to understand what the participant needs to know about a situation to make informed choices (Hoffman 1987). As the participant is chosen as an 'expert' through the selection criteria, the answers they provide describes the necessary information to make the correct choices (Burton and Shadbolt 1995).

The limited information task is useful in providing insight into expert's natural line of enquiry (Burton and Shadbolt 1995) and the knowledge about a situation they deem as important to know to make informed decisions (Shadbolt and Smart 2015). However, the method is rarely used on its own but as a compliment to other knowledge elicitation techniques (Shadbolt and Smart 2015); in this study, it is used at the start of the scenario discussions to identify what general knowledge is needed prior as well to get the participant talking openly.

Process Mapping

Process mapping is an effective means of eliciting tacit knowledge by analysing how an expert describes solving a problem by having them create a visual diagram map of the process they take (Damelio 2011). Visual methods such as mapping allow the participant to lead the session (Milton 2012), meaning they have a greater input into the data collection process and both the researcher and participant are learners (Barton 2015) or collaborators (Burton et al. 1995). The

method is also a visual form of research, which is more natural to many participants (Shadbolt and Smart 2015). The method of creating the process map from scratch is an effective way to help the participant explain the processes necessary to solve a problem in a clear way (Milton 2012) and allows them and the researcher to identify required knowledge as they progress (Ambrosini and Bowman 2001): in this way, processing mapping is both a data collection method as well as a means of presenting the data (Crandall, Hoffman and Klein 2006). Furthermore, Milton (2007) argues that not only are modelling techniques more effective at eliciting tacit knowledge than other methods, they also act as a means of validating knowledge too: it can therefore be cross-referenced with explicit knowledge in Stage 1 in Chapter 6.

This form of knowledge elicitation is passive, requiring less 'pulling' of knowledge from the participant and therefore not as mentally taxing (Andreeva and Gavrilova 2012). Whilst the map is being created the researcher can ask probes, such as 'what skills do you need to achieve this action?', allowing a subtle elicitation of knowledge; such probing identifies unspoken knowledge that is necessary to accomplish a task (Ambrosini and Bowman 2001).

Diagrams compose of actions, their order (represented by arrows), decision points and inputs/outputs (Milton 2012). As the researchers aim is to understand why decisions have been made, what knowledge is important to make them and what the participant believes is necessary to make the decision, process mapping uses some of the techniques utilised in verbal protocol analysis (Shadbolt and Smart 2015; Trafton and Trickett 2008). It is important that the method is participant-led though and questions only asked where necessary (Damelio 2011) otherwise the method becomes 'active' with the researcher leading the discussion (Andreeva and Gavrilova 2012): this makes the process taxing for the participant but also limits them describing the process naturally (Calderwood, Klein and Macgregor 1998).

Process mapping was chosen over protocol analysis after the pilot interview for two main reasons: the ease and speed of administering it during data collection sessions, and the ease of analysing the results (Crandall, Hoffman and Klein 2006). Furthermore Chennamaneni and Teng (2011) state that protocol analysis, along with interviewing, only elicits knowledge with a 'low degree of tacitness', whereas process mapping elicits knowledge with a 'medium degree of tacitness', or knowledge that is "inexpressible through words, but is, however, amenable to articulation through mechanisms such as metaphors, storytelling, concept mapping etc." (Chennamaneni and Teng 2011: 2476). Process maps allow the participants to focus on describing (drawing) how they would solve the task, rather than focussing on what knowledge

is needed to complete the task, allowing a focus on process (Milton 2012). Furthermore, the technique is both a data collection method but also a means of presenting, analysing and validating the data (Crandall, Hoffman and Klein 2006; Milton 2007).

Critical Decision Method

This method looks to understand how retrospective analysis of real-life events by those who experienced them can provide insight into decision-making and the required knowledge to make such decisions (Crandall, Hoffman and Klein 2006). Critical decision method is especially useful for recalling and analysing incidents which were difficult, unusual or involved critical decisions (Shadbolt and Smart 2015), making it particularly useful to study security incidents.

Critical decision method is broken down into five steps:

1. Incident selection: in this case, the incidents have been pre-selected as 6 different scenarios relating to key incidents in the humanitarian sector. When asking participants to recall a specific incident, it is suggested that they are asked to highlight why their "own decision making may have differed from someone with less experience" (Calderwood, Klein and Macgregor 1998: 466);
2. Unstructured account: participants asked to describe the incident in general, allowing them to remember the incident themselves as well as develop the researchers understanding (Shadbolt and Smart 2015);
3. Construct incident timeline: a timeline is created showing sequences of events (Calderwood, Klein and Macgregor 1998). Though it is suggested that the duration of each event is also recorded (Shadbolt and Smart 2015), as the events are historic this was not possible;
4. Decision point identification: decision points are identified throughout the timeline. Decision points are generally periods where alternative decisions could have been made or where others would have made a different decision (Shadbolt and Smart 2015);
5. Decision point probing: points marked during step 4 are studied in more detail using probing questions (Calderwood, Klein and Macgregor 1998; O'Hare et al. 1998). Example probing questions are shown in Table 5.7 below (see Shadbolt and Smart 2015: 177).

Type	Example
Knowledge	'What information did you use making this decision?'
Decision making	'How long did it take you to make the decision?'
Experience	'What specific experience was helpful in making this decision?'
Situation Assessment	'How would you summarise the situation at this point?'

Table 5.7: Example Decision Point Probing Questions

In this study, critical decision method is only applied where a participant has experienced an event like the scenario and where they want to discuss the event in more detail. It was chosen as a data collection method to complement limited task analysis and process mapping, allowing the researcher to guide the session to collect rich data which can be used to elicit important task-related knowledge (Shadbolt and Smart 2015).

Though a common means of capturing critical decision method data is through recording and subsequent transcription (Morrison, Morrison and Morton 2015), the method can produce a large amount of data, making analysis difficult, especially with multiple cases (Crandall, Hoffman and Klein 2006). Furthermore, as discussing actual security incidents is inherently sensitive (as discussed in Chapter 3.5), the need to turn off or not to use a Dictaphone is a strong possibility (Cowles 1998), meaning there cannot be a reliance on transcription. A suggested technique, especially when comparing across cases, is to capture event descriptions to on a single graphical timeline (Crandall, Hoffman and Klein 2006: 24). The benefit of illustrating cues rather than simply explaining them means that more complex cues can be captured in a way that is easier to understand by the researcher (Crandall, Hoffman and Klein 2006). Though the Dictaphone was used (where permitted) to capture key quotes, allowing depth to the data (King 2004), the critical decision method was captured on a visual A3 timeline which also served as a means of probing cues from participants (Wong 2004).

Apparatus

Interviews were conducted either face-to-face or online through Skype online video conferencing. Out of the 16 interviews, 6 took place at participants places of work, 3 took place at the City Business Library (London) and 7 were conducted through video conferencing in a conference room at Coventry University. All interviews were conducted in a quiet conference room only used by the researcher and participant. All interviews were given the option to decline to have their interviews recorded. For those that agreed, a digital recorder was used for this. For both sets, a separate sheet was used to write down key points from the interviewers.

A webcam was critical for the online interviews so that it could be directed at the process map for the participant to see; likewise, the participant needed a webcam also so that they could do the same.

Pilot

As in Study 2, a pilot interview was conducted prior to the actual interviews. This aimed to both acquaint the researcher with the method but also identify areas of the interview that could be improved. As the method was experimental, the researcher chose to interview a close acquaintance who they had previously worked with overseas. The pilot had a medical background for humanitarian organisations, though had moved into research. This background meant they understood both the research topic but also the research approach. This was key for feedback.

During the pilot interview, the participant noted that though the scenario descriptions provided an adequate description of the event, it would help if there was supporting material. They suggested a sketch of the situation, realistic video clips from movies or a top-down view of the situation, which would allow more natural decision making. The pilot identified that visual aids were therefore necessary. Barton (2015) further discusses the use of visual aids, which he states allow the participants to relate their emotions to something particular rather than an abstract idea created from a scenario. The supporting visual material is described in the next section.

The pilot was stopped after scenario 4. This was due to the time taken; to cover the first four scenarios had taken six hours and twenty minutes. Each scenario took roughly an hour and a half to discuss, though the critical decision method was only applied to one real-life experience and two fictitious experiences. As such, the actual interviews would have taken considerably

longer. Furthermore, on top of the Dictaphone recordings, there were roughly 8 pages of notes were made per scenario.

After the initial pilot, the researcher and pilot participant discussed the method and the data collected. The following conclusions were drawn:

- Limited task analysis, critical decision method and the situation task analysis were straight forward and effective;
- Protocol analysis was too labour intensive, with very little usable data being collected (in terms of achieving the study aim);
- The actual interviews would take considerably longer for those not experienced in research in general as well as those who have deep experiences to describe;
- Note taking was not an effective form of data capture: it removed the researcher from the process while they were attempting to record all the information and subtle cues mentioned. It failed to capture thoughts effectively though;
- An alternative method was needed to replace the protocol analysis to situate the researcher as a learner and reduce the quantity of 'grey' data, or data that did not address the study aim.

After the initial pilot, it was decided that protocol analysis would be replaced. Protocol analysis itself is a time-consuming process, producing 'expensive' data which is both time consuming to elicit and analyse (Trafton and Trickett 2008). Process mapping was chosen instead: it aims to collect similar data, but the collection method is simpler to run, the data collected is straight forward as well as easier to analyse (Shadbolt and Smart 2015). Burton et al. (1990) argue that though protocol analysis is widely used, it is no more effective than other methods, and when the need to transcribe the data is considered can often be replaced by more effective and intuitive methods. Furthermore, visual forms of knowledge elicitation such as process mapping are less taxing for the participants and create a more conducive learning environment rather than a research one (Barton 2015).

The second of the pilot was conducted once the method had been studied and understood. The new method was applied to scenarios 4, 5 and 6 (scenario 4 re-studied to compare the data collection methods). All three data collection methods- limited task analysis, process mapping and situational judgement tests- were used to understand how long the complete method would take per scenario. As an estimate, each scenario took 30 to 45 minutes; a big difference

to the use of protocol analysis. After all three scenarios were discussed a review of the new method was conducted. It was concluded that process mapping was more efficient and the data collected was more straightforward to analyse: the process map created allowed better dialogue between the researcher and participant, and the data was already partly analysed. Furthermore, the processes map data could be recorded on one A3 piece of paper. Dictaphone recordings were still used to support data collection and capture key quotes.

The three methods selected were practised with other researchers, though were not deemed pilots and done in a more informal setting. However, this understanding of the technique is important and should be done until the researcher is familiar with the techniques, especially the probes, which should be naturally applied, rather than structured as in an interview (Crandall, Hoffman and Klein 2006).

Ethical Information

Ethics was approved by Coventry University under certificate P24596 (Appendix 1.1). All participants were sent both a Participant Information Sheet which contained key information about the project as well as a Participant Informed Consent form which they were required to sign and return (either physical or electronic).

As there was the aim to collect accounts of potentially distressing accounts (using critical decision method) from participants, it was stressed on the ethical information that though the researcher had training in Psychological First Aid, they were not a trained counsellor and the sessions were not designed to be therapeutic interventions (as per the recommendations of Cowles 1998). A list of professional services was provided, however. A summary list of the considerations in Chapter 3.5.2 was printed out as a cue card for reference.

Supporting Material- Visual Aids

Scenario 6 was removed from the study. For the first 5 interviews, it was included with the discussions, but participants were not able to provide usable information. Participants stated that they had not experienced the risk, and therefore did not meet Burton and Shadbolt's (1995) definition of expert, and they stated that the organisation would lead the response, meaning individual knowledge played less of a role than in other scenarios.

As identified in the pilot, visual aids were created for the interview. Visual aids allow people to better contextualise problems presented to them (Barton 2015). The use of virtual environments software or serious gaming (games not designed with entertainment as a primary

purpose) is increasingly being used in other sectors to address this (Bowers et al. 2014). Though several platforms exist to create a virtual simulation where participants take control of characters, these are time intensive to design and require advanced software to run (Bowers et al. 2014). Further, they are logistically more challenging requiring the participant to come to the researcher. A solution was created by using the software to create visual aids which would be used during interviews.

The simulation game *Arma2* developed by Bohemia Interactive (Španěl 2009) was used as a platform to create visual aids. The 'Real Virtuality' platform the game runs on was created for military use and has been used by several militaries for training troops, including the US Army, US Marine Corp and Australian Defence Force (Stephens, Temby and Whitney 2013). It has also been used in academic research with good effect (Bowers et al. 2014; Eide, Pultier and Stiso 2015). The platform was also preferred as it was open access and was intuitive to use to create scenarios.

For each scenario, a viewpoint picture was created, as well as a map showing detail and a map showing the general area. An example of these is provided in Figure 5.12-13 showing the aids used for Scenario 1: Crowd in a Marketplace. These provided effective talking aids for the researcher and participant, allowing both to orientate themselves to the scenario and provide further context.

Figure 5.12: Visual Aid (Viewpoint) for Scenario 1.

Figure 5.13: Visual Aid (Detailed Map) for Scenario 1.

Figure 5.14: Visual Aid (Map of General Area) for Scenario 1.

Participants

Purposive sampling was used to identify experienced humanitarian workers again. The study aimed to recruit participants who fell into Burton and Shadbolt's (1995) definition of *practitioner class* of expert: those who are "engaged in constant day to day problem-solving in the domain." (Burton and Shadbolt 1995: 424). The practitioner class, as opposed to the academic class, make decisions implicitly, guided by the experience of doing and failing (Burton and Shadbolt 1995).

For this study, the inclusion criteria were even more selective to fit the above definition, but participants would also need to recite personal experience to enable the use of the critical decision method.

The following inclusion criteria were in place for the Study:

- At least 10 years' experience in the humanitarian sector;
- Working, or have worked within the last year, in a field role;
- Not have direct security responsibilities;
- Have worked in at least one of the following insecure environments in the last 2 years:
    - Afghanistan;
    - Somalia;
    - South Sudan;
    - Syria;
    - Yemen;
- Have been involved in one or more of the following security incidents:
    - Kidnapping;
    - Shooting;
    - Physical violence;
    - Use of explosive (mines, Improvised Explosive Devices, grenades, etc.).

As the study wanted to hear from those more experienced, the inclusion criteria on countries were reduced. Rather than the list of top-10 countries used in Study 3 and 4, this study used the top-5 countries listed in the *Figures at a Glance* infographic from the *Aid Worker Security Report 2016* which showed the most dangerous countries for the previous year (Humanitarian Outcomes 2016b) (note: the actual report for 2016 was never published). Additional criteria included being involved in at least one of the highest ranked security incidents so that the participants involved would have a higher level of knowledge (Humanitarian Outcomes 2016a).

It is noted here that 'physical violence' was classed as 'bodily assault (including rape)' in the infographic. For this study, this was excluded due to the ethical issues regarding researching sexual violence.

It is noted here that the actual sample size for humanitarian workers meeting that criteria is generally quite small. Looking at statistics compiled by the *Aid Worker Security Database*, the mean number of international workers reported involved in incidents between 2006 and 2016 is only 42 per year (Humanitarian Outcomes 2018). This also covers international workers not only those in the UK, and therefore geographic constraints would make the total sample much smaller still.

Snowball sampling was used as before, though this time one snowball referrer worked with a research/consultancy organisation who had access to multiple different participants and the other had been met during data collection in Study 5. Furthermore, 6 participants came forward themselves who had heard about the research. Of those, 4 met the inclusion criteria and were included in the study (FW 05, 09, 15 and 16).

The referrers asked the potential participants if they were happy to be contacted. Those that agreed had their details passed on to the researcher and were first contacted through email, and then telephone. The sensitivity of the information provided and anonymity of their data when used in the thesis was stressed during the phone engagement and reemphasised in the Participant Information Sheet. The study was originally designed as per Study 4 in that the participants contacted the researcher, but the referrer stated that this would mean fewer participants get in touch as they would likely forget. Again, this emphasises the issues around deadlines and workloads preventing research as mentioned in Study 3.

A total of 28 participants were recruited through this technique, 23 of whom met the criteria. Only 12 were able available to take part in an interview. 4 self-referred and met the inclusion criteria. Of the 16, 9 were done in person in the UK and the remaining 6 done remotely through skype due to their location overseas (4 currently deployed in high-risk environments). In-person interviews were conducted at the City Business Library, Ark Coworking (a business venue in Central London) and Coventry University.

Table 5.8: Field workers Interviewed for Study 6

Ref.	Job Title	Work Location	Organisation Type and Size	Years' Exp.	Interview Type	Length[2]
FW01	Deputy Clinic Manager	Kenya	International development organisation, 2000-3000 staff	15	F2F	5.15
FW02	Field Logistics Coordinator	Afghanistan	UN organisation, 2000-3000 staff	12	F2F	4.45
FW03	Project Manager	Turkey/Syria	International monitoring organisation, 100-500	17	F2F	4.45
FW04	Ass. Country Director	Afghanistan	International NGO, 500-1000 staff	13	Online	4.15
FW05	Programme Coordinator	Nigeria	International NGO, 1500-2000	12	Online	4.15
FW06	Country Manager	Tanzania	International development organisation, 2000-3000	25	F2F	3.45
FW07	Field Coordinator	N/A	Various	19	F2F	4.30
FW08	Programme Manager	Jordan/Syria	International NGO, 1500-2000 staff	23	Online	3.45
FW09	Country Finance Manager	Kenya	International NGO, 500-1000 staff	14	F2F	4.30
FW10	Dep. Country Manager	Uganda	International NGO, 500-1000 staff	10	Online	3.45
FW11	WASH Focal Point	S. Sudan	Humanitarian response organisation, 1500-2000	13	F2F	4.45
FW12	Fleet and Transport Manager	Iraq	International NGO, 1000-1500	17	Online	3.15
FW13	Specialist Technician	Malawi	International NGO, 500-1000 staff	14	Online	3.00
FW14	Programme Manager	Kenya	International development organisation, 1500-2000	13	F2F	3.15
FW15	Country Manager	Kenya	International funding body, 1000-15000	10	F2F	3.00
FW16	Operational Support	N/A	Various	26	F2F	3.45

[2] Interview length is a rough estimate, rounded back to the nearest 15-minute interval. Dictaphone recordings did not represent a realistic reflection of interview length due to data collected while recorder was off. Length does not include breaks.

Procedure

Data collection took place between 13th November 2016 and 22nd September 2017. The data collection was split into 6 stages:

1. The snowball referrer was contacted through skype and the aims of the study covered again. The inclusion criteria were emphasised as well as the controls in place (both in terms of anonymity and provision of emotional support). After the call they were sent an email with the Participant Information Sheet and background of the study to forward onto potential participants;
2. Once the snowball referrer had identified participants and passed their details back to the researcher, potential participants were contacted through email and asked if they could spare 15 minutes to learn more about the study and if they wanted to take part. As in Study 2 and 4, this was used to both develop a connection with the participants and establish credibility (Clark and Kotulic 2004) as well as vet their suitability to the inclusion criteria. This was also an opportunity to explain the ethical implications as well as the support the researcher could provide, as well as what other support was on hand, which was both an ethical choice as well as making the interviewee feel more at ease and therefore more likely to be open during the interviews (Rubin and Rubin 2011). Both telephone calls and Skype was used for this stage due to the geographic locations of participants;
3. Prior to the interviews taking place the interview guide was studied. Again, this would limit the need to refer to it and allow a more natural flow in the conversation;
4. The formal part of the interviews took the following format:
    a. Re-introduction to the research, discussion of ethical implications and an overview of the interview about to take place,
    b. Participant asked if they are happy for the interview to be digitally recorded;
    c. The layout of the interview and scenario supporting material explained. 3 forms of data collection explained with an example;
    d. Scenario discussions. The scenario is introduced and supporting material is explained. 3 data collection methods used in order:
        i. Limited Information Task: participant provided scenario description and asked what further information they would want to know;
        ii. Protocol Analysis: participants asked to talk-through how they would respond to the scenario. Probing questions asked to understand

responses. Process map created with the participant. Need for further actions to be recorded would end when participant believed they would be safe;

iii. (Participants who had experienced similar event given the opportunity to provide further details. Critical Decision Method used);

e. At the end of each scenario 5 different 'options' were presented to the participant- for each they had to decide whether it was an 'extremely bad' choice (1) or an 'extremely' good (9) choice, and then explain why;
f. At the end of the scenarios, the participants were asked if they wanted to add further detail. Answers were briefly read back to the participants for them to confirm;
g. Interview closed. Participants were asked if the accounts they gave had caused issues. If they felt any strong emotions after they were given a list of services they could use as well as being urged to contact the researcher. Participant given contact details for any follow-up information related to the research.

NOTE: Several breaks were taken throughout the interviews due to the length, including lunch breaks. These provided an opportunity for the researcher and participant to bond and the participants a chance to relax and return refreshed.

5. Interview notes were then checked immediately after the interviews and brief maps drawn of different courses of action/requests for information;
6. Participants were contacted after and thanked for their involvement. It was again emphasised that if recounting any incidents had caused distress they should reach out for help.

Participants were interviewed in the following order: 01, 02, 05, 04, 03, 09, 10, 11, 06, 14, 13, 07, 15, 16, 08. However, unlike in Study 2 where the interview order showed a more directed approach, the order here is irrelevant. The researcher was both comfortable in the interviewing techniques, both due to their professional development as well as their academic one. Further, the structured approach of the method set the pace more so than the probing of the researcher. As such, the study did not use an emergent design (as discussed by Marby 2008) as much as the other techniques.

Data Analysis

Specialist methods are unique in that they analyse data concurrently to collecting it (Milton 2007; Shadbolt 2005). Due to the interactive process of explaining and probing used in Process Mapping, it also acts as a means of data validation (Milton 2007) and presentation (Crandall, Hoffman and Klein 2006). The three methods used for data collection produce three different outputs, described below.

Limited information task elicits two important sets of data: the knowledge about a situation required to complete a task and the order the information is requested, and therefore its importance (Shadbolt and Smart 2015). The output provides an understanding of what information is needed prior to a task needing to be completed and the relevant importance of each piece of information (Hoffman 1987). The importance of this study, and thesis, allows the identification of knowledge required for effective decision making.

Process mapping visually depicts the methods used to 'solve' the problem as well as the knowledge necessary for this. The use of process mapping allows key decisions to be understood as well as identifying the knowledge needed to make the decisions (Milton 2012; Ambrosini and Bowman 2001). Actions are first mapped before probes are asked on what knowledge is necessary to complete the actions (Milton 2007). The process produces both a process map (method to solve a problem) and the knowledge necessary to achieve this.

From the Critical Incident Timelines, critical decision points have been identified, in which participants identified key areas where decisions had to be made. These decisions often have short time constraints, high information loads, and they result in serious consequences (Morrison, Morrison and Morton 2015), namely whether people are exposed to a threat or not. By applying probes to these decision points, it was possible to identify the perceptual cues participants looked for when making decisions, which results in a critical cue inventory (Crandall, Hoffman and Klein 2006). The application of this can then be used during future incidents to make decision making more effective (Crandall, Hoffman and Klein 2006).

5.4.3 Results

A total of 16 interviews were conducted, 9 of which were face-to-face, 7 online.

The limited information task produces a list of information needed to make decisions and its relative importance.

The process maps depict the way in which participants 'solved' the problem. The 16 maps for scenarios 1 – 5 were compiled to show the general process: a method that is inherently subjective but necessary (Holt et al. 2005). It shows from the start of the scenario, the actions taken (blue bordered boxes), decision points (diamonds) and the process taken until the participants deemed they would be safe (green boxes). The blue circled numbers on the process map show the actions which are dependent on specific knowledge requirements as described by the participants.

The incident timelines give a general overview of the incident, from start (prior to the event occurring) to finish (when the participant believed they were safe). The timelines do not give specific times as the events recalled were historic. The participants who had experienced the incident have been listed. On the timelines, the blue bordered boxes denote an event classification, which has been derived by grouping participant event description. The number in brackets next to the event description shows how many of the participants stated the event occurred. The numbers in circles represent decision points, which are described in more detail under each timeline. As with events, decision points have been grouped and classified together. The probing of these decision points results in an understanding of cues participants looked for when making decisions.

As the critical incident technique could only be applied where participants had been involved a similar experience to the one outlined in the scenario, data was only collected on incidents similar to scenario 1, 2, 3 and 4. Though 4 participants had experienced mine encounters (scenario 5), 2 were with the military in previous employment (so were excluded) and 2 had driven into a minefield though no explosions occurred (which would not provide effective data).

5.4.4 Scenario 1

Limited Information Task

The following decision knowledge requirements were identified:

Hierarchy	Information needed	Purpose of information
High ↕ Low	Relationship with community	Allows understanding of whether community members will protect you; Use as leverage to gain protection.
	Are there elements who dislike your presence?	Gives understanding whether you are likely to be attacked; Could reveal the level of violence.
	What level of violence has there been in the past?	Gives understanding of how likely an incident is going to become violent; Shows you if you can negotiate.
	Is it possible to negotiate?	Tells you whether to try to negotiate or move away immediately.
	Are there locals who could help you?	Shows whether support is close; Provide a location to go to.
	What organisation assets are there nearby?	Shows whether support is close; Provide a location to go to.
	Safe areas nearby?	Can show you where you can go to.
	What is the worst case?	Allows you to prepare mentally and guides your actions appropriately.

Table 5.8: Limited Information Task for Scenario 1

Process Mapping

The process map overleaf shows the general process taken to resolve the incident, from the start of the scenario to the point participants deemed they would be safe:

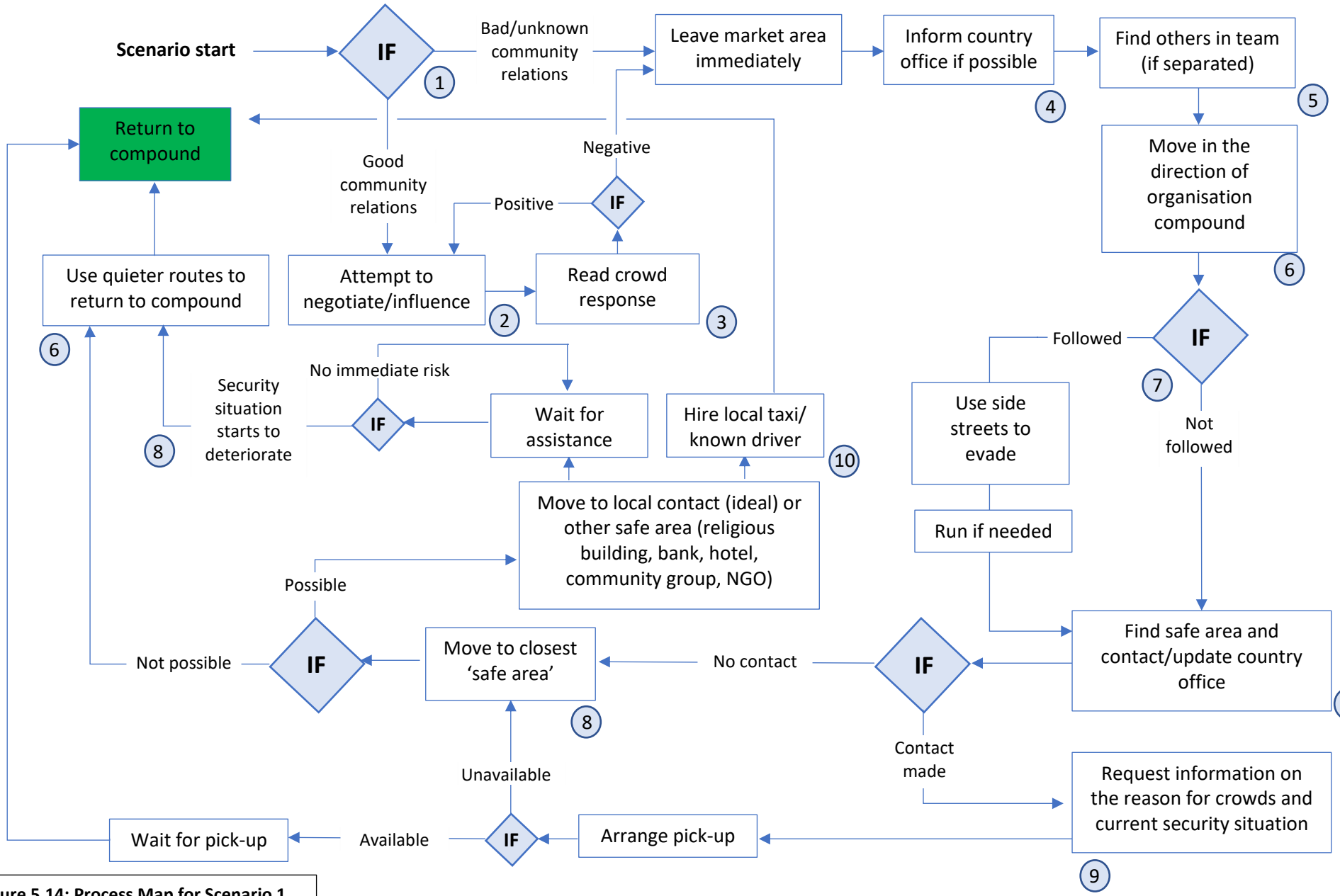


Figure 5.14: Process Map for Scenario 1

The following requirements were identified through the process map (requirement numbers relate to the process map):

Req. No.	Requirement Description
1.1	Developing community relationships
1.2	Ability to negotiate
1.3	Emotional intelligence/being able to read others
1.4	Communication to send critical information
1.5	Teamwork
1.6	Navigation and knowledge of local area
1.7	Awareness of others and surroundings
1.8	Identification of safe areas and decisions
1.9	Ability to understand situation
1.10	Building contacts/networking

Table 5.9: Requirements Identified through Process Map for Scenario 1

Critical Decision Method

Field workers who had experienced similar incidents: FW 01, 03, 04, 05, 07, 09, 10, 11, 12, 14, 16.

Total: 11 participants

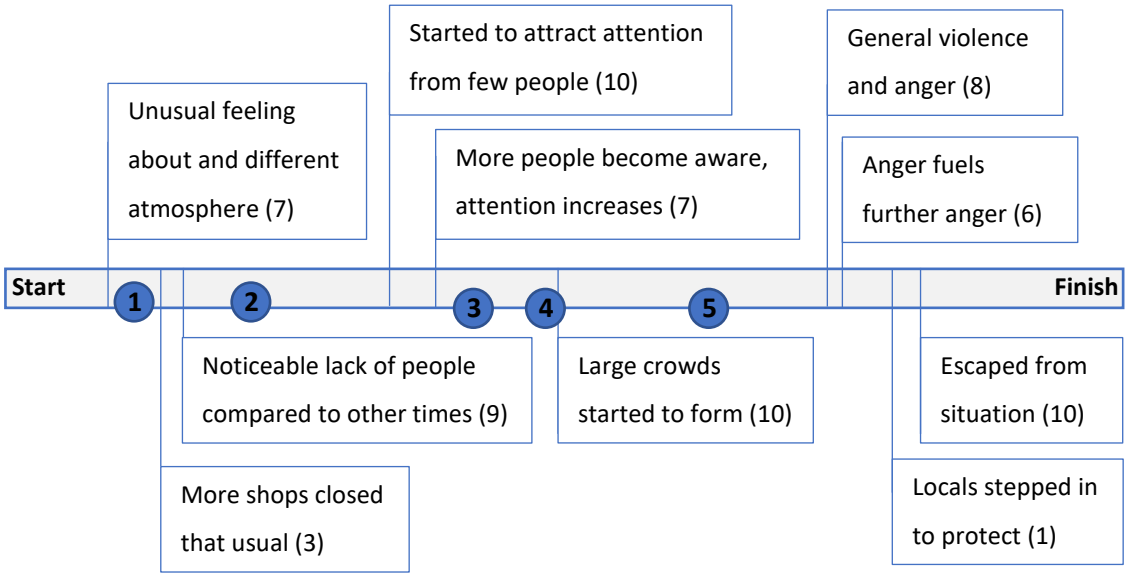


Figure 5.15: Timeline of critical decisions of Crowd at Marketplace

The following critical decision points were identified:

1. Research security situation: Participants noted that they noticed subtle differences in the atmosphere. These initial feelings were often gut-instinct and not corroborated by visual cues, but the participants felt something was wrong;
2. Return to the area of safety and assess the situation: once the instinctual feeling of something wrong has been corroborated by actual visual signs of something different, the participants suggested the best course of action would be to return to an area of safety and assess the situation;
3. Leave immediately and return to the compound, alert office on way back: attraction from locals is rarely a good sign in this situation and should be a sign of potential danger;
4. Attempt communication: try and find out why people are paying attention. Only possible with good community relations;
5. Leave the area immediately: Move to the nearest safe area, when possible return to the compound. At this point, as there is directed anger it is important to find the nearest safe area and not just the compound.

The following Critical Cues were identified:

Cue Category	**Example of Cue**
Feeling cues	'Bad feeling', upset stomach, restlessness.
Team cues	Others having 'bad-feeling', unusual behaviour from others
Atmospheric cues	Lack of locals, shops closed without reason, lack of public transport, lack of vehicles in general
People cues	People paying undue attention to presence, more people being drawn in, being avoided by locals, locals moving away to avoid being close
Risk cues	Attention from mainly males, confrontation, being questioned on presence, shouting, more locals turning up specifically to confront, projectiles (e.g. stones) thrown, sight of weapons (any type)
Direct threat cues	Confrontation becomes physical, pushing, shoving, weapons being drawn, projectiles thrown to cause harm (i.e. rocks)

Table 5.10: Critical Cue Inventory for Scenario 1

5.4.5 Scenario 2

Limited Information Task

The following decision knowledge requirements were identified:

Hierarchy	Information needed	Purpose of information
High ↕ low	Is this a common occurrence?	Frequency of occurrence will change the way you react.
	Are there any events on that are known about?	Could present plausible explanation for change in locals' behaviour.
	Do you have any local contacts?	Can use these to understand more about the situation or gain explanation.
	Is the organisation likely to have information that those in the field won't?	Information takes time to reach field teams but may provide insight into the situation.
	Are there any vantage points you could use to view the village?	Identifying ways to observe the village without getting too close.
	How critical is the journey?	Tells you whether it is worth exposing yourself to possible risk.

Table 5.11: Limited Information Task for Scenario 2

Process Mapping

The process map overleaf shows the general process taken to resolve the incident, from the start of the scenario to the point participants deemed they would be safe:

5. Stage 2: Exploratory Inquiry of Tacit Security Knowledge from Humanitarian Workers

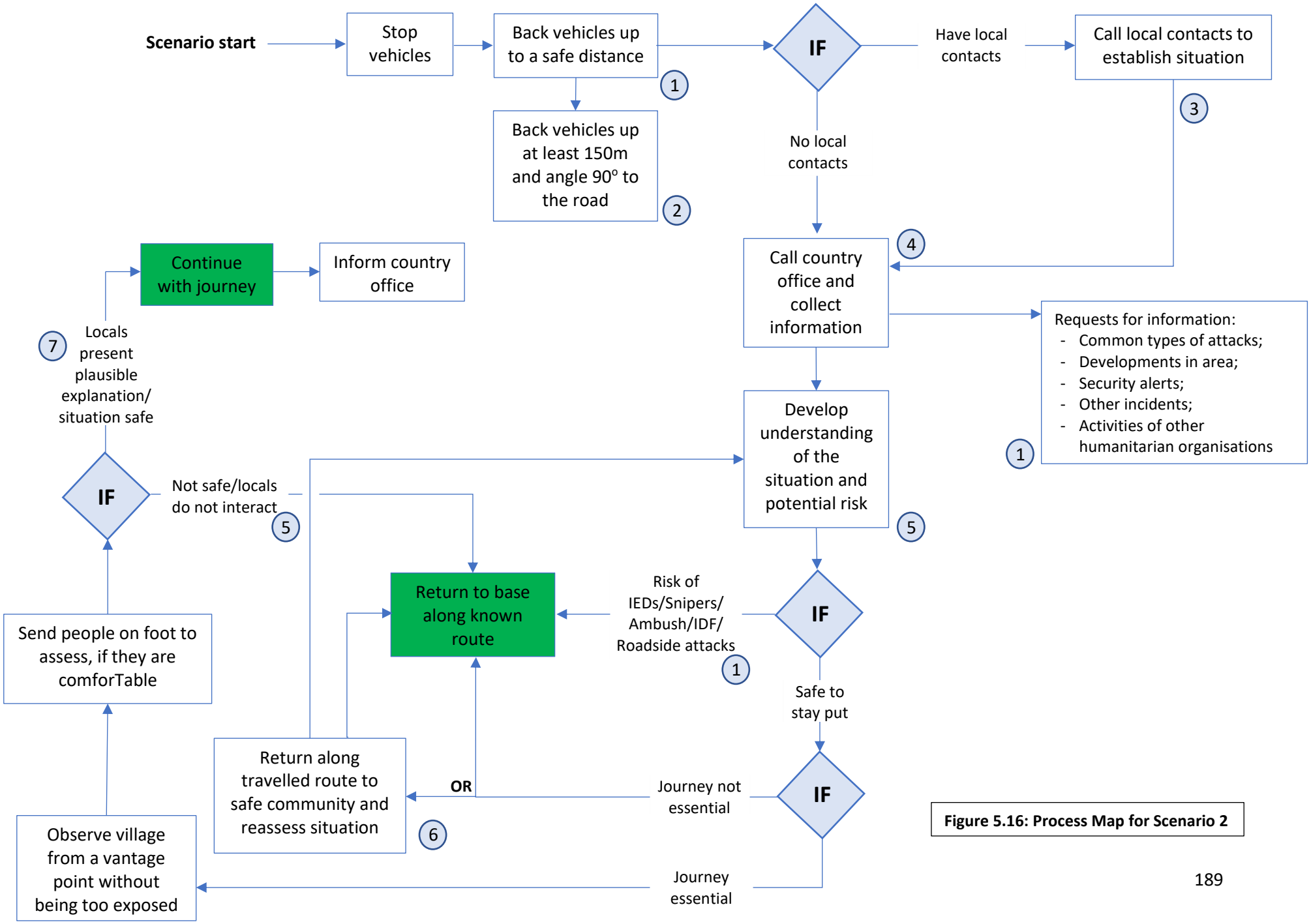


Figure 5.16: Process Map for Scenario 2

The following requirements were identified through the process map (requirement numbers relate to the process map):

Req. No.	Requirement Description
2.1	Awareness of potential risk
2.2	Driver training
2.3	Building contacts/networking
2.4	Communication to collect information
2.5	Understanding of situation through multiple sources
2.6	Navigation
2.7	Ability to make a logical judgement with limited information

Table 5.11: Requirements Identified through Process Map for Scenario 2

Critical Decision Method

Field workers who had experienced similar incidents: FW 01, 02, 03, 04, 06, 07, 08, 09, 10, 12, 13, 14, 15, 16.

Total: 14

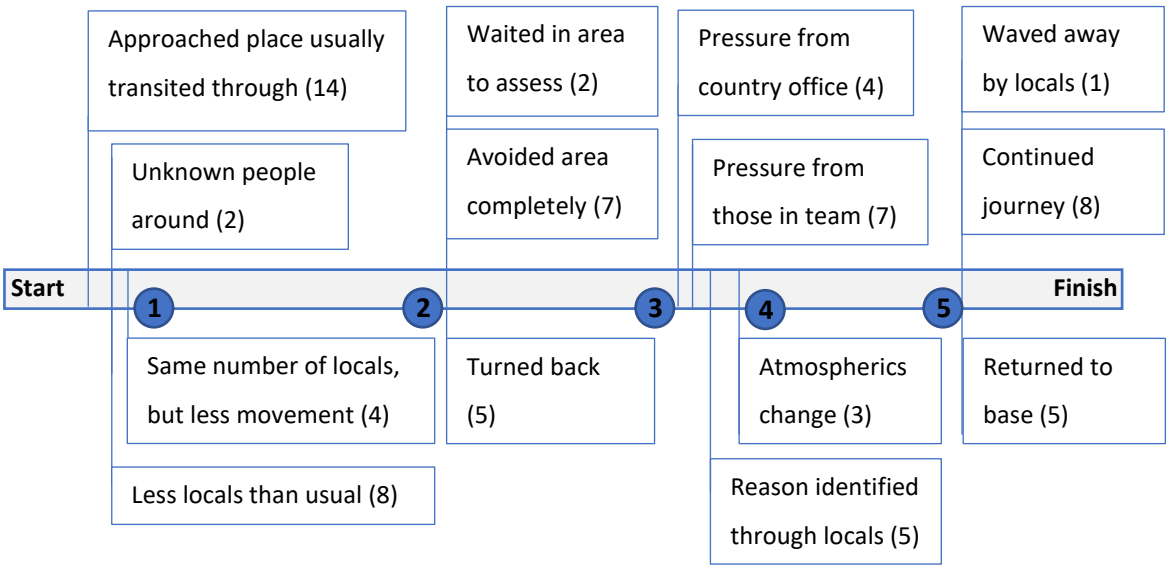


Figure 5.17: Timeline of critical decisions of Unusual Journey

The following critical decision points were identified:

1. Stop and assess the situation: where differences in local routine are evident, the suggested course of action was to stop and assess the situation, ensuring that the team were safe. Novice team members were more likely to continue into dangerous situations without first assessing the cause;
2. Turn back and return to base/avoid area: where a situation presents a difference in locals' behaviour it is usually best to err on the side of caution. Participants mentioned that locals' gut-instincts prompt their behaviour and it is important to take notice of it. The area should either be avoided or should turn back, so the situation can be assessed;
3. Ignore external pressure: when making decisions that are not based on actual incidents (i.e. where nothing wrong has occurred) but gut-feelings, it is important to rely on experience and block out external pressures. Participants noted that these come from both the organisation (in this case, what most participants referred to as the county or field office) as well as from those less experienced on the team;
4. Change in situation: just as looking out for differences in situation it is also important to watch for further changes in the atmospherics;
5. Decision on how to proceed: decisions should be made only when there is a change in situation and on sound judgement rather than through time pressure.

The following Critical Cues were identified:

Cue Category	**Example of Cue**
Feeling cues	Feeling of something wrong, gut-instinct
Team cues	Others share uneasy feeling, team noticing difference in atmospherics, internal pressure from novice team mates
Atmospheric cues	Lack of locals, shops closed without reason, lack of public transport, lack of vehicles in general
People cues	Different people present, new people being avoided by locals
Risk cues	Being waved away by locals, being warned of risk

Table 5.12: Critical Cue Inventory for Scenario 2

5.4.5 Scenario 3

Limited Information Task

The following decision knowledge requirements were identified:

Hierarchy	Information needed	Purpose of information
High ↓ low	Are there emergency procedures in place?	Shows you what the organisation expects you to do and how they will likely respond.
	Is there a safe/panic room?	Many compounds have them in high-risk countries; Allows you to locate this.
	Are there emergency exits/methods (e.g. ladders)?	Allows you to plan escape; Allows you to improvise methods.
	What is the relationship with the local village like?	Ives an understanding whether they will provide refuge and support.
	Are there UN military assets nearby?	Shows you how safe the base is; Gives insight into how likely there is to be an escalation in risk.
	Will the others likely intervene?	Shows you how safe you will be if you stay in the compound; More likely to use a panic room if so.
	Locals view of organisation/other organisations	Anger may not be directed towards your organisation; Can show if the crowd is likely to turn violent.
	What is the terrain surrounding the area like?	Provides information in case you need to escape on foot.
	How far to the nearest 'friendly' village/area or other organisation	Provides information in case you need to escape on foot.

Table 5.13: Limited Information Task for Scenario 3

Process Mapping

The process map overleaf shows the general process taken to resolve the incident, from the start of the scenario to the point participants deemed they would be safe:

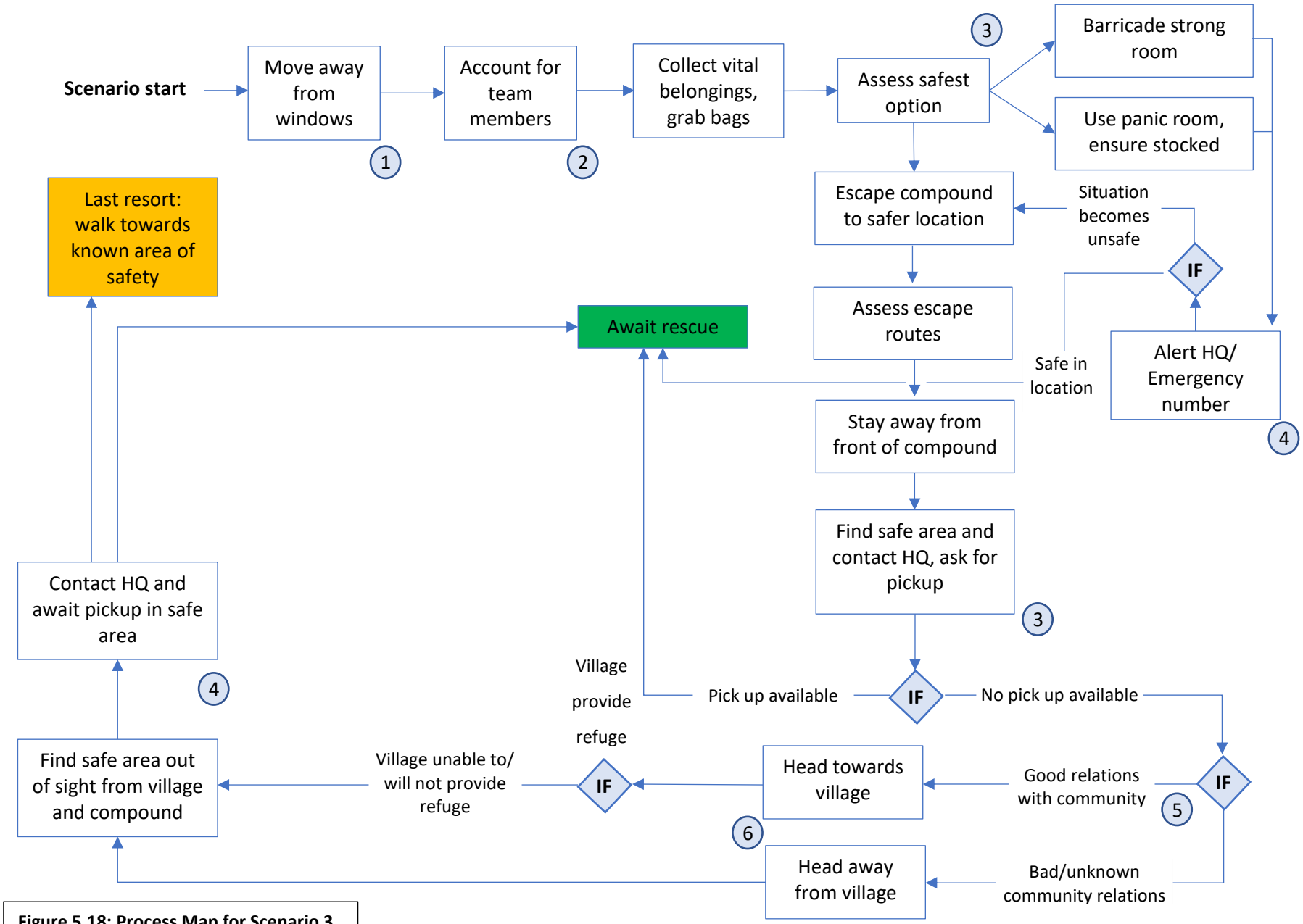


Figure 5.18: Process Map for Scenario 3

The following requirements were identified through the process map (requirement numbers relate to the process map):

Req. No.	Requirement Description
3.1	Awareness of potential risk
3.2	Teamwork
3.3	Ability to make a logical judgement with limited information
3.4	Communication to send critical information
3.5	Developing community relationships
3.6	Navigation

Table 5.14: Requirements Identified through Process Map for Scenario 3

Critical Decision Method

Field workers who had experienced similar incidents: FW 02, 07, 09, 12.

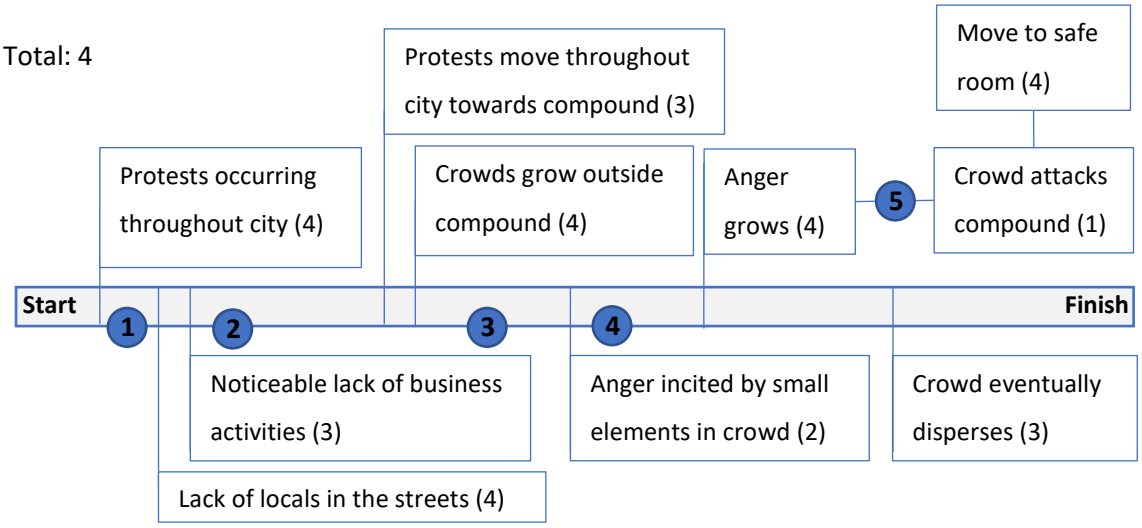


Figure 5.19: Timeline of critical decisions of Crowd at Marketplace

The following critical decision points were identified:

1. Assess situation: whenever protests occur there is a need to assess their causes and whether it will impact the organisation or project. Doing this at the start of protests means plans can be put in place to evacuate the area/compound;

2. Move from compound/establish safe room: where a crowd moves towards the compound there is a need to either evacuate the compound to safe areas, or establish safe rooms, especially if other organisations are also evacuating;
3. Attempt to diffuse anger: participants noted that there is the possibility to diffuse anger, but only when there is no danger to life. The decision would be directly related to decision point 1: if the protest is not directly related to the organisation then the opportunity to negotiate may be present;
4. Stay out of sight: participants noted that novice members of the team would often stand close to windows to observe what was occurring, though with no ability to influence the situation. It was important to stand away for protection but also to avoid inciting anger in the crowd;
5. Follow security protocols/stay in safe rooms: although only one participant noted the crowd turning violent (FW12), all participants stated the need to both know the security procedures in place. Most often, this was to get into the safe room. However, many of those who had not experienced at attack were unaware of where this was or how to use it.

The following Critical Cues were identified:

Cue Category	**Example of Cue**
Feeling cues	Sense of unease, 'bad feeling', upset stomach restlessness, sense of something going wrong, sense of needing to do something
Team cues	Others feeling uneasy, quietness and not wanting to say anything, quieter than usual office environment
Atmospheric cues	Lack of locals, lack of business activities, shops closed, no public transport running
Cause cues	Anti-Western sentiment, anger against humanitarian organisations, world-stage events likely to cause violence
Pre-cursor cues	Growing crowds across city, protests forming elsewhere in the city, protests moving from original point, other humanitarian organisations evacuating
Risk cues	Crowd congregates at compound, crowd shows signs of anger, projectiles being thrown, attempted breaching of gates, presence of weapons
Direct threat cues	Perimeter being breached, offensive projectiles being thrown (fire bombs, grenades etc.), weapons being fired

Table 5.15: Critical Cue Inventory for Scenario 3

5.4.6 Scenario 4

Limited Information Task

The following decision knowledge requirements were identified:

bs	Information needed	Purpose of information
High ↓ low	Is the threat still ongoing?	Protection of self-first and will guide all other actions.
	How many casualties?	Shows severity of situation; Allocation of resources.
	What injuries?	Shows severity of situation; Allocation of resources.
	What equipment is there on hand?	Identifies means of self-help at the scene.
	Is it likely the threat will return?	Guides the way in which you give treatment to injured: if threat will return, you will move before treatment.
	Is there a safer are nearby?	Identify areas you could move to if there is a threat or it may return.
	Where is the nearest medical facility?	To plan transportation of injured to medical treatment.
	Are there communications with country office?	So that they can be informed and warn others.
	What help can they send?	Identifies what help is available through organisation.
	Can and will locals help?	So you can utilise local assets that are likely closer.
	What help is nearby?	So you can see what other help is closer, such as other organisations or local security services.

Table 5.16: Limited Information Task for Scenario 4

Process Mapping

The process map overleaf shows the general process taken to resolve the incident, from the start of the scenario to the point participants deemed they would be safe:

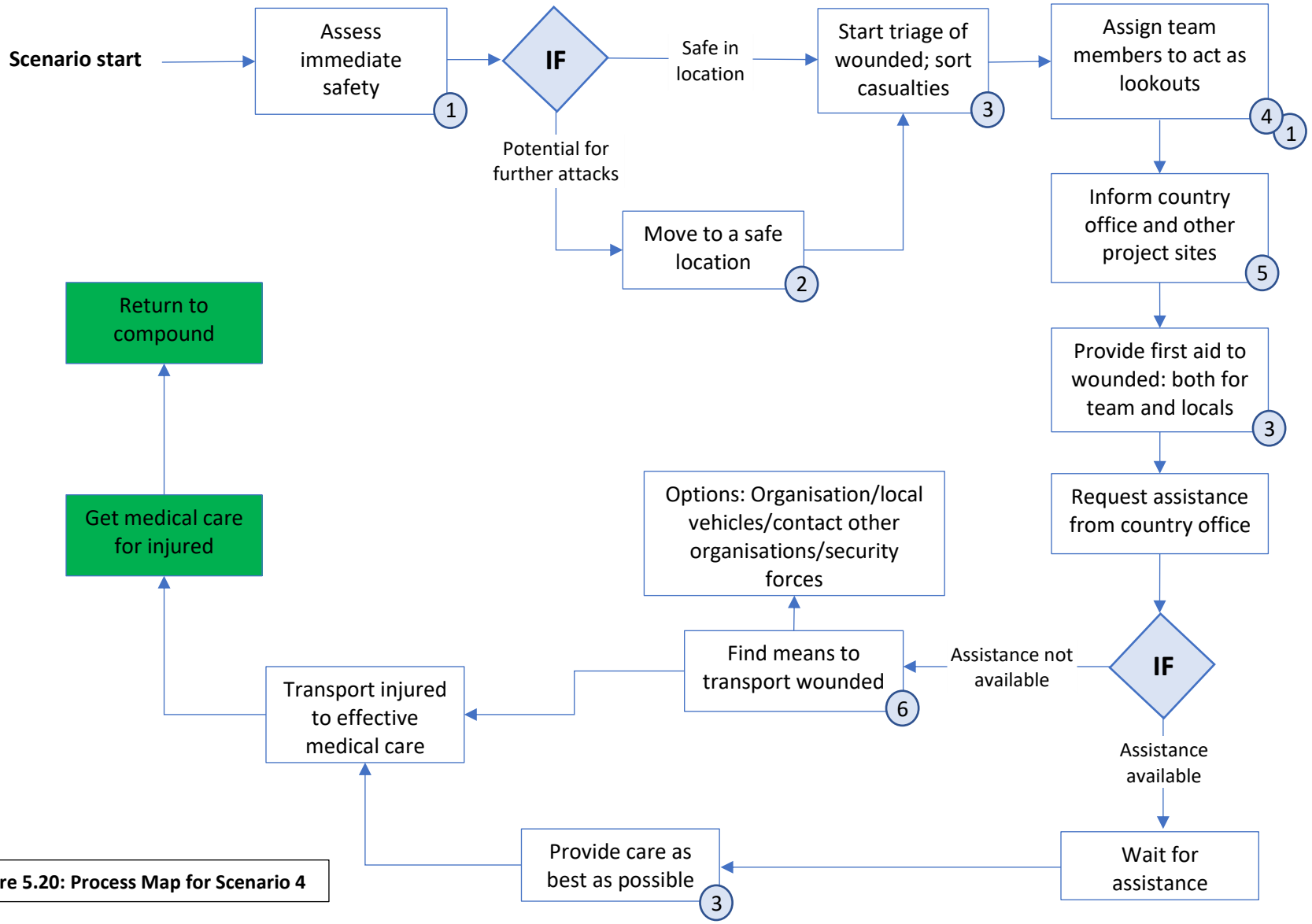


Figure 5.20: Process Map for Scenario 4

The following requirements were identified through the process map (requirement numbers relate to the process map):

Req. No.	Requirement Description
4.1	Ability to assess the situation for potential or future threats
4.2	Understanding of what constitutes safety
4.3	First aid
4.4	Team work
4.5	Communication to send critical information
4.6	Negotiation/persuasion (of locals to provide assistance)

Table 5.17: Requirements Identified through Process Map for Scenario 4

Critical Decision Method

Field workers who had experienced similar incidents: FW 03, 04, 07, 09, 10, 11, 16.

Total: 7

Note: those attacks witnessed by field workers were noted as much less violent than that described in the scenario.

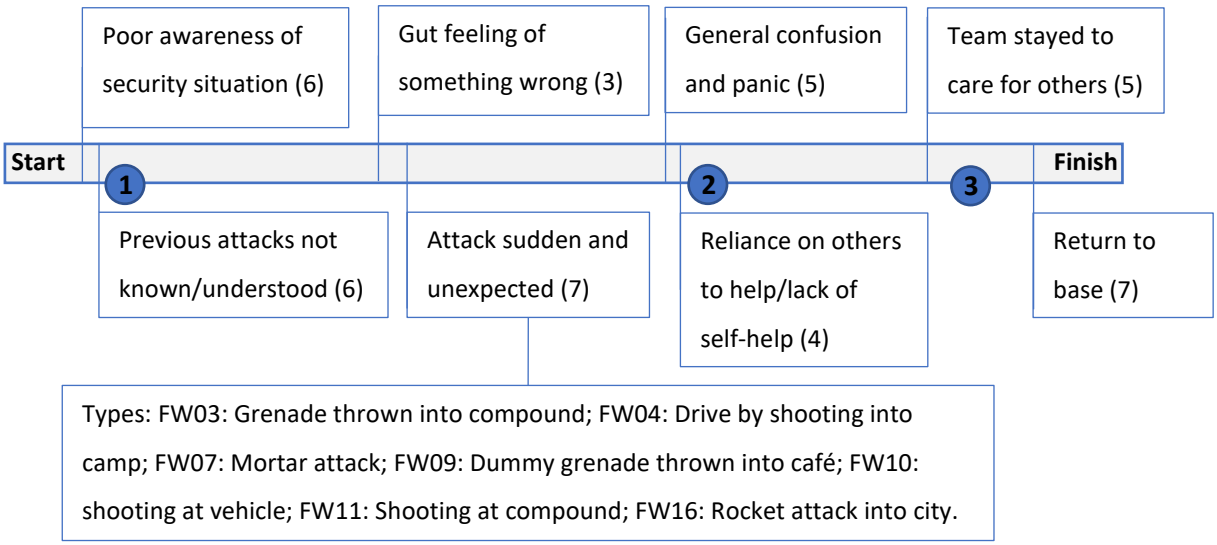


Figure 5.21: Timeline of critical decisions of Crowd at Marketplace

The following critical decision points were identified:

1. Knowledge about security situation: all but one participant mentioned that there was a general unawareness of the security situation and the presence of attacks on humanitarian workers;
2. Lack of ability to act: the sudden impact of the attacks caused a general sense of confusion and panic, even amongst experience humanitarian workers. The participants stated that greater stress inoculation was needed. Participants also noted that novice workers relied on others to help them rather than take ownership for their own help;
3. Need to put self-first: the participants stated that there was often a need to put themselves first. Though the team often wanted to stay and help where locals were involved, there came a point when the more experienced workers had to ensure they put their safety and the team safety first and leave the area.

The following Critical Cues were identified:

Cue Category	**Example of Cue**
Historical risk cues	Previous incidence of risk occurring, standing out as an organisation, being in a risk area, not following mitigation measures
Feeling cues	'Sense of dread', suddenly feeling in the wrong place
Risk cues	Hearing vehicles speeding up
Pre-cursor cues	Dispersion of locals

Table 5.18: Critical Cue Inventory for Scenario 4

5.4.7 Scenario 5

Limited Information Task

The following decision knowledge requirements were identified:

Hierarchy	Information needed	Purpose of information
high ▲	Is the threat over?	Protection of self-first and will guide all other actions.
	Is the vehicle still operational?	If the threat is ongoing allows you to escape.
	Is there a known mine risk?	Differentiate between mine (indiscriminate) and IED (targeted attack).
	How many people are injured?	Shows severity of situation; Allocation of resources.
	How many are dead?	
	What is the severity of injuries?	
	Are there communications with country office?	So that they can be informed and warn others.
	What help can they send?	Identifies what help is available through organisation.
	Is the explosion likely to attract negative attention?	Allows you to identify potential for further risks
	What equipment is available in the vehicles?	Identifies means of self-help at the scene.
	Are locals likely to try and help?	So you can utilise local assets that are likely closer.
▼ low	Where is the nearest medical facility?	To plan transportation of injured to medical treatment.

Table 5.19: Limited Information Task for Scenario 5

Process Mapping

The process map overleaf shows the general process taken to resolve the incident, from the start of the scenario to the point participants deemed they would be safe:

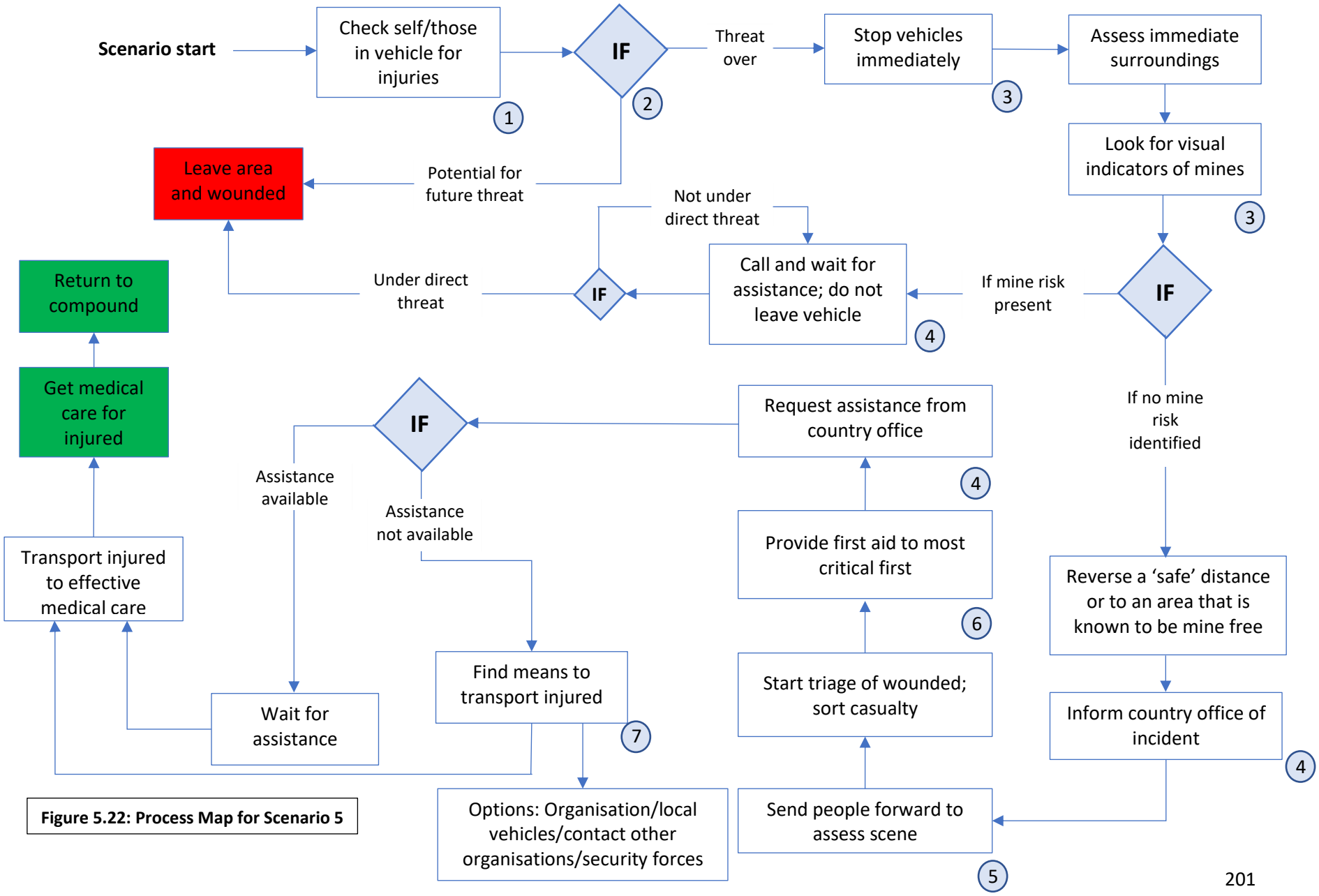


Figure 5.22: Process Map for Scenario 5

The following requirements were identified through the process map (requirement numbers relate to the process map overleaf):

Req. No.	Requirement Description
5.1	Teamwork
5.2	Ability to assess the situation for potential or future threats
5.3	Knowledge of threat characteristics
5.4	Communication to send critical information
5.5	Understanding of what constitutes safety
5.6	First aid
5.7	Negotiation/persuasion (of locals to provide assistance)

Table 5.20: Requirements Identified through Process Map for Scenario 4

5.4.8 Knowledge Synthesis

The data collected is specific to each scenario. However, the thesis aims to collect knowledge requirements for operating in high-risk environments in general. To do this the results of the study needed to be synthesised. The same process outlined by Garfield and Tohiye (2017) used in Study 2 was used to group and categorise the identified knowledge. It is reemphasised here that the condensing down of the data is a subjective and interpretive process (Holt et al. 2005) but is a necessary step in making the data usable (Corlett and Wilson 2005).

The first step in the data synthesis was tabulating all data from the limited information tasks, the process maps and the critical cue inventories. This was then reviewed so that duplicates across the scenarios were removed. The remaining concepts were grouped together to form a coherent picture of the concepts and how they relate to high-risk environments in general.

Decision Requirements List

Decision requirements represent the information necessary for effective decision making (Hoffman 1987). In this study, they represent the knowledge experienced field workers seek to make decisions (Botha et al. 2008), build up through the experience of regular problem solving (Brown and Duguid 1998).

From the 5 scenarios, a total of 46 decision requirements were identified. By removing duplicate and combining similar decision requirements a total of 27 requirements. These were then grouped under 4 categories: community relations, event history, possible support and situation assessment (Figure 5.22).

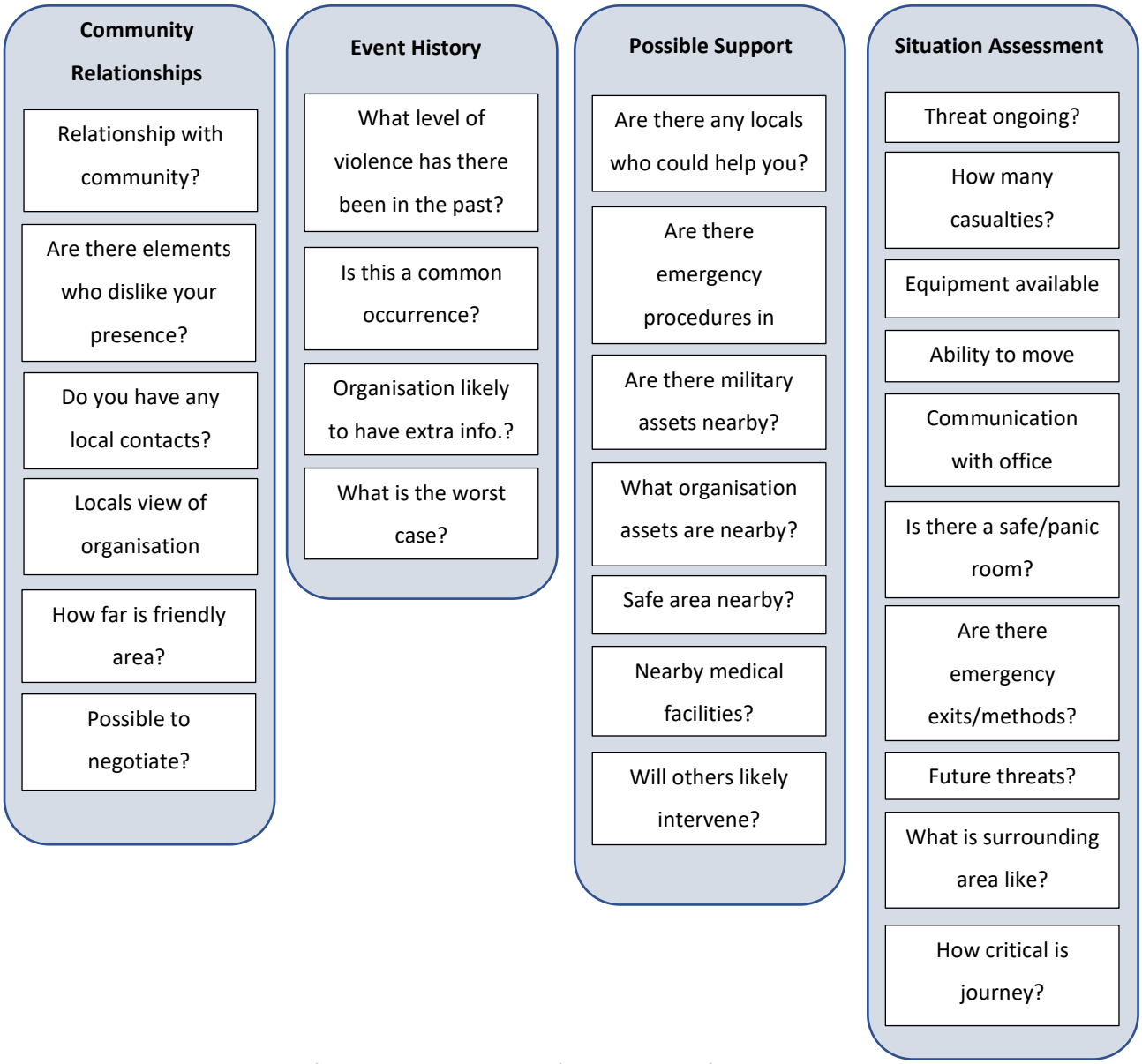


Figure 5.22: Categories of Decision Requirements from Limited Information Tasks

Knowledge Requirements List

Process maps allow participants to visualise the actions and decisions they would make to complete a task and through probing it is possible to elicit the knowledge required for these (Milton 2012): due to the method used, the knowledge identified is what Milton (2007) is termed true tacit.

A total of 18 individual requirements were identified, related to 36 different actions or decisions across the 5 scenarios.

Req. No.	Requirements	Description
1.1, 3.5	Developing community relationships	Building strong relationships with the community mean they are more likely to warn you of potential danger
1.10, 2.3	Building contacts/networking	By building up a network of local contacts, who are likely to know what is happening, allows you to collect information from those in the area
1.2, 4.6, 5.7	Negotiation/persuasion	Being able to negotiate to deescalate hostility or persuade people to help you out
1.3	Emotional intelligence/being able to read others	Being able to read peoples expressions and emotions to understand their intentions
1.4, 3.4, 4.5 5.4	Communication to send critical information	Able to send critical incident reports to country office coherently and concisely
1.5, 3.2, 4.4, 5.1	Team work	Working together to overcome a situation
1.6, 2.6, 3.6	Navigation and knowledge of local area	Understanding the local area and being able to navigate, with or without a map/compass
1.7	Awareness of others and surroundings	Being aware of what is happening around you, especially in terms of potential aggressors
1.8, 4.2, 5.5	Identification of safe areas and decisions	Identifying areas that are safe from a given risk (mines, gunfire, explosives) as well as when it is and is not safe to move

Table 5.21: Collective Tacit Knowledge Requirements from Process Mapping

Req. No.	Requirements	Description
1.9	Ability to understand a complex situation	Understanding a situation as it develops
2.1, 3.1	Awareness of potential risk	Having a general understanding of the risks in the area of operation
2.4	Communication to collect information	Communicating with others, such as other organisation contacts, to collect information pertinent to security
2.5	Understanding of situation through multiple sources	Assessing and understand a situation with information from multiple information sources
2.7, 3.3	Ability to make a logical judgement with limited information	Coming up with a coherent plan without having all the information
4.1, 5.2	Ability to assess the situation for potential or future threats	Assessing a situation for other potential threats, such as repeat attacks or attacks from others
4.3, 5.6	Trauma first aid	To be able to treat specific injuries sustained in high-risk environments
5.3	Knowledge of threat characteristics	Identifying key characteristics of a threat, such as mines

Table 5.21: Collective Tacit Knowledge Requirements from Process Mapping

Note: Driver training only occurred as a requirement in scenario 2. However, it was removed from the requirements list as it is a specialist skill that not all field workers will be trained in.

Critical Cue Inventory

Through reflection on incidents requiring critical decisions, participants create a critical cue inventory, which allows others to understand the thought-process experienced workers take when formulating and deciding on options (Shadbolt and Smart 2015). Notably, these cues trigger a response, such as pausing when something feels wrong. The cue categories and examples demonstrate the perceptions which guide experienced workers thoughts, which are not often followed by in-experienced workers (Calderwood, Klein and Macgregor 1989).

The method was applied to scenarios 1 to 4. From the 4 scenarios, a total of 22 cue categories were identified with a total of 62 cue examples. This was reduced to 8 cue categories with 50 examples (see Table 5.22).

Cue category	Examples of Cue
Feeling cues	Upset stomach, restlessness, feeling of something wrong, gut-instinct, sense of unease, restlessness, 'sense of dread', suddenly feeling in the wrong place
Team cues	Others share uneasy feeling, unusual behaviour from others, team noticing difference in atmospherics, others unusually quiet
Atmospheric cues	Lack of locals, shops closed without reason, lack of public transport, lack of vehicles in general
People cues	People paying undue attention to presence, more people being drawn in, being avoided by locals, locals moving away to avoid being close, different people present from usual, newcomers avoided by locals
Risk cues	Attention from mainly males, confrontation, being questioned on presence, shouting, more locals turning up specifically to confront, being waved away by locals, being warned of risk, angry crowds forming, non-lethal projectiles being thrown (i.e. stones), sight of weapons
Direct threat cues	Confrontation becomes physical, weapons being drawn, projectiles thrown to cause harm (rocks, fire bombs, grenades etc.), perimeter being breached, weapons being fired, hearing vehicles speeding up unnaturally (i.e. sudden screech of tires)
Cause cues	Anti-Western sentiment, anger against humanitarian organisations, world-stage events likely to cause violence, previous incidence of risk occurring, standing out as an organisation, being in a risk area, not following mitigation measures
Pre-cursor cues	Growing crowds across city, protests forming elsewhere in the city, protests moving from original point, other humanitarian organisations evacuating, sudden dispersion of locals

Table 5.22: List of Cue Categories and Examples from Critical Decision Method

5.4.9 Discussion

General Discussion

Novel knowledge elicitation methods are effective at eliciting tacit knowledge through having the expert focus on the resolution of the problem over the knowledge required, with the latter elicited through probes rather than direct questioning (Milton 2007). In the three methods used, experienced field workers talked through their approach to solving the security scenarios which have been used in Study 3 and 4. For this study, scenario 6 was removed as participants did not have the required level of knowledge to be classed under Burton and Shadbolt's (1995) definition of practitioner class of expert, for which this study used as inclusion criteria.

The study was able to elicit three forms of tacit knowledge from the discussions on individual scenarios and through synthesising these, generalise them to high-risk environments. The first, a decision requirements list, illustrates the type of information experienced field workers will seek to understand to make informed decisions. Four knowledge categories were identified:

community relationships, event history, possible support and situation assessment. The first three categories relate to information that is general in approach and can be collected prior to an event, whereas the last category is specific to after an event has occurred.

The second form of tacit knowledge identified resulted in a tacit knowledge requirements list, like that found in Study 1. A total of 8 requirements were identified, which represent a compiled list of 36 specific knowledge requirements. Their relative importance was also identified through how often they appeared across the scenarios. This provides a rich list of tacit requirements which can be compared to those found in Stage 1. Similarities are evident though, such as the identification of 'Situation Assessment' in this study and 'Situation Awareness' in Stage 1. However, the important aspect here is how experienced field workers operationalise the knowledge requirements through individual actions, such as collecting information and making judgements with limited information.

The last form of tacit knowledge identified in the study takes the form of a critical cue inventory: this is a list of the perceptual cues experienced workers looked to make critical decisions. This was based on the review of 36 separate incidents. The result was an inventory of 8 cue categories with a total of 50 cue examples, which can be utilised to support decision making during critical incidents.

Of interest are the participant's emphasis on the community relationships, especially evident in the decision requirements list and the tacit knowledge requirements, though also present in the critical cue inventory. This shows that experienced field workers still factor the community into effective security. This challenges what was identified in the literature, which argued the sector has moved away from the community-based approach into a systems-based approach (Brunderlein and Grassmann 2006). The limited information task showed that participants asked about community-based information above organisation support for scenario 1 and 2 where there was a need to understand the situation better; this was the opposite for scenarios 3 to 5. This shows that in incidents where no direct-threat is present, the community are prioritised to help, whereas when there is a direct threat the organisation is turned to first. As for the process maps, in scenario 1 and 2 understanding the relationship was one of the first decision points. However, the community relationship was only seen as a potential means of support should there be a need to leave the compound in scenario 3, and for scenario 4 and 5 was only mentioned as a potential means of transporting casualties should there be no organisational support. The result was that there were two tacit knowledge requirements related to

community relationships however: developing relationships and people skills. There was only one cue regarding direct interaction with the community in scenario 2, where participants considered the community warning them or waving them off a cue that there was a threat against them. Though the above does not show whether the community or systems-based approach is preferred, it does contradict the view that the sector has moved fully to a systems-based approach (Brunderlein and Grassmann 2006; Daudin and Merkelbach 2011).

Elicitation of Knowledge

The aim of the study was to elicit tacit knowledge requirements from participants utilising several novel knowledge elicitation methods. The study was effective at eliciting three types of tacit knowledge: decision requirements, tacit knowledge requirements and a critical cue inventory. The method allowed participants to 'solve' work-based problems (the security scenarios) in a natural way though also allowed probing by the researcher to understand knowledge requirements better: this built upon the issue of Study 5. The requirements that have emerged allow a greater understanding of how experienced field workers, or experts, make heuristic decisions daily.

Novel knowledge elicitation techniques (such as those used) are preferred to standard interviews when eliciting sensitive information (Barton 2015). They do this by reducing the traditional power imbalances interviews create between researcher and participant (Cowles 1998; Barton 2015). Furthermore, when visual design methods are used (such as process mapping) participants find the data collection less taxing and can sustain longer sessions (Andreeva and Gavrilova 2012). Discussions were therefore able to last longer than traditional data collection sessions, such as interviews.

As the study, as with most novel knowledge elicitation methods (Milton 2007), was participant led the researcher had limited control over the data collected. Furthermore, the probes asked of participants are unstructured and therefore subjectively applied by the researcher (Ambrosini and Bowman 2001). As with any qualitative data collection method, this affects the dependability of the study (Creswell 2003). Though transcription is often used to overcome this, it was unfeasible in this project due to the amount of data collected as well as the periods not digitally recorded to improve participant openness. Burton et al. (1990) suggest that transcription is not the most effective means of providing transparency, but rather transparently presenting the concepts that have helped form themes, including the presenting of themes that

are not aligned to the research question: for this reason, the combined data from the interviews have been presented in Chapter 5.4.4-8.

As the study used novel techniques suited to collecting tacit knowledge (Milton 2007), with the participants learning as data is collected (Barton 2015), the knowledge is tacit, under Nonaka's (1991) definition. Therefore, as knowledge elicitation method the study can be classed as a form of externalisation (tacit knowledge to explicit) (Nonaka 1991).

Utility

The findings provide the first identified tacit knowledge elicitation study into security knowledge in the sector. As the methods used are designed to specifically elicit tacit knowledge (Milton 2012), the knowledge identified is new and provides a view of bottom-up security knowledge.

The decisions requirement list can be used to tailor the information staff are presented when they first arrive in-country during their orientation, which is a common occurrence (Harmer, Haver and Stoddard 2010) though often poorly implemented (Barnett 2004). This allows the information to be contextualised, but also provides staff with the information they need to know to make effective decisions (Burton and Shadbolt 1995).

The knowledge requirements list presents requirements from a bottom-up perspective: if these are compared with those identified in Study 1 and show divergence, theory states that there is likely to be conflict in the field as to which are followed (Daudin and Merkelbach 2011): Study 5 showed that experienced field workers are likely to follow their own beliefs over explicit knowledge. Wilson (1995) states where the two do not align the whole system will be weaker for it. As such, the list created during this study can be used to enhance training, as well as provide a framework for a competency matrix to assess staff on, which was posed as a theme during Study 2. The method itself was useful for staff to identify their own knowledge as well as the important actions to take: this can be used during ongoing staff meetings for ongoing learning (Persaud 2014).

Lastly, the Critical Cue Inventory should not be seen as a comprehensive list. The cues created are constrained to the experiences of the participants. It does however prove that the method is usable in creating cues, which in turn can enhance situation awareness by stating exactly what changes should be looked for. This can be used to improve the situation awareness of even novice staff. Furthermore, the method can be used to enhance post-incident debriefs, which Barnett (2004) states as effective learning experiences. This is a promising area of development,

at a time where the sector is moving away from standard psychological debriefing (Dunkley 2018) and can make the experience a learning one, and therefore a positive, for the victim (Hawker and Hawker 2015). An area where the results can be utilised however is in training, where they can provide talking points of actions which could be taken prior to incidents manifesting, emphasising the preventative means of reducing risk (Persaud 2014).

As with previous studies, the spread of participants meant that the group represented the sector well, bar only being English-speaking humanitarian field workers. As for sensitivity, 16 participants was an appropriate number, both in terms of the possible sample size and for the time available. It was noted that the maximum sample size is relatively small, with a reported mean of 42 international aid workers involved in incidents yearly (Humanitarian Outcomes 2018). 16 participants provided a breadth of experience across the sector and geographically. The selective inclusion criteria meant participants had to have experience being in incidents, giving a deep insight into the reality of operational security. Collecting data from multiple experts is seen as more effective than single-expert studies as it allows a breadth of experiences to be understood (Burton et al. 1990).

The study cannot be described as easily replicable by other researchers. The combination of knowledge elicitation techniques requires familiarity and training. The study required several methods to be fully understood before they could be utilised. Furthermore, there is a need with knowledge elicitation methods for the researcher to have a clear and deep understanding of the domain to effectively understand participant descriptions and ask relevant probes (Burton et al. 1990). Such an understanding was developed by the researcher practically, rather than academically.

Face-to-face methods were more effective than the online form. The F2F methods allowed the participant to provide greater feedback to the researcher visually by explaining their thoughts. While this was done through webcams with the online participants, there was an element of lost collaboration which limited the effectiveness of the method. This would support Chennamaneni and Teng's (2011) theoretical model of how mediums of communication effect how well tacit knowledge can be elicited, with online chat functions (such as Skype) being less effective than F2F methods.

The method was one of the most time-intensive methods used, with the mean session time of over 4 hours; this also does not account for breaks throughout the data collection session either, which were necessary. The ideal approach to such a study would have been to have multiple

data collection sessions (Grinyer and Thomas 2012; Cronin and Earthy 2008). Where multiple methods are used, or the data collection goes into depth, the data collected towards the end of the session may become rushed and fatigue affects the ability of the participant and researcher (Grinyer and Thomas 2012), especially when discussing sensitive topics (Cowles 1998). Such an approach was not possible for this research, where study design focussed more on limiting the time impact on participants lives in order to recruit more participants (Andreeva and Gavrilova 2012). Furthermore, many of the participants were interviewed in small windows whilst they were back in the UK between trips or returning for breaks. Multiple data-collection sessions could be utilised with smaller samples or where such research is conducted within an organisation.

Though the data collection sessions were extremely long none of the participants asked to stop once they had started. Two anecdotal reasons for this are proposed. First, the data collection method is novel and removes the intensity that a traditional interview would have. Many of the participants had not experienced such methods before; there was some enjoyment for them. Second, the participants learnt a lot about themselves during the process, on how much knowledge they possessed, giving them a sense of achievement. This can be highlighted in a quote from FW15's after discussing scenario 3:

> *"I've never been in that situation before, thankfully, in any position. It happens, I know that. I'm glad that my natural thought process is this guided [points to process map]. I need to go away and think about it more, definitely, but I have the outline up here [points to head; inferring in their mind]. It's good to know." (FW15)*

As process mapping allowed both the participant and the research to learn (Neuman 2014), there was more engagement with the research and want to 'find' the answer: Barton (2015) discusses this in relation to education research, proposing that visual learning methods often retain attention better to traditional interviewing.

Furthermore, the participants were able to talk both openly as well as constructively about potentially traumatic experiences. This itself aided the researcher to run longer data collection sessions, which mirrors what Cowles (1998) discovered in her research on sensitive topics: though the initial 'opening up' takes time, once participants are comfortable, they are often happy to talk about their experiences and data collection sessions extended beyond what is usual. This again echoes the need to establish trust and rapport, however (Cowles 1998; Clark and Kotulic 2004).

The inclusion criteria selecting participants who had been exposed to the security incidents listed added a great deal of useful data to the interviews, with participants able to describe their own responses and reflect on these. However, such an approach would not be ethical or appropriate had the researcher not had adequate training in Psychological First Aid. To a degree, this limits the replicability of the study.

The discussions were time-intensive and emotionally draining, both for the participants and the researcher. However, they were useful and therefore warranted. They required very little material resource: a Dictaphone, A3 paper and a quiet space. It is noted that frequent tea breaks were required, meaning the session should be held close to where breaks can be taken outside of the data collection environment.

If there was the need to transcribe interviews it would have made the method unfeasible. Instead, contrived methods were used for the analysis rather than a thematic analysis which Burton et al. (1990) states produce the same amount of usable information. The use of recording data in a visual format rather than solely as audio and written recordings was more effective as a talking point as well as speeding up data analysis.

Sensitive Domain Issues

As the research in general aims to interact with a sensitive field, steps were taken to limit the emotional impact on the participants, as described in Chapter 3.5. This study required more preparation to deal with the potential for emotional distress during the data collection, with the researcher undergoing Psychological First Aid training prior.

The method of accessing participants, as well as eliciting information and the follow-up process was time-consuming but worthwhile. It allowed both access to the participants but also allowed a strong bond to be developed between the participant and researcher prior to data collection. The quote below emphasises this:

> *"I am glad someone is looking at this from a new angle. I haven't spoken about my experiences all that much outside the psychological debriefings you need to sit through. But someone can learn from them and it may help protect people's lives. You can learn from them, and you can pass it on." (FW16).*

The above quote also highlights that establishing trust and rapport is also done by demonstrating credibility in the field (Clark and Kotulic 2004; Lee 1993). In this instance, the field worker had also worked alongside the researcher on delivering aspects of the HEAT course in Study 5 in which credibility was established.

The methods employed whilst researching sensitive topics (described in Section 3.5) were effective, as was having training in Psychological First Aid. However, on reading the protocols in place to protect the participant and researcher it could dissuade some researchers on conducting sensitive topic research. However, participants were happy talking about their experiences in a learning manner, rather than in a traditional research environment. There were times when the participants became overwhelmed with the accounts: here, the use of breaks became critical. The phrase "Shall we stop there for a cup of tea" was the practical application of the Cowles (1998) advice to encourage the participant to move about and get a drink. The process of doing this with the participant however deepened that connection and the feeling that the researcher was also understanding of the emotional impact (Lee 1993).

It is noted here that though well-thought out protocols are necessary to research in sensitive domains, the application of these are not difficult or taxing, but are merely natural human responses to witnessing those in distress (Cowles 1998).

Snowball sampling was used as the primary means of accessing participants. Two snowball referrers were chosen, one from a large organisation with contacts across the sector and another met during Study 5. 4 participants self-referred, as they had heard about the project elsewhere. Anecdotally, this could be down to the use of professional social media channels (i.e. LinkedIn) or because of the researcher's connections with industry as a security trainer. It also highlights the interest from field workers, further challenging Daudin and Merkelbach's (2011) claim that field workers are unlikely to engage in security research.

Development of Method

Though there is limited empirical research on the effectiveness of using serious games for security training (Gonsalves 2016), it has been used effectively for research in other fields (Bowers et al. 2014; Eide, Pultier and Stiso 2015). Though this study used a simulation gaming platform to create visual aids, it does have the potential to be used completely for the research.

With limited training on using the platform, participants could adopt the role of the player and respond to the scenario. This way, rather than the researcher asking what actions would be taken they can witness this first-hand. This would overcome the issues identified in Study 5 in that the gaming simulation could be paused and the participant asked probing questions, combining the benefits of observation research (Milton 2007), Task Analysis (O'Hare et al. 1998) and Verbal Protocol Analysis (Trafton and Trickett 2008).

5.4.10 Study Summary

A total of 16 discussions were held with experienced field workers employing elements from limited information task, process mapping and critical decision methods. The aim of the study was to elicit action-orientated tacit knowledge on key risks faced by humanitarian workers, using the scenarios from the previous studies to base discussions on.

Sensitive domain issues were most prevalent in this study. The methods used probed participants to open-up about previous incidents in order to identify the requirements necessary. As such, they often spoke about situations where either their lives were in danger, where they were injured or where others died. The methodological considerations identified in Section 3.5 were important to follow. Of note, developing a relationship was important to allow participants to feel open about talking about such issues. Furthermore, training in Psychological First Aid was paramount in understanding emotional responses and acting accordingly. Such research should not be conducted without this.

In contrast to the literature reviewed on sensitive domain research, the participants were positive of the interaction. Though there were some cases of strong negative emotional responses, participants remarked that by dissecting the events in a learning manner was more positive than talking about feelings. This presents further avenues of research for psychologists on how post-incident debriefings can utilise these methods to create a more positive outcome.

The use of novel knowledge elicitation techniques allowed the identification of deep tacit knowledge. Such knowledge is seen as the highest level of tacit knowledge people can articulate, albeit imperfectly. This method used allowed this knowledge to not only be identified, but expressed without being forced out from participants. The result was three areas of tacit knowledge: decision requirement lists, which shows the knowledge needed to make rational decisions; a collective list of tacit knowledge requirements which are needed in order to respond to incidents, and a critical cue inventory, which show cues experienced workers act upon.

The results from this study present a true bottom-up understanding of the requirements field workers believe are important for security. A total of 18 knowledge requirements were identified, linked to 36 actions or decisions participants stated were necessary. On top of this, 7 decision requirements were identified as well as 8 critical cue categories, with 50 example cues. This provides valuable data to understand how the requirements identified by experienced workers compare to those established by security management systems.

5.5 Chapter Summary

Stage 2 documents an exploratory enquiry into bottom-up tacit knowledge from experienced field workers. A thorough investigation of literature in Chapter 2 identified that no such studies exist within the humanitarian sector. Further, limited studies exist studies tacit knowledge requirements for security in general. The result of the three studies was the identification of 12 tacit requirements. These were the outcome of the combination of 16 requirements from Study 4 and 17 from Study 6. The reduction to 12 requirements in Stage 2 was coincidental and not to match the 12 requirements from Stage 1. The combination of Study 4 and Study 6 requirements is presented in Table 5.23.

Further to the identification of tacit requirements, Study 5 was also able to observe the interaction between experience and tacit knowledge, and how this differed between field workers who were engaged in the sector for different lengths of time. The interaction of tacit knowing, tacit influence and tacit emotion resulted in positive actions and reactions. An ability to demonstrate these three areas was seen in those with more than 10 years' experience working in the field. The conceptual diagram is shown in Figure 5.24

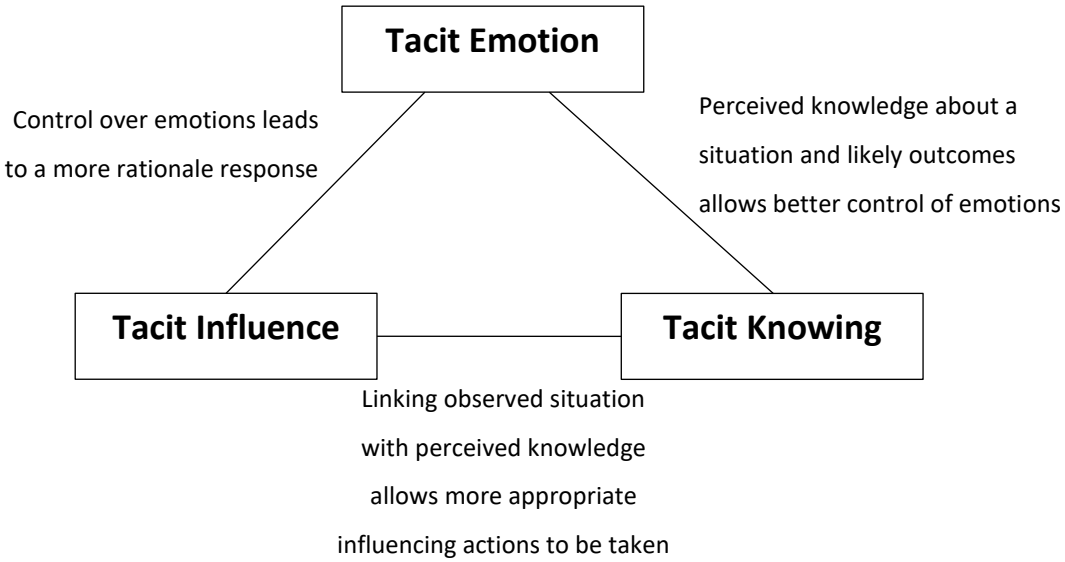


Figure 5.24: Conceptual Link Between Tacit Emotion, Knowing and Influence

Stage 2 added to the methodological literature on eliciting knowledge requirements on security. Study 4 verified the use of surveys to identify tacit knowledge. Though there is a debate in the literature, the use of correctly developed questions results in participants being able to articulate their knowledge. The comparison between Study 4 and 6 requirements (Table 5.23) demonstrates that the knowledge elicited through the surveys matches that elicited through

novel, true tacit knowledge elicitation methods. This creates evidence that the use of comparison questions (in Study 4, the comparison between experienced and novice qualities) as well as framing responses to solutions to realistic scenarios can elicit articulable tacit knowledge. This is useful for further research, both to develop as a method but also to conduct tacit knowledge elicitation remotely. This can be utilised for further research in the humanitarian sector where staff are often geographically dispersed.

Study 6 used a triad of novel methods which allowed the elicitation of deep tacit knowledge. Visual methods which emphasised shared learning between both the researcher and participant were effective. This created a collaborative environment in which the participant felt open to express knowledge, even that in which they did not know they possessed. The visual nature of the data collection aided this expression of knowledge. Furthermore, visual knowledge capture techniques (such as the timelines and process maps) were optimal for data collection. The visual nature overcame issues where digital recording was inappropriate; due to the sensitive nature of the research, participants can feel more open where their conversations are not recorded. Furthermore, the visual nature aided with data analysis and sped the process up.

The methodological considerations for accessing and researching sensitive domains were more important in Stage 2, especially during Study 6 in which participants were asked to recount incidents in which they were in danger. Study 4 built upon limitations identified in Study 3; though surveys are inopportune in researching sensitive domains, where relationships can be established with participants prior this resulted in better responses. For Study 4, participants were engaged with through phone calls to emphasise the protection of their data and the credibility of the researcher. In comparison to Study 3, this approach resulted in a higher response rate. Study 6 was the most sensitive in terms of the topics covered; the data collection required participants to be asked about incidents in which they were in danger and therefore recount personal distress. Notable findings from this study include the need to establish and develop a strong and open relationship with the participants prior to data collection, and the need to have training in Psychological First Aid. The latter was not in order to provide any form of psychological counselling, but to understand emotional responses and when to pause data collection. Contrary to the literature on sensitive domains, the knowledge elicitation techniques used were beneficial to the participants, providing a constructive way of analysing events. This resulted in a positive response from participants and a deeper level of data collection.

Table 5.23: Final List of Tacit Security Requirements from Stage 2

Study 4 Requirements	Study 6 Requirements	Combined Requirements Description
• Trauma first aid	• Trauma first aid	**Trauma First Aid** Able to assess different injuries specific to high-risk environments and provide effective medical intervention and treatment.
• Logical decision making	• Ability to make a logical judgement with limited information	**Logical Judgement and Decision Making** Using a range of information sources to draw logical conclusions and being able to use this to make decisions and creating a clear plan, under pressure and with alternative options.
• Teamwork • Leadership	• Teamwork	**Team Work and Leadership** Able to work as part of a team as well as take a leadership role, giving instructions in a non-imposing way, identifying the strengths of individual team members.
• Aware of surroundings/ situation awareness • Knowing when to leave	• Awareness of others and surroundings • Understanding of situation through multiple sources • Ability to understand a complex situation • Emotional intelligence/being able to read others	**Situation awareness** Having the ability to understand what is happening in the immediate surroundings, the expressions and interactions with locals and other key indicators to understand how a situation is developing and whether this poses a risk and knowing when to leave a situation prior to escalation.

Table 5.23 (cont.): Final List of Tacit Security Requirements from Stage 2

Study 4 Requirements	Study 6 Requirements	Combined Requirements Description
• Risk awareness/ understanding	• Awareness of potential risk • Knowledge of threat characteristics • Communication to collect information	**Knowledge of Potential Risks** Understanding past risks, where/when they are likely encountered and how they develop, including characteristics of key risks (types of mine, effects of bullets), as well as being able to effectively elicit further information from others and being able to utilise this information in decision making.
• Scene safety assessment	• Ability to assess the situation for potential or future threats • Identification of safe areas and decisions • Communication to send critical information	**Incident Assessment** Ability to assess an incident after it has occurred, including identifying potential or future risks (repeat attacks, mines etc.) and identifying areas that are safe from them (i.e. area providing cover from gunfire), including when it is and isn't safe to move from the area. Being able to send this information clearly to the country office.
• Communication	• Negotiation/ persuasion	**Communication** Being able to utilise a range of communication skills, including communicating with local stakeholders and community members to build local acceptance or to persuade them to help as well as potential aggressors to deescalate hostility.

Table 5.23 (cont.): Final List of Tacit Security Requirements from Stage 2

Study 4 Requirements	Study 6 Requirements	Combined Requirements Description
• Local knowledge/cultural knowledge	• Navigation and knowledge of local area	**Local and Cultural Knowledge** Knowing the local area well, including being able to navigate the area geographically, as well as knowing culture, custom and key religious or social dates.
• Networking	• Building contacts/networking • Developing community relationships	**Developing Relations with Local Community** Able to interact positively with the community to build strong relations so the accept your presence and work, as well as developing a network of local contacts who can provide information and assistance, as well as warn of potential risks.
• Calm under pressure Stress management/coping skills		**Controlling Emotions Under Pressure** Able to remain calm during high-stress situations and to calm others around, as well as employ effective coping mechanisms for prolonged periods of stress (such as kidnapping).
• Knowing security procedures		**Knowledge of Security Procedures** Having a good knowledge of the organisations security procedures and what you are expected to do in different situations
• Following gut instincts		**Following Gut Instincts** Able to identify and follow gut-instincts which tell you something is wrong rather than ignoring them

6. Discussion and Recommendations

6.1 Chapter Overview

The focus of the thesis was two-fold: to identify knowledge on requirements for good operational security and to review the methods of doing this. This chapter is therefore broken down into two sections covering these separately.

One, a discussion of the key findings from the thesis, which are related back to the original literature review. Two, a review of the knowledge investigated and of the methods used. Three, the resultant academic and practical findings. Followed by a high-level analysis of the data collected in the 6 studies which is related back to the literature analysed in Chapter 2.

6.2 Knowledge on Security in the Humanitarian Sector

This next section answers Research Objective 1: To identify knowledge on operational security in the humanitarian sector. The first two sections present a high-level analysis of the knowledge elicited, which is then compared.

6.2.1 Top-Down Knowledge Summary

Stage 1 identified explicit knowledge through a descriptive design. A total of 12 requirements were identified in Stage 1, which investigated security from a top-down perspective: the requirements were identified through a systematic review of sector security manuals and refined through Subject Matter Expert interviews with security managers and trainers. Documents, such as manuals and guidelines, provide a repository for the codified explicit knowledge available on a phenomenon (Nonaka and Takeuchi 1995), which is often passed on through training (Brown and Duguid 1991), delivered by in-house security managers or external security trainers in the humanitarian sector (Persaud 2014). As such, studying both provided a holistic view of top-down security requirements.

6.2.2 Bottom-Up Knowledge Summary

Stage 2 identified tacit knowledge through an exploratory design utilising several knowledge elicitation techniques (Milton 2012; Shadbolt and Smart 2015). A total of 12 requirements were identified, refined from a combination of 16 requirements in Study 4 and 17 in Study 6. Tacit knowledge is that built-up through the experience of doing tasks or overcoming problems. Tacit knowledge is difficult to elicit, often manifesting itself as gut instincts, hunches and intuition (Nonaka and Takeuchi 1995). The knower may also not be aware of the knowledge they possess (Brown and Duguid 1998). In this sense, there are multiple levels of tacit knowledge (Milton 2007): some of this is articulable and can be elicited, whilst some of it will only ever be tacit (Ambrosini and Bowman 2001). Stage 2 studied tacit knowledge from three angles. A qualitative questionnaire used to identify requirements seen as important by experienced Field workers. Observations were held of three simulation courses in which the interaction between levels of experience was witnessed. Lastly, a triad of 'novel' techniques (Milton 2007) was applied during discussions with experienced Field workers.

6.2.3 A Comparison of Knowledge

When top-down and bottom-up knowledge does not align, the systems in place to support users are weakened (Wilson 2005). Daudin and Merkelbach (2011) stated that this is the case in the humanitarian sector where there is little input from the field level. The knowledge identified during this thesis showed that there is a greater convergence that divergence. Though select terminology is different, on a whole the requirements align: the likely reason for this is the subjective nature of the naming of themes (Braun and Clarke 2006).

The requirements from Stage 1 and 3 have been compared side-by-side in Table 6.1. There were 9 requirements which, on a superficial comparison, appeared to be similar with 3 requirements from each stage not being similar.

Table 6.1: Comparison of Requirements from Stage 1 and 2

Stage 1	Stage 2
Organisational security policy and procedures	Knowledge of Security Procedures
Trauma first aid	Trauma First Aid
Communications	Communication
Situation awareness	Situation awareness
Common Sense	Logical Judgement and Decision Making
Stress management	Controlling Emotions Under Pressure
Team worker	Team Work and Leadership
Cultural awareness	Local and Cultural Knowledge
Security awareness	Knowledge of Potential Risks
Socio-cultural and political understanding	Incident Assessment
Incident response	Following Gut Instincts
Confidence	Developing Relations with Local Community

(Green = superficial similarity; Red = not similar)

A deeper comparison between each requirement and their descriptions has been provided

Security Policy and Procedures

Stage 1	Organisational security policy and procedures	A sound understanding of an organisation's Security Policies and a working knowledge of the procedures to be adhered to in the specific country of operations.
Stage 2	Knowledge of Security Procedures	Having a good knowledge of the organisation's security procedures and what you are expected to do

Security policy was not mentioned during Stage 2, though was highly rated both in documents in Study 1 and by the SMEs in Study 2. Experienced Field workers referred to the procedure in Study 4, but this was not mentioned in Study 6. Daudin and Merkelbach (2011) discussed issues around security procedures, stating that there was little input from those on the ground, and therefore the content of the procedures diverged.

Trauma First Aid

Stage 1	Trauma First Aid	The ability to treat the most common forms of **traumatic** injury sustained in insecure locations, including those from gunshots and blast/explosions.
Stage 2	Trauma First Aid	Able to assess different injuries specific to high-risk environments and provide effective medical intervention and treatment.

There was a consensus that Trauma First Aid was an important requirement. There was a conflict between SMEs on how important the requirement is, though there was agreement that the type of basic first aid training often given is not appropriate. Field workers expanded this, relating it to the injuries likely encountered during the scenarios.

Communications

Stage 1	Communications	The ability to use an organisation's communications means (radios, phones, Sat-phone), and the ability to effectively relay critical information accurately in a timely manner.
Stage 2	Communications	Being able to utilise a range of communication skills, including communicating with local stakeholders and community members to build local acceptance or to persuade them to help as well as potential aggressors to deescalate hostility.

Though there is a similarity between the two requirement names, the actual focus from the descriptions is different: Study 1 was related to the communication method, while Stage 2 did not mention the means of communication, focussing instead on how people communicated with others, both locals and aggressors.

Communicating to send incident information was identified in Stage 2, though has been included under Incident Assessment: this included assessing a scene and relaying this information back to the country office.

Situation awareness

Stage 1	Situation awareness	Having a good sense of what is happening around you, in your immediate surroundings, and noticing changes in normal patterns of behaviour.
Stage 2	Situation awareness	Having the ability to understand what is happening in the immediate surroundings, the expressions and interactions with locals and other key indicators to understand how a situation is developing and whether this poses a risk and knowing when to leave a situation prior to escalation.

Generally, the requirements from each stage converged. Field workers in Stage 2 developed the requirement further by relating situation awareness to know when to leave a situation or area. This could relate the Stage 2 requirements having scenarios to provide context, whereas Stage 1 studied requirements more generally.

Common Sense and Decision Making

Stage 1	Common Sense	Having a good level of practical knowledge and the ability to make sound judgements and decision in real time.
Stage 2	Logical Judgement and Decision Making	Using a range of information sources to draw logical conclusions and being able to use this to make decisions and creating a clear plan, under pressure and with alternative options.

Common sense was contested by the SMEs, though was more broadly defined as decision making, rather than the Study 1 requirement of acting sensibly. The term common sense was not mentioned by the Field Workers however, though decision making featured prominently in Study 4 and 6.

Stress Management and Controlling Emotions

Stage 1	Stress Management	Being able to deal with negative stress, both that built up over time as well as that experienced **in tense** and stressful situations, both during and after the event.
Stage 2	Controlling Emotions Under Pressure	Able to remain calm during high-stress situations and to calm others around, as well as employ effective coping mechanisms for prolonged periods of stress (such as kidnapping).

Stress management in Stage 1 was more related to longer-term exposure to risks, with less of a focus on immediate events; this was the reverse in Stage 2, with the only long-term focus applying to scenario 6 (kidnapping), where stress management was mentioned. Field workers

Team Work and Leadership

Stage 1	Team Work	The ability to cooperate and work for the benefit of the team, often putting team goals before your own, both with international and national staff.
Stage 2	Team Work and Leadership	Able to work as part of a team as well as take a leadership role, giving instructions in a non-imposing way, identifying the strengths of individual team members.

The requirements were mainly similar: Stage 1 made a distinction being able to work with both international and local staff, whereas Stage 2 did not. It did, however, expand the definition to include leadership and being able to give instructions.

Local and Cultural Knowledge

Stage 1	Cultural Awareness	An ability to integrate yourself within the culture you are visiting, acting appropriately and without drawing attention to yourself or causing **offen**c**e**.
Stage 2	Local and Cultural Knowledge	Knowing the local area well, including being able to navigate the area geographically, as well as knowing culture, custom and key religious or social dates.

The themes were very similar: participants from Stage 2 mentioned the need to have a knowledge of local cultures and customs, whereas Stage 1 expanded this into being able to integrate into the culture.

Knowledge of Risks

Stage 1	Security Awareness	Understanding past threat history and being constantly aware of any potential threats or future threats that might affect yourself/your group and how these may develop.
Stage 2	Knowledge of Potential Risks	Understanding past risks, where/when they are likely encountered and how they develop, including characteristics of key risks (types of mine, effects of bullets), as well as being able to effectively elicit further information from others and being able to utilise this information in decision making.

Stage 1 and 2 converged on the need to know historical risk characteristics and how this knowledge can be used in decision making, especially in the immediate aftermath of an incident.

Non-Matching Requirements

Study 4	**Study 6**
Socio-cultural and political understanding	Incident Assessment
Incident response	Following Gut Instincts
Confidence	Developing Relations with Local Community

A total of 6 requirements (3 from each stage) were not directly related to each other. Two Stage 4 requirements did have general similarities, however:

- Socio-cultural and political understanding had similarities to the combined requirement of Local and Cultural Knowledge, though focussed more on the history of a country. SMEs in Study 2 stated that it should be kept separate from Cultural Awareness, which was a more practical application of the general knowledge;
- Incident response was a broad requirement which was defined as: 'A knowledge of the recommended procedures and methods to respond to common threats and ability to follow them under pressure.' It was directly relatable to two Stage 2 requirements: Knowledge of Security procedures and Controlling Emotions Under Pressure.

Comparison Summary

A total of 9 out of the 12 requirements can be considered similar based on their descriptions; whilst 2 requirements from Stage 1 have general similarities. From the 24 total requirements, only 4 did were not similar: 1 top-down requirement and 3 bottom-up. Overall, there was more similarity than there was difference.

6.2.4 Expert Elicited Explicit-Tacit Knowledge Inventory

The thesis aimed to elicit the two main forms of knowledge, discussed throughout Nonaka's work (Nonaka 1991; Nonaka 1994; Nonaka and Takeuchi 1995; Nonaka and Toyama 2003; Nonaka, Voelpel and Von Krough 2006). Explicit knowledge was studied from security manuals and through security SMEs, both of which are holders of top-down knowledge in the sector (Brunderlein and Grassmann 2006). Tacit knowledge was elicited from experienced Field workers, who are users of the knowledge (Barnett 2004): the common inclusion criteria for Field Workers was a lack of security responsibility, a minimum of 10 years' experience and experience of operateing in a high-risk country.

A comparison of the two sets of requirements was conducted in the previous section, which showed that there was more similarity than difference in the requirements. This contradicts what the literature studied in Chapter 2 concluded, in which multiple authors stated a divergence in knowledge between top-down and bottom-up systems (Martin 1999; Van Brabant 2001; Barnett 2004; Brunderlein and Grassmann 2006; Egeland, Harmer and Stoddard 2011; Persaud 2014). This is explored in more detail in Chapter 6.4.3 in which a hypothesis from this thesis is postured for future research.

Inadvertently, the two groups studied are two forms of expert: Stage 1 established SME's as 'academic experts' and field workers as 'practitioner experts' per Burton and Shadbolt's (1995) terminology, which have both been studied in different and separate ways to elicit knowledge. The resulting requirements are therefore a combination of expert explicit and tacit knowledge (Burton et al. 1990; Nonaka and Takeuchi 1995) necessary to for effective problem solving (Chi, Glasser and Rees 1982; Chi 2006; Burton and Shadbolt 1995). This has been termed an inventory.

During this research, no other studies were identified in which requirements were identified in such a way. This study contributes to the body of literature by posing a knowledge inventory developed by combing top-down explicit and bottom-up tacit knowledge in the sector (see Table 6.2). This inventory is tied to the research undertaken: as with all qualitative research, it is affected by the methods used and the subjectivity of the researcher (Guba and Lincoln 1994; Creswell 2003; Silverman 2011). However, the methods suggested by Shenton (2004) to improve the trustworthiness of the research have been adhered to. The methods followed to collect the data and the method of analysis has been provided. The original requirements from each study have been presented, allowing any reader to understand how the requirements presented here have been refined.

Table 6.2: Finalised List of Security Requirements for High-Risk Operations

1	Security Procedures	Having a good knowledge of the organisation's security procedures to be adhered to in the specific area of operation and know what you are expected to do.
2	Trauma First Aid	Be able to assess casualties and treat wounds accordingly through a knowledge of common injuries encountered in high-risk environments.
3	Communication	To be able to use personal communication skills to effectively communicate with a range of stakeholders, including key stakeholders to build acceptance, the local community to influence them to help as well as potential aggressors to deescalate hostility.
4	Situation awareness	Understanding what is happening in the immediate surroundings, the expressions and interactions with locals to compare this with normal patterns of behaviour to understand how a situation is developing and whether this poses a risk allowing you to know when to leave a situation prior to escalation.
5	Logical Judgement and Decision Making	Having good practical knowledge to understand a range of information sources and draw logical conclusions, being able to use this to make decisions in real-time, creating a clear plan with alternative options.
6	Stress Management and Controlling Emotions	Being able to remain calm during immediately high-stress situations, being able to calm others as well as being able to employ effective stress management techniques to deal with prolonged stress or negative emotions post-event.
7	Team Work and Leadership	Able to work as part of a team, putting team goals before personal ones, as well as take a leadership role where necessary to utilise the strengths of team members and issue instructions in a non-imposing way.
8	Local and Cultural Knowledge	Understanding the local culture and customs to be able to integrate with the local community, without causing offence or drawing attention, as well as knowing the local geography and key dates.
9	Knowledge of Risks	Knowing and being constantly aware of past risks, where/when they are likely encountered and how they develop, including characteristics of key risks (types of mine, effects of bullets) as well as being able to effectively elicit further information from others and utilise this information in decision making.

6.3 Effectiveness of Research Methods

The way in which the research was designed is important and prompts the selection and use of methods. Reflection has been provided on how the research design led to the findings and how an emergent approach allowed studies to build upon each other. The review of the methods used to elicit knowledge reviews the research objective: 'Develop and test a method to identify aspects of explicit and tacit knowledge in operational security.' This section will also review the difficulties and successes in researching a sensitive domain and how participants were recruited, answering the following research objective: 'Identify a means of accessing and collecting data from a sensitive security domain.'

6.3.1 Research Design

Two broad research designs were selected for the research. A descriptive design was used to identify explicit knowledge, whilst an exploratory design was taken to investigate tacit knowledge. The more important aspect of the research design was the underpinning that the design itself was emergent. Such designs change constantly with the development of the research picture (Given 2008a; Pailthorpe 2017). This allowed the tailoring of each new study to build upon the weaknesses and findings of the last, and where possible allowed the knowledge to be approached by as many angles as possible (Milton 2012). Though most qualitative research follows this approach (Denzin and Lincoln 2005; Marshall and Rossman 2011), it was even more important in this research where little theory exists and most literature is practitioner focuses (Harmer and Schreter 2013). In this sense, Human Factors was an appropriate community of practice, which often does away with set designs in favour of problem-orientated research (Baber et al. 2013).

The design was also opportunistic, seeking new opportunities for research throughout the field. This emphasises Hoffman (1987) premise that knowledge elicitation requires close interaction between the researcher and the domain. This allows opportunities to be identified that would not be known otherwise. In two studies this close relationship paid off: Study 5, where the opportunity to conduct observations on the simulation course came up during a different project, and study 6 where participants had already heard of the research.

The design of the research also considered the academic development of the researcher, both in terms of knowledge around the domain, but also in terms of confidence researching the topics. This is closely related to personal and professional development too (Creswell 2003).

Hoffman (1987) posed that true knowledge elicitation studies, such as Study 6, cannot take place until the researcher becomes acquainted with the domain, with Burton and Shadbolt (1995) stating that the researcher should become an *academic expert* in that they know what the literature states about a current problem. The path taken, from understanding the manuals to speaking with SMEs, and understanding the quantitative and qualitative view of field workers, to then witnessing the interaction of experienced and novice workers first hand allowed a true understanding of the phenomenon. In turn, this allowed meaningful discussions with the participants in Study 6. Therefore, if the project was repeated and Study 6 took place first, it is unlikely it would produce the same thick description. This should be kept in mind when attempting similar projects.

6.3.2 Review of Methods

Six different methods were utilised, all with varying warrants for use. A summary table is first presented, which depicts a subjective assessment of the methods applying a colour coded system to show which methods were effective and where issues arose. The criteria for assessment of each study relate largely to the qualitative research concept of trustworthiness (Shenton 2004) and the criteria for assessing methods presented by Wilson (1995) which was discussed in Chapter 3.5. An analysis of the methods employed was both important to understand how they met the trustworthiness criteria (Annett 2005) but also to understand how they can be applied in a real-world setting (Stanton 2005).

Table 6.3: Summary of Knowledge Elicitation Methods

	Systematic Analysis	SME Interviews	Rating Survey	Tacit Knowledge Survey	Observation	Scenario Discussions
Elicitation of Knowledge	Easily elicits explicit knowledge, analysis refines knowledge from multiple sources (Combination)	Good at validating explicit knowledge; refines Study 1 knowledge (Combination), provides recommendations	Wilcoxon: poor understanding of knowledge; no new understanding FCA: useful to show conceptual links between ratings of different groups	Cannot be fully described as tacit knowledge as easily explained, a viewpoint not previously identified so provides a new view ('Externalisation')	Allowed a view of how tacit knowledge is shared (Socialisation), and how experience is operationalised; did not identify new knowledge	Effective at eliciting tacit knowledge in a non-obvious, participant-friendly manner (Externalisation)
Practical Application	Provides a condensed list of requirements, which can be used as a tool to base training on	Provides little usable data, refines requirements, provides background information only useful to the thesis	Low sample size affects any valid conclusions; provides a tool for comparing links between requirements	A better understanding of bottom-up requirements for comparison with those in Study 1	Findings constrained by small samples; provides recommendations on how to implement mentoring approaches; provides recommendations	Usable outputs for improving training, improving information gathering activities as well as identifying critical cues in specific contexts

Green= Good; Yellow = Minor Issues; Red = Poor

Table 6.3 (cont): Summary of Knowledge Elicitation Methods

	Systematic Analysis	SME Interviews	Rating Survey	Tacit Knowledge Survey	Observation	Scenario Discussions
Feasibility	Completely desk based, though time consuming.	Requires basic interviewing skills, interviews are time consuming; data analysis is very time consuming though not necessary to complete transcribe	Requires knowledge/ use of survey tool. Requires ability to perform basic statistical analysis (Wilcoxon signed rank test) and FCA.	Requires basic interviewing skills, interviews are time consuming	Required very little training to conduct observation, including of co-trainer; access to simulations courses is limited and required researcher to have a role as a trainer	Requires knowledge of domain and use of contrived techniques; need for researcher to be trained in a form of psychological support.
Sensitive Domain Issues	No need for participants, very few texts inaccessible	Snowball sampling very effective to recruit participants due to close personal networks between SMEs	Snowball sampling ineffective at recruiting participants; impersonal method and therefore hard to access participants	Snowball sampling used to identify participants, but researcher formed connection to recruit participants, which was effective but time-consuming	No control over recruitment: all participants agreed to take part due to personal nature taken	Snowball sampling effective at recruiting participants; networking and word-of-mouth also meant the research was known by some participants

Green= Good; Yellow = Minor Issues; Red = Poor

Systematic Document Analysis

The study of appropriate, practical literature is the first step in any knowledge elicitation project (Burton et al. 1990). This allows the researcher to both become acquainted with the knowledge available (Milton 2007) but also to follow the characteristics of an *academic expert* (Hoffman 1987): that is, to understand the solution from an academic point of view, where there is a well-defined solution that can be easily expressed. Manuals are commonly used across domains as a way of sharing knowledge (Nonaka 1991) and often represent repositories of the current explicit knowledge available (Nonaka and Takeuchi 1995). This is true of the humanitarian domain (Barnett 2004; Persaud 2014).

A systematic document analysis was chosen as it combines both the advantages of a meta-analysis and a document review, which are commonly used methods in knowledge elicitation (Denyer, Smart and Tranfield 2003). It has been used previously to assess competency studies in disaster medicine and provides a basis for future studies (Dennik-Champion, Peltier and Wisniewski 2004; Arculeo et al. 2015). Denyer, Smart and Tranfield (2003) applied the method to management research, adapting the method from the medical field.

Systematic reviews are not often used for analysis within documents (Denyer, Smart and Tranfield 2003). However, the method utilised in this thesis combined the warrants of the systematic review in its scientific approach to document selection with the specific application of document analysis (Bowen 2009). The use of this methodology was effective at identifying and synthesising knowledge requirements from all open-access manuals and presenting this as a thick description. By synthesising the explicit knowledge into a list, it can be classed as a Combination of current knowledge by Nonaka's (1994) SECI model.

The method provided a basis for future research. As no participants are involved, there are no ethical issues to using the method. Data sources were identifiable and accessible online. Resources requirements were low. Though time intensive, the method was effective at identifying and synthesising the domains explicit knowledge. It not only allowed recurring explicit requirements to be identified but also the frequency of their occurrence.

SME Interviews

The security manuals reviewed in Study 1 remove context to the requirements, as well as being subjective to the researcher's thoroughness. Though a systematic review was designed to remove this, SMEs were consulted to both validate the list, provide context, as well as identify

requirements that may have been missed. Security advisors are commonplace in most humanitarian organisations (Neuman and Weisman 2016) and were therefore identified as the SMEs who provide top-down knowledge.

In-depth interviews were chosen to fully understand the phenomenon from the SMEs perspective (Kvale 2006; Boyce and Neale 2006) and act as a form of validation through teach-back (Milton 2007; Johnson and Johnson 1987). They were preferred over structured interviews as they allowed validation of both the requirements identified (Milton 2007), but also the conflict between top-down and bottom-up knowledge in the sector, which is guided by the researcher tailoring questions as the interview progresses (Crabtree and DiCicco-Bloom 2006).

The study was able to achieve its primary aim of validating the requirements list, as well as providing a thicker description to each of the requirements. It was also able to elicit important themes on how the requirements can be utilised and how to make them effective, providing guidance from the practitioner perspective for the latter part of this chapter. The input of SME knowledge into the Study 1 knowledge is viewed as a form of Combination under Nonaka's (1994) SECI model, where elicited explicit knowledge is used to refine and improve existing knowledge. The validation of the 12 requirements can also validate the use of the systematic document analysis to elicit requirements which reflect the explicit knowledge in the sector.

There was a low resource cost to set up and run the interviews, though data collection sessions were long; a Dictaphone was necessary also. The analysis took a considerable time, being the second longest to complete (after Study 6). Template analysis was an effective means of only part-transcribing the important parts of the interview. There were no ethical issues as no personal sensitive topics were covered, though SMEs are likely to not share company information that could be deemed sensitive in terms of shortcomings in security unless they trust the researcher (Cowles 1988). Much of the interview was devoted to establishing this trust so provided unusable data though was none-the-less important (Clark and Kotulic 2004).

Quantitative Rating Surveys

The literature stated that where top-down and bottom-up knowledge diverges, the overall system is weaker (Wilson 1995): this was contextualised to the domain by Barnett (2004) who identified that field workers have very little input into security management, which means new security standards are resisted (Daudin and Merkelbach 2011). A study was designed to identify the extent of these differences by comparing how SMEs and Field Workers rated the

requirements. A more specific rating was provided by creating six security scenarios, developed from statistical from the Aid Worker Security Database (Humanitarian Outcomes 2018) with narrative provided by incident reports. Both Barnett (2004) and Persaud (2014) suggest the use of workplace scenarios to improve discussions, at the management level for planning, team level for knowledge sharing and even during interviews for recruitment. Though not claimed to be a novel contribution to knowledge as the information already exists in parts, the combination of this and the narrative applied provides a useful tool to be used in the domain.

A Wilcoxon signed rank test was used to understand the difference in rating between the two groups, which showed there was only significant difference in ratings for scenario 4 and 5. However, a low sample size (N=70) challenged the reliability and validity of the findings. Formal Concepts Analysis allowed a qualitative analysis of small quantitative samples, which was performed on the top 3 rated requirements for each group. The FCA showed that the only requirement that had a strong conceptual connection between both groups was Situation Awareness and that there was little to no similarity between the other ratings. It did not corroborate the findings of the Wilcoxon test however, which shows that the low numbers influenced how the results can be used.

The low numbers of the survey relate to the literature on sensitive domains; quantitative methods are less personal and therefore lose participants, with surveys not being able to develop any rapport to increase responses (Dickonson-Swift, James and Liamputtong 2007; Clark and Kotulic 2004).

There was a low resource requirement for the study, being completely desk-based. It did require access to a survey platform, however. No ethical issues were present, with no interaction with the participants and no personal details asked on the incidents. Data analysis required basic statistical analysis skills, though these can easily be learnt.

Qualitative Knowledge Surveys

Though questionnaires are not often used to elicit tacit knowledge (Ambrosini and Bowman 2001), argued to only elicit explicit knowledge (Andreeva and Gavrilova 2012), they have been utilised in other tacit knowledge studies (Dzekashu and McCollum 2014). Summarising his work using knowledge eliciting surveys, Busch (2008) stated that qualitative methods were preferred as knowledge is atypical and difficult to conceptualise quantitatively. In the first study of Stage 2, which sought to identify bottom-up knowledge, a qualitative questionnaire was administered.

The questionnaires were effective at eliciting knowledge from Field workers, allowing both a comparison of how participants viewed the differences between experienced and novice field workers, which allows identification of important requirements (Chi 2006), as well as the requirements they felt were important per scenario. By framing the questions with realistic scenarios participants can identify knowledge they would not otherwise be able to (Busch, Dampney and Richards 2002; Ambrosini and Bowman 2001) by providing a context (Polanyi 1966a; Sternberg 1995). The knowledge elicited is not deep tacit knowledge, however (Milton 2012) but is classed as articulable tacit knowledge (Ambrosini and Bowman 2001).

As with Study 3, there was a low resource requirement in designing the survey tool, being desk based but requiring a survey tool. Participant recruitment was more time intensive, requiring short phone calls with each participant, though allowed the researcher to establish a relationship and credibility of the research which improved responses (Clark and Kotulic 2004). Qualitative capture through online questionnaires allows fast and efficient analysis, which was supplemented with the use of computer software. Though there were no ethical issues administering a questionnaire, there was a low response rate to the optional questions which asked participants to provide accounts of incidents. This demonstrates Lee's (1993) premise that though surveys are non-intrusive, as participants cannot provide emotional responses they are likely to be ignored.

Simulation Course Observations

A limited opportunity exists to observe humanitarian workers in high-risk environments naturally, posing too great a risk to the researcher and ethical issues for the research (Clarke and Johnson 2003; Barnard, Gerber and McCosker 2001). A solution to this issue presented itself in the observation of a Hostile Environment Awareness Training course, in which participants are put through a simulated high-risk environment. Observations of realistic simulations are a suitable alternative to observing participants in a natural setting (Andreeva and Gavrilova 2012).

Group work settings allow the transmission of tacit knowledge between experienced and novice workers (Bly 1997; Johannessen, Olaisen and Olsen 2001). This is the basis for using mentoring as a learning approach to share knowledge (Nonaka and Takeuchi 1995) which has been suggested as a learning method for humanitarian organisations (Persaud 2014; Barnett 2004). However, the observations did show that the most experienced participants did not naturally share their existing knowledge, nor did they naturally take a mentoring role. Those with some exposure to the field did however but made mistakes in how they handled the situation. The

reasons for this were not identified in the observations; it does show that mentoring is not a simple solution. For mentoring to be effective, experienced candidates need to be identified, trained to be mentors and there needs to be effective monitoring of this. The requirements inventory could be one possible avenue, having mentors focus on specific areas with novice field workers.

As a knowledge elicitation method, the observations were ineffective, as the actions of participants could not be studied in detail. They did allow observation of how tacit and explicit knowledge interacted on the practical level. Nonaka and Takeuchi (1995) posed that experience is likely to trump training when it comes to solving a problem, which was observed on the course: even though participants were given training on how to behave during the situations they encountered, when it came to the simulation they acted through instinct instead. This stretches beyond training but to rules and procedures also, with participants only following those they believe will work from experience (Daudin and Merkelbach 2011). The course also affirmed themes raised by the SMEs in Study 2, in that training is not a one-off solution. Those without experience often froze during the stressful scenarios, unable to act, even though they had had training on how to respond the day before.

Resource wise the observations would be difficult to set up as a researcher alone. Multiple organisations across the UK run such course and researchers would have to approach these to observe, rather than setting them up, which poses too many logistical and ethical issues. The observations were also time intensive as was the analysis. It does provide a very detailed view of knowledge interaction, however, which would be difficult to achieve through other means. Ethically, observations were non-intrusive, with participants agreeing to the nature of the course when joining, separate from the research; the researcher needs credibility to present the research to reduce the likelihood of participants not wanting to take part (Clark and Kotulic 2004).

Scenario Discussions

In the final study, a combination of three different novel methods was used which are designed specifically to elicit tacit knowledge (Milton 2007): Limited Information Tasks, Process Mapping and Critical Decision Method. Studying experts during these methods allow both the identification of the knowledge they possess (Hoffman 1987) and the means of using it (Chi 2008). This provides recommendations of both necessary knowledge as well as how this can be utilised. The decision to use the three methods in conjunction was to approach tacit knowledge

elicitation from three, supporting positions (Milton 2012). A set of visual aids were also created for the study, which proved effective at contextualising the scenario descriptions developed in Study 2.

Limited Information Tasks are an effective method to understand the information necessary to make informed decisions (Hoffman 1987). As a method it is straightforward and quick to administer, so is often used to supplement other more intense methods (Shadbolt and Smart 2015). In this thesis, the method was effective at eliciting a range of information participants felt were important. It also allowed participants to ease into the data collection sessions, so provides a means of putting the participant at ease (Clark and Kotulic 2004). The information can be used to improve orientations, which can sometimes be lacking (Barnett 2004; Eastman, Evert and Mishori 2016).

Process Mapping elicits knowledge through having the participant visualise how they would overcome a problem (Milton 2012): in this case, how they would 'solve' the scenarios. Though it shares similarities to Protocol Analysis in that participants are explaining how they would deal with a problem (Shadbolt and Smart 2015), the visualisation of this is more intuitive to many participants and is less intellectually draining (Barton 2015) and can be sustained for longer data collection sessions (Andreeva and Gavrilova 2012). The method was effective at identifying tacit knowledge, with participants mapping out their response whilst being asked questions on the knowledge requirements for each scenario. In this manner, not only is knowledge elicited but the expert solution is identified. Participants are then able to learn from the experience (Milton 2012). In this way, process mapping can be an effective group knowledge sharing task, allowing socialisation of knowledge (Nonaka 1994).

Critical Decision Method provides a retrospective analysis of past incidents (Crandall, Hoffman and Klein 2006). Through such analysis, it is possible to identify decision points as well as the cues that state a decision is required, developing a Critical Cue Inventory (Calderwood, Klein and Macgregor 1998). This method is particularly suited to incidents which are unusual, difficult to solve or require immediate and critical decisions (Shadbolt and Smart 2015). This makes them particularly suitable for post-incident debriefing, which important for improving security (Barnett 2004).

This is the first identified study of any of the three methods being applied to understanding tacit knowledge on security, forming part of the main contributions to knowledge- the development

of a thorough method to elicit tacit knowledge on security from experienced field workers. It has potential usability both in terms of a method as well as the resulting findings.

The approach undertaken was resource intensive, requiring very long data collection sessions which were both intellectually and emotionally draining, both for the participant and the researcher. The methods undertaken required both planning and practice. Furthermore, there were complex ethical issues in researching past experiences of being involved in security incidents, requiring both ethical approvals as well as the researcher to be trained in a form of psychological support. The data analysis was the most time intensive of all studies. However, anecdotally the researcher found it the most interesting and rewarding due to the richness of the data and the new knowledge they themselves learnt.

Summary

A range of methods were used to elicit knowledge. The use of a systematic document analysis proved effective at eliciting and synthesising large volumes of data to identify specific requirements. The use of Subject Matter Expert interviews validated the requirements list, but also allowed the descriptions to be expanded. The use of a quantitative survey was challenged by low responses, which affected the results. This reflects the literature on sensitive domains, in that impersonal and quantitative methods are less effective at accessing participants. The qualitative survey was more effective at getting responses from participants, which was aided by researcher engagement with participants prior. It was effective at eliciting articulable tacit knowledge, though most participants opted not to answer optional questions. This again demonstrates that questionnaires are not an effective method for asking sensitive questions. The observation of the simulation courses allowed an understanding of how different experience levels interact, though was not effective at eliciting knowledge. They did provide witness to how tacit and explicit knowledge interact, with experienced staff ignoring what had been delivered in training, following their own instincts instead. The last method employed utilised three specialist knowledge elicitation techniques during scenario discussions. Though the sessions were time intensive, they elicited rich data, including that on actual security incidents. Process mapping led to the creation of requirements related to how the participants would solve the scenarios, allowing the participant to focus on the task rather than the knowledge. This was less intense for participants and allowed a natural process to remain. It is the first study identified where the methods have been used within the humanitarian security sector, and the first to elicit deep tacit knowledge.

6.4 Recommendations

This section provides recommendations on how the research can be used in the future, both academically as well as practically, answering the research objective: 'Formulate recommendations to bridge the gap between top-down and bottom-up knowledge in the humanitarian sector.' Suggestions have been provided for future research, which fulfils the general aim of qualitative exploratory studies (Creswell 2003). A potential hypothesis has been posed based upon the findings of the studies. Lastly, recommendations have been suggested to utilise the findings of this research in a practical way, which should be the underlying aim of any human factors research (Stanton 2005). Recommendations have been related back to the body of literature reviewed in Chapter 2.

6.4.1 Recommendations for Future Research

From the studies conducted as part of this thesis, it can be concluded that knowledge, in the form of requirements, converges more than diverges. This contradicts what was concluded during the literature review in Chapter 2, in which several authors stated a misalignment between the organisational and field level in terms of security thinking (Martin 1999; Van Brabant 2001; Barnett 2004; Brunderlein and Grassmann 2006; Egeland, Harmer and Stoddard 2011; Persaud 2014). Field workers who took part in the studies were classed as practitioner experts (Burton and Shadbolt 1995) however, so this contradiction between the findings and literature may not exist for less experienced staff. Experienced workers will have had the opportunity to internalise knowledge, through repeat exposure and experience of utilising it practically (Nonaka and Takeuchi 1994). In one study on intentional violence against humanitarian workers, out of the 2,000 respondents, 1 in 5 had been involved in a security incident in the 6 months before the study (Buchanan and Muggah 2005). This shows that the rate at which workers are involved in incidents is high, and therefore supports Claus's (2011; 2015) study that humanitarian organisations face more risks than other sectors.

The argument posed in the literature that top-down and bottom-up knowledge does not align may still be true for less experienced workers. This is potentially backed up through studies on humanitarian worker deaths which show that inexperienced workers are more at risk (Bolton et al. 2000; Burnham and Rowley 2005; Buchanan and Muggah 2005). Bolton et al.'s (2000) study, which is the only one accounting for length of service, concluded that out of the 382 deaths studied, 31% of deaths occurred within the first 3 months of service, with 17% occurring within

the first month, with a median of 8 months. This is also backed up by observations from Study 5 and reflections of experienced field workers in Study 4. Further study is needed to identify at what stage field workers adopt and demonstrate the requirements created in this thesis and stop showing qualities identified as those demonstrated by novice workers.

The HEAT simulation observed during Study 5 showed that training itself was not effective on its own to ensure novice workers are able to effectively operate in high-risk environments. Those who were classed as Non-Experienced (less than 5 years' experience) were not able to effectively apply the explicit knowledge learnt on the day prior to the simulation to the scenarios encountered. This largely reflects what is stated in the literature, that training is only introductory generic and cannot fully prepare staff for high-risk environments (Egeland, Harmer and Stoddard 2011; Brunderlein and Grassmann 2006; Darby and Williamson 2012; Persaud 2014). Two themes from SME interviews in Study 2 reinforce this: 3.1 Current training is ineffective, and 3.3 Training should be a starting point for attaining requirements.

A hypothesis for future research, based upon the research conducted as part of this thesis, can be as such:

- Novice field workers cannot demonstrate the requirements needed to operate effectively in high-risk environments, even after multi-day simulation training.

Organisations sometimes see this form of training as a means of meeting Duty of Care requirements (Barnett 2004; Daudin and Merkelbach 2011; Kemp and Merkelbach 2011). However, observations as part of the thesis have shown that the training itself cannot be the end state. This is backed up by Claus (2015), an expert on Duty of Care and legal obligations of organisations, who states that organisations are responsible to ensure not only the systems in place but also that staff are effectively trained for the environments they deploy into. Answering the above hypothesis will allow a better understanding of where knowledge diverges, which in turn would allow organisations to ensure that staff received the right training to ensure they are prepared for high-risk environments (Claus 2015). Furthermore, this would allow organisations human resources to ensure that only those who are able to demonstrate the requirements are selected for projects in high-risk environment, emphasising the HR aspect of security management (Darby and Williamson 2012). The list of requirements, the scenarios and the discussion techniques reviewed in Study 6 can provide an effective framework for HR staff; this is discussed as a recommendation for operationalisation below.

6.4.2 Recommendations for Applying the SECI Model to Security Knowledge

The recommendations under this section have been shaped through both a reflection on the literature reviewed in Chapter 2, the individual studies, but also the SME interviews from Study 2. The observations from Study 5 also provide an identification of the way the material can be utilised during training.

The risks faced by humanitarian organisations are constantly changing with the environments they operate in (Brunderlein and Grassmann 2006; Schneiker 2015a; Egeland, Harmer and Stoddard 2011; Harmer, Stoddard and Toth 2013; Harmer, Ryou and Stoddard 2014; Czwarno, Harmer and Stoddard 2017). Field workers are exposed to this changing nature of risk, and by necessity, develop the tacit knowledge to overcome this (Claus 2015). However, systems followed at the field level do not always follow that designed at the organisational level (Barnett 2004; Brunderlein and Grassmann 2006; Daudin and Merkelbach 2011; Collinson and Duffield 2013). Though the conclusion of the thesis was that the top-down and bottom-up requirements matched, there were still areas of discrepancy. For instance, in Study 5 feedback during the non-simulation days from experienced participants showed that whilst they understood the knowledge theoretically, they rarely applied it because they did not understand its importance.

The lack of engaging field workers in developing solutions (Barnett 2004; Collinson and Duffield 2006) means that ground-up knowledge is rarely elicited. Organisations that fail to do this lose knowledge which could improve systems and give them a competitive advantage, either over others or more pertinently for this domain over the problem (Nonaka 1991; Nonaka and Takeuchi 1995). This mission-critical information is lost over time in many sectors due to an ageing workforce (Dzekashu and McCollum 2014; Thibodaux and Rouse 2005), though is even more prevalent in the humanitarian sector due to an above average staff turn-over (Richardson 2006; Emmens, Hammersley and Loquerico 2006; Darby and Williamson 2012; Balbo et al. 2016). There is a need to continually capture this knowledge so that it can be passed on to other, less experienced workers, through explicit means, who in turn are able to internalise the knowledge and refine it to the problems they face.

This leads to the first suggestion for the content of the thesis to be utilised. Nonaka's (1994) SECI model has been discussed in relation to creating knowledge through the methods utilised in this research, discussed in Chapter 6.4.3. Further recommendations are made here in relation to the literature and the findings of the thesis.

Socialisation (Tacit to Tacit)

Both Barnett (2004) and Persaud (2014) suggested the use of coaching and mentoring to improve the sharing of knowledge from experienced staff to less-experienced staff: what Nonaka (1991) would consider the transfer of tacit knowledge. However, sharing of knowledge may not be a natural occurrence. Study 5, which studied the interaction between experienced and less experienced workers, showed that the sharing of knowledge was not naturally done. Workers classed as Relatively Experienced (who had 5-9 years' experience, so were not classed as practitioner experts) attempted to coach those classed as Non-Experienced (less than 5 years' experience), though often ineffectively. For this to be effective, those tasked with coaching need to be selected based on their knowledge, and its relevance to the known risks. Though both authors also suggest that advances in IT, such as video calling, can be used for remote coaching, Johannessen, Olaisen and Olsen (2001) recommended avoiding the use of IT as it hinders the sharing of tacit knowledge. Instead, this form of knowledge transfer is still a form of explicit knowledge transfer, reemphasising what is already known.

Johannessen, Olaisen and Olsen (2001) suggested that the most effective way to transfer tacit knowledge is through 'apprenticeship teams', in which less experienced workers are put in teams with a range of experience, 'instructors' are selected within the teams and a supportive environment is created. Here, tacit knowledge is passed on a day-to-day basis, rather than during one-off meetings which are ineffective: the continual and gradual absorbing of knowledge over time (Leonard-Barton 1994) and through day-to-day interactions (Lei and Sobol 1994). The stability of the environment is also important (Ambrosini and Bowman 2001). This bears resemblance to the view of SMEs in Study 2 who stated that training is a starting point, but this is honed through field exposure to countries that are not high-risk, where staff are able to practically apply these skills practically (Botha et al. 2008). This can be enhanced through personal instruction and discussions on problems (Pavitt 1991), which were also suggested by Persaud (2014). Study 6 used Process Mapping of scenarios as a knowledge elicitation method, but it is also an effective learning and solution visualisation tool (Milton 2012; Crandall, Hoffman and Klein 2006). As such, it can also be used as a learning tool during team discussions to enhance the transfer of knowledge.

A recommendation for the socialisation of tacit knowledge from this research is the use of mentoring teams, where experienced workers are selected to be instructors and new, novice workers are put with them to develop set requirements. This occurs in lower risk countries,

which still present an element of risk to which skills can be developed but the environment is more constructive to learning through daily interaction. The use of Process Mapping and scenario discussions should be used to foster knowledge sharing during team discussions.

Externalisation (Tacit to Explicit)

Experienced humanitarian workers have a wealth of knowledge on how to overcome risks (Claus 2015), though the process of eliciting this is inherently hard (Polanyi 1966a; Nonaka 1991; Lei and Sobol 1994; Fleck 1996; Brown and Duguid 1998; Botha et al. 2008). This is often because those possessing such knowledge are often unaware they possess it (Kujala 2003; Brown and Duguid 1998). This was witnessed in Study 6, where select participants commented on their ability to describe solving a task they had never been trained to. High-staff turnover in the humanitarian sector (Richardson 2006; Emmens, Hammersley and Loquerico 2006; Darby and Williamson 2012) means that such mission-critical knowledge is often lost, making it important that organisations identify and elicit this knowledge regularly.

The methods utilised within Study 6 (Limited Information Task, Process Mapping and Critical-Incident Technique) provide an effective way of eliciting true tacit knowledge (Milton 2012; Shadbolt and Smart 2015). The questionnaire used in Study 4 was quicker, though only elicited articulable tacit knowledge (Ambrosini and Bowman 2001). These methods can be used in conjunction however to ensure tacit knowledge is frequently elicited:

- Questionnaires are easy and cost-effective to create and distribute (Adam and Cox 2008) and present a view at a given time (Brown and Harris 2010). When combined with relevant scenarios, participants can contextualise knowledge (Polanyi 1966a) and describe knowledge necessary to the problem (Ambrosini and Bowman 2001). They can be used in the humanitarian space more frequently than other time-consuming methods, providing an understanding of the explicit knowledge necessary. This can then be used to update procedures and risk assessments, which currently lack from a field level input (Daudin and Merkelbach 2011);
- Limited Information Tasks are an easy method to apply and are time-efficient (Hoffman 1987). They only provide a snap-shot into the information necessary to make decisions however from an experts point-of-view (Burton and Shadbolt 1995). Study 6 concluded that such information can be elicited at the local level and used to improve staff inductions and security briefings, which Persaud (2014) states as important to improve personal security awareness;

- Process Mapping is an effective way to share knowledge, but also an effective way to elicit knowledge necessary to solve a problem (Milton 2012). Because of the visual nature it is also easily applied to a range of participants and is considered less intense (Damelio 2012; Barton 2015; Milton 2007), so can be utilised with a range of field workers. Utilising this method provides a good understanding of what training staff need to be able to overcome specific problems and therefore provides a means to improve training of the simulation courses observed in Study 5. Furthermore, they can be used during post-assignment debriefs, which Barnett (2004) and Persaud (2014) state as important learning experiences;
- Critical-Decision Method is a useful method when applied to incident reviews where there was a need to make instinctive decisions with limited information (Crandall, Hoffman and Klein 2006). The analysis produces a Critical Cue Inventory, which is a collection of perceptual cues used to make decisions (Shadbolt and Smart 2015). Where incidents do occur, the Critical-Decision Method presents a possible supporting tool to effective post-incident debriefings, which themselves are important for organisation learning (Barnett 2004). There is a shift in the sector to move away from psychological debriefings (Dunkley 2018) to techniques which are positive and allow the victims to learn (Hawker and Hawker 2015) as well as for that learning to have a positive effect on others (Barnett 2004), which this method could achieve.

The recommendation of this thesis on how the sector could foster externalisation is by using the methods from Study 4 and Study 6. However, high staff turnover means that such methods should be used frequently so that mission-critical knowledge is not lost.

Combination (Explicit to Explicit)

For knowledge to be effective, it is important that it is frequently updated (Nonaka and Takeuchi 1995). A means of updating knowledge is through refinement, in which existing knowledge from multiple sources is brought together and reduced (Nonaka 1991). The sharing of this knowledge throughout an organisation, or a sector, allows collective reflection so that the knowledge can be further improved and refined (Johannessen, Olaisen and Olesen 2001). Furthermore, this explicit knowledge forms the basis of manuals, guidelines and training, or the collective know-how to solve problems (Botha et al. 2008). For this reason, organisations will often attempt to make knowledge explicit so that it is easily shared to those who need it (Easterbrook and Nuseibeh 2000).

The thesis used two forms of combining knowledge. The first, a systematic document analysis, was used to identify and reduce explicit knowledge which existed in security manuals. The second was to refine this knowledge through SME interviews. However, this knowledge was further combined with the tacit knowledge which had been elicited in Study 4 and 6 (through the elicitation process, tacit knowledge becomes explicit). The list of requirements presented in Chapter 6.2.4 (Table 6.2) is a refined list of combined requirements from both the top-down and bottom-up perspectives. Two applications have been identified for this list of requirements: training and recruitment.

Training has been referenced in one form or another by most studies conducted on security in the humanitarian sector (see van Brabant 1998; Martin 1999; Barnett 2004; Brunderlein and Grassmann 2006; Bollentino 2008; Harmer and Haver 2010; Darby and Williamson 2012; Burkle and Macpherson 2013). The relative importance of training led to the seminal report by Persaud (2014), which is the most comprehensive work on humanitarian security training. Though the source provides suggestions on how to run training, it does not provide an encompassing list of what the result of the training should be. SMEs in Study 2 stated that training in its current form is introductory and that the lack of a standardised assessment weakens its approach- staff attend a course a pass, though SMEs are provided with no indication on how well they performed. Persaud (2014) reinforces this, stating that managers themselves have no means of assessing staff ability once they are deployed. Possible usage of the requirements list is as a basis for staff training and continual assessment, providing an identification, both after training and during employment.

Secondly, both the requirements inventory and the scenarios used throughout Studies 3, 4 and 6 can provide a basis for human resources to ensure the right staff are hired by providing a framework to ask questions around real-life application. The role of human resources is being explored in more detail in the humanitarian sector, to both ensure staff do not deploy unprepared, without adequate training (Barnett 2004; Eastman, Evert and Mishori 2016) but also to ensure that those with the right skill sets are hired (Darby and Williamson 2012). The role of HR in security also relates to staff retention, with many staff leaving because they feel unprepared for the risks faced (Emmens, Hammersley and Loquerico 2006). Not only does HR ensure that there is effective hiring of well-skilled staff to increase project success (Darby and Williamson 2012), but the assessment of staff ability and competence also allows an

organisation to fulfil its Duty of Care obligations (Daudin and Merkelbach 2011; Kemp and Merkelbach 2011; Claus 2015).

The thesis suggests that a possible use of the refined list of requirements is to both improve training but also alongside the scenarios and methods used improve HRs ability to ensure the right staff are hired and are effectively trained so that the organisation meets its Duty of Care obligations.

Internalisation (Explicit to Tacit)

Internalisation is an ongoing process of turning explicit knowledge into tacit knowledge by practising its application (Brown and Duguid 1998). Though training is often stated as the means in which staff internalise explicit knowledge (Botha et al. 2008), true internalisation goes beyond training into actual practice (Nonaka 1994). Internalisation can also be an individual process, in which staff read and understand knowledge and apply this in practice (Nonaka 1991).

The internalisation witnessed during this research was during Study 5 in which participants went through a simulated high-risk environment. No follow-up studies were conducted with participants to understand how they internalised the explicit knowledge delivered during the training, so few recommendations can be made from the study alone. However, SME's in Study 2 stated that the training is ineffective because they are seen as a solution, rather than a starting point for future training. This is largely backed up in the literature (Barnett 2004; Persaud 2014; Egeland, Harmer and Stoddard 2011; Brunderlein and Grassmann 2006), in which training is seen as a solution to meeting an organisations Duty of Care (Darby and Williamson 2012). Study 5 did show however that though participants were exposed to high-risk scenarios, the length of the course and the ability for repeat practice did not allow participants to internalise knowledge. The learning experiences practised on day-2, such as reacting to gunfire or explosions, were not aptly demonstrated by novice workers during the day-3 simulation.

A recommendation to internalise knowledge would be for longer simulation training courses, where participants have the chance to practice new skills gradually. This should be supported by initial deployments to low-risk countries where they can be mentored by experienced staff and practice knowledge in a constructive environment. The requirements inventory will also allow managers to understand how well staff are internalising knowledge. This can be identified by using the process mapping method from Study 6. A comparison can then be made on how well they understand the requirements against set scenarios.

Methods which foster reflection, such as team discussions used to socialise knowledge, post-incident reviews and the learning, as well as gradual field exposure all allow the internalisation of explicit knowledge also.

Conclusions on Nonaka's (1994) SECI Model

Humanitarian organisations have room for improvement in terms of security knowledge management (Persaud 2014; Harmer and Haver 2010; Egeland, Harmer and Stoddard 2011; Brunderlein and Grassmann 1006; Barnett 2004). The recommendations provided are one possible means of structuring the sharing of mission-critical security knowledge using the SECI model (Nonaka 1994) (see Figure 6.1). This not only ensures a competitive advantage (Nonaka and Takeuchi 1995; Botha et al. 2008) over risks, it ensures knowledge is not lost when staff leave (Darby and Williamson 2012) and that the right people get the right knowledge for the problems they face (Easterbrook and Nuseibeh 2000).

In summary, the following recommendations are made based on the SECI model:

- Socialisation: organisations should set up apprenticeship teams (Johannessen, Olaisen and Olsen 2001), where 'instructors' are identified, and teams support each other's learning. This echoes Barnett (2004) and Persaud's (2014) need for mentoring, but in a way that allows the transfer of tacit knowledge as well as explicit;
- Externalisation: questionnaires can elicit articulable tacit knowledge which can be used to update procedures and risk assessments, which currently lack field input (Daudin and Merkelbach 2011). Limited Information tasks can be used to elicit knowledge necessary to make informed decisions and can then be used during security briefings (Barnett 2004; Persaud 2014). Process mapping elicits deep tacit knowledge (Milton 2007). It can be used to identify the bottom-up requirements necessary for good operational security. Critical Decision Method has the potential for an alternative to psychological debriefings post-incident, which allows the participant to learn from the experience and that learning to benefit others (Dunkley 2018; Hawker and Hawker 2015);
- Combination: the systematic document analysis and SME interviews allowed knowledge to be refined into a requirements inventory: this can be used to improve training (Study 2 results) and for use when hiring or deploying staff (Darby and Williamson 2012);

- Internalisation: short simulation courses are not effective at doing this (Study 5). Longer courses and gradual exposure in low-risk countries is needed. Methods that foster discussion, in apprenticeship teams, also help internalise explicit knowledge.

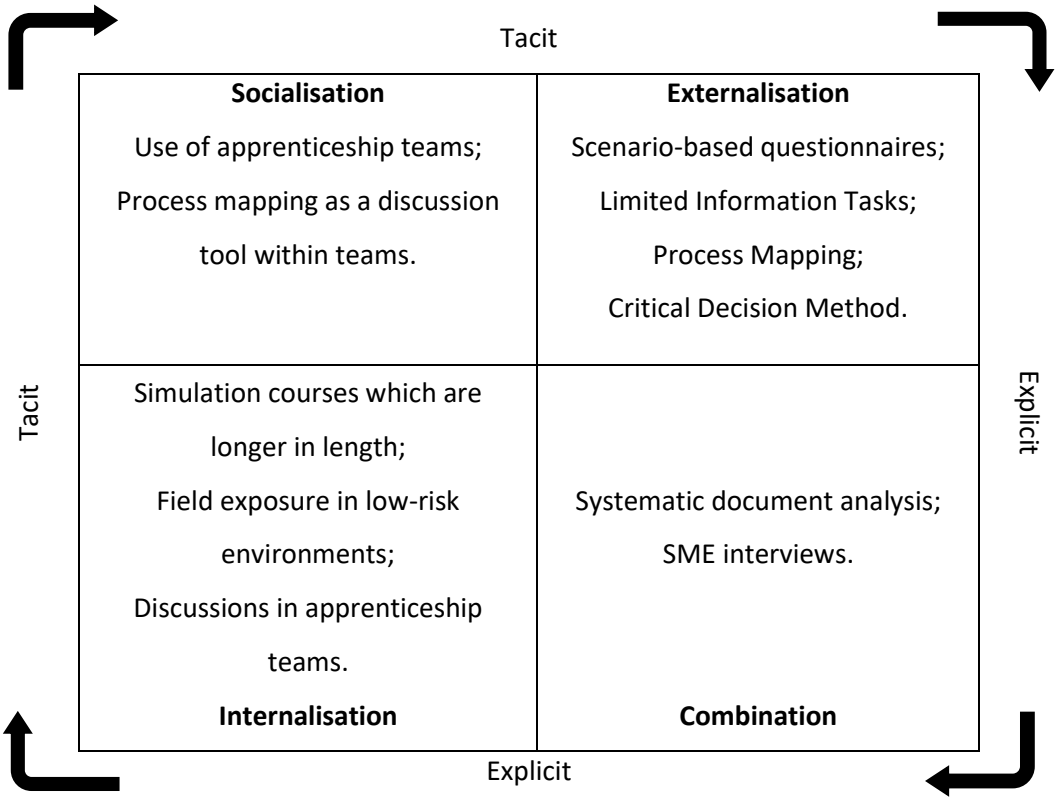


Figure 6.1: Recommendations for Applying the SECI Model

6.5 Research Limitations

This section discusses the limitations to the research conducted and the approach used. Means of improving methodological issues have been provided within the Discussion section of each chapter.

Generalisability

A notable limitation of this research is that the findings are only bound to the methods and participants involved. Purposive sampling was used which meant sample sizes were kept small, which allowed participants to be selected because of the likelihood they would contribute useful

data (Creswell 2003) and so that the researcher could develop a relationship with them, allowing the eliciting of sensitive domain information (Clark and Kotulic 2004; Cowles 1998).

The thesis presents a snap-shot study into the phenomenon, and through inductive reasoning has created a tentative theory. Results are therefore not generalisable. Such theory is only based on the studies and participants involved and is easier to disprove than deductive approaches (Creswell 2003; Babbie 2011). In defence, the process of creating a tentative theory to be proved or disproved is the purpose of this research: "growth in knowledge occurs as falsified theories are replaced by rival theories that explain a wider range of data (Fox 2008: 430).

Though the thesis presents a requirement inventory, their application to real-life cases should be fully analysed in relation to the actual risks faced first. The researcher warns caution not to assume greater confidence in the requirements as a complete solution, which itself could be dangerous in application; changing risks require continual assessment of requirements. The thesis provides methods for eliciting these. The list of requirements presented is related to the research conducted, and not an all-encompassing solution.

Small Sample Size in Study 3

Small sample size in Study 3 affected the validity of the survey. Wilcoxon signed rank tests are applicable for low sample size studies (Busch and Richards 2002; Busch 2008) and were useful in studying whether there was a significant difference in the ratings. However, the review of the method allowed different recruitment techniques to be used in Study 4 which produced greater usable data to meet the research aim. Results of the study are weak however and did not help understand tacit/explicit divergence.

Access to Domain

Chapter 3.5 established humanitarian security as a sensitive domain. Though the methods used to allow participants open-up about the topic were successful, there are still limitations. Due to the length of the data collection sessions, namely in Study 2 and Study 6, it was not possible to arrange multiple sessions. This was also feedback from participants. Therefore, the relationship established was only at the surface. Deeper relationships may have revealed further information, especially when discussing failing in security management systems.

Furthermore, humanitarian organisations limit the amount of information that can be found openly as well as what their staff are allowed to discuss (Harmer and Schreter 2013). This limits the body of literature on what can be studied through research alone. As a result, Study 1 was

unable to access 24 sources identified through the systematic review. Though the investigation into these sources showed they would have likely not met the inclusion criteria, this cannot be stated for sure. As such, some sources which guide knowledge may have been missed.

Anecdotally, as the researcher works in the field as a security advisor, there was better access to the material than someone outside of the field. This allowed a greater access to participants in Study 2. Furthermore, the only source inaccessible at the time of Study 1 was Roberts (2006), which is the security manual used by the International Committee of the Red Cross. Superficial examination was conducted when it became openly available in 2016. It provided no additional requirements, however.

Approaches to overcoming issues with access require external support. Research think-tanks, such as the European Interagency Security Forum, which has established trust by being practitioner focussed is making inroads into researching the field. The Overseas Development Institute, a research institution focussed on the humanitarian sector, has also published a number of reports used within this thesis. Such bodies would have greater access to the domain and the available literature.

Researcher Bias

Related to the above, during the time this thesis was conducted the researcher worked as a security advisor. This was both within the humanitarian sector as well as within the financial sector. This presents the possibility for researcher bias to affect data collection and analysis (Guba 1981; Denzin and Lincoln 2000; Creswell 2003). This is even more so with experience across two sectors; Claus (2011) conducted a benchmarking study on how different sectors ensured the security of their staff and met Duty of Care obligations. She concluded that other sectors had improved their practices whilst the humanitarian sector had not. This means that there is the potential for bias both fulfilling a top-down security advisor role, as well as being exposed to different, arguably safer, practices.

Shenton's (2004) criteria for trustworthiness have been followed to improve trustworthiness and reduce bias. Methods have been triangulated, which allows knowledge to be examined from multiple angles, the reduction of bias as well as the researcher to understand the issue from new perspectives. Where appropriate, thick description has been used. This is especially so in Study 2, where researcher bias could affect the coding in a way to emphasise improvements in security management. In order to show transparency in coding, 'chunks of text' have been used

to provide greater context and transparency (King 2004). Study 6 methods were less likely to be affected by researcher bias as the methods used, especially Process Mapping and Critical-Decision Method, are means of both data collection and validation (Milton 2007). Again, anecdotally the researcher learnt a lot about field practices during these sessions, which challenged their bias. Experienced field staff could effectively devise plans to the scenarios in a clear and coherent manner and were able to recount details of where decisions could have been made better than was expected.

6.6 Chapter Summary

The chapter has presented a discussion of the two research stages. Top-down explicit requirements from Stage 1 and bottom-up tacit knowledge from Stage 2 have been critically compared. Contrary to the literature in Chapter 2, the knowledge elicited from academic-experts, or security SMEs, and practitioner-experts, or the field workers, converged more than diverged. From the 12 requirements identified in each stage, only 3 from each stage did not match.

The similarity is likely down to the level of experience of the field workers. The combination of the academic and practitioner expert knowledge led to the creation of an explicit-tacit knowledge inventory. This constitutes 9 security requirements. Not only is this important in understanding where top-down/bottom-up knowledge matches, it also shows the requirements that are seen as important by both academic and practitioner experts. This requirements inventory can be used to improve security systems, direct training and improve knowledge sharing across organisations.

The methods used per study have been reviewed against the criteria set out in Chapter 3.4. Systematic document analysis and the scenario discussions were the most effective across all criteria. Both of these present novel methods for use in knowledge elicitation projects.

As the explicit knowledge from SMEs and the tacit knowledge from experienced humanitarian workers converged, an alternative hypothesis has been presented: the divergence in knowledge is with those in the middle, or novice field workers. Recommendations from the research have also been provided on how the SECI model can be applied to improving knowledge creation and sharing within humanitarian organisations.

7. Conclusions

This chapter presents the main conclusions from this work. The research question and objectives are addressed, the novel contributions are discussed, and the limitations of the research are presented.

7.1 Thesis Summary

The focus of this thesis has been on security knowledge for humanitarian operations, taking a knowledge elicitation approach. The starting point for the research was a report released on security training in the sector (Persaud 2014), which stated there was a divergence in the organisational and field levels of what was deemed important, which was backed up by literature studied in Chapter 2. This thesis sought to understand this phenomenon, identifying the necessary requirements from a top-down and bottom-up perspective. Doing so will allow security management systems to better utilise knowledge from those who have relevant experience overcoming security challenges in the field.

Chapter 2 examined the literature on knowledge management. It identified how knowledge is made up of explicit and tacit components, how it is created and shared effectively, using Nonaka and Takeuchi's (1995) SECI model. It showed that where explicit and tacit knowledge does not align, the overall system is weaker (Wilson 1995), with people more likely to follow tacit experience than explicit methods (Nonaka 1994; Botha et al. 2008; Adams 2003). However, tacit knowledge is inherently harder to elicit. This shaped the second focus: how tacit knowledge on security can be effectively elicited.

Lastly, when initial research started it was identified that accessing the domain would be inherently difficult, with security not wanting to be spoken about. The domain was therefore identified as a sensitive one (Lee 1993), so the research had to consider how to effectively access participants reviewing literature from other fields (Lee 1993; Cowles 1998; Clark and Kotulic 2004).

A qualitative, emergent design was followed for the studies, each building on the other so that the research could approach the phenomenon from a multitude of angles. This not only allowed various forms of knowledge to be elicited, but it also allowed a range of methods to be tested. Traditional research methods were used, including systematic document analysis and interviews, which were effective at identifying and refining top-down, explicit knowledge in

Chapter 4. Novel knowledge elicitation techniques were used to identify bottom-up, tacit knowledge in Chapter 5. These methods were analysed individually on set criteria for their use, both of trustworthiness but also their effectiveness as possible knowledge elicitation techniques.

The two forms of knowledge elicited were compared in Chapter 6.2. Contrary to the literature, the two forms of knowledge were more similar than different. This thesis stated a possible reason for the similarity was the field workers consulted were expert practitioners, with more than 10 years' experience in the sector. The result of this was that the requirements list devised during this research is an expert designed requirements list combining both organisational explicit and field worker tacit knowledge. The fact that the knowledge converged led to an alternative hypothesis for further testing, in that novice field workers cannot demonstrate the recommended requirements to effectively deal with the risks faced.

The methods utilised in the thesis were also reviewed in Chapter 6.3, so their effectiveness at eliciting knowledge on security requirements could be reviewed. Two notable methods used were systematic document analysis and scenario-based discussions. Systematic review allowed a scientific selection of sources, which removes subjectivity, while the document analysis allowed an analysis of within source. Utilising these two methods together created an effective way to identify and refine document based explicit knowledge. The last study conducted utilised the researcher learning from the other studies, allowing the use of three specialist techniques (Limited Information Tasks, Process Mapping and Critical-Decision Tasks) during discussions based around scenarios to elicit deep tacit knowledge.

Chapter 6.4 recommended both an alternative hypothesis, but also a practical application of the research by applying the knowledge to the SECI Model (Nonaka 1994), which provides a framework for ensuring effective knowledge creation and sharing within an organisation. The thesis provides practical recommendations on knowledge sharing, situating this within existing literature.

7.2 Addressing the Research Aim

The aim of the research was: To investigate top-down and bottom-up knowledge requirements for operational security in the humanitarian sector. The following chapter outlines how each of the objectives were met, thus achieving the aim.

Review the scientific literature on operational security to explore explicit and tacit knowledge and identify gaps to take forward in the thesis

The increase in attacks against humanitarian organisations has prompted them to follow systems-based security management approaches, which attempt to analyse risk and devise procedures to reduce staff risk (Brunderlein and Grassmann 2006; Schneiker 2015a; Neuman and Weissman 2016). This has largely minimised the role of the individual field workers who have knowledge relevant to overcoming risks (Claus 2015; Daudin and Merkelbach 2011; Collinson and Duffield 2013; Beerli and Weissman 2016). The literature review showed that there are two types of knowledge which are managed ineffectively. Explicit knowledge, which the systems are based on, is easy to express and communicate and passed around through manuals, procedures and training (Nonaka 1991; Nonaka and Takeuchi 1995). Tacit knowledge is developed through experiences and is how field workers make instinctive decisions and utilise knowledge to overcome problems, though it is harder to express and rationalise (Nonaka 1991; Nonaka and Takeuchi 1995). Security systems do not currently attempt to elicit tacit knowledge, which leads to procedures being ignored as they do not represent the reality of the situation and training being ineffective as it is basic and not relevant to the environment (Barnett 2004; Bollentino 2008; Daudin and Merkelbach 2011; Darby and Williamson 2012; Burns, Burnham and Rowley 2013; Beerli and Weissman 2016).

Knowledge management theory provides a possible solution to solving this problem. Organisations which utilise both explicit and tacit knowledge in a complimentary way can overcome problems and maintain a competitive advantage (Nonaka 1991). The SECI model is a means of eliciting, sharing and converting tacit and explicit knowledge (Nonaka and Takeuchi 1995).

Combining the two academic areas led to the creation of a conceptual framework for the research. This shows that knowledge management can be used by the humanitarian sector to improve security management systems. Notably, the review of literature on knowledge management identified that experienced humanitarian field workers can be identified as practitioner experts. By applying this typology to them, it is acknowledged that through every day interaction with problems in high-risk environments they are able to develop the knowledge to overcome these issues and ensure their own security.

Identify a means of accessing and collecting data from a sensitive security domain

Security within the humanitarian sector was established as a sensitive domain in Chapter 3.5, showing aspects of the three areas of sensitivity stated by Lee (1993): possibility of an intrusive-threat, which is likely to cause strong emotional reactions; threat of sanction, in the form of potential disciplinary for staff who have broken rules and caused security incidents and a political threat, in the way the research could potentially reveal weaknesses which could be exploited in the future.

Techniques used to access sensitive domains and elicit information that is often limited were explored from other research areas and applied to this research. Notable successes in this include the use of snowball sampling, building a relationship and sharing personal stories with the participants, as well as ensuring that appropriate training is received should negative reactions be experienced. The application of these principles improved access to participants and enabled research that would have otherwise not been possible.

Develop and test a method to identify aspects of explicit and tacit knowledge in operational security

The literature studied in Chapter 2 revealed that there were very few studies in the humanitarian sector which focussed on eliciting security knowledge and those that did use standard research techniques such as interviews. Such methods are suitable for eliciting explicit knowledge but less appropriate for eliciting tacit knowledge (Burton and Shadbolt 1995). A range of methods was used, both to approach knowledge elicitation from multiple angles (Milton 2012), but also to identify a method to elicit relevant knowledge.

A range of methods assessed against both trustworthiness criteria (Shenton 2004) as well as criteria for assessing human factors methods (Wilson 2005). Methods included: systematic document analysis, in-depth interviews, quantitative and qualitative surveys, simulation observations and a triad of novel methods. The purpose of assessing the methods was both to identify effective methods which could be used by practitioners and other researchers for future inquiry, but also to identify methods which were effective at eliciting specific knowledge.

Two methods used are notable. A systematic review was applied to identify and synthesis explicit knowledge in security manuals (Chapter 4.2). Systematic reviews is a method which has been used extensively in medical research and is effective at providing an overview of a range of study conclusions. As a method, they ensure that all possible studies fitting the inclusion

criteria are included, providing a good saturation of data. The sources included as part of the study were practitioner documents, and therefore did not present defined conclusions to compare such as academic sources would. To overcome this and improve the within case analysis, document analysis methods were used. The combination of these two supplementary methods allowed a thorough examination of security knowledge in security manuals.

The other method of note was a combination of novel knowledge elicitation techniques, which were used in conjunction during scenario discussions in Study 6 (Chapter 5.4). Limited Information Tasks, Process Mapping and Critical-Decision Method were applied to discussions on scenarios created from statistics on humanitarian worker security incidents. The novel techniques were effective at eliciting deep tacit knowledge and showing how they can be applied in a practical sense.

A summary of all methods shows how they can be applied to Nonaka's (1994) SECI model, which have provided a basis for recommendations for utilising the knowledge.

Conduct a systematic comparative analysis between explicit and tacit knowledge in operational security

The review of literature examined in Chapter 2 stated that there was a disparity between the knowledge passed down from the organisational level, through manuals, guidelines and training, and that which field workers know from experience (Barnett 2004; Brunderlein and Grassmann 2006; Persaud 2014).

The research was broken down into two distinct stages of data collection. The first followed a descriptive methodology to understand explicit knowledge (Chapter 4), whilst the second used an exploratory methodology to identify tacit knowledge in operational security (Chapter 5). The findings from the studies were presented as requirements, which are capabilities needed by users to overcome problems; in this setting, the problem being the security incidents field workers are potentially going to face. Presenting knowledge as requirements allowed a systematic analysis between the two types of knowledge.

The systematic comparison revealed that explicit knowledge at the organisational level and tacit knowledge at the field level is more similar than it is different (Chapter 6.2.3). This contradicts what is stated in the literature, however.

A possible reason for the contradiction to the literature is that the field workers that that were included in this research were classed as practitioner experts (Burton and Shadbolt 1995), so

had 10 or more years' experience and had worked in high-risk countries previously. They may have had the ability to internalise explicit knowledge over time, which less experienced workers have not. Therefore, there is still the possibility novice field workers knowledge diverges from that of the organisation, which puts them in danger. Studies on humanitarian worker deaths show that less-experienced workers are more likely to die, with most a high proportion occurring within the first 3 months of service (31% of the 382 deaths studied) (Bolton et al. 2000). The list of requirements from the combined explicit and tacit studies can be used as a tool for further study on this. Harmer and Haver (2010) state that organisations still send poorly trained and inexperienced staff to high-risk locations regularly. A hypothesis for future research on this area has been suggested: 'Novice field workers cannot demonstrate the requirements needed to operate effectively in high-risk environments, even after multi-day simulation training'. Further study can be conducted on the difference in knowledge between novice and experienced field workers to identify the implications on operational security.

Formulate recommendations to bridge the gap between top-down and bottom-up knowledge in the humanitarian sector

Recommendations have been broken down into three areas. The hypothesis stated for the previous section provides a recommendation to further the work conducted herein on using knowledge elicitation methods to improve security. Secondly, the findings from each study produce results which can be utilised by practitioners. Lastly, the methods used to elicit knowledge have academic applications in fields further than the domain studied.

A notable practical recommendation from the research is the creation of a set of requirements which has been created through the synthesis of both explicit and tacit knowledge, from the organisational and field levels respectively (Chapter 6.2.4). This can be considered an expert solution to the problem (Burton and Shadbolt 1995). Possible applications include the standardising of training, both courses and continual training through mentoring and group discussions, as well as a tool for HR staff to appropriately assess new staff and assess whether staff meet the requirements to be sent to high-risk countries (Chapter 6.4.2).

The recommendations for applying the methods academically reflect on the type of knowledge they elicit and how effective they are. Systematic document analysis and interviews elicit explicit knowledge, whilst methods such as scenario-based qualitative surveys and novel knowledge elicitation techniques can elicit tacit knowledge. Observations did not elicit knowledge but were effective at providing a greater understanding of how explicit and tacit knowledge interact.

7.3 Contributions to Knowledge

This thesis posits three novel contributions to knowledge. The first is the methodological approach to eliciting explicit and tacit knowledge on security requirements. The second contribution is that to the theory, posing 9 knowledge requirements for operational security in high-risk operations. The last contribution is the practical recommendations for improving security knowledge management.

7.3.1 Methodological Contributions

Previous studies on security knowledge in the humanitarian sector are lacking, those that are available openly are lacking in rigour in their research (Harmer and Schreter 2013). Current methods only approach the topic from a top-down view (Barnett 2004) and do not take a knowledge elicitation approach, having a focus on training methods instead (Persaud 2014). This research addressed these concerns by applying knowledge elicitation techniques to identify aspects of explicit and tacit knowledge. The systematic document analysis in Study 1 and the scenario discussions in Study 6 were both novel. Neither technique has been applied to knowledge elicitation in the humanitarian sector from the literature reviewed in Chapter 2. Furthermore, the methods applied were assessed against established academic trustworthiness (Shenton 2004) and qualities of approach as a human factor's method (Wilson 2005). This allows them to be replicated in a rigorous way whilst still providing findings which are usable by practitioners. This applies to research outside of thehumanitarian domain.

7.3.2 Theoretical Contributions

Through applying the range of knowledge elicitation methods, security requirements were investigated at multiple levels. The methods allowed an academically rigorous investigation into requirements for high-risk environments. Both explicit and tacit requirements were elicited, from a top-down and a bottom-up perspective respectively, and a comparative analysis was conducted. Contradictory to the literature (Barnett 2004; Brunderlein and Grassmann 2006; Daudin and Merkelbach 2011; Persaud 2014) the two levels of knowledge requirement converged, showing a high level of similarity. Selection criteria for the studies followed Burton and Shadbolt's (1995) taxonomy on experts: SME's at the organisational level were classed as academic experts because of their knowledge of the technical solutions whilst field workers involved were classed as practitioner experts because of their exposure to the problems. As

such, the finalised list of requirements presented in Chapter 6.2.4 (see Table 7.1 below) is the product of an expert designed solution combining both explicit and tacit requirements. This marries the two levels of organisational knowledge on the requirements for operating in high-risk environments. No such study identified during this research has presented a similar list, combing types of knowledge from different expert groups.

The theoretical conclusion of the thesis is that there is no substantial difference between top-down explicit knowledge and bottom-up tacit knowledge requirements when those at the field level are classed as practitioner experts. This led to an alternative hypothesis for future research:

- Novice field workers cannot demonstrate the requirements needed to operate effectively in high-risk environments, even after multi-day simulation training.

Novice field workers were not studied as part of this research, though studies on humanitarian worker deaths show that they could be more at risk (Bolton et al. 2000; Burnham and Rowley 2005; Buchanan and Muggah 2005). Harmer and Haver (2010) stated that it is still common practice for organisations to send inexperienced and undertrained staff into high-risk environments.

Further investigation into how well novice workers demonstrate the necessary requirements is important as it allows organisations to understand and meet their Duty of Care obligations as well as ensure they manage their staff capability effectively. Claus (2015) states that organisations are responsible not only for ensuring systems are in place but ensuring that staff can deal with the risks they face. Many organisations see training, especially simulation courses, as a means of achieving this (Barnett 2004; Daudin and Merkelbach 2011; Kemp and Merkelbach 2011). Training itself is not a solution: SMEs in Study 2 echoed the literature (Brunderlein and Grassmann 2006; Bollentino 2008; Egeland, Harmer and Stoddard 2011; Burns, Burnham and Rowley 2013; Persaud 2014) by stating that current training is ineffective (Theme 3.1, Study 2). Training should be more focussed, but more so should be assessed. In this way, staff would not be sent to high-risk environments unless they can demonstrate the necessary requirements. This is in line with newly emerging literature relating security to human resource management (Darby and Williamson 2012). Without any form of assessment, HR staff are unaware of who is capable of being sent to high-risk locations and who is not.

Table 7.1: Security Requirements Inventory for High-Risk Operations

1	Security Procedures	Having a good knowledge of the organisation's security procedures to be adhered to in the specific area of operation and know what you are expected to do.
2	Trauma First Aid	Be able to assess casualties and treat wounds accordingly through a knowledge of common injuries encountered in high-risk environments.
3	Communication	To be able to use personal communication skills to effectively communicate with a range of stakeholders, including key stakeholders to build acceptance, the local community to influence them to help as well as potential aggressors to deescalate hostility.
4	Situation awareness	Understanding what is happening in the immediate surroundings, the expressions and interactions with locals to compare this with normal patterns of behaviour to understand how a situation is developing and whether this poses a risk allowing you to know when to leave a situation prior to escalation.
5	Logical Judgement and Decision Making	Having good practical knowledge to understand a range of information sources and draw logical conclusions, being able to use this to make decisions in real-time, creating a clear plan with alternative options.
6	Stress Management and Controlling Emotions	Being able to remain calm during immediately high-stress situations, being able to calm others as well as being able to employ effective stress management techniques to deal with prolonged stress or negative emotions post-event.
7	Team Work and Leadership	Able to work as part of a team, putting team goals before personal ones, as well as take a leadership role where necessary to utilise the strengths of team members and issue instructions in a non-imposing way.
8	Local and Cultural Knowledge	Understanding the local culture and customs to be able to integrate with the local community, without causing offence or drawing attention, as well as knowing the local geography and key dates.
9	Knowledge of Risks	Knowing and being constantly aware of past risks, where/when they are likely encountered and how they develop, including characteristics of key risks (types of mine, effects of bullets) as well as being able to effectively elicit further information from others and utilise this information in decision making.

7.3.3 Practical Contributions

The last contribution from this research recommends how the methods of the findings can be applied by practitioners. The methods used within the studies have been applied to Nonaka's (1994) SECI model. The practical application of the methods by both organisations and across the sector will allow better management of knowledge, between top-down and bottom-up systems as well as between experienced and novice workers:

- Training can be improved by assessing staff against the requirements inventory, which would allow organisations to better meet Duty of Care obligations and for human resources to ensure that only trained and competent staff are sent to high-risk environments;
- Using apprenticeship teams, rather than just mentoring, would allow better sharing of tacit knowledge as well as an externalisation of such knowledge. Process mapping can be used to facilitate discussions within such teams, which improve learning of both novice and experienced workers;
- Systematic document analysis is effective in combining knowledge and can be used to elicit and synthesise data from across organisation documents. This would be especially useful for organisations which have multiple offices and separate documents;
- Critical Decision Method is a useful alternative to psychological debriefings, or to be used in conjunction with them. They ensure post-incident reviews remain positive by creating learning from the experience, which is an empowering experience for the victims;
- Short simulation courses are not a complete measure in ensuring staff are fully prepared for high-risk environments. Organisations should implement longer-term training programmes which use simulation courses as a starting point but also include other forms of formal and informal learning.

7.4 Areas for Future Research

This thesis is an initial study in a new area for the humanitarian security sector. As the sector becomes more aware of its legal obligations (Claus 2015) and the way in which it managed staff (Darby and Williamson 2012), there will likely be a need for staff to be assessed on their capability to work in high-risk environments. This is summed up in a quote by SME 11 in Stud 2: "So relate it to a firefighter. They wouldn't be allowed into a burning building without first training and then assessments."

The thesis used small sample sizes with purposive sampling to access what was defined as a sensitive domain. A natural route for further research would be to use random sampling with bigger sizes so that the theory can be generalisable, not just transferable. This would require the researcher to have credibility and trust of participants so that sensitive domain issues do not affect sample sizes.

A hypothesis which can be investigated further to understand the difference between experienced and novice workers has been stated. This is an important area for future research as inexperienced workers are potentially more at risk. The only study on deaths to include the length of service was conducted by Bolton et al. 2000, which found 31% of workers die within their first three months. Research into experienced/novice staff differences will also help organisations implement effective knowledge creation programmes, which enable knowledge sharing across the SECI model.

Further, the methods suggested herein have been effective at eliciting knowledge from experts, both academic and practitioner (by Hoffman's (1987) definition, not by participant vocation). It does not state that the methods are effective at eliciting knowledge from novices. Alternative methods may be necessary for this. The suggestions for sharing knowledge within an organisation are also only theoretical. Their effectiveness should be tested empirically. The knowledge elicitation methods in Study 6 can be used to benchmark this, however. Organisations can apply these methods to understand workers tacit knowledge, employ other methods from the SECI model, then reapply the Study 6 methods to identify how knowledge has changed or developed. The three methods to elicit deep tacit knowledge were effective, though there are further methods that can be used (Milton 2007; Smart and Shadbolt 2015). Many of these methods relied on some form of existing knowledge body, which was not present. The findings from this thesis can be used as a means of applying these however, such as concepts sorting (Milton 2007).

7.5 Concluding Remarks

This thesis has investigated the knowledge present in the humanitarian sector. To do this, several methods of knowledge elicitation have been assessed which has identified an effective approach to knowledge elicitation management. A set of knowledge requirements for high-risk environments has been produced from this as well as recommendations to use.

The humanitarian sector has advanced it's thinking on security exponentially in the last two decades since Van Brabant's first report in 1998. There has been a gradual increase in the sector, both on theoretical knowledge as well as on practical guides and manuals. More organisations have appointed security managers and emphasise the need for staff to be trained before heading out on deployments. This thesis does not claim to pose a solution to the issue of humanitarian workers being in danger. It does present a new method for eliciting experience-based knowledge by utilising specialist knowledge elicitation techniques. Namely, Limited Information Tasks, Process Mapping and Critical-Decision Method. Recommendations on how to frame knowledge sharing within organisations with the SECI model have also been suggested, which will help organisations improve possible disparity between top-down and bottom-up knowledge and improve the knowledge of their staff. This process of eliciting experience-based knowledge, sharing it, allowing it to be refined in the field and then re-eliciting it for the process to start again has been successful in other fields and is presented as a way of improving knowledge sharing across organisations and across the sector. Though the methods have been presented in such a way that they can be used within organisations, the researcher's view is that they should be used across the sector too, so that a wide range of knowledge can be used to improve security management systems.

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12. Appendix

Appendix 1: Ethical Certificates

Appendix 1.1: Certificate P24596

Certificate of Ethical Approval

Applicant:

Daniel Paul

Project Title:

Security in Humanitarian Operations

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval:

21 September 2015

Project Reference Number:

P24596

12. Appendix

Appendix 1.2 Certificate P31340

Certificate of Ethical Approval

Applicant:

Daniel Paul

Project Title:

Security in the Humanitarian Field- Questionnaire

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

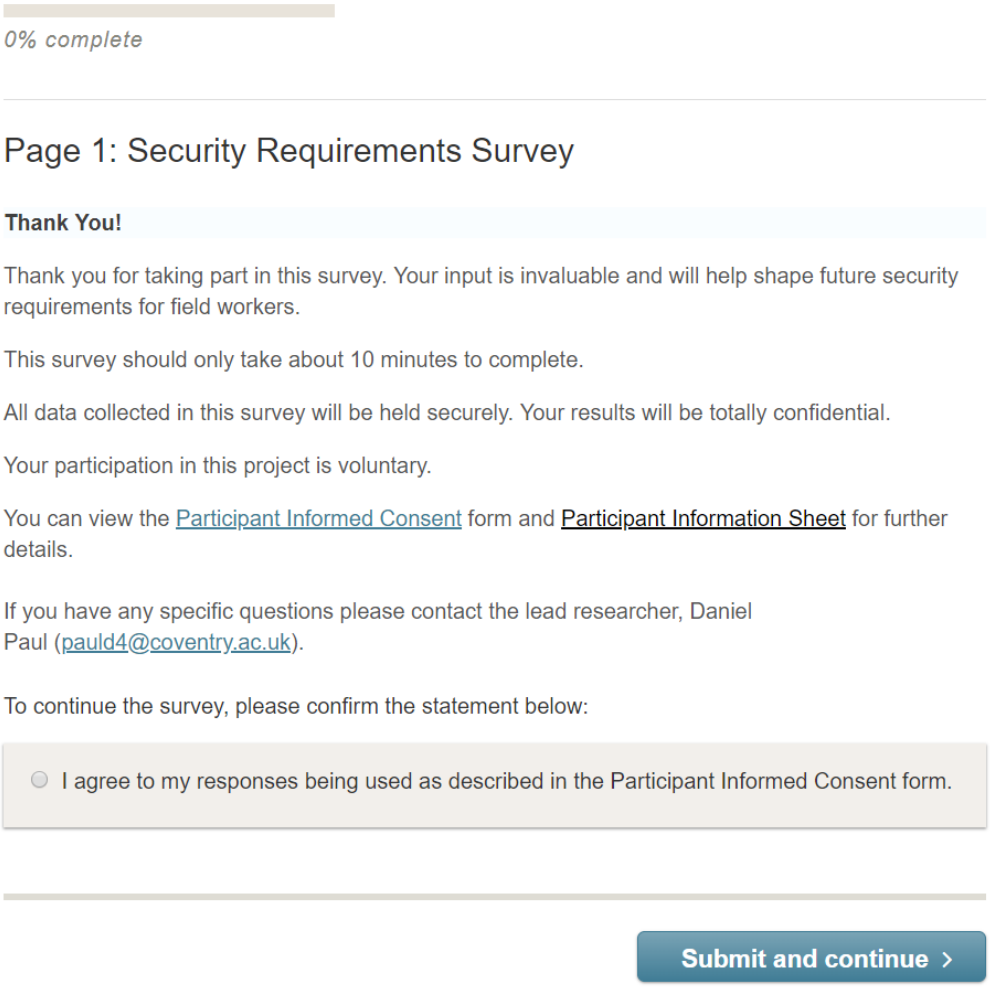
Date of approval:

21 September 2015

Project Reference Number:

P31340

Appendix 1.2a: Participant Information Sheet and Informed Consent on page 1 of the survey for Study 3.



Appendix 1.3: Certificate P42883

Certificate of Ethical Approval

Applicant:

Daniel Paul

Project Title:

A human factors approach to understanding tacit knowledge for security in humanitarian operations

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

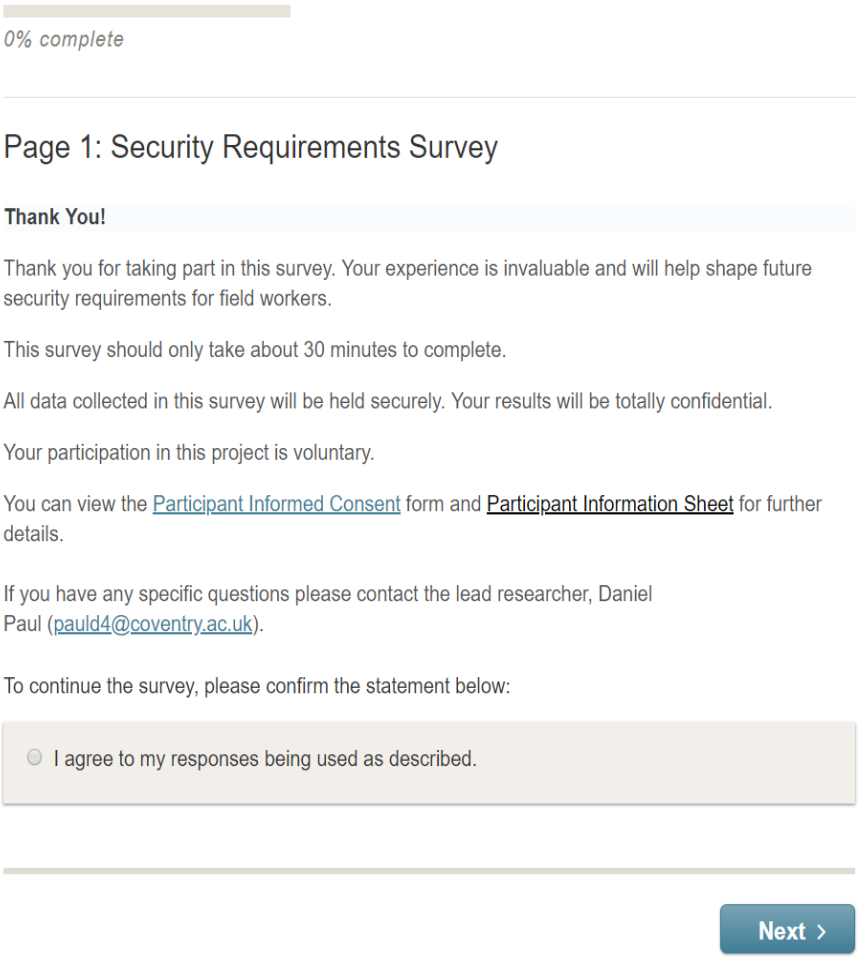
Date of approval:

07 September 2016

Project Reference Number:

P42883

Appendix 1.3a: Participant Information Sheet and Informed Consent for Study 4.



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Page 1: Security Requirements Survey

Thank You!

Thank you for taking part in this survey. Your experience is invaluable and will help shape future security requirements for field workers.

This survey should only take about 30 minutes to complete.

All data collected in this survey will be held securely. Your results will be totally confidential.

Your participation in this project is voluntary.

You can view the Participant Informed Consent form and Participant Information Sheet for further details.

If you have any specific questions please contact the lead researcher, Daniel Paul (pauld4@coventry.ac.uk).

To continue the survey, please confirm the statement below:

I agree to my responses being used as described.

Next ›

Appendix 2: Data Management Plan (Brief Version)

DCC Checklist	DCC Guidance and Questions to Consider		
Administrative Data			
ID	3225314		
Project Name	Security Requirements		
Project Description	Nature of Project: PhD Purpose of Data Collection: to address aims and objectives/thesis research		
Principal Researcher	Daniel Paul (pauld4@coventry.ac.uk)		
Date of 1st Version	2nd August 2014	Date of Last Version	19th March 2018
Related Policies	Coventry University Policies; Data Management Guidelines; Bristol Online Surveys privacy policy; Data Protection Act 1998; General Data Protection Regulations		
Data Collection			
Collection method	Interviews, surveys, observations		
Collection means	Dictaphone recordings (transferred to computer and deleted from device); written notes; typed notes; typed template transcripts		
Storage/Organisation	On computer; USB and external hard-drive.		
Ethics			
Consent	Coventry University Ethics Applications. Updates where study design changes.		
Sensitive data	No transcribers used. No names or identifying features to be included in thesis.		
Withdrawal	Data deleted of all storage platforms. Participant allowed to provide reason but not asked.		
Protection			
Legal	Data Protection Act 1998 complied with. UPDATE: GDPR effects participants. Express consent needed to share any ID details.		
Security, electronic	Virus scanner/firewall installed and up-to-date; scans completed weekly minimum; external hard-drive and USB to be encrypted (Bitdefender); passwords on laptop.		
Security, physical	All physical copies to be stored in one central place. In locked office or at home.		
Resources			
What resources	Bitdefender subscription, USB, external hard-drive, Dictaphone, office space.		

Appendix 3: Protocol for Researcher Safety

The below tool was used as an aide to the researcher to ensure that the research would be unlikely to present any form of physical harm. The Protocol for Researcher Safety is detailed by Gregory, Paterson and Thorne (1999).

The following assessments were made prior to any face-to-face research being conducted:

1. Does the interviewee pose a threat to the researcher?
2. Do other people associated with the interviewee(s) pose a threat to the researcher?
3. What is the nature of the phenomenon and does the researcher have a background to appropriately undertake the research?
4. What is the nature of the environment (context) in which the data will be collected?

Once the above assessment has been conducted and shown that there is no likely harm to come to the researcher, the following approach is taken (Gregory, Paterson and Thorne 1999):

- Contact established with participant: participants recruited in line with Coventry Universities ethics policy, and done in a personal manner rather than public advertisements;
- Interview logistics: a time and place is decided upon between the researcher and participant where both feel safe. This should be done somewhere known to both the researcher and participant, where they have access to external support;
- Check location: the decided upon location should be checked prior to the interview to ensure safety, including nothing exits and external support. If a physical check is not possible the researcher should phone ahead to ensure safety;
- Researcher safeguards: an external person should know who the researcher is meeting with, where, when and for how long. A procedure should be set up should the meeting go on for too long. A phone should be carried, and a trusted person notified immediately if the researcher feels unsafe;
- Evaluation and change of protocol: a process should be in place should threats be identified prior to a meeting that had not been factored into the assessment.

Any research that is deemed high risk from the assessment will be accompanied by a thorough risk assessment which will be signed off by the supervisor and a member of Coventry Universities Ethics Committee.

Appendix 4: Tally of Explicit Knowledge Categories

Knowledge Category	# of Times Mentioned	Knowledge Category	# of Times Mentioned
Organisations security framework	2	Discipline	4
Security policy	10	Situational awareness	8
Security procedures	9	Health risks	2
Appropriate dress	2	Local greeting/language	3
Appropriate behaviour	4	Culture and politics	8
What to look for in a briefing	3	Practices and customs	3
Vehicle maintenance	2	How power is gained	2
Use of satellite phones	2	Confidence	7
Use of radios	7	Calmness under threat	2
Email security	2	PESTEL analysis	3
How to negotiate (i.e. for access)	2	Medical response (not individual)	2
Trauma care	3	No-go/high risk areas	2
Good judgement ability	2	Local history	2
First aid	5	Religious beliefs	2
Organising an evacuation	2	Effectiveness of emergency services	2
Stress management	7	Local laws	2
Journey planning/route cards	2	Landmine awareness	2
Incident reporting	2	Defensive driving (for drivers only)	2
Knowledge of experienced staff	2	Effective communicating and influencing	3
Knowledge of past incidents	2	Common sense	8
How to react to likely threats	7	Decision-making	2

Use of Personal Protective Equipment	2	Having attended a Security Awareness course	7
Accommodation security methods	2	Self defence	2
Security consciousness	8	Wilderness survival	2
Assessing risk	3	Diffusing anger	2
Acceptance approach	2	Map reading	3
Social hierarchies/relationships	3	How to maintain a low profile	3
Team work	6	How to negotiate (i.e. for access)	2
Reaction to events	4	Knowing what is going on around	4

The following requirements from the above list were classed together:

- First and trauma care into 'First Aid';
- Security procedures and policy;
- Situational awareness and knowing what is going on around you were condensed to 'Situational Awareness';

Appropriate dress, appropriate behaviour, practice and customs, local greetings and culture were summarised as 'Cultural Awareness'.

Appendix 5: SME Interview Guide and Data

Appendix 5.1: Interview Guide for Study 2

Introduction Key Components: • Thank you • Your Name, Job role, background • Purpose • Confidentiality • Duration • How interview will be conducted • Opportunity for questions • Signature of consent (Boyce and Neale 2006: 11)

Question Area	**Prompts**
General Questions	
What is your understanding of the term 'security'?	
What do you imagine when I mention 'insecure environments'?	
What would you name as the top 5 insecure countries? [LIST]	
What sources do you get your security knowledge from?	
Do you, as a company, keep up to date with security practices and advancements in other industries?	
Per Requirement	
What is your initial view of x	
What does it mean to you?	
Is it important to include?	
Is it achievable?	
How do you ensure people have it?	

12. Appendix

Appendix 5.2: First Template of *A Priori* Codes

Competencies	**SME00 Quotes**
(1) Organisation Security Policy and Procedure	
(2) Socio-political and cultural understanding	
(3) First Aid	
(4) Radio Communications	
(5) Security Awareness	
(6) Common Sense	
(7) Situational Awareness	
(8) Stress Management	
(9) Cultural Awareness	
(10) Confidence	
(11) Security Conscious	
(12) Team Worker	

Requirement	**SMExx Quotes**		**Researcher Comments**
Relationship between security and programming			
Initial View of List			
Method of Attaining Knowledge for Requirement			
(Agree/Unsure/Disagree)		**A/U/D**	
(1) Organisation Security Policy and Procedure			
(2) Socio-political understanding			
(3) First Aid			
(4) Radio Communications			
(5) Security Awareness			
(6) Common Sense			
(7) Situational Awareness			
(8) Stress Management			
(9) Cultural Awareness			
(10) Confidence			
(11) Security Conscious			
(12) Team Worker			
Incorrect Requirements			
Missing Requirements			
Barriers to achieving all requirements			

Appendix 5.3 Select Participant Quotes per General Theme

This section is not a complete list of participant quotes, which was too large to attach in this thesis. Instead, the following tables present a selection of quotes which have been used to develop themes.

4. Conflict between Security Management and Programming	1.1 Negative security culture	1.1.1 Lack of buy-in	"There needs to be more senior management buy-in to security, to give it emphasis and importance." (SME 02) "I think the biggest issue is programme staff do not see its importance." (SME 03) "I think the issue is more a lack of appreciation from management." (SME 09)
		1.1.2 Lack of understanding between programmes and security	"Programmes see security as a hinderance, we see programmes as risk takers." (SME 05) "You often find board members understand it very well, but not the department heads." (SME 06) "It's not conflict, it's misunderstanding." (SME 09) "It is more this misunderstanding" "There wouldn't be misunderstanding if you got to spend time just telling them (programme staff) what exactly you do." (SME 12)
	1.2 Security seen as a limiting factor	1.2.1 Security is too procedural	"staff are used to doing things in a certain way, and security is more procedural than they like." (SME 02) "Management like processes evidenced, when you're in the field you don't have time" (SME 10) "It's procedural. It may impose restriction, but ones that keep people safe." (SME 12)
		1.2.2 Security procedures take extra time	"I also think that not enough resource is devoted to security. Time, money, manpower." (SME 08) "not enough time is given to actual programme managers or officers to complete key [security] tasks" (SME 09) "The operations teams are often too busy to do everything necessary" (SME 11) "You have to realise the legal fuel has really changed security management. For the better, yes. But it takes more time and more administration." (SME 11)

2. Simplicity is key to effective adoption	2.1 Limited number of requirements would be more effective	2.1.1 Staff have a limited capacity to learn	"realistic on paper" (SME 12) Too many requirements- "There's more there than I would have thought" (SME 06) "It's idealistic, certainly…" (SME 01) "It's a lot to learn" (SME 10) "It covers a lot of ground" (SME 08)
		2.1.2 Effective list needs to be condensed	"You'd never find anyone with all of those." (SME 01) [Need to focus on main ones] 'There are ones missing, but not key ones. I don't know but this could be sifted into the primary ones that are mission critical and the other ones, the nice to have.' (SME 03) "I think there are some key ones there which would definitely improve security, no doubt. But maybe not all of them." (SME 06) "There are a lot of key areas there that need to be known. You then build upwards." (SME 08) "You could boil that down to 3-5 key points." (SME 10) "Maybe not all, but the most important ones. There are key ones we need to vet" (SME 12)
		2.1.3 Foundation requirements	"Pick out the key competencies. Find those that are important, most important. That will be the base to rest everything else." (SME 10) "Keep the list simple. You could boil that down into the most important ones." (SME 02) "You make a list as long as my arm, but you have to have the foundation" (SME 01)

2. Simplicity is key to effective adoption	2.2 Requirements can be trained	2.2.1 Requirements are trainable	"Training covers these areas." (SME 12) "You can't teach skill so well- you can teach knowledge and you can give people the chance to practice skill."(SME 02) 'The majority are trainable…' (SME 05) Talking about passing to organisations security trainers: "…those are all things they can train…" (SME 07)
		2.2.2 Requirements should be split into preventative and responsive	"What is important to differentiate is that some skills are to, are best practice, are to prevent threats or risks. That's where you want to be. Others, they are responsive. Reactive more. How to react when things turn bad." (SME 01) 'There has to be two threads. Individual security management. Risk assessments, understanding situations, etcetera. How you stop the bad occurring. Then the other side, the smaller side, how to actually respond when it goes wrong.' (SME 03) "Operational and planning competencies. One, how do you take sensible choices that do not put you in danger. Two, what should you do when avoiding them doesn't work out." (SME 07) "There are some skills…here that show there are two sides to good security. Preventing issues and dealing with them." (SME 10)
	2.3 Lack of requirements could put staff in danger	2.3.1 Staff unlikely to meet all requirements	"Doubt many meets these" (SME 09) "If every worker had these I'd have an easier job for sure" (SME 11) "It would be rare to have all of these competencies" (SME 06)
		2.3.2 Set requirements would make staff safer	"You get everyone that trained, and you could operate in dangerous places better." (SME 11) "It would prevent avoidable deaths" (SME 12) "Staff competence…is critical to operating in those highest risk areas." (SME 08) "…there are ones which would definitely improve security" (SME 06) "Having this skillset would make staff safer" (SME 01)
		2.3.3 Overreaching is a current issue	"So we cram. Everything becomes an awareness of, rather than the ability to do. There is too much content and not enough time." (SME 02) "So that is fine, but ensuring competence, being competent in those. That is a masters course. Not a week-long hit… Too much is covered in too short a time." (SME 06) "But this is symptomatic of the sector we work in. Trying to go all the way, but not to great depth." (SME 07)

3. Attaining requirements must go beyond just training	3.1 Current training can be ineffective	3.1.1 Inadequate methods are used	"There is a bigger issue underlying this all in how do we teach people? There has to be effective training. I don't think there is." (SME 06) 'With all training, you have to keep it simple, so people understand. Key points that they are able to remember.' (SME 01) "The competencies are trainable. However, standard training is one off and is not effective." (SME 03)
		3.1.2 Learning should focus on key points	6.1.1 "a restriction is too much to learn- staff can only remember so much, so you want them to remember the best parts." (SME 12) 6.1.2 'With all training, you have to keep it simple, so people understand. Key points that they are able to remember.' (SME 01)
		3.1.3 Need to be aware of staff capacity to learn	[talking about how much staff need to know:] "I think that is unrealistic for anyone, let alone people who are sometimes stressed, under other pressures, …." (SME 10) But it also has to be reflective of what staff can learn. Security is part of the job, and therefore cannot take up all of their time learning it." (SME 06)
	3.2 Training for preventative and reactive requirements should use different methods	3.2.1 Simulation training is effective for reactive requirements	'Many available, but simulation style training are the best.' The second type has to be stressful. It has to put people under pressure. Simulation based." (SME 01) 'Simulation training pushing puts people under pressure'- "you need to push peoples comfort a little." (SME 12) "We send staff on a training course where they're put through their paces. They do a day practice too and are kidnapped and what not. I think it gives them a taster. It is necessary. They have to feel stressed, out of control. We can't teach that in a classroom." (SME 03) "Qualifications and training are a starting point, but that has to be applied somewhere first. Or practiced. And it has to be a constructive place… It's why we always turn to HEAT training and it's why it has a part to play." (SME 10) "The outdoors training, where you can practice how you respond: it needs to be realistic, with gunshots and explosions, and people being aggressive. That's how people learn. With controlled exposure." (SME 06)

3. Attaining requirements must go beyond just training	3.2 cont.	3.2.2 Preventative requirements can be trained in the classroom	"Preventative training is about building awareness and teaching procedures. Paper based. It's classroom stuff. It still has to be effective, engaging. Enjoyable even. (SME 01) "We can teach risk assessments and route planning in a classroom, so we separate the two." (SME 03) "It's okay to train some basic stuff. Risk analysis and the what. That is simple. It's something you can teach at the office." (SME 06)
		3.2.3 Training should focus on training basic abilities, rather than general awareness	"If you try to get people trained in everything, they'll only have a basic understanding." (SME 02) "…the courses only really cover the basic elements. It gives people at awareness." (SME 07) "So that is fine, but ensuring competence, being competent in those. That is a masters course. Not a week-long hit… Too much is covered in too short a time." (SME 06)
		3.2.4 Requirements should be assessed, not just trained	"There is a period where they do a practical task. But we don't get certificates with pass/fail. I really think this is missing. It is needed." (SME 10) "What I would like is a list of competencies and if staff do not meet them, they don't go." (SME 07) "HEAT courses are great at the training, but really, they should also make it a passable event. An assessment." (SME 11)
	3.3 Training should be a starting point in attaining requirement	3.3.1 Training is a foundation, not a complete solution	"Training provides a baseline, then you practice this." (SME 07) "It is not a means to an end though. It's just a start." (SME 12) "You use this as a foundation and develop it." (SME06) "Training really should only come at the start of the process." "Recruit competent staff, train them up, then develop that further." (SME 09)
		3.3.2 Training should be built upon with practice	"Training only goes so far" (SME 09) Training should be backed up by field exposure: "It should be staged though. I don't think you can learn these skills naturally in Sudan. But start in Uganda for a few years." (SME 11) "Training only goes so far…you hone these when you're […] doing the job." (SME 09) "no form of training can supplement drilling this when you get in the field." (SME 07) "Everything has to be practiced in-country." (SME 06)
		3.3.3 Critical reflection is important to ensure requirements are still valid	"There is very little follow-up in this regard. There was this 'best practice' a while back saying once every three years is when you should refresh. Why three years? What relevance is that? It's when the person is no longer effective and is dangerous. We need to start really reviewing this. And be ruthless" (SME 03) "What we really need to start doing is having regular knowledge audits. We audit our department once a year. Yet we never test people. […] Not to start firing people, but to start designing a solution." (SME 07) "I also think what we are missing is a mentoring type relationship […] It allows you to understand what you need to know. And where you can improve on and you can ask questions on this." (SME 11)

Appendix 5.4: Select Participant Quotes per Requirement

(1) Organisation Security Policy and Procedure	1.1 A critical requirement	1.1.1 "That's near the top. It's critical you know that. You have to." (SME 11) 1.1.2 "It holds everything we do. It is critical everyone knows this, across the organisation" (SME 12) 1.1.3 "I'd rate that as critical" (SME 01) 1.1.4 "One thing I learnt from being in Afghanistan was security policy is *hugely* important" (SME 08) 1.1.5 "the policy binds everything together and acts as a foundation. It is a need to know!" (SME 09) 1.1.6 'Sat a bit higher up' (SME 05)
	1.2 Needs to be known by everyone	1.2.1 'it is important to set what is expected of everyone.' 'Makes people responsible throughout.' (SME 05) 1.2.2 'You need to understand what security is and how it relates to the overall organisation.' (SME 06) 1.2.3 "But this isn't operational security responsibility. This needs to be known by everyone. Directors too." (SME 06)
(2) Socio-political understanding	2.1 Understanding how context affects individuals	2.1.1 "It's about context. It's no good knowing what has happened, who was affected. It's about knowing how that affects you." (SME 12) 2.1.2 "Knowing where you are gives you a good idea of the risk." (SME 02) 2.1.3 Knowing the what's gone on gives you insight to what may happen." (SME 06) 2.1.4 "You need to know what this stuff means, how it impacts you." (SME 07)
	2.2 Does not prevent risks occurring	2.2.1 "But at the end of the day, the level of detail needed to make it effective. Is it realistic?" (SME 08) 2.2.2 'but I don't know if I believe it. I think if someone want to shoot you, they'll do it because they don't like you' (SME 01) 2.2.3 'You need to know it, but that doesn't mean it'll stop something occurring.' (SME 05) 2.2.4 "You can know the makeup of a country, but it won't stop you being a target." (SME 11)
	2.3 Not a key requirement	2.3.1 "It really is important to know generally, but I don't think it's one of the main competencies." (SME 12) 2.3.2 It's not as important as people make out, but it's still high up.' (SME 01) 2.3.3 "Knowing this is important generally, but not before everything else." (SME 08) 2.3.4 "For the individual worker this isn't critical." (SME 11)
(3) First Aid	3.1 Basic first aid is not effective	3.1.1 "The type of injuries we are talking about can't be covered in your 5-hour first aid at work" (SME 01) 3.1.2 "…you can't teach staff to be able to deal with severe trauma more than the basics…" (SME 07) 3.1.3 "You need to know this stuff, but becoming proficient is a long time thing." (SME 08) 3.1.4 "I've done a basic first aid at work. I can't remember it mind. But that won't help. It's combat stuff. Like you see in films. I think." (SME 11) 3.1.5 "It is important but very complex to ensure people have the skills." (SME 12)

	3.2 Less important than people believe	3.2.1 “We do it but I do not think it’s as important as people make out” (SME 05) 3.2.2 ‘Staff do not need to be experts- there are people in field for that.’ (SME 06) 3.2.3 “There’s probably better places to spend time. People want this, but I think it’s less important than we all make out.” (SME 12)
	3.3 Medical training on trauma, not just first aid	3.3.1 “The type of injuries we are talking about can’t be covered in your 5-hour first aid at work.” (SME 01) 3.3.2 ‘So it’s not just first aid, it’s battlefield first aid.’ (SME 03) 3.3.3 “You can’t have something basic. Or off the shelf. It has to be specific. And it’s on trauma aid, not first aid.” (SME 08) 3.3.4 “Trauma first aid is a whole thing in itself. In a high risk environment; add it to the list!” (SME 09) 3.3.5 “I’ve done a basic first aid at work. I can’t remember it mind. But that won’t help. It’s combat stuff. Like you see in films. But the injuries sustained aren’t broken arms, they’re gunshot wounds.” (SME 11) 3.3.6 “It is important but very complex to ensure people have the skills. This isn’t something basic like a two-day course you can do in the office.” (SME 12)
(4) Radio Communications	4.1 Radios are being less used	4.1.1 ‘What we are seeing is that radios aren’t the favoured choice anymore.’ (SME 01) 4.1.2 ‘Yes, but it’s becoming less and less used.’ (SME 02) 4.1.3 “They’re not always used now anyway” (SME 12) 4.1.4 ‘In some countries you cannot use radios so need other methods of communication.’ (SME 07)
	4.2 Communication in general is important	4.2.1 ‘everything we do we have to communicate.’ (SME 05) 4.2.2 “You find that the message is more important than the method.” (SME 12) 4.2.3 “Being able to relay information that is critical is not easy when the bullets are bouncing but so important.” (SME 01) 4.2.4 ‘But the skill here needs to be how to communicate.’ (SME 11)
	4.3 Technical skill on the most up-to-date method	4.3.1 “Knowing how to use sat. phones is important.” (SME 12) 4.3.2 ‘Satellite phones are a must for remote areas. They’re not hard to use, but take some knowledge.’ (SME 02) 4.2.3 ‘Making sure someone is able to operate a radio, a sat phone, whatever form of talking.’ (SME 09)
(5) Security Awareness	5.1 Need to know how to respond to threats in their context	5.1.1 ‘Again, we come back to context. Knowing what the threat is tells you how to react. There needs to be an understanding of how the threat is happening or could happen.’ (SME 01) 5.1.2 “Being aware of triggers is important.” (SME 11) 5.1.3 “It’s not awareness, it’s knowing what to do related to the actual danger.” (SME 10) 5.1.4 ‘It has to be relevant to the risks though. Like, for instance, running away when someone takes a pot shot at you can either get you killed or save your life.’ (SME 11) 5.1.5 “You should be able to understand the situation and respond appropriately.” (SME 12)

	5.2 Needs to be instinctive	5.2.1 'Always being aware that you are in an environment that has a risk that could turn at any point. And as soon as you forget that, that's when it becomes dangerous. And that's when you make mistakes.' (SME 08) 5.2.2 "It relates to a lot of things, but it is not theory. It is practice and second-nature response." (SME 02) 5.2.3 'It should be practiced. There's no time. But it has to be rehearsed so people know what to do without freezing.' (SME 06) 5.2.4 "Not something on paper, something in their minds." (SME 07) 5.2.5 "Where you say being able to react, that links with stress management. But also exposure and drilling." (SME 09) 5.2.6 "It's just knowing what to do. Less about thinking, more just knowing." (SME 11)
(6) Common Sense	6.1 lack of common sense causes incidents	6.1.1 'I'd say some of the incidents are common sense failing.' (SME 01) 6.1.2 "A lack of common sense definitely increases the risk." (SME 02) 6.1.3 "I think about a fair few security incidents or near misses, and a lot of it has come down to a bit of a mix between common sense and awareness." (SME 05) 6.1.4 "…stopping and applying a little common sense, and your gut instinct would say 'no'." (SME 07) 6.1.5 "I think a lot of risk management and risk mitigation is all about making sensible decisions. Most people don't." (SME 08) 6.1.6 "just a failure of common sense, but there were sometimes we were in some dicey situations which should never have happened" (SME 09)
	6.2 Common sense is about decision making	6.2.1 "Thinking through actions is needed and lacking. It comes down to really poor decision making." (SME 12) 6.2.2 "More being able to think what you are doing and thinking 'is this sensible?'" (SME 06) 6.2.3 "I think a lot of risk management and risk mitigation is all about making sensible decisions." (SME 08)
	6.3 Common sense cannot be defined	6.3.1 "How can you assess these? I'm looking at common sense especially" (SME 06) 6.3.2 "Is common sense something you can guarantee? I wouldn't say incorrect, but I would say not always possible." (SME 02) 6.3.3 "Common sense is a difficult one to have. What is it? You cannot define it, but you can tell when someone lacks it." (SME 10) 6.3.4 'Common sense sticks out. It is true, common sense is important. But it's not checkable. At least I don't think' (SME 11)
(7) Situational Awareness	7.1 Maintaining situational awareness is challenging	7.1.1 'I agree that you need to know what's going on, but that in itself is difficult even where there is no danger.' (SME 01) 7.1.2 "It's not just knowing, it's staying aware." (SME 02) 7.1.3 "And sometimes there's a lot of complacency around…" (SME 06) 7.1.4 'That's hard to get right. Sometimes you are all focussed on the project, and you lose that awareness.' (SME 09)
	7.2 Understanding atmospherics affects security	7.2.1 "Understanding of how the dynamic changes when something becomes different." (SME 08) 7.2.2 "It's not just knowing where things are, but knowing what everything means." (SME 11) 7.2.3 "Just knowing how what the locals are doing shows you what potential aggressors are doing." (SME 12)

(8) Stress Management	8.1 Good stress management is key for responding to incidents	8.1.1 "It's about knowing your body and how it will react." (SME 01) 8.1.2 "It's more about being in control when you're under attack or threatened." (SME 12) 8.1.3 "If you have a good check on yourself when it's calm, you have a good ability when it's not." (SME 06) 8.1.4 "People start breaking down in these environments, and then they screw up." (SME 07) 8.1.5 "If you can control your reactions, you can think the response through." (SME 11)
	8.2 Better understanding of unhealthy than of healthy coping techniques	8.2.1 "You need to know what isn't healthy coping more than what is good." (SME 08) 8.2.2 "You can tell someone what not to do. Drink, smoke, drugs. But not what to do." 8.2.3 "How to manage stress generally. It's not lacking. The knowledge. It's just badly followed through. Alcohol and sex are easier than addressing you have too much work." (SME 11)
(9) Cultural Awareness	9.1 Lack of cultural awareness causes threats	9.1.1 "Lots of issues come from bad cultural awareness." (SME 06) 9.1.2 "Acceptance really is a locally driven issue. And locally lost. As soon as you lose acceptance the risks do really increase." (SME 12)
	9.2 Cultural awareness is not complex	9.2.1 "Just dressing right, showing respect to elders… filial piety as the Japanese say… simple things like that." (SME 07) 9.2.2 "It's not hard to know this stuff. Especially when you work with local staff." (SME 09) 9.2.3 "This is Lonely Planet basics. Wikipedia advice. It means doing things differently, but anyone can do this." 9.2.4 "This is paramount. So basic. It's not hard at all, but it makes so much difference." (SME 11)
(10) Confidence	10.1 Confidence at the right time	10.1.1 'Confidence at the wrong time can get you shot. What field workers have a harder time understanding is that there's a point when you shouldn't be confident.' (SME 01) 10.1.2 'There's an important distinction here. Confidence in the field against aggression is not always good. In fact, rarely.' (SME 02) 10.1.3 'Confident in certain situations- not when I don't have a lot of knowledge.' (SME 08)
	10.2 Confidence to question management	10.2.1 'But confidence to question decisions. To be able to speak out, to feel comfortable to say something exceeds your risk appetite. Risk threshold.' (SME 02) 10.2.2 "To know what a bad plan is and say that openly. Without being scared of your job. To really be able to say 'this is shit'." (SME 10) 10.2.3 "Not so much against the aggression, but more so against poor choices. Especially from management. When to say 'no'." (SME 11)
	10.3 Overconfidence is dangerous	10.3.1 'Don't want to be overconfident as well.' (SME 05) 10.3.2 "You don't want to be over bearing though." (SME 07) 10.3.3. "It's confidence in yourself. But not cocky. Confident to be quiet too. Being cocky is frowned on and puts you and your team at risk." (SME 10) 10.3.4 "Confidence to be aware of your boundaries too. Being outwardly confident, brash maybe, that is dangerous." (SME 12)

(11) Security Conscious	11.1 Consciousness needs to be translated into practical actions	11.1.1 “Staff need a briefing sure. But what do they do with that? I have no clue?!” (SME 08) 11.1.2 “You also have to make sure staff know it, understand it, but do something about it.” (SME 02) 11.1.3 “Staff need a briefing sure. But what do they do with that? I have no clue?!” (SME 08)
	11.2 to be up-to-date of current risks, not historical ones	11.2.1 ‘Here there is a need just to be up-to-date on what risks there are and the developments.’ (SME 06) 11.2.2 ‘This one actually is actually quite important. Risks develop quickly. It’s about keeping relevant on your knowledge.’ (SME 07) 11.2.3 ‘Here there is a need just to be up-to-date on what risks there are and the developments. There’s lots of materials on this now.’ (SME 06) 11.2.4 ‘Risks develop quickly. It’s about keeping relevant on your knowledge.’ (SME 07) 11.2.5 “We give staff documents with country security issues in, but they don’t always translate that to what is going on.” (SME 12)
	11.3 Complacency opposes security consciousness	11.3.1 “You tell people what to look out for, what risks there are. But when they don’t occur, which they often don’t, people forget about them. Forget they occur.” (SME 02) 11.3.2 “It’s really about maintaining that awareness across a deployment or trip or whatever, which is so lacking.” (SME 07) 11.3.3 ‘I think in the first few days or weeks it’s easy to have that awareness, that consciousness. But then as nothing happens, you forget where you are is potentially dangerous.’ (SME 10) 11.3.4 “But when you get here you realise it’s not like it’s pictured. You can go to the shop. That makes you complement. Then you venture further because the media has lied. But the risks are real, just not as they appear.” (SME 08)
	11.4 Awareness is easier in highest risk environments	11.4.1 ‘Unless you’re talking high intensity environments like Afghan. But elsewhere, it’s not even at the bottom of the list. It’s not even made it into most people’s thoughts. Change that and you win.’ (SME 01) 11.4.2 ‘That is easier for extreme risk countries. Where there are constant threats.’ (SME 05) 11.4.3 “At the sharp end, of the really high-risk ones, staff tend to take security seriously. So you can talk about Afghanistan, with a few exceptions, most people erm, are geared up to it.” (SME 09) 11.4.4 “There is some consciousness when people first arrive. It’s built up from briefings and training. And those in the thick of it [dangerous areas of Syria], well, they can’t not lose consciousness. They see it day in day out.” (SME 08)
(12) Team Worker	12.1 Being able to work in multicultural teams	12.1.1 “Working with mixed makeup teams. Wow. That couldn’t be more important.” (SME 12) 12.1.2 “You should also put something in about working with local staff. We see issues on this.” (SME 06) 12.1.3 “… a broad spectrum of members and the idea being from that fairly disparate group which have a single aim which is staying safe, we can cross learn quite well so you can take the information from one and share it.” (SME 09) 12.1.4 “It’s not team work. It’s being able to work with other cultures. That is key.” (SME 08)
	12.2 Team work improves awareness	12.2.1 “But with that collective awareness, you have such a higher chance of realising somethings not right before it becomes definitely not right.” (SME 01) 12.2.2 ‘It’s definitely important in general. If you say awareness is key, then a team’s eyes are better than one person’s eyes.’ (SME 02) 12.2.3 “It only improves awareness when everyone is aware, but they’re not always aware. People are not always switched on. But some teams do that well. This collective sharing of information works when it works.” (SME 07)

Appendix 6: Descriptive Statistics and Wilcoxon Test Results from Study 3

Appendix 6.1: Example Descriptive Statistics from Scenario 1

	Req 1		Req 2		Req 3		Req 4		Req 5		Req 6	
	FW	SME	FW	SME	FW	SME	FW	SME	FW	SME	FW	SME
Mean	5.111111111	6.764705882	8.305555556	8.823529412	1.583333333	2.088235294	2.25	6.264705882	6.583333333	4.882352941	8.472222222	7.764705882
Standard Error	0.525202573	0.286533226	0.302947018	0.225276967	0.403112887	0.472727978	0.435297745	0.420738726	0.546816182	0.506226306	0.262727184	0.409466466
Median	5	6.5	9	9	0.5	1	1.5	6	7.5	4.5	9	8.5
Mode	3	6	10	10	0	0	0	6	10	8	10	10
Standard Deviation	3.151215437	1.670761458	1.81768211	1.313579155	2.418677324	2.756454102	2.611786471	2.453307273	3.28089709	2.951781238	1.576363104	2.387579268
Sample Variance	9.93015873	2.79144385	3.303968254	1.725490196	5.85	7.598039216	6.821428571	6.018716578	10.76428571	8.713012478	2.484920635	5.700534759
Kurtosis	-1.075322049	-0.193641319	-1.159455789	-4.552704411	-2.190233653	-1.420206066	-1.092381984	-0.402986188	-0.714652575	-0.89179156	-0.628139715	-2.587382323
Skewness	-0.10063912	-0.272462777	-1.209110624	-1.785132005	-1.752236727	-1.470603492	-1.269056921	-0.548086506	-0.660830667	-0.062013514	-0.988557559	-1.463758951
Range	10	7	7	6	9	10	10	10	10	10	6	10
Minimum	0	3	3	4	0	0	0	0	0	0	4	0
Maximum	10	10	10	10	9	10	10	10	10	10	10	10
Sum	184	230	299	300	57	71	81	213	237	166	305	264
Count	36	34	36	34	36	34	36	34	36	34	36	34

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	Req 7		Req 8		Req 9		Req 10		Req 11		Req 12	
	FW	SME	FW	SME	FW	SME	FW	SME	FW	SME	FW	SME
Mean	8.777777778	9.323529412	6.388888889	6.647058824	8.305555556	8.323529412	7.361111111	8.558823529	8.111111111	8.088235294	2.055555556	5.941176471
Standard Error	0.347579182	0.15058169	0.380638098	0.309914464	0.335278715	0.234009416	0.35890658	0.296116204	0.29487091	0.264903867	0.447114993	0.384506482
Median	9.5	10	7	6.5	9	8	7.5	9	8	8	1	6
Mode	10	10	7	6	10	8	6	10	8	10	0	6
Standard Deviation	2.08547509	0.87803459	2.283828587	1.807096331	2.011672289	1.364497648	2.153439478	1.726639343	1.769225461	1.544641707	2.682689955	2.242038797
Sample Variance	4.349206349	0.770944742	5.215873016	3.265597148	4.046825397	1.861853832	4.637301587	2.981283422	3.13015873	2.385918004	7.196825397	5.026737968
Kurtosis	9.568989627	-0.135926855	2.500937828	-0.208591034	4.069996231	-0.379375633	2.70524723	-10.50504963	2.094028629	-0.905975199	0.933435992	-0.806625069
Skewness	-2.88881892	-0.991441842	-1.592578948	-0.270608008	-1.827795855	-0.706997207	-1.225474333	-2.676211471	-1.292295448	-0.260912569	-1.44157667	-0.299167294
Range	10	3	10	7	9	5	10	9	7	5	9	10
Minimum	0	7	0	3	1	5	0	1	3	5	0	0
Maximum	10	10	10	10	10	10	10	10	10	10	9	10
Sum	316	317	230	226	299	283	265	291	292	275	74	202
Count	36	34	36	34	36	34	36	34	36	34	36	34

Appendix 6.2: Summary of Statistics for Tukey Range Test Post Hoc

Scenario 1				
Requirement		**FW Mean**	**P value**	**SME Mean**
1	Organisational security policy and procedures	5.111	0.007	6.764
2	Socio-cultural and political understanding	8.305	0.174	8.823
3	Trauma first aid	1.583	0.419	2.088
4	Communications	2.25	6.498×10^{-09}	6.264
5	Incident response	6.583	0.025	4.882
6	Common Sense	8.472	0.151	7.764
7	Situational awareness	8.777	0.156	9.323
8	Stress management	6.388	0.600	6.647
9	Cultural awareness	8.305	0.965	8.323
10	Security awareness	7.361	0.012	8.558
11	Confidence	8.111	0.954	8.088
12	Team worker	2.055	8×10^{-09}	5.941

Scenario 2				
Requirement		**FW Mean**	**P value**	**SME Mean**
1	Organisational security policy and procedures	5.305	2×10^{-4}	7.588
2	Socio-cultural and political understanding	6.166	2.629×10^{-8}	2.235
3	Trauma first aid	1.305	0.461	1.705
4	Communications	4.277	5.258×10^{-8}	7.941
5	Incident response	7.833	1.240×10^{-5}	4.764
6	Common Sense	8.222	0.015	7.058
7	Situational awareness	8.888	0.891	8.941
8	Stress management	3.16	0.268	3.882
9	Cultural awareness	6.888	4.89×10^{-11}	1.852
10	Security awareness	5.055	0.011	6.823
11	Confidence	7.972	0.017	9.147
12	Team worker	3.861	4×10^{-4}	6.176

Scenario 3				
Requirement		**FW Mean**	**P value**	**SME Mean**
1	Organisational security policy and procedures	7.472	0.372	7.911
2	Socio-cultural and political understanding	7.027	1×10^{-4}	4.382
3	Trauma first aid	3.25	0.065	4.588
4	Communications	5.25	1.77×10^{-5}	8.5
5	Incident response	8.055	0.330	7.5
6	Common Sense	8.361	9.867×10^{-4}	6.735
7	Situational awareness	8.583	0.223	9.029
8	Stress management	6.5	1	6.5
9	Cultural awareness	6.472	0.001	4.117
10	Security awareness	5.777	0.562	5.352
11	Confidence	8.333	0.041	9.088
12	Team worker	5.861	2.8×10^{-4}	8.117

Scenario 4				
Requirement		**FW Mean**	**P value**	**SME Mean**
1	Organisational security policy and procedures	8.277	0.539	8.029
2	Socio-cultural and political understanding	4.555	8.941×10^{-4}	2.029
3	Trauma first aid	8.972	0.764	8.882
4	Communications	8.416	3.4×10^{-4}	9.676
5	Incident response	8.222	0.231	8.676
6	Common Sense	8.666	8.901×10^{-6}	6.411
7	Situational awareness	8.805	0.509	8.558
8	Stress management	9.166	9.004×10^{-5}	7.411
9	Cultural awareness	4.5	0.004	2.323
10	Security awareness	5.611	0.042	3.970
11	Confidence	7.972	0.232	9.029
12	Team worker	7.722	0.266	8.235

Scenario 5				
Requirement		**FW Mean**	**P value**	**SME Mean**
1	Organisational security policy and procedures	8.25	0.511	7.970
2	Socio-cultural and political understanding	4	0.002	1.735
3	Trauma first aid	8.75	0.458	9.029
4	Communications	8.583	2.64×10^{-5}	9.852
5	Incident response	8.583	0.579	8.794
6	Common Sense	8.583	1.195×10^{-5}	6.205
7	Situational awareness	8.916	0.089	8.294
8	Stress management	9.222	2.444×10^{-5}	7.441
9	Cultural awareness	4.388	0.001	1.882
10	Security awareness	6.055	0.005	3.764
11	Confidence	8	0.025	9
12	Team worker	7.777	0.513	8.088

Scenario 6				
Requirement		**FW Mean**	**P value**	**SME Mean**
1	Organisational security policy and procedures	8.527	0.002	9.647
2	Socio-cultural and political understanding	8.083	0.007	6.176
3	Trauma first aid	2.416	0.093	3.647
4	Communications	3.138	7.39×10^{-1}	2.882
5	Incident response	6.861	0.568	7.294
6	Common Sense	8.805	1.530×10^{-5}	5.588
7	Situational awareness	8.6111	0.004	6.5
8	Stress management	9.416	0.563	9.588
9	Cultural awareness	7.055	0.261	7.735
10	Security awareness	6.277	0.024	4.470
11	Confidence	6.888	0.477	7.352
12	Team worker	6.027	7.64×10^{-4}	8.441

Appendix 7: Observation Protocol Templates for Study 5

Appendix 7.1: Observation Protocol Template- Researcher

Tacit Emotion	powerful social responses, such as people becoming anxious, confused, laughing nervously, expressing irritation, anger (Neuman 2014) or strong control of one's natural emotion (Piperopoulus 2010).
Tacit Influence	there is a link between recognition of a situation (or stimulus), the resulting response or influencing actions taken and a successful outcome which can reveal tacit knowledge (Eerikäinen and Puusa 2010; Virtanen 2010).
Tacit Knowing	the ability to join what we observe directly (focal awareness) and what we perceive about a situation and act accordingly (Polanyi 1966b). This perception is further broken down into marginal clues (events occurring around us but not being directly observed) and subliminal clues (non-observable, such as past experiences or background information) (Virtanen 2010). These insights concerning the future of an event are a good indication of tacit knowledge (Eerikäinen and Puusa 2010).
Divergence in knowledge	Actions that were different to day 2 teaching.
Mentoring	or other experienced to novice guidance; where RE staff show others what to do.

Appendix 7.2 Observation Protocol Template- Actor

[Note: Answer spaces condensed to save space. Originally one question per page.]

Thank you for filling in this short survey. Your view is unique to the humanitarian security issue. Filling out this survey as soon as the group has passed your serial will be most beneficial, if possible.

Thinking about the two groups who passed through your serial, please answer the following:

What personal qualities did participants show that were beneficial or lessened the chance of negative actions from yourself (please list below and add a short description if you would like to):

What personal qualities were shown which were detrimental and in the 'real world' would have put the individual/group at further risk (please list below and add a short description if you would like to):

What mistakes were made which affected, or could have affected, the individual/group in a negative way (please list below and add a short description if you would like to):

Please list any other observations you have which are related to the qualities participants showed and their security:

If you are willing to be contacted afterwards, please provide the following:

Name

Appendix 8: List of Codes Per Serial, Study 5

Appendix 8.1 Themes per Scenario

Scenario 1: Military Checkpoint

Brief: the vehicles comes up to a marked, well designated military checkpoint controlling a road. The group have to negotiate access. The soldiers search the vehicle as per their protocol and ask the participants some basic questions ('Where are you going?', 'What purpose?', etc.)

A summary of the observations for scenario 1 is provided below:

- Non-Experienced participants struggled with the scenario. The sight of weapons and military personnel, as well as light questioning, caused them to become nervous and flustered;
- Very Experienced participants were able to make a link between the formal uniforms and set up with a legitimate force and understood what that mean, whereas Non-Experienced participants assumed they were being held up;
- Very Experienced and Relatively-Experienced participants have had more exposure to such occurrences and were able to deal with it. Feedback showed that they demonstrated tacit knowing: the linked what they observed (such as ID checks or the vehicle searches) with the perceived need of having to conduct them, and were able to draw a conclusion that it was necessary and legitimate;
- Non-experienced participants could not link what was being observed and the perceived need and therefore did not understand why the processes were being carried out. This caused them to question the soldiers causing tension;
- Relatively Experienced participants were able to emphasise the humanitarian mission, in contrast to Non-Experienced participants who portrayed themselves as entitled in their work, phrases similar to 'We are humanitarian, you have to let us through' being heard on several occasions. However, Very Experienced participants were able to understand the soldiers' mission in the country (provided in resources during the course, read on days 1 and 2), link this to their mission and create a link to sell their goal: by allowing them to progress with their work, it will help foster peace and an end to the conflict, making the soldiers' lives safer (and easier);

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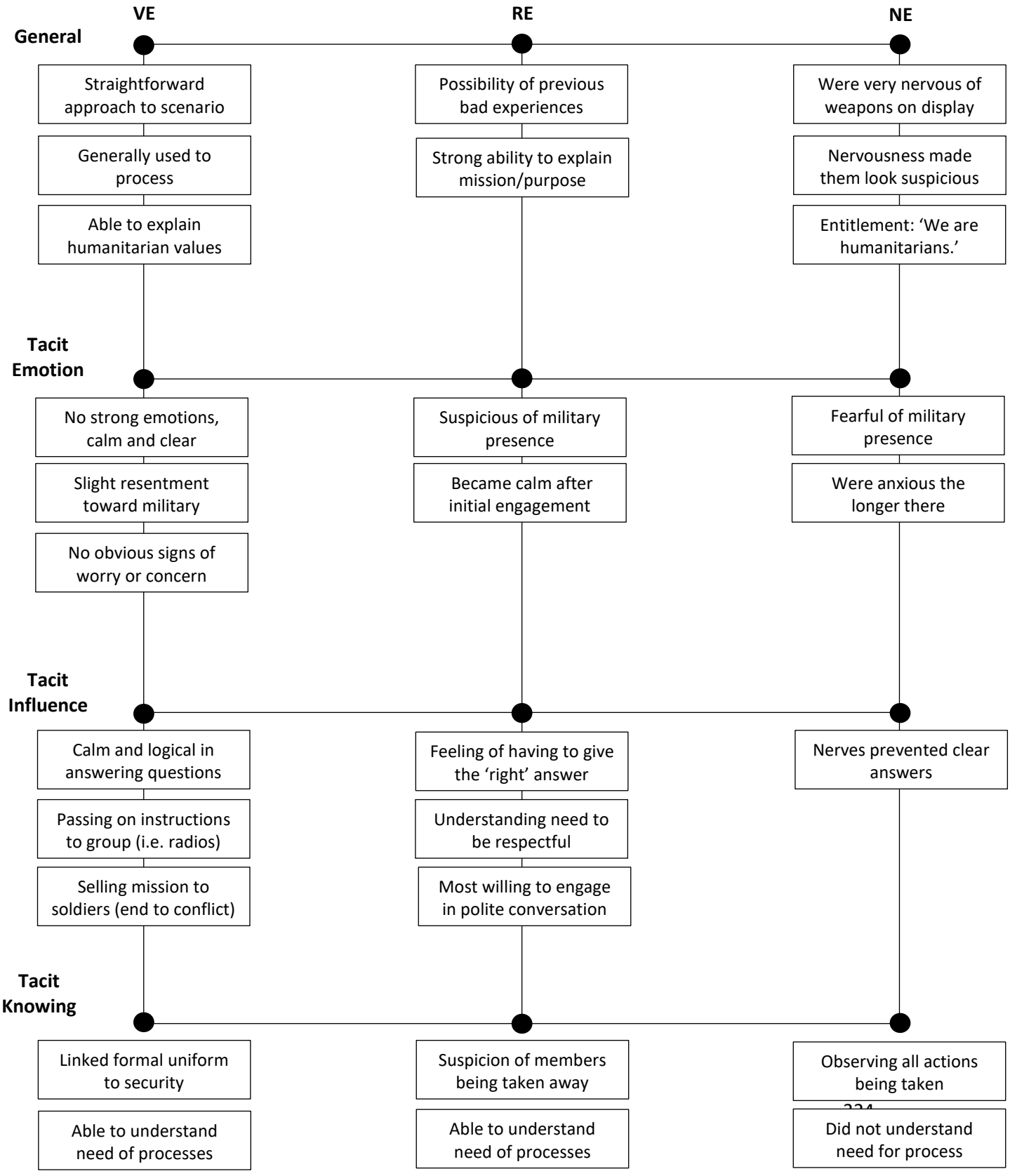
- Very and Relatively Experienced participants were able to stay calm throughout which aided them in answering questions logically, whereas Non-Experienced participants became flustered, panicked and in some cases lied to end the questioning;
- Prior exposure and some general knowledge about vehicle checkpoints went a long way- this was demonstrated by the ease in which Very Experienced and Relatively participants handled the situation.



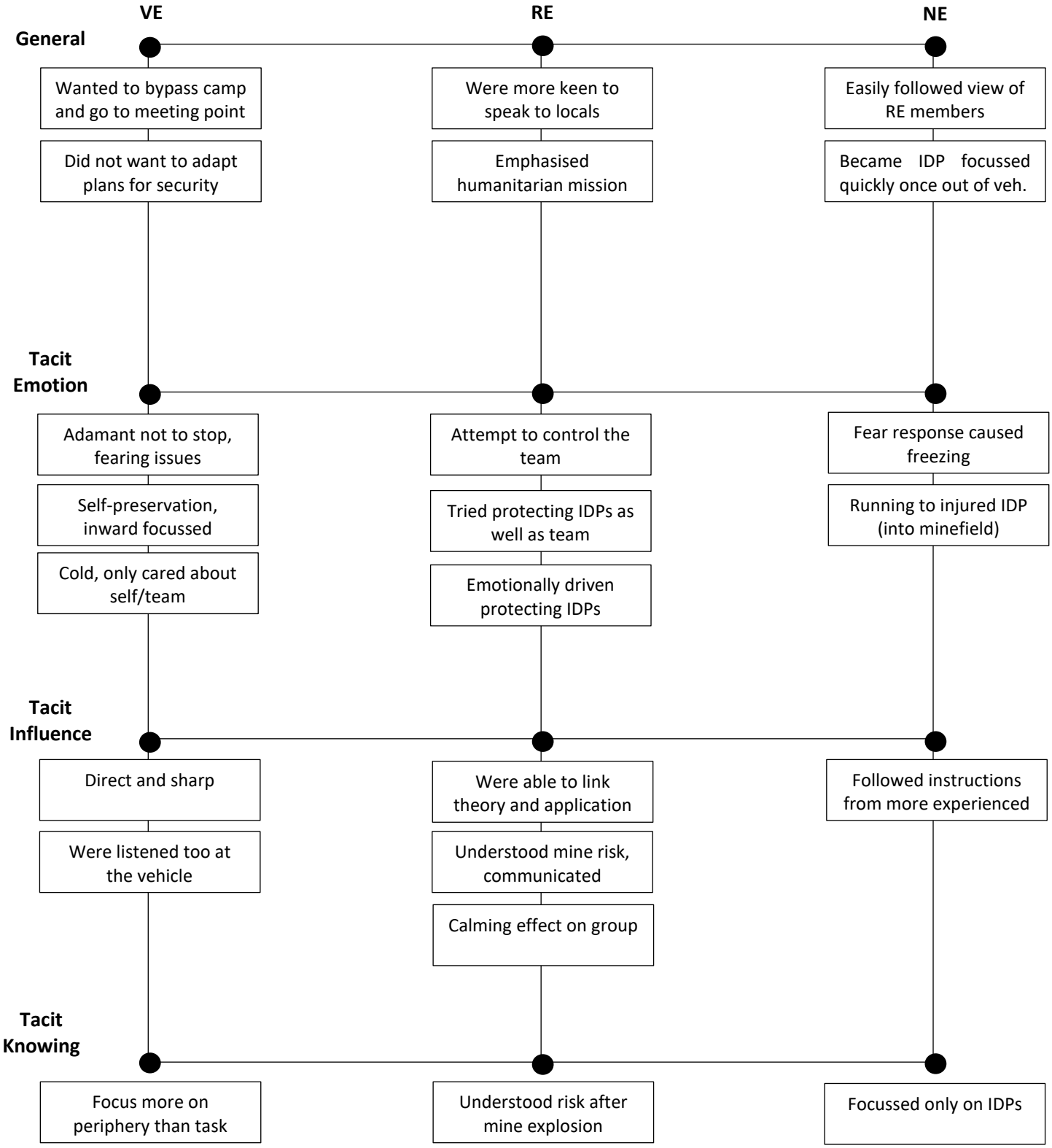
Scenario 2: Landmine Explosion at IDP Camp

Brief: along the route the vehicle passes an IDP camp. There are villagers going about their routine who want to speak with the participants. After some time talking a villager walks off to collect firewood and steps on a landmine.

A summary of the observations for Scenario 2 is provided below:

- Upon discovering the IDP camp, VE participants were adamant not to stop, ignoring the humanitarian mission of the fictitious organisation they were working for. This was a show of strong tacit emotion, with them becoming visibly agitated;
- In all three observations, the Standard Operating Procedures developed on Day-2 stated that the vehicles should not make unplanned stops. However, RE and NE participants exited the vehicle with little thought. VE participants emphasised the need to stay in the vehicle but did not relate this to the SOPs;
- The way in which participants interacted with locals differed greatly: NE were quick to speak with the locals prior to assessing their surroundings and were focussed solely on the villagers; RE participants did interact, but ensured they were closer to the vehicle and kept aware of their surroundings and VE participants preferred not to interact and either stay in the vehicle or stay standing towards the entrance to the IDP camp, always being aware of where the driver was;
- After the visual and audio queue of the explosion, NE participants were prone to freezing on the spot and unable to process what had occurred. RE participants were able to understand the explosion was likely a mine and avoided sudden movement. VE participants were quick to move towards the vehicle
- On all three observations NE participants, after the initial shock of the explosion wore off and they could see the injured IDP, ran towards them. This shows a lack of tacit knowing, not being able to link the observed (explosion) with the perceived (a known mine risk, identified through country briefing material read on days 1 and 2). RE participants were quick to stop them doing this, being able to tacitly know that the explosion was likely from a landmine and understanding the link between theory and praxis;
- VE participants took a self-preservation stance, and were observed looking after themselves rather than the group; NE were IDP focussed and misjudged the risk they faced while RE staff were in the middle, mainly looking after the group but also facilitating the medical treatment of the IDP who was injured from the landmine;

- NE participants were susceptible to influence from the two sets of experienced workers and listened to instructions without questioning them. Instructions came from RE whilst at the IDP camp, though VE participants were able to give ideas when at the vehicles and there were deliberations on what to do with the injured IDP.



Scenario 3: Informal Checkpoint

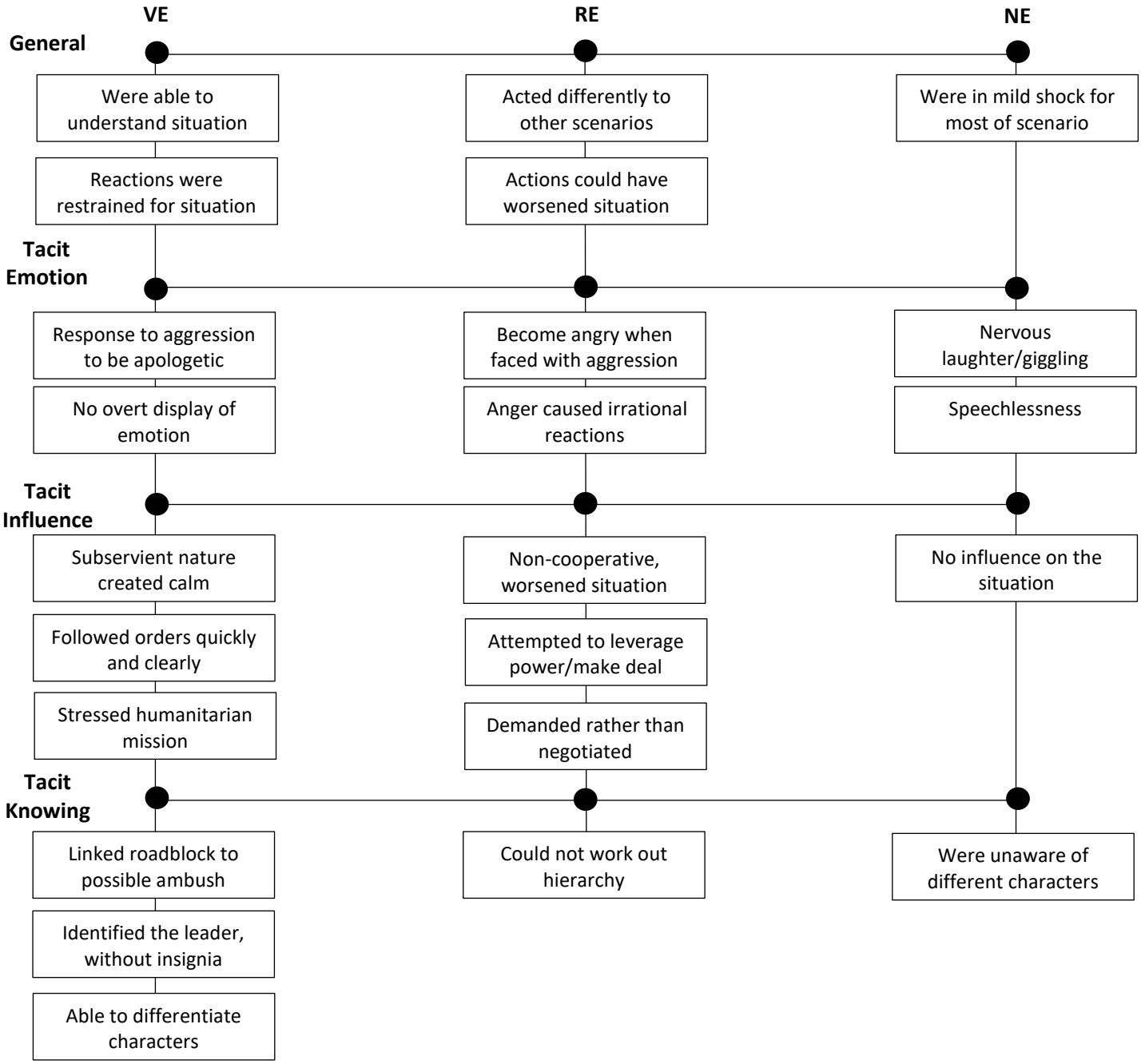
> *Brief: the vehicle approaches a makeshift barricade made by cars and debris. They are then sprung upon by an armed militia, taken out of the vehicle, their possessions are robbed, and they are questioned*.

A summary of the observations for Scenario 3 is provided below, as well as an illustrative example provided after the thematic map:

- VE participants showed tacit knowing as the vehicle approached the makeshift roadblock, understanding that the blockage was abnormal and asked the driver to turn around. Though there were no observable signs of danger (gunmen), they were able to perceive the link of the roadblock and potential ambushes. Some RE participants were able to understand that something was wrong, while NE only understand that there was a blockage;
- When the vehicle was stopped by the gunmen, VE participants quickly became subservient and were able to not draw attention to themselves, quickly understanding (tacit knowing) that they had no power to influence the situation. RE participants on the other hand were not able to identify the aggression shown by the ambushers to them not being able to negotiate, instead attempting to negotiate access. NE participants were clearly fearful of the situation, especially when the 'rebels' started shooting at the start of the holdup;
- NE participants fear at the aggression and gunshots meant that they demonstrated odd behaviour, such as nervous giggling and laughter. Furthermore, when questioned about their intent they were unable to answer questions. For the most part, they were silent during the scenario through fear, which worked in their favour as it did not anger the rebels;
- By being subservient, understanding the hierarchy between the rebels and showing respect to the one in the leadership position, VE participants were able to open dialogue. This power dynamic was not understood by RE participants, who also misunderstood the means to influence the situation. Rather than taking the subservient route like VE and identifying the person they could bargain with, they became aggressive and tried leveraging power and moral high ground (Participant 2.5: "You cannot hold us here. We work with an NGO."). This aggression also resulted observations which were deemed odd: for instance, Participant 1.13 was stripped of her jewellery, and upon placing a ring in a rebel's hand then proceeded to spit on it. Such an act was brought up

by the actor (who had worked in the humanitarian sector for almost 12 years, including overseas) and in reality would have potentially lead to severe repercussions, including being shot. The reaction was also out of the ordinary, having been a participant who had guided the NE participants on the previous scenario as well as having worked across the Middle East, where informal checkpoints are commonplace. When asked about it in the debriefing, they themselves were unsure for the reaction;

- Instances of RE participants meeting aggression with aggression were common, showing an inability to control their emotions like VE participants, who admitted after (the scenario in the vehicle as well as during the debriefing) that they themselves were becoming frustrated but knew it was futile.



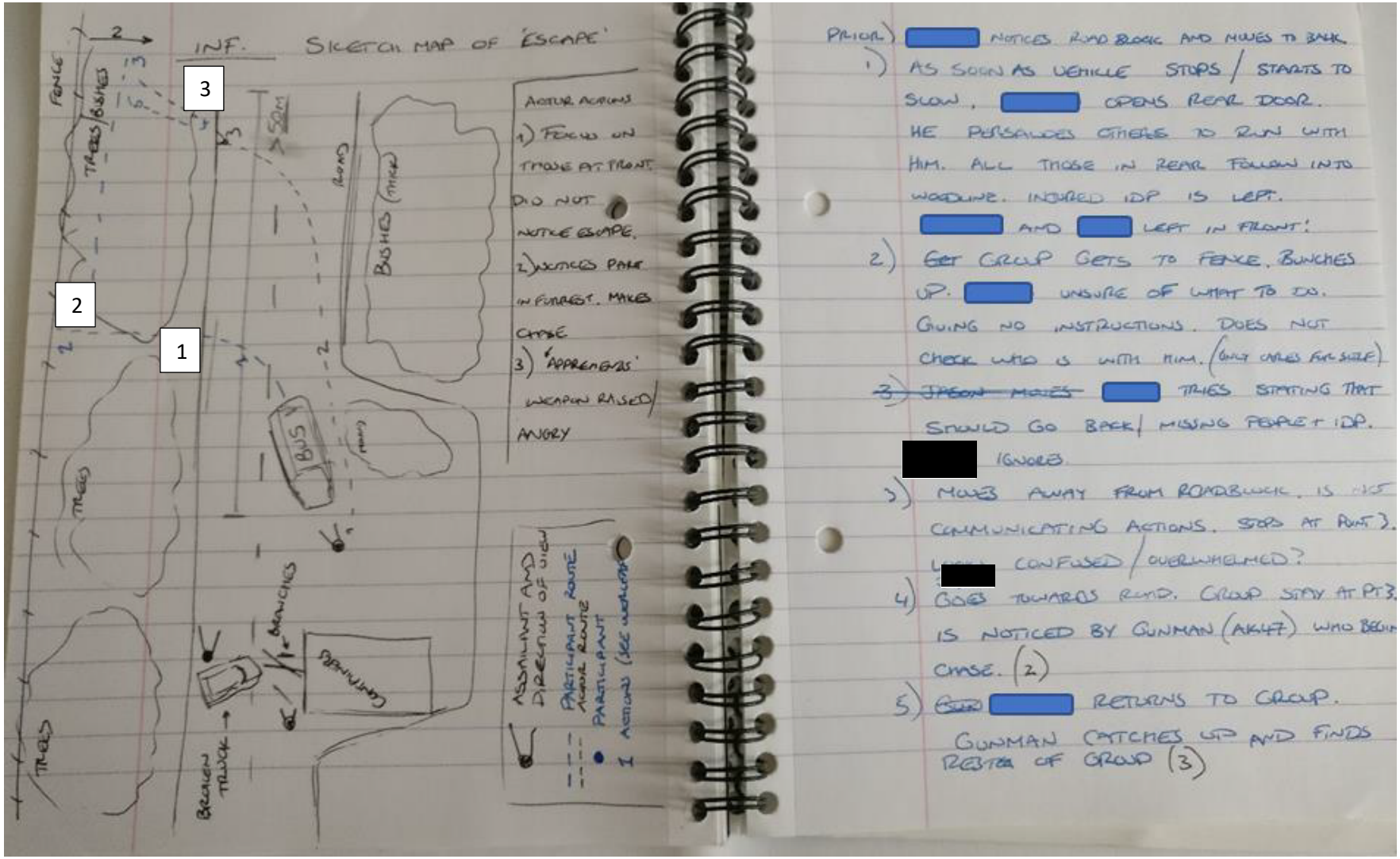
Scenario 3 Case in Point: Attempted Escape

RE participants were more likely to take impulsive actions which put the group in danger, but because of their influence on NE participants the group followed them. A case illustrating this occurred during the October 2017 simulation. The group observed was made-up of 2 VE, 2 RE and 4 NE participants. A sketch map from the observation notebook is found overleaf.

- As the vehicle approached the roadblock and the armed rebels became visible one of the RE participants (Participant 3.8, P3.8) sitting in the back forced the driver to stop;
- As the vehicle stopped they ran to the back of the vehicle opening the rear door, telling the others to follow them as they did so;
- P3.8 then proceeded to run to the treeline (see 1 on the sketch map in Figure 5.* below);
- They moved around in the woodblock looking for a way out, at which point the remainder of the group had joined. One of the VE participants had followed the group but stated to everyone that what they had done was "stupid, and you'll get us killed" (Participant 3.1), directing their anger towards P3.8. Two participants were left in the front of the vehicle with the driver;
- They were eventually caught (see point 3 on Figure 5.*) when P3.8 tried observing the road by walking out of the bushes when they felt they were far enough away. Here, P3.8 showed a lack of tacit knowing: they had observed the rebels carrying weapons (mAK47 model, something that was picked up in the debriefing) but believed that the 50m distance would mean they were safe, when the weapon has a range of 300m+. Again, this was brought up by P3.1 during the debriefing;
- The group was eventually found by the rebels and 'apprehended'.

The case in point is a good example of RE participants having some relevant experience, but not developing the same level of tacit knowing as VE participants, but through their perceived confidence in their experience NE participants followed their decisions/instructions. VE participants were able to see that they were being stopped, not ambushed, and linked this to a likely carjacking or bribery, rather than a killing. This was mentioned by all three groups of VE participants in the debriefing, whereas the RE and NE assumed they were being attacked.

The case cannot be generalised to all RE participants, though the same was attempted by a participant in observation 2, but they were unable to open the back door of the vehicle. In both cases, the impulsive decisions could be down to character type rather than experience.



Appendix 8.2: Sketch Map of Scenario 3, Simulation 3 Showing Attempted Escape

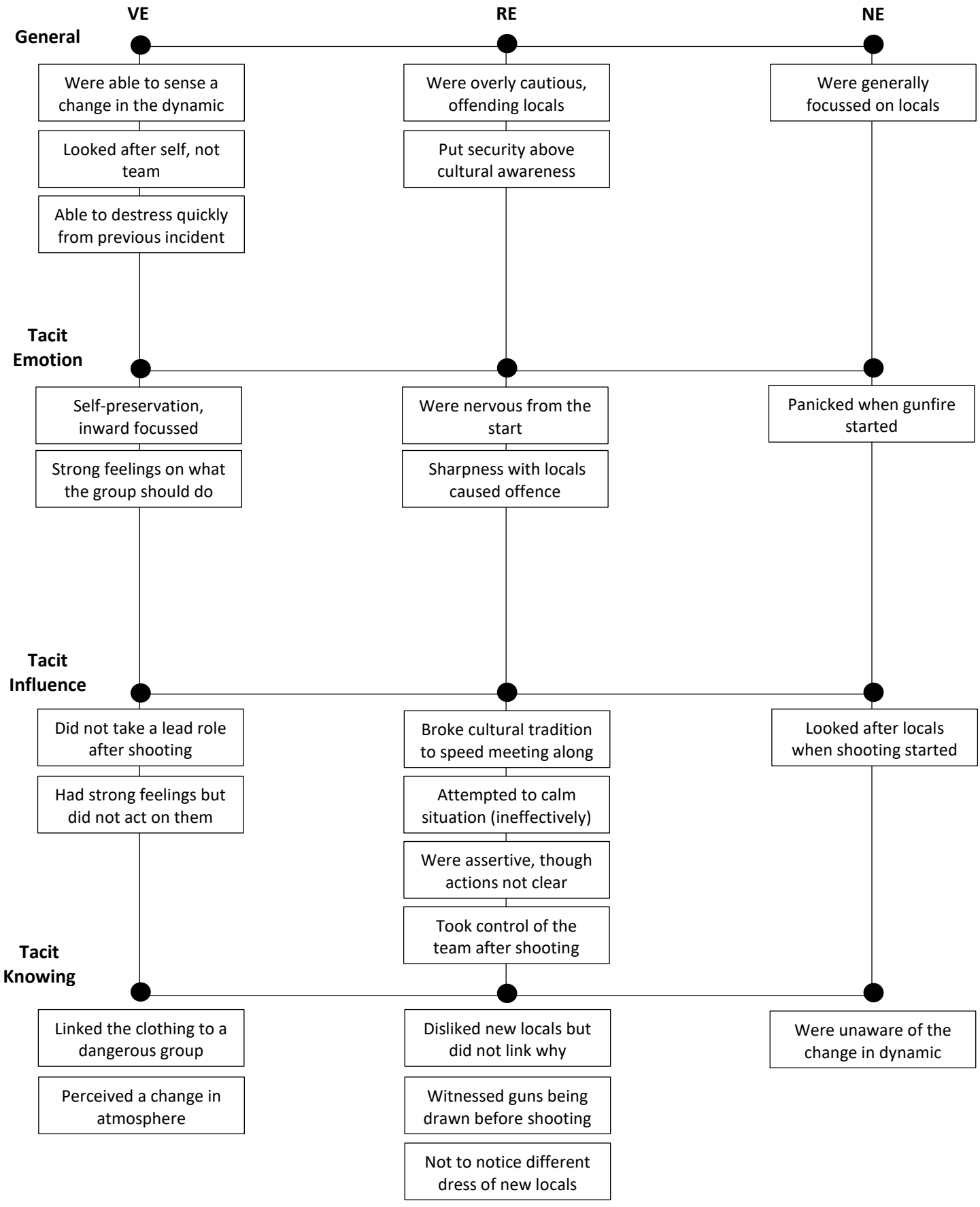
Scenario 4: Crossfire at Village Meeting

Brief: both teams conduct a meeting with a local elder. After the meeting has been ongoing for some time a new group of villagers arrives from a different tribe. Tension escalated, resulting in a disagreement that ends in a shooting between the two village group leaders.

A summary of the observations for Scenario 4 is provided below:

- There was a clear difference between the way VE and RE participants to the situation. VE participants were able to regain their composure from the last high-stress scenario and approach the village meeting calmly whilst keeping aware of their surroundings. RE participants were visibly agitated from the start, not being able to calm down from the last scenario, and were short and sharp with the locals, causing offence within the realms of the scenario;
- Due to the jumpy nature of RE participants, constantly looking around for danger, they were unaware of the new local's dress being different to the villagers they were originally meeting with, even missing the sudden change in dynamic when the two groups of locals started discussing land rights. Though they were on the lookout for potential danger, they were unable to demonstrate tacit knowing;
- NE participants were generally unaware of a change in dynamic, several not realising a new group had joined. They were unaware of the change in dynamic and the pre-cursors to danger. They did however try and protect the locals when the shooting started, which would have had an influence at the local level;
- When the argument intensified and locals from both groups started to draw their weapons (pistols, which were concealed), two interesting observations occurred: VE participants had already sensed a change in dynamic and had started to move to the vehicles, so were quick to spot the weapons which made them dash for what they perceived as safety. As with the explosion scenario (2) they became inwards focussed and looked after themselves. RE participants on the other hand were group orientated, trying to coral the group towards the vehicle;
- On one occasion, a RE participant tried intervening once the weapon had been drawn, not to disarm but talk the villager down, over estimating their ability to influence the situation;
- RE participants took control of the group after the shooting but went against the theory lessons by moving around whilst there was still gunfire, rather than lying down and staying still.

12. Appendix


VE
RE
NE
General
Were able to sense a change in the dynamic
Looked after self, not team
Able to destress quickly from previous incident
Were overly cautious, offending locals
Put security above cultural awareness
Were generally focussed on locals
Tacit Emotion
Self-preservation, inward focussed
Strong feelings on what the group should do
Were nervous from the start
Sharpness with locals caused offence
Panicked when gunfire started
Tacit Influence
Did not take a lead role after shooting
Had strong feelings but did not act on them
Broke cultural tradition to speed meeting along
Attempted to calm situation (ineffectively)
Were assertive, though actions not clear
Took control of the team after shooting
Looked after locals when shooting started
Tacit Knowing
Linked the clothing to a dangerous group
Perceived a change in atmosphere
Disliked new locals but did not link why
Witnessed guns being drawn before shooting
Not to notice different dress of new locals
Were unaware of the change in dynamic

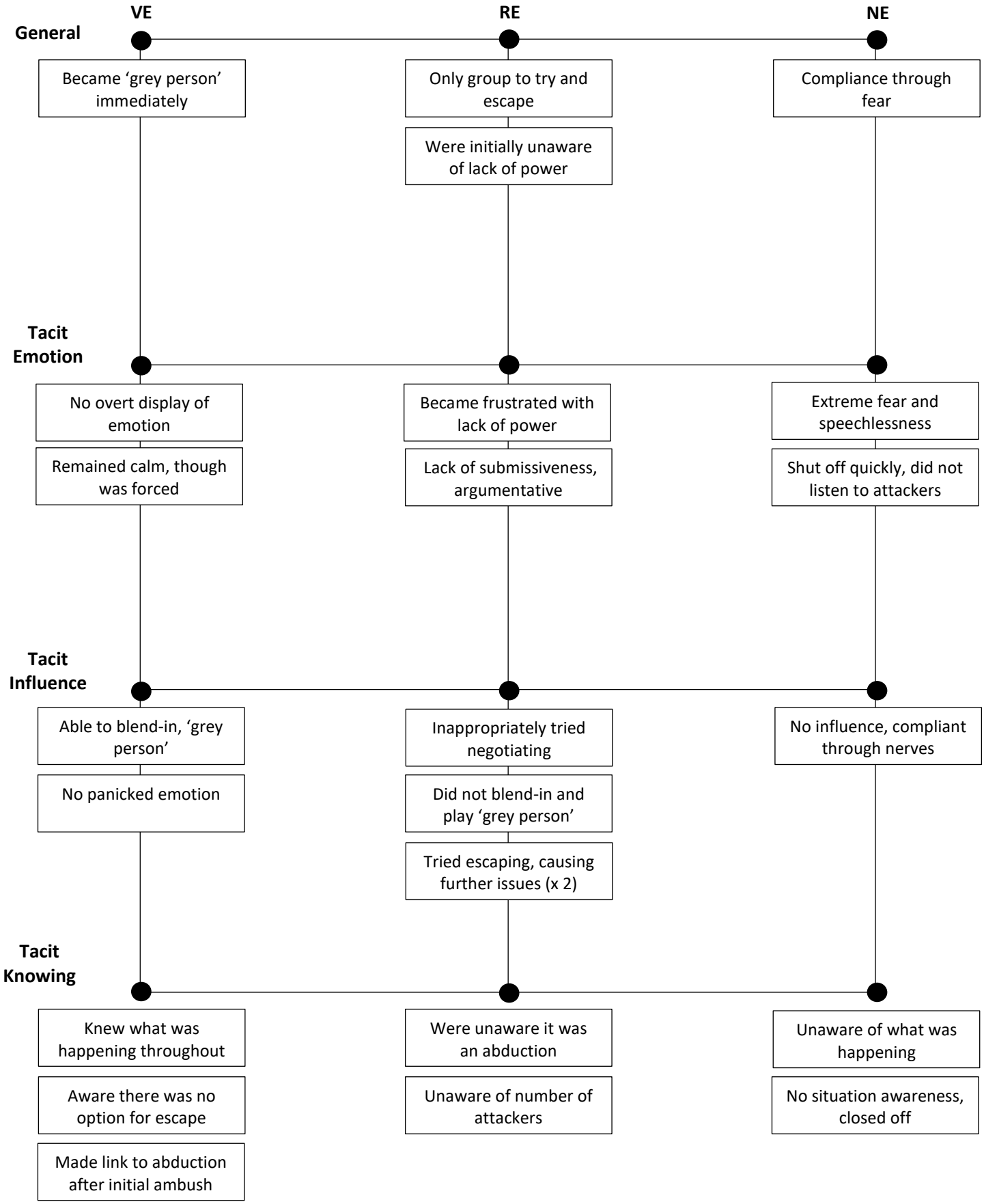
Scenario 5: Ambush

Brief: the vehicles return to base in a convoy. Along the route they are ambushed by a large group of rebels. They are bundled out of the vehicles, searched and questioned. They are then taken away in another vehicle.

A summary of the observations for Scenario 5 is provided below:

- Again, VE participants acted in a way which showed their experience. They were able to quickly adopt a 'grey person' persona, not making themselves stand out. Because of this, they were able to prevent any unnecessary aggression being drawn to them;
- NE participants were again overcome by emotion and froze, not being able to both process what was going on in front of them nor make rationale decisions. Following instructions from the ambushers was slow and often misinterpreted. Because of this emotional response they were unaware of what was occurring around them and in the post-simulation debriefing were often unable to recount what occurred;
- RE participants showed a lack of tacit knowing as they were looking for means of escape, with two RE participants (2.5 and 3.8) attempting an escape. Though they were able to observe the ambush take place, they were not able to link this with the perceived number of attackers or their intent (they had stopped the vehicles but not immediately killed the participants, therefore was unlikely an ambush with the intent to kill). This also shows an inability to link their escape attempt with possible consequences for the rest of the group, a point brought up by VE participants in the post-simulation debriefing;
- Again, RE participants were unaware of their complete lack of power in the aftermath of the ambush, attempting to negotiate with the ambushers as they did during Scenario 3. In this situation the participants had no power to negotiate and the ambushers were merely searching them for valuables and stripping them of radios and shoes. The ambushers were looking for complete compliance, which was evident from their tone, which was not understand by RE participants;
- VE participants remained calm throughout, able to prevent any emotions being shown. Again, this was in contrast to RE participants who became frustrated and argumentative with the ambushers when they were unable to make sense of the situation;
- In the post-simulation debriefing, VE staff stated that they knew it was likely an ambush after the initial stop as they had not been injured or shot on the spot (tacit knowing). RE and NE participants did not make this link.

12. Appendix


VE
RE
NE
General
Became 'grey person' immediately
Only group to try and escape
Were initially unaware of lack of power
Compliance through fear
Tacit Emotion
No overt display of emotion
Remained calm, though was forced
Became frustrated with lack of power
Lack of submissiveness, argumentative
Extreme fear and speechlessness
Shut off quickly, did not listen to attackers
Tacit Influence
Able to blend-in, 'grey person'
No panicked emotion
Inappropriately tried negotiating
Did not blend-in and play 'grey person'
Tried escaping, causing further issues (x 2)
No influence, compliant through nerves
Tacit Knowing
Knew what was happening throughout
Aware there was no option for escape
Made link to abduction after initial ambush
Were unaware it was an abduction
Unaware of number of attackers
Unaware of what was happening
No situation awareness, closed off

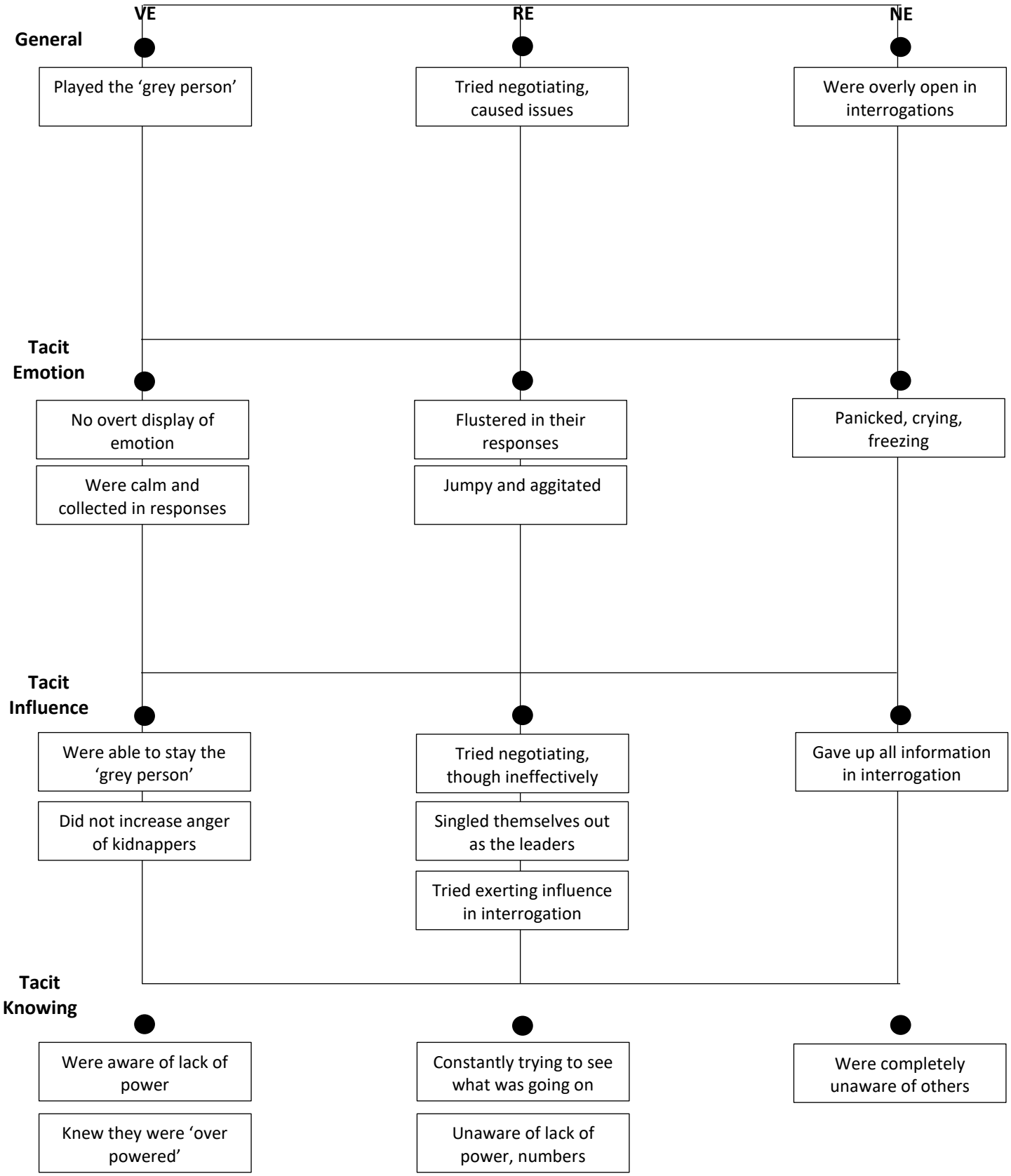
Scenario 6: Kidnapping

Brief: after the ambush the participants are taken to a rebel base where they are interrogated, harassed by rebels and left in solitude.

A summary of the observations for Scenario 5 is provided below:

- Again, VE participants were able to adopt a 'grey person' persona which did not draw attention to themselves. They were able to influence the situation by ensuring their compliance and not standing out;
- Strong emotional response witnessed from NE participants, who were unable to cope. They were unable to answer questions directed at them, were visibly anxious and in some cases crying. A few were taken aside to prevent any traumatic effects;
- NE participants gave up all information during the interrogations, unaware of what the information could be used for. A lack of understanding of the kidnapping risk was a possible cause as well as an inability to control their emotional response;
- VE staff were able to stay collected throughout, drawing on past experiences to remind them of their inner strength (identified in the post-simulation debriefing). This allowed them to respond rationally during the interrogations and limit the information they provided;
- VE participants were able to quickly understand the motive behind the abduction and identify that they abductors were kidnapping them for ransom- they were able to take what they directly observed in terms of the ambush and those holding them and link this to information they perceived, such as the focus of the questioning prior to the interrogations and previously known information from scenario material. By using this information VE participants were able to influence the direction of the interrogations positively;
- RE participants were again unaware of the influence they could have during the scenario, trying to leverage humanitarian power during the interrogations. Unlike VE participants, they were unable to understand the motives without it being made clear;
- Re participants also singled themselves out as leaders, not playing the 'grey person' as VE participants did;
- NE participants were unaware of their surroundings, solely focussing on themselves.

12. Appendix


VE
RE
NE
General
Played the 'grey person'
Tried negotiating, caused issues
Were overly open in interrogations
Tacit Emotion
No overt display of emotion
Were calm and collected in responses
Flustered in their responses
Jumpy and aggitated
Panicked, crying, freezing
Tacit Influence
Were able to stay the 'grey person'
Did not increase anger of kidnappers
Tried negotiating, though ineffectively
Singled themselves out as the leaders
Tried exerting influence in interrogation
Gave up all information in interrogation
Tacit Knowing
Were aware of lack of power
Knew they were 'over powered'
Constantly trying to see what was going on
Unaware of lack of power, numbers
Were completely unaware of others