



SECURE DYNAMIC CLOUD FOR
INFORMATION, COMMUNICATION AND RESOURCE INTEROPERABILITY
BASED ON PAN-EUROPEAN DISASTER INVENTORY

Deliverable 6.4

**Standardisation, Exploitation and
Dissemination report**

Final

Olivier Paterour¹, Christina Schäfer², Jens Pottebaum², Monika Buscher³, Paul Hirst⁴

¹Airbus Defence and Space, ²Paderborn University,

³Lancaster University, ⁴British APCO

April, 2017

Work Package 6

Project Coordinator

Prof. Dr.-Ing. Rainer Koch (University of Paderborn)

7th Framework Programme

for Research and Technological Development

COOPERATION

SEC-2012.5.1-1 Analysis and identification of security systems
and data set used by first responders and police authorities





Distribution level	Public
Due date	30/04/2017
Sent to coordinator	30/04/2017
No. of document	D6.4
Name	<i>Standardisation, Exploitation and Dissemination Report</i>
Type	<i>Report</i>
Status & Version	<i>Version 1.0</i>
No. of pages	32
Work package	6
Responsible	<i>Airbus Defence and Space</i>
Further contributors	<i>UPB ULANC BAPCO TUDO</i>
Keywords	<i>Standardisation, Data Model, Taxonomy, ELSI, 3GPP, Mission Critical Services, CIS concept</i>



History	Version	Date	Author	Comment
	V0.1	31/01/2017	ADS	Table of content
	V0.2	31/03/2017	ADS	Includes contributions from UPB, BAPCO and ADS.
	V0.3	20/04/2017	ADS	Last contributions included + first Q&A and monitoring comments
	V0.4	27/04/2017	ADS	Last comments are addressed
	V1.0	28/04/2017	UPB	Final version for submission

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n°607832.



Editor



Airbus Defence and Space

Olivier Paterour

Email: Olivier.Paterour@airbus.com

Authors



Airbus Defence and Space

Olivier Paterour

Email: Olivier.Paterour@airbus.com



University of Paderborn

C.I.K.

Jens Pottebaum

Email: pottebaum@cik.upb.de

Christina Schäfer

Email: c.schaefer@cik.upb.de



Centre for Mobilities
Research
Department of Sociology
Lancaster University
LA1 4YD
UK

Monika Buscher

Email: m.buscher@lancaster.ac.uk

Katrina Petersen

Email: k.petersen@lancaster.ac.uk

Sarah Becklake

Email: s.becklake@lancaster.ac.uk

Catherine Easton

Email: c.easton@lancaster.ac.uk

Malé Luján Escalante

Email: m.lujanescalante@lancaster.ac.uk

[Xaroula Kerasidou](#)

Email: x.kerasidou@lancaster.ac.uk



British APCO

Paul Hirst

Email: paul.hirst@bapco.org.uk



Reviewers



T6 Ecosystems

Simona De Rosa

Email: s.derosa@t-6.it

Ivan Cucco

Email : i.cucco@t-6.it



Center for Security Studies
(KEMEA)

P.Kanellopoulou 4

1101 77 Athens

Greece

Ioannis Daniilidis

Email: i.daniilidis@kemea-research.gr

ELSI Monitor



Centre for Mobilities
Research
Department of Sociology
Lancaster University
LA1 4YD
UK

Monika Buscher

Email: m.buscher@lancaster.ac.uk



Executive summary

SecInCoRe is a cross-cutting activity in the 'Security' theme of the 7th research framework programme of the European Commission. Therefore it envisages to close gaps identified by earlier or parallel projects and to solve issues across all 'missions' of the security research programme. The project, and stakeholder engagement that would promote and support the future of the project, dedicates specific attention to research regarding knowledge creation and dissemination, exploitation and the standardisation of the SecInCoRe outcomes. These are important aspects for ensuring the project's progress beyond the state-of-the art and for sustainability after the completion of the project. In order to support these objectives, this document describes the status on standardisation activities and on crisis management models.

Chapter 2 describes the SecInCoRe sustainability strategy which relies on four dedicated elements:

- Extended dissemination and exploitation
- Contribution to / New Crisis Management Models
- Contribution to / New Business Models
- Standardisation – standardisation potentials are identified during the project lifetime and based on the data model of PAN-European inventory, ELSI Guidance and NEC concept

Dissemination and exploitation and contribution to / New Business models will be provided in D6.3.

The contribution to crisis management models will be described in this chapter. It will be shown that SecInCoRe is not of itself the foundation for a new model and that simply adding another model to the already wide variety available is not necessarily a good thing. There is a common theme running through existing models however (plan and train – exercise and / or implement – learn lessons – feed back into the planning and training process), and the various elements of SecInCoRe however do contribute towards management and implementation of that process.

The other point in the overall sustainability strategy will be described in more depth in the following chapters.

Chapter 3 provides a report on standardisation activities regarding the data models for Pan European Inventory. Here a distinction between efforts to standardize command processes is necessary and reaching de facto standards by a wider dissemination of research results. Currently a revision of the ISO 22320 is under construction, which enables Prof. Dr.-Ing- Koch, who leads Working Group WG3 on Emergency Management, to contribute with SecInCoRe background knowledge. Further a CEN working agreement started regarding Terminologies on disaster and crisis management. Here research results from the SecInCoRe project will be integrated.



Chapter 4 provides a status on standardisation activities regarding the ELSI Guidance. This effort focuses on developing opportunities to create products, services, organizational and social innovations that support networked collaborations and new partnerships, including cross-border collaboration. By having access to standardized ELSI guidance, software developers, can create software products, such as products developed to realise the SecInCoRe common information space concept, knowing about ethical, legal and social constraints and issues as well as opportunities. Standardisation efforts include formation of an ELSI Task Force and collaboration with the Public Safety Network Europe as well as user organisations such as BAPCO and KEMEA, and integration of ELSI Key Terms into the CEN Terminologies on disaster and crisis management. A website www.islTethical.eu has been developed as a community platform for the ELSI Guidance. This is now hosted by the PSCE Network.

Chapter 5 provides a status on standardisation activities regarding the NEC concept to manage communications interoperability. During the project duration, the following NEC concepts were addressed:

- The communications interoperability between PPDR organisations leveraging
 - legacy narrowband PMR systems based on Tetra or TetraPol technologies and
 - new broadband PMR systems based on technologies such as 3GPP (e.g. LTE) allowing to access to 3GPP Mission Critical Services (MCPTT, MCVideo, MCData) and to a large ecosystem of data applications
- The Seamless connectivity concept enables link aggregation for more robust and efficient communication by integrating the concept of Network Coding and MultiPatch TCP (MPTCP). Therefore, several communication technologies such as LTE and WiFi ad-hoc networks are used.

Several dissemination activities have been executed to publish the concepts behind NEC in order to discuss and evolve the concepts.

Chapter 6 provides a status on activities regarding the ELSI and Taxonomy task forces in place between SecInCoRe, EPISECC, SECTOR and ReDIRNET projects.

Based on this effort new partnerships come up with the other research projects funded under the same call and enable the joint work in the CWA TER-CDM and also several joint events in early 2017.



Table of contents

1	Introduction	7
1.1	Purpose of this document	7
1.2	Validity of this document	7
1.3	Relation to other documents little as	7
1.4	Contribution of this document	7
1.5	Target audience	7
1.6	Glossary	8
1.7	List of figures	9
1.8	List of tables	9
2	Sustainability strategy	10
2.1	Contribution to New Crisis Management Models	11
2.2	Standardisation	12
3	Data models of the Pan European Inventory	15
3.1	Standardisation efforts – processes, structures, activities	15
3.2	Dissemination to enable reuse	16
3.3	Plans for further evolution	16
4	ELSI Guidance	17
4.1	Standardisation efforts – processes, structures, activities	17
4.2	Dissemination to enable reuse and de facto standards	18
4.3	Plans for further evolution	20
5	NEC concepts to manage communications interoperability ...	22
5.1	Standardisation efforts – processes, structures, activities	22
5.1.1	<i>3GPP MCS Status</i>	<i>22</i>
5.1.2	<i>ETSI TCCE Status</i>	<i>23</i>
5.2	Dissemination to enable reuse	24
5.2.1	<i>Communications interoperability</i>	<i>24</i>
5.2.2	<i>Seamless connectivity concept</i>	<i>24</i>
5.3	Plans for further evolution	25
5.3.1	<i>Communications interoperability</i>	<i>25</i>
5.3.2	<i>Seamless connectivity concept</i>	<i>26</i>



6	Outlook	27
6.1	Joint Task-Forces	27
6.2	Joint activities and events	27
6.2.1	<i>CIS - Cluster of European Projects for Enhanced Interoperability in Brussels (28th of February, 2017)</i>	<i>27</i>
6.2.2	<i>CWA on terminologies in crisis and disaster management – Kick-off meeting</i>	<i>28</i>
6.2.3	<i>PSCE / Standardisation Workshop in Munich (3rd of May, 2017)</i>	<i>29</i>
6.2.4	<i>7th Event of CoU on Secure, Safe and Resilient societies in Brussels (17th of May, 2017)</i>	<i>29</i>
6.3	Conclusion	29



1 Introduction

1.1 Purpose of this document

The first purpose of this D6.4 report is to provide the outcomes of the SecInCoRe sustainability strategy with a special emphasis on standardisation based on the topics identified in D6.2 and on the new crisis management models.

SecInCoRe is actively cooperating with parallel projects EPISECC, ReDIRNET and SECTOR. Therefore the outcomes of the tasks forces in place are also provided.

1.2 Validity of this document

This document depicts the status of the work done by the SecInCoRe team related to standardisation on the different concepts of the project.

1.3 Relation to other documents little as

The Relationships with other documents created as part of the SecInCoRe project include a general framing through:

- [1] Grant Agreement
- [2] Consortium Agreement
- [3] Description of Work (DOW)
- [4] D6.1 Standardisation strategy including identification of relevant standardisation bodies
- [5] D6.2 Status Report on Standardisation

Further, this document has relationships with other documents created within the SecInCoRe project. The following documents are referred to in terms of foreground literature:

- [6] D6.3 Report and Evaluation on new business models

1.4 Contribution of this document

Knowledge creation and dissemination, exploitation and standardisation of the SecInCoRe outcomes are important aspects for ensuring the project's progress beyond the state-of-the art and for sustainability after the completion of the project. In order to support these objectives, this document describes the outcomes on standardisation activities and on crisis management models.

1.5 Target audience

D 6.4 is public and its main target audience are all stakeholders in the field that could be interested in understand how project results will be sustained after the end of the project.

The particular target audience is the European Commission which may be interested in understanding how the SecInCoRe project intends to support a long-term use of the project results.



1.6 Glossary

Abbreviation	Expression
3GPP	3rd Generation Partnership Project
CEIS	Cloud Emergency Information Systems
CIS	Common Information Space
DoW	Description of Work
DRM	Disaster Risk Management
EENA	European Emergency Number Association
ELSI	Ethical, Legal and Social Issues
FEU	Federation of European Union Fire Officer Associations
FWDV	Feuerwehr-Dienstvorschriften
IAEM	International Association of Emergency Managers
ICT	Information and Communication Technologies
IT	Information Technology
KB	Knowledge Base
MCDData	Mission Critical Data
MCPTT	Mission Critical Push To Talk
MCVideo	Mission Critical Video
NEC	Network Enabled Communication
NIMS	National Information Management System (USA)
OMA	Open Mobile Alliance
OPEX	Operational expenditure is an ongoing cost for running a product, business, service or system.
PEI	Pan-European Inventory
PMR	Professional Mobile Radio
PPDR	Public Protection and Disaster Relief
PPP	Public Private Partnership
PSC-E	Public Safety Communications – Europe forum



Abbreviation	Expression
WG	Working Group

1.7 List of figures

Figure 1 CIS concept	10
Figure 2 Sustainability strategy	11
Figure 3 Standardisation efforts depending on the CIS concept	13
Figure 4 ELSI Guidance at www.islTethical.eu	17
Figure 5 ETSI TCCE MCS-Tetra Interworking	23
Figure 6 SecInCoRe Gateway bridges Legacy services and MCS services	24
Figure 7 RescueRoam & Multipath TCP demonstration during 2nd review meeting	25
Figure 8 Network Coding setup during 3 rd Advisory Board Meeting	25
Figure 9 Pictures from the various presentations and panel discussion on the Joint Event in February 2017	28

1.8 List of tables

None

2 Sustainability strategy

The overall sustainability strategy of the SecInCoRe project (described in D6.3) takes a double perspective. From one side, it explores opportunities for the CIS as a unique and comprehensive outcome; from the other side, it considers each single outcome and builds a sustainability strategy for them. The outcomes are structured in the CIS concept documentation and visible at: secincore.eu/cis-concept (Figure 1).

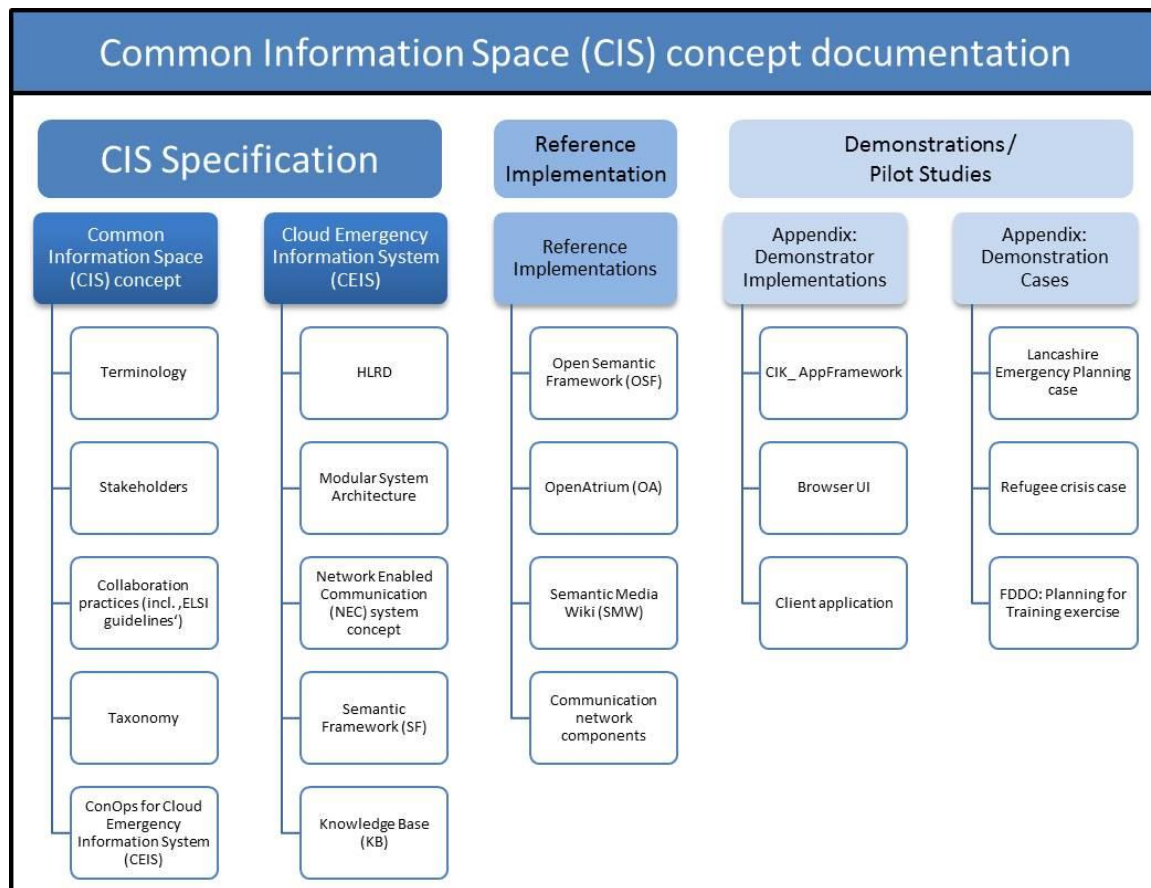


Figure 1 CIS concept

According to the nature of the project as a cross-cutting activity (cp. FP7 Security work program), the intention is not having a 'simple' dissemination and exploitation with regard to a unidimensional mission oriented, socio-technical system, but is more related to how SecInCoRe elements will be sustained when the project ends.

The sustainability strategy is described in the following Figure and depends on four dedicated elements:

- Extended dissemination and exploitation - All partners describe dissemination and exploitation strategies in detail in D6.3. Targeting ways for identifying selling opportunities and opening of new markets, reuse of gathered knowledge during the project, and scientific publications.

- Contribution to New Crisis Management Models – dealing with extending existing models, guidance to simplify and facilitate the use of data, information systems and partnerships
- Contribution to New Business Models - contributing to policy making and focusing on business perspectives in the domain of first responders and Police authorities, especially procurement mechanisms and regulations for PPP and PPI.
- Standardisation – standardisation potentials are identified during the project lifetime and based on the data model of PAN-European inventory, ELSI Guidance and NEC concept

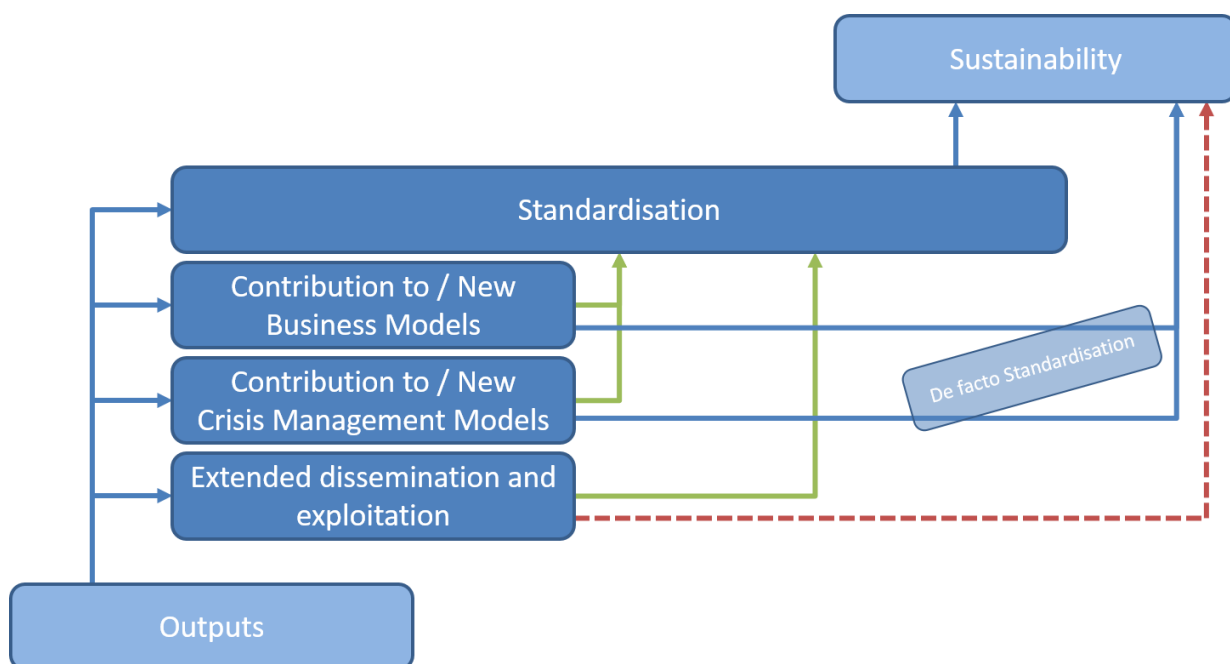


Figure 2 Sustainability strategy

Both section targeting dissemination and exploitation and contribution to / New Business models are discussed in D6.3. The other point in the overall sustainability strategy will be described in depth in the following chapters.

2.1 Contribution to New Crisis Management Models

The concept of crisis management models is a complex one and there is any number of proposed structures available for organisations to make use of. It would be unrealistic to imagine SecInCoRe being responsible for the development of a new model based on the project itself – indeed, it could also be argued that, unless a new model could deliver perfection in itself, to generate yet another model would simply add to the menu without necessarily identifying which model is the ‘chef’s choice’. On that basis, it would be better to focus on where the various elements of SecInCoRe would be able to assist on any chosen model of crisis management.



The landscape of crisis management models is changing. Policy analysts, and international efforts like the UNISDR Sendai Framework assume that more open and people centred approaches can leverage important and local knowledge, and enable a more democratic, broad-based understanding of the complexities of risks and thereby foster more effective preparedness and response. Principles of ‘netcentric’ work have been developed in the Public Protection and Disaster Relief domain to ‘improve the exchange of information between heterogeneous actors’ (Boersma et al. 2010, see also Bossong and Hegeman 2015, Chen et al 2013, Scolobig et al 2015, Büscher et al 2017, See also D2.7). This approach, is based on a break with ‘established patterns of command and control ... [and] supposed to enable new networks of communication’. SecInCoRe supports these emergent new models.

An examination of crisis management models will result in a wide variety of process diagrams and terminology. There is some commonality of shape however; and that shape is the circle. Essentially to plan and train – to exercise and / or implement – to reap the lessons learned and feed back into the planning and training process. This construction may be broken down into other elements; mitigation, recovery etc. but the essentially, the flow remains the same.

SecInCoRe is focused mainly on the planning and training elements of crisis management, but with the possibility that further development could place it firmly in the operational arena and assisting with the management of rises in real time.

From the end-user perspective, the elements of the SecInCoRe project which generate the most interest are perhaps the Common Information Space, the ELSI Guidance and the Inventory. For a more detailed account of end-user feedback on the various elements of SecInCoRe, the reader should refer to deliverable D5.5.

Discussions with the project Advisory Board have led to the conclusion that an operational version of SecInCoRe would be best hosted at European level (see D6.3 for detail), together with substantial support at the national level. This concept was delivered at a joint presentation (SecInCoRe, REDIRNET, EPISECC and SECTOR) to EU-level representatives in Brussels in February 2017 and favourably received.

2.2 Standardisation

Main standardisation activities depend on the CIS specification and concrete efforts are highlighted in Figure 3. In order of the variety of specification outcomes (i.e. ELSI Guidance, taxonomy (data model of PAN European inventory), NEC components, etc.), the standardisation efforts have to follow different approaches.

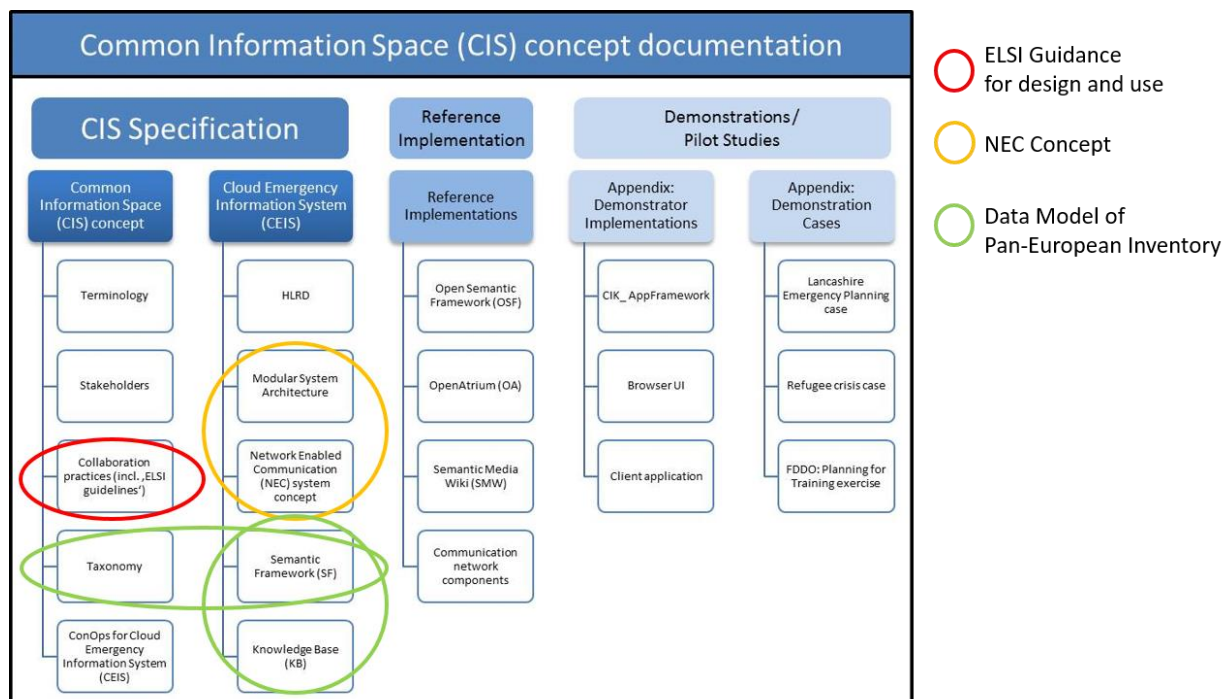


Figure 3 Standardisation efforts depending on the CIS concept

In the following section the three identified aspects regarding standardisation will be detailed.

Data model of a Pan European Inventory (see chapter 3):

- The **Pan-European Inventory (PEI)** includes data for example about data sets regarding past disaster, information management processes, information systems, business models, Ethical, Legal and Social Issues (ELSI) and interdependencies between them.
- A **taxonomy** structure that captures key categories and terms in the PPDR domain based on the inventory categories of data sets, processes, information systems and ELSI is produced during the project. Further an ontology will be derived based on existing semantic approaches and will be part of the **semantic framework** of SecInCoRe.
- The **knowledge base** consists of a technology based implementation of the inventory and provides a database containing the inventory and taxonomy by using the semantic framework (especially Open Semantic Framework).

ELSI Guidance for design and use (see chapter 4) has been developed alongside these components, supporting design for:

- privacy,
- transparency,
- accessibility,



- pre-emptive risk assessment / regulatory changes / planning,
- trust, articulation work, configuring awareness
- translation between different national and organisational cultures and cross-border collaboration
- new partnerships.

The guidance is available at www.isITethical.eu.

The Network Enabled Communication (NEC) concept (see chapter 5):

- Secure local communications. This communication is mainly required for efficient response at an incident scene (e.g., communication between first responders inside and outside of buildings);
- Communication with the CEIS and a wide area network (e.g., Internet). This communication is needed for the transmission of information about the incident scene to further organisations;
- Providing a concept for an international roaming service for rescue organizations and first responders providing secure access on distributed locations (e.g. eduroam concept).

The following sections of this report detail the status of each topic.



3 Data models of the Pan European Inventory

One main aim was the establishment of a way to bring research results from building the SecInCoRe taxonomy (T4.1) and data structures based on the inventory (WP3) into standardisation procedures (de facto or de jure).

Mainly based on T3.1 “Acquisition of representative data sets for past disaster events” and T3.2 “Systemic process analysis based on unified incident command systems”, existing command and control systems and information management processes were analysed, documented and translated in a comparative way. Available and needed data were taken into account and addressed during the research activities to consider respective tasks of first responders. First results were presented in D3.2, D3.3 and finally in D3.4 and further described in D4.3 and D4.4, showing the structuring process regarding a common process model.

3.1 *Standardisation efforts – processes, structures, activities*

There are different ways for standardisation. De Jure standards are one approach and de facto standards are another option. A common European approach is often not useful or possible for each individual member state and a common definition of all aspects of current practices of first responder organisations is hard to realise based on individual history and regulations. Nevertheless ways for defining standards where it is possible or alignments to overcome barriers and misunderstanding is needed.

For developing research results of the inventory, data model and taxonomy in standardisation efforts, two approaches were chosen:

1. To define possible alignments between terms used in the PPDR domain UPB and ULANC are part of the CEN Workshop on Terminologies in Crisis and Disaster Management (CWA TER CDM) to work together with other researchers, companies, and stakeholders (such as the French Transport Ministry) in that domain to define alignment in existing terminologies. This is also one outcome of activities from the taxonomy task force. The workshop started on 01/03/2017 and will finish in September 2017 with a final publication of the work.
2. Prof. Dr.-Ing. Rainer Koch is elected Convenor of ISO/TC292 WG3 Emergency Management and therefore involved in the revision of the ISO 22320. This relation to the respective ISO-Standard enables SecInCoRe and Prof. Dr.-Ing. Rainer Koch to push, in person, research results in the revision process of the ISO 22320 and moreover to influence the design of the respective ISO-Standard based on insights gained in the analysis of WP3 and WP4 and bring these results into standardisation activities. In this case SecInCoRe has no official liaison to ISO/TC292 WG3 Emergency Management standardisation activity but has the opportunity to contribute research outcomes to the standardisation process.

The process of revision will not end before the SecInCoRe project finishes its work. Therefore all results will be brought in through Prof. Dr.-Ing. Rainer Koch.

3. To enable the persistence of the work in defining relations between existing taxonomies a PURLs registration (Persistent Uniform Resource Locators) was conducted, to achieve a fixed accessibility. PURLs are Web addresses that act as permanent identifiers in the face of a dynamic and changing Web



infrastructure. A GitHub repository (<https://github.com/upb-cik/SecInCoRe>) was utilised in accordance with PURLs to publish the created ontologies.

3.2 Dissemination to enable reuse

There are two approaches to enable the reuse of SecInCoRe inventory content or structure. One is the publication of inventory content in the SecInCoRe Search Engine, to demonstrate the opportunities for using such information in a common information space in the current practices of the respective first responder organisation. On the other hand scientific publications address mainly other researcher with the aim of exchanging and bringing knowledge together and enable new cooperation.

- Making the inventory content publicly available is one measure to disseminate the content and also the structure and model behind the content. One aim is to visualise connections between data / information to support users to understand relationships and give a hint to a possible ongoing exploration of information. The developed components that enable an easy access to the inventory content are mainly described in D3.4 and D4.4. For each element of the inventory a dedicated database was created and combined in the SecInCoRe knowledge base as a living resource to allow growing of the amount of data and the publication of relevant information of the PPDR domain.
- Scientific publications and submissions to conferences – this activity enables the SecInCoRe consortium to share results with other researchers and experts, open ways in communities and strengthen the vision of SecInCoRe. To disseminate the way of accessing the inventory content the publication at SysCon 2017 is one example with the title: “Cloud-based Semantic Services for Pan-European Emergency Preparation and Planning”. Therefore submission to conferences on different national and international level is being pursued.

3.3 Plans for further evolution

Research results targeting the concept of the common information space and the gathered knowledge and inventory content will be reused in other existing or upcoming national and international research projects. Further, the CEN Workshop “Terminologies in Crisis and Disaster Management” (WS TER-CDM) will close September 2017 with a final publication of the joint work between all workshop proposers and participants. In this way a chance is enabled to proceed with our work regarding terminologies and taxonomies (in relation to WP3 and T4.1 and WP2 T2.3 Formulation of user goals and ELSI). Moreover further publications disseminate the work conducted in SecInCoRe in relation to WP3 and WP4 are planned and also described in D6.3.

4 ELSI Guidance

The ELSI guidance provides information and supports reflection of key ethical, legal and social issues relating to governing and using or ‘inhabiting’ (and designing) common information spaces like those enabled by SecInCoRe’s CIS concept. It is available publicly at www.isITethical.eu.

4.1 Standardisation efforts – processes, structures, activities

The development of the **ELSI Guidance** has been led by ULANC through the ELSI Task Force, which includes members from the EPISECC, SECTOR and REDIRNET projects and has developed collaboration with other projects, such as BRIDGE, ConCORDE, IMPRESS, Broadmap, SATORI, INSPIRE.

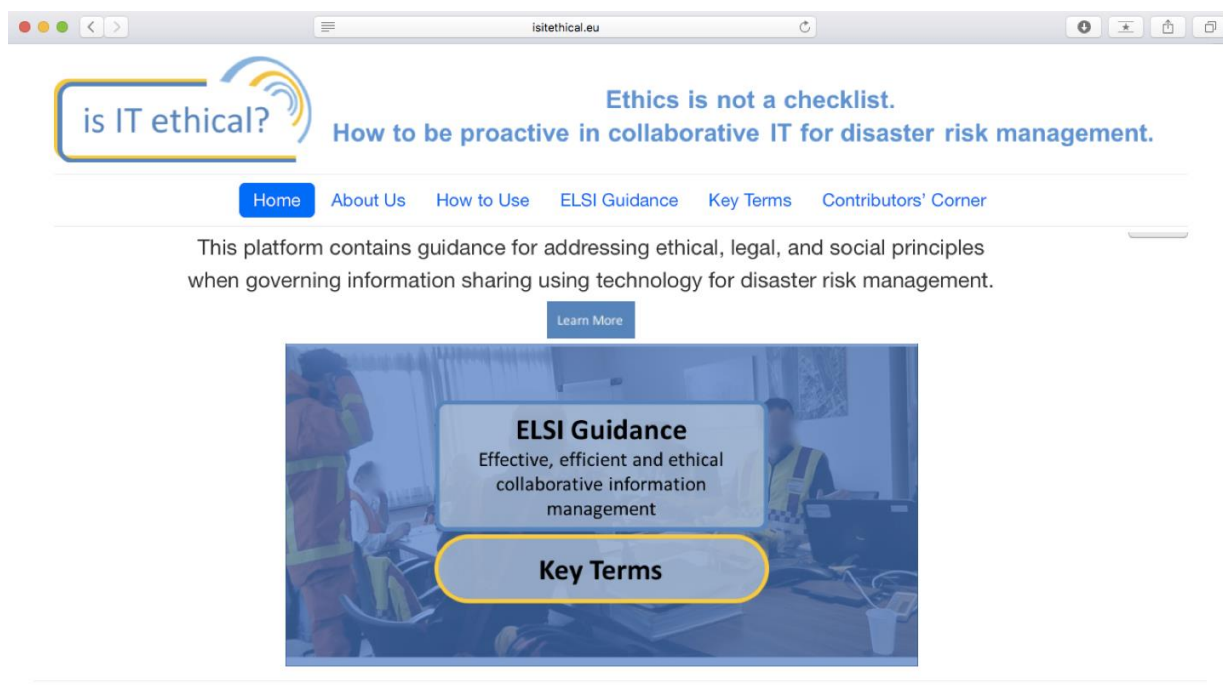


Figure 4 ELSI Guidance at www.isITethical.eu

Throughout the lifetime of the project, we have sought to involve practitioners and relevant stakeholders in the development of content and the format of the community platform through co-design workshops, discussions and activities during advisory board meetings, knowledge exchange workshops, as well as integration into developments of other SecInCoRe technologies and services. This has ensured that the ‘soft’ standards of the guidance are deeply grounded in practitioner experiences and needs as well as our research. This has been accompanied by academic debate pursued through conference presentations and scholarly publications.



Collaboration with other projects in the SecInCoRe-led ELSI Task Force and the wider Public Protection and Disaster Response (PPDR) and other communities, has led to a widening of the scope of the ELSI Guidance to address not only innovation pursued in SecInCoRe (Pan European Inventory, Common Information Space (CIS) and Cloud Service) and sister projects EPISECC, SECTOR, REDIRNET, but broader efforts. The current title for the Guidance is *ELSI Guidance: Effective, efficient and ethical collaborative information management*.

Participation in standardisation initiatives (such as the Workshop on Standardisation at European Security Research, 4-6.11.2015. Dublin, Ireland, and an expert invitation to the European Data Protection Supervisor's Workshop on Digital Ethics (31 May 2016, Brussels) have led to the incorporation of ELSI key terms in the CEN Workshop "Terminologies in Crisis and Disaster Management" (WS TER-CDM).

The adoption of the ELSI Guidance by the PSCE Network is evidence of the relevance of a coherent, standardized, research-based approach to the production of live, lived and living ELSI Guidance as a community resource.

4.2 Dissemination to enable reuse and de facto standards

Apart from dissemination with and through practitioners and relevant stakeholders, the SecInCoRe and ELSI Task Force advisory board members, and academic presentations and scholarly publications (a selection is listed below), we have developed the ELSI Guidance into a Community Platform hosted by the Public Safety Communications Europe Network (PSCE <http://www.psc-europe.eu>), a major European network for practitioners, industry developers, policy-makers and researchers. PSCE expressed an interest in the ELSI Guidance based on conversations and invited presentations and workshops, and have now agreed to host the ELSI Guidance (available at www.islTethical.eu), to promote it and make it widely available to practitioner and policy communities from now on and beyond the end of the SecInCoRe project. Developing the ELSI Guidance as a community platform is an ongoing dissemination effort, as it invites practitioners and stakeholders (e.g. commercial and academic developers of collaborative ICT) to engage with the content and participate in its evolution through a 'contributors' corner'. Contributions are monitored by Monika Büscher and Catherine Easton at Lancaster University, in collaboration with the PSCE Board.

In an invited chapter 5.2.1 *Ethical, legal and social issues in preparedness and response planning* in the forthcoming Joint Research Council Disaster Risk Management Knowledge Centre Report, we highlight the importance of reflexive guidance and provide examples from our work (DRMKC 2017).



In addition to developing the ELSI Guidance Community Platform, ULANC have led ELSI Task Force efforts to enable the **incorporation of ELSI terms into the CEN Workshop Agreement on Terminologies in Crisis and Disasters**.

Dissemination has also included academic publications. These include:

Petersen, K., Büscher, M. (2018, forthcoming) Reflexive Resilience: Probing the socio-technicality of disaster management, in Amir, S, Kant, V. *Socio-Technical Resilience*. Palgrave Macmillan.

Kerasidou, X., Petersen, K., Büscher, M. (forthcoming 2017). Intersecting Intelligence: An Exploration of Big Data Disruptions, in *Big Data, Surveillance and Crisis Management: The Dark Aide of Big Data*. Routledge: London and New York.

Büscher, M. (2017, forthcoming) Sub-Section 5.2.1 Ethical, legal and social issues in preparedness and response planning. In Wilkinson, E., Peters, K., Büscher, M., Fearnley, C., Helsloot, I., Twigg, J. Chapter 5. Disaster Risk Management, Section 5.2 Preparedness and Response Planning. *Disaster Risk Management Knowledge Centre Report*. Disaster Risk Management Knowledge Centre <http://drmkc.jrc.ec.europa.eu>

Büscher, M., Kerasidou, X., Petersen, K. and R. Oliphant (2017 in press). 'Networked Urbanism and Disaster', in Freudendal-Petersen, M. and Kesselring, S. (Eds). *Networked Urban Mobilities*. Springer.

Petersen, K. and Büscher, M. (2017) ELSI Guidance for 21st Century Networked Crisis Management. SecInCoRe Deliverable D2.7. <http://www.secincore.eu/publications/deliverables/>

Rizza, C., Büscher, M. and Watson, H. (2017) Working with Data: Ethical Legal and Social Considerations Surrounding the Use of Crisis Data and Information Sharing During a Crisis. *Journal of Contingencies and Crisis Management* 25(1):2-6. Introduction to Special Issue.

Petersen, K., Oliphant, R., Büscher, M. (2016). 'Experimenting with Ethical Impact Assessment'. In *ISCRAM 2016 Proceedings*, 22-26.05.2016. Rio de Janeiro, Brazil.

Büscher, M., Becklake, S., Easton, C., Kerasidou, X., Oliphant, R., Petersen, K., Jasmontaite, L., Paterour, O. (2016). 'ELSI Guidelines for Networked Collaboration and Information Exchange in PPDR and Risk Governance'. In *ISCRAM Proceedings 2016*, 22-26.05.2016. Rio de Janeiro, Brazil.
http://idl.iscram.org/files/monikabuescher/2016/1360_MonikaBuescher_et al2016.pdf

Büscher, M., Kerasidou, X., Liegl, M., Petersen, K. (2016). '[Digital Urbanism in Crises](#)', in Kitchin, R. and Peng, S-Y. (Eds.) *Code and the City* (pp. 163-177). Routledge: London and New York.

Kerasidou, X., Büscher, M., Liegl, M. and Oliphant, R. (2016) [Emergency ethics, law, policy & IT innovation in crises](#). *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)* 8(1):1-24.

Liegl, M., Boden, A., Büscher, M., Oliphant, R., and X. Kerasidou (2016). '[Designing for Ethical Innovation: A Case Study on ELSI Co-Design in Emergency](#)'. *International Journal of Human-Computer Studies*. Available Online. DOI 10.1016/j.ijhcs.2016.04.003

Petersen, K., Büscher, M. (2016) [Mobile work in crisis](#). *Applied Mobilities* 1(2):176-192.

Pottebaum, J., Kuhnert, M., Schäfer, C., Behnke, D., Büscher, M., Petersen, K. and C. Wietfeld (2016). Common Information Space for Collaborative Emergency Management. In *Proceedings of the IEEE International Symposium on Technologies for Homeland Security 2016*, Boston, 2016.



- Büscher, M., Perng, S-Y., Liegl, M. (2015) Privacy, Security, Liberty: ICT in Crises. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)* 6(4): 72-92.
- Easton, C. and Büscher, M. (2015). The role of the privacy impact assessment in IT Innovation in Crises: An Example. Palen, Büscher, Comes & Hughes, (Eds.): *Proceedings of the ISCRAM 2015 Conference* - Kristiansand, May 24-27.
- Kerasidou, X., Büscher, M. & Liegl, M. (2015) Don't Drone? Negotiating Ethics of RPAS in Emergency Response in: Palen, Büscher, Comes & Hughes, (Eds.): *Proceedings of the ISCRAM 2015 Conference* - Kristiansand, May 24-27.
- Liegl, M., Oliphant R. & Büscher, M. (2015) Ethically Aware IT Design for Emergency Response: From Co-Design to ELSI Co-Design. In: Palen, Büscher, Comes & Hughes, Hrsg.: *Proceedings of the ISCRAM 2015 Conference* - Kristiansand, May 24-27.
- Perng, S-Y. & Büscher, M. (2015) Uncertainty and Transparency: Augmenting Modelling and Prediction for Crisis Response. In: Palen, Büscher, Comes & Hughes, Hrsg.: *Proceedings of the ISCRAM 2015 Conference* - Kristiansand, May 24-27.
- Petersen, K. and Büscher, M. (2015). Technology in Disaster Response and Management: Narratives of Ethical, Legal, and Social Issues. Palen, Büscher, Comes & Hughes, (Eds.): *Proceedings of the ISCRAM 2015 Conference* - Kristiansand, May 24-27.
- Petersen, K., Büscher, M. Kuhnert, M., Schneider, S., Pottebaum, J. (2015) Designing with Users: Co-Design for Innovation in Emergency Technologies. In: Palen, Büscher, Comes & Hughes, (Eds.): *Proceedings of the ISCRAM 2015 Conference* - Kristiansand, May 24-27.
- Büscher M., Liegl, M., 2014: Connected Communities in Crises. *IEEE STC Social Networking E-Letter* Vol.2 No.1 edited by Hermann Hellwagner, Daniela Pohl and Rene Kaiser. <http://stcsn.ieee.net/e-letter/vol-2-no-1>
- Büscher, M., Kuhnert, M., Pottebaum, J., Ahlsén, M., Easton, C., Van Veelen, B., Wietfeld, C. (2014). Cloud Ethics for Disaster Response. ELSI Track, *Proceedings of the ISCRAM Conference 2014*, 289-293. Available at http://idl.iscrum.org/files/buescher/2014/354_Buescher_etal2014.pdf
- Büscher, M., Liegl, M., Rizza, C. and Watson, H. (2014): How to do IT more carefully? Ethical, Legal and Social Issues (ELSI) in IT Supported Crisis Response and Management. Introduction to Special Issue.

4.3 Plans for further evolution

The ELSI guidance provides opportunity to create products, services, organizational and social innovations that support networked collaborations and new partnerships, including cross-border collaboration. By having access to standardized ELSI guidance, software developers, for example, can create cross-border software products, such as products developed to realise the SecInCoRe common information space concept, knowing about ethical, legal and social constraints and issues as well as opportunities. Therefore the development process is faster and by using the ELSI guidance the quality and beneficence of such products, as well as their social acceptability are actively supported and new training concepts for software developers arise. This decreases the scepticism of authorities of buying foreign software e.g. because they have a common reference point and basis for agreements. In addition, the risk that practitioners and citizens will mistrust/abandon the software is reduced. The Guidance also supports



deployment of software in different countries that work closely together, which provides easier communication. SecInCoRe demonstration cases include examples, such as a CBRN incident affecting several nations along a major river. First responder agencies of all Member States involved may have to exchange personal information in order to cooperate effectively. The ELSI Guidance describes the legal basis for such sharing and gives examples of how data can be shared lawfully (<http://www.isitethical.eu/lawful-conduct/data-protection-when-crossing-borders-2#examples>). This supports development of new business models and crisis management models based on the SecInCoRe CIS concept and identifies needs for further standardisation efforts.

Together with partners within SecInCoRe and other projects and initiatives, researchers at ULANC are exploring a range of different avenues to take the development of ELSI Guidance forwards. These activities include:

- Continued dialog and collaboration with practitioners and stakeholders to enhance the guidance in alignment with emerging needs and opportunities (through www.isitethical.eu, PSCE, BAPCO, KEMEA, the JRC and DRMKC and other networks and mechanisms)
- Collaboration with relevant parties to develop a Collaboration and Support Action that brings together the state of the art of ELSI Guidance efforts across Europe. Including, for example, efforts are made to develop guidance for the public sector at the Data School in Utrecht, disaster risk management practitioners and collaborative ICT managers and developers, ELSI-aware collaborative ICT development initiatives in other domains (such as Geospatial Data, Crisis Mapping). The aim of this CSA would be to scope out opportunities and develop a research roadmap to achieve a step-change in ELSI-reflexive innovation around collaborative ICT for DRM.
- Development of Guidance for Responsible Research and Innovation in DRM Innovation (for example specifying approaches to securing informed consent, enabling ethical impact assessment methodologies, supporting partitioner and public engagement, and research co-creation) to be incorporated into or set alongside the ELSI Guidance as it is hosted at PSCE, aiming to support research in this field.
- Development of an EU ELSI Guidance service hub that is led by a group of experts in collaboration with an advisory board drawn from practitioners and developers and takes the form of a community platform that produces (through crowdsourcing and dialog) live, lived, living ELSI Guidance for collaborative ICT design and use in DRM. This would seek collaboration from the JRC, DRMKC, the EDPS, and other European bodies.
- Ongoing scholarly publications and debate, involving the interdisciplinary community of researchers and practitioners that has evolved around the SecInCoRe project.



5 NEC concepts to manage communications interoperability

During the project duration, the following NEC concepts were addressed:

- Communications interoperability between PPDR organisations leveraging
 - legacy narrowband PMR systems based on Tetra or TetraPol technologies and
 - new broadband PMR systems based on technologies such as 3GPP (e.g. LTE) allowing to access to 3GPP Mission Critical Services (MCPTT, MCVideo, MCDATA) and to a large ecosystem of data applications
- The Seamless connectivity concept enables link aggregation for more robust and efficient communication by integrating the concept of Network Coding and MultiPatch TCP (MPTCP). Therefore, several communication technologies such as LTE and WiFi ad-hoc networks are used.

5.1 Standardisation efforts – processes, structures, activities

As part of the SecInCoRe project, the work performed in WP4 is described in D4.3, where we report details on the analysis, on the options and on the rationale to select the Mission Critical Services specified by the 3GPP since 2015. Then, D6.2 describes the status of the work done by 3GPP on the Mission Critical Services until April 2016, and D4.4 provides an update based on December 2016 status.

This section below provides:

- an update of the 3GPP works based on the April 2017 status;
- the 3GPP plan for the coming months in relation to the SecInCoRe topics;
- ETSI TCCE status (April 2017).

The Mission Critical Services interoperability is addressed by 3GPP, the ETSI TCCE but also by Airbus as part of the SecInCoRe project.

5.1.1 3GPP MCS Status

The focus of the 3GPP Release 13 (R13) related to Mission Critical Services was on MCPTT service definition. MCPTT specifications have been approved in March 2016 (stage 3 level).

The main focus of the 3GPP R14 at System Architecture Working Group 6 (SA6) level, in charge of Mission Critical Services specifications, was split in two categories:

Work items:

- MCPTT improvements (due to the fact that the work was not completed in R13);
- MCVideo definition;
- MCDATA definition.

Study Items:

- Study on Multimedia Broadcast and Multicast Service (MBMS) usage for mission critical communication services;
- Study into interconnections and migration between MCPTT systems;



- Feasibility Study on Mission Critical Communication Interworking between LTE and non-LTE LMR systems.

As a result of guidance provided by SA#73 (System Architecture Plenary meeting number 73 held in September 2016), prioritisation was applied to MCData and MCVideo by the end of 2016. As a consequence, study items (except MBMS) had low priority and could not be completed in R14 SA6 timeframe whereas the other items have been almost completed.

However, it was also agreed that the completion date for these studies could be moved to June 2017.

During the Plenary meeting SA#75 (March 2017), the SA6 report indicates that the work progress is the following for these two study items:

- Study into interconnections and migration between MCPTT systems : 60%;
- Feasibility Study on Mission Critical Communication Interworking between LTE and non-LTE LMR systems: 50%.

Airbus is a key contributor to Mission Critical Services in Working Groups SA1 (services requirements), SA6 (System Architecture for Mission Critical Services), SA3 (Security) and CT1 (protocols) at 3GPP.

5.1.2 ETSI TCCE Status

In parallel of the 3GPP MCS specifications, the ETSI TCCE (Tetra and Critical Communications Evolutions) is also working on specifications in order to ensure that the MCS implementations are compatible with end-user organisations needs and existing deployments.

As an example of this focus, the ETSI TCCE WG4 is currently working on a TR (Technical Report) dealing with the Tetra-MCS interworking following the principles described in the figure here below:

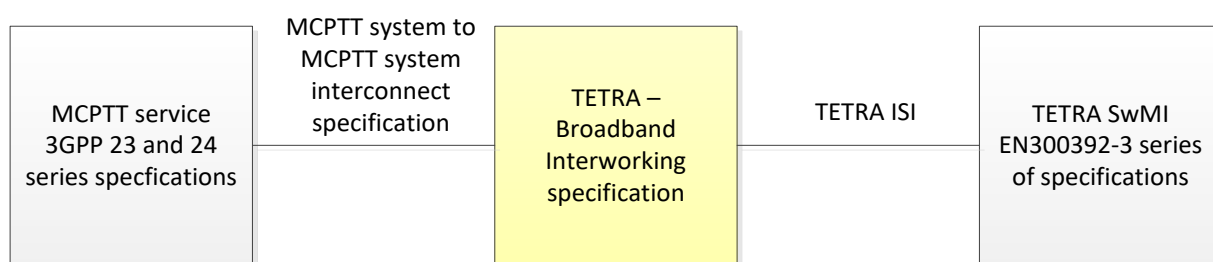


Figure 5 ETSI TCCE MCS-Tetra Interworking

The 3GPP MCS specifications cover the left part of the figure, but the interworking specification is handled by ETSI TCCE in addition to the right part of the figure.

ETSI TCCE WG4 expects to complete Technical Report by mid-2017.

Then an ETSI TCCE WG4 Technical Specification is expected in 2018.

Airbus is a key contributor on this topic at ETSI TCCE WG4. Airbus objective is to drive and ensure that the definition of these solutions fulfils the organisation requirements including at borders.

5.2 Dissemination to enable reuse

5.2.1 Communications interoperability

Even if the 3GPP and ETSI TCCE have a slower progress than initially expected on the MCS and legacy networks interworking specifications, Airbus is still actively working in advance of the standard. Therefore, without waiting for the availability of the full set of 3GPP specifications on this item, Airbus has started, in line with the current specifications, the design of a prototype of a gateway to bridge MCS services with PMR legacy services.



Figure 6 SecInCoRe Gateway bridges Legacy services and MCS services

The prototype of this gateway has been installed in the show room in Airbus premises and a demonstration has been developed that can be held during customer's visits. Moreover, an Airbus users group event gathering all customers was organized in March 2017, and the prototype of this gateway was part of the overall demo.

This demo was very well received by PPDR organisations and has generated interesting discussions related to the services which could be leveraged thanks to this gateway. It is also seen as a key enabler for some customers to start to deploy new services on BB networks (private or commercial) while ensuring service continuity and allowing interoperability with other PPDR organisations.

Airbus will continue to demo this prototype gateway during the coming months both during private or public events (e.g. next CCW in Hong-Kong).

5.2.2 Seamless connectivity concept

SecInCoRe partners have presented NEC components regarding seamless connectivity at manifold opportunities during the project's duration.

At the 1st review meeting, a concept for an ad-hoc communication network for fire brigades has been presented using the fire hoses as tool for extending the network range. Further investigations of different seamless connectivity concepts lead to development of a Multipath TCP (MPTCP) demonstrator in Year 2 (cf. Fig. Figure 7). The concepts behind have been presented to potential users at different advisory board meetings, getting a positive feedback, especially for the concept of RescueRoam, providing a holistic approach to ensure technical interoperability and enable collaboration of pan-European emergency services.

The seamless connectivity concept was refined in Year 3, integrating the novel concept

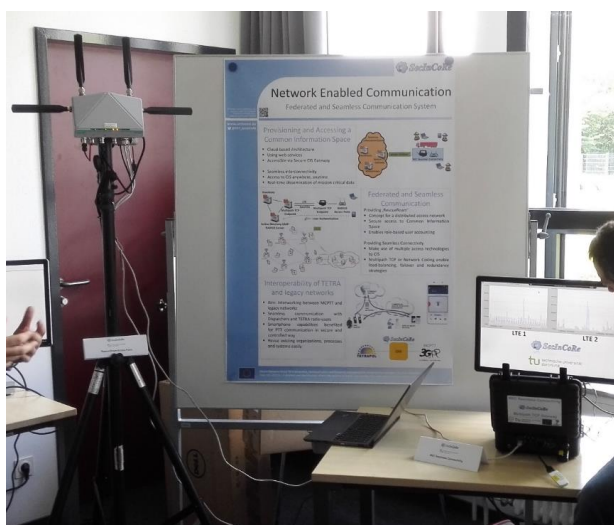


Figure 7 RescueRoam & Multipath TCP demonstration during 2nd review meeting



Figure 8 Network Coding setup during 3rd Advisory Board Meeting

of Network Coding to enhance robustness and efficiency of multipath network transmissions. A first demonstrator was presented at the 3rd advisory board meeting in Manchester. An enhanced demonstrator will be shown at the 3rd review meeting.

5.3 Plans for further evolution

5.3.1 Communications interoperability

In addition to the dissemination of the gateway prototype, Airbus plans to continue to invest by developing this solution in order to reach the level of a product integrated in the PMR solution portfolio e.g. by the addition of communication features and exploitation means.

These developments, as a key input, will have to take into account the 3GPP specifications once they will be available. Moreover, due to the different technologies used to deploy legacy PMR networks (Tetra, TetraPoI, P25), different vendor solutions, and the different interfaces which could be leveraged for each technology (analog, console interface, inter-network interface) will be explored; there is still a lot to do to support the full set of legacy capabilities from the standardised and unified Mission Critical Services side.



5.3.2 Seamless connectivity concept

In order to enhance and evolve the developed concepts, two publications have been prepared by the SecInCoRe team. The publication on “Cloud-based Semantic Services for Pan-European Emergency Preparation and Planning” is presented in April 2017 at the IEEE Systems Conference. In this work, the holistic idea of a Common Information Space as a socio-technical system is presented with introducing Network-enabled Communication as one part of the system.

TU Dortmund has prepared a publication regarding seamless connectivity with focus on Network Coding. The work “ScalaNC - Scalable heterogeneous link aggregation

enabled by Network Coding” is submitted to the IEEE Symposium on Wireless Communication Systems. In this publication, the scalable link aggregation architecture *ScalaNC* is introduced and evaluated in first experiments.



6 Outlook

The projects SECINCORE, EPISECC, SECTOR and REDIRNET have built up joint task forces in the last years in place such as ELSI and Taxonomy task forces. Based on these efforts new partnerships have emerged with these other research projects funded under the same theme SEC-2013.5.1-1. This has enabled joint work in the task forces, especially around the ELSI Guidance, but also the CEN workshop agreement TER-CDM, and also several joint events early 2017.

6.1 Joint Task-Forces

Within the last project year of SecInCoRe the collaboration within the different defined task forces were going on and lead to different initiatives:

- ELSI Task Force
 - Definition of ELSI guidance based on the work of SecInCoRe (lead of the task-force), EPISECC¹, SECTOR² and REDIRNET³ and with further collaboration with other projects, such as BRIDGE, ConCORDE, IMPRESS, Broadmap, SATORI, INSPIRE. A detailed description is in chapter 4
- Taxonomy Task Force
 - CEN Workshop “Terminologies in Crisis and Disaster Management” (WS TER-CDM) based on collaboration and discussion in the group of participants of the task force. Further information in section 6.2.2.

6.2 Joint activities and events

Based on joint activities, presented in the section before, different events and meeting are organised by the projects SECINCORE, EPISECC, SECTOR and REDIRNET, supporting the sustainability and common vision of a CIS.

6.2.1 CIS - Cluster of European Projects for Enhanced Interoperability in Brussels (28th of February, 2017)

Supported by the European Commission, the four project teams jointly decided to demonstrate the idea of a Common information Space during the joint event held on 28th of February 2017 in Brussels. During the Joint Event, they suggested possible approaches for its realization and collected feedback from organisations operating at the European level. The portfolio of concepts and related solutions was framed by presentations on joint activities, coordinated complementary concepts and specific solutions by the four projects.

The panel discussion identified possible approaches for establishing a Common Information Space for crisis management. Additionally, the panel concluded on the following future steps towards the adoption of a CIS:

¹ <https://www.episecc.eu/>

² <http://www.fp7-sector.eu/>

³ <http://www.redirnet.eu/>

- Create a community of stakeholders (starting from the 3 project advisory boards);
- Refine the requirements of stakeholders and give priority to regional ones;
- Demonstrate the common platforms to the stakeholder community and validate their impact using indicators and by listing the identified benefits to the users;
- Provide a business model to ensure viability of the PEIs and adoption of the platforms.

As a result of the first Joint event all projects are invited to the Community of User event in May 2017 to enable further discussions about the creation, adaption, use and sustainability of a CIS.



Figure 9 Pictures from the various presentations and panel discussion on the Joint Event in February 2017

6.2.2 CWA on terminologies in crisis and disaster management – Kick-off meeting

Language barriers and lack of common understanding in terminology and structure of the various national crisis management models hinder the collaboration, cooperation and information sharing across these borders. In order to face this challenge, an initiative for the development of a thesaurus for crisis and disaster management was started with the CEN Workshop “Terminologies in Crisis and Disaster Management” (WS TER-CDM). This is a joint initiative based on the starting discussions also in the taxonomy task force. The duration of this workshop will end in September 2017 with a publication of the results and agreements of the participants of the workshop. Chairman is Georg Neubauer from the EPISECC project and vice-chairman is Jens Pottebaum part of the SecInCoRe project.



6.2.3 PSCE / Standardisation Workshop in Munich (3rd of May, 2017)

An overall aim is to keep SecInCoRe outcomes sustainable and visible in the public. Therefore a cooperation with the PSCE was build up, to maintenance the ELSI guidance described also in D2.7 and visible at: www.isITethical.eu . The ELSI guidance results from the joint activities in the ELSI task-force and mainly work done within WP2. The open community platform including ELSI definition and guidance will be presented at the PSCE meeting on the 3rd of May 2017 from Monika Büscher. The community platform approach supports the concept of having live, lived and living guidance as described also in D2.7. The platform is also integrated in the SecInCoRe demonstration space to show relevance of the guidance as part of our CIS concept.

6.2.4 7th Event of CoU on Secure, Safe and Resilient societies in Brussels (17th of May, 2017)

Based on the first Joint Event in February 2017, the projects SECINCORE, EPISECC, SECTOR and REDIRNET get the chance to provide their concepts and outcome to a more user oriented community at the 7th Event of CoU on Secure, Safe and Resilient societies in Brussels. The current agenda leave space open to highlight the complementary approaches of each project, but also enable the presentation of common initiatives like the ELSI guidance. SecInCoRe will use the chance to have a demonstration of a “Cloud based Common Information Space for smart planning and training” as one outcome of SecInCoRe.

6.3 Conclusion

The four projects dealing with the idea of a common information space, demonstrates in the past events various complementary approaches (e.g. NEC, taxonomy, inventory) but also similarities in the joint activities. Consequently, SecInCoRe will go on in the cooperation with these projects to use best possible ways for demonstrating and highlighting the outcomes of SecInCoRe to a broader audience and use the synergies coming up in these topics.