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**A CRISIS MANAGEMENT FRAMEWORK
FOR INTERPOL
TO MANAGE TRANSNATIONAL DISASTERS**

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ABSTRACT

A crisis management framework for INTERPOL to manage transnational disasters

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The number of disasters over the past fourteen years (2000-2014) has already exceeded the number of disasters that occurred over the entire decades of the 1970s, 1980s, 1990s. It is estimated that the number of deaths in disasters over the past ten years (2004-2014) has already exceeded the number of deaths that occurred over the previous twenty years (1984 -2004). The total economic damage of disasters over the past ten years (2004-2014) has also already exceeded the damage of disasters that occurred over the previous twenty years (1984 -2004). Transnational disasters may be even more complex because they involve various aspects such as number of countries affected, number of victims, socio-economic aspects, geo-political factors, legal jurisdiction, cultural differences, and the coordination of multiple agencies. In this arena, INTERPOL plays a crucial role since it is the world's largest international police organisation and a leader in disaster management engaging its 190 member countries and developing a command and control role within the international disaster networks around the globe. Consequently, it becomes crucial to create frameworks to manage transnational disasters.

However, up to now INTERPOL does not have a framework to manage transnational disasters under its auspices. Therefore, the main objective of this thesis is to fill this gap and build a crisis management framework for INTERPOL when working with transnational disasters. This thesis is based on case studies: tsunami in the Indian Ocean in 2004; Air France air crash in Brazil in 2009. It was carried out an analysis across cases to figure out similarities and differences in order to identify behaviour patterns (key factors) and use them as a common framework for analogous cases. The key factors affecting all phases of transnational disasters at INTERPOL are as follows: (1) Governance; (2) Service; (3) Resource; (4) Multi-agency Network; (5) Stakeholder; (6) Finance; (7) Barrier; (8) Facilitator. The studies of the cases also identified the main barriers to, and facilitators of effective multi-agency working and transnational cooperation at INTERPOL.

The main purpose of this thesis was not to produce a general theory about disasters, although one may emerge incidentally, but to create and use a crisis management framework (called CMF) for the understanding and management of transnational disasters under the auspices of INTERPOL. CMF was compared with other existing international frameworks developed in the research and international organisations. The result of this comparison proved that CMF was the most complete. The study of CMF's impacts also revealed that it affects all levels of management at INTERPOL: individual, departmental and organisational. In order to ratify the practical use of CMF, this thesis created an information system called CRIMAFIS. It is a business intelligence system based on Artificial Intelligence (AI) techniques that uses the themes and codes emerged from data analysis and provides relevant information upon transnational disasters. Ultimately, this thesis made forty-two recommendations for INTERPOL to increase and enhance its crisis and disaster management capability.

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DEDICATION

I want to dedicate this thesis to

My mother and my father (*in memoriam*)

who have struggled with me since my very first day on the planet and who always have inspired me with love and wisdom.

My wife

for her understanding and support during the time spent away from home.

My baby Gabriel

for his smile when I was very tired

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ABBREVIATIONS AND ACRONYMS

ADPC	Asian Disaster Preparedness Center
AMERIPOL	American Police Community
ASEANAPOL	Association of Southeast Asian Nations
BFP	Brazilian Federal Police
BIS	Department for Business, Innovation & Skills, Government, UK
BKA	Bundeskriminalamt, Germany
BOND	Board on Natural Disasters, National Research Council, US
CARICOM	Caribbean Community
CBRNE	Chemical, Biological, Radiological, Nuclear, and Explosive
CCLD	Crabbe Consulting Ltd
CM	Crisis Management
CRED	Center for Research on the Epidemiology of Disasters
CRIMAFIS	CRIsis MAnagement Framework Information System
DM	Disaster management
DVI	Disaster Victim Identification
EMA	Emergency Management in Australia
ENSP	Ecole Nationale Supérieure de Police
EUROPOL	European Law Enforcement Agency
FBI	Federal Bureau of Investigation, US
FEMA	Federal Emergency Management Agency, US
FRONTEX	European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European
GA	General Assembly of INTERPOL
GS	General Secretariat of INTERPOL
HSA	Health Sciences Authority of Singapore
ICAO	International Civil Aviation Organization
ICDRM	Institute for Crisis, Disaster, and Risk Management
ICMP	International Commission on Missing Persons
IFRC	International Federation of Red Cross and Red Crescent Societies
IMO	International Maritime Organization
INTERPOL	International Criminal Police Organisation
IPO	International Police Organisation

ISO	International Organization for Standardization
NAUSS	Naif Arab University for Security Sciences
NCB	National Central Bureau of INTERPOL
RB	Regional Bureau of INTERPOL
SADC	Southern African Development Community
UKFA	United Kingdom Forensic Alliance
UN	United Nations
UNDHA	United Nations Department of Humanitarian Affairs
UNISDR	United Nations International Strategy for Disaster Reduction
UNIVDUN	University of Dundee
UoL	University of Liverpool

Chapter 1

Introduction

1.1 Overview

When a major disaster occurs, one country alone may not have sufficient resources, services, finances, and governance mechanisms to deal with mass casualties. Transnational disasters may be the most complex involving, potentially, different aspects such as socio-economic aspects, geo-political factors, legal jurisdiction, cultural differences, and the coordination of multiple agencies. These aspects can generate barriers or facilitators in the international cooperation context. A rich picture of the complexity in managing transnational disasters can be verified by looking at the statistics. First, the number of disasters over the past fourteen years (2000-2014) has already exceeded the number of disasters that occurred over the entire decades of the 1970s, 1980s, 1990s (CRED, 2015). See Figure 1.1.

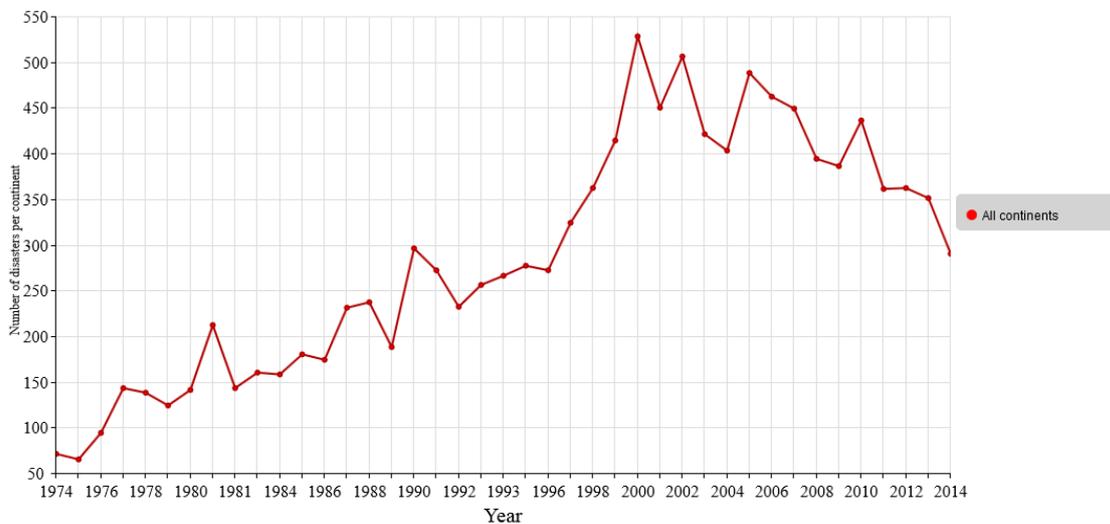


Figure 1.1 – Total number of reported disasters between 1974 and 2014

Second, it is estimated that the number of deaths in disasters over the past ten years (2004-2014) has already exceeded the number of deaths that occurred over the previous twenty years, 1984 – 2004 (CRED, 2015). See Figure 1.2.

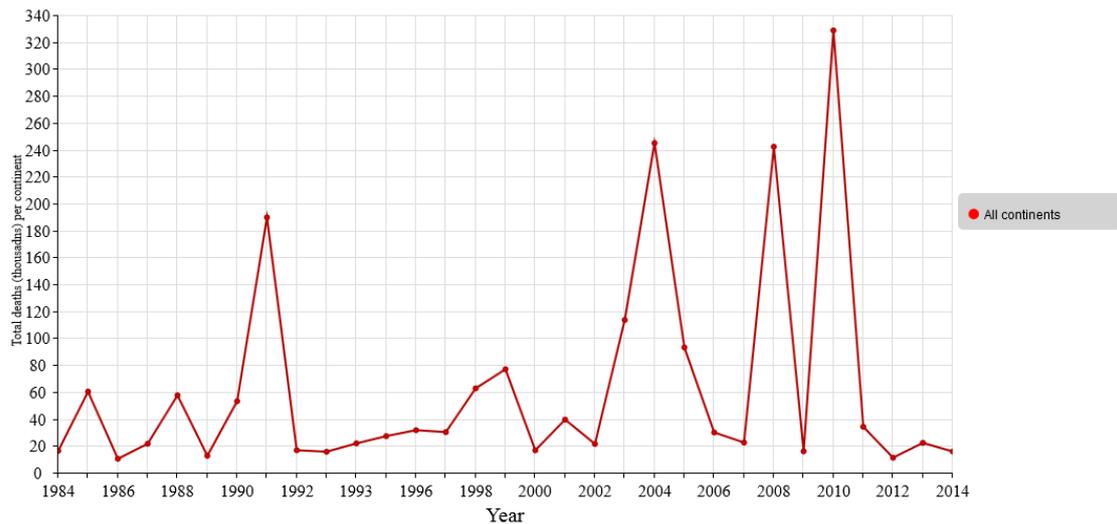


Figure 1.2 – Total of deaths caused by reported disasters between 1984 and 2014

Third, the economic cost of disasters is another factor that cannot be forgotten. The total economic damage of disasters over the past ten years (2004-2014) has also already exceeded the damage of disasters that occurred over the previous twenty years, 1984 - 2004 (CRED, 2015). See Figure 1.3. Indeed, in today’s current global landscape the detrimental effects on the socio-economic environments compound the problem further.

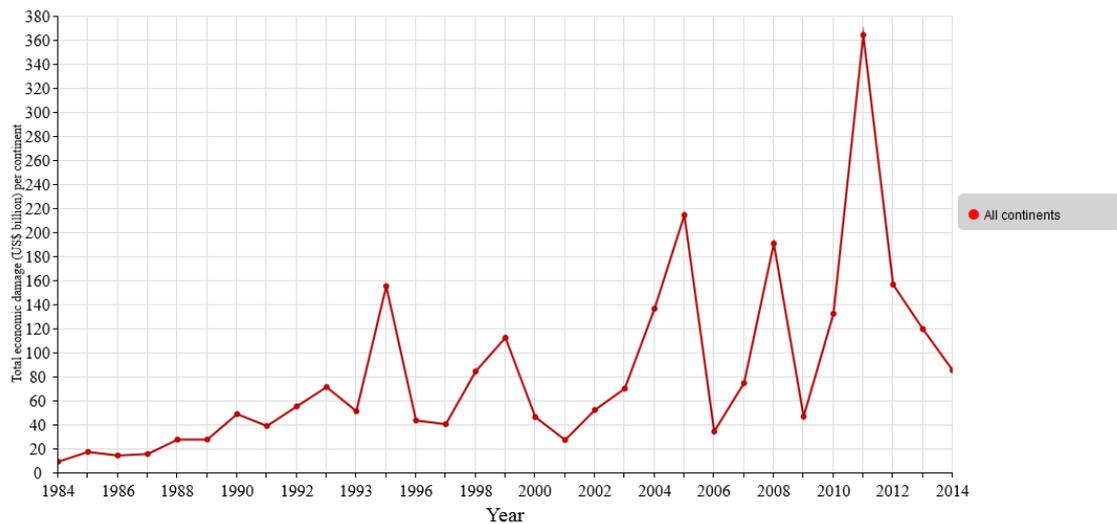


Figure 1.3 – Total of economic damage by reported disasters between 1984 and 2014

In this arena, INTERPOL plays a crucial role since it is the world’s largest international police organisation and as a leader in disaster management engaging its 190 member countries and developing a command and control role within the international disaster networks around the globe. A coordinated effort by the INTERPOL together with international disaster community can significantly speed up disaster management,

enabling affected countries by disasters to bounce back and become more resilient¹. INTERPOL and its member countries have been engaged in major transnational disasters since its creation in 1914, providing resources, services, finances, and governance mechanisms to support member countries affected by devastating disasters, mainly after the creation of its Disaster Unit in 2004 following the tsunami in Indian Ocean. Table 1.1 summarises some of the transnational disasters where the Disaster Unit of INTERPOL had a full engagement² of its teams. The aim of the Table 1.1 is to evidence the pluralistic activity of INTERPOL and how it operates in diversified scenarios, such as natural and man-made disasters, including those caused by terrorist attacks.

Table 1.1 – Some transnational disasters with full engagement of INTERPOL teams

Transnational Disaster	Type	Place of deployment	Year	Fatalities
Tsunami	Natural Disaster	Indian Ocean	2004	230,000
Earthquake	Natural Disaster	Pakistan	2005	87,000
Ferry disaster	Man-made Disaster	Philippines	2008	800
Air France (AF447) air crash	Man-made Disaster	Brazil	2009	228
Earthquake	Natural Disaster	Haiti	2010	160,000
Terrorist attack (FIFA World Cup)	Man-made Disaster	Uganda	2010	70
Ferry disaster	Man-made Disaster	Tanzania	2012	800
Typhoon Haiyan	Natural Disaster	Philippines	2013	7000
Terrorist attack (Westgate Mall)	Man-made Disaster	Kenya	2013	60
Malaysia Airlines (MH17) air crash	Man-made Disaster	Ukraine	2014	298
Germanwings plane crash	Man-made Disaster	French Alps	2015	150

¹ In the context of this study, resilient means the ability to bounce back or return to normalcy/equilibrium after the occurrence of a crisis or disaster.

² Full engagement means that the Incident Response Teams (IRTs) are used to assess and deploy their activities using all available INTERPOL resources and services to manage the disaster; whilst, in partial engagement the IRTs are only used to yield risk assessment reports.

As a result, it becomes crucial to create frameworks to help manage transnational disasters. However, up until now INTERPOL does not have a framework to manage its operation in all phases of transnational disasters.

1.2 Workplace-based problem

The lack of a crisis management framework for INTERPOL to manage transnational disaster.

The absence of a framework has generated several difficulties and obstacles for INTERPOL in responding to crisis and disaster including: (1) INTERPOL staff have reported experiencing psychosocial barriers (e.g. nervousness, stress, anxiety, demotivation, and losses in human potential) during meetings to decide the deployment of Incident Response Teams (IRTs), the experience of which may be exacerbated by the absence of an appropriate framework; (2) there are potential conflicts and uncertainties in governance mechanisms at INTERPOL (e.g. the difficult of identification, assessment, prioritization, and mobilisation of resources and services from/to 190 member countries); (3) The absence of a blue print or overarching guide to key factors, key indicators, key relationships, which INTERPOL personnel can use as a guide to help them make sense of tasks/issues to deal with when preparing, responding, recovering, and mitigating to transnational disasters or crisis under aegis of INTERPOL; (4) Potential misunderstandings about the requirements for essential data and information on the management of a transnational disaster, that are neither available nor ready to access generating barriers to create or integrate INTERPOL systems and databases; (5) without the identification and recognition of the key factors, which are meaningful segments of information to build a framework, INTERPOL will struggle to develop a shared view nor a behaviour pattern of their member countries in cases of transnational disasters; (6) the absence of correct identification about the governance mechanisms available in a framework has produced difficulties for INTERPOL to manage the vital information related to the structures, policies, norms, and regulations used in different cases of crises or disasters; (7) transnational disasters and crises can involve relationships between different organisations who work together in a multiagency network mobilising resources and services, sharing information, knowledge, skills, and experiences, and without a comprehensive framework to recognise these relationships INTERPOL cannot participate

of multi-agency networks in a more effective way; (8) No international organisation or country is capable to manage all kind of disasters or crises alone. Therefore, it is crucial to build a framework in order to identify the main stakeholders that have interest or concern in INTERPOL's success with regard to the management of transnational disasters; (9) financial uncertainty is a risk and needs to be managed by any kind of organisation engaged in transnational disaster or crisis. However, the lack of a crisis management framework, that includes key factors to manage finance arrangements in cases of transnational disasters, makes the risk management at INTERPOL more complex and challenging; (10) transnational cooperation can help the world community to more effectively manage risk reduction and limit the impacts of natural and man-made disasters. Nonetheless, the absence of a framework for INTERPOL to establish a clear link between transnational cooperation and its barriers/facilitators makes the management of disasters at INTERPOL a difficult task.

1.3 Research context

It is important to emphasise this doctoral research is an original study and focus on the management of real life transnational disasters within the INTERPOL context. The inclusion criteria to the research cases are different types of disasters, mass fatalities involving different foreign nationals configuring a transnational disaster, full participation and development of INTERPOL teams, national interest demonstrated via request or appeal to INTERPOL, multi-agency cooperation, plentiful amount of data, and international social repercussions. Therefore, this doctoral research will use the case study method (Creswell, 2013; Yin, 2009) to investigate two different real cases involving transnational disasters under umbrella of INTERPOL and according to the inclusion criteria aforementioned. The rationale to choose the case study as research strategy in this thesis is shown in Section 3.3.2.

- Case 1: Tsunami in Indian ocean, specifically in Thailand, 2004, about 5,000 fatalities, approximately 2,400 were foreign nationals from 36 different nations, participation of INTERPOL and different multi-agencies (see details in Chapter 3).
- Case 2: Air France air crash in Brazil, 2009, 228 fatalities, 169 were foreign nationals from 33 different nations, participation of INTERPOL and different multi-agencies (see details in Chapter 3).

1.4. Research questions

Central Question

- What are the key factors to consider in developing a crisis management framework for INTERPOL in order to support the management of transnational disasters?

Complementary questions

1. What are the governance mechanisms adopted by INTERPOL to manage transnational disasters?
2. What resources and services does/should INTERPOL mobilise in transnational disasters?
3. Who are the key stakeholders in cases of transnational disasters?
4. What are the finances and funding arrangements used by INTERPOL in cases of transnational disasters?
5. How does INTERPOL create formal/explicit and informal/tacit relationships within the crisis and disaster management?
6. What are the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL?

1.5. Objectives

The achievement of the objectives will help to address the central and complementary questions as well as to put in practise the answers to these questions, as follows:

- Understand and critically reflect upon the key terms related to transnational disasters and their applications within the INTERPOL environment. This objective will help to clarify what the term transnational disaster means since it takes part of the central question and complementary questions 1 to 4, and 6.
- Carry out a conceptual development and literature review on core themes that affect INTERPOL actions in the transnational scenario. This objective will help to build a conceptual base to better understand how INTERPOL manages transnational disaster taking into account relevant aspects such as crisis management, disaster management, multi-agency network, and transnational cooperation. Therefore, this objective will help to address the central question and complementary questions 1 to 6.
- Develop a matrix of transnational disasters requiring the intervention of INTERPOL, based on existing classifications and taxonomies of disasters. This matrix should assist INTERPOL to manage more effectively its resources and services before, during, and after a disaster helping to address the complementary question 2.

- Map out the role of INTERPOL as part of a multi-agency network of crisis management that connects police forces and other international organisations in the aftermath of a transnational disaster. Therefore, this objective will help to address the central question and complementary questions 1, 5, and 6.
- Identify the main barriers to, and facilitators of effective multi-agency working within the context of transnational disasters. This objective will be crucial to answer the complementary question 6.
- Cluster the emerging codes into categories (themes). The outcomes will be presented in tables, schemas, and figures as part of a ‘static’ structure to better understand the processes by which transnational disasters may be managed. This objective will help to address the central question and complementary questions 1 to 6.
- Create visual diagrams highlighting the relationships between concepts and categories that emerged from data analysis. The outcomes will be class diagrams using the Unified Modeling Language – UML (ISO/IEC, 2012; Nogueira, 2004) as part of establishing a blue print for a ‘dynamic’ structure to manage transnational disasters more effectively. This objective will help to address the central question and complementary questions 1 to 6.
- Create a crisis management framework for INTERPOL to manage transnational disasters comprised of both ‘static’ and ‘dynamic’ structures. Therefore, this objective will help to address the central question and complementary questions 1 to 6.
- Critically reflect and present findings and discussions to INTERPOL based on the proposed crisis management framework and its priorities for action. This objective will help to put in practise the answers of the central questions and complementary questions 1 to 6.
- Propose recommendations to INTERPOL and its member countries based on the crisis management framework and its findings. This objective will help to put in practise the answers of the central questions and complementary questions 1 to 6.

1.6. Contributions and benefits

Practical/Professional level

For INTERPOL and its member countries:

- INTERPOL does not have a framework to crisis management in order to assist its member countries in cases of transnational disasters. Thus, this study and its results will be indispensable to fill the interorganizational gap involving the lack of framework over time as much as to implement strategic measures related to crisis and disaster management at INTERPOL taking into account the priorities for action. This research will also offer an original contribution presenting a crisis management framework to legitimate INTERPOL's activity before, during, and after transnational disasters. In addition, this study will provide recommendations to INTERPOL increases and enhances its crisis and disaster management capability.

For leaders, managers, policy makers, and practitioners:

- A solution to the workplace problem presented in this research will help managers and leaders to create, lead, and manage crisis management in different practical contexts related to transnational disasters. The solution will be based on a comprehensive framework that can be easily generalised to other types of disasters. In the strict sense, this research will provide leaders, managers, policy makers, and leaders with an original contribution preventing and mitigating transnational disasters through an innovative framework for crisis and disaster management. In the broad sense, the results will assist managers and practitioners to avoid predictable mistakes in the whole crisis and disaster lifecycle.

Theoretical level

This study will substantially contribute to professionals, practitioners, academics and researchers to:

- Conceptualise, design, and implement applied research for the generation of professional knowledge and to the develop the skills base to transnational cooperation in disaster response. These steps intend to bring the areas of professional expertise together with the general skills and capabilities required by international organisations during the transnational cooperation.
- Develop understanding of the academic sense (epistemological and ontological) related to multi-agency network and transnational cooperation within the context of the disaster research.

- Use case study method in order to find out crisis and disaster management concepts and categories creating a structure of research and inquiry as well as generating new knowledge (Creswell, 2013; Easterby-Smith et al., 2012).
- Identify future avenues for research related to crisis management, disaster management, multi-agency network, and transnational cooperation.
- Re-focus the business school agenda through the application of mode 2 of research to crisis and disaster management taking into account the international cooperation.
- Develop understanding on how to create and implement a formal notation for data storing involving multiple cases studies. This notation is used to facilitate the identification, localization, and traceability of the collected data in qualitative researches.
- Use the techniques of axial coding, triangulation, cross-case analysis, and generalizability through multiple case studies applying them in the context of crisis and disaster management.

1.7 Key terms

1.7.1 Crisis

The origin of the term crisis comes from Greek “*krisis*” and means decision, a time of intense difficulty, danger, disagreement, confusion, or suffering when problems must be solved or important choices and judgments must be made (Oxford University Press, 2015; Cambridge University Press, 2015). In the management and business administration context, several authors have widely explored the term crisis according to their specific spheres of activity. Pearson and Clair (1998, p.60) define crisis in the organisational context as “a low probability, high impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effects and means of resolution, as well as by a belief that decisions must be made swiftly”. Gregory (2005, p. 313) explores crisis as an event characterised by “high consequence, low probability, overlaid with risk and uncertainty, conducted under time-pressure, disruptive of normal business and potentially lethal to organizational reputation”. In turn, Raftari et al. (2011, p.1923) outlines crisis as “a condition that disrupts the original system of order or parts of it named sub-system and disarranges its stability”. Grounded in the practical context of crisis, the International Institute for Crisis and Disaster and Risk Management argues that crisis is

“a crucial point or situation in the course of anything; a turning point; an unstable condition in which an abrupt or decisive change is imminent” (ICDRM, 2010, p.25). As a result, it is possible to infer that there is no consensus around the definition of the term crisis.

Several authors identify a lack of consensus about the concept of crisis. According to Paraskevas (2006) the use of term crisis varies depending on the circumstance in which it is being applied and the researcher’s context. Elliott and Macpherson (2010) reveal a complementary viewpoint on this lack of consensus when they mention that crises depend on those acting within them in order to promote flexibility and innovation to translate the theory into practice. Thus, a crucial problem concerns ambiguities in the term crisis is that several authors define their characteristics taking into account the symbolic impact of an event and the resulting challenge to predominant norms (Elliott and Smith, 2006).

Classifying events as crisis

Although there is no consensus about the term crisis, this thesis investigates an extensive literature and there appears to be now a reasonable level of agreement in the literature about the essential elements to consider incidents, events or situations as crises (see Table 1.2). Therefore, it is necessary to create a process to identify these key elements. This process was created based on the following four steps.

Step 1 – Extraction of general definitions

The first step was to find out a set of frequently used definitions, as presented in Table 1.2. The identified crisis definitions were rooted in the existing crisis literature by several authors. A study of the crisis domain was first compiled by investigating a representative collection of some existing definitions (16 in total) elaborated by scholars and practitioners in different domains. This gave a broad knowledge of the key elements to define “crisis”. The sources of these definitions with its essential elements were obtained from University of Liverpool Online Library, Scopus, Web of Science, and Google Scholar. The total of citations of each literature was obtained from Google Scholar in April/2015. Table 1.2 is organised in decreasing order by number of citations.

Table 1.2 – Key elements used in crisis definitions according to different authors/sources

Definition	Source/author	Cited by	Domain	Key element
1.	Mishra (1995)	1333	Organisational crisis	Major threat Little time to respond Ill-structured situation Exceed the organisational capacity
2.	Weick (1988)	1143	Crisis Management	Low probability High impact Threaten the fundamental goals
3.	Pearson and Clair (1998)	1011	Crisis management	Low probability of occurring High impact Threat the viability of the organization Ambiguity of cause, effects and means of resolution Decisions must be made swiftly
4.	Hermann (1963)	546	Organisational crisis	Threaten high-priority goals Restrict the amount of time available for response Surprise the members of the by its occurrence
5.	McConnell and Drennan (2006)	149	Crisis management	Unexpected threats High uncertainty Urgency in decision making
6.	Mitroff et al. (1988)	136	Organisational crisis	Low probability of occurring High-consequence Threaten Exhaustive damage
7.	Brockner and James (2008)	55	Organisational crisis	Low probability of occurring Highly ambiguous situation Surprise to organisational members Fast decision or judgment to improve the organisation
8.	Smith and Elliott (2006)	48	Crisis management	Emergent properties Complex Non-linear Damaging event Affect a considerable proportion of the organisation Spatial and temporal dimension Exceed an organisation's abilities to cope with
9.	Brecher (1979)	45	International crisis	Threat to basic values Low probability of occurring Finite time for response
10.	Veil (2011)	28	Crisis management	Non-routine event High levels of uncertainty Threat to an organization
11.	Elliott and Macpherson (2010)	21	Learning from crisis	Low probability of occurring High impact Suddenness
12.	Gregory (2005)	19	Crisis in public affairs	Low probability of occurring High consequence

Definition	Source/author	Cited by	Domain	Key element
				Risk Uncertainty Time-pressure Disruption of normal business Potentially lethal to organisational business
13.	ICDRM (2010)	19	Disaster management	Ill-structured condition Abrupt decision Damage event
14.	UNISDR (2009)	16	Disaster management	Threatening condition Fast decision and action Exceed the organisational capacity
15.	Raftari et al. (2011)	11	Disaster management	Exceed organisational resources Damage event Threatens essential goals Limited time to for decision. Surprises the elements
16.	BIS (2014)	9	Crisis in public business	Non-routine situation Exceeds the organisational capacity of everyday business Threatens the operation, safety and reputation of an organisation

Step 2 – Reconciliation of candidate key elements

Various key elements found in Table 1.2 are synonyms one each other or have the same semantic context in the field of crisis research. It is important to highlight that some of the terms studied and presented here cannot be synonyms in other contexts. Hence, it is useful to make a reconciliation of these terms in order to avoid misunderstanding and duplicates, as following:

- (i) Uncertainty also represents: surprise, unexpected, sudden event, ambiguity.
- (ii) High-impact also represents: high consequence, potentially lethal to organisational business.
- (iii) Time pressure also represents: fast decision-making, little time to respond, temporal dimension, finite time to take action, emergency, temporal dimension.
- (iv) Threat also represents: risk, threaten to the viability of individuals, organisations, communities, or nations.
- (v) Non-routine also represents: disruption of normal business, abnormal event.
- (vi) Ill-structured also represents: non-linear event, complexity.

Step 3 – Listing of candidates for key elements using frequency

It also becomes important to create a short-list of key elements within definitions catalogued in Table 1.2 and according to the reconciliation process. The candidates will be elected using frequency presented in Table 1.3.

Table 1.3 – Key elements of crisis distributed by source and frequency

Key element of crisis	Source																Frequency
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Threat	✓	✓	✓	✓	✓	✓			✓	✓		✓		✓	✓	✓	12
Time pressure	✓		✓	✓	✓		✓	✓				✓	✓	✓	✓		11
Uncertainty			✓	✓	✓		✓			✓	✓	✓			✓		8
Low probability		✓	✓			✓	✓		✓		✓	✓					7
High impact		✓	✓			✓		✓			✓	✓					6
Exceed capacity	✓							✓						✓	✓	✓	5
Damage event						✓		✓					✓		✓		4
Ill-structured	✓							✓					✓				3
Non-routine										✓		✓				✓	3
Emergent properties								✓									1
Spatial dimension								✓									1

Process to create a candidate list:

It is a way of quantifying from a small sample of studies, how a qualitative term is to be used. Firstly, calculate the frequency results for all key elements as shown in Table 1.3. Secondly, it is required to use a Frequency-Based Selection (FBS) for all 16 sources/authors of definitions. This FBS is a function to evaluate the importance of each key element found in the definitions.

$$FBS(x) = \frac{\text{Frequency of key element}}{\text{Total of key elements in the set of sources}} \times 100\%$$

where, *x* is a key element.

Examples of FBS:

$$FBS(\text{Threat}) = 12/16 = 0.75 \times 100 = 75\%$$

$$FBS(\text{Time pressure}) = 11/16 = 0.6875 \times 100 = 68.75\%$$

$$FBS(\text{Low probability}) = 7/16 = 0.4375 \times 100 = 43.75\%$$

FBS (High impact) = $6/16 = 0.375 \times 100 = 37.50\%$

FBS (Spatial dimension) = $1/16 = 0.0625 \times 100 = 6.25\%$

The complete calculation of FBS for each key element is illustrated in the frequency graph shown in Figure 1.4.

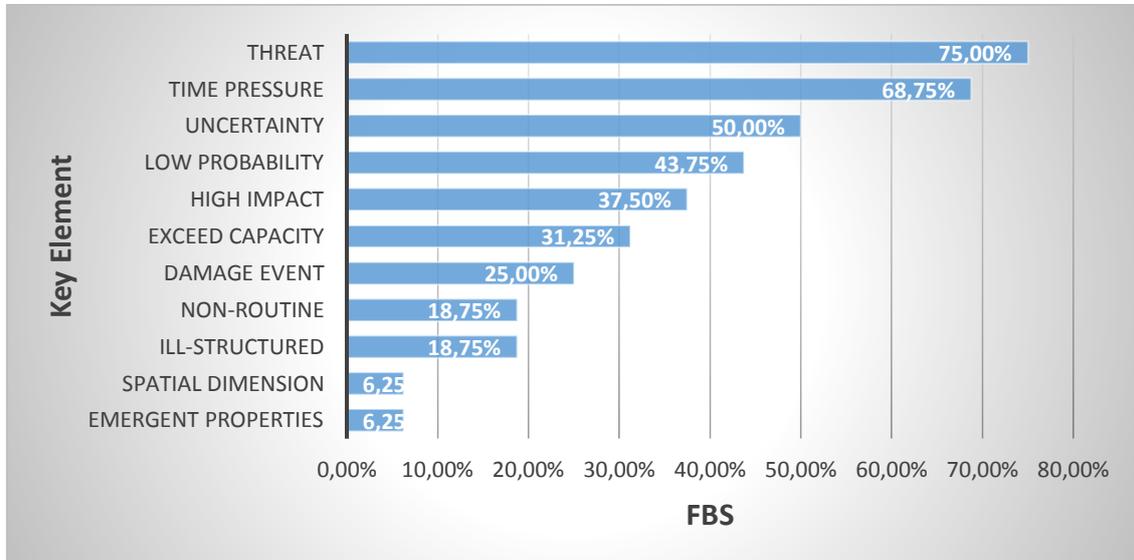


Figure 1.4 – FBS for 11 key elements found in crisis definitions

Step 4 – Selection of the key elements

The premise is that the best key elements are formed by the most frequent in the sources of definitions. Table 1.3 denotes which elements are linked to which sources/author(s) and the frequency with which these elements appear. At this moment, it is necessary to select the candidates using a Confidence Factor (CF) based on their FBS. It is defined five categories of CF:

- I) Very strong (FBS result: 100% – 70%)
- II) Strong (69% – 50%)
- III) Moderate (49% – 30%)
- IV) Mild (29% – 11%)
- V) Very Mild (10% – 0%)

For the purpose of this study, it will be only considered as key elements those that have CF very strong, strong, or moderate (i.e. from 100% to 30%). The selected/elected key elements to consider an event as crisis are time pressure, threat, uncertainty, low probability, high impact, and exceed capacity, as presented in Figure 1.5.



Figure 1.5 – Crisis and its key elements

Crisis in this thesis

A widely accepted viewpoint is that crises may be differentiated from other events by the challenge they present to established assumptions and mechanisms for response and mitigation (Elliott, 2009). In order to clarify and avoid any kind of misunderstanding, this study uses the six most frequent key elements (see Figure 1.5) and proposes the following definition to crisis:

Crisis is an uncertain event with low probability of occurring and high impact, which threatens the individual, organisation, community, or nation, exceeding its response capacity and demanding fast decision-making.

1.7.2 Disaster

What is a disaster?

Over the years, a wide spectrum of social, psychological, and management literature has been published regarding disasters. The origin of the term disaster comes from the Latin,

pejorative prefix *dis-* (expressing of negation) + suffix *astrum* (star). Thus, the root of the word disaster ("ill-starred event" in Latin) is astrological, a calamity due to an unfavourable position of a planet. Etymologically, disaster is an unexpected event that produces great harm, damage, death, or serious difficulty (Oxford University Press, 2015; Cambridge University Press, 2015).

First and foremost, disaster as defined within this thesis, is a specific kind of crisis with an additional spatial dimension across boundaries, communities, countries, and not confined by organisational boundaries. A number of studies have set out definitions and conceptualisations on the term disaster. Some authors examine the term disaster based on different perspectives. Turner (1976, p.381) in his seminal paper presents a notion of disaster that is very close to later definitions of crisis. He defines disaster from a social perspective and posits

“a disaster in the sociological sense involves a basic disruption of the social context and a radical departure from the pattern of normal”.

Janssen et al. (2010, p.1) explores another facet of the term disaster setting out as

“a continuously unfolding situation, marked by changes in urgency, scope, impact, the types of appropriate responders, and the responders’ needs for information and communication”.

Verchick (2010, p.6) offers a different perspective that exclude armed conflict from disaster defining as

“a serious disruption of the functioning of society, which poses a significant, widespread threat to human life, health, property or the environment, whether arising from accident, nature or human activity, whether developing suddenly or as a result of long-term processes, but excluding armed conflict”.

Other researchers focus on the social role and its impact upon a community or society affected by disasters. Coppola (2015) claims that disaster occurs when a hazard risk occurs and overwhelms the response capability of a community.

In this scope, not all adverse events are disasters, only those that overwhelm the community response capacity. Benson and Clay (2004, p.5) argues

“Disaster is the occurrence of an abnormal or infrequent hazard that affects vulnerable communities or geographic areas, causing substantial damage, disruption and perhaps casualties, and leaving the affected communities unable to function normally”.

Taylor (1987, p.535) also offers a social perspective acknowledging disaster as

“an unexpected event that has a social stressor variable to which a variety of people respond according to the extent, the duration, the frequency and the type of their involvement”.

The importance of the term disaster is also recognised by a number of relevant international agencies specialised in disaster management and has the same sociological viewpoint taking into account the society and community affected by disasters. The United Nations Office for Disaster Reduction (UNISDR, 2009, p.9) defines disaster as

“a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources”.

The International Federation of Red Cross and Red Crescent Societies (IFRC, 2012, p.2) in the same vein acknowledges disaster as

“a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community’s or society’s ability to cope using its own resources”.

The Institute for Crisis, Disaster, and Risk Management (ICDRM, 2010, p.30) provides a social application of the term disaster and defines as

“accidental or uncontrollable events, actual or threatened, that are concentrated in time and space, in which a society undergoes severe danger and incurs such losses to its members and physical appurtenances”.

The Emergency Management Australia (EMA, 2004, p.9) reinforces this sociological approach contending that

“Disaster is a condition or situation of significant destruction, disruption and/or distress to a community”.

Thesis’ approach to disaster

For the purpose of this thesis, disaster is a particular form of crisis; therefore, its definition is very close to crisis. Although the several definitions of disaster presented previously, INTERPOL represents the scope of this study and has its own definition. Furthermore, the INTERPOL’s definition of disasters is synergy with the academic and organisational perspectives shown before. Therefore, this thesis will use the INTERPOL definition to disaster, as follows:

“Disaster is an unexpected event causing the death of many people, which exceeds the response capacity in the affected member country”

(INTERPOL, 2014a, p.8).

This thesis will only investigate and analyse those disasters under umbrella of INTERPOL according to its legal attribution, roles, and responsibilities. It is possible to identify three characteristics in the INTERPOL definition, which separate a disaster from other events. First, disaster is an “unexpected event”, and thus it is an uncertain, surprise, or sudden event. It is not a routinely situation or part of the normal set of events likely to happen according to the space and time dimension, i.e. it does not always happen in the same place and time. For example, endemic disease, famine, poverty, and drought are not under the umbrella of INTERPOL because they are not unexpected events neither are part of the INTERPOL responsibilities. Second, the sentence “causing the death or injuring of many people” is a precondition for INTERPOL involvement in cases of disasters. This characteristic relates to effects or impact on people, which includes death, injury, and resulting hardship. For instance, one of the roles of INTERPOL in the disaster management context is establishing fast, certain and confident disaster victim identification (DVI) and delivering confirmation to the surviving family members. Third, the last sentence of the INTERPOL definition “which exceeds the response capacity in the affected member country”. This means that if a disaster occurs in a country that the needs are greater than its own response capacity, a support by disaster response teams from other countries can be requested through INTERPOL channels and networks (see Figure 1.6). More details on how is the INTERPOL support through participation in

multi-agency networks or transnational cooperation can be seen in sections 2.4 and 2.5 respectively.

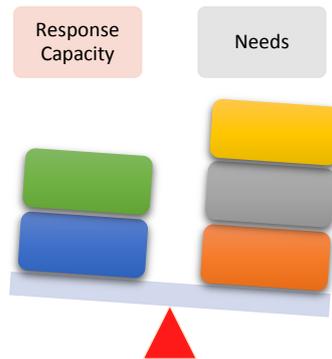


Figure 1.6 – The relationship between needs and response capacity in a disaster situation

Disaster Classification

An essential theoretical-practical aspect to lead with disaster is how to organise, typify, and classify disasters grouping them by categories. There are two major reasons to create this classification or taxonomy of disasters. First, scholars, practitioners, organisations, and disaster management operators seek to organise the diverse types of disasters into classes and to identify their relationships. Second, in a practical context related to information system, databases have to deal with classifications of data in order to offer an effective and efficient mechanism to benefit users, tools, and systems (BOND, 1999; FEMA, 2014). Therefore, a vast literature produced by academics, practitioners, and specialised organisations has classified or clustered disasters using different criteria, according to their missions, aims, competencies, and responsibilities (Berren et al., 1980; Hogan and Burstein, 2007). INTERPOL uses explicitly a two-dimensional classification of disaster by nature and identifiable group of victims (INTERPOL, 2014b), as presented in Figure 1.7.

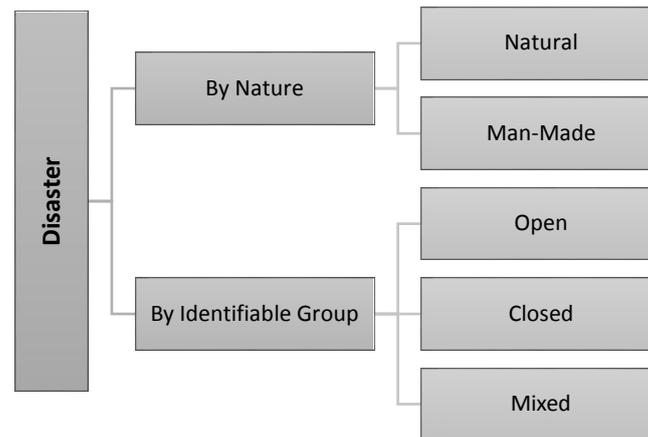


Figure 1.7 – The two-dimensional classification of disaster according to INTERPOL

I) Classification by nature:

a) Natural disasters³. They are provoked by nature, such as: tsunamis, avalanches, landslides, earthquakes, eruptions, typhoons, hurricanes, tornadoes, floods, storms, etc.

b) Man-made disasters⁴. They are provoked by humans, such as: aircraft crash, train crash, maritime accident, plant accidents, terrorist attack using hazardous materials (chemical, biological, radiological, nuclear, and explosive), etc.

II) Classification by identifiable group of victims:

a) Open disaster. It is a major catastrophic event resulting in the deaths of a number of unknown individuals for whom no prior records or descriptive data are available. It is very difficult to obtain information about the actual number of victims following such events.

b) Closed disaster. It is a major catastrophic event resulting in the deaths of number of individuals belonging to a fixed, identifiable group such as an aircraft crash with passenger list.

c) Mixed. Combinations of the two forms mentioned previously (e.g. aircraft crash in a residential area).

³ Natural disaster: any disaster produced primarily/originally by forces of nature. The trigger event is the forces of nature.

⁴ Man-made disaster: A disaster not produced primarily by forces of nature. The trigger event is the human being.

Therefore, based on the INTERPOL classification it is possible to create a two-dimensional matrix categorising several types of disasters. See Table 1.4 with more than 30 examples of disasters classified into INTERPOL two-dimensional matrix.

Table 1.4- Two-dimensional matrix of disasters with more than 30 examples according to INTERPOL classification

	Open	Closed	Mixed
Natural	Avalanches, Earthquakes, Eruptions, Typhoon, Wildfires, Hurricanes, Tornadoes, Floods, Landslides, Storms, Tsunamis	Landslide in a school, Boat sunk due to storm, Tornado in a factory	Earthquakes in urban zones
Man-Made	Terrorist attack in a metro, or bus, Explosion of hazardous materials (chemical, biological, radiological, nuclear, and explosive)	Aircraft crash, Train crash, Maritime accident, Plant accidents, Terrorist attack in an aircraft, a cruise, a train	Aircraft crash in a residential area, Terrorist attack in trade zones (e.g. trade centres, factories, hotels).

1.7.3 Transnational disaster

People, organisations, and nations can take action and intervene on disaster in different levels, such as local, national, international, and transnational (Nogueira, 2015a).

- (i) Local disaster: it occurs when provincial or state response entities can manage the consequences of the disaster as a whole.
- (ii) National disaster: it takes places when it is necessary the intervention of the national government entities to manage the consequences of the disaster.
- (iii) International disaster: it happens when the national government is not capable to manage the consequences of the disaster and accepts the assistance and relief of other national governments. Therefore, it refers to international cooperation among nation-states.

(iv) Transnational disaster:⁵ it occurs when the actions taken extend or operate across national boundaries by a set of international assistance and relief entities since the national government or several national governments are unable to manage the consequences of the disaster (Bartlett and Ghoshal, 1998; Fijnaut, 2000; Hearn, 2004). It refers to international entities (usually, international NGOs) that act "transcending" the idea of nation-states or national governments but under the authorization and permission of them (Javidan, 2013; McConnell and Drennan, 2006). Hence, it is a global cooperation between entities (public, private, and NGO organisations) that transcends the national boundaries and the concept of nation-state (Bartlett and Ghoshal, 2003; Crowe, 2011).

Thesis' approach to transnational disaster

The transnational disasters are increasingly complex due to several factors and there is not an extensive study on transnational issues. Nonetheless, some researches point out some complex factors to the term transnational (Eom, 1994; Nogueira, 2015a; Smith and Elliott, 2007). For instance, factors related to the massive circumstances in which they usually arise, the number of victims, the scientific and specialised knowledge required, the social networks, the level of environmental destruction, the engagement of different transnational organisations with different roles and interests, and the cross-border nature of the damage caused since many disasters in one country can swiftly spread to others in a world risk community.

Thus, in the context of this research, the transnational need to be very objective and based on the activities and responsibilities developed by INTERPOL around the world. Therefore, for this study, the transnational term is applied to disaster and defined as follows:

Transnational disaster is a natural or man-made disaster caused or suffered by foreign citizens in one or more countries, or when the effects of the disaster exceed the response capacity in the affected country.

⁵ Transnational means something extending or operating across national boundaries (Oxford University Press, 2015; Cambridge University Press, 2015). In the context of this research, there is a difference between transnational and international. Whereas international comprises the relations between the government of one nation-state with the government of another nation-state, or of several nation-states, transnational, go further by ignoring the differences between nations operating on a truly global level involving public, private, and non-governmental actors.

1.7.4 General secretariat (GS)

In order to further strengthen the physical presence across the world, INTERPOL is comprised of the General Secretariat (GS), the National Central Bureaus (NCBs) in member countries, and the Regional Bureaus (RBs) in some regions of the globe. The General Secretariat is the headquarter of INTERPOL. It is located in Lyon/France and operates 24 hours a day, 365 days a year. All INTERPOL central units and directorates are connected and located at the General Secretariat, including command and control centre, operational directorate, strategic planning directorate, police database directorate, and police forensic directorate with its disaster unit.

1.7.5 General assembly (GA)

The General Assembly (GA) is composed of representatives appointed by the police forces of INTERPOL member countries. It meets once a year and takes all the major decisions affecting general themes such as governance mechanisms, mobilisation of resources and services, finances, and programmes of activities. The General Secretariat implements GA's decisions.

1.7.6 National central bureau (NCB)

The centre of every INTERPOL member country is a National Central Bureau (NCB), linking national police with the global organisational structure. It is typically a division of the national police agency or investigation service and serves as the contact point for all INTERPOL activities in the field. Therefore, there are 190 NCBs around the world.

1.7.7 Regional bureau

Recognizing the value of bringing together police within a region to share experiences and tackle common issues, INTERPOL has seven Regional Bureaus: Argentina (Buenos Aires), Cameroon (Yaoundé), Côte d'Ivoire (Abidjan), Kenya (Nairobi), El Salvador (San Salvador), Zimbabwe (Harare), and Thailand (Bangkok).

1.7.8 Framework

The term framework can have various meanings and interpretations depending on the area of application. Overall, framework means an essential structure around which a set of ideas or beliefs is used to plan or decide about something (Cambridge University Press, 2015; Oxford University Press, 2015). Anderson and Woodrow (1989) clarifies that a

framework sets out categories of factors that should be considered for a particular phenomenon and these categories must be comprehensive enough to cover all the important variables. Rowley and Slack (2004) argues that frameworks are useful tools in developing an understanding of a subject area and in identifying key concepts in a collection of documents or research area.

Thesis' approach

For the purpose of this study,

Framework is a structure that forms a theoretical-practical scaffolding containing categories, concepts, and relationships of the way to view a particular phenomenon upon which researchers and managers use to develop their activities as well as to plan or make decisions.

This thesis offers an innovative Crisis Management Framework (CMF) for INTERPOL to manage transnational disasters divided in two dimensions: static and dynamic.

- (i) *Static CMF*. It is a structure with relevant concepts (codes) and categories (themes) that emerged from data analysis and will be used to develop the management activities as well as to plan or make decisions at INTERPOL.
- (ii) *Dynamic CMF*. It is a structure comprised of the relationships between concepts and categories represented in class diagrams developed using the Unified Modeling Language – UML (ISO/IEC, 2012; Nogueira, 2004). These class diagrams will be used to give a unified view of common building patterns (concepts and categories), to identify the actions that can be applied in all transnational disasters under the auspices of INTERPOL, and to build practical information systems and databases for crisis and disaster management.

1.8. Thesis outline

The outline is an organisational guide of this thesis and is structured into six chapters. The following is a brief description and summarisation of each.

Chapter 1

Introduction: overview, workplace-based problem, research context, research questions, objectives, contributions and benefits, key terms, thesis outline.

Chapter 2

Conceptual Development and Literature Review: crisis management, disaster management, multi-agency network, transnational cooperation.

Chapter 3

Methodology: philosophical scaffolding, research design, sense making, research generalizability, research quality, ethical considerations.

Chapter 4

Crisis Management Framework: static CMF, dynamic CMF, comparison between CMF and other international frameworks.

Chapter 5

Findings and discussions: priorities for action, recommendations, CMF Information System (CRIMAFIS), answers to research questions, impacts of CMF.

Chapter 6

Conclusion.

1.9. Conclusion

This introductory chapter provided the reader with a preliminary and explanatory vision of the major disasters portraying a rich picture of the complexity in managing transnational disasters. The role of INTERPOL in disaster management was depicted because it is the application domain of this study and the world's largest international police organisation and a leader in disaster management engaging its 190 member countries within the international disaster networks around the globe. Some transnational disasters with full engagement of INTERPOL teams were presented in order to show the relevance of INTERPOL in the international scenario. The workplace-based problem and the research context were highlighted. The research questions (central and complementary) as well as the objectives of the research were paid attention. Contributions and benefits of this study at theoretical and practical levels were presented. Subsequently, key terms underlying the study were critically discussed, and in doing so misunderstanding and wrongful interpretation were eliminated or reduced. At last, this chapter revealed the thesis outline.

The following chapter aims to provide the reader with an in-depth conceptual development and critical literature review upon crisis management, disaster management, multi-agency network, and transnational cooperation that are core themes in this doctoral thesis. In addition, it goes further addressing the barriers and facilitators, which contribute to build a crisis management framework to transnational disasters from a theoretical viewpoint.

Chapter 2

Conceptual Development and Literature Review

2.1 Introduction

As the relevant literature on crisis and disaster management grows, it increasingly fragments in terms of theory and practice. Furthermore, there is also a gap to connect conceptual elements in a way which provides scholars and practitioners with a common vision on the studied phenomenon (Aram and Salipante, 2003; Hodgkinson and Rousseau, 2009; Shah and Corley, 2006).

This chapter provides the structure/content for the whole research based on literature and personal experience depicting a conceptual development and critical literature review in order to explain the main topics to be studied. The task here is to elaborate a conceptual content in order to support the development of the research questions alongside reference to how my own experiences at INTERPOL have shaped the initiation of this study. This chapter also provides an explanation of why the structure/content of this thesis takes the form and shape it does. It relates to both on the review of literature and the personal experience of the researcher and their influence upon conceptual development. Another task is to elaborate a conceptual content in order to highlight how the research questions emerged, as graphically presented in Figure 2.1. Firstly, INTERPOL does not have a crisis management framework to face transnational disasters generating several organisational difficulties, as depicted in Section 1.2 (Workplace-based problem). However, as police forensic director and senior manager of the disaster unit at INTERPOL, I have a vast practical experience managing dozens of transnational disasters around the world. Likewise, several INTERPOL staff members in the disaster unit have also vast experiences in the field and could be participants in an academic research. Therefore, I was in the right place and time to develop a conceptual structure to answer the research questions and achieve the proposed objectives. Secondly, during this DBA programme the crisis and change management module supported me with key readings on crisis management and disaster management – two important topics to study before the creation of a crisis management framework to face transnational disasters. Furthermore, in the context of management, crisis is a broad term, differs from disaster in terms of its triggers events and dimensions (see details in Section 2.3.3); consequently, there are two separated topics in this conceptual development: crisis management and disaster

management. Thirdly, in a practical context, the organisational mission of INTERPOL is to manage transnational disasters in a cooperative approach which takes into account the multi-agency networks. Therefore, before developing a crisis management framework, it is also necessary to have an in-depth study on other two topics: transnational cooperation and multi-agency network. Moreover, the key elements in the research questions (governance, resources and services, stakeholders, finance and fund, formal and informal relationships, barriers and facilitators) are concerned with INTERPOL and its multi-agencies networks when cooperating transnationally to manage disasters. This fact makes this doctoral research a distinctive work.

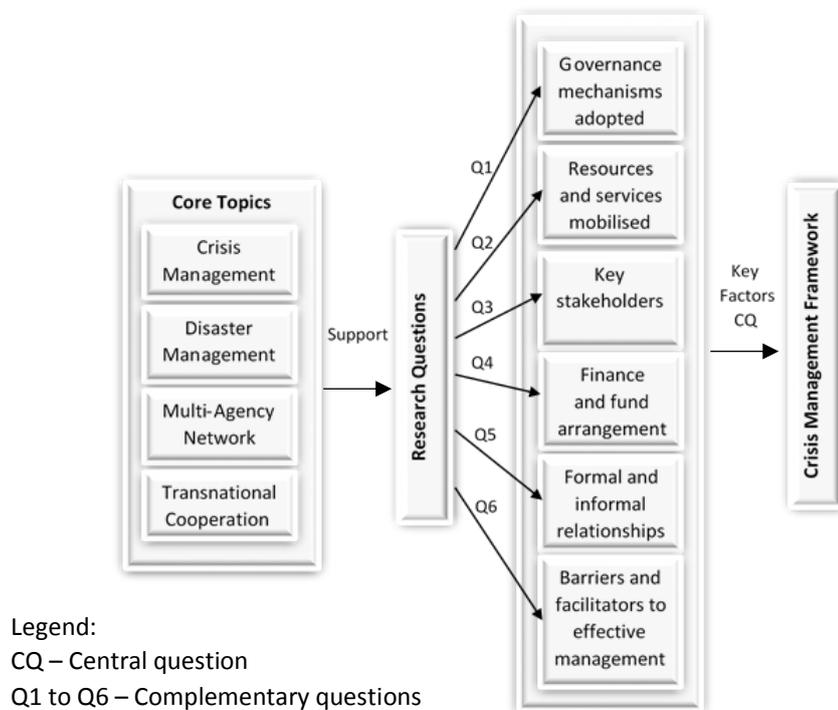


Figure 2.1 – Conceptual development in this doctoral research

Therefore, based on these four aforementioned core topics (i.e. crisis management, disaster management, transnational cooperation, and multi-agency network) a critical literature review was developed in order to support the development of the research questions as well as my own daily experiences working on these topics have helped to achieve the objectives of this study. Therefore, these four knowledge areas comprise the core topics where concepts, themes, and their relationships will emerge in order to develop the research questions and find out the key factors to consider in developing a crisis management framework for INTERPOL to manage transnational disasters, as presented in Figure 2.1.

2.2 Crisis management

Crisis Management (CM) is a term usually used to outline the way in which an organisation handles a crisis. The concept of crisis management has evolved over time, many definitions were proposed within crisis and disaster literature, and those definitions differ immensely in scope, focus, and terminology used (Houben, 2005).

The early studies of crisis management arose from the area of disaster response, noticeably on how to respond better to natural disasters (Fink, 1986; Quarantelli, 1954; Smith, 1990). Nowadays, the definition of crisis management (CM) can vary considerably from business to business, organisation to organisation, and country to country (Jaques, 2007). Some scholars explicitly centre their approaches on the pivotal role of the actors involved in CM, mainly leaders and managers. For example, Pearson and Clair (1998) sets out that CM is a systematised effort by organisational members together with external stakeholders to avoid crises or to effectively manage those that are occurring. Whereas Boin et al. (2005) mention that CM is a set of interrelated and extraordinary governance challenges, where leaders are expected to make critical decisions and provide direction in the most difficult circumstances. In addition, they highlight that when policy makers manage well a crisis, the damage has less impact in the organisation; but when they fail, the crisis effect increases. Pauchant and Mitroff (1988) advocate that some organisations are crisis prone and others crisis resistant – they see culture as the main factor in this, consequently executives who consider the necessity for changing their organisational culture should not only consider the technical aspects involved in CM but also the human and social aspects. In turn, some authors focus their studies on the conceptualisation of CM based on a processual approach. Kash and Darling (1998) claim that CM involves a process to identify, investigate and forecast crisis issues, and set different manners that an organisation could prevent or cope with a crisis. Raftari et al. (2011) posits that CM is a set of organised and systematic processes that organisations attempt to identify and forecast the potential crisis and then use preventive functions against them to diminish its effects. Other groups of researchers explore CM as a trans-organisational phenomenon that companies need to cope during their life cycle. Shrivastava et al. (1988) argue that CM has fundamental trans-organisational origins, encompassing social, cultural, and political factors, and its prevention and management cannot be achieved at the organisational level alone. Smith (1990) reinforces this broad critical reflection explaining that the most common aspect in effective CM appears to be the existence of

an intertwined global culture recognising the worldwide context, which facilitates effective communication and develops organisational support during crises. Smith also advocates that crisis management needs to acknowledge when the contingency planning has limitations to allow for more effective decision-making.

In addition, over time, the understanding CM has changed from crisis response emphasizing the operational aspect of CM as explored by several authors since decades to another approach based on prevention and preparedness, cultural antecedents, learning, and resilience. Therefore, it is necessary to review and understand the connections between CM and these other approaches.

First, regarding the connection of prevention and preparedness with CM, Jaques (2007) contends that CM should be seen not just as a reactive response when a crisis occurs, but also as a proactive way of managing embracing inter-related actions extending from response to prevention, preparedness, and recovery. Moreover, McConnell and Drennan (2006) argue that for crisis managers, where prevention and preparedness is part of their organisations, the actions on CM is easier because they do not have to fight strongly against a rigid organisational culture focused on crisis response. These authors also highlight that prevention and preparedness in CM is not a mission impossible but it is undoubtedly difficult to achieve.

Second, another aspect that need to be better understood is the connection between learning and CM. Learning involves the acquisition of knowledge and skills through experience as an asset to be passed on, and academics have studied this aspect in the context of CM. Brockner and James (2008) claims that CM should focus on redressing the organisational systems and executives, and should be in learning mode in order to perceive opportunities in crises. Smith and Elliott (2006) states that the learning process is an essential factor to generate many of the necessary conditions to effectively deal with future problems within CM. In addition, Smith and Elliott emphasise the fundamental role of learning as a means to feed the information back into the strategy process around crisis prevention and response as well as to challenge core beliefs around CM. However, during the learning process in CM, a major question arises “what are the barriers to learning from crisis?” Smith and Elliott (2007) answer this question in their exploration of some of the key barriers to learning from crisis and advocate that these barriers generate situations that allow a simple incident to escalate into a crisis. Some of these barriers,

including from different authors, is better explored and classified within multi-agency network (see Section 2.4).

Third, regarding the connection of cultural adjustment with CM, the seminal paper of Turner (1976) is one of the early research that highlights the process of cultural readjustment (i.e. adapt to a changed environment or situation) within CM, more specifically related to disasters, a topic that is fully linked with the focus of this thesis. According to Turner, a full cultural readjustment is carried out through inquiries and assessments, and beliefs and norms need to be adapted to fit the newly gained understanding of the world. Therefore, the cultural readjustment is necessary to prevent future problems in CM, and this requires a reevaluation of core assumptions, beliefs, and culturally accepted devices when disasters occur. By the same token, Pauchant and Mitroff (1988) encourage organisations to investigate their basic sense of identity such as leaders and managers can recognise the necessity for changing the organisational culture not only considering the technical aspects in CM but also taking into account the social and human aspects. Elliott and Macpherson (2010) reinforce this necessity of changing of culture in CM when they clearly posit that CM is an enacted process, and recognising lessons is not sufficient; learning must draw attention to the ability to generate resilience to cope with unpredicted high impact events, for example in cases of disasters.

Fourth, another aspect around crisis is the connection of CM with resilience. In a practical context, CM managers should advance and incorporate resilience-building processes to empower their organisations to both prevent and diminish the effects and duration of crises and disasters when they do occur. This seems as too difficult, especially when dealing with transnational crises, however efforts have been done by several scholars and practitioners. McEntire et al. (2002) claims that organisations and communities must give more attention to resilience because it has close relation to crises (mainly disasters) and their cultural, social, psychological, and particularly economic factors. Johnson and Elliott (2011) explore sources of organisational resilience through inter-organisational cooperation (public–private partnerships) considering how interconnectedness and interrelation can be joined to build resilience by enhancing the organisational capacity to prevent and respond to crises as well as they also explore how social capital provides a productive base that facilitates organisational resilience. It is important to emphasise that the framework proposed in this thesis also takes into account resilience as part of the mitigation phase of disaster. In turn, Pat and Van Dewald (2008) explains that

governments need to move away from the traditional thinking that nothing could be done to prevent crises and disasters to adopt a new developmental approach in line with global trends by integrating crisis and disaster management methodologies to build resilience in communities and areas known to be at risk. Paraskevas (2006) adds that the response system in crisis events needs to be reframed to take into account the reaction and response with broader factors based on organisational resilience, such as: the response system should allow an organisation to become more resistant to intense difficulties or danger; should enhance its capabilities to restore itself after a crisis. On the other hand, resilience is not an exclusive preoccupation of academics, researchers, and scholars of CM and DM. For example, the United Nations (UN) is also worried about how to build the resilience of nations and communities in disasters and then published the Hyogo framework that gives guidelines about the major challenges to build resilience through enhanced national and local capabilities to manage and reduce risk (UNISDR, 2005). This theoretical-practical view of resilience connected with CM is an important factor that needs to be better understood as part of the crisis management framework proposed to this thesis.

2.3 Disaster management

2.3.1 Origins of disaster management

Remembering that disaster is a kind of crisis, and consequently a subclass of crisis (see definition in Section 1.7.2), a number of scholars and researchers report rich pictures involving disaster management (DM). Early history is focused on natural disasters and the disaster management phases evolve in a cycle according to Figure 2.2. For example, the story of Noah's ark is an emblematic example of the relevance of preparedness, response, and mitigation in DM; the towns of Herculaneum and Pompeii faced an unforeseen catastrophe when the volcano Vesuvius in AD 79 began the eruption; the urban fire in Rome, 2000 years ago when the city was nearly destroyed by fire (Coppola, 2015). These historical events extol the importance of DM since the beginnings of the humanity and shows that the habitants of a community, nation, or country die and suffer with the absence of knowledge on how managing the incident, the lack of resources, the poor preparedness, and prevention on how to conduct an effective disaster management (McNutt and Leshner, 2013; Quarantelli, 1988). In the modern and contemporary era, humanity still suffers with huge natural and man-made disasters, in terms of the urgency

of globalised standards, the communication process, the exercise of authority, the development of coordination and the mobilisations of resources and services (McNutt, 2015, Nogueira, 2015a).

2.3.2 Different approaches to disaster management

After understanding the origins of DM, it becomes necessary to understand DM in some contexts. There is not a unified conceptualisation to DM because it encompasses various areas of knowledge and applications. Hence, there are several concepts and perspectives about what DM is, and this study will present a categorisation of the literature review (cognitive, processual, and multi-agency contexts) including classics and contemporaries studies. The choice of these studies takes into account the relevance that they have in the building of the proposed crisis management framework (see Chapter 4).

(i) Cognitive context

In this context, DM involves knowledge sharing and collective decision-making usually considered by a high level of complexity engaging different forms of knowledge scattered across time, space, and human resources (Anderson and Woodrow, 1989; Below, 2009; Butt et al., 2014; Chitakornkijasil, 2010). These authors also suggest that many international and national entities need to create cognitive models in order to allow effective DM activities.

(ii) Processual context

This context provides a comprehensive view exploring the fact that DM implies in a number of activities, services, and actions to be developed as a process with different phases: before disaster happens, during the disaster, and after disaster takes place (Benson and Clay, 2004; Janssen et al., 2010; Othman et al., 2014). Furthermore, these authors also reinforce that DM involves a series of actions distributed in phases or stages in order to permit a fast and effective response to unexpected events.

(iii) Multi-agency context

A number of studies have been developed in this context engaging multi-agencies (Nogueira, 2015b; Pat and Van Dewald, 2008; Salmon et al, 2011). However, this thesis is particularly interested in the viewpoint of other international agencies like INTERPOL. For instance, the United Nations through its Department of Humanitarian Affairs points out that DM is the set of policy and administrative decisions and operational actions that comprise the response to the different stages of a disaster at all levels (UNDHA, 1992). A humanitarian view of DM is also provided by International Federation of Red Cross and Red Crescent Societies when it defines DM as “the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters” (IFRC, 2012). The Asian Disaster Preparedness Center explains that DM is a balanced approach of management to reduce the consequences of disaster by addressing prevention, mitigation, response and recovery services (ADPC, 2005).

(iv) Thesis’ approach

For the purpose of this thesis, disaster is a particular form of crisis; therefore, the definition of DM used in this study is close to CM.

The view adopted here is that

Disaster management is the set of organised steps carried out to administer and diminish the effects of a disaster in order to come back to normalcy and give continuity and sustainability to individuals, organisations, communities, and nations.

2.3.3 Difference between DM and CM

There is a difference between CM and DM. CM concerns the management of a broad range of triggers events affecting individuals, organisations, communities, and nations (e.g. economic, financial, political, and legal affairs), whilst DM focus upon the management of extreme events causing fatalities/injuries and destructions. In addition, disaster is a specific kind of crisis with additional spatial dimension across boundaries of individuals, organisations, communities, nations, and not confined by organisational limits. Jaques (2007) clarifies and informs that the expression “disaster management” is

sometimes incorrectly used as a synonym for crisis management, but disaster management is more specific and involves a distinct process, usually engaging governmental entities and different authorities related to communities affected by disasters. CM is more extensive than DM and it is often used to depict situations and events that are difficult to deal with, but not necessarily destructive or catastrophic (Smith and Elliott, 2006). For example, an economic crisis is concerned with the management of crisis event itself, but it is not a disaster to be managed by DM. Consequently, based on these authors and also in the definitions in the sections 1.7.1 and 1.7.2, it is possible to infer that DM is a subset, subtype or subclass of CM.

2.3.4 Disaster management phases

There are various phases in DM that require more study and clarification. A typical disaster management includes preparedness, response, recovery, and mitigation. The disaster management phases also evolve in a cycle according to Figure 2.2.

❖ Preparedness

Preparedness is the phase to establish arrangements before disaster. It involves an incessant cycle of preparation, equipping, organizing, planning, training, exercising/simulating, assessing, and taking corrective actions (Coppola, 2015). This process often covers several tasks such as identification of critical resources, stockpiling of supplies, training first responders, education and information to prepare the community to deal effectively with disasters, and development of necessary agreements among responding agencies (EMA 2004; ICDRM, 2010).

❖ Response

Response is a phase that provides emergency aid and assistance, to reduce or eliminate the impact of disasters, decreasing the risk of damage and minimizing their possible secondary effects (Vitoriano et al., 2013; McEntire et al., 2002). Response provides emergency aid for victims (e.g. search and rescue, mass feeding, medical care, DVI). This phase also seek to reduce the probability of secondary damage such as shutting down contaminated food and water supply sources, isolating and patrolling looting-prone areas, and to speed assessment operations (e.g. damage/impact reports) (Janssen et al. 2010; Unlu, et al., 2010). Therefore, it involves the immediate efforts to attend victims, prevent

further suffering, and stop ongoing hazards. It puts in place the preparedness arrangements and plans.

❖ Recovery

Recovery is a phase that involves the post-disaster activities dealing with the consequences of the emergency or disaster. It often begins after the immediate response has ended, and can persist for months or years thereafter (Coppola, 2015; Kapucu and Van Wart, 2006). It assists the affected community in reconstruction of the basic services and physical infrastructure such as temporary settlement, debris clearance, provision of food and water, clothing, communication. It also provides restoration of emotional, social, economic, and psychological well-being.

❖ Mitigation

Mitigation (also called as prevention) is a phase to eliminate or reduce the impact of disasters, reducing their susceptibility or increasing the resilience of the affected community (Nogueira, 2015a; Othman et al., 2014). Therefore, in this phase measures need to ensure effective risk assessment and preventive actions providing service such as structural mitigation measures, disaster risk reduction, hazard and vulnerability assessment, standardization, public education.



Figure 2.2 – Disaster management cycle

2.4 Multi-agency network

Agencies and organisations usually work in isolation from one another. However, when a transnational disaster occurs its complex environment requires multiple agencies to transform from individual, serial and autonomous actors to collective, collaborative, and interdependent decision-making teams (Nogueira, 2015b). In the multi-agency environment, managers and leaders need to change their mindsets and leadership styles from centralised and individualist to decentralised and cooperative since working in transnational environments require the creation of networks in different levels of engagement across the organisational boundaries. Thus mindset and leadership style have to adapt to the requirements of a complex and uncertain context whilst engaging with other organisations facing similar adaptation issues.

In the context of this thesis,

Network is a model of knowledge representation comprised of nodes and edges that helps academics, researchers, managers, and practitioners to understand agencies/organizations and their relationships.

As argued by Gerspacher and Dupont (2007) in their studies about international police cooperation and transnational security networks, this kind of network is regularly presented as an alternative to hierarchical structures of governance since it can be more flexible, adaptable, and dynamic than hierarchies (p. 348). The adaptability, possibility of redundancy, and decentralised nature of networks can make them resilient to multi-agency efforts: removal of some members or even one part of the network will briefly impair the activities, but not stop the operational work of the whole network.

Therefore, for the purpose of this study,

Multi-agency network is a group of interconnected agencies with their respective members who work together and share resources, services, procedures, values, information, knowledge, and other relevant elements.

Notwithstanding, the complexity of multi-agency networks can significantly vary from one scenario to another and come in all sizes and shapes since local partnerships and regional groupings until transnational organisations. For instance, past decades have

observed a change towards more international cooperation toward crescent involvement of different types of agencies, such as NGOs, multinational corporations, humanitarian organisations, and philanthropic foundations (Payler and Georgeson, 2013; Tallberg et al., 2014). In fact, the globalised world is characterised by multi-agency networks and their interorganizational relationships that engages many nation-states, civilian and military agencies, and various actors connected in a transnational dimension (Babiak, 2009; Chatzigianni, 2006; Ergun et al., 2014). This demand for world-wide networks is reinforced by Happaerts et al. (2011) when they argue that in the global context, a transnational multi-agency network plays a noteworthy role influencing actions and decisions of nation-states and forming a multilateral structure to foster cooperation based upon common interests, needs, and aspirations.

Even in the multifaceted context of international disaster management, it is possible to recognise some pillars to facilitate the network workflow: (1) cooperation; (2) reciprocity; (3) mutual trust; (4) willingness to share resources, services, information, knowledge, and values among diverse agencies (Nogueira, 2015b). As discussed by Janssen et al. (2010), disaster management engaging multi-agency networks requires collaborative work among geographically distributed NGOs, public and private agencies to allow a fast, effective, and efficient response to disaster. Moreover, before, during, and after a transnational crisis or disaster, multiple independent agencies need to construct a global network across the operational, tactical and strategic echelons affecting actions and decision-making in all levels. Kapucu and Van Wart (2006) also underline that a high-performance disaster response system calls for more than contingency plans and formal relationships because it requires the creation of multi-agency operational networks to ensure interactions and auto-adaptation between agencies.

In the context of transnational disasters, the creation of multi-agency networks permits the use of technology such as computational systems and databases or the creation of new tools that facilitate the sharing and pooling of scarce resources and services, in that way avoiding duplication of efforts. In fact, international agencies usually use multi-agency networks to cooperate sharing resources, services, data, and information that cannot be matched singly or by vertical command-and-control hierarchy. An example of multi-agency network for transnational disaster in the context of INTERPOL is shown in Figure 2.3.

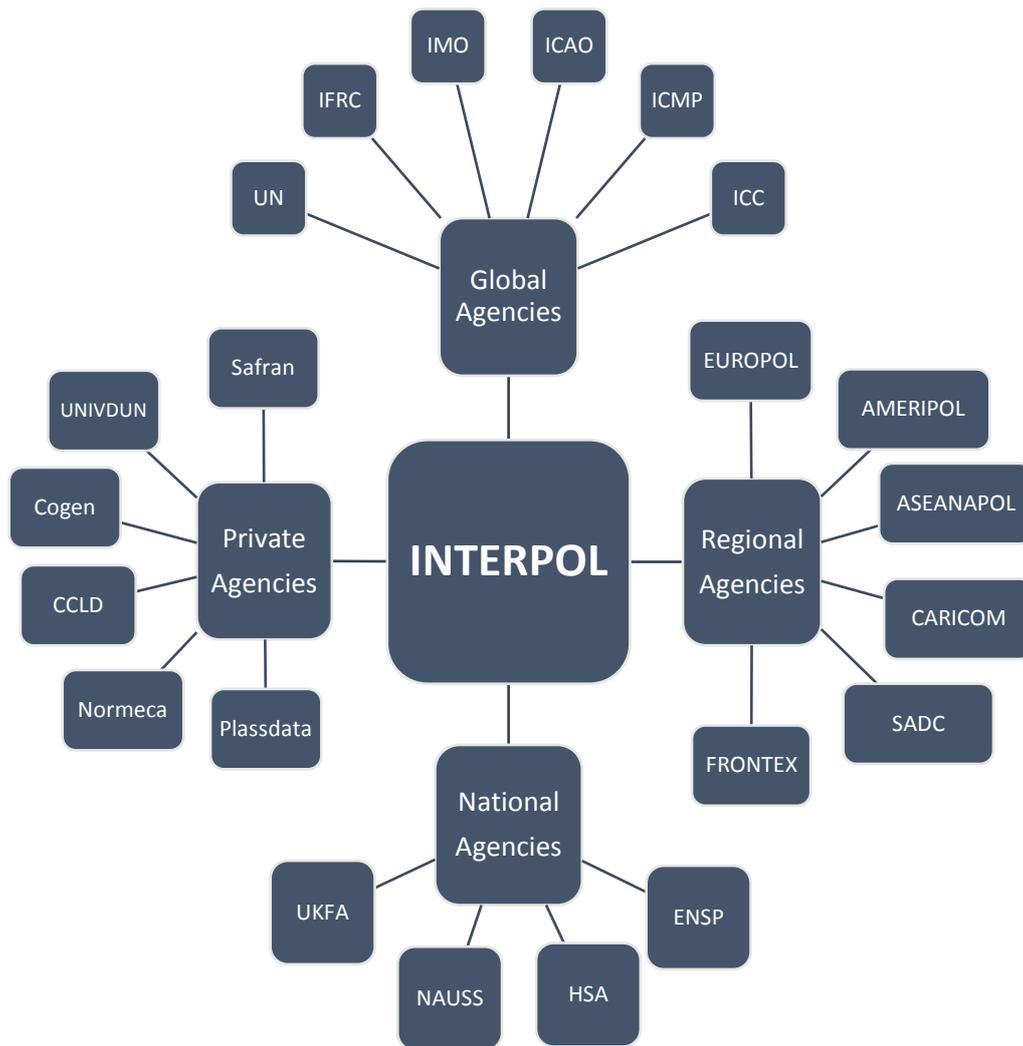


Figure 2.3 – An example of INTERPOL’s multi-agency network for transnational disasters

The multi-agent network in Figure 2.3 represents a realistic mapping of 22 agencies (see abbreviation and acronyms list presented in this thesis) that work together with INTERPOL in cases of transnational disasters. It is not an exhaustive list with all partners, but it represents the major agencies that have formal and official international cooperation agreements with INTERPOL.

However, the construction of multi-agency networks in which various agencies work and act together is a complex task and they may duplicate efforts and fail to achieve the established aims and missions. In addition, there is a structural and cultural fragmentation because different agencies can have different missions, roles, responsibilities, and cope with rigid institutional identities, views, and priorities (Smith and Elliott, 2007; McMaster and Baber, 2012). The creation of multi-agency networks for transnational disasters is not an easy task; there are problems and barriers already identified by several researchers and

scholars (Nogueira, 2015d; Smith and Elliott, 2007, Vitoriano et al., 2013). Hence, it is important to identify the potential major barriers to building multi-agency networks for transnational disasters. Table 2.1 presents a list of barriers faced in transnational disasters categorised by levels⁶ (operational, tactical, or strategic) and types of adjust (time, complexity, and action). This table was developed from key authors in the literature review such as Coppola (2015), McMaster and Baber (2012), Nogueira (2015d), Pauchant and Mitroff (1988), Smith and Elliott (2007), Turner (1976) as well as from multiple sources of data, mainly during interviews and focus groups.

Table 2.1 – Barriers to build multi-agency networks for transnational disasters

Level	Barriers	Adjusts	Sources
Strategic	<ul style="list-style-type: none"> - Rigidity in institutional beliefs - Rigidity in legal frameworks - Non-alignment between organisational priorities - Multiple objectives between agencies - Lack of coordination between agencies - Lack of shared responsibility between agencies - Network infidelity between agencies - Institutional competition between agencies - Distrust between agencies - Different interests between agencies - Failure to fully integrate civilian and military forces in all disaster phases 	Duration: - Long term Complexity: - High Action: - Non-routine	Coppola (2015); McMaster and Baber (2012); Nogueira (2015d); Pauchant and Mitroff (1988); Smith and Elliott (2007); Turner (1976); Interviews; Focus groups.
Tactical	<ul style="list-style-type: none"> - Lack of common assessment - Lack of knowledge on the roles and core values of other agencies - Tendency to minimize emergent danger - Neglect of outside complaints 	Duration: - Medium term Complexity: - Medium Action:	Coppola (2015); McMaster and Baber (2012); Nogueira (2015d); Pauchant and Mitroff (1988); Smith and Elliott (2007); Turner (1976);

⁶ In the context of INTERPOL, strategic barrier is relating to the identification of overall obstacles and the means of overcome them in long-term. Tactical barrier is relating to identification of medium-term obstacles and lesser in importance than those of a strategy or an overall purpose. Operational barrier is relating to the routine obstacles and the means to overcome them in short-term.

Level	Barriers	Adjusts	Sources
	<ul style="list-style-type: none"> - Failure to integrate existing systems and databases - Lack of integrated systems 	<ul style="list-style-type: none"> - Non-routine 	Interviews; Focus groups.
Operational	<ul style="list-style-type: none"> - Use of ad hoc teams - Lack of knowledge on the responsibilities and competencies of each agency and its actors - Difficult to comply with norms and regulations - Ineffective communication and warnings - Response systems crushed by the scale of the emergency - Difficulties in information handling - Lack of systematic monitoring of data - High staff turnover 	Duration: <ul style="list-style-type: none"> - Short term Complexity: <ul style="list-style-type: none"> - Low Action: <ul style="list-style-type: none"> - Routine 	Coppola (2015); McMaster and Baber (2012); Nogueira (2015d); Pauchant and Mitroff (1988); Smith and Elliott (2007); Turner (1976); Interviews; Focus groups.

2.5 Transnational cooperation

After the review of literature on multi-agency networks the next step of the conceptual development of this study is to critically reflect upon the transnational cooperation. First, providing an overview on transnational cooperation. Second, presenting the transnational cooperation in the police context, using INTERPOL as example. Third, identifying barriers and facilitators to effective transnational cooperation in disasters.

2.5.1 Overview

For this study,

Transnational cooperation is the action or process of working together to the same end across organisational borders.

For decades, cooperation agreements engaging nations and subnational entities such as regions, states or provinces have created transnational associations based on common interests and multilateral decision-making, noticeably in Europe (Grande and Peschke,

1999; Happaerts et al., 2011). Indeed, transnational cooperation can support individual actors to progress their local/regional development policies by learning from the good practices, innovative resources, services, and technologies used by other partners within the multi-agency network (Colomb, 2007). As per Rohrschneider and Dalton (2002), the transnational cooperation creates new political opportunities to reinforce the formation of international networks particularly in developing nations.

From the disaster management perspective, transnational cooperation can be used from different forms: emergency, humanitarian, police, development, volunteerism, funding, and so on. In the last decade, the necessity for transnational cooperation before, during, and after natural or man-made disasters has substantially increased. This rise demands governments to work with civil society and NGOs, and a solid cooperation of several key international agencies is crucial to the success of effective response since many of these agencies have a vast experience on disasters and regularly assist their counterparts in different events and situations (Coppola, 2015). Chan (2008) adds that for multi-agency networks to truly represent global civil society, they must exhibit transnational cooperation across organisational, social, political, and cultural cleavages generating a collective identity. In effect, transnational cooperation enables more effective disaster response and becomes vital because resources are limited and time is critical in disaster management. Therefore, the capacity of international agencies (e.g. INTERPOL, UN, IFRC, ICMP, Doctors Without Borders, CARE International, World Vision International, etc.) to assist transnational disasters depends on their ability to cooperate with all stakeholders (Kapucu, 2005). For example, major catastrophes such as Malaysia Airlines aircraft crash in Ukraine (2014), Philippines Typhoon Haiyan (2013), New Zealand Earthquake (2011), Haiti Earthquake (2010), Air France aircraft crash in Atlantic Ocean (2009), Cyclone Nargis (2008), Hurricane Katrina (2005), and Indian Ocean tsunami (2004) illustrate very well the relevance of a transnational cooperation among agencies, organisations, communities, and countries.

2.5.2 Transnational cooperation in the police context

Few, if any, countries are capable of containing all types of transnational crimes and disasters by itself – not even those occurring on its own territory. The trend toward the emergence of transnational disasters obligates law enforcement agencies to create cross

borders cooperation mechanisms, including partnerships with non-governmental and private organisations (Betts, 2013; Nogueira, 2016). Indubitably, the successful international police cooperation demands collaboration among international, regional, and local organisations. For example, INTERPOL has the mission of prevention and response to disaster through enhanced cooperation and innovation. To ensure this cooperation, each INTERPOL member country indicates a national body, so called as National Central Bureau (NCB), which ensures a connection with the various departments in the country, NCBs in other countries, and the INTERPOL's General Secretariat. Without a systematic cooperation between national police and international police organisations – IPOs (e.g. INTERPOL, EUROPOL, AMERIPOL, ASEANAPOL) the global assistance in transnational disasters becomes more difficult and ineffective (Gerspacher, 2005; Gerspacher and Dupont, 2007).

2.5.3 Operationalization of transnational cooperation through disaster teams

A practical scenario upon how to operationalize a transnational cooperation through disaster teams is provided by INTERPOL. For example, INTERPOL operationalizes its disaster response to member countries through Incident Response Team (IRT). The name of the IRT can vary according to the organisation and specialised ability; for instance, response team, emergency team, CBRNE response team, field assessment coordination teams, and so on. At INTERPOL, an IRT is comprised of a specialised group of people to deal with incident responses (INTERPOL, 2014c; Martha, 2010). It is deployed at the request of a member country and has expert police officers and support staff from INTERPOL headquarters and member countries. Usually, an IRT is part of specialised organisational units (e.g. command and control, forensic, IT, logistics, etc.) providing support and offering specialised assistance into the incident area. It is tailored to the specific nature of the crisis and the type of assistance that INTERPOL is requested to provide. An IRT can be briefed, equipped and deployed anywhere in the world within 12 to 24 hours of an incident. There are two types of IRTs at INTERPOL: IRT for disasters and IRT for crimes. IRT for disasters is an emergency response team for a man-made or natural disaster. This IRT delivers concentrated attention to urgent issues and problems arising from the disaster, focusing all available INTERPOL resources, services, and governance mechanisms on the situation at hand. This kind of IRTs is able to reach the affected area and send information back to the headquarters. IRT for crimes involves the

deployment of specialised personnel to provide specific expertise and investigative support to national police.

Nonetheless, there are key principles applied to ensure the transnational cooperation in police matters.

(I) Sovereignty

The main principle to accomplish the transnational cooperation is the sovereignty principle, which means that

“A nation-state is an independent actor within the international system and has the right and power to govern itself without any intervention from outside sources” (Gottlieb, 2011, p.146).

Therefore, the transnational cooperation process is taken by the IPOs in member states, within their own national boundaries and in accordance with their own national laws, but in respect with the public international laws.

(II) Respect of human rights

“The respect of fundamental human rights to ensure and promote the widest possible mutual assistance between all police authorities within the limits of the laws existing in the different countries and in the spirit of the Universal Declaration of Human Rights” (Martha, 2010, p.212).

(III) Neutrality

“It is strictly forbidden for the Organization to undertake any intervention or activities of a political, military, religious or racial character” (INTERPOL, 2014b).

(IV) Data protection

“...The respect of data protection standards takes into account the laws existing in its country, in conformity with the international conventions to which it is a party, and with the Organization's Constitution” (Gottlieb, 2011, p.162)

2.5.4 Barriers to effective transnational cooperation in disasters

The barriers to effective and efficient transnational cooperation are the same presented to multi-agency network (Section 2.4). However, it is possible to highlight some of them that are crucial to create a transnational cooperation process at INTERPOL.

Firstly, there is a serious barrier/limitation in thinking transnational cooperation concerns only the strategic level. For example, Luo et al. (2010) contends that transnational cooperation refers to strategic cooperation between international agencies and local agencies in transnational business. However, effective transnational cooperation does not only arise in the strategic aspect, other degrees of cooperation need to be established across the different levels of management. The conjunction of operational, tactical, and strategic facilitators leverages and accelerates the creation of a strong transnational cooperation within the international environment.

Secondly, there is a barrier to integrate different agencies, especially in terms of civilian–military cooperation. Civilian organisations traditionally have resistance to directly cooperate with military forces (Coppola, 2015; Ergun et al., 2014) due to different reasons. For instance, they have consternation that such cooperation can corrupt their core values and principles, including the perception of impartiality (neutrality) and independence; they have fear that military forces attempt to take over the relief and aid operation, impeding them from aiding the target communities; they simply have bias to work with the military, based on their negative past experiences, ideological or political differences. Nonetheless, many civilian organisations have realized that there are important resources and services that only the military can provide. For example, the military has heavy equipment (e.g. ships, airplanes, helicopters) to transport response and recovery supplies and materials, as well as employees of civilian organisations, to the affected areas. The military also has the technological resources and advanced mobile communications capacity in situations where infrastructure is damaged, broken, or destroyed. On the other hand, the military often believes that civilian organisations (mainly NGOs) are uninformed, ineffective, inefficient, and that only interfere without actually acting any valuable service. Therefore, these barriers between civilian organisations (public, private, and non-governmental) and military forces need to be overcome to have an effective and efficient cooperation in transnational disasters.

Thirdly, despite the advances in cooperation, there is also a lack of knowledge on the roles, responsibilities and competencies of each agency acting in a crisis or disaster. This fact has often generated attritions and conflicts, and should be eliminated during the preparedness phase. For instance, the DVI in routine disasters is often carried out by local agencies, however when a transnational disaster occurs with victims from foreign countries the DVI services need to be carried out by accredited international organisations such as INTERPOL, ICMP, UN, and international forensic institutes. Consequently, without the results of these accredited international agencies some governmental organisations and private companies cannot give full assistance to the family of victims, such as repatriation of bodies, life assurance, and social benefits.

2.5.5 Facilitators to effective transnational cooperation in disasters

Transnational cooperation has helped the world community to more effectively manage risk reduction and limit the impacts of natural and man-made disasters. Nonetheless, the establishment of a clear link between transnational cooperation and its facilitators is a difficult task. Thus, some scholars and practitioners have identified and disclosed different facilitators of cross border cooperation (Coppola, 2015; Elliott, 2009; Nogueira, 2015d). Analysing these authors and based on my practical experiences managing dozens of disasters all over the world under umbrella of INTERPOL is possible to posit that promote and strengthen cooperation in the activities of mitigation, preparedness, response, and recovery to transnational disasters should identify different facilitators as presented in Table 2.2, categorised by levels: operational, tactical, or strategic.

This table was developed from key authors in the literature review. For example, Coppola (2015) and Vitoriano et al. (2013) disclose as facilitators (1) share information and technology; (2) promote information exchange through collective agreements; (3) Ensure concurrent, interoperable, and real-time communication; (4) integrate the existing systems and databases; (5) avoid high staff turnover. McMaster and Baber (2012) acknowledges some facilitators such as (1) strong multi-agency networks; (2) collective mechanisms of command; (3) collaborative mobilisation of resources and services; (4) share information and technology; (5) multilateral agreements. In turn, Elliot (2009) reveals as facilitators (1) promote policy harmonization and standardization of norms, regulations, and procedures; (2) disclose the key norms, regulations, and agreements.

Nogueira (2015d) also presents a list of facilitators in his in-depth study, such as: (1) construct a strong multi-agency network, based on trust and fidelity; (2) align the institutional priorities into the multi-agency network; (3) encourage collective and collaborative mechanisms of command, coordination and control; (4) systematic monitoring of data and information; (5) operate under multilateral agreements; (6) produce common assessment reports and action plans. The other facilitators listed in Table 2.2 emerged from multiple sources of data such as interviews and focus groups.

Table 2.2 – Facilitators to develop transnational cooperation in disasters by level of management

Level	Facilitator	Sources
Strategic	<ul style="list-style-type: none"> - Create a crisis and disaster management framework to facilitate transnational cooperation - Construct a strong multi-agency network, based on trust and fidelity - Align the institutional priorities into the multi-agency network - Change the leadership style of management from serial, individual, and controlling leadership to the strengthening of concurrent, collective, and collaborative leadership - Encourage collective and collaborative mechanisms of command, coordination and control - Joint strategy development - Share responsibilities between agencies - Make the institutional beliefs more flexible - Promote policy harmonization and standardization of norms, regulations, and procedures - Stimulate mutual assistance agreements - Proactively act anticipating funding arrangements - Social appeal from media, society, and key stakeholders - Integrate civilian and military forces in all disaster phases 	Coppola (2015); Elliott (2009); McMaster and Baber (2012); Nogueira (2015d); Vitoriano et al. (2013); Interviews; Focus groups.
Tactical	<ul style="list-style-type: none"> - Disclose the key norms, regulations, and agreements - Disseminate the roles and core values of each agency 	Coppola (2015); Elliott (2009); McMaster and Baber (2012);

Level	Facilitator	Sources
	<ul style="list-style-type: none"> - Collaborate on capacity-building and training (institutional and human) - Prepare a shared mobilisation and logistics of resources and services - Share information and technology - Promote information exchange through collective agreements - Ensure concurrent, interoperable, and real-time communication - Ensure effective warnings systems - Integrate the existing systems and databases - Create new integrated systems of data, information, and knowledge 	<p>Nogueira (2015d); Vitoriano et al. (2013); Interviews; Focus groups.</p>
Operational	<ul style="list-style-type: none"> - Avoid ad hoc incident response teams - Avoid high staff turnover - Systematic monitoring of data and information - Operate under multilateral agreements - Produce common assessment reports and action plans - Undertake training/exercises and simulations on the equipment, protocols, and procedures used before, during, and after disaster - Give due value to all evidence found in the field - Hear the stakeholders' complaints 	<p>Coppola (2015); Elliott (2009); McMaster and Baber (2012); Nogueira (2015d); Vitoriano et al. (2013); Interviews; Focus groups.</p>

2.6 Conclusion

This chapter provided an explanation of why the structure of this thesis took this form. This structure was based on the review of literature and the personal experience of the researcher and their influences upon conceptual development related to four core topics mentioned previously: crisis management, disaster management, multi-agency network, and transnational cooperation. These topics were identified as the conceptual structure from the literature review and personal experience that would support the development of the research questions shown in Section 1.4 along with the key factors to consider in

developing a crisis management framework for INTERPOL to effectively manage all phases of transnational disasters: preparedness, response, recovery, and mitigation (see Section 2.3.4). Figure 2.1 graphically shows the conceptual structure comprised of the four core topics that supported the development of the research questions related to (1) the governance mechanisms; (2) the resources and services; (3) the main stakeholders; (4) the finance and fund arrangements; (5) the formal and informal relationships; (6) the potential barriers and facilitators. In addition, Figure 2.1 also presented the six complementary research questions as key factors to consider in developing a crisis management framework in order to develop the central research question. Therefore, the conceptual structure presented in Figure 2.1 was done in conjunction with the development of the research questions and it was an iterative process since any change to the conceptual structure entailed the reformulation the literature review to ensure its consistency and accuracy. Furthermore, this chapter aimed to provide the reader with an orientation upon the origin of crisis management since its early studies. A sample of the different interpretations to the study of crisis management was depicted. The chapter also presented the origins of disaster management and the different approaches to disaster management: cognitive context, processual context, multi-agency context, and the approach used in this thesis. This chapter identified that there is a difference between disaster management and crisis management. It also offered a clarification on the disaster management phases and shown how they evolve as a cycle engaging preparedness, response, recovery, and mitigation (see Figure 2.2). This chapter expanded its focus to consider disasters as part of a multi-agency network. Some pillars to facilitate the network workflow were recognized and an example of multi-agency network for transnational disasters was represented taking into account the relationships between INTERPOL and multiple agencies. This chapter also provided an in-depth study on how to develop transnational cooperation. It considered transnational cooperation in the police context, operationalization of transnational cooperation through disaster teams, and the main barriers and facilitators to build multi-agency networks for transnational disasters.

Chapter 3

Methodology

3.1 Introduction

In this chapter, the philosophical positions with their ontological and epistemological perspectives, the modes of research, reasoning and inquiry are outlined and elaborated upon a theoretical scaffolding. There are some fundamental reasons why a comprehension of theoretical and philosophical issues is very valuable. Firstly, it can provide clarifications on the research design. This not only engages what kind of data are required and how it is to be collected and analysed, but also how this will offer useful answers to the essential questions being investigated in the research (Easterby-Smith et al., 2012; Johnson and Duberley, 2000). As per Creswell (2013), philosophy in research shapes how to formulate problems and research questions to study and how to seek information to answer the questions.

3.2 Philosophical scaffolding

Philosophy means the study of the theoretical basis of a particular branch of knowledge or experience (Oxford University Press, 2015). In the context of the research design, Creswell (2013, p.16) states that philosophy is “the use of abstract ideas and beliefs that inform our research”. There are a number of philosophical positions which have been studied by different schools of thought such as positivism, empiricism, pragmatism, interpretivism, social constructionism, critical theory, structuration theory, hermeneutics, conventionalism, postmodernism, and so on (Johnson and Duberley, 2000). The intention of this section is to place this doctoral study within the philosophical positions, including ontology, epistemology, mode of research, mode of reasoning, and mode of inquiry according to their characteristics and constitutive elements. Therefore, this thesis created a theoretical and philosophical scaffolding in five phases according to Table 3.1.

Table 3.1 – Phases to build the theoretical and philosophical scaffolding

Phase	Description
1.	Ontology - Positioning the study among the three ontological approaches: realism, relativism, or nominalism.
2.	Epistemology - Positioning the study between the two epistemological paradigms: positivism or interpretivism
3.	Mode of research - Positioning the study between the two modes of research: pure (mode 1) or applied (mode 2)
4.	Mode of reasoning - Positioning the study between the two modes of reasoning: deductive or inductive
5.	Modes of inquiry - Positioning the study between the two modes of inquiry: qualitative or quantitative

3.2.1 Ontology

Ontology is a branch of philosophy that is concerned with the nature of the world and existence (Lewis-Beck et al, 2004). According to Thorpe and Holt (2008), research uses ontology to take a position on – what there is to know (what the world is). Easterby-Smith et al. (2012) states that there are three main ontological perspectives: realism (also called as representationalism or objectivism), nominalism, and relativist. This doctoral research is situated in relativism since it assumes that reality is a dynamic spectrum of interactions of INTERPOL members where different observers may have different viewpoints and multiple realities according to social conditions and contexts (Easterby-Smith et al., 2012).

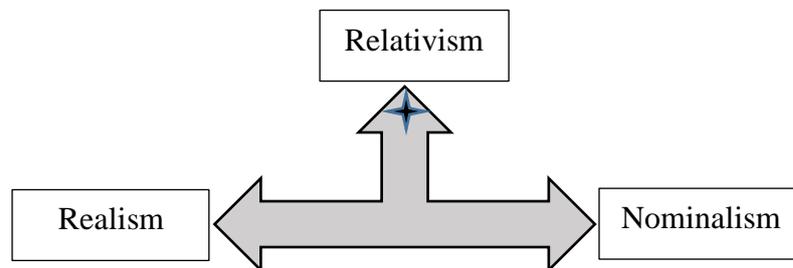


Figure 3.1 – Ontological perspective

Legend: The sign  denotes the position of this study

3.2.2 Epistemology

Epistemology is the branch of philosophy concerned with the nature of knowledge, its justification, and how it is acquired (Lewis-Beck et al, 2004). There are two main epistemological approaches in management research: positivism and interpretivism (Easterby-Smith et al., 2012). Positivism sets out that the only legitimate source of knowledge are sense data, through which reality is experienced (Thorpe and Holt, 2008), and that its properties should be measured through objective methods (Easterby-Smith et al., 2012). On the other hand, interpretivism refers to epistemologies about how it is possible to gain knowledge of the world, which rely on interpreting or understanding the meanings that people assign to their concepts and actions, as advocated by Lewis-Beck et al, (2004). This doctoral research has the social constructionism as epistemological position because it suggests that the social realities, identities, and knowledge are created and maintained in interactions of multi-agency networks comprised of INTERPOL members and the main stakeholders.



Figure 3.2 – Epistemological position

3.2.3 Modes of research

The literature presents two modes of research: mode 1 and mode 2 (Creswell, 2013; Easterby-Smith et al., 2012). Mode 1 (also called as pure research) draws attention on the creation of theoretical knowledge characterised by homogeneity, objectivity, experimentation, value-free, theory-based focus. Mode 2 (also called as applied research) concentrates on the creation of knowledge through direct involvement with social practice in the context of application. This doctoral study uses mode 2 because it is focused on social practise of disaster management applied in the context of INTERPOL and it is characterised by heterogeneity, value based on social structures, diversity, and reflexivity.

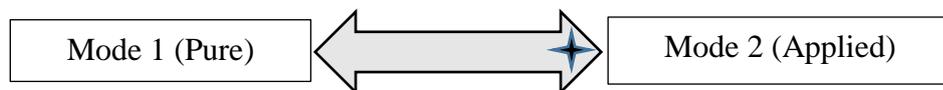


Figure 3.3 – Mode of research

3.2.4 Modes of reasoning

There are essentially two modes of reasoning in scientific research: deductive and inductive (Easterby-Smith et al., 2012). Deductive or theory-testing reasoning uses theory as a foundation for the development of testable hypotheses. Inductive (also called as theory-building reasoning) is the process of discovering a general principle from a set of concepts, facts, ideas, themes, and patterns. This doctoral research is identified as inductive reasoning because it is based on interpretations of INTERPOL members those experiencing the phenomenon under study moving from research participants' viewpoints to conclusions about general principles, as advocated by Creswell (2013).

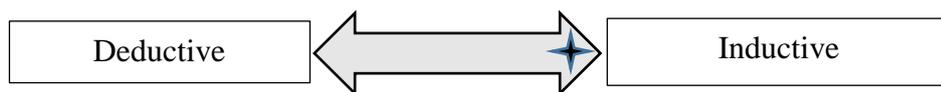


Figure 3.4 – Mode of reasoning

3.2.5 Modes of inquiry

There are two modes of inquiry in scientific research: quantitative and qualitative (Creswell, 2013; Easterby-Smith et al., 2012). Quantitative inquiry refers to approaches to empirical inquiry that collect, analyse, and display data in a numerical form whose findings may be expressed numerically and manipulated mathematically enabling the researcher to estimate future events or quantities. On the other hand, qualitative inquiry is a set of actions toward strategies for conducting inquiry that are aimed at discerning how human beings understand, experience, interpret, and produce the social world. This doctoral study is identified as qualitative because it is used to explore the transnational disaster phenomenon under the context of INTERPOL in order to capture the interpretations, meanings, thoughts, and social values that make the crisis and disaster management at INTERPOL more visible, as argued by Johnson and Duberley (2000).



Figure 3.5 – Mode of inquiry

3.3 Research design

The design of an appropriated research approach is an important step to produce an effective and efficient doctoral study. Creswell (2013) argues that qualitative researchers need to anticipate and plan taking into account the diversity in their qualitative studies. Based on different topics discussed in qualitative research design provided by several authors (Creswell, 2013; Easterby-Smith et al., 2012; Thorpe and Holt, 2008) this qualitative study proposes a social constructionist research plan that includes preparedness and general considerations, research strategy, data collection, data analysis, data triangulation, cross-case analysis, sense making, and research generalizability. At last, it is important to highlight that this plan is based on the general structure of a qualitative research design plan suggested by Creswell (2013, p.61-62).

3.3.1 Preparedness and general considerations

(I) Statement of the research problem

The lack of a crisis management framework for INTERPOL to manage transnational disasters.

(II) Purpose of the study

The purpose of this qualitative research using case studies is to develop a comprehensive framework to facilitate INTERPOL's crisis and disaster management and understand transnational disaster in a multi-agency context.

(III) Research questions

Central question

- What are the key factors to consider in developing a crisis management framework for INTERPOL in order to support the management of transnational disasters?

Complementary questions

- What are the governance mechanisms adopted by INTERPOL to manage transnational disasters?
- What resources and services does INTERPOL mobilise in transnational disasters?
- Who are the key stakeholders in cases of transnational disasters?

- What are the finances and funding arrangements used by INTERPOL in cases of transnational disasters?
- How does INTERPOL create formal/explicit and informal/tacit relationships within the crisis and disaster management?
- What are the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL?

These complementary questions are in the Interview Form presented in Appendix B.

(IV) Limitations

A limitation of this study includes the sole focus of the sample being from INTERPOL, i.e. the absence of data from participants from other international agencies. Future studies might examine opinions of other stakeholders in order to create a detailed framework that might have broader application in different international organisations. To improve the usability of the framework in other settings, it will need to be applied in other organisations and cultures to determine if there is any validity beyond the sample chosen for this research. Hence, this research effort could lead to other investigations such as the direct involvement of other external interviewees that could provide more information on the strategic, tactical, and operational levels.

As argued by Creswell (2013) and Easterby-Smith et al. (2012), in a qualitative study is not possible to be completely free of bias. Therefore, in a couple of interactions within interviews and focus groups for this research, it was necessary to exercise restraint and avoid injecting personal opinion into a conversation. Being a director of INTERPOL specialised in crisis and disaster management, personal experience with disaster situations has provided this researcher with a passion to conduct this research, but it was vital to avoid personal opinions in interviews and focus groups, particularly when people shared opinions that were contrary to the researcher's personal perceptions of how to manage a disaster. In order to avoid this kind of bias, this researcher undertook briefings before the interviews and focus groups explaining that he was as researcher and not as director. This motivated the interviewees to provide their honest opinions, and gave neutral feedback upon the answers of respondents, for example using phrases such: "that's helpful", "that is important for this research", "thank you".

The framework presented in this thesis is a compilation of interviews, focus groups, and physical artefacts made from the participants, and may not be apply directly to other types

of disasters rather than transnationals, but it may provide an opportunity to start a further reflection about findings and how they may be managed in different environments.

3.3.2 Research strategy

An essential step in the research design is defining a strategy to inquiry. It is necessary to identify one approach to qualitative inquiry in order to present it as a sophisticated study with theoretical rigour and practical relevance, to offer it as a contextualized research so that other academics and reviewers may properly understand, use and assess it. The great question that emerges is “which qualitative research strategy can be more useful for this thesis in theoretical and practical sense?” Therefore, before choice a qualitative research strategy for this thesis, it was studied, analysed, and evaluated five of them: narrative research, phenomenology, grounded theory, ethnography, and case study (Easterby-Smith et al., 2012; Thorpe and Holt, 2008).

After examining these five qualitative strategies and their characteristics, this thesis used the case study (Stake and Savolainen, 1995; Yin, 2009) to develop and investigate the research problem and its related questions. Case study is “an empirical inquiry about a contemporary phenomenon (e.g., a “case”), setting within its real-world context” (Yin, 2009, p.18).

The rationale to select case study as research strategy to inquiry is because this thesis intends to

- (1) study multiple cases of transnational disasters involving real-life contexts;
- (2) delimitate the multiple cases by space and time;
- (3) have an in-depth study of actual transnational cases selected to better understand the investigated problem and research questions;
- (4) use multiple methods of qualitative data collection and analysis augmenting the validity of the research;
- (5) have a better understanding on different concepts and categories;
- (6) describe the complexity of the cases through identification of themes into a bounded system;

(7) analyse across cases to figure out similarities and differences in order to identify behaviour patterns and use them as a common framework for analogous cases.

3.3.3 Data collection

This thesis created a new data collection process developed to multiple cases studies based on Creswell (2013) and Yin (2009) which shows a sequence of data gathering activities that take place in qualitative research designs. Therefore, in this thesis, the data collection process is comprised of the following stages: gaining access and permission, sampling, collecting data, recording data, and storing data (see Figure 3.6).



Figure 3.6 – Data collection process developed to multiple case studies

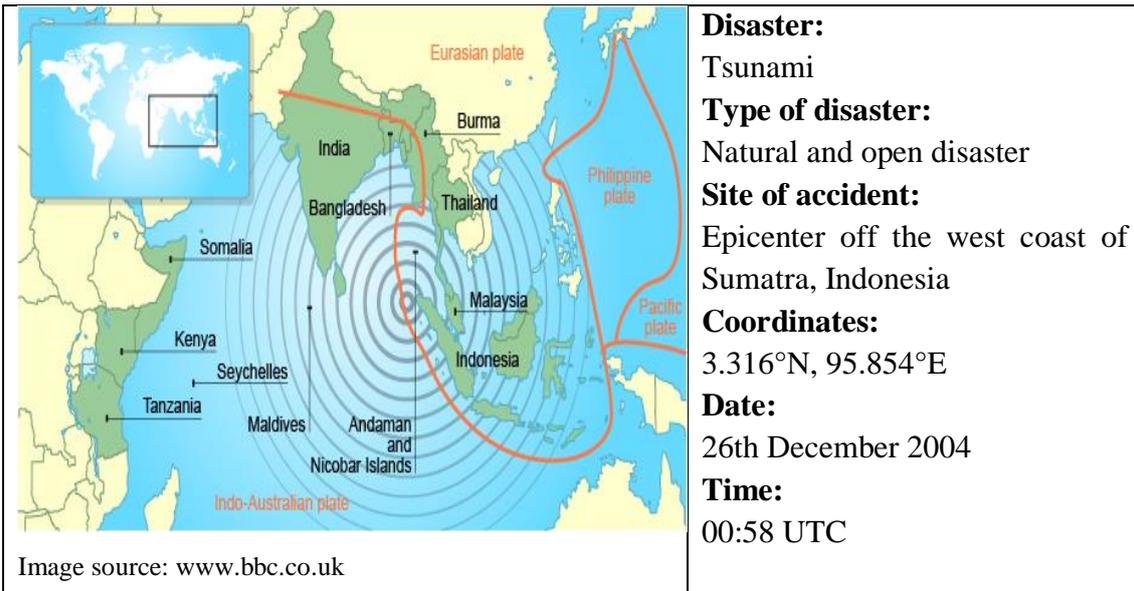
(I) Gaining access and permission

As a qualitative research, it was necessary to gain access and permission to study the sites in a way that enabled an easy collection of data. Accesses and permissions were facilitated because this researcher works as senior manager at the examined organisation, INTERPOL, hence having access to several materials for this data collection. The template of the Participant Consent Form used in this research are in Appendix A. This template is an adaptation of that suggested by University of Liverpool.

(II) Sampling

According to Easterby-Smith et al. (2012), the case study looks in depth at one, or a small number of cases, over the time. In turn, Creswell (2013) advocates that case study research is a qualitative approach in which the researcher explores a real-life bounded system (a single case, within-site study) or multiple bounded systems (cases, multisite

study) where researchers typically choose between two and four cases. In addition, this doctoral research used a maximum variation sampling (Creswell, 2013, p.298) to develop a multisite study examining 02 (two) different real-life cases of transnational disasters under umbrella of INTERPOL. The criteria used to include the research cases were that they are different types of disasters, mass fatalities involving different foreign nationals configuring a transnational disaster, full participation and development of INTERPOL, national interest demonstrated via request or appeal to INTERPOL, multi-agency cooperation, plentiful amount of data, and international social repercussion.



Triggering event:

The Eurasian and Indo-Australian tectonic plates collided deep under the Indian Ocean causing a 9.0 magnitude earthquake, 240 kilometres (150 miles) off the coast of Sumatra displacing hundreds of cubic kilometres of water. This volume then moved away from the epicentre as a series of waves generating a tsunami that caused mass fatalities and havoc along much of the coast of the Indian Ocean. This tsunami affected 13 countries, mainly Indonesia, Sri Lanka, India, and Thailand.

INTERPOL mobilisation:

Thailand

Other relevant information:

5,395 fatalities confirmed in Thailand, approximately 2,400 were foreign nationals from 36 different nations. It was estimated 280,000 casualties by this tsunami across the 13 nations affected (INTERPOL, 2014d). INTERPOL participated together with several international, regional, national, and local agencies.

Figure 3.7 – Case 1: Tsunami in the Indian Ocean

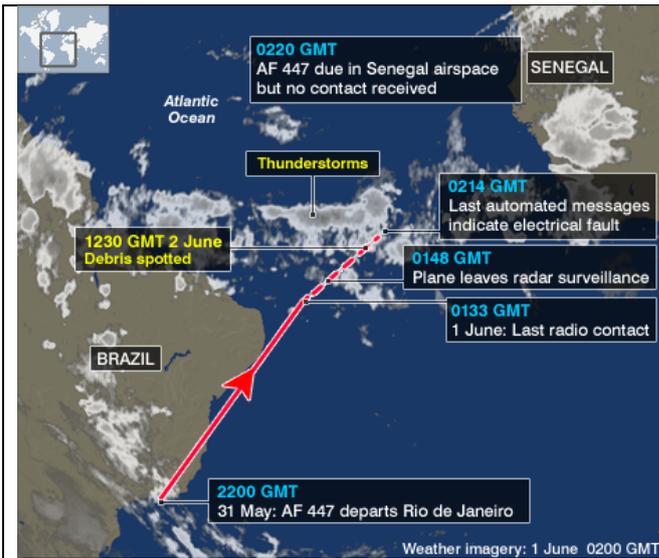


Image source: www.bbc.co.uk

Disaster:

Air crash

Type of disaster:

Man-made and closed disaster

Site of accident:

Atlantic Ocean, near Fernando de Noronha island, Brazil

Coordinates:

3°03'57"N 30°33'42"W

Date:

1st June 2009

Time:

02:14 UTC

Triggering event:

On 31 May 2009, the Airbus A330 flight AF 447 took off from Rio de Janeiro, Galeão airport to Paris, Charles de Gaulle airport. The airplane was in contact with the Brazilian control centre and the last know position was on 1st June at 2h08min. On 1st June 2009, at around 2h14min the aeroplane was in a stall situation that lasted until the impact with the sea.

INTERPOL mobilisation:

Brazil

Other relevant information:

228 fatalities, 169 were foreign nationals from 33 different nations (INTERPOL, 2014d) INTERPOL participated together with some international, national, and local agencies.

Figure 3.8 – Case 2: Air crash of Air France flight 447

(III) Collecting data

As per Creswell (2013), a major strength of case study data collection is the opportunity to use many different sources of data (e.g. interviews, focus groups, documentations, audiovisual materials, etc.) describing multiple perspectives about the case. In the same vein, Yin (2009) contends that the use of multiple sources of data in case studies enables a researcher to address a wide range of historical, attitudinal, and behavioural issues developing converging lines of inquiry. In this research, four different sources of data were used: interviews, focus groups, documentations, and audiovisual materials. More details on these sources used in both case studies can be seen in Tables 3.2-3.3.

Interviews

One of the most relevant sources of case study data is the interview (Vissak, 2010; Yin, 2009). Stake and Savolainen (1995) states that two principal uses of case study are to obtain the descriptions and interpretations of others, and the interview is the main road to qualitative researchers discovery and portray multiple realities.

Type of interview. In this research, it was chosen semi-structured in-depth interview (Easterby-Smith et al., 2012; Yin, 2009). Semi-structured is a kind of guided open interview where respondents are free to interrupt and be flexible toward issues being discussed (Easterby-Smith et al., 2012; Yin, 2009). In turn, in-depth interview is a kind of interview that provides an opportunity to probe deeply a rich and real life experience on the cases as well as open up new dimensions and insights from respondents (Easterby-Smith et al., 2012; Yin, 2009). See details in Table 3.2.

Identifying interviewees. The interviewees were chosen between managers and specialized officers those who had experience in cases of transnational disasters (i.e. at least 5 years allocated in the disaster unit of INTERPOL) and according to their engagement in one or both cases studied in this thesis (case 1-tsunami or case 2-Air France air crash). Therefore, some interviewees gave their contributions for both cases. See details in Table 3.2.

Interview form. A paper form with relevant data was collected during the interview, with title of research, case name, date, time, and place of interview, interviewer, interviewee, position of interviewee, and research questions. This research used open-ended questions on the cases in the study, as advocated by several authors (Creswell, 2013; Stake and

Savolainen, 1995; Yin, 2009). See the interview form in Appendix B. Furthermore, interviewee's field notes were read in detail during the interviews.

Focus Groups

This study involved the use of multiple sources of data – physical artefacts, interviews, and focus groups – together with the processes of triangulation and axial coding (Yin, 2009) in order to provide corroborating evidence for validating the credibility and accuracy of the study. It is essential to emphasize that the use of interviews and focus groups recognizes the value of qualitative research as important instruments to learn with experiences and social relationships between research participants since they can create and give meaning within a socially constructed reality (Denzin and Lincoln, 1998). Interviews do not necessarily need take place on a one-to-one basis, and for some types of investigations, such as this doctoral research, focus groups can be very useful since it takes the form of loosely structured discussion group held with selected participants (Easterby-Smith et al., 2012; Yin, 2009). The idea of focus groups in the data analysis was to promote self-disclosure among participants concerning a specific issue on the case (Creswell, 2013). Thus, this research adopted group interviews with research participants: two focus groups, 45-60 minutes each, with 10 staff from INTERPOL (1 senior manager specialised in DM, 1 senior manager specialised in DVI, 8 specialised officers in disasters) for case 1. In addition, this research also adopted group interviews for case 2: two focus groups, 45-60 minutes each, with 8 staff members from INTERPOL (1 senior manager specialised in DM, 1 senior manager specialised in DVI, 6 specialised officers in disasters). The focus group participants were chosen between managers and specialized officers those who had experience in cases of transnational disasters (i.e. at least 5 years allocated in the disaster unit of INTERPOL) and according to their engagement in one or both cases studied in this thesis (case 1-tsunami or case 2-Air France air crash). Thus, some interviewees gave their contributions for both cases as well as participated of different focus groups. Details on the focus groups conducted in both studies can be seen in Table 3.2.

It is important to underline that the focus group was chosen in this qualitative research due to several reasons. First, the interactions among participants provided extra information. For example, focus groups gave more details about the community affected by disasters, workplace in the field, response team's needs, common barriers and facilitators faced in both cases.

Table 3.2 – Method of data collection by participant

Case	Method of Data Collection	Participant	Place of Data Collection	Date of Data Collection
1	Interviews	10 interviews one-to-one, 60-90 minutes each, with 10 participants from INTERPOL: <ul style="list-style-type: none"> - 2 senior managers specialised in DM - 1 senior manager specialised in DVI - 7 specialised officers in disasters 	INTERPOL headquarter in Lyon, France	October/2014 to April/2015
	Focus groups	2 focus groups, 45-60 minutes each, with 10 staff from INTERPOL: <ul style="list-style-type: none"> - 1 senior manager specialised in DM - 1 senior manager specialised in DVI - 8 specialised officers in disasters 	INTERPOL headquarter in Lyon, France	October/2014 and April/2015
2	Interviews	10 interviews one-to-one, 60-90 minutes each, with 10 participants from INTERPOL: <ul style="list-style-type: none"> - 1 senior manager specialised in DM - 1 senior manager specialised in DVI - 8 specialised officers in disasters 	INTERPOL headquarter in Lyon, France	October/2014 to April/2015
	Focus groups	2 focus group, 45-60 minutes each, with 8 staff members from INTERPOL: <ul style="list-style-type: none"> - 1 senior manager specialised in DM - 1 senior manager specialised in DVI - 6 specialised officers in disasters 	INTERPOL headquarter in Lyon, France	October/2014 and April/2015

Second, focus groups helped to validate or invalidate the data collected individually in one-to-one interview. For example, the mobilisations of resources and services mentioned individually during the interviews were confirmed during the focus groups. Third, focus groups were useful to clarify and reconstruct individual viewpoints more appropriately. For example, some individual viewpoints about the facilitators found in both cases were not so clear and were better explained during the focus group, such as the impact of the social appeal, operation of the partnership agreements, and development of collective working for case 1, and deployment of the real-time communication in the field and functioning of collaborative operation between agencies for case 2.

In turn, transcripts and field notes were discussed in detail during the focus groups (see Appendix C). They were critically reflected with focus group participants in order to have double check of their responses, that is, at the end of each focus group session the transcripts/field notes and interview forms were read to confirm and validate their responses.

Documents

Documentation can take many forms – letters, memoranda, agendas, minutes of meetings, field notes, reports, archival material, records, written formal researches of the same case under study, hypertext documents in Internet sites, newspaper clippings, and the like (Creswell, 2013; Stake and Savolainen, 1995; Yin, 2009). Yin (2009) posits that for case studies, the most important use of documents in data collection is to corroborate and increase evidence from other sources.

Beyond the advantages to use documentation as data collection method, it was chosen for this study because there were a vast amount of documents related to both studied cases as well as this researcher had full access to these documents in their diverse forms of presentation. See details in Table 3.3.

Audiovisual Materials

The ability to record sound, images and videos provides an outstanding benefit for case study research due to several reasons (Creswell, 2013; Easterby-Smith et al., 2012). First, digital sources can store huge quantities of audiovisual data for access by large numbers of researchers (Lewis-Beck et al, 2004). Second, researchers can use audiovisual materials to present new perspectives and stimulate discussion and debates between members of focus groups. Participants talk much more about ideas taking into account audiovisual materials and this help to develop a more clear understanding of the activities developed on the case study (Easterby-Smith et al., 2012). Furthermore, Creswell (2013) recommends audiovisual materials as an elicitation technique to generate new insights and discussion on the case.

There are several types of audiovisual materials that can be used in qualitative research, such as photographs, sound records, videos, and most recently the specialised websites

(e.g. YouTube, Wikipedia, and media centres in some organisations). In this study, the audiovisual materials (i.e. photographs and videos) were used as a complementary source of data and were collected at INTERPOL media centre and Internet (You Tube). More details see Table 3.3.

Table 3.3 – Method of data collection by physical artefact

Case	Method of Data Collection	Physical artefact	Place of Data Collection	Date of Data Collection
1	Documents	87 documents comprised of memoranda, agendas, minutes of meetings, reports, archival records, peer reviewed articles, presentations, hypertext documents in Internet sites, and newspaper clippings collected on the case.	INTERPOL headquarter in Lyon, France	October/2014 to May/2015
	Audiovisual Materials	150 photos of the site, destruction, infrastructure, resources, and activities developed. 10 institutional and public videos (10-72 minutes each) of site and activities developed.	INTERPOL media centre and Internet	October/2014 to May/2015
2	Documents	38 organisational and public documents comprised of field notes, reports, archival records, agendas, minutes of meetings, presentations, hypertext documents in Internet sites, and newspaper clippings collected on the case.	INTERPOL headquarter in Lyon, France. NCB Brasilia in Brazil.	October/2014 to April/2015
	Audiovisual Material	60 photos of the site, infrastructure, resources, and activities developed. 4 institutional and public videos (15-60 minutes each) of site and activities developed.	INTERPOL media centre and Internet	October/2014 to April/2015

(IV) Recording data

Anonymity, integrity, and confidentiality are key principles of this research. The research data were maintained on the researcher's notebook with password. No external computer was used for data storage. Data was not shared with other organisations. Due to the anonymity, privacy, and confidentiality principles, no personal information was disclosed. Data was anonymised at the point of collection. The outcomes of the interviews, focus groups and field observations were recorded in physical artefacts, such as such as field notes, interview write-ups, forms, and mapping. Therefore, no sound or image was recorded in audiovisual devices during the interviews and focus groups.

(V) Storing data

A vast amount of relevant data about the cases was collected during the course of this thesis. Consequently, it was adopted a protocol about data storage that was particularly well suited for this qualitative research, as shown in Figure 3.9.

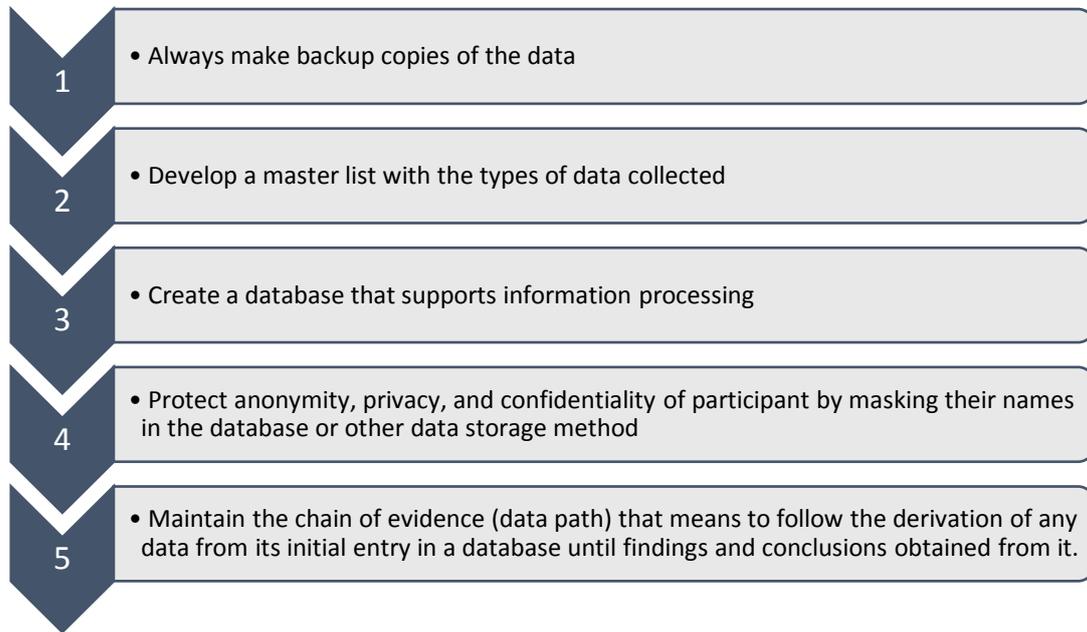


Figure 3.9 – Data storage protocol

3.4 Data interpretation

The sheer quantity of data generated by qualitative approaches makes the task of analysis particularly challenging. Interpretation involves making sense of the data, the “lessons learnt”, as described by Lincoln and Guba (1985). Interpretation in qualitative research engages abstracting out beyond the codes and themes to the larger meaning of the data (Corbin and Strauss, 2008; Easterby-Smith et al., 2012). It is a process that begins with the development of the codes, the formation of themes from codes, and then the organisation of themes into larger units of abstraction to make sense of the data (Creswell, 2013). As such, the interest in operating the data interpretation in this thesis was to know how the coding to physical artefacts, interviews, and focus groups might suggest an acceptable understanding about how things occurred within the analysed cases in order to establish patterns of activity during the management of transnational disasters under aegis of INTERPOL. The data interpretation began with multiple readings of the physical artefacts followed by the interviews and focus groups transcripts as a cycle (see Figure

3.10) until the saturation point when no more changes were needed within the codes and themes.

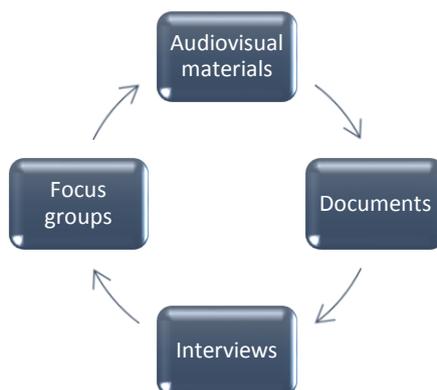


Figure 3.10 – Investigative sequence of data interpretation

Therefore, data interpretation also included in the analysis documentary evidence (i.e. based on audiovisual material and documents) comprised of transcripts, field notes, reports, archival records, memoranda, agendas, minutes of meetings, peer reviewed articles, presentations, hypertext documents in Internet sites, and newspaper clippings collected on the case. The sequence of data analysis started by the interpretation of physical artefacts followed by interviews and focus groups demonstrated to be quite productive, as advocated by Creswell (2013). Focus groups were undertaken after interviews; consequently, the answers and discussions around the research questions were much more elaborated and constructive. Some documents were the same for both cases because they were relevant for both examined cases, as can be verified into the column “Examples of transcriptions/field notes” in Tables 4.1 and 4.2. Therefore, in an iterative process, codes and themes were developed, defined, refined, and finally allocated under one of the ‘tables’ within the relational databases (Silberschatz et al, 2010; Nogueira, 2015c) as presented in Section 5.4.2, that is similar to ‘tree nodes’ within NVivo 10 software (NVivo, 2014). The benefits of relational database software to support the qualitative analysis is that it allows automated searching, comparison, and traceability of making the process of analysis much easier than with manual methods.

A code (also called as concept) in qualitative research is a meaningful segment of information, a word or a sentence that symbolically assigns a summary, an essence, a text segment for a portion of data that contributed to answering the research questions, and each code can be subdivided in small portions, called as subcodes (Stake and Savolainen, 1995; Yin, 2009). These subcodes represent the minor portion of data analysis. On the other hand, a theme (also called as category) is a broad unit of information that consist of

several codes aggregated to form a common idea, i.e. a set of codes or high-level codes (Creswell, 2013; Corbin and Strauss, 2008). In this thesis, a theme was comprised of several codes clustered to form a common idea representing the larger meaning or abstraction of the data based on the analysed case, as an exploratory factor rather than its frequency, as argued by Corbin and Strauss (2008) and Creswell (2013). In a practical way, I requested to research participants during the interviews and focus groups to seek for subcodes and codes in their sentences that were transcribed on small pieces of paper with adhesive strip of glue (post-it) and placed in clusters. At the end of each session, interviewees and focus groups participants had selected sentences representing meaningful information together with a set of subcodes, codes, and themes. Therefore, from data interpretation, emerged codes (concepts) that were clustered in themes (categories) by research participants, as presented in Tables 4.1 and 4.2. Many subcodes appeared in more than one code. Through a critical reflection process using member checking (Creswell, 2013; Lincoln and Guba, 1985) during the interviews and focus groups, codes were reassessed, merged or expanded as appropriated for best location in building themes. For example, the sentences “disaster management”, “disaster victim identification”, “systems & databases”, “recommendations”, “training & capacity building” appeared several times in different places as subcodes, then they were reassessed and relocated in best places into the appropriated theme. This continuous comparison among subcodes, codes, and themes continued until “theoretical saturation” was reached and no new theme emerged (Corbin and Strauss, 2008; Shah and Corley, 2006). In total, case 1 generated 8 themes, 23 codes and 76 subcodes. On the other hand, case 2 produced the same amount of themes and codes, and 60 subcodes. Similarities in the levels of themes and codes were identified, as well as differences in the level of subcodes during the cross-case analysis (see Section 4.2). In fact, during the cross-case analysis, similarities for eight themes and twenty-three codes were found. Subcodes varied according to each transnational disaster. However, after a critical reflection, this result is natural and corroborative since both cases were related to the same subject (transnational disasters) and managed by the same entity (INTERPOL). Notwithstanding, it was valuable to identify that two so different types of transnational disasters, case 1 (tsunami) – natural and open disaster, and case 2 (air crash) – man-made and closed disaster, occurring at different sites Thailand and Brazil, in different periods 2004 and 2009, had displayed similar themes and codes. The reactions by interviewees and focus

group participants when they were asked to review the cross-case outcomes were corroborative since they agreed with the choice of subcodes, codes, and themes.

3.5 Data triangulation

Data triangulation is a process that makes use of multiple and different sources of data to provide corroborating evidence for validating the credibility and accuracy of the study (Creswell, 2013; Yin, 2009). Therefore, the findings and conclusions in each case were much more convincing and accurate because they were supported by more than a single source of data, creating a validation strategy. In this research, the data triangulation began with the initial data collection and continued with open coding that helped to identify the various concepts and issues that emerged. The interpretation identified common codes patterns from individual interviews that were compared to other interviews and focus groups (Yin 2009). In addition, physical artefacts (i.e. documents, photos, and videos) were also analysed in order to identify common codes patterns that corroborated the interviews and focus groups. Axial coding was used to identify the relationships among these codes and to group them into broader themes (Creswell, 2013; Easterby-Smith et al., 2012). Hence, the triangulation process was looking a set of data with different lens on subcodes that converge to codes, and codes that converge to themes obtained from axial coding (Figure 3.11).

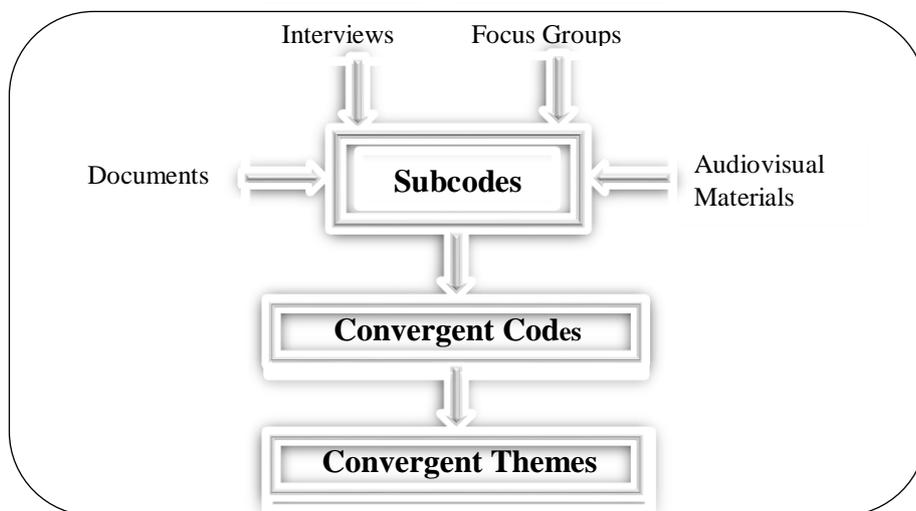


Figure 3.11 – Data triangulation using axial coding

3.6 Ethical considerations

(I) Ethical issues

During the process of planning and designing a qualitative study, researchers need to consider what ethical issues might surface throughout the study and to plan how these issues need to be addressed (Creswell, 2013). A common misconception is that these issues only surface during data collection. Indeed, they arise during several phases of the research process; they are ever expanding in scope as inquiries become more sensitive to the needs of participants, sites, stakeholders, and publishers of research (Easterby-Smith et al., 2012). Ethical issues involve considering the researcher role as insider/outsider to the participants: assessing subjects that may be sensitive of disclosing; establishing supportive, respectful relationships without stereotyping and using labels that participants not embrace; acknowledging those voices that will be represented in the final study, and critically reflecting on people and sources of data.

(II) Ethical issues in all phases of this research process

According to Creswell (2013), ethical issues in qualitative research can be described as occurring prior to conducting the study, at the beginning of the research, during the data collection, in data analysis, in reporting data, and publishing the study. All ethical actions were grounded in the DBA Thesis Handbook published by University of Liverpool (UoL) as part of the professional doctorate programmes delivered in partnership with Laureate Online Education. It was ensured the ethical approval for this research before begin to collect any data or make any form of intervention. The ethical approval was gained by primary supervisor taking into account the considerations of UoL's ethical committee. Table 3.4 presents the ethical issues considered in this thesis.

Table 3.4 – Ethical issues

Phase	Ethical issue	Consideration and action
Prior to conducting the study	<ul style="list-style-type: none"> - Gain access and permission from site and participants 	<ul style="list-style-type: none"> - Under the guidance of the primary supervisor, it was completed the Full Ethics Application Form. - As part of the application process, it was prepared an “Informed Consent Form”. These forms were approved and used to obtain the informed consent of the participants in the research. - The template of the Participant Consent Form used in this research are in Appendix A. These templates are an adaptation of that suggested by University of Liverpool.
Beginning to conduct the study	<ul style="list-style-type: none"> - Disclose purpose of the study - Do not pressure participants into signing consent forms 	<ul style="list-style-type: none"> - Contacted participants and informed on the purpose of the study - Informed Consent Forms were signed
Collecting data	<ul style="list-style-type: none"> - Respect the site and disrupt as little as possible - Avoid deceiving participants - Disclose the ethical principles to participants - Accomplish the ethical principles 	<ul style="list-style-type: none"> - The participation of interviewees was voluntary. - This research did not induce psychological stress or cause harm or negative consequences. - Anonymity, privacy, and confidentiality were provided within the research scope; therefore, no personal information was disclosed. - The researcher did not utilise any research assistant to recruit participants or collect research data on behalf of the researcher. - No university or company computers were used for data storage. - Data was not shared with other organisations. - Data was anonymised at the point of collection. - No audio/visual recording devices were used during the interviews and focus groups.
Analysing data	<ul style="list-style-type: none"> - Avoid siding with participants - Avoid disclosing only positive results 	<ul style="list-style-type: none"> - Multiple perspectives were reported - Contrary opinions and findings were reported - The privacy of participants were respected
Reporting data	<ul style="list-style-type: none"> - Do not plagiarize - Avoid disclosing information that would harm participants - Communicate in clear, straightforward, appropriate language - Share data and information with participants 	<ul style="list-style-type: none"> - Data and information were reported honestly - Appropriated language was used according to the audience - Data analysis results were provided to participants and stakeholders
Publishing the study	<ul style="list-style-type: none"> - Do not duplicate or piecemeal publications - Complete proof of compliance with ethical issues and lack of conflict of interest 	<ul style="list-style-type: none"> - Practical results were presented to INTERPOL members - Some peer reviewed scientific articles were published based on this thesis - None ethical problem or conflict of interest were found - None legal risk was found in the data collection or other research stage. - This research study did not require discussion of sensitive topics. - Acknowledgements were provided to participants, supervisor, and INTERPOL co-workers.

3.7 Conclusion

This chapter presented the scientific methodology used in this research. Some fundamental reasons to study the theoretical and philosophical issues were presented in an objective manner. The phases to build the theoretical and philosophical scaffolding were identified as ontology, epistemology, mode of research, mode of reasoning, and mode of inquiry. As result, this study was positioned as relativist (ontological dimension), social constructionist (epistemological dimension), mode 2 (applied research), inductive (mode of reasoning), and qualitative research (mode of inquiry). The qualitative research design allowed the researcher to objectively collect data in the most effective manner for this particular study. After examining five qualitative strategies and their characteristics, i.e. narrative research, phenomenology, grounded theory, ethnography, and case study, this researcher recognised the case study as the most appropriated strategy to this thesis. The rationale to select case study as research strategy to inquiry was based on seven objective reasons.

This chapter also offered a detailed view on the data collection process developed to multiple case studies and evidenced in five stages: gaining access and permission, sampling, collecting data, recording data, and storing data. The data was gathered from two major cases managed by INTERPOL: case 1 - tsunami in the Indian Ocean and case 2 – air crash of Air France flight 447 in Brazil. A key point of the data collection based on case study was the opportunity to use many different sources of data (i.e. interviews, focus groups, documentations, audiovisual materials) describing multiple perspectives about the case. In total, ten interviews one-to-one, 60-90 minutes each, with 10 participants from INTERPOL were carried out for case 1, and ten interviews one-to-one, 60-90 minutes each, with 10 participants from INTERPOL were carried out for case 2. In turn, two focus groups, 45-60 minutes each, with 10 staff from were undertaken for case 1, and two focus groups, 45-60 minutes each, with 8 staff from INTERPOL were undertaken for case 2. Eighty-seven documents, one hundred and fifty photos, and ten videos were collected on the case 1; and thirty-eight documents, sixty photos, and four videos were collected on the case 2. Afterwards, the data interpretation was done in order to find out and present the categories (themes) and concepts (codes) in both cases. This chapter also presented the data triangulation process using axial coding that made use of

multiple and different sources of data to provide corroborating evidence for validating the credibility and accuracy of the study. Ultimately, during the process of planning and designing this qualitative study, it was important to consider ethical issues that surface throughout the research and to plan how these issues need to be addressed. The ethical approval was gained by primary supervisor taking into account the considerations of UoL's ethical committee.

The following chapter will present the data analysis to support the development of themes, codes, and subcodes producing a generalizable research that will be used to create a Crisis Management Framework (CMF) that is the main objective of this thesis.

Chapter 4

Crisis Management Framework

4.1 Introduction

Frameworks are relevant to a wide range of situations involving crisis and disaster management (Janssen et al., 2010) and several authors have attempted to create them in different approaches. Elliott (2009) suggests a framework incorporating knowledge acquisition, transfer, and assimilation as an opportunity to enhance successful organisational learning from crisis. Gerybadze and Reger (1999) contend that management frameworks are developed to serve as a basis for analysing different building patterns, and for assessing the appropriate mechanisms to coordinate and control transnational corporations. Unlu et al. (2010) acknowledges the use of comprehensive frameworks to help managers in explain the systemic issues and problems in crisis management systems. Othman (2014) investigates various disaster management frameworks and proposes a new meta-modeling to help researchers and managers to handle and share information, related to disaster management.

The International Organization for Standardization (ISO) also develops several standards in the area of societal security (ISO/TC 223, 2011) involving the protection of society from and response to incidents, emergencies, and disasters caused by intentional and unintentional human acts, natural hazards, and technical failures. For instance, ISO 22320:2011 (Societal Security – Emergency Management – Requirements for Incident Response) enables public and private incident response organisations to improve their capabilities in handling different types of emergencies (for example, crisis, disruptions, and disasters). However, these ISO standards are not fully align with the requirements of a crisis management framework for INTERPOL since they do not cover all static and dynamic capabilities required by a framework to manage transnational disaster under the auspices of INTERPOL.

For the purposes of this study, the term framework was defined in Section 1.7.8.

Why a framework?

There are a number of reasons why a crisis management framework for transnational disasters can be useful. First, a framework can simplify complex events such as transnational disasters by assisting to distinguish between critical themes, concepts and

their relationships. Anderson and Woodrow (1989) clarifies that a framework sets out categories of factors that should be considered for a particular phenomenon and these categories must be comprehensive enough to cover all the important variables. Second, Rowley and Slack (2004) argues that frameworks can be useful tools in developing an understanding of a subject area and in identifying key concepts in a collection of documents or research area. Third, contrasting actual conditions with a theoretical-practical framework may conduct to a better understanding of the current situation, and how a disaster and its effects may evolve. Fourth, a written crisis management framework for transnational disasters helps establish a common understanding for all stakeholders involved. Ultimately, a crisis management framework can be very beneficial to local, national or international managers and agencies in explaining the course and possible future actions of a disaster to experts and non-specialists. If the framework is clear (a major condition), then its presentation to select or general audiences can facilitate support for crisis management efforts.

Therefore, the lack of a general framework to deal with similarities and synergies among different transnational disasters by taking their specific features into account was the main problem to be faced in this thesis. A core aim of this study was to create a comprehensive crisis management framework for INTERPOL to manage transnational disasters. The following Crisis Management Framework (CMF) was comprised of two dimensions: static and dynamic. Both dimensions were based on the data collection and data interpretation presented in Chapter 3 and derived from the emergent categories (themes), concepts (codes), and their relationships.

4.2 Data analysis

An important step before the creation of CMF is the data analysis since it will analyse themes, codes, subcodes, and their relationships. According to Creswell (2013), data analysis in qualitative research consists of preparing and organizing the data (i.e. transcriptions, documents, field notes, and audiovisual materials) for analysis, then reducing the data into codes and clustering them in themes.

In this study, the subcodes and codes (also called concepts) were produced by looking for recurrent patterns within the data such as the repetition of words and linkages and how respondents used or discussed key terms concerning crisis management. This was an

iterative process rather than a linear one as new insights and questions emerged which required revisiting the data. Thus, I analysed the subcodes for codes and after codes for themes and emerging theoretical insights, and then returned to the data for further coding and analysis in the light of these emerging theoretical insights. In this thesis, a theme (also called as category) is a unit of information and consists of several codes aggregated to form a common idea. Therefore, the criterion for what constitute a theme is its relevance within the analysed case as an exploratory factor rather than its frequency. Several authors of case study method, such as Corbin and Strauss (2008), Yin (2009), and Creswell (2013), advocate this criterion in order to generate themes in qualitative studies.

To analyse the data, I drew from interviews and focus groups to identify and categorise themes (Elliott and Macpherson, 2010; Yin, 2009). I was interested in how references to these sources of data suggested how effective crisis management at INTERPOL might be accomplished—an accepted order about how to do things. I was also interested in how existing artefacts (documents, photos, and videos) obtained in the data collection would contribute to understanding established patterns of INTERPOL's activities. That is, I was alert to find out key factors emerging from codes and themes within the different sources of data. In conducting the analysis, I intended to identify patterns as well as conflicts and disagreements within the data (Corbin and Strauss, 2008; Creswell, 2013, Elliott and Macpherson, 2010). For example, the subcodes attitude, consumables, deficient infrastructure, lack of coordination, and lack of standard only emerged in the data collection and analysis for case 1 (Tsunami in Indian Ocean), not appearing for case 2. In turn, some subcodes only emerged in the data collection and analysis for case 2 (Air France air crash in Brazil); for example, the subcodes DVI complexity, navy systems, and specialised underwater teams. The intention was to create a generalizable research (Section 4.2.1) using cross-case analysis (Section 4.2.2) that can be used in other scenarios involving transnational disasters. Hence, I was looking for behaviour patterns in order to find out what principles guide actions, as argued by several authors (Creswell, 2013; Easterby-Smith et al. 2012; Shah and Corley, 2006; Yin, 2009; Yin, 2011). Notwithstanding, the particular activities continue as part of the crisis management framework. Drawing from the sources above mentioned, eight themes or categories emerged: governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator. I was not only concerned with who was doing what, and with

whom, but I was also interested in why particular activities were conducted and what principles guided actions.

For example, where there was evidence of international law, organisational norms, or technical documents being followed at INTERPOL, I noted whether this was a codified practice (norm and legislation). That is, in order to effectively fulfil its cross-border activities, INTERPOL functions under norms and legislation, mainly when the crisis management involved transnational disasters. Thus, international law (e.g. Universal Declaration of Human Rights), organisational norms (e.g. constitution, resolutions, rules, and regulations) and technical documents (e.g. guides, manuals, and fact sheets) were the subcodes and clustered in a code called norm and legislation. I also identified that the General Secretariat at INTERPOL headquarter and the National Central Bureaus were subcodes related to the code physical structures (e.g. units, sectors, departments, bureaus, or even whole organisations) mobilised for any kind of disaster under the auspices of INTERPOL. As such, each transnational disaster required at least these two structures. Thus, General Secretariat and National Central Bureau were identified as subcodes of a common idea, so a code called structure. Other identified group of evidences involved the policy at INTERPOL. The political commitment to manage a transnational disaster was ensured when a member country accepted or requested INTERPOL assistance. The policy identified at INTERPOL considered the principles related to cooperation, assistance, or public safety in order to achieve and preserve the interest of member countries. Thus, cooperation, assistance, and public safety were codified as subcodes of a code called policy. I also paid attention to the fact that INTERPOL performed several roles and responsibilities before, during, and after a transnational disaster, such as disaster management, victim identification, information sharing, capacity building and training, knowledge dissemination, or recommendations. Consequently, I codified role and responsibility as a code comprising disaster management, victim identification, information sharing, capacity building and training, knowledge dissemination, and recommendations as subcodes. The codes structure, policy, role and responsibility, norm and legislation were the building blocks to a common idea, a theme called governance. Therefore, in the context of transnational disasters at INTERPOL, the data analysis shown that there was a direct connection between the category governance and its concepts structure, policy, norm and legislation, role and responsibility.

In the context of this study, service means an action or effort performed to satisfy a need or to fulfil a demand of INTERPOL member countries in cases of transnational disasters and the codes involving the theme service were clustered by disaster management phases (mitigation, preparedness, response, and recovery). It is important to underline that the services were grouped by disaster management phases because INTERPOL uses this pattern to classify its services to member countries when working in cases of disasters. Also this same pattern was evidenced by research participants during the interviews and focus groups.

For example, during the mitigation phase, where there was evidence of non-structural or structural mitigation services being undertaken at INTERPOL in cases of transnational disasters. I verified whether this was a codified practice (mitigation service). Thus, after the confirmation of this practice through the sources of data, non-structural mitigation services and structural mitigation services were the subcodes and clustered in a code called mitigation service. For example, in the context of this research, some concepts involving mitigation service emerged (shared role and responsibility, critical reflection on lessons learnt, technical resourcefulness, forensic robustness) because INTERPOL has used them to reduce the impact of disasters and to increase the resilience of member countries. Moreover, it is important to highlight that some structural and non-structural mitigation services were undertaken by INTERPOL in order to decrease the impact of disaster on affected communities. Structural mitigation services evidenced by INTERPOL included practical actions; for example, the relocation of INTERPOL staff and offices in NCBs and the integration and update of information systems and databases. I also verified that INTERPOL evidenced some non-structural mitigation services; for example, education and public awareness through meetings and recommendations on technical matters related to transnational disasters. In turn, during the preparedness phase, where there was evidence of training and capacity building, preparatory documents, and early public information being followed at INTERPOL, I observed whether this was a codified practice related to preparedness services. For example, after the confirmation of each practise through different sources of data, I identified that training and capacity building, preparatory documents, and early public information were subcodes and they were clustered in a code called preparedness service. In the same vein, during the response phase, it was evidenced that the response services at INTERPOL were performed through Incident Responses Teams (IRTs) sent to the sites of disasters. An IRT was typically

composed of expert police officers and support staff, and was tailored to the specific nature of the each disaster and the type of assistance that INTERPOL was requested to provide. Thus, I verified whether this was a codified practice (response service). For example, emergency service, disaster management service, or DVI service emerged from different sources of data. Thus, emergency service, disaster management service, and DVI service were codified as subcodes and clustered in a code called response service. Similarly, during the recovery phase, it was evidenced that several recovery services were performed by INTERPOL encompassing the reconstruction, restoration, or rehabilitation of essential infrastructure for NCBs, including logistical networks, supply chains, IT & telecommunication. Consequently, reconstruction, restoration, and rehabilitation were the subcodes and clustered in a code called recovery service. Therefore, in the context of transnational disasters at INTERPOL, the coding showed that there was a direct connection between the category service and its concepts mitigation service, preparedness service, response service, and recovery service.

This research also revealed that there were three underlying codes influencing the theme resource when it was related to transnational disaster at INTERPOL: staff, tools and technology, and infrastructure. For example, the disaster may have damaged or destroyed the country's existing infrastructure, tools and technologies, staff, making the task of crisis management even more difficult. Thus, during the process of coding, where there was evidence of expert police officers, support personnel, or specialised teams being used at INTERPOL, I verified whether this was a codified practice (staff). Consequently, after the confirmation of this practice through the sources of data, expert police officers, support personnel, and specialised teams were the subcodes, and clustered in a code called staff. In the context of this study, the code staff meant a group of people who work for INTERPOL and was engaged with cases of disasters. On the other hand, where there was evidence of systems and databases, computer networks, or communication mechanisms being used at INTERPOL, I verified whether this was a codified practice related to tools and technologies. Thus, after the confirmation of this practice through the sources of data, systems and databases (e.g. I-24/7 system, FASTID system, I-Link system, AFIS system and database, DNA profiles database, nominal database, and MPUB database), computer networks (e.g. intranet, virtual private network), and communication mechanisms (mobile and satellite phones, tetrapol communicator) were the subcodes and clustered in a code called tools & technology. In the same token, the code of infrastructure was related to the

basic elements needed for the operation of each disaster team. For example, where there was evidence of temporary offices, consumables, or specialised devices being used at INTERPOL, I verified whether this was a codified practice (infrastructure). Thus, after the confirmation of this practice through the sources of data, temporary offices, consumables, and specialised devices were codified as subcodes and clustered in a code called infrastructure.

INTERPOL was not alone in the scenario of transnational crisis and disaster management. The public sector with its governmental agencies usually interacts with private sector and non-profit agencies when responding to the effects of natural or man-made disasters. Therefore, a multi-agency network develops a fundamental role in the transnational disaster setting. Throughout the coding process, I paid attention to the evidence of the interactions and relations of multiple agencies working transnationally. For example, where there was evidence of formal relations or informal relations being pursued at INTERPOL, I noted whether this was a codified practice (social capital). Thus, formal relations and informal relations were the subcodes and clustered in a code called social capital. In the context of this study, the formal relations (contractual) were grounded in official written documentation, such as cooperation agreements, international conventions, contracts, and official partnerships. On the other hand, informal relations (non-contractual) were comprised of personal relationships based on trust and respect, such as shared understanding and knowledge, reputation, informal agreements, information exchange, or network of contacts. Furthermore, it is important to underline that the definitions of social capital vary according to whether the focus was on substance, sources, or effects (Johnson and Elliott, 2011, p.105). Therefore, in order to avoid misunderstanding or different interpretations, for this study, social capital represented the relationships between people or organisations that worked together with INTERPOL enabling to function effectively in coping transnational disasters. I also paid attention that the skills, knowledge, experiences, or attitudes were other evidences of a common idea related to the human capital when working in a multi-agency environment under the auspice of INTERPOL. Thus, skills, knowledge, experiences, and attitudes were the subcodes and clustered in a code called human capital. At last, the codes social capital and human capital were identified as the building patterns to a common idea, a theme called multi-agency network. Therefore, in the context of transnational disasters at

INTERPOL, the coding process shown that there was a direct connection between the category multi-agency network and its concepts social capital and human capital.

Crises and disasters under the aegis of INTERPOL affect a wide range of stakeholders and this study revealed that there were some concepts influencing the stakeholders when related to transnational disasters. For example, where there was evidence of international, regional, national, or local actors being followed at INTERPOL, I verified whether this was a codified practice (actor). Thus, after the confirmation of this practice through the sources of data, international, regional, national, and local actors were the subcodes and clustered in a higher code called actor. International actors were represented by international organisations and groups, such as all nations that have incurred human losses, foreign affairs departments, international funding nations, international agencies (e.g. INTERPOL, UN, IFRC, ICAO), international forensic laboratories, international companies. Regional actors were represented by regional unions, such as regional bodies, task forces, regional funding nations, and regional law enforcement agencies (e.g. EUROPOL, AMERIPOL, ASEANAPOL, CARICOM, SADC, FRONTEX). National actors were represented by national organisations and groups, such as national governmental departments, national law enforcement agencies (e.g. FBI, BFP, BKA), national health agencies, national forensic teams. Local actors were represented by local or provincial organisations, groups, and people, such as local governmental departments, local law enforcement agencies, local forensic teams, local health agencies, volunteers. Moreover, I also paid attention to the society sectors that were involved as stakeholders. Thus, where there was evidence of public, private, or non-governmental sectors being followed at INTERPOL, I verified whether this was a codified practice (sector). For example, in the context of multi-agency network, INTERPOL developed a cooperative approach engaging several public agencies (national police forces, national, regional, and provincial governments and departments, governmental ministries), private organisations (logistics companies, transportation companies, insurance companies, suppliers of consumables for DVI activities, companies to provide mobile hospitals and related equipment, morgue companies), and NGOs (United Nations, International Federation of Red Cross, International Commission on Missing Persons, etc.). Thus, after the confirmation of this practice through the sources of data, public sector, private sector, and non-governmental sector were the subcodes and clustered in a higher code called sector. Finally, the codes actor and sector were the building patterns to a common idea, a theme

called stakeholder. Therefore, in the context of transnational disasters at INTERPOL, the coding process shown that there was a direct connection between the category stakeholder and its concepts actor and sector.

The management of transnational disasters is an expensive activity, quickly consuming INTERPOL's finances. The finance at INTERPOL concerns the allocation of financial resources and this research revealed that contributions and incomes were underlying concepts influencing the category finance when it was related to transnational disaster at INTERPOL. The financial assistance to response, recovery, mitigation, and preparedness phases were provided at INTERPOL by different sources, such as statutory contribution and extraordinary contribution, and incomes. The major part of the INTERPOL's operating finance for all matters including disasters came from contributions by member countries (70% of the total) where statutory contribution represents 63% of the total and extraordinary contribution 7% of the total. Thus, for example, during the coding process where there was evidence of statutory or extraordinary contributions being used at INTERPOL, I noted whether this was a codified practice (contribution). Thus, after the confirmation of this practice through the sources of data, statutory contribution and extraordinary contribution were the subcodes and clustered in a code called contribution. Similarly, where there was evidence of formal financial agreements, financial projects, or consortiums being used at INTERPOL, I noted whether this was a codified practice related to income. Thus, after the confirmation of this practice through the sources of data, formal financial agreements, financial projects, or consortiums were the subcodes and clustered in a code called income. At last, the codes contribution and income were the building patterns to a common idea, a theme called finance. Therefore, in the context of transnational disasters at INTERPOL, the coding process shown that there was a direct connection between the category finance and its concepts contribution and income.

In the practical context of INTERPOL, it was possible to identify several barriers or impediments to effective response faced before, during, and after a transnational disaster, and they can be clustered by levels: operational, tactical, or strategic. Thus, for example, during the coding process, where there was evidence of strategic barriers such as the rigidity of core beliefs, non-alignment and different interests among agencies, initial lack of coordination, or long-term activity being followed at INTERPOL, I verified whether this was a codified practice (strategic barrier). Thus, after the confirmation of this practice through the sources of data, the rigidity of core beliefs, non-alignment and different

interests among agencies, initial lack of coordination, and long-term activity were the subcodes and clustered in a code called strategic barrier. In the same token, the lack of common assessment and knowledge about the roles and responsibilities, difficulty to integrate systems and databases, complex logistics, or non-accomplishment of international protocols being followed at INTERPOL, I verified whether this was a codified practice (tactical barrier). Thus, after the confirmation of this practice through the sources of data, the lack of common assessment and knowledge about the roles and responsibilities, difficulties in integrating systems and databases, complex logistics, and non-accomplishment of international protocols were the subcodes and clustered in a code called tactical barrier. Similarly, the deficient country's infrastructure, ineffective communication, complexity of DVI activities, or low level of engagement among different agencies being followed at INTERPOL, I verified whether this was a codified practice (operational barrier). Thus, after the confirmation of this practice through the sources of data, the deficient country's infrastructure, lack of standard, ineffective communication, complexity of DVI activities, and low level of engagement among different agencies were the subcodes and clustered in a code called operational barrier. Finally, the codes strategic barrier, tactical barrier, and operational barrier were the building patterns to a common idea, a theme called barrier. Therefore, in the context of transnational disasters at INTERPOL, the coding process shown that there was a direct connection between the category barrier and its concepts strategic barrier, tactical barrier, and operational barrier.

It was also possible to identify several facilitators faced before, during, and after a transnational disaster, and they can be clustered by levels: operational, tactical, or strategic. Thus, for example, during the coding process, where there was evidence of strategic facilitators such as social appeal or partnership agreements being followed at INTERPOL, I noted whether this was a codified practice (strategic facilitator). Thus, after the confirmation of this practice through the sources of data, social appeal and partnership agreements were the subcodes and clustered in a code called strategic facilitator. In the same token, disclosure of norms, shared displacement of resources, or real-time communication being followed at INTERPOL, I noted whether this was a codified practice (tactical facilitator). Thus, disclosure of norms, shared displacement of resources, and real-time communication were the subcodes and clustered in a code called tactical facilitator. Likewise, the collective working or collaborative operation being followed at

INTERPOL, I noted whether this was a codified practice (operational facilitator). Thus, after the confirmation of this practice through the sources of data, the collective working and collaborative operation were the subcodes and clustered in a code called operational facilitator. At last, the codes strategic facilitator, tactical facilitator, and operational facilitator were the building patterns to a common idea, a theme called facilitator. Therefore, in the context of transnational disasters at INTERPOL, the coding process shown that there was a direct connection between the category facilitator and its concepts strategic facilitator, tactical facilitator, and operational facilitator.

Through a critical reflection process using member checking (Creswell, 2013; Lincoln and Guba, 1985) during the interviews and focus groups, codes were reassessed, merged or expanded as appropriate for building themes. For example, the codes disaster management, disaster victim identification, systems & databases, recommendations, training & capacity building appeared several times in different places as subcodes; thus, they were reassessed and relocated in best places into the appropriated theme. This continuous comparison among subcodes, codes, and themes continued until “theoretical saturation” was reached and no new theme emerged (Corbin and Strauss, 2008; Shah and Corley, 2006). Examples of transcriptions/field notes related to the subcodes, codes, and themes generated in this in-depth qualitative study can be seen in Tables 4.1 and 4.2.

Therefore, in this doctoral research, all source of data (see Section 3.3) were carefully analysed i.e. (read and coded in Section 3.4), summarised and categorised according to the participants responses, documents, and audiovisual materials. The emergent themes based on the sources of data were governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator that helped to understand the investigated cases and formulate a proposal of crisis management framework.

4.2.1 Notation used in this data analysis

A specific formal notation was created as unit of reference in order to build databases to multiple case studies, to maintain the chain of evidence (data path) within the data storage protocol as presented in Figure 3.9 as much as to facilitate data management including the identification, localization, traceability of the collected data.

A tuple T , represented by “ $\langle \dots, \dots, \dots \rangle$ ”, is an ordered set of data constituting a record. The formal notation using tuple was chosen because it is traditionally used in relational algebra and applied in databases (Silberschatz et al., 2010). Therefore, the intention is to store records in databases. The set of tuples $\{T_1, \dots, T_n\}$ forms a file F . A set of files $\{F_1, \dots, F_n\}$ and their relationships forms a database D . The database created for this study was based on Tables 3.2 and 3.3 for data collection, and Tables 4.1 and 4.2 for data analysis.

- $\langle I, N, C \rangle$ is a tuple, where I is the set of interviewees $\{1, \dots, 10\}$; N is the set of identification number $\{1, \dots, m\}$; C is the set of case studies $\{1, 2\}$. For example, $\langle I, 10, 1 \rangle$ represents Interviewee, Number 10, Case 1.
- $\langle F, N, C \rangle$ is a tuple, where F is the set of focus groups $\{1, 2\}$; N is the set of identification number $\{1, \dots, m\}$; C is the set of case studies $\{1, 2\}$. For example, $\langle F, 2, 2 \rangle$ represents Focus Group, Number 2, Case 2.
- $\langle D, N, C \rangle$ is a tuple, where D is the set of documents $\{1, \dots, 87\}$ for case 1 and $\{1, \dots, 38\}$ for case 2; N is the set of identification number $\{1, \dots, m\}$; C is the set of case studies $\{1, 2\}$. For example, $\langle D, 32, 1 \rangle$ represents Document, Number 32, Case 1.
- $\langle A, N, C \rangle$ is a tuple, where A is the set of audiovisual materials $\{1, \dots, 160\}$ representing 150 photos and 10 videos for case 1, and $\{1, \dots, 64\}$ representing 60 photos and 4 videos for case 2; N is the set of identification number $\{1, \dots, m\}$; C is the set of case studies $\{1, 2\}$. For example, $\langle A, 10, 2 \rangle$ represents Audiovisual Material, Number 10, Case 2.

Table 4.1 – Case 1: Tsunami in the Indian Ocean

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Governance	Structure	General Secretariat National Central Bureau Regional Bureau	“Disasters are a governance-related issue, and as such INTERPOL has an important role in the international scenario” <F,2,1> “General Secretariat, National Central Bureaus and Regional Bureaus were the structures of INTERPOL used in this transnational disaster” <I,2,1>
	Policy	Cooperation Assistance Public safety	“Cooperate in disaster management matters for a safer world” <D,2,1> “...One of the main roles of INTERPOL is assisting member countries in issues related to transnational disasters” <I,1,1> “Beyond cooperation, our organisation is responsible to provide public safety through information exchange of victims, families and people” <F,1,1>
	Role & responsibility	Disaster management (DM) Disaster victim identification (DVI) Information sharing Capacity & training Recommendation Knowledge dissemination	“Assist and advise Interpol member countries in Disaster Management (DM) and Disaster Victim Identification (DVI) using accepted international standards” <D,5,1> “Share DM information and practical knowledge, both between member countries and, between countries and other international agencies, when responding to a disaster” <F,2,1> “In this case, INTERPOL promoted various specialised trainings to national police forces in order to disseminate the knowledge...” <I,3,1> “...dozens formal recommendations were presented in tsunami case” <I,5,1>
	Norm & legislation	International law Organisational norms Technical documents	“In order to effectively fulfil its cross-border activities, INTERPOL functions under international law and organisational norms such as its constitution, rules and regulations” <F,1,1> “Guides and manuals are used as technical documents in cases of transnational disasters, but they are insufficient” <I,9,1>>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Service	Mitigation Service	Non-structural mitigation service Structural mitigation service	“Meetings, recommendations, and operational procedures were non-structural mitigation measures used...” <F,2,1> “Some structural mitigation services provided by INTERPOL included relocation of INTERPOL staff and offices from NCB Bangkok” <F,1,1>
	Preparedness Service	Early public information Training & Capacity Building Preparatory documents	“Before the tsunami... We had helped to build a preliminary form of capacity building and training in Thailand, equipping them with the knowledge, skills and best practices” <F,2,1> “Prepare registry of organisations and services, experts and abilities, supplies and suppliers” <D,28,1> “...the organisation usually prepares several types of early public information to our member countries. For example, leaflets, guidelines, handbooks, and educational videos” <I,4,1>
	Response Service	Emergency service DM service DVI service	“We deploy emergency infrastructure services, such as logistics, field communications equipment, IT and communication, information systems and databases for our NCB in Thailand” <F,1,1> “... 24/7 DVI operational assistance and DM support” <A,2,1> “I am sure... A major response service is the deployment of Incident Response Teams (IRT) in the field of disaster... Moreover, occupational care for IRTs” <I,6,1>
	Recovery Service	Reconstruction Restoration Rehabilitation	“Reconstruction, restoration and rehabilitation of essential infrastructure, resources and services for NCBs, including logistical networks, supply chains, IT & telecommunication” <D,25,1> “As recovery service, the organisation offers risk and impact assessment” <F,2,1>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Resource	Staff	Expert police officers Support personnel	<p>“Our teams are comprised of managers, police officers, and support staff” <D,13,1></p> <p>“...when there is a major incident that requires expert police officers and support staff and, such as in a transnational natural disaster, a member country can request help from INTERPOL” <I,4,1></p>
	Tools & technology	Systems & Databases Computer networks Communication	<p>“The INTERPOL systems and databases contain millions of records on nominal data, fingerprints, DNA, travel documents, and more” <D,7,1></p> <p>“INTERPOL has a number of databases covering all types of evidence from fingerprints to stolen passports, and even DNA profiles” <A,6,1></p> <p>“The lack of communications and computer networks were big infrastructure challenges in this tsunami case” <I,8,1></p>
	Infrastructure	Temporary offices Consumables Specialised devices	<p>“A number of mechanisms of communication are daily used in disaster situations by member countries, such as notices, diffusions, and messages. Hence, it was necessary to bring specialised equipment to create another network for a new NCB office in Thailand” <D,30,1></p> <p>“I remember me that we provided temporary offices to NCB” <I,7,1></p>
Multi-agency Network	Social capital	Formal Relations	<p>“Transnational disaster cannot be tackled in isolation. Partnerships with other organizations and the private and public sectors are essential to tackle challenges in common areas” <D,20,1></p> <p>“I can identify international agreements as a key role in crisis management, such as in tsunami case” <I,9,1></p> <p>“Our partners were absolutely crucial in the case of tsunami in Thai” <I,2,1></p>
		Informal Relations	<p>“...relationships were not only formal... I believe that informal relations and contacts with key personnel within the disaster management process were very important” <I,1,1></p>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
			“Informal relations involved different individuals and groups” <F,1,1>
	Human capital	Knowledge Skill Experience Attitude	“Knowledge and experience were essential prerequisites to obtain successful multi-agency cooperation in the case of tsunami” <I,6,1> “Disaster experts need to know what to do, but also know how to do... they need to have ability and attitude ” <F,1,1>
Stakeholder	Actor	International Regional National Local	“This case integrated actions into relevant coordination mechanisms involving international, regional, national and provincial actors” <D,2,1> “I believe... we can’t forget that victims and their families as key stakeholders in this transnational disaster” <I,10,1> “This transnational disaster involved all nations which have incurred human losses” <F,2,1>
	Sector	Public Private Non-governmental	“The disaster management was a big challenge requiring the full commitment and involvement of all sectors concerned, including public, private, and non-governmental agencies” <F,1,1> “International non-governmental agencies, such as UN and INTERPOL, were key stakeholders in tsunami disaster” <I,4,1>
Finance	Contribution	Statutory contribution Extraordinary contribution	“Financial assistance to emergency/response, recovery, mitigation, and preparedness are provided by different sources, including statutory and extraordinary contributions” <D,1,1> “Well... I think that member countries’ contributions were essential to the disaster response activity” <I,3,1>
	Income	Agreements Projects Consortiums	“We were passing for severe budget constraints and it was necessary to find out alternative funding arrangements... look at our incomes in projects, bilateral agreements, and consortiums” <F,2,1> “...In that time, alternative incomes were indispensable” <I,6,1>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Barrier	Strategic Barrier	Rigidity Non-alignment Lack of coordination Different interests Long term	<p>“Long-term activity became more difficult due to the high staff turnover and funding reduction over the time” <D,3,1></p> <p>“A big challenge was the non-alignment with the DM international protocols and procedures by Thai specialists” <I,7,1></p> <p>“I identified some rigidity in the core beliefs of national forces” <I,5,1></p> <p>“Each agency has its own interest.” <I,9,1></p> <p>“Initially, the lack of coordination made our activity more difficult” <F,2,1></p>
	Tactical Barrier	Common assessment Lack of knowledge System integration Complex logistics International protocols	<p>“...Inefficient tools to integrate systems and the absence of common assessment became serious problems to support sharing and exchanging of information” <D,15,1></p> <p>“Lack of knowledge on the roles, responsibilities, and core values of other agencies” <F,1,1></p> <p>“I saw the non-accomplishment of international protocols and procedures to DVI and complex logistics as barriers in this mammoth transnational disaster” <I,5,1></p>
	Operational Barrier	Deficient infrastructure Number of victims Lack of standard Ineffective communication Level of engagement High staff turnover	<p>“We were facing an extremely poor infrastructure” <F,1,1></p> <p>“Tsunami provoked a huge number of victims, more than 5,000 fatalities in Thailand and over 250,000 people in cities, towns and villages along the coastlines” <A,5,1></p> <p>“I saw that our organisation had difficulties to disseminate procedures, norms and regulations among participants since they had different levels of engagement” <I,8,1></p> <p>“...Ineffective communication by the scale of the emergency” <I,3,1></p> <p>“...Due to the long term period this case faced the problem of high staff turnover” <I,2,1></p>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Facilitator	Strategic Facilitator	Social appeal Partnership agreements	<p>“Partnership agreements with public and private sectors represented a key strategic point to have a successful crisis management” <D,10,1></p> <p>“This transnational disaster provoked a social appeal that helped us to attract other means of funding” <I,1,1></p>
	Tactical Facilitator	Disclosure Displacement Real-time communication	<p>“Concerning to facilitators... There was a collective displacement of resources to the field of disaster” <F,2,1></p> <p>“...during and after this disaster, some organisations disclosed their norms and regulations” <I,6,1></p> <p>“In the first moment, technical messages were sent through real-time communication using satellite phones” <I, 4,1></p>
	Operational Facilitator	Collective working Collaborative operation	<p>“Forensic teams were represented by several nations, but under umbrella of INTERPOL” <D,6,1></p> <p>“Some units in the field ran under a collective and collaborative approach emphasizing the qualities of each agency” <F,1,1></p>

Table 4.2 – Case 2: Air crash of Air France flight 447

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Governance	Structure	General Secretariat National Central Bureau	<p>“INTERPOL's activities are driven by General Secretariat and member countries, within a clear framework of governing bodies” <D,8,2></p> <p>“In this disaster, it was used the structure of General Secretariat in Lyon/France and the National Central Bureau in Brasilia/Brazil” <I,2,2></p>
	Policy	Cooperation Assistance Public safety	<p>“Public safety also involves disaster management in cases like these. And INTERPOL develops a key role in this international setting” <F,2,2></p> <p>“Cooperate in disaster management matters for a safer world” <D,2,2></p> <p>“INTERPOL provided assistance in coordinating international efforts to identify the victims of the June 1 Air France plane tragedy in which 228 people from 32 countries lost their lives” <A,1,2></p>
	Role & responsibility	Disaster Management (DM) Disaster victim identification (DVI) Information sharing Recommendations International standards	<p>“Assist and advise INTERPOL member countries in Disaster Management (DM) and Disaster Victim Identification (DVI) using accepted international standards” <D,3,2></p> <p>“Responsibility of INTERPOL – Make recommendations related to DM and DVI: preventing and mitigating from air disasters, responding and recovering for these types of disasters” <I,2,2></p> <p>“Arrange to meet annually with disaster practitioners at INTERPOL in order to share information, international standards as well as to disseminate our recommendations” <I,5,2></p>
	Norm & legislation	International law Organisational norms Technical documents	<p>“...day-to-day implementation of the Organization's decisions related to transnational disasters was carried out by the organisational norms and technical documents in consonance with international law” <F,1,2></p>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Service	Mitigation Service	Non-structural mitigation service Structural mitigation service	<p>“Prospection of resource and service” <D,6,2></p> <p>“...I believe in the establishment of disaster culture through public education and public awareness” <I,4,2></p> <p>“An important mitigation service was the attempt to integrate and update information systems and databases” <F,2,2></p>
	Preparedness Service	Training & Capacity Building Preparatory documents	<p>“Prepare the registry of organisations and services, experts and abilities, supplies and suppliers” <D,15,2></p> <p>“...implement capacity building and training, exercises and simulations. Test the IT and communication services” <I,10,2></p> <p>“...furthermore, we do believe that the Organisation also prepares early specialised information and makes available in our site at Internet. For instance, contingency plans, fact sheets, reports, manuals and guides” <F,2,2></p>
	Response Service	Emergency service DM service DVI service	<p>“Forensic services consist of DVI, missing persons identification, unidentified bodies identification and linking, DVI assessment teams, DVI deployment on field, family identification and reconciliation, restoring family links and missing persons” <D,2,2></p> <p>“...direct assistance from Command and Control Coordination (CCC)... For example, the warning system through CCC” <I,8,2></p> <p>“In this case, INTERPOL provided information-sharing and exchange on-site in a more effective way, if compared with other previous disasters” <I,3,2></p>
	Recovery Service	Resilience Lessons learnt Assessments	<p>“INTERPOL generated resilience through shared responsibility, respectful interaction, critical reflection on lessons learnt, technical resourcefulness, and forensic robustness” <F,2,2></p> <p>“A relevant recovery service was the re-evaluation/review of response phase” <I,7,2></p> <p>“At the end, during the debriefing, it was discussed on lessons learnt” <I,4,2></p>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
Resource	Staff	Specialised Teams Administrative Teams	<p>“INTERPOL's staff members, including specialised teams and administrative teams, can assist national police forces and bring much needed expertise and experience” <D,30,2></p> <p>“An Incident Response Team (IRT) can be deployed anywhere if there is natural or man-made disasters” <A,3,1></p> <p>“There are different teams for each phase of disaster: mitigation team, preparedness team, incident response team (the most known), and recovery team. Some members can actuate in all these teams” <F,1,2></p>
	Tools & technology	Systems & Databases Communication	<p>“The INTERPOL databases contain millions of records on nominal data, fingerprints, DNA, travel documents, and more” <D,8,2></p> <p>“INTERPOL supported this case with instant and direct access to a wide range of technologies, particularly communication systems and databases” <F,2,2></p>
	Infrastructure	Underwater equipment Navy systems	<p>“In this case, the organisation used the navy systems to access reports and notices: yellow (missing person) and black (unidentified bodies)” <D,9,2></p> <p>“Autonomous underwater vehicles were used to find out the black boxes” <F,1,2></p> <p>“The IRT also used a mobile videoconference equipment as an effective and efficient mean of communication in order to reduce the distance between the General Secretariat in France and the site of disaster in Brazil” <I,6,2></p>
Multi-agency Network	Social Capital	Formal relations	<p>“Transnational disaster cannot be tackled in isolation. Partnerships with other organizations and the private and public sectors are essential to tackle challenges in common areas” <D,10,2></p> <p>“... formal partnerships take part of the disaster management process and they were essentials, in all levels: Micro Level (Group), Meso Level (Institutional), Macro Level (Multi-Agencies)” <F,2,2></p>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
			“Police cooperation agreement was an important factor in this air crash case” <I,7,2>
		Informal relations	“I’ve used my personal contact list... When I needed, I used...” <I,6,2> “Informal relationships (such as telephone list and social networks) were a useful method to obtain rapid access to data and information” <I,3,2>
	Human capital	Knowledge Skill Experience	“We have used our knowledge and skills in our work” <F,1,2> “The set of expert’s skills and experiences of our colleagues were crucial, particularly working in a multi-agency environment like this” <I,1,2>
Stakeholder	Actor	International National Local	“There’s mutual benefits among the involved actors and in different levels: international, national, and local” <F,1,2> “This air crash of Air France flight 447 was comprised of different international, national, and local actors involving civilian and military forces” <I,9,2>
	Sector	Public Private Non-governmental	“Sectors are comprised of provincial governments, departments, and foreign law enforcement agencies in the venue of disaster” <D,5,2> “As usual in this kind of disaster, we had also the involvement of private insurance companies” <I,8,2> “INTERPOL’s support in ensuring that our work is integrated with the international community is an important part of this case and we welcome governmental and non-governmental partners” <A,5,1>
Finance	Contribution	Statutory contribution Extraordinary contribution	“Financial assistance to emergency/response, recovery, mitigation, and preparedness are provided by different sources, including statutory and extraordinary contributions” <D,7,2>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
			“Well... Extraordinary contribution was a key factor” <I,3,2>
	Income	Agreements Consortiums	“Disaster management is an expensive activity, consuming INTERPOL’s contributions and incomes” <I,8,2> “...fortunately, DVI activities are also fomented through agreement with some organisations as well as the FASTID consortium” <F,2,2>
Barrier	Strategic Barrier	Rigidity Non-alignment Different interests	“We faced some kind of rigidity in institutional beliefs and legal frameworks, as difficult barrier to overcome” <F,1,2> “I consider as barrier: the non-alignment among objectives, organisational priorities, and coordination, mainly working in a multi-agency setting like this air crash” <I,1,2> “There were different interests from stakeholders” <I,5,2> “This case faced a barrier due to the different interests from military and civilian organisations” <I,6,2>
	Tactical Barrier	Common assessment System integration Complex logistics International protocols	“Some barriers were the complex logistics, lack of common assessment from involved agencies” <I,4,2> “It wasn't possible to have a full integration of our systems and databases with the military systems” <F,2,2> “In line with INTERPOL protocols, victims’ data were compared at the Information Management Centre (IMC) established in Recife, Brazil. However, it wasn’t an easy task” <I,3,2>
	Operational Barrier	DVI complexity Level of engagement	“The underwater search for bodies, the forensic identification of victims, and the necessity of families data gathering from around the world were complex and time-consuming tasks” <F,1,2>

Themes	Codes	Subcodes	Examples of transcriptions/field notes
			“I believe there were initial difficulties due to the different levels of engagement from civilian society, police and military forces involved” <I,10,2>
Facilitator	Strategic Facilitator	Social appeal Partnership agreements	“Partnership agreements with public and private sectors represents a key strategic point to have a successful crisis management” <D,20,2> “This kind of closed disaster involving air crash usually produces a social appeal. This appeal can facilitate the financial assistance” <I,9,2>
	Tactical Facilitator	Disclosure Displacement Real-time communication	“The displacement of heavy resources (e.g. ships, underwater robots) are provided by Brazilian and France Navy Task Force” <D,4,2> “At first, real-time communication with members of military forces was difficult, but after some collective meetings this obstacle was overcome” <I,5,2>
	Operational Facilitator	Collective working Collaborative operation	“As facilitator, we always hear the stakeholders’ complaints. Sometimes it’s possible to act immediately, and sometimes later” <F,2,2> “Collective and collaborative working was fundamental” <I,3,2>

4.2.2 Cross-case analysis

Case studies often have as relevant step the interpretations and conclusions obtained by the researcher about the overall meaning derived from the cases. There are two major approaches or techniques to qualitative data analysis using codes and themes: within-case and cross-case (Creswell, 2013). In within-case analysis, the researcher analyses a case and searches for themes (Creswell, 2013; Yin, 2009). In turn, cross-case analysis is a technique applied specifically to the analysis of multiple cases in which the researcher examines codes and themes across cases in order to find out similarities and differences to other cases (Creswell, 2013; Yin, 2009).

This study applied both analysis techniques. Firstly, it identified the subcodes, codes, and themes for each case using the within-case analysis (see themes in Tables 4.1 and 4.2). Secondly, the outcomes of the within-case analysis were compared across two cases in a cross case analysis (see Table 4.3). It was used an adapted version of the template for cross-case analysis presented by Creswell (2013). Furthermore, it was used the member checking (Creswell, 2013; Lincoln and Guba, 1985) during the focus groups as a form of review process and critical reflection. In member checking performed during focus groups, this researcher solicited participant's views upon the findings and interpretations so that they judge the credibility of the emerged subcodes, codes and themes.

The operationalization of the cross-case analysis was done using tabular and figure forms. The tables 4.1 and 4.2 represent themes, codes, and subcodes for case 1 and case 2 respectively. In addition, these cells contain some examples of transcripts extracted from interviews, focus groups, or physical artefacts. Another cross-case representation was created using a hierarchical tree diagram (Figure 4.1) that shows different levels of abstraction, with boxes in the top of the tree representing the most abstract information (level 1 - themes) and those at the bottom representing the least abstract information (level 2 - codes). The findings and discussions about the implementation of data analysis are shown in Section 3.4.

Table 4.3 – Within-case and cross-case analyses

In-depth portrait of cases				
Context Analysis (Codes and Subcodes)		Within-Case Analysis (Themes)		Cross-Case Analysis
Case 1	Case 2	Case 1	Case 2	Similarities and Differences
<ol style="list-style-type: none"> 1. Actor 2. Agreements 3. Assessments 4. Assistance 5. Attitude 6. Capacity & training 7. Collaborative operation 8. Collective working 9. Common assessment 10. Communication 11. Complex logistics 12. Computer networks 13. Consortiums 14. Consumables 15. Contribution 16. Cooperation 17. Deficient infrastructure 18. Different interests 19. Disaster management (DM) 20. Disaster victim identification (DVI) 21. Disclosure 22. Displacement 23. DM service 24. DVI service 	<ol style="list-style-type: none"> 1. Actor 2. Administrative teams 3. Agreements 4. Assessments 5. Assistance 6. Collaborative operation 7. Collective working 8. Common assessment 9. Communication 10. Complex logistics 11. Consortiums 12. Contribution 13. Cooperation 14. Different interests 15. Disaster management (DM) 16. Disaster victim identification (DVI) 17. Disclosure 18. Displacement 19. DM service 20. DVI complexity 21. DVI service 22. Emergency service 23. Experience 24. Extraordinary contribution 	<ol style="list-style-type: none"> 1. Barrier 2. Facilitator 3. Finance 4. Governance 5. Multi-agency Network 6. Resource 7. Service 8. Stakeholder 	<ol style="list-style-type: none"> 1. Barrier 2. Facilitator 3. Finance 4. Governance 5. Multi-agency Network 6. Resource 7. Service 8. Stakeholder 	<p>Similarities:</p> <ul style="list-style-type: none"> ▪ Themes and codes were the same for both cases <hr/> <p>Differences:</p> <ul style="list-style-type: none"> ▪ Several subcodes were different across cases (CASE 1) <ol style="list-style-type: none"> 1. Attitude 2. Capacity & training 3. Computer networks 4. Consumables 5. Deficient infrastructure 6. Early public information 7. Expert police officers 8. Ineffective communication 9. Knowledge dissemination 10. Lack of coordination 11. Lack of knowledge 12. Lack of standard 13. Long term 14. Number of victims 15. Projects 16. Reconstruction 17. Regional 18. Regional bureau 19. Rehabilitation

In-depth portrait of cases				
Context Analysis (Codes and Subcodes)		Within-Case Analysis (Themes)		Cross-Case Analysis
Case 1	Case 2	Case 1	Case 2	Similarities and Differences
25. Early public information 26. Emergency service 27. Experience 28. Expert police officers 29. Extraordinary contribution 30. Formal relations 31. General Secretariat 32. High staff turnover 33. Human capital 34. Income 35. Ineffective communication 36. Informal relations 37. Information sharing 38. Infrastructure 39. International 40. International law 41. International protocols 42. Knowledge 43. Knowledge dissemination 44. Lack of coordination 45. Lack of knowledge 46. Lack of standard 47. Level of engagement 48. Local 49. Long term	25. Formal relations 26. General Secretariat 27. Human capital 28. Income 29. Informal relations 30. Information sharing 31. Infrastructure 32. International 33. International law 34. International protocols 35. International standards 36. Knowledge 37. Lessons learnt 38. Level of engagement 39. Local 40. Mitigation service 41. National 42. National Central Bureaus 43. Navy systems 44. Non-alignment 45. Non-governmental 46. Non-structural mitigation service 47. Norm & legislation 48. Operational barrier 49. Operational facilitator 50. Organisational norms 51. Partnership agreements			20. Restoration 21. Specialised devices 22. Support personnel 23. Temporary offices (CASE 2) 1. Administrative teams 2. DVI complexity 3. International standards 4. Lessons learnt 5. Navy systems 6. Resilience 7. Specialised teams <ul style="list-style-type: none"> ▪ In total, case 1 has 16 subcodes more than case 2 (23 differences for case 1 minus 7 differences for case 2 = 16). ▪ There are 30 different subcodes between both cases (23 differences for case 1 plus 7 differences for case 2 = 30). ▪ Out of the 198 possible matches (8 themes, 99 codes and subcodes for case 1 plus 8 themes, 83 codes and subcodes for case 2 = 198) among themes, codes, and subcodes in the both analysed cases, about 85% were similar and 15% were different.

In-depth portrait of cases				
Context Analysis (Codes and Subcodes)		Within-Case Analysis (Themes)		Cross-Case Analysis
Case 1	Case 2	Case 1	Case 2	Similarities and Differences
50. Mitigation service	52. Policy			
51. National	53. Preparatory documents			
52. National Central Bureaus	54. Preparedness service			
53. Non-alignment	55. Private			
54. Non-governmental	56. Public			
55. Non-structural mitigation service	57. Public safety			
56. Norm & legislation	58. Real-time communication			
57. Number of victims	59. Recommendation			
58. Operational barrier	60. Recovery service			
59. Operational facilitator	61. Resilience			
60. Organisational norms	62. Response service			
61. Partnership agreements	63. Role & responsibility			
62. Preparatory documents	64. Rigidity			
63. Preparedness service	65. Sector			
64. Private	66. Skill			
65. Projects	67. Social appeal			
66. Public	68. Social capital			
67. Public safety	69. Specialised teams			
68. Real-time communication	70. Staff			
69. Recommendation	71. Statutory contribution			
70. Reconstruction	72. Strategic barrier			
71. Recovery service	73. Strategic facilitator			
72. Regional	74. Structural mitigation service			
73. Regional bureaus	75. Structure			
74. Rehabilitation	76. System integration			
75. Response service	77. Systems & databases			
	78. Tactical barrier			

In-depth portrait of cases				
Context Analysis (Codes and Subcodes)		Within-Case Analysis (Themes)		Cross-Case Analysis
Case 1	Case 2	Case 1	Case 2	Similarities and Differences
76. Role & responsibility 77. Restoration 78. Rigidity 79. Policy 80. Sector 81. Skill 82. Social appeal 83. Social capital 84. Specialised devices 85. Staff 86. Statutory contribution 87. Strategic barrier 88. Strategic facilitator 89. Structural mitigation service 90. Structure 91. Support personnel 92. System integration 93. Systems & databases 94. Tactical barrier 95. Tactical facilitator 96. Technical documents 97. Temporary offices 98. Tools & technology 99. Training & capacity building	79. Tactical facilitator 80. Technical documents 81. Tools & technology 82. Training & capacity building 83. Underwater equipment			

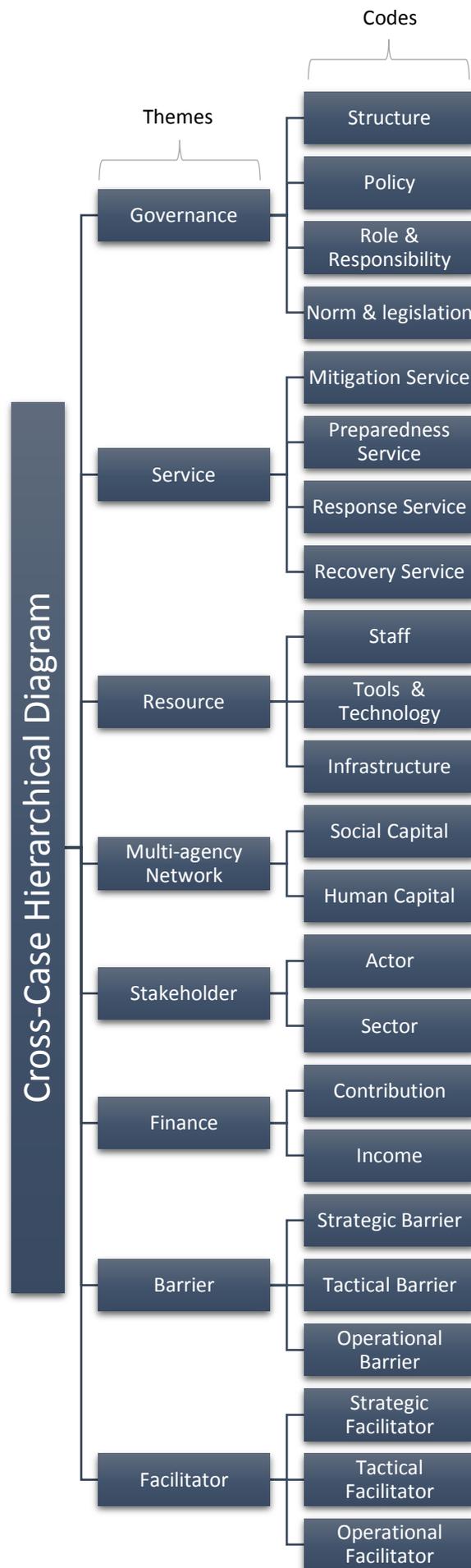


Figure 4.1 – Hierarchical diagram with similarities found in cross-case analysis

4.2.3 Research generalizability

When the patterns from each case study were compared, a common explanation emerged, then norms were established which will be used to generalise theories as well as to characterise the main objective of this thesis that is to create a comprehensive crisis management framework for transnational disaster under the auspices of INTERPOL. This fact motivated to examine the research generalizability. According to Easterby-Smith et al. (2012) generalizability in qualitative studies is the extent to which observations or theories derived in one context can be applied to other context. In other words, generalizability is the extension of the study to other domains. Shah and Corley (2006) posits that case study research is often simple, accurate, and potentially generalizable especially in multiple case studies For case study research, the latter is the appropriate type (Creswell, 2013; Yin, 2009). In this research, meanings, perspectives and understandings created in one case were examined through axial coding, cross-case analysis, member checking, and critical reflection upon the similarities and differences creating generalizability, as observed throughout Section 3.3 and highlighted in Table 4.3. Therefore, this thesis produced a generalizable research since the similarities that emerged from case 1 (e.g. natural and open disaster) and case 2 (e.g. man-made and closed disaster), evidenced throughout Section 3.3 and highlighted in Table 4.3, can be extended or applied in a simple and accurate manner to other cases of transnational disasters under the auspices of INTERPOL. Therefore, this research will propose a crisis management framework (Chapter 4) based on themes, codes and relationships that can be transferable from one context (e.g. natural and open disaster) to another context entirely different (e.g. man-made and closed disaster) creating analytic generalizations, as advocated by Yin (2011).

4.3 Static CMF

The static CMF is a structure with concepts (codes) and categories (themes) that emerged from data analysis (Chapter 3). In a practical context, it will be used to develop the management activities as well as to plan or make decisions at INTERPOL. It consists of four components:

- ❖ Categories (themes): define the overarching focus of the framework;
- ❖ Concepts (codes): refine the categories into specific aspects;
- ❖ Studied phenomena (scope): transnational disasters;
- ❖ Context (application domain): INTERPOL.

The static CMF is comprised of eight categories (themes) derived from data analysis: governance, service, resource, multi-agency network, stakeholder, finance, barrier, facilitator, and they will be used to plan and make decisions during crisis events involving transnational disasters under the auspices of INTERPOL. In addition, the static CMF encompasses twenty-three concepts (codes) emerged from the data analysis: structure, policy, role & responsibility, norm & legislation, mitigation service, preparedness service, response service, recovery service, staff, tools & technology, infrastructure, social capital, human capital, actor, sector, contribution, income, strategic barrier, tactical barrier, operational barrier, strategic facilitator, tactical facilitator, operational facilitator. The aim of each concept was to refine the categories into comprehensible and applicable aspects. These concepts were identified as success factors, which define each category. In doing so, these categories and concepts serve as a checklist for crisis and disaster managers in all organisational levels. Figure 4.2 depicts the static CMF.

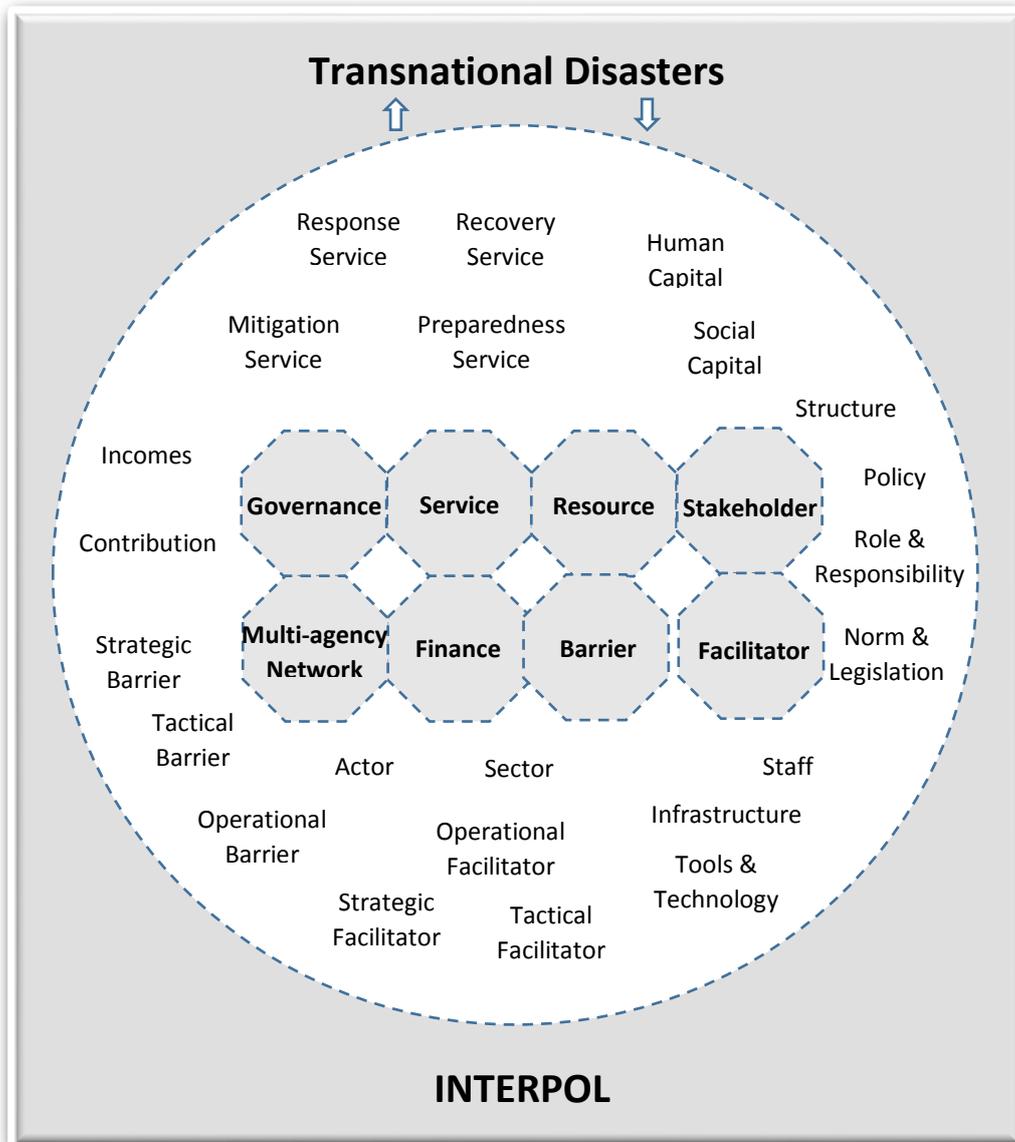


Figure 4.2 Visual schema representing the static CMF

4.4 Dynamic CMF

4.4.1 Relationships among categories in CMF

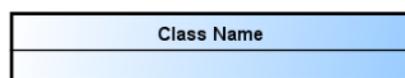
A vital aspect covered by CMF is the revelation of relationships between categories and concepts. CMF uses these relationships to give a view of common building patterns (concepts and categories) and to identify the actions that can be applied in all transnational disasters under the auspice of INTERPOL. In the viewpoint of this researcher, relationships are essential for scholars and practitioners have a thick and comprehensive understanding of the actions undertaken by each element in the framework. The identification of the relationships among the concepts and categories matches with the

practical implementation of axial coding as advocated by Creswell (2013) and Easterby-Smith et al. (2012), as presented in Section 3.3.5. In addition, a framework becomes more expressive and adapted to learn from crisis whether the number and strengths of relationships increase. Therefore, the relationships between concepts and categories become essential and need to be mapped within the dynamic part of CMF. Consequently, the dynamic CMF can be seen as a structure comprised of the relationships between concepts and categories represented in class diagrams. These class diagrams are developed using the Unified Modeling Language – UML (ISO/IEC, 2012; Nogueira, 2004). They will be used to give a unified view of common building patterns (concepts and categories) and to identify the actions that can be applied in all transnational disasters under the aegis of INTERPOL.

The Unified Modeling Language (UML) is used to represent the dynamic part of CMF due to its standard of applicability and ease of comprehension for any researcher and practitioner. Furthermore, the UML is an international standard (ISO/IEC 19505-1:2012) and general-purpose modeling language with a semantic specification, a graphical notation, an interchange format, and a repository query interface (ISO/IEC, 2012; Nogueira, 2004, Rumbaugh et al., 2004). In this thesis, the class diagrams of UML will be used in order to build the dynamic CMF and some basic definitions become necessary to understand UML and its class diagrams.

Definition 1. An *instance* (also called as object) is a concrete manifestation of an abstraction to which a set of operations or actions may be applied. Instances are used to model subcodes and pieces of data that live in the real world. For example, the General Secretariat of INTERPOL is an instance of the class Structure as well as the Universal Declaration of Human Rights, the INTERPOL’s constitution, the rule for data processing #12/2015, and the DVI guide are instances of the class Norm & Legislation.

Definition 2. A *class* is comprised of a set of instances. For example, all categories/themes, concepts/codes, and the own CMF are classes. Graphically, a class is represented as a rectangle with its name.



Definition 3. A *class diagram* is a diagram that shows a set of classes and their relationships. Graphically, a class diagram is a collection of vertices (e.g. CMF,

categories, and concepts) and arcs (i.e. relationships), as shown in Figures 4.2-4.10. There are three basic types of relationships in class diagrams: association, generalisation, and aggregation.

Definition 4. An *association* is a generic relationship that specifies that a class is connected to another class and is rendered as a solid line (———), possibly directed.

Definition 5. A *generalisation* is a particular kind of hierarchical association (“is a kind of”) between a more specific class and a more general class, and is rendered as a line with a hollow arrowhead pointing to the general class (———▷).

Definition 6. An *aggregation* is another special kind of association representing a whole-part (“has”) or part-whole (“part of”) association, and is rendered as an open diamond pointing to the whole class (◇——).

Definition 7. A *cardinality* of a relationship represents the amount of possible instances in an association among classes. In many modeling situations, it is important to state how many instances may be connected across a relationship. The cardinality is written as an expression to a range of values or an explicit value, such as exactly one (1), zero or one (0..1), zero-to-many (0..* or *), one-to-many (1..*), many-to-one (*..1), or many-to-many (*..*).

After these core definitions about UML notation is possible to represent the relationships between categories (themes) and concepts (codes) in CMF. The Figure 4.3 represents the class diagram for CMF with its eight categories: governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator.

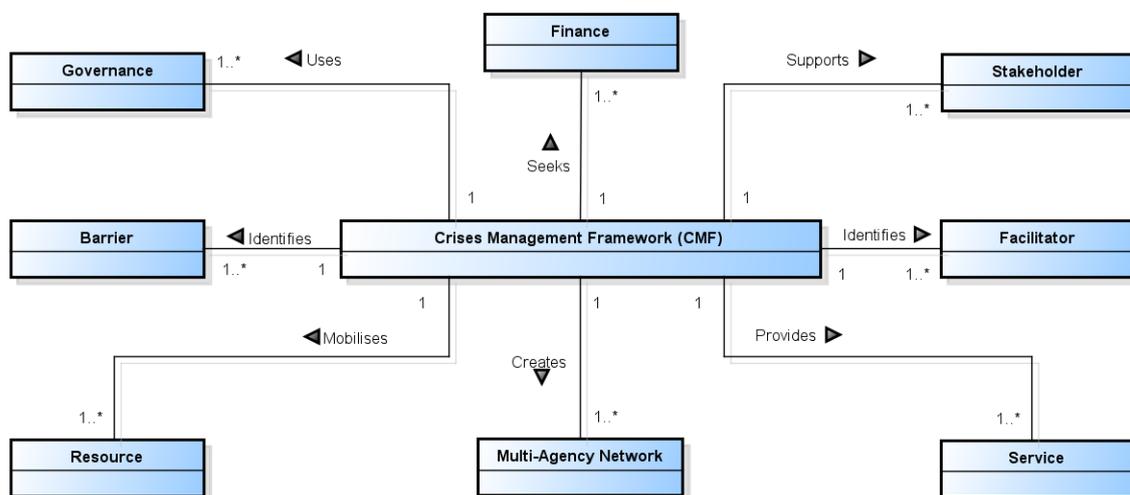


Figure 4.3 – Relationships among CMF and its categories

Table 4.4 is based on Figure 4.3 and depicts the relationships among CMF and its categories with regard to INTERPOL context.

Table 4.4 – Relationships among CMF and its themes

Class Origin	Relationship	Class Target	Cardinality	Description
CMF	Association 'Uses'	Governance	(1) (1..*)	One instance of CMF uses one or many instances of the Governance.
CMF	Association 'Provides'	Service	(1) (1..*)	One instance of CMF provides one or many instances of Services.
CMF	Association 'Mobilises'	Resource	(1) (1..*)	One instance of CMF mobilises one or many instances of Resources.
CMF	Association 'Creates'	Multi-Agency Network	(1) (1..*)	One instance of CMF creates one or many instances of Multi-Agency networks.
CMF	Association 'Supports'	Stakeholder	(1) (1..*)	One instance of CMF supports one or many instances of Stakeholders.
CMF	Association 'Seeks'	Finance	(1) (1..*)	One instance of CMF seeks one or many instances of Finance.
CMF	Association 'Identifies'	Barrier	(1) (1..*)	One instance of CMF identifies one or many instances of Barriers.
CMF	Association 'Identifies'	Facilitator	(1) (1..*)	One instance of CMF identifies one or many instances of Facilitators.

4.4.2 Relationships between themes and concepts in CMF

Critically reflecting upon the Figures 4.2-4.3, Table 4.4 and analysing the comparative study in Table 4.3 it was possible to infer some important relationships between each category and its respective concepts that are valuable descriptions to CMF.

Theme 1: Governance

The research has shown that there is a direct connection between the governance mechanisms to engage in transnational disasters and the actual application of crisis management at INTERPOL. This research also revealed that INTERPOL uses some basic governance elements when working in cases of transnational disasters: structures, policies, norms and legislation, roles and responsibilities. First, this study identified that the Disaster Unit at INTERPOL headquarter and the National Central Bureaus – NCBs are the basic instances of the category physical structure (e.g. units, sectors, departments, bureaus, or even whole organisations) and are mobilised for any kind of disaster under the auspice of INTERPOL. As such, each disaster, whether transnational or not, involves

at least these two instances. However, depending on the type of disaster, other instances of physical structure can emerge, such as the Bangkok Regional Bureau in case 1 – tsunami. Second, the concept of policy means a course or principles of action adopted or recommended by INTERPOL in cases of transnational disasters. Policies at INTERPOL usually involve principles related to cooperation, assistance, and public safety instances, and seek to achieve and preserve the interest of member countries. The political commitment to manage a transnational disaster is ensured when a member country accept or request the INTERPOL assistance. Third, in order to effectively fulfil its cross-border activities, INTERPOL functions under norms and legislation, mainly when the crisis management involves transnational disasters. These norms and legislation are grounded in several instances, such as international laws (e.g. Universal Declaration of Human Rights), organisational norms (e.g. constitution, resolutions, rules, regulations) and technical documents (e.g. guides, manuals, fact sheets). Fourth, INTERPOL performs several roles and responsibilities in all disaster’s phases (mitigation, preparedness, response and recovery), such as disaster management, disaster victim identification, information sharing, capacity building & training, knowledge dissemination, and international standardization (Nogueira, 2016).

Finally, Figure 4.4 contains a class diagram with the theme governance and its concepts. This figure indicates that the theme governance is associated through some relations with its concepts structure, policy, role & responsibility, norm & legislation.

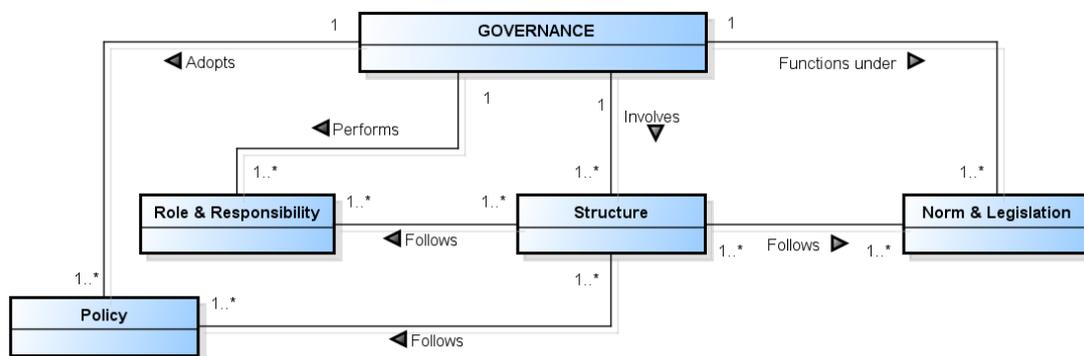


Figure 4.4 – Relationships between the theme governance and its concepts

Table 4.5 depicts the relationships between the theme governance and its concepts: policy, role & responsibility, structure, and norm & legislation.

Table 4.5 – Relationships between the theme governance and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Governance	Association 'Adopts'	Policy	(1) (1..*)	One instance of Governance adopts one or many instances Policy.
Governance	Association 'Performs'	Role & Responsibility	(1) (1..*)	One instance of Governance performs one or many instances of Role & Responsibility.
Governance	Association 'Involves'	Structure	(1) (1..*)	One instance of Governance involves one or many instances of Structure.
Governance	Association 'Functions under'	Norm & Legislation	(1) (1..*)	One instance of Governance functions under one or many Norm & Legislation.
Structure	Association 'Follows'	Role & Responsibility	(1..*) (1..*)	One or many instances of Structure follows one or many instances of Role & Responsibility.
Structure	Association 'Follows'	Policy	(1..*) (1..*)	One or many instances of Structure follows one or many instances of Policy.
Structure	Association 'Follows'	Norm & Legislation	(1..*) (1..*)	One or many instances of Structure follows one or many instances of Norm & Legislation.

Theme 2: Service

In the context of this study, service means an action or effort performed to satisfy a need or to fulfil a demand of INTERPOL member countries in cases of transnational disasters. Concepts involving the theme service were clustered by disaster phase as presented in Chapter 2: mitigation, preparedness, response, and recovery services. First, the concept of mitigation service means the actions that INTERPOL uses to reduce the impact of disasters and increase the resilience of member countries subject to the impact. In the context of this study, resilience means the ability to bounce back or recover to normalcy after a crisis or disaster occurs. INTERPOL produces resilience through shared role & responsibility, respectful interaction, critical reflection on lessons learnt, technical resourcefulness, forensic robustness, and re-evaluation and review of response phase. Therefore, some structural and non-structural measures are taken which aim at decreasing the impact of disaster on affected communities. Structural mitigation services provided by INTERPOL include several facets from relocation of INTERPOL staff and offices in NCBs up to the integration and update of information systems and databases. INTERPOL also provides some non-structural mitigation services such as public education and public

awareness through meetings and recommendations on technical matters related to transnational disasters. Second, INTERPOL provides preparedness services establishing arrangements and plans through training & capacity building, preparatory documents, and early public information. Third, as a form of response service, INTERPOL usually takes action during, and immediately after disasters to ensure that their effects were minimised. Response services are performed through Incident Responses Teams (IRTs) sent to the sites of disasters. An IRT is typically composed of expert police officers and support staff, and is tailored to the specific nature of the each disaster and the type of assistance that INTERPOL is requested to provide (e.g. emergency service, disaster management coordination, and DVI service). Fourth, INTERPOL provides recovery services encompassing the reconstruction, restoration and rehabilitation of essential infrastructure, resources and services for NCBs, including logistical networks, supply chains, IT & telecommunication (Nogueira, 2016).

Ultimately, Figure 4.5 contains a class diagram with the relationships between the theme service and its concepts. This figure indicates that the theme service is a generalisation of its concepts: mitigation service, preparedness service, response service, and recovery service. The cardinality one-to-many (1..*) in the generalisation represents an inheritance association where each instance of the specific classes – mitigation service, preparedness service, response service, or recovery service is a kind of the general class – service.

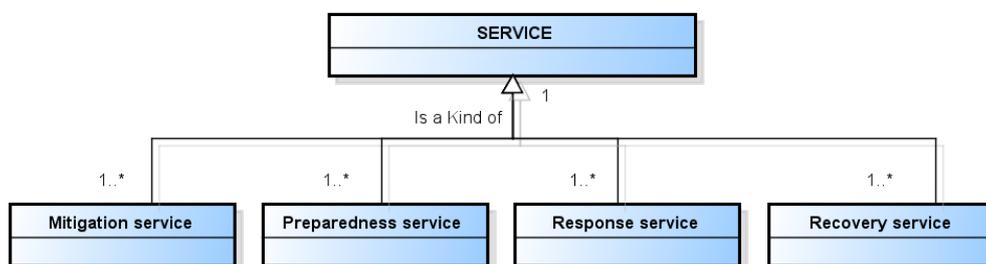


Figure 4.5 –Relationships between the theme service and its concepts

Table 4.6 depicts a hierarchical relationship between the theme service (general class) and its concepts: mitigation service, preparedness service, response service, or recovery service (specialised classes).

Table 4.6 – Relationships between the theme service and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Mitigation Service	Generalisation <i>'Is kind of'</i>	Service	(1..*) (1)	One or many instances of Mitigation Service is a kind of Service.
Preparedness Service	Generalisation <i>'Is kind of'</i>	Service	(1..*) (1)	One or many instances of Preparedness Service is a kind of Service.
Response Service	Generalisation <i>'Is kind of'</i>	Service	(1..*) (1)	One or many instances of Response Service is a kind of Service.
Recovery Service	Generalisation <i>'Is kind of'</i>	Service	(1..*) (1)	One or many instances of Recovery Service is a kind of Service.

Theme 3: Resource

When a transnational disaster occurs, one country alone may not have sufficient resources to deal with mass casualties. In these cases, the incident may have damaged or destroyed the country's existing infrastructure, tools and technologies, staff, making the task of crisis management even more difficult. This research revealed that there are three underlying concepts influencing the theme resource when it is related to transnational disaster: staff, tools & technology, and infrastructure. First, in the context of this study, the concept of staff means a group of people who work for INTERPOL and is engaged with cases of disasters. Staff members are usually comprised of expert police officers and support personnel composing the INTERPOL teams for crisis management. Second, the concept of tools and technologies is related to systems and databases, computer networks, communication mechanisms. At INTERPOL, the tools and technologies for disaster management comprise a vast offer of resources, such as I-24/7 system, FASTID system, I-Link system, AFIS system and database, DNA profiles database, nominal database, and MPUB database. Third, the concept of infrastructure is related to the basic physical structures needed for the operation of each disaster team. For example, temporary offices, consumables, and specialised devices were the main instances of infrastructure resources for case 1, whilst the underwater equipment and navy systems were the most relevant for case 2.

Finally, Figure 4.6 contains a class diagram with the relationships between the theme resource and its concepts. This figure indicates that the theme resource presents an aggregation relationship with its concepts staff, tools & technology, infrastructure. Then, staff, tools & technology, and infrastructure concepts are parts of the theme resource. The cardinality one-to-many (1..*) in the aggregation means that INTERPOL resources are

comprised of many staff members, tools & technologies, and infrastructures when actuating in cases of transnational disasters (Nogueira, 2016).

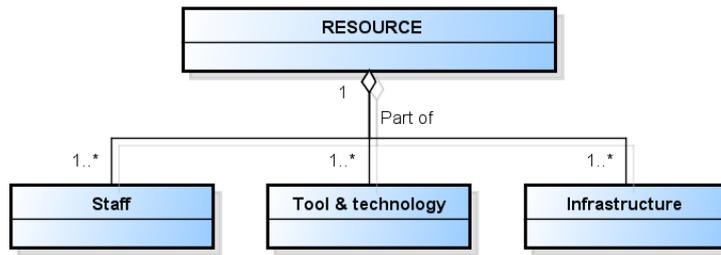


Figure 4.6 – Relationships between the theme resource and its concepts

Table 4.7 depicts the relationships between the theme resource and its concepts: staff, tools & technology, and infrastructure.

Table 4.7 – Relationships between the theme resource and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Staff	Aggregation <i>'Part of'</i>	Resource	(1..*) (1)	One or many instances of Staff is part of one instance of Resource. Resource has Staff as its component.
Tools & Technology	Aggregation <i>'Part of'</i>	Resource	(1..*) (1)	One or many instances of Tools & Technology is part of one instance of Resource. Resource has Tools & Technology as its component.
Infrastructure	Aggregation <i>'Part of'</i>	Resource	(1..*) (1)	One or many instances of Infrastructure is part of one instance of Resource. Resource has Infrastructure as its component.

Theme 4: Multi-Agency Network

Organisations are not alone in the scenario of international crisis and disaster management. The public sector with its governmental agencies interacts with private sector and non-profit agencies to protect from natural or man-made disasters. Therefore, a multi-agency network develops a fundamental role in this disaster setting. As mentioned in Chapter 2, a multi-agency network is a group of interconnected agencies with their respective members who work together and share resources, services, knowledge, skills, experiences and other relevant elements. This study confirms that there are two main concepts influencing the theme multi-agency network when related to transnational disaster: social capital and human capital. The definitions of social capital vary according to whether the focus is on substance, sources, or effects (Johnson and Elliott, 2011,

p.105). In order to avoid misunderstanding or different interpretations, for this study social capital represents the relationships between people or organisations that work together with INTERPOL enabling to function effectively in coping transnational disasters and is comprised of formal and informal social relations. The formal relations (contractual) for INTERPOL are grounded in official written documentation, such as cooperation agreements, international conventions, contracts, and official partnerships. On the other hand, informal relations (non-contractual) are comprised of personal relationships based on trust and respect, such as shared understanding and knowledge, reputation, informal agreements, information exchange, network of contacts (e.g. contact lists with telephones and e-mails of key people). In turn, the human capital is a set of skills, knowledge, experiences, and attitudes possessed by a staff member (police officer or support personnel) or specialised teams, viewed in terms of their values to INTERPOL when facing transnational disasters.

At last, Figure 4.7 contains a class diagram with the relationships between the theme multi-agency network and its concepts. This figure indicates that theme multi-agency network presents an aggregation relationship with its concepts social capital and human capital. Therefore, the concepts of social capital and human capital are parts of the theme multi-agency network. The cardinality one-to-many (1..*) in the aggregation means that the INTERPOL has social capital and human capital as part of its multi-agency network when actuating in cases of transnational disasters (Nogueira, 2016).

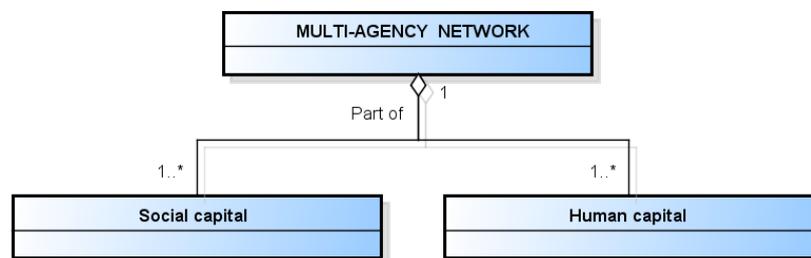


Figure 4.7 – Relationships between the theme multi-agency network and its concepts

Table 4.8 depicts the relationships between the theme multi-agency network and its concepts: social capital and human capital.

Table 4.8 – Relationships between the theme multi-agency network and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Social Capital	Aggregation <i>'Part of'</i>	Multi-Agency Network	(1..*) (1)	One or many instances of Social Capital is part of one instance of Multi-Agency Network. Multi-Agency Network has Social Capital as its component.
Human Capital	Aggregation <i>'Part of'</i>	Multi-Agency Network	(1..*) (1)	One or many instances of Human Capital is part of one instance of Multi-Agency Network. Multi-Agency Network has Human Capital as its component.

Theme 5: Stakeholder

Stakeholder in this research denotes a person, group or organisation that has interest or concern in INTERPOL's success with regard to management of transnational disasters. Crises impact upon a wide range of stakeholders and this study revealed that there are two central concepts influencing the theme stakeholder when related to transnational disaster: actor and sector. Therefore, the stakeholders' interests and concerns can affect or be affected by actors and sectors (Nogueira, 2016). First, actor is a kind of stakeholder and can be clustered by different spheres of activity: international, regional, national, and local. International actors are represented by international organisations and groups, such as all nations that have incurred human losses, foreign affairs departments, international funding nations, international agencies (e.g. INTERPOL, UN, IFRC, ICAO), international forensic laboratories, international companies. Regional actors are represented by regional unions, such as regional bodies, task forces, regional funding nations, and regional law enforcement agencies (e.g. EUROPOL, AMERIPOL, ASEANAPOL, CARICOM, SADC, FRONTEX). National actors are represented by national organisations and groups, such as national governmental departments, national law enforcement agencies (e.g. FBI, BFP, BKA), national health agencies, national forensic teams. Local actors are represented by local or provincial organisations, groups, and people, such as local governmental departments, local law enforcement agencies, local forensic teams, local health agencies, volunteers, and families of the victims. Second, this study revealed that the stakeholders could also be clustered by society sectors: public, private, and non-governmental. The concept of sector emerged as a kind of the theme stakeholder. Public sector means the part of an economy that is controlled by the state and is concerned with providing various government services. Private sector

means the part of an economy that is run by private individuals, groups, or companies. Non-governmental sector means the part of an economy that not belonging to or associated with any government. In the context of this research, the non-governmental sector is only represented by non-profit organisations, agencies or groups.

Ultimately, Figure 4.8 contains a class diagram with the relationships between the theme stakeholder and its concepts. This figure indicates that theme stakeholder presents an aggregation relationship with its concepts actor and sector. Therefore, the concepts of actor and sector are parts of the theme stakeholder. The cardinality one-to-many (1..*) in the aggregation means that the INTERPOL has different actors and sectors as part of its stakeholders when participating in cases of transnational disasters.

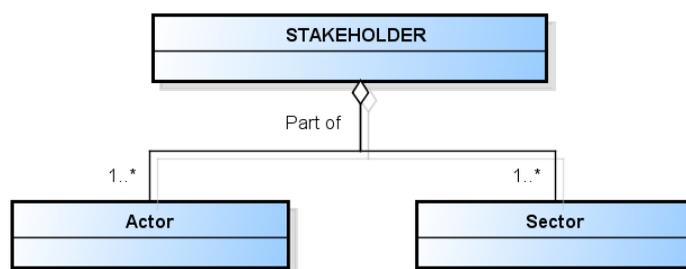


Figure 4.8 – Relationships between the theme stakeholder and its concepts

Table 4.9 depicts the relationships between the theme stakeholder and its concepts: actor and sector.

Table 4.9 – Relationships between the theme stakeholder and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Actor	Aggregation <i>'Part of'</i>	Stakeholder	(1..*) (1)	One or many instances of the Actor is part of one instance of Stakeholder. Stakeholder has Actor as its component.
Sector	Aggregation <i>'Part of'</i>	Stakeholder	(1..*) (1)	One or many instances of Sector is part of one instance of Stakeholder. Stakeholder has Sector as its component.

Theme 6: Finance

In the context of this study, finance means a branch of INTERPOL that concerns with allocation and management of financial resources. This research revealed that there are two central concepts influencing the theme finance when related to transnational disaster: contribution and income. The financial assistance to response, recovery, mitigation, and

preparedness phases are provided by different sources, such as statutory and extraordinary contributions, and incomes (Nogueira, 2016). First, the major part of INTERPOL’s operating finance for all matters including disasters comes from contributions by member countries (70% of the total) where statutory contribution represents 63% of the total and extraordinary contribution 7% of the total. Second, the income received on externally funded projects or from private foundations and/or commercial enterprises, with like objectives or interests as INTERPOL, constitutes about 30% of gross income for disasters. It is important to highlight that the management of transnational disasters is an expensive activity, quickly consuming INTERPOL’s contributions and incomes. So, that is the reason why there is a specific theme for finance.

Finally, Figure 4.9 contains a class diagram with the relationships between the theme finance and its concepts. This figure indicates that theme finance presents a generalisation relationship with its concepts contribution and income. The cardinality one-to-many (1..*) in the generalisation represents an inheritance association where each instance of the specific classes – contribution or income is a kind of the general class – finance.

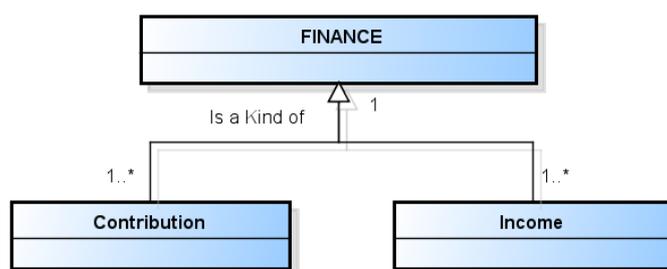


Figure 4.9 – Relationships between the theme finance and its concepts

Table 4.10 depicts a hierarchical relationship between the theme finance (general class) and its concepts: contribution and income (specialised classes).

Table 4.10 – Relationships between the theme finance and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Contribution	Generalisation <i>'Is kind of'</i>	Finance	(1..*) (1)	One or many instances of Contribution is a kind of Finance.
Income	Generalisation <i>'Is kind of'</i>	Finance	(1..*) (1)	One or many instances of Income is a kind of Finance.

Theme 7: Barrier

Based on both case studies, this research revealed several barriers that fit well with the Table 2.1 (Chapter 2). These barriers were grouped in three concepts: strategic barrier, tactical barrier and operational barrier following the same schema presented in Table 2.1. First, this study identified the rigidity of core beliefs, non-alignment and different interests among agencies, initial lack of coordination, long-term activity as strategic barriers. Second, this study identified the lack of common assessment and knowledge about the roles and responsibilities, difficulty to integrate systems and databases, complex logistics, and non-accomplishment of international protocols as tactical barriers. Third, this study identified the deficient country's infrastructure, number of victims, lack of standard, ineffective communication, complexity of DVI activities, and low level of engagement among different agencies as operational barriers. Furthermore, taking into account the experience of this researcher in several transnational disasters it is possible to infer that these barriers may generate obstacles to the effectiveness of multi-agency working.

Ultimately, Figure 4.10 contains a class diagram with the relationships between the theme barrier and its concepts. This figure indicates that the theme barrier presents a generalisation relationship with its concepts: strategic barrier, tactical barrier, and operational barrier. The cardinality one-to-many (1..*) in the generalisation represents an inheritance association where each instance of the specific classes – strategic barrier, tactical barrier, or operational barrier is a kind of the general class – barrier.

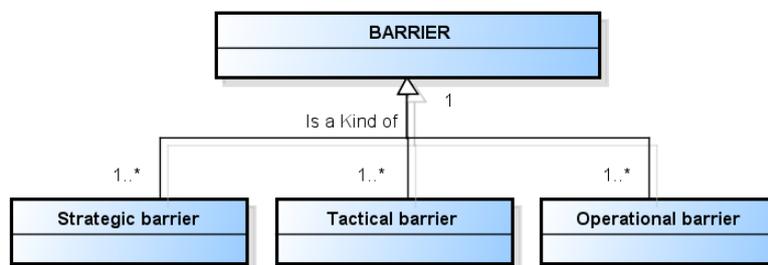


Figure 4.10 – Relationships between the theme barrier and its concepts

Table 4.11 depicts a hierarchical relationship between the theme barrier (general class) and its concepts: strategic barrier, tactical barrier, and operational barrier (specialised classes).

Table 4.11 – Relationships between the theme barrier and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Strategic Barrier	Generalisation <i>'Is kind of'</i>	Barrier	(1..*) (1)	One or many instances of Strategic Barrier is a kind of Barrier.
Tactical Barrier	Generalisation <i>'Is kind of'</i>	Barrier	(1..*) (1)	One or many instances of Tactical Barrier is a kind of Barrier.
Operational Barrier	Generalisation <i>'Is kind of'</i>	Barrier	(1..*) (1)	One or many instances of Operational Barrier is a kind of Barrier.

Theme 8: Facilitator

All facilitators identified in the analysed transnational disasters cases fit well with the Table 2.2 (Chapter 2). These facilitators were grouped in three concepts: strategic facilitator, tactical facilitator and operational facilitator (Nogueira, 2016). First, this study revealed the social appeal and partnership agreements as strategic facilitators for both studied cases. Second, this study revealed the disclosure of norms, shared displacement of resources, and real-time communication as tactical facilitators for both studied cases. Third, this study revealed the collective working and collaborative operation as operational facilitators for both studied cases.

At last, Figure 4.11 contains a class diagram with the relationships between the theme facilitator and its concepts. This figure indicates that the theme facilitator also presents a generalisation relationship with its concepts: strategic facilitator, tactical facilitator, and operational facilitator. The cardinality one-to-many (1..*) in the generalisation represents an inheritance association where each instance of the specific classes – strategic facilitator, tactical facilitator, or operational facilitator is a kind of the general class – facilitator.

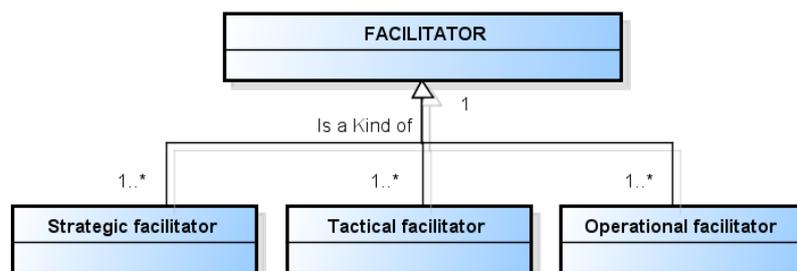


Figure 4.11 – Relationships between the theme facilitator and its concepts

Table 4.12 depicts a hierarchical relationship between the theme facilitator (general class) and its concepts: strategic facilitator, tactical facilitator, and operational facilitator (specialised classes).

Table 4.12 – Relationships between the theme Facilitator and its concepts in CMF

Class Origin	Relationship	Class Target	Cardinality	Description
Strategic Facilitator	Generalisation <i>'Is kind of'</i>	Facilitator	(1..*) (1)	One or many instances of Strategic Facilitator is a kind of Facilitator.
Tactical Facilitator	Generalisation <i>'Is kind of'</i>	Facilitator	(1..*) (1)	One or many instances of Tactical Facilitator is a kind of Facilitator.
Operational Facilitator	Generalisation <i>'Is kind of'</i>	Facilitator	(1..*) (1)	One or many instances of Operational Facilitator is a kind of Facilitator.

4.5 Conclusion

This chapter revealed the main contribution of this thesis. The data analysis process was done in order to find out the categories (themes) and concepts (codes) in both cases. A specific formal notation was created as unit of reference in order to build databases to multiple case studies, to maintain the chain of evidence (data path) within the data storage protocol as much as to facilitate the data management including the identification, localization, traceability of the collected data. Cross-case analysis was used to examine codes and themes across cases in order to figure out similarities and differences between the investigated cases. An investigative sequence was done in order to make sense of the data. This sequence started by the analysis of physical artefacts (documents, photos, and videos) followed by interviews and focus groups. Therefore, this thesis produced a generalizable research since the similarities that emerged from case 1 (e.g. natural and open disaster) and case 2 (e.g. man-made and closed disaster) can be extended or applied in a simple and accurate manner to subsequent cases of transnational disasters under the auspice of INTERPOL.

This research created an innovative crisis management framework (CMF) to manage transnational disasters based on the studied cases and the emerged concepts and categories presented in the data analysis. It is a two-dimensional framework comprised of static and dynamic structures. The static structure encompass four components: (1) eight categories (themes) that defined the overarching focus of the framework; (2) twenty-three concepts (codes) that refined the categories into specific aspects; (3) studied phenomena (scope) that was the transnational disasters; (4) context (application domain)

that was the INTERPOL organisation. All these components were identified as key indicators for transnational disasters and can be used to develop the management activities as well as to plan or make decisions. The dynamic structure presented the relationships between concepts and categories emerged in the static model. It was represented in class diagrams developed using the Unified Modeling Language – UML (ISO, 2012; Nogueira, 2004) and can be used to create databases and information systems. Therefore, the dynamic structure was used to give a unified view of common building patterns (concepts and categories) and to identify the actions and relationships that can be applied in all transnational disasters under the aegis of INTERPOL.

The following chapter will address the findings and discussions. It will start by discussing the priorities for action on how to implement and put them in practice. It will suggest recommendations for effective and efficient crisis management at INTERPOL. It will disclose the CMF Information System (CRIMAFIS), a business intelligence system developed by this researcher. This chapter will answer the research questions – central and complementary – proposed in Chapter 1 and re-emphasised in Chapter 3. At last, this chapter will also reveal the impacts of CMF at INTERPOL.

Chapter 5

Findings and Discussions

5.1 Introduction

This thesis is the unique applied research to explain, describe, and detail the work that is required from eight thematic domains for INTERPOL to manage transnational disasters. This is a key chapter since it is possible to point to ways in which this thesis put in practise its results, disseminating ideas and recommendations with emphasis on how this doctoral research may percolate through to a range of stakeholders amongst the internal units as well as multi-agencies that INTERPOL works with.

First, this chapter starts by discussing the priorities for action on how to implement and put them in practice in the eight thematic areas emergent from the themes found in CMF. Second, this chapter suggests forty-two recommendations for an effective and efficient crisis management in order to provide the best course of action on how to manage transnational disasters, especially suitable for INTERPOL and its stakeholders. Third, this chapter presents the CMF Information System (CRIMAFIS) a business intelligence system with its various databases (i.e. one for each theme/category proposed in this thesis) developed by this researcher. Fourth, this chapter answers the research questions – central and complementary – proposed in Chapter 1 and re-emphasised in Chapter 3. Fifth, this chapter reveals the impacts of CMF at INTERPOL in different levels: individual, departmental, and organisational.

5.2 Priorities for action

This thesis raises important issues into priority areas emerged from the eight themes where the crisis management has a transformational and cumulative impact within the INTERPOL efforts to manage transnational disasters. Thus, this section provides the priorities by considering actions to be implemented in the eight thematic areas emergent from the themes found in CMF: governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator. As emphasised in Section 3.3.4, the criterion used in this thesis for what constitute a theme was its relevance within the analysed case as an exploratory factor, as advocated by Corbin and Strauss (2008), Yin (2009), and Creswell (2013)

1 - Governance	
Priority for action:	Govern the activity of INTERPOL in cases of transnational disasters through the structures, policies, norms & legislation, roles & responsibilities.
2 - Service	
Priority for action:	Perform mitigation, preparedness, response, and recovery services to satisfy the needs of INTERPOL member countries in cases of transnational disasters.
3 - Resource	
Priority for action:	Mobilise infrastructure, tools & technology, and human resources to attend INTERPOL member countries in cases of transnational disasters.
4 - Multi-agency Network	
Priority for action:	Facilitate the creation of multi-agency networks taking into account the social and human capitals.
5 - Stakeholder	
Priority for action:	Support key actors and sectors that has interest or concern in INTERPOL's success with regard to management of transnational disasters.
6 - Finance	
Priority for action:	Seek and manage financial assistance to response, recovery, mitigation, and preparedness phases of disasters.
7 - Barrier	
Priority for action:	Identify and reduce strategic, tactical and operational barriers related to transnational disasters.
8 - Facilitator	
Priority for action:	Identify and increase strategic, tactical and operational facilitators related to transnational disasters.

Figure 5.1 – Priorities for action

5.3 Recommendations

In the context of this thesis, recommendation is a suggestion or proposal as to the best course of action on how to manage transnational disasters, especially suitable for INTERPOL and its members. The importance to create recommendations in crisis management is highlighted by Elliott and Macpherson (2010) when these authors argue that recommendations are essential in learning from crisis because they stipulate new protocols for the future, and actions taken in a future event (e.g. a disaster) might be judged against the way in which the recommendations have been adopted.

This thesis produced 42 important recommendations for INTERPOL as presented in Table 5.1. Such recommendations present the actionable knowledge obtained from the CMF. They can be operationalized as response to be implemented by different actors (local, regional, national, and transnational) and sectors (public, private, and NGO). The deployment of each recommendation is depicted within the column Implementation (Actors and Sectors) presented in Table 5.1. Therefore, these recommendations take into account the CMF results and are the core elements that will encourage the decision makers at INTERPOL and the main stakeholders to work together using the governance mechanisms, mobilising resources and services, creating multi-agency networks, undertaking finance arrangements, sharing knowledge, information, systems and databases, functioning under norms and legislations, delineating roles and responsibilities, adopting policies, and identifying the main barriers and facilitators related to transnational disasters. Furthermore, the purpose of these recommendations is also to ensure the commitment of leaders and managers at INTERPOL since they play an active part in the supervision and management of practices.

In the actual practice, the recommendations at INTERPOL were implemented in an interactive process involving different units that worked in the management of transnational disasters, noticeable the General Secretariat (GS) with its Disaster Unit (DU), Police Forensic Directorate (PFD), and Operational Directorate (OP); the Regional Bureaus (RB); the National Central Bureaus (NCB). The units involved in the implementation process varied according to each type of recommendation. Therefore, the 42 recommendations presented in Table 5.1 were critically reflected, presented, and approved to be implemented. After the approval, the recommendation takes a time to be implemented because it depends on different actors. However, several recommendations have already been implemented by INTERPOL. In the context of INTERPOL, a

recommendation was implemented when it was officially enacted and published as 'INTERPOL recommendation', and it had a status called as 'done'. After the publication, INTERPOL member countries can undertake their activities grounded in approved and accepted recommendations. As result, they can show that they are following an international recommendation produced by INTERPOL. Furthermore, the discussions during the ordinary meetings at INTERPOL, the recommendations 3, 4, 5, 6, 7, 9, and 11 involved PFD as the main decision maker. Therefore, it was decided that the PFD would give the final approval to implement these recommendations.

Thus, the recommendations 3, 4, 5, 6, 7, 9, and 11 were discussed within the DU and after being presented to PFD. It is important to highlight that the recommendations presented by DU need to be approved by PFD since DU is a unit of PFD. Thus, after the discussions during the ordinary weekly meetings at PFD these above mentioned recommendations were presented and approved in order to be implemented. For example, the Critical Decisions Register (CDR) was created as a database (recommendation 3) and it was functioning as part of the PFD databases and being used by INTERPOL member countries through security intranet. Thus, this recommendation 3 was communicated to INTERPOL member countries and they are aware of its content; consequently, this recommendation was officially published (done). Similarly, following the same workflow, the recommendations 4, 5, 6, 7, 9, and 11 were approved by PFD, officially published, and communicated to INTERPOL member countries. Therefore, the GS defined the policies, roles and responsibilities of its structure of governance (recommendation 4); elaborated supportive internal norms specifically for transnational disasters (recommendation 5); developed a new information management system as part of the I-Link international system (recommendation 6); developed realistic and measurable indicators of disaster management, i.e. the same CMF key factors (themes and codes) developed in this thesis (recommendation 7); defined goals and commitments with key stakeholders (recommendation 9); strengthened the DU at INTERPOL headquarter recruiting more specialised police officers to manage the new procedures, systems, and databases (recommendation 11). As such, the recommendations 3, 4, 5, 6, 7, 9, and 11 were already officially published, consequently implemented (done). Based on these recommendations, two new indicators were created at disaster unit and operational directorate (resources, services), standard operational procedures (POPs #DU289, #PFD292, #OD301) were developed at police forensic directorate and operational

directorate, IRTs have operated the CRIMAFIS integrated with I-Link system, the first workshop to discuss CMF and CRIMAFIS with key stakeholders was held in Lyon/France, in June/2015, a new recruitment of 2 police officers for disaster unit was achieved to manage the new POPs, CMF, and CRIMAFIS system.

The recommendations 1, 2, 8, 10, 12, 15, 20, 21, 22, 23, 24, 25, 26, and 33 were discussed within the DU and presented to PFD for approval. After the discussions during the ordinary weekly meetings at PFD these above mentioned recommendations were presented and it was decided that the GS, RB, and NCB would give the final approvals to implement these recommendations. Thus, the GS, RB, and NCB representatives also gave their approvals and the recommendations were communicated to INTERPOL member countries; consequently, these recommendations were officially published (done). Therefore, the GS, RB, and NCB used the CRIMAFIS system with its databases (see Section 5.4) as an database containing the information about the governance, services, resources, multi-agency network, stakeholders, finances, facilitators, and barriers (recommendation 1); designated the commission for the institutional control as the appropriate organisational mechanism (recommendation 2); established a finance team responsible for prospect and allocate contributions, incomes, and voluntary public-private funds (recommendation 8); created a register based on the INTERPOL multi-agency networks using the CRIMAFIS system (recommendation 10); used the CRIMAFIS to create a database containing information about the human capital (recommendation 12); defined the key factors presented as part of the Crisis Management Framework – CMF (see Chapter 4) as an international guidance incorporated in the initial and final assessment reports of missions (recommendation 15); assisted and strengthened the overall capacity of disaster-prone countries using the CMF and CRIMAFIS system (recommendation 20); used the CMF and CRIMAFIS system to be proactive in the disaster management since this system had the key factors related to transnational disasters (recommendation 21); used the CRIMAFIS system to update and monitor the mitigation services (recommendation 22); used the CRIMAFIS system to update and monitor the preparedness services (recommendation 23); used the CRIMAFIS system to update and monitor the response services (recommendation 24); used the CRIMAFIS system to update and monitor the recovery services (recommendation 25); used the CRIMAFIS system to prepare and periodically update disaster preparedness and contingency plans (recommendation 26); used the CRIMAFIS system to maintain a web-

based global information platform on transnational disasters (recommendation 33). However, the recommendation 32 was still ongoing since the data mining search engine to examine large pre-existing databases was not concluded.

The recommendations 13, 14, 16, 30, and 39 were discussed within the DU and presented to PFD for approval. After the discussions during the ordinary weekly meetings at PFD these above mentioned recommendations were presented and it was decided that the NCB would give the final approval to implement these recommendations. Thus, the NCB representative also gave its approval to recommendation 13 and this recommendations was communicated to INTERPOL member countries; consequently, this recommendation was officially published (done). Therefore, the NCB sent an official message to GS demonstrating strong political commitment to promote and integrate the key factors presented in CMF as part of its development programming (recommendation 13). However, the recommendations 14, 16, 30, and 39 were ongoing. The NCB was still working to develop procedures for reviewing the national progress based on the CMF (recommendation 14); to prepare and publish national baseline assessments with the status of their crisis management according to CMF (recommendation 16); to develop of their training requirements around internationally agreed minimum standards and in accordance with the CMF (recommendation 30); to review their national capacity to respond to transnational disasters in line with the CMF (recommendation 39).

The recommendations 17, 18, 19, 27, 28, 29, 31, 34, 35, 36, 37, 38, 40, 41, and 42 were discussed within the DU and presented to PFD for approval. After the discussions during the ordinary weekly meetings at PFD these above mentioned recommendations were presented and it was decided that the GS, RB, NCB, and external stakeholders directly involved in these recommendations would give the final approval to implement these recommendations. Thus, the GS, RB, NCB, and external stakeholders representatives gave their approval to the recommendations 17, 18, 27, 29, 34, 35, 40 and 42, these recommendations were communicated to INTERPOL member countries; consequently, these recommendations were officially published (done). Therefore, the GS, RB, NCB, and external stakeholders representatives sent formal messages through memorandum, electronic message, or INTERPOL notice highlighting the importance of international cooperation in the field of transnational disaster management (recommendation 17); created a working group to facilitate the formal and informal relations contributing to the implementation of the CMF (recommendation 18); carried out monthly workshops to

promote the culture of safety and disaster resilience based on CMF (recommendation 27); used the CRIMAFIS system to transfer knowledge, technology and expertise (recommendation 29); used the CRIMAFIS system to enhance the logistics of INTERPOL and its multi-agency networks (recommendation 34); evaluated existing human capital for transnational disasters based on CMF and developed capacity-building plans (recommendation 35); undertook monthly events such as seminars or working groups in order to promote partnerships among key stakeholders (recommendation 40); used the CMF and CRIMAFIS system as bases to minimise the barriers and maximise the facilitators regarding to transnational disasters (recommendation 42). However, the recommendations 19, 28, 31, 36, 37, 38, and 41 were ongoing. The GS, RB, NCB, and external stakeholders representatives still working to implement and strengthen the legal and normative instruments related to transnational disaster (recommendation 19); to develop early warning systems of triggers of transnational disasters in vulnerable member countries (recommendation 28); to adopt business protocols and standard operational procedures (SOP) based on the themes and concepts developed in CMF (recommendation 31); to mobilise sufficient resources for the development and the implementation of disaster management, including staff, tools and technologies, and infrastructure components on the basis of clearly prioritized actions demonstrated in CMF, but this is depending on the additional funding (recommendation 36); to create a specific emergency fund for transnational disasters, but this is depending on the approval of the INTERPOL General Assembly delegates appointed by each member country (recommendation 41).

Table 5.1 - Recommendations for INTERPOL grounded in CMF

No	Recommendation	Implementation (Actors and Sectors)	Status
1.	It is recommended that INTERPOL develops a matrix or database of governance, services, resources, multi-agency network, stakeholders, finances, facilitators, and barriers in support of follow-up to this CMF and in accordance to the priorities for action.	GS, RB, and NCB ⁷	Done
2.	It is recommended that INTERPOL designates an appropriate institutional mechanism for the implementation and follow-up of this CMF, and communicates the outcomes to the GS.	GS, RB, and NCB	Done
3.	It is recommended that INTERPOL General Secretariat creates and maintains a Critical Decisions Register (CDR) or database grounded in this CMF as good practice for future missions.	GS	Done

⁷ See list of abbreviations and acronyms.

No	Recommendation	Implementation (Actors and Sectors)	Status
4.	It is recommended that INTERPOL General Secretariat clearly defines policies, roles and responsibilities of its structure of governance at all levels taking into account this CMF when actuating in transnational disasters.	GS	Done
5.	It is recommended that INTERPOL General Secretariat elaborates supportive internal norms specifically for transnational disasters, as part of the governance mechanisms presented in this CMF.	GS	Done
6.	It is recommended that INTERPOL General Secretariat develops a new information management system on an international basis for use in future disasters taking into account this CMF.	GS	Done
7.	It is recommended that INTERPOL General Secretariat develops realistic and measurable indicators of disaster management based on the CMF's themes and concepts in order to enable decision-makers to evaluate the impact of transnational disasters.	GS	Done
8.	It is recommended that INTERPOL establishes a finance team responsible for prospect and allocate contributions, incomes, and voluntary public-private funds using this CMF as parameter in order to ensure that sufficient and appropriate logistics, resources, and services are available in a timely manner for all disaster phases.	GS, RB, and NCB	Done
9.	It is recommended that INTERPOL has clearly defined goals and commitments of key stakeholders (theme evidenced in this CMF) in managing transnational disasters.	GS	Done
10.	It is recommended that INTERPOL maintain a register of its multi-agency networks taking into account the codes and themes evidenced in this CMF in order to ensure that efforts are focused and targeted but not duplicated.	GS, RB, and NCB	Done
11.	It is recommended that INTERPOL strengthens the Disaster Unit at INTERPOL headquarter since as presented in this CMF it is a key structure mobilised for all types of disaster.	GS	Done
12.	It is recommended that INTERPOL clearly define, grounded in this CMF, the human capital of its managers and team members designated to future operations can accomplish their qualifications and expertise.	GS, RB, and NCB	Done
13.	It is recommended that INTERPOL member countries demonstrate strong political commitment to promote and integrate the CMF into development programming.	NCB	Done
14.	It is recommended that INTERPOL member countries develop procedures for reviewing the national progress against this CMF.	NCB	Ongoing
15.	It is recommended that INTERPOL uses this CMF as an international guidance and incorporates it into both the initial assessment and the final assessments of ongoing missions.	GS, RB, and NCB	Done
16.	It is recommended that INTERPOL member countries prepare and publish national baseline assessments with the status of their crisis management according to this CMF.	NCB	Ongoing

No	Recommendation	Implementation (Actors and Sectors)	Status
17.	It is recommended that INTERPOL takes into account the importance of international cooperation in the field of transnational disaster management as evidenced in the policies of CMF.	GS, RB, NCB, and External Stakeholders ⁸	Done
18.	It is recommended that INTERPOL develops formal and informal relations contributing to the implementation of this CMF.	GS, RB, NCB, and External Stakeholders	Done
19.	It is recommended that INTERPOL implements and strengthens the legal and normative instruments related to transnational disaster taking into account the concepts and categories presented in this CMF.	GS, RB, NCB, and External Stakeholders	Ongoing
20.	It is recommended that INTERPOL assists and strengthens the overall capacity of disaster-prone countries using this CMF, especially in Africa, Nation-States in small islands in South Pacific, and least developed countries, with particular care to their upper vulnerability and risk levels, which often exceed their capacity to respond to and recover from transnational disasters.	GS, RB, and NCB	Done
21.	It is recommended that INTERPOL be proactive at the time of a disaster to offer assistance and coordination to host nations bearing in mind the phases of preparedness and mitigation, as presented in CMF and Chapter 2.	GS, RB, and NCB	Done
22.	It is recommended that INTERPOL updates and monitors its mitigation services according to this CMF, including non-structural mitigation service and structural mitigation service.	GS, RB, and NCB	Done
23.	It is recommended that INTERPOL updates and monitors its preparedness services according to this CMF, including early public information, training & capacity building, and preparatory documents.	GS, RB, and NCB	Done
24.	It is recommended that INTERPOL updates and monitors its response services according to this CMF, including emergency service, disaster management service, and DVI service.	GS, RB, and NCB	Done
25.	It is recommended that INTERPOL updates and monitors its recovery services according to this CMF, including reconstruction, restoration, rehabilitation, and assessments.	GS, RB, and NCB	Done
26.	It is recommended that INTERPOL prepares and periodically updates disaster preparedness and contingency plans at all levels taking into account this CMF.	GS, RB, and NCB	Done
27.	It is recommended that INTERPOL promotes a culture of safety and disaster resilience based on this CMF in order to enhance governance for disaster management and for awareness-raising initiatives, mainly in least developed countries.	GS, RB, NCB, and External Stakeholders	Done
28.	It is recommended that INTERPOL encourages GS and global agencies to develop early warning systems for transnational disasters in vulnerable member countries, as evidenced in the preparedness services of this CMF.	GS, RB, NCB, and External Stakeholders	Ongoing

⁸ External stakeholders are external people, groups, agencies, or organisations that has interest or concern in INTERPOL's success with regard to management of transnational disasters. The main external stakeholders were presented in Figure 2.3 (Chapter 2).

No	Recommendation	Implementation (Actors and Sectors)	Status
29.	It is recommended that INTERPOL transfers knowledge, technology and expertise, as evidenced in this CMF, in order to enhance capacity building for disaster management.	GS, RB, NCB, and External Stakeholders	Done
30.	It is recommended that INTERPOL member countries encourage the development of their training requirements around internationally agreed minimum standards and in accordance with this CMF.	NCB	Ongoing
31.	It is recommended that INTERPOL develops and adopts business protocols and standard operational procedures (SOP) based in the themes and concepts of this CMF for future use in transnational disasters.	GS, RB, NCB, and External Stakeholders	Ongoing
32.	It is recommended that INTERPOL uses data mining based on this CMF to exam large pre-existing databases in order to generate new information for future disasters.	GS, RB, and NCB	Ongoing
33.	It is recommended that INTERPOL maintains a global information platform on transnational disasters and a web-based register of their occurrences based on this CMF and taking into account the information security principles of integrity, availability, authenticity, and non-repudiation.	GS, RB, and NCB	Done
34.	It is recommended that INTERPOL engages with its multi-agency networks taking in account the concepts that emerged in this CMF in order to ensure an effective logistics for its actives, resources, and services.	GS, RB, NCB, and External Stakeholders	Done
35.	It is recommended that INTERPOL evaluates existing human capital for transnational disasters based on this CMF and develops capacity-building plans for meeting ongoing and future requirements.	GS, RB, NCB, and External Stakeholders	Done
36.	It is recommended that INTERPOL mobilises sufficient resources for the development and the implementation of disaster management, including staff, tools & technology, and infrastructure components on the basis of clearly prioritized actions demonstrated in this CMF.	GS, RB, NCB, and External Stakeholders	Ongoing
37.	It is recommended that INTERPOL integrates the data accumulated of transnational disasters from a range of sources in databases based on this CMF in order to guide management decisions.	GS, RB, NCB, and External Stakeholders	Ongoing
38.	It is recommended that INTERPOL strengthens networks among managers and disaster experts across sectors and among regions based on the themes developed in the CMF.	GS, RB, NCB, and External Stakeholders	Ongoing
39.	It is recommended that INTERPOL member countries review their national capacity and capability to respond to transnational disasters in line with this CMF to ensure that they are resilient.	NCB	Ongoing
40.	It is recommended that INTERPOL encourages partnerships presented in this CMF among key stakeholders in all levels, including international, national, regional, and local actors as well as public, private and non-governmental sectors.	GS, RB, NCB, and External Stakeholders	Done
41.	It is recommended that INTERPOL creates a specific emergency fund for transnational disaster (as mentioned in the interviews and focus groups during the construction of this CMF) in order to support response, recovery, mitigation, and preparedness measures.	GS, RB, NCB, and External Stakeholders	Ongoing

No	Recommendation	Implementation (Actors and Sectors)	Status
42.	It is recommended that INTERPOL uses this CMF as base to reduce or minimise barriers and increases or maximises facilitators regarding to transnational disasters.	GS, RB, NCB, and External Stakeholders	Done

5.4 CMF information system (CRIMAFIS)

5.4.1 Overview

The recommendations shown in Table 5.1 embrace the creation of information systems and/or databases⁹ involving the key categories, concepts, and relationships depicted in CMF. One of the major advantages of CMF when compared with other frameworks is that it has a dynamic structure through a relational approach in order to make sense upon the relationships among categories/themes and concepts/codes (see Section 4.3). This relational approach in CMF linking concepts and categories provides several benefits (Nogueira, 2015c). First, it permits the organisation of data (codes, themes, and relationships) into a number of relational tables facilitating the creation of forms, checklists, information systems, and databases. Second, it offers quick search for data such as disaster by date, type, place, resources and services mobilised, agencies participants, finance instruments, and so on since the relationships can connect all type of data into a powerful system. Third, it provides easy traceability of the data stored. Fourth, it permits different managers and decision-makers have the common understanding on the data. Finally, it facilitates the handling of the storage, retrieval, and updating of data by different internal units at INTERPOL.

Therefore, this section presents CRIMAFIS – CRISIS Management Framework Information System. It is a business intelligence system for crisis management involving transnational disasters. It uses CMF as paradigm and was planned and developed by this researcher throughout this thesis. CRIMAFIS will help police officers, managers, and support personnel at INTERPOL as well as scholars and researchers to better understand and manage transnational disasters using a computational tool developed with Artificial Intelligence (AI) techniques.

⁹ Database is an organized collection of data in a computational tool to model aspects of reality in a way that that allows easy insertion, deletion, retrieval, updating, analysis, and output of data.

5.4.2 Data management model

Disasters that result in transnational inquiries have generated a considerable amount of information that need to be analysed by scholars and practitioners with theoretical rigour and practical relevance. As argued by Elliott (2009) the processes around information management and knowledge transfer have received limited attention within the academic literature and even less within public inquiries, which appear to make specific recommendations without fully comprehending how these should be implemented. In addition, some recommendations engage practical implementation, for example creating databases that evolve for information systems. Therefore, the intention of this section is to present a theoretical-practical data management model created by this researcher in order to manage the data stored in databases and accomplish the recommendations 1, 3, 6, 10, 22, 23, 24, 25, 29, 32, 33, and 37, as presented in Table 5.1.

Before the creation of an information system to CMF, it is necessary to design a data management model. The data management model proposed for CMF consists of concepts (i.e. columns/attributes), categories (i.e. rows/tuples), and their relationships, as shown in Figure 5.2. This kind of database model comprised of rows and columns creating a table with categories, concepts, and their relationships are called as relational databases (Silberschatz et al, 2010; Nogueira, 2015c).

(I) Relational schema:

A_1, A_2, \dots, A_n are *attributes* representing *concepts*, where each A_n , $1 \leq n \leq 23$ (total of concepts in this study).

$R_i = \langle A_1, A_2, \dots, A_n \rangle$ is a *relational schema* representing a *category*, where each R_i , $1 \leq i \leq 8$ (total of categories in this study).

Therefore, CRIMAFIS has eight relational schemas representing each one of the eight CMF categories with its own set of concepts, as following:

$R_1 = \text{GOVERNANCE} = \langle \text{Structure, Policy, Role \& Responsibility, Norm \& Legislation} \rangle$

$R_2 = \text{SERVICE} = \langle \text{Mitigation Service, Preparedness Service, Response Service, Recovery Service} \rangle$

$R_3 = \text{RESOURCE} = \langle \text{Staff, Tools \& Technology, Infrastructure} \rangle$

$R_4 = \text{MULTI-AGENCY NETWORK} = \langle \text{Social Capital, Human Capital} \rangle$

$R_5 = \text{STAKEHOLDER} = \langle \text{Actor, Sector} \rangle$

$R_6 = \text{FINANCE} = \langle \text{Contribution, Income} \rangle$

$R_7 = \text{BARRIER} = \langle \text{Strategic Barrier, Tactical Barrier, Operational Barrier} \rangle$

$R_8 = \text{FACILITATOR} = \langle \text{Strategic Facilitator, Tactical Facilitator, Operational Facilitator} \rangle$

(II) Instances

I_1, I_2, \dots, I_v are *instances* representing the current values of each concept, where $v \in \mathbb{N}$.

For example,

$I_1 = \text{disaster unit at general secretariat}$

$I_2 = \text{international standards}$

...

$I_v = \text{systems \& databases}$

(III) A *table* T (also called as file, class) specifies the set instances of relational schemas.

Therefore,

$T = \{ R_1 = \langle A_1(I_v), A_2(I_v), \dots, A_n(I_v) \rangle,$

$R_2 = \langle A_1(I_v), A_2(I_v), \dots, A_n(I_v) \rangle,$

...

$R_i = \langle A_1(I_v), A_2(I_v), \dots, A_n(I_v) \rangle \}$

For example,

T = {GOVERNANCE = <Structure (disaster unit at general secretariat), Policy (cooperation), Role & Responsibility (information sharing, international standards), Norm & Legislation (rule for data processing #12/2015, dvi guide)>, SERVICE = <Mitigation Service (relocation of staff and offices), Preparedness Service (early public information, training & capacity building), Response Service (DVI service), Recovery Service (reconstruction, assessments)>, RESOURCE = <Staff (expert police officers), Tools & Technology (systems & databases, computer networks, communication), infrastructure (consumables, specialised devices)>, MULTI-AGENCY NETWORK = <Social Capital (contracts, informal relations), Human Capital (knowledge, skill, experience)>, STAKEHOLDER = <Actor (international agencies), Sector (non-governmental)>, FINANCE = <Contribution (statutory contribution), Income (consortiums)>, BARRIER = <Strategic Barrier (rigidity, non-alignment, lack of coordination), Tactical Barrier (system integration, complex logistics), Operational Barrier (number of victims, level of engagement, high staff turnover)>, FACILITATOR = <Strategic Facilitator (social appeal), Tactical Facilitator (displacement of resources), Operational Facilitator (collective working)> }

(I) A *database* is a set of tables

$\{T_1, T_2, \dots, T_j\}$, where $j \in \mathbb{N}^*$.

The definitions presented in this section involving databases and its components are conform with categories (themes) and concepts (codes) depicted in Section 3.3.4 (Data Analysis) and Section 4.2 (Static CMF) as well as classes, instances, relationships, and cardinalities in Section 4.3 (Dynamic CMF).

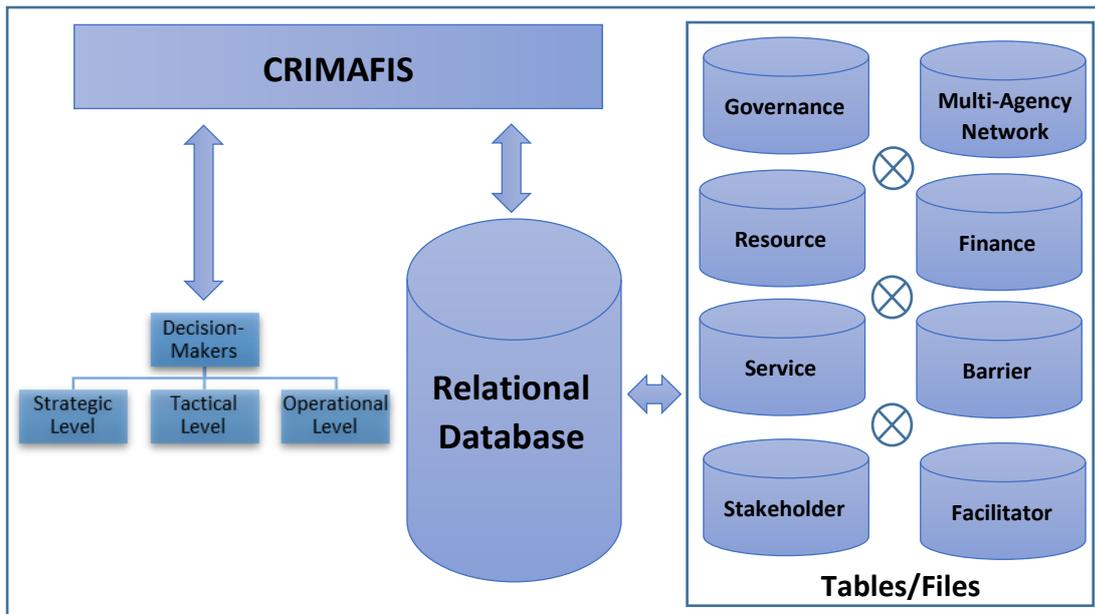


Figure 5.2 – Data modeling for CMF and its databases

As argued by Nogueira (2015c), after the data modeling, as shown in Figure 5.2, the next step is implementing a relational database comprised of all CMF categories, concepts, and their relationships. Figure 5.3 presents this relational database implemented using a computational tool based on Artificial Intelligence (AI), so called Protégé¹⁰. Details and the rationale about the use of AI and Protégé in this thesis can be seen in the next section.

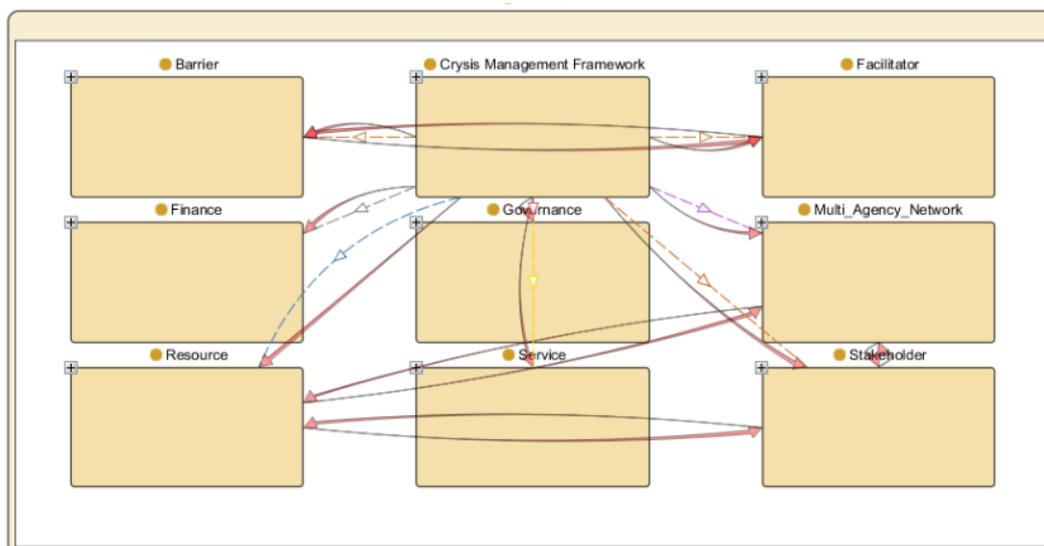


Figure 5.3 – The relational database schema implemented for CMF

¹⁰ Protégé is a free, open-source computational tool that uses the AI ontology approach for building intelligent systems (Protégé, 2015). It was developed by Stanford University.

5.4.3 Intelligent information system

In his seminal work, Turner contends that relevant information becomes a scarce resource and the cost of obtaining one piece of information has been high (Turner, 1976). This section presents CRIMAFIS, a business intelligence system based on Artificial Intelligence (AI) techniques that provides relevant information upon transnational disasters under aegis of INTERPOL and uses the CMF structures (static and dynamic) and its databases. CRIMAFIS will help INTERPOL decision makers in all levels. The intention is to automatize the data management model presented in Figure 5.2 using Protégé and create a business intelligence system in order to retrieve relevant information and accomplish some recommendations presented in Table 5.1. The AI approach was chosen because it is a domain of the human knowledge that uses computer systems to perform tasks that normally require human intelligence (Russell and Norvig, 2009). AI systems can be classified in three main areas: symbolist, connectionist, and evolutionist. The symbolist approach involves manipulation of symbols such as concepts, categories, hierarchies, relations, and logic axioms. The main AI symbolist systems are represented by ontologies, expert systems, and artificial agents (Russell and Norvig, 2009).

This study used Protégé – an ontology-based tool – to explore the part of the human intelligence that can be reduced to symbol manipulation and to create the CRIMAFIS. In AI, ontology is a specification of a conceptualization describing concepts, categories, characteristics, relationships, and rules that can exist for a knowledge domain (Gruber, 1995; Nogueira and Vasconcelos, 2008). It is easy to understand why ontology is the most suitable and feasible AI technique to apply in qualitative researches because it handles symbolic systems engaging themes, codes, and relationships. For instance, the use of ontology demonstrated to be an effective and efficient tool to depict the CMF's static and dynamic structures as shown in Figures 5.4-5.5.

Therefore, CRIMAFIS is a business intelligent system created to put into practice the data modeling schema presented in Figure 5.2. It was designed using Protégé in order to automatize the static CMF with its categories/themes and concepts/codes, studied phenomena/scope, and context/application domain (depicted in Section 4.2) as well as to automatize the dynamic CMF with its instances, classes, class diagrams, relationships between categories and concepts (depicted in Section 4.3). A visual representation of the

ontology for CRIMAFIS is shown in Figure 5.4. It is relevant to highlight that Figure 5.4 presents the ontology implemented in CRIMAFIS using a computational tool called Protégé. It is important to clarify that the arrows in Figure 5.4 are part of the Protégé language and embedded as visual devices. These arrows are generated to show that there are relationships between classes (i.e. concepts/codes, themes/categories), but they not describe the type of relationship such as generalisations and aggregations mentioned in Dynamic CMF using UML. Therefore, the dynamic CMF with its generalisations, aggregations and other relationships are implemented as internal data structure in Protégé and does not appears in Figure 5.4.

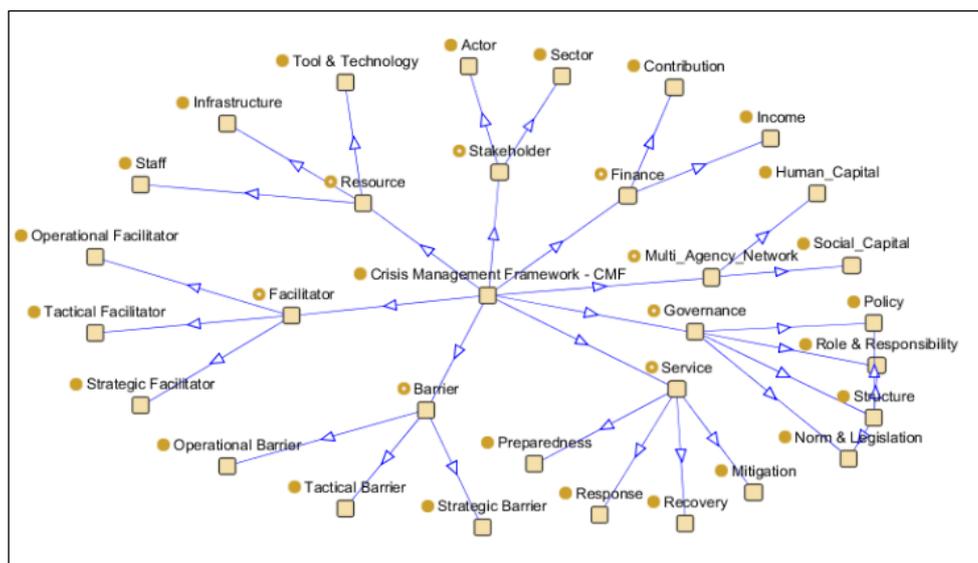


Figure 5.4 – The ontology implemented in CRIMAFIS

CRIMAFIS demonstrates a practical operationalization of the CMF theory studied in Chapter 4. It can manage any kind of transnational disaster under aegis of INTERPOL, including case 1 (tsunami) and case 2 (air crash) presented in this thesis. INTERPOL members in the Disaster Unit have populated the CRIMAFIS's databases. Figure 5.5 is a screen shot of the CRIMAFIS applied for transnational disasters under the auspice of INTERPOL. Beyond the aforementioned application of CRIMAFIS, it is relevant to highlight that it can automatically answer research questions proposed in Section 1.4. In practise, CRIMAFIS is a business intelligence system that accomplish the recommendations 1, 2, 3, 6, 10, 16, 22, 23, 24, 25, 29, 32, 33, 36, and 37 using relational databases and automatically answering five research questions:

- What are the governance mechanisms adopted by INTERPOL to manage transnational disasters?

- What resources and services does INTERPOL mobilise in transnational disasters?
- Who are the key stakeholders in cases of transnational disasters?
- What are the finances and funding arrangements used by INTERPOL in cases of transnational disasters?
- What are the barriers and facilitators to manage transnational disasters under the auspices of INTERPOL?

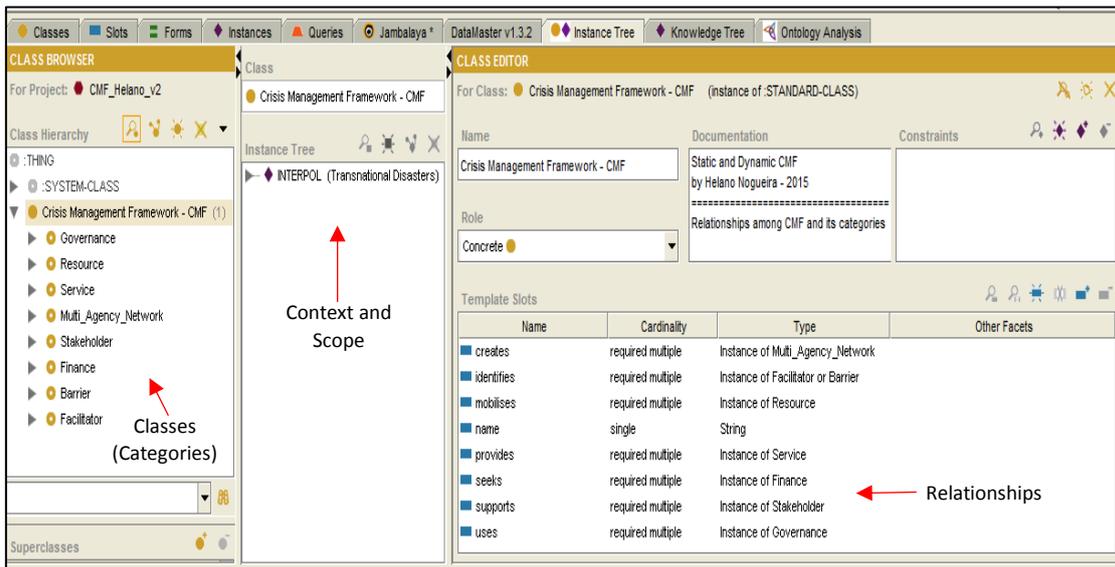


Figure 5.5–The use of CRIMAFIS for INTERPOL to manage transnational disasters

5.5. Impact of CMF

Elliott (2009) posits that a central problem in crisis management is that researchers identify lessons to be learned, make recommendations and prepare plans and regulators regulate, but often to little avail or impact. This viewpoint makes sense. If an organisation like INTERPOL is confronted with several occurrences of similar types of crisis, notably disasters, scholars and practitioners expect that INTERPOL may develop a comprehensive crisis management framework and thereafter evaluate its results and impacts. Hence, this thesis, particularly the CMF framework, intends to provide concrete results and guidelines for reducing the negative impacts of transnational disasters at INTERPOL and its 190 member countries over the next years. If implemented according to the recommendations (see Section 5.3 and Table 5.1), it may reduce the economic, cultural, social, and organisational effects of transnational disasters under aegis of

INTERPOL. Thus, this research feeds into several levels of individual, departmental, and organisational actions/changes as following.

5.6.1 Individual impact

Individually this doctoral research, noticeably CMF, has helped police officers and support personnel at INTERPOL to handle several factors before, during, and after a transnational disaster. The first set of impacts, those dealing with issues around the individual, can be classified as a set of psychosocial concerns. INTERPOL staff did not have any framework to follow; as consequence, this generated anxiety, stress, losses in human potential, and demotivation. Therefore, CMF arose as a manner to mitigate those undesirable psychosocial problems since now the INTERPOL members in the Disaster Unit have a framework to follow, and it emerged from interviews and focus groups involving experienced disaster specialists that routinely work in crisis situations. The second individual impact is that this study has positively influenced senior managers and decision-makers providing them with new knowledge and business intelligence analysis encompassing the governance mechanisms. For example, the managerial aspect of CMF has helped managers and decision-makers to identify and critically reflect on core issues related to roles and responsibilities, policies, organisational structures, norms and legislations engaged in different types of transnational disasters involving multi-agency networks where INTERPOL takes part. A third, and related individual impact, is that although INTERPOL staff be much specialised, CMF has revealed that social capital and human capital have been vital factors to take into account by disaster managers, coordinators, and supervisors in any kind of man-made or natural disaster, mainly when working in multi-agency network settings. The fourth individual impact is that CMF has represented an opportunity to develop effective ways of interpreting and acting upon the transnational disasters that managers, police officers and support people at INTERPOL have to deal with. Furthermore, CRIMAFIS, as a business intelligence system, has offered an optimised tool for analysis upon transnational disasters because it has used the databases based on the thematic areas obtained in data collection and analysis phases. For example, CRIMAFIS has provided data and information for IRTs (Incident Response Teams) about staff, tools and technology, infrastructure, response services, and financial instruments available for a specific time, place, and type of disaster. This has facilitated the INTERPOL assistance in the site of disaster.

5.6.2 Departmental impact

The second set of impacts operates at the departmental level. CMF generated a new paradigm in the Disaster Unit at INTERPOL because it has been used in all disaster management phases based on a range of factors. For example, CMF identified the key factors (themes and codes) for INTERPOL to manage any kind of transnational disaster: governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator. These key factors have helped to better understand the investigated cases (case 1 - tsunami in the Indian Ocean in 2004 and case 2 – air crash of Air France flight 447 in Brazil in 2009) as well as other subsequent disasters such as the earthquake in Haiti/2010; the ferry disaster in Tanzania/2012; the typhoon Haiyan, in Philippines/2013; the terrorist attack, in Kenya/2013; the air crash of Malaysia Airlines (MH17) in Ukraine/2014. Thus, the key factors revealed in the CMF have helped to formulate strategic and operational plans to the next years in the Disaster Unit at INTERPOL. For example, the strategic plans for the next 5 years (2015-2020) of the Police Forensic Directorate, Operational Directorate, and Command & Coordination Centre at INTERPOL used the themes developed in the CMF (governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator) as key indicators. In turn, the Disaster Unit taken into account these same themes in its annual operational plan, including the use of these themes in the field of disaster since they are part of the CRIMAFIS system. Thus, CMF and CRIMAFIS with its databases were considered as practical evidences of the departmental change at INTERPOL.

In addition, CRIMAFIS, as mentioned in Section 5.4, is an innovative business intelligence system comprised of several databases. Thus, it has been used by several units/department at INTERPOL (e.g. Disaster Unit, Police Forensic Directorate, Operational Directorate, and Command & Coordination Centre) in all disaster management phases. First, in the preparedness phase of disaster, CRIMAFIS has been used for preparation, equipping, and planning by Disaster Unit, Police Forensic Directorate, and Operational Directorate. For example, nowadays, the management of resources (i.e. staff, tools and technology, infrastructure) has been carried out using the CRIMAFIS databases in an integrated and automatized way. Before the CRIMAFIS system, MS-Excel worksheets were used to the prospection of resources without any kind of integration. That is, each specialised department or unit engaged in a disaster had its own worksheets generating results without accuracy or credibility. Moreover, the use of

CRIMAFIS in the preparedness phase has also impacted on how the Disaster Unit, Police Forensic Directorate, and Operational Directorate at INTERPOL register relevant disaster information. For example, information about the main stakeholders (e.g. international, regional, national, local), early public information to community (e.g. leaflets, brochures, guidelines, handbooks), contacts of disaster specialists and their skills, information about supplies and suppliers. In turn, a vast amount of official documents need to be checked in the preparedness phase. So, for example, CRIMAFIS system has been used to organise and generate checklists with resources, services, norms and legislations, multilateral agreements, memorandums of understanding (MoU), roles and responsibilities of each agency, and sources of funding.

Second, the key factors of CMF and CRIMAFIS system in the response phase have influenced on how the Disaster Unit, Police Forensic Directorate, and Command & Coordination Centre at INTERPOL handle with core response activities. The key factors presented in the CMF have been used as categories of information for CRIMAFIS databases in order to develop emergency plans: emergency medical services, first aid experts and voluntarism, life-line supply services, emergency infrastructure services, and forensic services. For example, CRIMAFIS system has been used to provide data and information about the emergency medical services (trauma and acute medical care, basic health care, medical transport to patients, rapid deployment hospital, base camp); the first aid experts and voluntarism (first responders, paramedics, nurses, physicians, psychosocial specialists, volunteers); the life-line supply services (water, food, sanitation, clothes, blankets, heaters, tarps, mosquito nets); the emergency infrastructure services (logistics, shelter and settlement, field communications equipment, vehicles, IT and communication services); forensic services (Incident Response Team – IRT, Disaster Victim Identification – DVI, missing persons identification, unidentified bodies identification and linking, , DVI deployment on field, morgue service). Moreover, CRIMAFIS system has been used in the response phase to reduce the time of assistance since it has provided immediate data and information in the field. This has been possible because CRIMAFIS has its database populated with realistic and updated data. For example, since May/2015, each IRT goes to the site of disaster with a version of CRIMAFIS system containing data about resources, services, multiagency networks, stakeholders, and other relevant factors revealed in CMF.

Third, in the recovery phase, CRIMAFIS system and its databases have influenced how the Disaster Unit, Police Forensic Directorate, and Operational Directorate at INTERPOL support essential activities in the field. For example, CRIMAFIS system has been used to manage information about the recovery plans, projects, and programmes; reconstruction, restoration and rehabilitation of essential infrastructure (logistical networks, supply chains, tools and technologies; debris clearance, hospital, bridges, roads); resources and services (sanitation and hygiene recovery services, risk analysis, damage assessment, impact assessment, financial assistance to recovery); resilience (sustainable livelihood; safeguard). Furthermore, CRIMAFIS system has been used in the recovery phase to provide information about the psychosocial support and religious care. Fourthly, in the mitigation phase, CRIMAFIS system with its databases has provided valuable information to the Disaster Unit, Police Forensic Directorate, and Operational Directorate at INTERPOL by different means. For example, CRIMAFIS has helped to provide information about the mitigation plans; strategic governance plans; mitigation teams; disaster risk reduction; vulnerability assessment; structural mitigation measures (relocation of INTERPOL staff and offices); non-structural mitigation measures (laws, norms, regulations, policies, protocols, standard operational procedures). However, it is important to clarify that CMF and CRIMAFIS cannot change the financial approach to create new investments or funds to transnational disasters because this aspect depends on the political and economic variables influenced by both external stakeholders (international, regional, national, and provincial actors) and internal stakeholders (INTERPOL and its member countries).

5.6.3 Organisational impact

This doctoral study, particularly CMF and CRIMAFIS system, has produced positive and constructive organisational impacts at INTERPOL. First, the lack of a crisis management framework had hampered the management of crises and disasters at INTERPOL throughout years (see details in Section 1.2). This fact had negatively influenced on how INTERPOL works in the preparedness, response, recovery, and mitigation phases of disaster management, mainly when it operates in multi-agency networks during transnational disasters. For example, before CMF and CRIMAFIS system, one of the major problems was that INTERPOL managed each disaster as if it was a completely new disaster. However, the data analysis presented in this research demonstrated that there were common building patterns (8 categories/themes and 23 concepts/codes, presented in

Chapter 4) to manage transnational disasters under the auspices of INTERPOL even in different types of disasters. Therefore, CMF and CRIMAFIS system produced an organisational change at INTERPOL because, for example, the key factors identified in CMF (governance, resource, service, stakeholder, multi-agency network, finance, barrier, facilitator) and the relational databases within the CRIMAFIS system transformed the manner how specialised police officers and support personnel at INTERPOL manage the data and information concerning to crises and disasters. This change is not only in a particular unit at INTERPOL, but in the organisation as a whole because the data and information in CRIMAFIS system can be created, used, and organised anywhere in real-time by any INTERPOL unit.

Second, the implementation of CMF with its key factors (categories, concepts, and their relationships) and CRIMAFIS system with its databases enhanced the business process management at INTERPOL. For example, the incident response processes at INTERPOL were improved due to the better understanding of the roles and responsibilities stored in CRIMAFIS databases. Being more specific, the governance database in CRIMAFIS has all roles and responsibilities of the incident response teams (IRTs) when working transnationally in cooperation with other agencies. Thus, the IRTs have used the CRIMAFIS system with its databases to verify their roles and responsibilities as well as the identification of the goals, objectives, and expected outcomes during their missions in the field of disaster. Other example of the organisational improvement provided by CMF was the recognition of norm and legislation as a core concept. Thereafter, this concept was converted in a table within the governance database. Being clearer, the rules, regulations, protocols, and legislation for each kind of disaster were stored in files as part of the governance database in CRIMAFIS system. In the same vein, for example the available resources (staff, tools & technology, infrastructure) and services (emergency service, DVI service, disaster management service) mobilised as response to each kind of disaster were within the resource database and service database respectively. Thus, any information about the available resources and services in a specific period was stored in databases as part of the CRIMAFIS system. Thus, these aforementioned organisational improvements were possible because CMF disclosed the key factors to manage disasters to the decision makers at INTERPOL and CRIMAFIS possessed the data related to these key factors and additional relevant information stored in its databases.

Third, CMF also revealed that the theme stakeholder was a key factor to be managed by senior managers during transnational disasters. For example, the studied cases in this doctoral research shown that INTERPOL has always worked with key international, regional, and national stakeholders in order to provide efficient mechanisms during transnational disasters. This fact has provoked some changes of attitudes by senior managers and disaster leaders at INTERPOL since they recognised the relevance of the stakeholders as part of the organisational management process at INTERPOL. Thus, senior managers and leaders changed their attitudes promoting the realization of meetings with the main stakeholders (internal and external) in order to determine what stakeholders needs were. After these meetings, the CRIMAFIS databases were populated with the outcomes. Another example of the organisational impact of CMF and CRIMAFIS system was the fact that INTERPOL held the first workshop to discuss with key stakeholders upon the CMF and CRIMAFIS system deployment. This was a two-day event for 20 participants at INTERPOL headquarter in Lyon/France, in June/2015.

Fourth, CMF and CRIMAFIS system has changed the organisational planning at INTERPOL. For example, the key factors identified in CMF and the CRIMAFIS databases have efficiently impacted on how INTERPOL must create and manage its organisational plans in cases of crises and disasters. Being clearer, the governance plans developed in the Police Forensic Directorate and Operational Directorate at INTERPOL have taken into account the concepts (structures, roles and responsibilities, policies, norms and legislation) evidenced in CMF and automatized in CRIMAFIS system. In turn, IT plans in the IT coordination at INTERPOL have clustered its key concepts within its operational plans in four categories databases (tools, technologies, systems, and databases), as evidenced in the CMF and populated in CRIMAFIS. Other relevant example was the fact that the mobilisation plans prepared by Disaster Unit during the response and recovery phases has used both resource database and the service database created as part of the CRIMAFIS system.

Fifth, another point of organisational impact caused by this doctoral study was the revelation of the main barriers and facilitators for INTERPOL to manage transnational disasters. After the data analysis (see Section 4.2), barriers and facilitators were identified as key factors (themes and codes) in CMF. These factors received special attention because they were crucial for INTERPOL to identify the main barriers to, and facilitators of effective multi-agency working within the context of transnational disasters. For

example, the CMF revealed that there were barriers to fully integrate different agencies, especially in terms of civilian–military cooperation; to recognise the roles and responsibilities of each agency; to overcome the rigidity in institutional beliefs; to comply with norms and regulations; to accomplish international protocols; to maintain specialised personnel due to the high staff turnover; to create integrated systems and databases. On the other hand, CMF revealed several facilitators in order to have an effective multi-agency working within the context of transnational disasters under auspices INTERPOL. For example, CMF shown as facilitators the partnership agreements, social appeal provoked by transnational disasters, collective working in multi-agency networks, collaborative operation emphasising the qualities of each agency, real-time communication using mobile technology. In addition, it is also important to highlight that these barriers and facilitators were used to populate the databases called barrier and facilitator within the CRIMAFIS system as presented in Section 5.4. For example, in a practical way, some barriers evidenced in CMF were categorised as strategic barriers in CRIMAFIS system (rigidity in institutional beliefs, non-alignment between organisational priorities, lack of shared responsibility between agencies, different interests between agencies, failure to fully integrate civilian and military forces). In the same token, some examples of barriers were categorised as tactical barriers in CRIMAFIS system (lack of common assessment, lack of knowledge on the roles and core values of other agencies, failure to integrate existing systems and databases, lack of integrated systems). At last, other examples of barriers evidenced in CMF were categorised as operational barriers in CRIMAFIS system (use of ad hoc teams, high staff turnover, lack of knowledge on the responsibilities and competencies of each agency and its actors, difficult to comply with norms and regulations). In turn, some examples facilitators evidenced in CMF were categorised as strategic facilitators in CRIMAFIS system (creation of a crisis and disaster management framework to facilitate transnational cooperation, construction of a strong multi-agency network, based on trust and fidelity, encouragement of collective and collaborative mechanisms of command and control, sharing of responsibilities between agencies). Other examples of facilitators were categorised as tactical facilitators in CRIMAFIS system (disclosure of key norms and regulations, dissemination of roles and core values of each agency, collaboration on capacity-building and training, shared mobilisation and logistics of resources and services, sharing of information, creation of new integrated systems of data, information, and knowledge). At last, other examples of facilitators evidenced in CMF were

categorised as operational facilitators in CRIMAFIS system (avoid ad hoc incident response teams, avoid high staff turnover, operation under multilateral agreements, hear the stakeholders' complaints). Therefore, the decision makers at INTERPOL has used CMF and CRIMAFIS system in order to Identify the main barriers to, and facilitators of effective multi-agency working within the context of transnational disasters.

Sixth, CMF and CRIMAFIS system have consolidated the reputation of INTERPOL as one of the leader organisations in crisis and disaster management. For example, this author reinforced this reputation of INTERPOL during the presentation of CMF and CRIMAFIS system to working groups, conferences, congress, and meetings around the world involving different scholars (professors, graduate students), practitioners (leaders, senior managers, coordinators, supervisor, specialists, police officers), and other organisations engaged in crisis and disaster management (e.g. UN, IFRC, IMO, ICC, EUROPOL, AMERIPOL, ENSP, NAUSS). In addition, this reputation was independently evidenced through the appreciation letter produced at the end of the first event to discuss upon the CMF and CRIMAFIS system with key stakeholders. This letter was written by the external participants (e.g. UN, IFRC, IMO, ICC, AMERIPOL, and ENSP representatives) and presented to the event chair as result of the two-day event at INTERPOL headquarters in Lyon/France, in June/2015.

However, in the viewpoint of this researcher, CMF and CRIMAFIS system still have some challenges since the success of their implementations within the INTERPOL organisation is dependent upon senior managers' ability and perseverance to manage organisational change, whilst also creating value for their stakeholders.

5.7 Conclusion

This chapter addressed the findings and discussions. It started by discussing the priorities for action on how to implement and put them in practice. It suggested forty-two recommendations for an effective and efficient crisis management at INTERPOL. This chapter also shown the CMF Information System (CRIMAFIS), a business intelligence system with its various databases (i.e. one for each theme/category proposed in this thesis) developed by this researcher. CMF has already helped police officers, managers, and support personnel at INTERPOL as well as scholars and researchers to better understand

and manage transnational disasters using the CRIMAFIS tool developed with Artificial Intelligence (AI) techniques. This chapter answered all research questions – central and complementary – proposed in Chapter 1 and re-emphasised in Chapter 3. At last, it disclosed the impacts of CMF at INTERPOL in different levels: individual, departmental, and organisational.

The following chapter will provide the conclusions on this doctoral research, noticeably related to the challenges faced, contributions, and peer reviewed articles published from this thesis, research limitations, and future researches.

Chapter 6

Conclusion

INTERPOL faces many challenges in managing transnational disasters and in creating a crisis management framework that all member countries want and deserve. This research has attempted to provide a crisis management framework for INTERPOL to manage transnational disasters. Therefore, important theoretical-practical contributions and outcomes have emerged from this doctoral study in order to provide concrete guidelines for reducing the effects of transnational disasters over the next years.

This thesis offered a better understand and critically reflect on the key terms related to transnational disasters and their applications within the INTERPOL environment, such as crisis, disaster, transnational disaster, crisis management, disaster management, multi-agency network, and transnational cooperation. In addition, this research gave special attention to identify key barriers and facilitators involving crisis management in the transnational disaster context. As a result, this thesis proposed two classifications for both barriers and facilitators through which transnational disasters should be managed. Each classification was clustered by organisational level (i.e. strategic, tactical, and operational). A set of barriers to build multi-agency networks and a set of facilitators to develop transnational cooperation, as depicted in Tables 2.1 and 2.2.

In the methodological context, this study was based on applied qualitative research that used interviews, focus groups, and physical artefacts as multiple sources of data collection. What was evident from the data, however, was a commitment to the collective since the research participants were chosen among specialised police officers and support specialists allocated at INTERPOL headquarter that had worked at least in one of the two actual case studies (case 1 – tsunami in Thailand, 2004, natural/open disaster; case 2 – air crash of Air France flight 447 in Brazil, 2009, man-made/closed disaster). The maximum variation sampling was chosen to select those cases because it is a form of qualitative approach that consists of determining in advance some criteria that differentiate sites or participants, and then selecting those that are quite different on the criteria (Creswell, 2013). It was carried out an analysis across cases to figure out similarities and differences in order to identify behaviour patterns and use them as a common framework for analogous cases producing generalizability. This researcher created a formal notation to manage multiple sources of data in multiple cases. This was an important aspect to

prepare the data triangulation, facilitate the chain of evidence (data path) within the data storage protocol, and maintain traceability of the data. The outcomes of these case studies were presented in tables, schemas, and figures as part of a ‘static’ structure to manage transnational disasters as well as in class diagrams using the Unified Modeling Language – UML (ISO/IEC, 2012; Nogueira, 2004) as part of a ‘dynamic’ structure to manage transnational disasters. The studies of these cases also identified the main barriers to, and facilitators of effective multi-agency working and transnational cooperation at INTERPOL. Based on these barriers and facilitators, this thesis proposed forty-two recommendations (Table 5.1) to reduce barriers and increase facilitators before, during, and after transnational disasters. It is important to highlight that some of these recommendations were implemented and others are ongoing. A vital aspect of these recommendations was to prevent recurrent difficulties of INTERPOL when facing transnational disasters. If INTERPOL acts according to the recommendations, these measures will reduce the economic, operational, and social impacts of disasters, including the number of people killed and affected every year by transnational disasters.

In addition, the purpose of this thesis was not to produce a general theory about disasters, although one may emerge incidentally, but to create and use a crisis management framework (called CMF) as a comprehensive framework for the understanding and management of transnational disasters under the aegis of INTERPOL. CMF was grounded in both static and dynamic structures that emerged during the qualitative research. CMF covers all disaster management phases and addresses all 8 categories/themes and 23 concepts/codes identified as relevant to INTERPOL throughout the process of data analysis. CMF presented other innovative characteristics, such as the presentation of dynamic structure (i.e. relationships between concepts and categories, hierarchical structure between classes of concepts and categories, cardinalities, and instances), facilitators and barriers to work in the international multi-agency scenario, visual representation of themes, codes and their relationships, and sufficient representativeness to create databases and information systems in an objective way, as argued by Nogueira (2015c).

The impact of CMF upon practice was other important factor in terms of INTERPOL deployment in the field of crisis and disaster management; for example, the results of CMF has helped INTERPOL senior managers to organise the mobilisation of resources and services before, during, and after a disaster. Moreover, CMF has been used to answer

the applied research questions in a practical manner as well as to support INTERPOL and its 190 member countries during the management of all phases of transnational disasters. The study of CMF and its impacts has revealed that it affects all levels of INTERPOL: individual, departmental and organisational. Consequently, CMF has demonstrated to be an original crisis management framework to legitimate INTERPOL's activity before, during, and after transnational disasters. In other words, this legitimation refers to the process whereby the use of CMF through 42 recommendations presented in Table 5.1 becomes acceptable and legitimate by its attachment to norms, rules, and values within INTERPOL.

In order to ratify the practical use of CMF, this thesis also created an innovative information system called CRIMAFIS. It is a business intelligence system based on Artificial Intelligence (AI) techniques that provides relevant information upon transnational disasters under the auspice of INTERPOL and uses the CMF structures (static and dynamic) and the eight thematic dimensions of CMF (i.e. governance, service, resource, multi-agency network, stakeholder, finance, barrier, and facilitator) as databases. CRIMAFIS has already helped INTERPOL decision makers in all levels when managing with transnational disasters. Therefore, the practical studies in the field has demonstrated that CMF and CRIMAFIS has potential to be catalysts for constructive organisational change and enhanced organisational effectiveness enabling managers, policy makers, and INTERPOL community to be better prepared for preventing and dealing with crisis involving transnational disasters.

Another major contribution obtained in this thesis was the publication of five peer-reviewed articles (Nogueira, 2015a; Nogueira, 2015b; Nogueira, 2015c, Nogueira 2015d, Nogueira, 2016) to help INTERPOL members, managers, leaders, policy makers, and scientists in the crisis and disaster community to establish a better understanding and a realistic discussion that advances the frontiers of transnational disaster management.

A limitation of this study includes the sole focus of the sample being from INTERPOL, i.e. the absence of data from participants from other international agencies. Future studies might examine opinions of other stakeholders in order to create a detailed framework that might have broader application in different international organisations.

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Appendix A – Access and permissions

PARTICIPANT CONSENT FORM

Title of Research: A crisis management framework for INTERPOL to manage transnational disasters

Researcher: Jose Helano Matos Nogueira

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected. In addition, should I not wish to answer any particular question or questions, I am free to decline.

3. I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.

4. I agree to take part in the above study.

Participant Name

Researcher and Interviewer
Jose Helano Matos Nogueira

Appendix B – Interview form

INTERVIEW FORM

Title of research: A crisis management framework for INTERPOL to manage transnational disasters.

Case name: _____

Date: ____/____/____

Time: ____:____

Place of interview: _____

Interviewer: _____

Interviewee: _____

Position of interviewee: _____

Role of interviewee in the case: _____

Research questions:

1. What are the governance mechanisms adopted by INTERPOL to manage transnational disasters?
2. What resources and services did INTERPOL mobilise in this transnational disaster?
3. Who were the key stakeholders in this case?
4. What were the finances and funding arrangements used by INTERPOL in this case you have participated?
5. How did INTERPOL create formal/explicit and informal/tacit relationships within this crisis and disaster management?
6. What were the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL?

Appendix C – Examples of transcripts and field notes

Reference	Examples of transcripts and field notes ¹¹
Case 1 Interviewee 1	Research question: 1. What are the governance mechanisms adopted by INTERPOL to manage transnational disasters? Answer: “One of the main roles of INTERPOL is assisting member countries in issues related to transnational disasters.”
Case 1 Focus Group 1	Research question: 1. What are the governance mechanisms adopted by INTERPOL to manage transnational disasters? Answer: “Beyond cooperation, our organisation is responsible to provide public safety through information exchange of victims, families and people.”
Case 1 Interviewee 4	Research question: 2. What resources and services did INTERPOL mobilise in this transnational disaster? Answer: “...the organisation usually prepares several types of early public information to our member countries. For example, leaflets, guidelines, handbooks, and educational videos.”
Case 1 Focus Group 2	Research question: 2. What resources and services did INTERPOL mobilise in this transnational disaster? Answer: “We deploy emergency infrastructure services, such as logistics, field communications equipment, IT and communication, information systems and databases for our NCB in Thailand.”
Case 1 Interviewee 10	Research question: 3. Who were the key stakeholders in this case? Answer: “I believe... we can’t forget victims and their families as key stakeholders in this transnational disaster.”
Case 1 Focus Group 1	Research question: 3. Who were the key stakeholders in this case? Answer: “The disaster management was a big challenge requiring the full commitment and involvement of all sectors concerned, including public, private, and non-governmental agencies.”
Case 1 Interviewee 3	Research question: 4. What were the finances and funding arrangements used by INTERPOL in this case you have participated? Answer: “Well... I think that member countries’ contributions were essential to the disaster response activity.”
Case 1 Focus Group 2	Research question: 4. What were the finances and funding arrangements used by INTERPOL in this case you have participated? Answer: “We were passing for severe budget constraints and it was necessary to find out alternative funding arrangements... look at our incomes in projects, bilateral agreements, and consortiums.”
Case 1 Interviewee 2	Research question: 5. How did INTERPOL create formal/explicit and informal/tacit relationships within this crisis and disaster management? Answer: “Our partners were absolutely crucial in the case of tsunami in Thai.”

¹¹ At least one answer of each interviewee and focus group was selected as example

Reference	Examples of transcripts and field notes ¹¹
Case 1 Interviewee 6	<p>Research question: 5. How did INTERPOL create formal/explicit and informal/tacit relationships within this crisis and disaster management?</p> <p>Answer: “Knowledge and experience were essential prerequisites to obtain successful multi-agency cooperation in the case of tsunami.”</p>
Case 1 Interviewee 8	<p>Research question: 6. What were the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL?</p> <p>Answer: “Barrier... I saw that our organisation had difficulties to disseminate procedures, norms and regulations among participants because they had different levels of engagement.”</p>
Case 1 Focus Group 1	<p>Research question: 6. What were the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL?</p> <p>Answer: “Other barrier was the lack of knowledge on the roles, responsibilities, and core values of other agencies.”</p>
Case 2 Interviewee 5	<p>Research question: 1. What are the governance mechanisms adopted by INTERPOL to manage transnational disasters?</p> <p>Answer: “Arrange to meet annually with disaster practitioners at INTERPOL in order to share information, international standards as well as to disseminate our recommendations.”</p>
Case 2 Focus Group 1	<p>Research question: 1. What are the governance mechanisms adopted by INTERPOL to manage transnational disasters?</p> <p>Answer: “...day-to-day implementation of the Organization’s decisions related to transnational disasters was carried out by the organisational norms and technical documents in consonance with international law.”</p>
Case 2 Interviewee 10	<p>Research question: 2. What resources and services did INTERPOL mobilise in this transnational disaster?</p> <p>Answer: “...capacity building and training, exercises and simulations. Test the IT and communication services.”</p>
Case 2 Focus Group 2	<p>Research question: 2. What resources and services did INTERPOL mobilise in this transnational disaster?</p> <p>Answer: “We do believe that the Organisation also prepares early specialised information and makes available in our site at Internet. For instance, contingency plans, fact sheets, reports, manuals and guides.”</p>
Case 2 Interviewee 9	<p>Research question: 3. Who were the key stakeholders in this case?</p> <p>Answer: “This air crash of Air France flight 447 was comprised of different international, national, and local actors involving civil and military forces.”</p>
Case 2 Focus Group 1	<p>Research question: 3. Who were the key stakeholders in this case?</p> <p>Answer: “There are mutual benefits among the involved actors and in different levels: international, national, and local.”</p>
Case 2 Interviewee 3	<p>4. What were the finances and funding arrangements used by INTERPOL in this case you have participated?</p> <p>Answer:</p>

Reference	Examples of transcripts and field notes ¹¹
	“Well... Extraordinary contribution was a key factor.”
Case 2 Focus Group 2	4. What were the finances and funding arrangements used by INTERPOL in this case you have participated? Answer: “DVI activities are also fomented through agreement with some organisations as well as the FASTID consortium.”
Case 2 Interviewee 7	Research question: 5. How did INTERPOL create formal/explicit and informal/tacit relationships within this crisis and disaster management? Answer: “Police cooperation agreement was an important factor in this air crash case.”
Case 2 Focus Group 2	Research question: 5. How did INTERPOL create formal/explicit and informal/tacit relationships within this crisis and disaster management? Answer: “Formal partnerships take part of the disaster management process and they were essentials, in all levels: Micro Level (Group), Meso Level (Institutional), Macro Level (Multi-Agencies).”
Case 2 Interviewee 6	Research question: 6. What were the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL? Answer: “This case faced a barrier due to the different interests from military and civil organisations.”
Case 2 Focus Group 1	Research question: 6. What were the barriers and facilitators to manage transnational disasters under umbrella of INTERPOL? Answer: “We faced some kind of rigidity in institutional beliefs and legal frameworks, as difficult barrier to overcome.”