**D5.3 – Public**

![DARWIN logo](image)

**Expecting the unexpected and knowing how to respond**

Adapt to Survive

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**DARWIN Community of Practitioners (DCoP) workshop resilience concepts, users and academia interactive workshops (WS2)**

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**ABSTRACT**

The DARWIN project aims to develop state of the art resilience guidelines and innovative training modules for crisis management. The guidelines, which will evolve to accommodate the changing nature of crises, are developed for those with responsibility of protecting the population or critical infrastructure/services from policy to practice.

The aim of this deliverable is to describe the process and results of the 2\textsuperscript{nd} DARWIN Community of Practitioners workshop (DCoP WS2, held 28th – 29th of March 2017 in Linköping, Sweden). The purpose of the workshop was to facilitate the interaction and co-creation of DARWIN Resilience Management Guidelines (DRMG) with stakeholders involved in crisis management at different levels from policy to practice. This report describes how the interactive workshop contributed to the creation of the guidelines through participants’ critical view and enhancement on the operationalization and deployment of the DRMG. Target audience readers e.g. practitioner (industry, government, NGOs) and academia interested in resilience and crisis management can use this document as a body of knowledge on experiences relevant for resilience and crisis management. Readers from the DARWIN project can use feedback provided by DCoP members as means to increase relevance and usefulness of project results in terms of addressing needs concerning resilience management. DCoP WS2 provided the following content and insights:

- The DARWIN project contribution to resilience in crisis management.
- How to assess brittleness and sources of resilience
- Input for concept cards adaptation.
- Group work on evaluation of the guidelines focusing on collaboration.
- Responses on DARWIN Wikipedia and additional useful guideline format.
- Feedback for the adaption of training to the scenarios envisaged for the pilot trials.
- Description of the variety of domains and experiences represented within the community.
- Things to improve and things to keep for organizing next interactive workshop.

The DARWIN team acknowledge the valuable contribution provided by DCoP participants to the workshop.

**KEYWORDS:** Resilience, Resilience Engineering, Crisis Management, Interactive, Workshop, End-users; Practitioners

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D5.3—DARWIN DCoP resilience concepts, users and academia interactive workshops

The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.

Release history

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D5.3— DARWIN DCoP resilience concepts, users and academia interactive workshops

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The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.
Executive Summary

The aim of this deliverable is to describe the preparation, execution and results of the Community of Crisis and Resilience Practitioners second interactive workshop (DCoP) held in March 2017 in Linköping, Sweden. The purpose of the workshop was to facilitate the interaction and co-creation of DARWIN Resilience Management Guidelines (DRMG) with stakeholders involved in crisis management at different levels from policy to practice. This report will describe how the interactive workshop contributes to the creation of the guidelines through participants’ critical view and enhancement on the operationalization and deployment of the DRMG. Practitioners involved in issues related to resilience within different countries, disciplines and at different levels, such as: policy makers, managers, NGO, service providers and first responders participated. The stakeholder analysis illustrates a DCoP composition that represents a diversity of different critical infrastructures, types of stakeholders from varied organisations with different functions (frontline operator to policy officer) on different levels (European to local and private/other) from 13 different countries. A majority of them considers that it is essential that concepts and practices, examples, hands-on application, and resilience concepts and practices across agencies should be included in training packages.

Adaptable resilience concepts were identified during the workshop and fundamental actions were: To have a clear understanding of involved actors’ responsibilities and interdependencies between the organizations that may be jointly involved in managing a crisis. Establish networks for promoting inter-organizational collaboration paves the way for more effective collaboration and communication (e.g. establish a common language and goals) during crisis across organizations. If roles and responsibilities have been identified and networks have been established prior to a crisis, the resilience will increase. In order to achieve this, repetitive cross-organizational dissemination exercises and/or workshops have to be implemented both before and after a crisis. This will increase organizations mutual awareness, perspectives, terminologies and working practices. After a crisis it will further facilitate a mutual analysis of the situation in order to improve procedures for future crisis.

DCoP members were very positive on the use of DARWIN wiki-type application for resilience management guidelines. However, specific formats were considered more suitable than other depending on e.g. functions and types of stakeholders. Web application and paper copy were for example considered more suitable for crisis managers and community leaders, whereas frontline operative personnel preferred a mobile app and a field manual.

A strategic, adaptive and timely response to crisis can be achieved if planning and prevention activities have existed prior the crisis. The guidelines will ease to recognise the complexity between different actors and interactions in the system with the result of more resilient response actions, at all levels.

About the project: The DARWIN project aims to develop state of the art resilience guidelines and innovative training modules for crisis management. The guidelines, which will evolve to accommodate the changing nature of crises, are developed for those with the responsibility of protecting population or critical services from policy to practice. The guidelines address the following resilience capabilities and key areas:

- Capability to anticipate
  - Mapping possible interdependencies
  - Build skills to notice patterns using visualisations
- Capability to monitor
  - Identify resilience related indicators, addressing potential for cascade
  - Establish indicators that are used and continuously updated
- Capability to respond and adapt (readiness to responds to the expected and the unexpected)
  - Conduct a set of pilot studies
  - Investigate successful strategies for resilient responses
- Capability to learn and evolve
  - Explore how multiple actors and stakeholders operate in rapidly changing environments
  - Enable cross-domain learning on complex events
- Key areas: social media and crisis communication; living and user-centred guidelines; continuous evaluation and serious gaming
1 Introduction

1.1 Purpose of the document

The aim of this deliverable is to describe the process behind and the results of the interactive DCoP workshop. The goal of DCoP WS2 was to facilitate the interaction and co-creation of DARWIN Resilience Management Guidelines (DRMG) with stakeholders involved in crisis management at different levels from policy to practice. This report will describe how the interactive workshop, containing a training phase, and an exploratory phase procured feedback from the participants and thus contributed to the creation of the guidelines though participants’ critical view and enhancement on the operationalization and deployment of the DRMG. Results from discussions how resilience guidelines will enhance the ability to sustain operations (prior, during and after the event) are also presented.

The main outcome of the workshop were the participants’ critical view and enhancement on the operationalization and deployment of the DRMG. DCoP WS2 involved a wide collaboration of DARWIN’s end user stakeholders including those directly involved in crisis and disaster management, policy makers, service providers, managers, first responders and the public.

DRMG consists of a set of principles, methods, practices and strategies to aid organizations in the creation, assessment or improvement of their own guidelines. Based on resilience management concepts, the guidelines help the organization in developing a critical view of its own crisis management activities. They are intended to complement existing guidelines, procedures and practices already present in an organization.

The development of the DRMG requires interaction and co-creation with stakeholders involved in crisis management at different levels from policy to practice. Thus, the purpose of DCoP WS2 was to enable workshop participants to explore, and contribute to the creation of the guidelines. Feedback and engagement in the development of the guidelines from end-users on the evolving DARWIN Resilience Management Guidelines, will consequently contribute to enhancing EU responses to crises.

1.2 Intended readership

The intended readership is actors that are interested in issues concerning crisis management, e.g. crisis response practitioners from safety- and security-critical complex domains to research communities involved in various aspects of resilience and crisis management research and application. The project partners of DARWIN benefit from a wider collaboration of DARWIN’s end user stakeholders including those directly involved in crisis and disaster management, policy makers, service providers and managers. Additional readerships are academia and research establishments interested in bringing forward DARWIN solutions.

1.3 Structure of this document

Chapter 1 gives a brief introduction to the DARWIN project in order to give the context of the deliverable as well as to describe its relationship to other deliverables in the project. Chapter 2 describe the background with objectives, and planning, preparation and implementation. The main part of this deliverable is chapter 3, which describe the result of the second DCoP Workshop, followed by the Evaluation (chapter 4) and the Conclusion (chapter 5).

1.4 Stakeholder involvement

DCoP WS2 aimed to provide face-to-face interaction between DARWIN project members, Air Traffic Management, Healthcare and stakeholders representing other critical infrastructures. The initial intention was the DCoP members to provide advice and feedback to the developments. In reality, the DCoP members have become co-creators of DARWIN developments. Through use of innovation games and unorthodox approaches, we have been able to unleash people thinking. We managed to have good engagement where collaboration happens when diverse people interact. Representatives from different CI’s, nationalities and from policy to practice have been gathered in DCoP WS2 (more details on participants are included in Section 2.2).
1.5 Relation to other projects and initiatives

Representatives from other initiatives have been involved in the 2nd workshop:

- Creating Collaborative Resilience Awareness, Analysis and Action for the Finance, Food and Fuel System in INteractive Games (CCRAAAFFFTING 2017-2020, Swedish project financed by the Swedish Civil Contingencies Agency). The project coordinator participated in the workshop. Linköping University (DARWIN member) participated in this project and Ivonne Herrera is in advisory committee of this group. The relation is CCRAAAFFFTING project to take advantages and build on knowledge already gathered within DARWIN.

- Training for Operational Resilience Capabilities (TORC, 2014-2016, European project funded by SAFERA). SINTEF coordinated this project. The training game concept developed within TORC is considered as element within DARWIN. A small experiment of TORC was conducted during DARWIN 2nd workshop.

- Collaboration with other DRS-7 project: a representative from Smart Mature Resilience (SMR) who also participates in the 100 resilient cities participated in the 2nd workshop. This participation allows identifying complementarities among DRS-7 projects.

- Considering standardisation work, DARWIN builds on existing and ongoing standardisation activities. In particular, current developments in the CEN/TC 391 working group addressing Crisis Management – Guidance for developing a strategic capability was used during the workshop.

1.6 Inputs and relationship with other deliverables

The DCoP workshop results are the main input to this deliverable, but in order to reach these results the main contributions and input to this deliverable were the following project deliverables:

- **D1.1 - Consolidation of resilience concepts and practices for crisis management**: This deliverable presents a collection of needs, issues, and definitions in relation to resilience management which D1.3 has used as input to the formulation of requirements.

- **D1.2 - Evaluation and selection of resilience concepts and approaches**: This deliverable gives two main inputs to the current deliverable:
  1. A set of criteria for evaluating concepts, approaches and practices in relation to their appropriateness which D1.3 has taken as input to the formulation of requirements;
  2. A set of the most appropriate concepts, approaches and practices for incorporation in resilience management guidelines, prioritized according to their level of importance (building on D1.1).

- **D1.3 - Practitioner and academic requirements for resilience management guidelines**: Requirements for resilience guidelines developed within this project.

- **D2.1 - Generic Resilience Management Guidelines**: The most promising concepts and methods adapted to manage crisis.

- **D3.1 - Process and tools for easy access of guidelines**: Ensures easy access to the guidelines.


- **D5.1 - DCoP Terms of reference and collaboration**: Defines and sets the collaboration strategy, procedures to invite, share knowledge and work in an innovative and open manner.

- **D6.1 - Dissemination**: Effective dissemination is critical to the long-term impact of DARWIN results and the resilience guidelines.
D5.3—DARWIN DCoP resilience concepts, users and academia interactive workshops

1.7 Addressing DARWIN D1.3 requirements

The following table (Table1) presents the requirements that have been identified as relevant for this deliverable, and how they are addressed.

Table 1: DARWIN Requirements

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<th>Means of compliance/how requirement is addressed in this deliverable</th>
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<td>DR-001</td>
<td>The DRMG should be presented in a form that is understandable for the target users</td>
<td>Format questions from WP3 were included in the WP5 Survey performed after DCoP WS2</td>
<td>Achieved</td>
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<tr>
<td>DR-005</td>
<td>The DRMG should be presented in a way that takes the target users' context into account</td>
<td>Format questions from WP3 were included in the WP5 Survey performed after DCoP WS2</td>
<td>Achieved</td>
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<tr>
<td>DR-020</td>
<td>The DRMG should address specific users</td>
<td>Stakeholder analysis prepared by WP2 was conducted in advanced to DCoP WS2</td>
<td>Achieved</td>
</tr>
<tr>
<td>DR-021</td>
<td>The DRMG target users are policy-making (European, national, regional, organisational), managerial, and operational roles, at infrastructure operators, service providers and related stakeholders, who have responsibility for critical infrastructures that might be affected by a crisis, as well as the public (community members, municipalities, voluntary services, and other recognised services and legal entities that can act by mandate) and media (regarding communication to general public during response, use of social media, and mass communication)</td>
<td>Different stakeholders having responsibility for CI affected by crisis as well as NGO participated in DCoP WS2. Media was not covered by the 2nd workshop.</td>
<td>Partially achieved</td>
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<td>DR-022</td>
<td>The DRMG should be adapted to specific domains (health care and ATM), including guidelines for its application</td>
<td>Consortium members and DCoP participants represent health care, ATM as well as other domains</td>
<td>Achieved</td>
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<td>DR-113</td>
<td>The development of the DRMG should consider the context of the users</td>
<td>DCoP participants to the 2nd workshop shared their context and needs for development of DRMG</td>
<td>Achieved</td>
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<td>DR-114</td>
<td>The development of the DRMG should consider enablers and barriers for the users’ implementation and application of the DRMG</td>
<td>Stakeholder analysis prepared by WP2 was conducted in advanced to DCoP workshop</td>
<td>Achieved</td>
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1.8 Acronyms and abbreviations

Table 2: List of definitions

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<thead>
<tr>
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<th>Explanation</th>
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<tr>
<td>DARWIN Resilience Management Guidelines</td>
<td>Help or advice for DARWIN Resilience Management Guideline users to recognise or improve resilient performance (from the definition of “guidance”, Merriam-Webster Online Dictionary)</td>
</tr>
<tr>
<td>DRS-7</td>
<td>Topic ID for the call behind this project. Full name of call is &quot;Disaster-resilience: safeguarding and securing society, including adapting to climate change&quot;. Full name of topic 7 is &quot;Crisis and disaster resilience – operationalizing resilience concepts&quot;. There are five Horizon 2020 projects financed under this topic (DARWIN, IMPROVER, RESILIENS, RESOLUTE, SMR)</td>
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<td>Incident</td>
<td>Situation that might be, or could lead to, a disruption, loss, emergency or crisis (ISO 223000:2012)</td>
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<tr>
<td>Resilience</td>
<td>The ability to resist, absorb, accommodate to and recover from the effects of disturbances and changes in a timely and efficient manner, including through adaptation and restoration of basic structures and functions (adapted from UNISDR, 2009; Hollnagel, 2011)</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity. A decision maker can be an stakeholder (ISO 31000:2009)</td>
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Table 3: List of acronyms and abbreviations

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<td>DCoP</td>
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<td>DCoP WS2</td>
<td>The 2nd DCoP workshop (held in held 28th – 29th of March 2017 in Linköping, Sweden)</td>
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<td>CI</td>
<td>Critical Infrastructure stakeholders</td>
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<td>DRMG</td>
<td>DARWIN Resilience Management Guidelines (DRMG)</td>
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<td>ATM</td>
<td>Air Traffic Management</td>
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<td>CC</td>
<td>Concept Card</td>
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1 This is a working definition, which may be updated during the DARWIN project.
2 This is a working definition, based on the DoA definition and a common definition in Resilience Engineering. As a working definition it may be updated during the DARWIN project.
2 Background

2.1 Objectives
The purpose of DCoP WS2 is to ensure that the development of the DARWIN Resilience Management Guidelines (DRMG) takes into account the needs and priorities of practitioners in resilience and crisis management.

2.1.1 Scope of DCoP WS2
DCoP WS2 focused on the co-creation of the guidelines. Specific case studies, stories and practical examples were presented and discussed with the participants to investigate how resilience guidelines will enhance the ability to sustain operations. It considered all crisis phases prior, during and after the event. The workshop contained a training phase, an exploratory phase and a phase involving feedback from potential end-users. The 1st DARWIN workshop addressed the overall scope of the project whereas DCoP WS2 focused on different aspects concerning development of the guidelines.

2.1.2 Deliverable of the workshop
The main outcome of DCoP WS2 was the participants’ critical view and enhancement on the operationalization and deployment of the DRMG.

2.1.3 Take away – End users
Participants at the workshop received updates on the most recent research on resilience concepts and the development of the DRMG. Participants also had the opportunity to make sure their priorities and needs were met when it comes to the development of the DRMG. DCoP WS2 facilitated exchange of knowledge, insights, expertise and lessons learnt for practitioners and researchers, and thus promoted international networking concerning resilience aspects.

2.2 Planning, preparation and implementation

2.2.1 Content, setup and innovation game
The agenda (Appendix 1) was set up in order to obtain input and feedback on the on-going work on the DRMG. The agenda was therefore scheduled to ensure this need. The program covered a short presentation of the DARWIN project’s scope and an introduction to resilience in crisis management. This served as an introduction to all workshop participants on the focus and objective of the workshop.

The sessions presented below were in some cases elaborated and followed by round table discussions in different groups, each with approximately 8-10 participants. Some discussions took place across all workshop participants. Each group then presented their ideas in response to the questions and posted them on a flat working surface visible to everyone following the discussions. Each group was also assigned a facilitator and a note taker.

Sessions for DCoP Workshop
An initial agenda was prepared; by the end of first day the participants expressed their wish to have more time for discussion. The flexible agenda was updated to align more time for evaluation of guidelines and feedback. Therefore, the format session was covered by a questionnaire.

- Participants’ introduction using a game, to create thrust and collaborative environment.
- Introduction to resilience in crisis management
- Overview of guidelines
- Adaptation of the guidelines to specific domain
- Training for Resilience Capabilities
- Analysis and group work evaluation of guidelines
D5.3– DARWIN CoCRP resilience concepts, users and academia interactive workshops

- Diverse representation and evaluation of guidelines (covered by questionnaire)
- Open space – Training for resilience capabilities experiment (TORC)
- Open space – Presentations of learning across Cis, domains, and agencies participating in the DCoP
- Closing up and summary

2.2.2 Target audience and participants

The workshop invitation (see Appendix 2) was sent to members of the DCoP and other relevant end-users that are involved in disaster management, policy makers, service providers, managers and first responders. Participants’ attendance at DCoP WS2 was from a variety of different disciplines and countries, and from a diversity of levels and responsibilities, e.g. from USA, Israel, Italy, Sweden, Germany, Norway, Kosovo, Ireland, France, Denmark, and Spain and from a broad spectrum of organisations and specialities such as: ATC Supervisor and safety assessor, Director of Galicia Medical Emergency Service, Chairman for National Council for Trauma and Emergency Medicine, Assistant professor in information systems, Secretary of the Technical Task Force, Water & Wastewater Manager, Chief Surgeon, Medical Doctor, Paramedic Nurse, Research coordinator, Researcher, Civil protection officer, Lead Calpine’s human performance program, Nurse Specialist in Prehospital Emergency Care (Appendix 3).

3 Result

Notes were taken during every workshop session. After the workshop, the notes were gathered and summarised by each table top group note taker and facilitator. The results from DCoP WS2 are summarised below.

3.1 Resilience in crisis management

The resilience contribution to crisis management in the DARWIN project and how the project can improve the ability of stakeholders to anticipate, monitor, respond, adapt, learn and evolve, to operate efficiently in the face of crises was also introduced. Why it is essential to e.g. evaluate the linear thinking and needs and expect the unexpected and to know how to respond was also presented. The value of the project was likewise pronounced, such as:

- Developments validated with practitioners from CIs (i.e. aviation, healthcare, water, energy, water, and railway).
- DARWIN Resilience Management Guidelines (DRMG) are guiding principles to advice CI stakeholders in the creation/assessment/improvement of its own guidelines/procedures/practices.
- DRMGs a combination of concepts cards in developing a critical view on its own crisis management activities based on resilience management concepts.
- Training modules resilience concepts in action, innovation and involve (or be addressed to serious games and simulations).

A selection of what was presented in short:
The complexity between different actors and interactions in the system also has to be better recognised.

If the CI stakeholders are involved in the creation/assessment/improvement of its own guidelines/procedures/practices the guidelines become more relevant and usable for different groups.

Resilience can be focused on in 3 different phases of an event; how to handle changes, disturbances and opportunities and thereby sustain required operations under both expected and unexpected conditions;

- Graceful extensibility
- Sustain adaptability
- Community resilience and the human dynamic of crisis situations
- Intercultural issues

The new crisis definition: “Any event or situation that threatens an organisation and requires a strategic, adaptive and timely response in order to preserve its viability and integrity”. (On-going work Standardisation CEN Working Group 3-TC391)

Resilience management aim: to “create, maintain and facilitate”

Risk management aim: to “avoid, protect and compensate”.

This indicates that Risk management focuses more on present issues whereas Resilience management is to be understood forehand. The two aspects are however intimately linked.

Comments and reflections:

➢ Risk management system need to involve a lot of people (i.e. when you involve citizens you need a secure communication system.

➢ Some organizations and authorities are too focused on either risk- or resilience. NASA for example focusses on risk management but not on resilience management. This leaves the system vulnerable.

➢ Early warning systems: can work both in risk management and resilience management (when it is used in different unexpected situations).
3.2 DARWIN Resilience Management Guidelines (DRMG)

DARWIN Resilience Management Guidelines (DRMG) are guiding principles to advice Critical Infrastructures stakeholders (CI) in the creation/assessment/improvement of its own guidelines/procedures/practices. DRMGs a combination of concepts cards in developing a critical view on its own crisis management activities (management of resources, procedures, training, etc.) based on resilience management concepts. The generic DRMG will be validated by practitioners from different domains (i.e. oil & gas, water, energy, water, railway, Air Traffic Management (ATM), Health care) and subsequently adapted to the ATM and Health Care domain. The process of the development of the DRMG and the three core elements is described;

- Concept cards (CC): Initial approximately 60 abilities and capabilities how to build resilience was mapped.
- The DRMG map: Themes and topics of DRMG was organised in a roadmap.
- DARWIN Wikipedia: Development of and access to structured DRMG content.

3.2.1 Assessing resilience

The focus on assessing resilience (brittleness, sources of resilience) is illustrated by a fire fighting example (Appendix 4). The participants discuss in pairs/small groups if the system is resilient and/or brittleness and how resilience can be observed with support of following questions:

- How do you identify resilient performance?
- How do you notice brittleness?
- What should you focus on?
- What activities can be implemented?
- What does exist in your organisation already?

Case discussion:

The coordination of operations has to be external. The incident commander (IC) is the first who enters in the building; instead he needs to have an overview picture. The IC performs the right things, but late. It is necessary that someone else fulfils his role.

Different actors have conflicting goals. Some have the priority to save lives as fast as possible, others to get water and ventilating the house. There is a problem when you don’t share the same overall view of the situation. Sharing goal and interest is important, such the need for good leadership. In the scenario it seems that the goal for the “ladder group” was to get in as fast as possible to save people but they didn’t realize that the water made their effort contra productive and actually put more people in danger (themselves as well). Everybody’s main goal is reduce losses but since everyone is too focused on their own practical task the chance to achieve goal reduces. In the evaluating procedures, risk assessment should highlight the risk not to have water in time and an update on procedures. The system needs to be capable to bounce, since unexpected situations arise. Debrief after the event is key in order to improve (Table 4).

<table>
<thead>
<tr>
<th>Brittle</th>
<th>Resilient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everything collapses when one thing doesn’t work</td>
<td>Declaration of “All hands” – plan B</td>
</tr>
<tr>
<td>Lack of communication and coordination</td>
<td></td>
</tr>
<tr>
<td>Absence of escape routes</td>
<td></td>
</tr>
<tr>
<td>Too tactical, not enough strategy</td>
<td></td>
</tr>
<tr>
<td>Lack of professionalism/education</td>
<td></td>
</tr>
<tr>
<td>Deficient teamwork</td>
<td></td>
</tr>
<tr>
<td>Absence of knowledge/understanding of the other teams tasks</td>
<td></td>
</tr>
</tbody>
</table>

This exercise (see Figure 2-3) resulted also in discussions concerning how resilience and be accomplished and why brittleness occurs in general:
How to achieve and/or increase resilience:

- Learn from the experience. Process for analysis, learning and debriefing.
- A good plan is needed before something happens.
- The importance of resources.
- Additional routines to respond.
- Satisfactory coordination.
- Identification of boundaries.
- Orchestrating as the situation evolves. Resilience consists in changing the current way of thinking and operating. Adapt the situation accordingly.
- Activities from everyday situation to prepare strategic framework.
- Lessons learned within an organization.
- Awareness on how the system handles cascade effects.
- If there are guidelines that are clear and easy with an adaptive capacity.
- Initiative capabilities.
- Good leadership.
- Structure and rules to cope with the crisis are needed. The balance between rules/structures and instinct is yet difficult to achieve.
- Training plans and repetitive (collaborative) exercises and education on risk analysis and assessment.
- Resilience means not only to adapt but also to build back better in order to change the system.
- Resilience is achieved if the environment allows people to make decision “out of the frame”.
- Availability of relevant equipment.
- There are mechanisms in place for cooperation between regions to share resources.
- Engagement of several organisations, local community, volunteers etc.
- Functional and effective dissemination of information to public.

- Britteness is when there exist: Lack of coordination.
- No structure within an organization.
- Inadequate structures and rules within an organization.
- No proactive philosophy.
- Lack of resources.
- Lack of options.
- Deficiency of supplementary routines.
- No identification of when a situation is reaching boundaries.
- Determine by decision despite evolving situation. Unwillingness of change the current way of thinking and operating.
- Absence of strategic framework.
- Lessons only observed.
- No awareness on how the system handles cascade effects.
- Unclear and to complex guidelines which are not adaptive.
- Different teams and countries may have different agreements rules which make guidelines useless.
- Lack of training and (collaborative) exercises and education on risk analysis and assessment.

Final remarks:

- Resilience may represent different things for different organization and/or countries. For some, a very well structured organization result in a decrease in resilience. It is not resilient to give people the possibility to act in a flexible way, yet it may be the opposite of some other organisations. It depends on the type of organization, its characteristics. Improved procedures can prepare a community on how to be resilient; nonetheless, it may be difficult to find a balance between procedures and effective ones.
- Training and exercises is important, however we need to find ways on how to cope with the unexpected. Usually training is focused on known situations. How do we plan for eventual events – eventual procedures? How do we know what the eventualities are? How do you motivate the work?
- Pro-active coordination activities improve the ability to shift the authority/responsibility among the other actors involved during a crisis.
Example from one attack in London during a major incident was that you should not improvise too much and try to hold onto procedures according to major incident. At this specific incident personnel were not hanging onto the plan, and thus, they were running to the site. This resulted in lack of people at the nearest hospital.
3.2.2 Adaptation of guidelines to specific domain

During the session the process (Figure 4-6) how the generic resilience management guidelines (DRMG) are going to be adapted to the healthcare and ATM domain by:

- Identify adaptable priority resilience concepts
- Translate into operating practices and procedures specific to healthcare and ATM
- The approach relies on user feedback to validate a viable and optimal process

The goal is to adapt the DRMG to healthcare and ATM domains. This is done via SWOT-analysis to collect/create adaptable concept cards. The analysis gives an output of non-adaptable & adaptable concept cards which are adapted. Once a concept card is considered adaptable you start adaptation. The first step is interview of a panel of experts (ENAV & ISS/KMC) as an initial evaluation of the guidelines. After this the release of the first version of concept cards which are tested in pilot cases for review and consolidation. After this the final version of the concept cards are released. These guidelines are constantly evolving and the work being done here during these days in Linköping is also helping the evolution of the Concept Cards.

During the process some strengths and challenges have been identified:

**Figure 4-6: The adaptation process**
D5.3– DARWIN CoCRP resilience concepts, users and academia interactive workshops

Strengths

- Set up of *ad hoc* methodology for the “adaptability” assessment
- Collection of useful inputs also for the DRMG improvement
- Fruitful involvement of domain experts in the adaptation process
- Cross-fertilization between ATM and healthcare domains

Challenges

- Involvement of the domain experts
- Merge of different cultural perspectives (for instance, the Swedish and Italian approaches to healthcare)
- Coping with different sectors within the healthcare domain
- Synchronization with T2.1 (Development of generic resilience management guidelines) and T4.2 (Implementation of Pilot cases)

3.2.3 Concept Cards adaptation

During the workshop, DCoP members gave feedback for concept cards adaptation by answering questions related to different concept cards;

- Concept description
- Type of crisis
  - According to your own experience, list the 3 actions that you consider relevant:
    - Before crisis
    - During crisis
    - After crisis
- List useful methods/practices that support the concept
- List useful tools that support the concept

DCoP members’ feedback (some of them) for concept cards adaption on the following concept cards are summarized on the forthcoming pages.

- DR-27: “Ensure that the actors involved in resilience management have a clear understanding of their responsibilities and the responsibilities of other involved actors”
- DR-30: “Establish networks for promoting inter-organizational collaboration”
- DR-46: “Adaptation relative to both expected and unexpected events (all-hazard approach)”
- DR-47: “Ensure sufficient flexibility relative to plans and procedures”
- DR-77: “Promoting common ground in cross-organizational collaboration in crisis management
- DR-83-A: “Identifying sources of brittleness to invest in their correction”
- DR-85: “Systematic management of policies involving policy-makers and operational personnel for dealing with emergencies and disruptions”
**DR-27 Concept:** “Ensure that the actors involved in resilience management have a clear understanding of their responsibilities and the responsibilities of other involved actors”

*This includes knowing what resources, plans, experiences and expertise the involved actors have. The objective is to identify gaps and cooperate before, during and after a crisis. Actors should understand their own and other’s roles so that effective actions are taken.*

<table>
<thead>
<tr>
<th>Domain</th>
<th>ATM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of crisis</td>
<td>Aircraft emergency or accident</td>
</tr>
</tbody>
</table>

**Actions relevant BEFORE CRISIS:**

- Training for emergency event
- Establish communication channels with all actors during a crisis
- Define a contingency plan for operation, staffing
- Existence of a guide manual to manage the event. It is agreed by all relevant actors. It has to highlight the difference between the operational context and the official scenario focusing on clear coordination links and scope of responsibilities between actors that manage the crisis operationally and “institutionally”.
- Existence of a “schedule” at single actor’s level, in order to guarantee the periodic verification of procedures that are in the manual and possibly their update.
- Existence of a “schedule” between actors that are operationally and institutionally involved in order to verify and possibly update manuals taking into account the results of the procedures verification activity.

**Actions relevant DURING CRISIS:**

- Correct information
- Good communication between actors in a crisis
- The organization should offer autonomy
- involved personnel should detect immediately the level of gravity of the event and the right procedure to use
- immediate detection of roles and responsibilities especially those related to coordination between different actors
- maintenance of acceptable level of stress for the involved operational personnel, possibly providing supplementary support units

**Actions relevant AFTER CRISIS:**

- possibility to tell, debriefing
- Collect "what went well?"
• “How do we (organization) regain trust?”
• Focus on strength, not weakness (if only…)
• Management of “fatigue reduction” of involved personnel
• Management of restore the conditions pre-crisis/normal operations
• Collection of functional data and careful analysis of post-event

DR-30 Concept: “Establish networks for promoting inter-organizational collaboration”

The identification of relevant stakeholder organisations prior to a crisis and cultivating positive relationships with these is extremely important for successful crisis response. Establishing pre-crisis relationships among the organizations that may be jointly involved in managing a crisis paves the way for more effective collaboration and communication during crisis and post crisis responses.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Water &amp; wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>type of crisis</td>
<td>Water pollution / failure in water treatment</td>
</tr>
</tbody>
</table>

Actions relevant BEFORE CRISIS:
- know who the stakeholders are or that could be impacted (**)
- know what are the interdependencies between you and the stakeholders(**)
- know the limits of the existing infrastructure and how interconnection work
- running exercises with some of the external stakeholders at regular intervals helps, everyone understands what their roles are and it helps to eliminate any clashes in crisis procedure that may exists in the different organizations

Actions relevant DURING CRISIS:
- what is the nature of the crisis/what is impacted/can it be contained
- what assets/staff have we available to deal with the crisis
- establish timelines to firstly control the crisis and secondly to revert to a normal status
- we have to inform our environmental regulator and our financial regulator so they can monitor & report on any breaches in our regulatory requirements

Actions relevant AFTER CRISIS:
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- workshop the incident with the operational staff & management & other stakeholders
- prepare a post incident review report/highlight both good and bad
- recommend any changes to procedures, based on the post incident review

Useful methods and/or practices that support the concept above

- Carry out exercises with the inter-organizational stakeholders. They get to see how they deal with a crisis and you get to see how they do, long before there is a crisis

Useful tools that support the concept above

- We use internal policy documents in the event of an incident

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Concept Card Adaptation

**DR-46 Concept:** “Adaptation relative to both expected and unexpected events (all-hazard approach)”

Organizations need to ensure that roles, processes, training in place support their capacity to adapt to both expected and unexpected situations. Emergency response plans do not guide a specific action in a specific event. The “thinking process” prepares the relevant actors with a framework for action rather than a blueprint for action. The “framework for action” needs to be periodically verified through monitoring and control activities.

<table>
<thead>
<tr>
<th>Domain</th>
<th>ATM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of crisis</td>
<td>Aircraft accident</td>
</tr>
</tbody>
</table>

**Actions relevant BEFORE CRISIS:**

- identify all the stakeholders even if involved once in crises
- create informal relationship next to formal meeting
- know how other stakeholders work

**Actions relevant DURING CRISIS:**

- respect defined roles
- any stakeholder connected by the same means share the big picture of what is happening

**Actions relevant AFTER CRISIS:**

- verify what went wrong
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- verify if every stakeholder were involved or missed
- verify if the big picture was ok or something missed

**Useful methods and/or practices that support the concept above**

- Workshop

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**Concept Card Adaptation**

**DR-47 Concept:** “Ensure sufficient flexibility relative to plans and procedures”

Resilience is positioned in complement to plans and procedures. Plans and procedures often are not fully useful and have to be used as “skeletons” to base actions on rather than as comprehensive and accurate guides. Flexibility and improvisation compensate for gaps in the procedures, providing solutions needed on the spot.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Education and training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of crisis</td>
<td>Flooding</td>
</tr>
</tbody>
</table>

**Actions relevant BEFORE CRISIS:**

- remove important things from low areas
- have sand and bags
- have a resilient local community
- secure and verified communication
- people must have a basic knowledge of the crises beforehand

**Actions relevant DURING CRISIS:**

- deliver proper verified information
- have enough material
- make people do the right things

**Actions relevant AFTER CRISIS:**

- debriefing
- establish better procedures
- continue to work on social resilience
Useful tools that support the concept above

- Blockchain technology for secure and open communication

Additional comment

As a municipality we are much more focused on stresses that can turn into challenges that chocks (there are other systems for that)

Concept Card Adaptation

**DR-77 Concept:** “Promoting common ground in cross-organizational collaboration in crisis management”

In order to collaborate effectively at the time of crisis, first responders of different organizations need to have a sufficiently clear understanding of their mutual goals, expectations, capabilities, operational procedures and needs, in order to operate effectively and safely while minimizing losses. Establishing such a common ground needs the promotion of periodic cross-organisational dissemination exercises.

<table>
<thead>
<tr>
<th>Domain</th>
<th>ATM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of crisis</td>
<td></td>
</tr>
<tr>
<td>- Closing an Area Control Centre (*)</td>
<td></td>
</tr>
<tr>
<td>- Aircraft Accident (**)</td>
<td></td>
</tr>
<tr>
<td>- Technical system failure - Severe weather situation (***)</td>
<td></td>
</tr>
</tbody>
</table>

**Actions relevant BEFORE CRISIS:**

- plans for relocation of service (*)
- possibly plans for contingency during relocation (*)
- plans for lots of additional resources (money) (*)
- define local protocols (ANSP/Airlines) (**) and (***)
- organize forums between different domain safety investigators/managers (**) and (***)

**Actions relevant DURING CRISIS:**

- closing down gracefuul (*)
- quickly get started again with low capacity (*)
- set up a plan for “full” recovery (*)

**Actions relevant AFTER CRISIS:**
DR-83-A Concept: “Identifying sources of brittleness to invest in their correction”

Noticing brittleness is the approach that aims at revealing and understanding the factors that undermine resilience of the system under consideration. Brittle performance means that the system might break down, especially in the face of surprising situations, at the boundaries of what the system typically handles correctly. This assessment supports preparedness (e.g., related to planning or training) and the avoidance of challenging conditions that would result in potential harm or damage, for instance by anticipating potential bottlenecks in the response to a crisis situation.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Training, project management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of crisis</td>
<td>IT-breakdown</td>
</tr>
</tbody>
</table>

**Actions relevant BEFORE CRISIS:**

- prevent that the municipality servers can be damaged
- make sure that you make analog procedures
- social resilience

**According to your own experience, list the 3 actions that you consider relevant DURING CRISIS:**
The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.

- inform the public
- take care of vulnerable citizens
- help your neighbour

According to your own experience, list the 3 actions that you consider relevant AFTER CRISIS:

- continue not to rely totally on IT systems
- continue build social resilience
- prepare for other unknown crises and stresses

Do you know any useful methods and/or practices that support the concept above that are worth to be mentioned?

- Continue to work with social resilience
- Create imaginary burning platforms to prepare for “back swans”
- Do you know any useful tools that support the concept above that are worth to be mentioned?
- Blockchain technology for secure and open communication among stakeholders

---

**Concept Card AdaptatioN**

**DR-85 Concept:** “Systematic management of policies involving policy-makers and operational personnel for dealing with emergencies and disruptions”

The purpose is to encourage working systematically with management of policies and using relevant means to facilitate dialogue among operational personnel and policy-makers, as well as among policy-maker groups. In order to achieve adaptive and holistic policy management for emerging risks and threats, such dialogue needs to take place across domains, organisations and geographical borders. Policy management includes simplifying, modifying or redesigning policies to learn from ways of working and compensating strategies that operational personnel uses to handle emerging risks and threats and get the job done.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Water and wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of crisis</td>
<td>Water pollution/failure in water treatment</td>
</tr>
</tbody>
</table>

Actions relevant BEFORE CRISIS:

- prepare contingency plan for the loss of key infrastructures
- workshop the failure of the infrastructure with operational staff & management separately
- update contingency plans regularly on board any changes in asset condition
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Actions relevant DURING CRISIS:
- establish the nature of the crisis who is impacted and can it be contained
- establish the options available / what staff & equipment & asset are available
- formulate a plan/contact regulators/make resource available to operational staff

Additional action to be mentioned
We assess each incident, escalate on incident to a crisis if it becomes more problematic

Actions relevant AFTER CRISIS:
- workshop the incident to establish the facts
- prepare a post incident review report-making suggested changes to the SOP/contingency plan

Useful methods and/or practices that support the concept above
- Carry out exercises to ensure all of the internal (in particular) and external players are familiar with what will be expected of them in the event of a crisis when there is no crisis

Additional comment
- Training exercises give an organization the “muscle memory” needed to allow them to go through severe crisis without the risk of failure in a real life incident. It helps take a lot of the “what do I do now?” questions out of the high pressure situation and makes organization think about consequences when there are none that will impact on life.

Final Remark:
Material collected in these questionnaires is very useful for adaptation of the concept cards considering aspects important for different critical infrastructures. It will be analysed and considered for both the adaptation of the guidelines for specific domain as well as the generic guidelines.

3.2.4 Evaluation of guidelines focusing on collaboration
Three guidelines (down below) are presented and explained before the group exercise. Guiding questions for the group work:

A. Are the Concept Card principles implementable in your domain and organization?
   (Think of specific crisis examples from your domain)
B. Are there elements of the Concept Card that you already apply in your organization?
C. Are there things in your organization that might be improved by applying the Concept Card principles?
D. Which aspects of the Concept Card would you modify? (if any).

Understanding roles and responsibilities: DR-27
The guideline ensures that the actors involved in resilience management have a clear understanding of their responsibilities and the responsibilities of other involved actors. This includes knowing what resources, plans, experiences and expertise they have. This is vital in order to identify gaps and cooperate before, during and
after a crisis. This facilitates to know who to contact if actions need to be coordinated or changes to plans need to be made. This is critical for team, intra and inter-organisational coordinated action.

**Discussion:**

- It is essential to identify shared procedures and responsibilities for different organizations. Organize periodic coordination activities between organizations. Make sure each organization inform colleges regarding e.g. lessons learned, new procedures, and how this procedure will be adapted to their organization.
- Different responsibilities between actors have to be clear prior to the crisis. However, some responsibilities might have to be changed when necessary during emergency situations. Flexibility is important.
- Pre-planned joint activities/exercises are vital.
- It is important to create network and define the common goals for emergencies. Connections between stakeholders can create synergies.

**Examples:**

- **Swedish civil contingency agency** is in charge of coordinating and organizing weekly meetings (complementary if required, in times of crisis). The meeting is a short teleconference with several actors who share their status regarding risks, situation, etc. It works efficiently since these meetings take place regularly (for several years). Goals and values are already established.
- **Spanish pre-hospital medical emergency services** have experience of difficulties to share information with other organizations, outside the health care domain. From their perspective, the most sufficient way for improvements is to carry out exercises. Exercises reveal the needs for collaboration, roles etc.
- **In Kosovar pre-hospital care**, one agency acts as coordinator for emergency situations and collects all actors, in order to prepare for crises. After a crisis, all actors involved gathers around questions such as: “what have we done wrong?” and “how can we improve?”
- **Israeli emergency medical services command** emphasize the term “organize” which is an active process. In their experience, it requires the involvement of a clear authority, and a clear legal context. They also emphasize the importance of personal relationships to support collaboration. Important aspects to support:
  - The possibility for information sharing in order to promote personnel to share the same goals and thus the importance of cooperating.
  - Joint command and control system.
  - Common language.
  - A good relationship with the press/media is important.
  - Learn from success and not judge from the mistakes.

- In the ATM context, each actor has its own responsibilities according to emergency plans, and there is a common standard at European level. During the crisis, coordination and roles are really important. Aircraft accident involves many actors. In this situation the role of coordinator is assigned to Airport operators and all the network has to be prepared. Drills, simulations and training are important and planned/organized, but it is important to highlight that during the simulations everyone is behaving well according the rules and the procedures. The pathos and emotions are not included (Similarities between Sweden and Italy). After each simulation, debriefings are performed in order to collect useful feedbacks. Feedbacks and outcomes of the simulations are inputs used to review and update documentation and guidelines. It is also important to observe daily operations because people develop habits and contacts with other actors. It is useful to analyse if those habits are transferred during the crisis.

Procedures are defined and compulsory, but sometimes they are not properly applied or not used. It is fundamental to train people to use checklist. For example pilots use checklist because they are trained to use them.

The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.
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Establish network: DR-30

The guidelines include the task to establish networks for promoting inter-organizational collaboration. Establishing pre-crisis relationships between the organizations that may be jointly involved in managing a crisis paves the way for more effective collaboration and communication during crisis and post crisis responses across organisations.

Discussion:
- Identify organizations with whom collaborations is necessary.
- Establish collaboration terms of references.
- Maintain a record of the status of inter-organizational relationship.
- Important to re-locate resources prior a crisis
- Establish networks are before the crisis is very important both on the national and municipal level.
- Functional information spreading is a central key.
- The guideline could be improved by an example how international collaboration could be achieved. Currently, there is a lack of collaboration between countries.
- Important to establish a common language between involved organisations. Otherwise it is a risk for miscommunication with the consequence of different views of the scene.
- Complexity of establishing a network with all collaborating actors.
- Public are often involved but not involved in the planning. How do you respond to ad-hoc initiative from the public?
- Identify collaborating organization prior and specify the rational for collaboration.

Example:
Aircraft controller: It is important to establish collaboration in order to understand who is involved and in order. You have to apply the concept on a case and on specific examples instead of a hypothetical view. The main task is to understand and gain knowledge of the other actors’ tasks and responsibilities so you don’t overlap each other’s tasks.

Promoting common ground: DR-77

This guideline embraces promoting common ground in cross-organizational collaboration in crisis management. It supports periodic cross-organizational dissemination exercises to increase organizations mutual awareness of other motives, perspectives, terminologies and working practices. In turn, this can support
D5.3– DARWIN CoCRP resilience concepts, users and academia interactive workshops

improved collaboration at the time of crises, because first responders are more aware of the likely behaviour
to expect from staff of other organizations.

Discussion:

• Organize cross-fertilization and dissemination workshops.
• Establish periodic visits of own staff to facilities of other organizations.
• Organize joint crisis preparation exercises in order to address potential sources of joint activity breakdowns.
• Analyse a crisis together with personnel from different organizations.
• Official channels for networking are not always the most efficient ones.
• Need for concrete examples of application to make the network work.
• Improve general public involvement. The general public is a provider of information and can be used as a source of information.
• There is a need of a hierarchy to manage a crisis to avoid the problem with not knowing who is in charge of the overall situation at the scene.
• Sometimes a procedure is not working satisfactory because it is used rarely. Therefore, there is a need for training/exercises.
• Network works well within your own organization but the problems occur when you have to collaborate with other organizations. Spending time together, training and having workshops seems on the other hand improve this network.
• In an airport situation important messages are shared with pilots and everyone in the community using Aeronautical Information Publication.
• In Italy pilots and controllers use the same language (English). Fire-fighters, EMS, police etc. do yet not use the same language. This can be confusing and a source for misunderstandings.

Example:

• This concept cards is partially already applied in the ATM domain. The emergency response plan/red manual is yet applicable for all types of crisis. There is a need to also have plans for different possible crisis events. One difficulty with a crisis within aviation is that you have to collaborate with organizations that are usually not involved with the aviation scenery. The coordination and the lack of a common language is a challenge.
• If an earthquake happens in Italy there is a protocol on how each municipality should work. This approach makes collaboration challenging between municipalities because they all have their own made-up guidelines on how to handle and manage a crisis.
• In Sweden there are experiences of difficulties of getting in contact with personnel (e.g. because they might have change email addresses). In Denmark they work with a system where they send out information every day even regardless of the situation. This approach keeps track of eventually new addresses. Yet, there might be a problem with overload of information.

Before the supervisors of Copenhagen, Stockholm and Malmö airport met 3-4 times/year to make sure they had a common ground on how to handle organizational collaboration in a crisis management. This way of working has nevertheless ended since it was thought to be too expensive (even though it seemed to be an effective way of making sure that the network was working and to ensure all organizations knew their responsibilities and tasks during crisis management).
Final remarks:

- Due to the limited time of the DCoP Workshop it was not possible to receive a comprehensive and analytic view of all the available concept cards, which would have been desirable. On the other hand, the practitioners had the opportunity to familiarize with the approach proposed by DARWIN with the resilience management guidelines.
- The difference between some interventions in the concept cards is not always obvious why the differences between the approaches proposed in the cards should be better emphasized in the description of the concept cards where it is possible.

3.2.5 Formats and access to guidelines

DARWIN Wikipedia where the DRMG can be found is presented. DRMG is an evolving and ongoing project where the idea is that the guidelines can be used differently accordingly to special interest, roles or the degree of involvement. Information on the Wiki can be expanded or contracted and the triggering questions support to focus on specific issues. Wiki is an open source and links to additional information are found inside each concept cards. The DCoP members’ feedback is essential in order to gain an improved understanding of how the e.g. Wiki format could be more useful for people with different roles (i.e. in the office, in the field).

Final remarks:

- DCoP members were very positive on the use of a wiki-type application for resilience management guidelines.
- Easy to find the guidelines on the Wiki-page. If it possible make it easier to understand and implement the guidelines. The challenge is to convince own organization to implement the concept.
- It must be packaged and “sold” well to convince organizations that it could be a useful to implement.
- Referring to the triggering questions. A “template” (i.e. that can be directly filled in) to make an assessment is needed if these cards will be used as an assessment tool.
- Two different kinds of tools could be included by taking into account how the content of the concept cards is currently organized: an assessment tool (referring to the triggering questions), and a check list (considering bullet points/actions included in the concept cards).
- The Wiki seems useful especially to build community resilience at the local level. However, a complement/other version to Wiki are need (“popular” version). For instance with pictures and less triggering questions.
- The use of an “App” could be useful when an assessment in the field.
- Valuable if it possible to capture, collect and export data and to share with other involved actors.
- Having reference indicators could be useful when examination progress on resilience.
- There is a great need of events for the DCoP members to learn on guidelines.
- Guidelines that is easy to understand.
D5.3– DARWIN CoCRP resilience concepts, users and academia interactive workshops

- Include graphic content (e.g., generalizing the use of diagrams to describe the relationships between concept cards).
- Desire of something to use to convince leadership of the guidelines’ relevance for the organization.

A survey concerning formats and access to the guidelines were distributed to the 24 DCoP members who attended the March 2017 workshop. Of these, nineteen replied to the questions. Of the 19 responses, 10 were from healthcare, 5 were from the aviation domain, one was from civil protection, one was from water and wastewater, one was a manager in education, and one was from air traffic control. Down below a summary of responses to the questions is presented.

What kind of guideline formats do you think are usable for which target user group?

Figure 8: Preferred guidelines formats per DCoP user group

As illustrated by the above graph (Figure 8), web application and paper copy was considered most suitable for crisis managers. For the community leaders the web application and paper copy were also appropriate, as well as the paper copy. Mobile app or a field manual were preferred within neither this target group nor the policy makers. All different guideline formats were considered handy for the organisation leader. The Wiki and the mobile app were however ranked on top. For the crisis manager a mobile app was most appropriate, followed by a web application and a field manual. The frontline operative personnel preferred a mobile app and a field manual and the wiki was considered less applicable.
What kind of product would you prefer? Rank it on a range from 1 (low interest) to 4 (high interest).

![Preferred guideline formats](image)

Figure 9: Preferred guideline formats

A short version of the concept cards was the product that was ranked highest followed by the other three formats which had about the same ranking (Figure 9). The question concerning preferred format was followed by a follow up question regarding if they could think of additional products/formats in which the concepts and its derivatives could be presented. Most of the respondents did not have any more suggestions but dedicated learning management system such as moodle, newsletter and videos was pointed out as other ways. Kick off meeting when the format will be launched was one way to get personnel inspired and motivated to test and implement the new format.

3.3 Training for Resilience Management

Ben-Gurion University (BGU) is working with the development of an academic course dealing with resilient management. The course is based on comprehensive knowledge and experience. The course includes e.g. how to assess community resilience with the following goal:

- To provide the students with a broad perspective on the resilient management of disasters and emergency situations over the timeline sequence.
- To understand the concept of resilience as a holistic approach.
- To recognize the terminology and key areas of the resilient management.
- To understand the impact of the disaster on communities, organizations, infrastructure and the interfaces between them.

Community resilience is perceived as a core element in managing emergency situations. The assessment and monitoring of community resilience prior, during and after crises allows policy makers to establish interventions and plans in collaboration with community leaders. This ensures communities to manage and recover from future events. It is possible to measure community resilience (before/during/after) crisis if a base line score, as a reference point for comparison during crisis or after implement intervention plans, is formed. A magnitude of change and the direction of the change trend can serve as a predictor of a community's ability to sustain an assault and recover.

There are two main approaches for assessing community resilience:

1. Top down (health status, income, education etc.).
2. Bottom up (surveying the community members among attitudes and feeling regarding their communities).
The Conjoint Community Resilience Assessment Measurement (CCRAM) development process is to conduct periodical measurements that will facilitate monitoring community resilience on an ongoing basis. The CCRM tool identified five factors of community resilience: Collective efficacy, Leadership, Preparedness, Place attachment and Social trust.

### 3.3.1 Training for Operational Resilience Capabilities: utilizing the TORC gaming approach

Training for Operational Resilience (TORC) is a training approach aiming to guide operational teams and management to recognize and facilitate resilience as a critical capability in the context of compliance. The workshop included a small experiment on the use of TORC to facilitate training on DARWIN concepts for operational and managerial personnel.

TORC comprises three separate training arenas with distinct but coherent objectives, utilizing the same game PAD (Figure 10) with complementary material:

- **Operational training**: reveal, articulate, develop and demonstrate the needed margin of manoeuvre in complex operations (when procedures are insufficient).
- **Management training**: articulate, explore, maintain and manage a mandated space of manoeuvre in complex operations.
- **Integrated training**: establish, calibrate, reconcile and sustain the balance between margin and space of manoeuvre over time.

**Figure 10: Training arenas, objectives and TORC game PAD**

Scenarios and applicable rules and procedures are defined in advance. The *unexpected* is introduced as different kinds of disturbances, surprises, changes or opportunities that deviate from the reach and grasp of the procedural base. One game cycle is conducted per occurrence of the unexpected. Both disturbances, as well as available resources, skills and strategies to cope with the unexpected may be predefined in terms of cards. Time and other operational constrains are defined by the game master. A typical workshop consists of operational training by means of group discussion at tables, followed by a group synthesis and/or after-action-review to support management and integrated training. It is possible to address a scenario from the same point of view across training groups, or to exercise from several points of view within a network of actors/organizations, located at different TORC tables (see Appendix 5 for more information).

**Final remarks:**

- In retrospective, the session on TORC sparked interest, for example an Italian organization wanted to get more information on it, but it was too short to explain the approach and to use it on the intended scenario. However, it became clear that the scenario would involve more stakeholders than expected, thereby increasing the persons necessary to play TORC. This would slow down the game play. Furthermore, it emerged that it is of utmost importance that the game master has to be very knowledgeable of the scenario and the preparation of the training have to carefully consider the demarcation of the initial scenario, the number of actors and the presumed escalation.
3.4 Stakeholder analysis including training aspects

A stakeholder analysis survey was introduced to the DCoP members prior to the workshop. It was sent out to all DCoP members with the objective to describe the variety of domains and experiences represented within the community. The survey gave information regarding stakeholders’ roles, interests, views, expectation and influence in making crisis management more resilient. The survey is conducted as part of a stakeholder analysis (i.e. a process for a participatory approach for the development of the guidelines). Its purpose is to provide updated input to the development of the guidelines.

Figure 11-15 present background information about the DCoP members, such as represented critical infrastructure, types of stakeholder organizations, what level the organization represents, represented countries, and respondent's function or role in organization.
The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.

Figure 13: Represented organizational levels

Figure 14: Represented countries
The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.

Figure 15: Respondent’s function or role in own organization

Tables 5 and 6 show that a majority of the respondents agree that concepts and practices, examples, hands-on application, and resilience concepts and practices across agencies should be included in training packages and that it is essential or important.

Table 5: Training needs for some DARWIN aspects

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Agree</th>
<th>Disagree</th>
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<td>Resilience concepts and practices for crisis management</td>
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<tr>
<td>Examples when resilience management has been applied</td>
<td>15</td>
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<td>1</td>
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<tr>
<td>Hands-on application of resilience concepts for crisis management</td>
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<td>2</td>
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<td>Resilience concepts and practices across agencies</td>
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<td>3</td>
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Table 6: Level of importance regarding some DARWIN aspects

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<td>Resilience concepts and practices across agencies</td>
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Table 7 presents the preferred medium for communication. Both distance learning and classroom teaching were accepted.

Table 7: Medium for communication

<table>
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<tr>
<th>Answer Options</th>
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<th>Low</th>
<th>I do not know/not applicable</th>
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<td>How would you rank distant learning?</td>
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<td>3</td>
<td>1</td>
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<tr>
<td>How would you rank classroom teaching?</td>
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Table 8: Level of importance of each constraint concerning the use of guidelines

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<th>Answer Options</th>
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<tr>
<td>Economy</td>
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<td>4</td>
<td>4</td>
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<td>Time</td>
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<tr>
<td>Political</td>
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<td>7</td>
<td>4</td>
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</table>

Activities that 50% or more of the DCoP members are involved in are: development of DRMG, training in the use of DRMG, and evaluation of DRMG. Table 5. Impact of constraints indicate that most constraints have a high impact on the use of the guidelines. Cognitive and political constraints are considered less important.
D5.3– DARWIN CoCRP resilience concepts, users and academia interactive workshops

4 Workshop evaluation

An evaluation of DCoP WS2 was carried out with the participants two questions; what went well during the workshop, and what can be improved for next workshop. The participants wrote down responses to the questions on post-it notes which were collected and analysed after the workshop. Each participant could give more than one response to each question. An individual statement cannot be linked to a single participant.

What went well during DCoP WS2?

Several themes were identified. Below the themes (in bold text) are presented with quotes following.

Networking and new contacts

“The introduction of other members helped break the ice”
“Interesting to meet so many competent experts”
“Great interactions between different domains”
“Exchange of ideas and experience”

DARWIN resilience and concept cards

“The discussion around the concept cards”
“The use of the Wiki to provide information”
“Discussions – Good and enough time to elaborate the various topics”
“Good information”
“Concept cards – Fantastic!”
“A good presentation of the DARWIN guidelines”
“Use of staff technique with concept cards, based on case study”

Workshop organization

“Interesting with education, online gamification”
“Good preparedness of the workshop”
“New connections, New stories, much better understanding of DARWIN”
“The arrangements were very good”
“The disposition of sessions”
“Great support from DARWIN team”
“Workshop dynamics”
“Good presentation of we had to do; good organization and clear communication”
“The group discussions, the exchange of ideas, etc.”

Personal benefits

“Interesting to hear case examples/stories from experts from different fields”
“It was good experience for me and my country”
“I learned a lot of experiences from different countries about managing crises”
“I've learned a lot more about the project!”
“I will send these cards to my country and I will discuss in the first weeks with agency for emergencies”
“Learned a lot from other domain experts”

As can be seen from four the themes and examples above, there were several positive aspects as a consequence of the workshop. The four themes cover a wide range of facets.

What can be improved for next workshop?
Three themes for improvement were identified. Below the themes (in bold text) are presented with quotes following.

**Pre-workshop preparation**
- “More information on the actual project beforehand”
- “Send out more materials so we are better prepared”
- “Give the material to the group before the meeting”
- “I've liked to have had more information about DARWIN before I came here. Like DARWIN for dummies.”

**Workshop organization**
- “Time managing, sometimes not enough time to go deeper”
- “More small group discussions!!!”
- “More time for discussions”
- “The interactive work developed yesterday (the first day) was too weak. Probably it is possible to implement some more triggering”
- “If you've so few time; maybe it’s better a different way to manage the ‘round of table’”

**Content development**
- “Maybe specific organization related workshops, i.e. ATM, Healthcare, etc.”
- “The final exercise about the “TORC”. It’s too complex to be explained and managed”
- “Always use real case study, or inspire to a case that really happened”
- “More focused discussion topics (the themes were too broad so we did not have time)”
- “Practice with cards and guidelines”
- “Discuss different situations between countries”
- “Simulations of scenarios and the cards”
- “A little bit hard to follow the main idea of the project – to many pre-assumptions”
- “As the concept cards are developed farther the use of examples may be helpful”

The three themes that emerged related to improvement provide a useful input for developing the next workshop. Several of the quotes are easy to implement directly, while others need to be considered as they affect the workshop structure and length.
5 Conclusions

A strategic, adaptive and timely response to crisis can be achieved if planning and prevention activities has existed prior the crisis. The guidelines will ease to recognise the complexity between different actors and interactions in the system with the result of more resilient response actions, at all levels. The DCoPs contribution in the creation, assessment and improvement on DARWIN Resilience Management Guidelines (DRMG) will further assist to more relevant and usable guidelines and DARWIN-Wiki will simplify the resilience work and implementation of the concept cards.

The cards will prove a good entry point for forming networks and establishing cooperation and collaboration on several levels and between actors and nations. The participants remarked also the potential to learn both, vertical and horizontal, vertical within one domain, within one country, horizontally across countries and domains.

The participants were active and contributed to all sessions which were appreciated by the DARWIN team. The challenge was to keep momentum. The participants were informed about future ways of engagement. The first way will be thought virtual collaboration. The virtual collaboration through the wiki or dedicated webinars will gather additional feedback. Secondly, some DCoP members will be invited to the evaluation exercise (considering language constrain as some evaluations will be conducted in Scandinavian and or Italian language). Next year (2018), the 3rd DCoP workshop will take place.
References


# Appendix 1. Agenda

## Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>9:00</th>
<th>9:00</th>
<th>TUESDAY 28th March</th>
<th>Description</th>
<th>Presenter(s)</th>
</tr>
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<tbody>
<tr>
<td>1:00</td>
<td>9:00</td>
<td>10:00</td>
<td>Preparation for WS</td>
<td>Open issues and documenting the WS</td>
<td>Peter Berggren, Johan Hornwall, KMC, Ivonne Herrera, SINTEF DARWIN team participate</td>
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<td>10:30</td>
<td>COFFEE BREAK</td>
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<tr>
<td>1:30</td>
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<td>12:00</td>
<td>Open space – WP work or finalization of WS preparations</td>
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<td>Welcome, purpose, agenda, outline of the workshop &amp; practical outline</td>
<td>Helene Nilsson, Peter Berggren, KMC, NT: Ivonne Herrera</td>
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<td>13:15</td>
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<td>Presentation of participants</td>
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<td>0:25</td>
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<td>14:00</td>
<td>Session 1: Introduction to resilience in crisis management</td>
<td>Ivonne Herrera, SINTEF NT: Matthieu Branlat</td>
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<td>Session 2: Overview of guidelines - interactive work</td>
<td>Matthieu Branlat, SINTEF NT: Ivonne Herrera, Tor Olav Gratan</td>
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<td>15:30</td>
<td>Session 2: Overview of guidelines - interactive work</td>
<td>Matthieu Branlat, SINTEF NT: Ivonne Herrera, Tor Olav Gratan Group facilitators: Rogier Wolf/Jar/Carl-Oskar, Valentina/Sabina/Mathieu/Pete, Sabina/Luca</td>
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<td>0:20</td>
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<td>Session 3: Adaptation of the guidelines to specific domain</td>
<td>Sabina Giorgi, JSS, Valentina Cedrini ENEV, NT: Odeya</td>
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<td>16:50</td>
<td>Session 4: Training for Resilience Capabilities – Interactive work</td>
<td>Per - Odeya Cohen, BGU, Tor Olav Gratan, SINTEF NT: Per Martin Schachtebeck Group facilitators: Ivonne/Sabina/Valentina, BGU, Tor Olav Gratan/Mathieu, SINTEF, Carl-Oscar Jonson KMC, Rogier, Per/Linda</td>
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<td>0:30</td>
<td>16:50</td>
<td>17:00</td>
<td>Debriefing from training (if time allows Kahoot)</td>
<td>Ivonne Herrera, SINTEF; Rebecca</td>
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<td>0:00</td>
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**WEDNESDAY 29th March**

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<td>Summing up day 1 and agenda day 2</td>
<td>Session 5: Analysis and group work evaluation of guidelines focussing on collaboration</td>
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<td>Session 6: Diverse representation and evolution of guidelines – Interactive workshop gathering feedback on format</td>
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<td>Visit to KMC lab – discussing resilience in practice</td>
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*Peter Berggren / Rebecca Forsberg, KMC, Ivonne Herrera, SINTEF*

**The research leading to these results has received funding from Horizon 2020, the European Union’s Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement n° 653289.**

**Day 2**
Invitation to DARWIN Community of Practitioners Workshop,
28th – 29th of March, Linköping, Sweden

The DARWIN project would like to invite you to a two-day interactive workshop, hosted by DARWIN partner KMC, in Linköping, Sweden from the 28th to the 29th of March. The cost of participation in the workshop (travel and accommodation) is covered by the DARWIN project. The purpose of the workshop is to ensure that the development of the DARWIN Resilience Management Guidelines (DRMG) takes into account the needs and priorities of practitioners in resilience and crisis management. Workshop participants will learn about the most up-to-date research in resilience and the latest developments of the DRMG, while ensuring that the DRMG are relevant and practical to resilience and crisis management practitioners.

Purpose of the Workshop
The DARWIN Resilience Management Guidelines consist of a set of principles, methods, practices and strategies to aid organizations in the creation, assessment or improvement of their own guidelines. Based on resilience management concepts, the guidelines help the organisation in developing a critical view of its own crisis management activities. They are intended to complement existing guidelines, procedures and practices already present in an organisation. The development of the DRMG requires interaction and co-creation with stakeholders involved in crisis management at different levels from policy to practice. Thus, the purpose of the workshop is to enable workshop participants to explore, and contribute to the creation of the guidelines. Feedback and engagement in the development of the guidelines from end-users on the evolving DARWIN Resilience Management Guidelines, will consequently contribute to enhancing EU responses to crises.

Scope of the workshop
The workshop will focus on the co-creation of the guidelines. Specific case studies, stories and practical examples will be presented and discussed with the participants to investigate how resilience guidelines will enhance the ability to sustain operations. It considers all crisis phases prior, during and after the event. The workshop will contain a training phase, an exploratory phase and a phase involving feedback from potential end-users.

Outcome of the workshop
The main outcome of the workshop will be the participants’ critical view and enhancement on the operationalization and deployment of the DRMG.

Take away
Participants at this workshop will receive updates on the most recent research on resilience concepts and the development of the DRMG. Participants will also have the opportunity to make sure their priorities and needs are met when it comes to the development of the DRMG. The workshop will facilitate exchange of knowledge, insights, expertise and lessons learnt for practitioners and researchers, and thus promote international networking concerning resilience aspects.
Logistics

Travel to Linköping & Accommodation

Linköping is located 200 km south of Stockholm and 450 km north of Copenhagen. Trains are available from Copenhagen and Stockholm to Linköping. The journey takes 3.5 hours from Copenhagen and 1.5 hours from Stockholm. There is also a connection to Linköping airport via Amsterdam Schiphol Airport.

The accommodation in Linköping will be Best Western Plus Priceless which is centrally located. Breakfast is included and the hotel has free wifi, gym, sauna and a pool.

For travel and accommodation please contact Lingmerths Travel Agency at Phone: +46 (0)10-122 68 57 or e-mail: cecilia.joelsson@lingmerths.se. They will assist you to the best of their ability with travel arrangements and accommodation. Declare that the booking concerns the DARWIN project as these costs (travel and accommodation) are covered for the DCoP. There are a limited number of seats for the workshop. Please register your interest before the 1\textsuperscript{th} of March.

Further information about the town Linköping can be viewed on http://www.visitlinkoping.se/en

Transportation to the Workshops

KMC is located at the Linköping University Campus. Buses will be arranged and will transfer you from the hotel to and from KMC. The buses will departure from the Hotel.

Registration

For registration contact Johan Hornwall by e-mail: johan.hornwall@regionostergotland.se or telephone +46-10 103 74 90. There are a limited number of seats for the workshop. Please register your interest before the 1\textsuperscript{th} of March.

Remember to report e.g. any special food allergies.

More details, including a workshop agenda, will follow in January 2017.

We are looking forward to meeting you at The Centre for Teaching and Research in Disaster Medicine and Traumatology (KMC) in Linköping.

Yours Sincerely

The DARWIN Team
# Appendix 3. DCoP Workshop Participants

<table>
<thead>
<tr>
<th>Speciality</th>
<th>Occupation</th>
<th>Place at work</th>
<th>Nationality</th>
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</thead>
<tbody>
<tr>
<td>Training Specialist</td>
<td>Air traffic Controller</td>
<td>LFV/NUAC Malmö ATCC</td>
<td>Sweden</td>
</tr>
<tr>
<td>Safety assessments</td>
<td>ATC Supervisor and safety assessor</td>
<td>LFV / NUAC</td>
<td>Sweden</td>
</tr>
<tr>
<td>Dr. Air Traffic Management</td>
<td>Safety, Security &amp; Quality Director</td>
<td>DSNA</td>
<td>France</td>
</tr>
<tr>
<td>MD: Emergencies</td>
<td>Director of Galicia Medical Emergency Service</td>
<td>Galicia Medical Emergency Service</td>
<td>Spain</td>
</tr>
<tr>
<td>Pediatrics; Health Policy and Management</td>
<td>Chairman, National Council for Trauma and Emergency Medicine</td>
<td>Ministry of Health</td>
<td>Israel</td>
</tr>
<tr>
<td>Dr. Crisis management training researcher</td>
<td>Assistant professor in information systems</td>
<td>University of Skövde</td>
<td>Sweden</td>
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<tr>
<td>Aviation</td>
<td>Secretary of the Technical Task Force</td>
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<td>Italy</td>
</tr>
<tr>
<td>Task force volunteers coordinator: Emergency Response</td>
<td>Task force volunteers coordinator, psychological response, emergency drill organization</td>
<td>Aeroporto di Bologna</td>
<td>Italy</td>
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<tr>
<td>Water &amp; Wastewater networks</td>
<td>Civil Engineer – Production Planning &amp; Demand Management</td>
<td>Irish Water</td>
<td>Republic of Ireland</td>
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<tr>
<td>Manager: Management, language training, resilience</td>
<td>Manager</td>
<td>VIFIN</td>
<td>Denmark</td>
</tr>
<tr>
<td>Physician: Emergency and Emergencies</td>
<td>Head of emergency and emergency medical in Asturias (Spain). Health Service</td>
<td>Plaza del Carballon Nº 1</td>
<td>Spain</td>
</tr>
<tr>
<td>MD: Orthopaedics and disaster</td>
<td>IDF Home Front Command , Chief Surgeon</td>
<td>IDF HFC</td>
<td>Israel</td>
</tr>
<tr>
<td>Advisor Gender, Diversity &amp; Community engagement</td>
<td>Swedish Redcross, Disaster Management and policy unit</td>
<td>Swedish Redcross</td>
<td>Sweden</td>
</tr>
<tr>
<td>Urgent Medical Center- CEO Family Medicine</td>
<td>Medical Doctor- Family Medicine Specialist</td>
<td>Urgent Medical Center- Prishtina</td>
<td>Republic of Kosovo</td>
</tr>
<tr>
<td>Paramedic Nurse</td>
<td>Nurse</td>
<td>Urgent Medical Center</td>
<td>Republic of Kosovo</td>
</tr>
<tr>
<td>Research coordinator, PhD: Natural hazards and continuity &amp; resilience in the society</td>
<td>Research coordinator and responsible for the research area continuity &amp; resilience in the society at the Knowledge development section</td>
<td>Swedish Civil Contingencies Agency</td>
<td>Sweden</td>
</tr>
<tr>
<td>MD: Epidemiology, modeling and prevention of infectious diseases</td>
<td>Researcher</td>
<td>National Center for Epidemiology, Surveillance and Health Promotion Epidemiology of Infectious Diseases Unit</td>
<td>Italy</td>
</tr>
<tr>
<td>MD. Hygiene and Preventive Medicine: Public Health PhD: Science of Public Health and Microbiology</td>
<td>Researcher</td>
<td>Istituto Superiore di Sanità</td>
<td>Italy</td>
</tr>
<tr>
<td>MD: Infectious Diseases</td>
<td>Researcher</td>
<td>Dipartimento Malattie Infettive (Infectious Diseases Unit)</td>
<td>Italy</td>
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D5.3– DARWIN CoCRP resilience concepts, users and academia interactive workshops

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<tr>
<th>Name and Position</th>
<th>Company/Institution</th>
<th>Country</th>
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<tbody>
<tr>
<td>Dr. Civil Protection and Defense Emergencies planning and management</td>
<td>Civil protection officer – Disaster manager</td>
<td>Civil protection Department of Autonomous province of Trento</td>
</tr>
<tr>
<td>CEO Secure Communication. Incident management. Situational awareness</td>
<td>Systems development</td>
<td>SmartHelp</td>
</tr>
<tr>
<td>Director of Human Performance: Resilience Engineering</td>
<td>Lead Calpine’s human performance program.</td>
<td>Calpine Corp</td>
</tr>
<tr>
<td>Instructor: Medical Command and Control at Incidents and Disasters.</td>
<td>Nurse Specialist in Prehospital Emergency Care</td>
<td>Landstinget Sörmland</td>
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<tr>
<td>MRT-trained (Mobile Response Team) London Ambulance Service</td>
<td>Paramedic</td>
<td>Landstinget Sörmland – London Ambulance Service</td>
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Companies arrive on the fire scene and implement standard operating procedures for an active fire on the first floor of the building. The first ladder company initiates entry to the apartment on fire, while the second ladder gets to the second floor in order to search for potentially trapped victims (the “floor above the fire” is an acknowledged hazardous position). In the meantime, engine companies stretch hoselines but experience various difficulties delaying their actions, especially because they cannot achieve optimal positioning of their apparatus on a heavily trafficked street.

While all units are operating and conditions are deteriorating in the absence of water being provisioned on the fire, the Incident Commander (IC) transmits a “all hands” signal to the dispatcher, leading to the immediate assignment of additional companies. Almost at the same time, members operating above the fire transmit a “URGENT - URGENT” message over the radio. Although the IC tries to establish communication and get more information about the difficulties encountered, he does not have uncommitted companies to assist the members.

Within less than a minute, a backdraft-type explosion occurs in the fire apartment, engulfing the building’s staircase in flames and intense heat for several seconds, and erupting through the roof. As the members operating on the second floor had not been able to get access to the apartment there due to various difficulties, they lacked both a refuge area (apartment) and an egress route (staircase). The second ladder company was directly exposed to life-threatening conditions.
Appendix 5. Training for Resilience Capabilities (TORC)

DARWIN essentials for utilizing TORC: “Training for Resilience Capabilities”

Laws, regulations and public expectations imply that few if any risk-exposed businesses can "opt out" the procedural and compliance approach to safety. The pragmatic issue is therefore how we can cultivate resilience and operate more flexibly, not only in combination with, but actually from within the “contextual shadow” of its opposite principle; compliance with rules. The overall aim is a reconciliation of rules and adaptive capacities into a functional whole, consistent with the (dynamic) operational conditions and contexts.

Organizations aiming to engage in TORC training thus should acknowledge the challenge of manoeuvring "safely" in the overlap zone between the two principles. That is, they should aim to recognize, implement and develop the principles of resilience in an accountable and prudent manner, avoiding any temptation to overestimate resilient properties, in which case risk may increase.

Objective of the play

TORC comprises three separate training arenas with distinct but coherent objectives, utilizing the same game PAD (shown below) with complementary material:

- Operational training: reveal, articulate, develop and demonstrate the needed margin of manoeuvre in complex operations (when procedures are insufficient);
- Management training: articulate, explore, maintain and manage a mandated space of manoeuvre in complex operations;
- Integrated training: establish, calibrate, reconcile and sustain the balance between margin and space of manoeuvre over time.

Figures: Training arenas, objectives and TORC game PAD

**Ingredients:**

<table>
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<th>Players</th>
<th>6 participants per group</th>
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<tr>
<td>Facilitator</td>
<td>1 per table</td>
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<tr>
<td>Duration</td>
<td>Maximum 2 hours</td>
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**Preparation - Material**

Scenarios and applicable rules and procedures are defined in advance. The unexpected is introduced as different kinds of disturbances, surprises, changes or opportunities that deviate from the reach and grasp of the procedural base. One game cycle is conducted per occurrence of the unexpected.

- 1 TORC game PAD is needed per group
1 Game log to document the series of game cycles is needed per group

Both disturbances, as well as available resources, skills and strategies to cope with the unexpected may be predefined in terms of cards. Time and other operational constrains are defined by the game master.

**How to play**

A typical workshop consists of three 20-minute rounds of operational training by means of group discussion at tables, followed by a group synthesis and/or after-action-review to support management and integrated training. It is possible to address a scenario from the same point of view across training groups, or to exercise from several points of view within a network of actors/organizations, located at different TORC tables.

The following agenda is proposed:

- 15 min: Facilitator introduces the game, including the cognitive process each group must follow to deal with each disturbance/situation, documentation of the decision-making and other actions taken, together with mapping of the (group's) perceived degree of resilient performance.
- For each situation, the following cognitive steps should be followed using the TORC game PAD:
  1. Situational awareness: ensure that all possible relevant information is gathered
  2. Sense making: assess, as holistically as possible, what might happen, how the scenario and the disturbance might develop into something unwanted
  3. Anticipation: elaborate the possible paths of action to counter the disturbance
  4. Decide: the role of group leader may circulate during the game, but one person is urged to decide what to do
  5. Monitor effects: elaborate on the possible effects of the decisions made, and assess where the attention of the group should be directed for proper follow-up
- After each cycle as described above the team is invited to assess their level of resilient performance according to the game PAD (DEFEND, BUILD, STRETCH).
- As the training proceed through a number of disturbances, a trajectory over resilient performance relative to rules is generated. This can be used for reflection in action and after action review as basis for management training or integrated training.
- For management training, a key issue will be to assess whether the training group is capable of operating at the resilience performance level they perceive as necessary, and what type of managerial intervention or support that might be necessary
- Thus, it is possible to invent, reveal and describe a repertoire of adaptive behaviour that is complementary to the rule base behaviour, in a way that directly supports the "Managing Adaptive Capability" concept card. Other concept cards may be trained by means of developing corresponding training scenarios.
- In effect, TORC training also contributes to experience-based revision or improvement of rules, procedures or strategies.

After the last round, if work is performed in different groups, a discussion to synthesise what the groups have discovered is to be carried out. Referring back to the resilient performance that matters, ask what the answers were at the different tables, and how they are connected.

Possible extension: groups of stakeholders playing TORC at different locations in a joint scenario.

*This is a short description with some adaptations for the DARWIN project. For more details:*