# CREST
CENTRE FOR RESEARCH AND
EVIDENCE ON SECURITY THREATS

# THE PSYCHOLOGY OF INTEROPERABILITY
## STUDY ONE SUMMARY

Identifying the psychological principles that outline how interoperability can be achieved within the UK Emergency Services.

> " Emergency response requires effective interoperability, whereby different emergency teams combine efforts and expertise to contain and reduce the impact of a major incident "

## THE CURRENT STUDY

### INTRODUCTION

Effective emergency response is of vital important to public life. Complex emergencies require emergency teams to temporarily combine their expertise to deal with a situation that would otherwise be impossible to manage by a single team, demanding effective collaboration within as well as across teams.

In 2012, JESIP was established to improve joint working between the emergency services in response to government-level acknowledgement that the emergency services had not been working well together at major incidents (for example, see the Pollock report). The focus of JESIP since its inception has been the development of the Joint Doctrine. This doctrine provides emergency

responders with a framework for the actions they should take when working together. However, despite JESIP's best efforts, public enquiries have repeatedly identified that JESIP has not been properly embedded. Pollock warned that procedural changes alone were not enough to achieve effective interoperability and argued that for interoperability to be fully embedded, there also needed to be a concerted effort to shape organisational culture, attitudes, values, and beliefs.

Furthermore, the Manchester Inquiry has been critical of JESIP for failing to be embedded into the 'muscle memory' of the emergency services. Hence, work needs to be done to understand where the failures of interoperability lie.

## SYSTEMATIC REVIEW AIMS

A core problem with the term 'interoperability' is that definitions of it vary or are omitted entirely. JESIP's own definition ('working together coherently as a matter of routine') introduces potential for confusion and lack of agreement regarding what joint working means in practice.

This review has three aims:

1. to establish a concrete definition of the term 'interoperability'

2. to identify what interoperability looks like with reference to existing structural principles

3. to further our understanding of how interoperability can be achieved by identifying important psychological principles.

## METHOD

Seven databases were searched using relevant keywords (emergency, major incident, disaster response, crisis, interoperability, multi-agency, inter-team, joint organisational, and multi-team system). 5572 articles were sifted through inclusion and exclusion criteria, resulting in 94 articles.

These were added to 16 grey literature articles provided by industry experts and relevant websites (e.g., JESIP) and 24 papers added once relevant themes had been identified.

## DEFINITIONS

Out of the 94 articles we synthesised, 62 discussed interoperability explicitly, but only 35 provided a definition (56.5 per cent).

Social definitions broadly agreed with (or quoted) the JESIP definition "the extent to which organisations can work together coherently as a matter of routine".

Most made reference to working together and/or working towards a common or shared goal. Some specified the need for appropriate information exchange and coordinated action. Technological definitions referred to two (or more) independent systems to meaningfully exchange information, interact or communicate, and to use the information that has been exchanged to achieve their objectives.

## WHAT IS INTEROPERABILITY? STRUCTURAL PRINCIPLES

We identified two structural principles within our systematic review that were typical of the types of behaviours expected of an interoperable team. These were:

1. Communication and information sharing; and

2. Having a flexible and decentralised team structure.

The core findings on each principle are summarised in this guide.

> **The extent to which organisations can work together coherently as a matter of routine.**

## COMMUNICATION AND INFORMATION SHARING

Emergencies are complex contexts where there can be voluminous, missing, incomplete, and contradictory information that must be made sense of to effectively coordinate behaviour.

- Information sharing is the basis of joint situational awareness and understanding and each emergency service holds various information relevant to their own andother services' response.

- Individuals can become overwhelmed and preoccupied by irrelevant or non-critical information a balance must be struck between communicating enough detail to inform the actions of other teams and team members, whilst avoiding unnecessary information overload. Managing this information requires a filtering process with regards to what the information holder (and hence one's own team) needs to know, and further what other sub-teams need to know.

- Miscommunication between team members can derail teamwork, especially when using organisation specific terminology, acronyms and knowledge. For example, confusion about

the 'Operation Plato' declaration and its meaning at the Manchester attack.

• Sub-teams working within an MTS tend to prioritise communications with their own sub-team members over communications with other component teams which is more likely to happen when under stress.

• Teams have been found to lack a culture of information sharing outside of their own organisation.

• Processes for sharing information are not effectively embedded (e.g., failure to co-locate at scene during the Manchester attack).

## FLEXIBLE AND DECENTRALISED TEAM NETWORK

Structures within the emergency services tend to be largely hierarchical, with a direct chain of command, often based on rank and/or position. Each emergency service will have a Gold/strategic, Silver/tactical and Bronze/operational commander who are each responsible for a different tier of command depending on the size and scale of the emergency.

However, the overlapping of command structures across the emergency services is not clear cut. For example, the Fire Service work in small teams who each have a commander. When an incident becomes more complex the role of incident commander is passed upwards as more senior personnel arrive, meaning that the person delegated as 'commander' can change regularly. Compare this to the Police Service who might have multiple commanders working alongside each other. For example, in a firearms incident the

Police will have a tactical commander in charge of the more general police response whilst also having a tactical firearms commander responsible for the firearms team. The assumption by JESIP that these command structures can map together coherently across multiple different types of emergencies is fundamentally flawed. It also risks limiting decision-making by imposing a (potentially) mismatched and rigid command structure onto a fluid emergency that would be better served by a dynamic team structure that can adapt to the changing circumstances of the event.

## KEY PROBLEMS WITH HIERARCHICAL STRUCTURES

• No individual has the time or cognitive resource to process all of the existing information before making a decision. Hence, reducing the 'span of control', i.e., the number of people and information one person must deal with, and increasing flexibility is key.

• Decision making is more effective by distributing authority throughout the network empowering team members to make their own decisions drawing on knowledge/skill within the team rather than rank. This means that decisions can be made quickly, rather than being deferred higher up and away from team members.

• Different elements of an emergency response are better handled by different emergency services due to varying skillsets.

## HOW DO WE ACHIEVE INTEROPERABILITY? PSYCHOLOGICAL PRINCIPLES

We identified three psychological principles that are important for information how interoperability can be embedded within the 'muscle memory' of the Emergency Services.

1. Trust

2. Secure Team Identities

3. Goals

**We argue that training to promote interoperability needs to incorporate these principles.**

## TRUST

Trust is defined as the extent to which an individual is confident that they can rely upon, and are willing to act on, the words, actions and decisions of another individual or group.

- Trust has been shown to influence intentions to collaborate between organisations: organisations who trust one another are open to understanding that joint effort will result in outcomes greater than they could have achieved alone.

- Without trust, teams tend to focus on task demands instead of teamwork, furthering their own goals rather than superordinate ones.

- Trust between team members supports information sharing and the willingness to accept feedback, hence promotes collaborative working.

- Without trust, the team's capacity to be flexible to new information is reduced. A lack of trust also increases the risk of silo working, reducing interoperability.

### 3 KEY TYPES OF TRUST:

1. Interpersonal

2. Cognitive

3. Group-based

## INTERPERSONAL TRUST

Interpersonal / affective-based trust is defined as having faith in other team members based on past interpersonal interactions.

Repeated exposure to the same people and enduring similar occupational experiences helps to:

- Promote greater familiarity and trust in professional capabilities, as well as learning from individuals and their respective organisations.

- Reduce negative preconceptions about inter-agency colleagues and increases recognition of similarities with one another.

## COGNITIVE TRUST

Cognitive trust refers to faith in another that they can complete the specific tasks associated with their role meaning that even if individuals do not know each other personally, they can trust one another to perform their duties based on an understanding of roles and responsibilities within the MTS.

- Emergency services form under severe time constraints and are usually temporary so it is often not possible to rely on interpersonal trust as individuals from different emergency services may not have worked together before.

- One way to promote cognitive trust is by building 'swift trust': building knowledge and understanding about the roles within a team rather than the individuals. This allows teams members to work with different individuals as they place trust in the function of a given role rather than the interpersonal trust of a specific individual.

Cognitive trust is important for establishing interoperability because:

- Sub-teams within a MTS often do not fully understand who is responsible for different tasks which can limit information exchange.

- Sub-teams within a MTS often do not fully appreciate the capabilities that other team members can offer, causing issues with coordination and unrealistic expectations.

- The development of 'swift trust' can support the rapid formation of unfamiliar emergency teams by building faith in role understanding over individuals

## GROUP-BASED TRUST

Group-based trust is defined as the tendency to place trust in strangers with whom individuals share a salient social category.

- Like cognitive trust, group-based trust is useful for establishing swift trust when working with strangers from a common social in-group (e.g., Hardin).

- Group-based trust is underpinned by two assumptions: that in-group members possess positive qualities, and that in-group members will act favourably towards individuals they also define as being within their in-group.

**As group-based trust is contingent upon an individual categorising an unknown team member as being part of a common ingroup, how an individual defines their group membership within the wider MTS is central.**

## SECURE TEAM IDENTITIES

Secure team identities may allow team-members to fluidly work with and trust both intra- and inter-team members. Social Identity Theory suggests that people are motivated to define themselves as members of distinct groups: building a sense of 'us' and connection with others.

- When people identify strongly with a group, they have a strong sense of connection and common purpose with other members of that group and are motivated to further the group's goals.

- Identification can facilitate teamwork with strangers due to the establishment of group-based trust.

- When team members are more strongly committed to the overall MTS, rather than their pre-existing sub-team, planning, and coordination is more effective.

- Through repeated exposure to similar professional experiences, or placing in one analogous team boundaries between distinct agencies have been shown to dissolve, developing an 'identity' as a blue-light service or as part of the wider 'emergency services' with common purpose.

However, when employees strongly identify with their pre-existing subgroup (i.e., Police Service), then shifting focus towards a shared superordinate group (i.e., emergency services) can lead to identity threat and hence rejection of the shared group in defence of these identities.

- Research showed that emergency services justify their own actions within a response based on expertise, for example, ambulance staff knowing the best way to treat casualties versus fire staff knowing the best way to extract individuals, rather than seeing these actions as part of one overarching, superordinate goal.

- Emergency responders wear different uniforms to make them easily recognisable and distinct in their roles, which might limit their sense of 'oneness' with other emergency workers.

**To improve teamwork and build effective interoperability, shared vision and interdependence should be promoted between sub-teams but ensure that these efforts to do not come at the expense of identity threat and blurred professional boundaries.**

## COHESIVE GOAL SETTING

Ensuring members of a MTS have cohesive goals is important for establishing interoperability:

- Goals help to motivate decision-making and teamwork towards purposeful outcomes/

- Goals can be abstract (e.g., 'save life') or concrete (e.g., 'prioritise most at-risk patients') and how a team member interprets a goal is important for informing behaviour.

- The difficulty for goal setting in MTS is striking the balance between holding shared superordinate goals that risk being vague and open to misinterpretation and having overly specific goals that might lead to selective processing and tunnel vision.

- There is a potential for conflict between personal, organisation, and collective inter-organisational goals.

Specifically, JESIP's Joint Decision Model central goals are to 'save life' and 'reduce harm'. 'Save life' can be classified as an approach-oriented goal, which motivates individuals to try and maximise outcomes. Whereas 'reduce harm' is avoidance-oriented goal, which motivates individuals to avoid causing harm. **These are opposing mindsets.**

- Approach mindsets have been associated with improved performance compared to avoidance mindsets which have been associated with anxiety and poor performance.

- Approach- or avoid-oriented goals influence time taken for multi-agency teams to make choices.

- There is a risk of creating a gap between an assumption of shared goals and the reality of intra-agency focussed objectives which can lead to inconsistent behaviour and duplicated or wasted efforts at the multi-team level.

- During a simulated counter-terrorism exercise, commanders from the three emergency services believed they were working towards a common 'save life' goal, but the goal was translated into agency-specific and potentially conflicting, concrete objectives (e.g., paramedics wanted to save life by getting hands on patients; whereas fire fighters sought to save life by taking careful risk assessments).

**To support effective interoperability, responders need training to develop a greater understanding about different types of goals and how they interact with contextual demands and associated implementation intentions and behaviour across the MTS.**

Firstly, we found that existing definitions were often vague, simplistic, and disparate, making it difficult to formulate a comprehensive understanding of interoperability.

Based on findings from this review, we define interoperability as: "a shared system of technology and teamwork built upon trust, identification, goals, communication, and flexibility".

Secondly, our review identified two structural principles underlying successful interoperability:

1. Communication and information sharing

2. Having a flexible and decentralised team network

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> **We define interoperability as "a shared system of technology and teamwork built upon trust, identification, goals, communication, and flexibility"**
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Finally, we identified three psychological principles that should be targeted to build a more interoperable culture:

1. Establishing trust across the MTS;

2. Building secure team identities; and

3. Ensuring cohesive goal setting.

Training could be designed to specifically focus on these principles (e.g., building cognitive trust through training on roles and responsibilities) or the social by-product of training could also support principles (e.g., building more adaptive intra- and inter-team identities through repeated exposure with other responders). We argue that regular access to high fidelity simulation-based training (see, Brown et al. for a review) that is *specifically designed to train and develop the psychological principles of interoperability* (rather than test policies and procedures) would be the best way to achieve this.

# READ MORE

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## About the project

This CREST guide comes from the Systematic Review as part of the project: 'Psychology of Interoperability: Building Better Multi-Agency Counter-Terrorism Training (INTEROP)'. You can find all the outputs from this project at: *www.crestresearch.ac.uk/projects/building-better-multi-agency-counter-terrorism-training/*

To read the full list of references and table of definitions, you can view the Systematic Review here: *https://sway.office.com/Zcrn7EUlHZFvwyyv?ref=Link*

## READ MORE

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