Project Number 700099
Call: H2020-DRS-01-2015

Project Title:

ANYWHERE

EnhANcing emergencY management and response to extreme
WeatHER and climate Events

Subject:

**Deliverable 5.1:
Supporting innovation for self-preparedness and self-protection:
Good practices, approaches, guidelines and constraints**

Dissemination Level: PU

Delivery date: **31ᵗʰ December 2017**
Month: **Month 19**
Organisation name of lead contractor for this deliverable: **UPB**

Document Information

Title	**Supporting innovation for self-preparedness and self-protection: Good practices, approaches, guidelines and constraints**
Lead Author	Scholle, Philipp
Contributors	Schäfer, Christina; Habdank, Matthias; Pottebaum, Jens; Ruin, Isabelle; Terti, Galateia; Capone, Francesca; Venier, Silvia Lorini, Valerio; Marras, Irene; Pylkkö; Pirkko; Sancho, David; Tesfai, Ivan; Brune, Michaela; Rodehutskors, Nikolai; Nowak, Rene Philipp; Sempere-Torres, Daniel
Distribution	PUBLIC
Document Reference	ANYWHERE Deliverable D5.1

Document History:

Date	Revision	Prepared by	Organisation	Approved by
17.11.2017	Rev_0_12	Scholle, Philipp	UPB	Pottebaum, Jens
11.12.2017	Rev_0_18	Scholle, Philipp	UPB	Pottebaum, Jens
31.12.2017	Rev_2	Sempere-Torres, Daniel	UPC-CRAHI	Berenguer, Marc

Related Documents:

This report and others are available from the **ANYWHERE** Project Website at:
http://www.anywhere-h2020.eu/

Summary

This document presents a concept to support innovation for tools to raise self-preparedness and self-protection as results of ANYWHERE WP5 tasks T5.1 and T5.2. The concept targets interested third-party enterprises to develop innovative tools for raising self-preparedness and self-protection. The concept is based on two principles: "Guide" and "recommend". For the first, guidelines are provided to support innovation. These are accompanied by a tool for strategic planning – the ANYWHERE scenario tool. For the second principle, case studies as well as best practices are presented as instruments. These are flanked by the ANYCaRE game, a tool to analyse and illustrate the potential benefits of the implementation of ANYWHERE components. The aspects mentioned are based on the output of studies on ethical, legal and social constraints, communication as well as generic requirements and good practices.

Table of Contents

1 Concept to support innovation for self-p* tools

WP5 envisages raising self-preparedness and self-protection (self-p*) of citizens, enterprises, and other organizations to reduce population vulnerability. Therefore, existing tools and services (either applied for crisis management or designed for different contexts of use like enterprise resource planning, fleet management, etc.) will be adapted. ANYWHERE products subsume components like models from WP2 and systems like MH-EWS (WP3) and A4DEMOS (WP4) respectively their sub-systems. The work in WP5 is structured based on two major assumptions:

a) Enterprises invest into business continuity and intend to adapt their existing tools and communication channels also for that purpose,

b) Citizens are intrinsically motivated for self-preparedness and -protection and spend money for that as long as there is intuitive access to tools and there is an obvious added value.

Both assumptions imply that there is an enormous potential and innovation for crisis management which can only be utilized if existing tools and familiar environments are provided.

According to the Description of Action, the objectives of this WP include:

- To adapt knowledge about policies and constraints for the combination of crisis management by public authorities and self-preparedness and self-protection along all phases of the cycle,

- To improve communication between public authorities and organisations/citizens especially regarding public warnings and follow-up or parallel communication among organisations/citizens,

- To adapt existing tools for self-preparedness and self-protection and identify best practices how to perform this adaptation based on lessons learned both from past crisis events and technology uptake,

- To draw conclusions in correlation with first responders and social needs including ethical, legal and environmental implications (coming from WP1) in terms of best practices, business models, and proposals to contribute to policy making processes (for instance, regarding the use of information generated by citizens). Results will be used to address the market of self-protection and self-preparedness (WP8).

The Description of Action states one Key Performance Indicator (KPI) for WP5 (pp. 20): The number of self-protection applications developed during the project. The purpose of this deliverable is to present a concept to support innovation for self-p*. Development of this concept was structured according to the overall engineering approach of the work package. The adapted engineering approach based on VDI guideline 2206 ("V-Model") is illustrated in Figure 1 below.
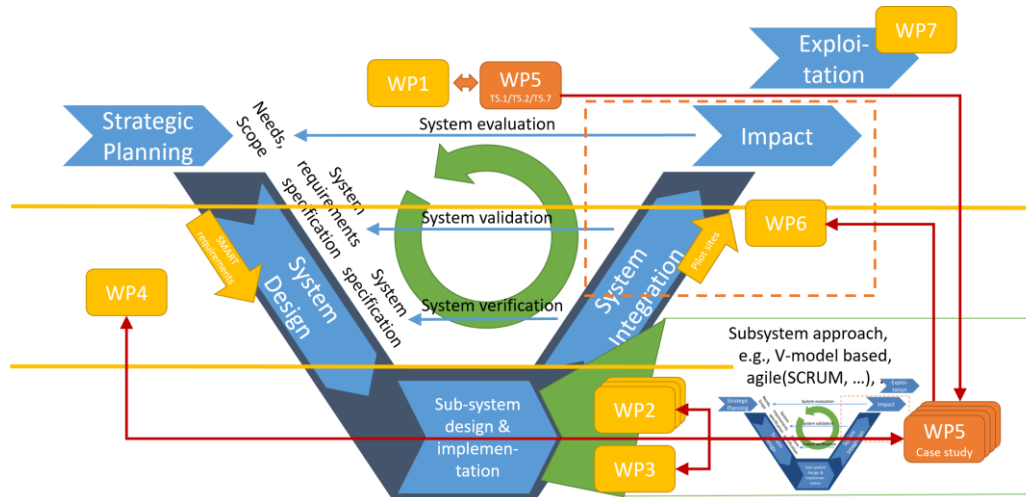
Figure 1 Engineering Approach for WP5 based on (*VDI 2206 - Design Methodology for Mechatronic Systems* 2004)

1.1 Concept to raise both innovation and self-p*

Schumpeter defined innovation as the development of a new combination of production factors (also referred to as the invention) as well as its successful application in practice – the diffusion of innovation (Schumpeter 1997). Third-party enterprises have to be supported in their effort to successfully innovating products to increase self-preparedness and self-protection for both, citizens and enterprises. The purpose of this concept presented in this deliverable is to provide a toolkit to potentially interested users of ANYWHERE components. The concept targets various aspects influencing the success of an innovation – the provision of guidance and recommendation. These include a guidance how to overcome major pitfalls for the innovation of tools for self-preparedness and self-protection. To ensure a sustainable market uptake and success of the innovation, third-party enterprises must also be able to act strategically and foresee potential future market developments. All these perspectives are inherited in the concept for innovation to overcome potential problems in the innovation of new tools to increase self-preparedness and self-protection.

Starting with the conceptual work, innovation needs to be implemented into all phases of an emergency. In WP1 three phases after an event have happened have been introduced in Deliverable D1.2 (See Figure 2).
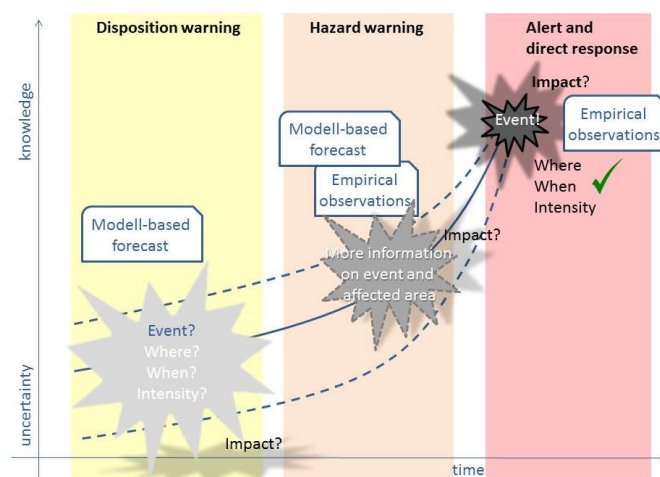
Figure 2 Scheme of the warning stages that are relevant for the ANYWHERE project. Source: Own elaboration. SOURCE: ANYWHERE deliverable D1.2.

With that regard we identified, that innovation for self-p* has to be considered also before the event happens in order to improve preparedness and protection. For that reason, WP5 extends this scheme by introducing a phase 0 (See Figure 4).
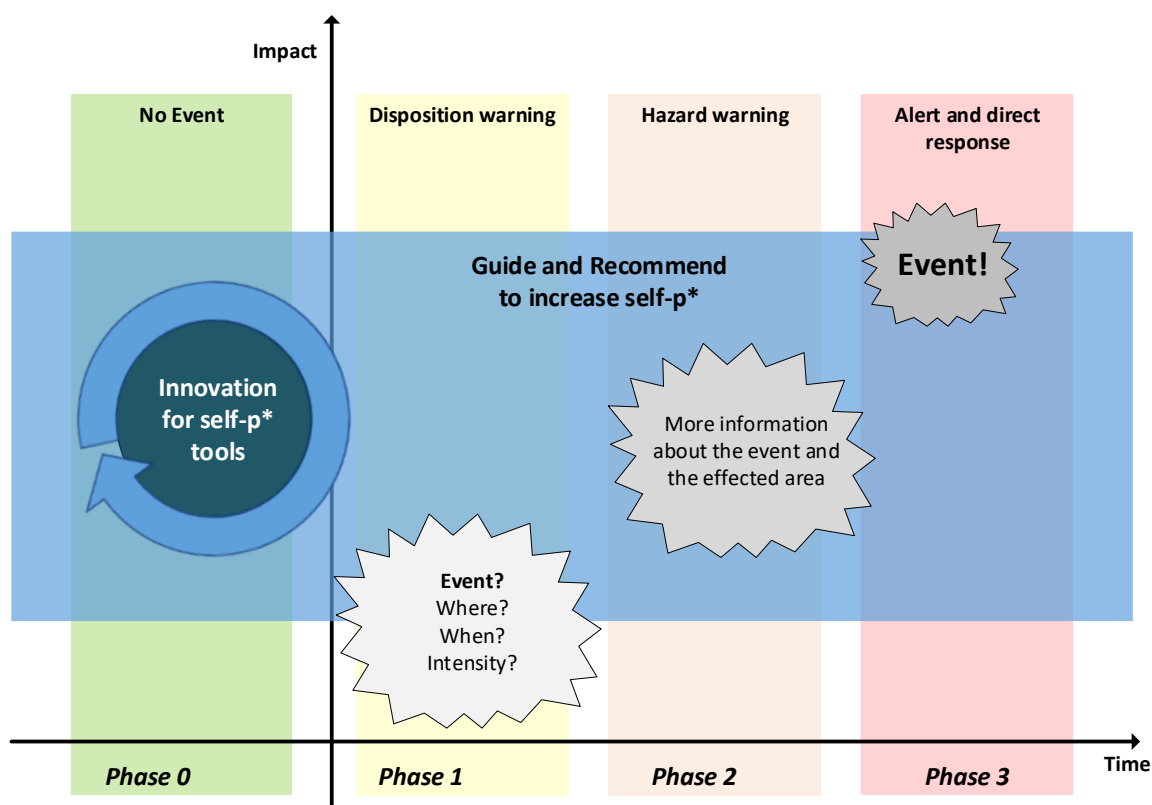
Figure 3 WP5 phase model to increase self-p*

Reasons for phase 0 are twofold:

- New innovation of tools and services will be implemented in a phase without any known disaster event. The innovations will affect all other phases later on.
- Usage of self-p* tools in daily routine is important, to guarantee the usage in a dedicated emergency events. E.g. using Facebook day-by-day support the use in exceptionally situations and advance the knowledge about specific functions, that are useful in such events, like the "safety button".

As Figure 4 shows, the two main drivers in this concept are "Guide" and "Recommend". These two drivers and their building blocks are explained in the following sections.
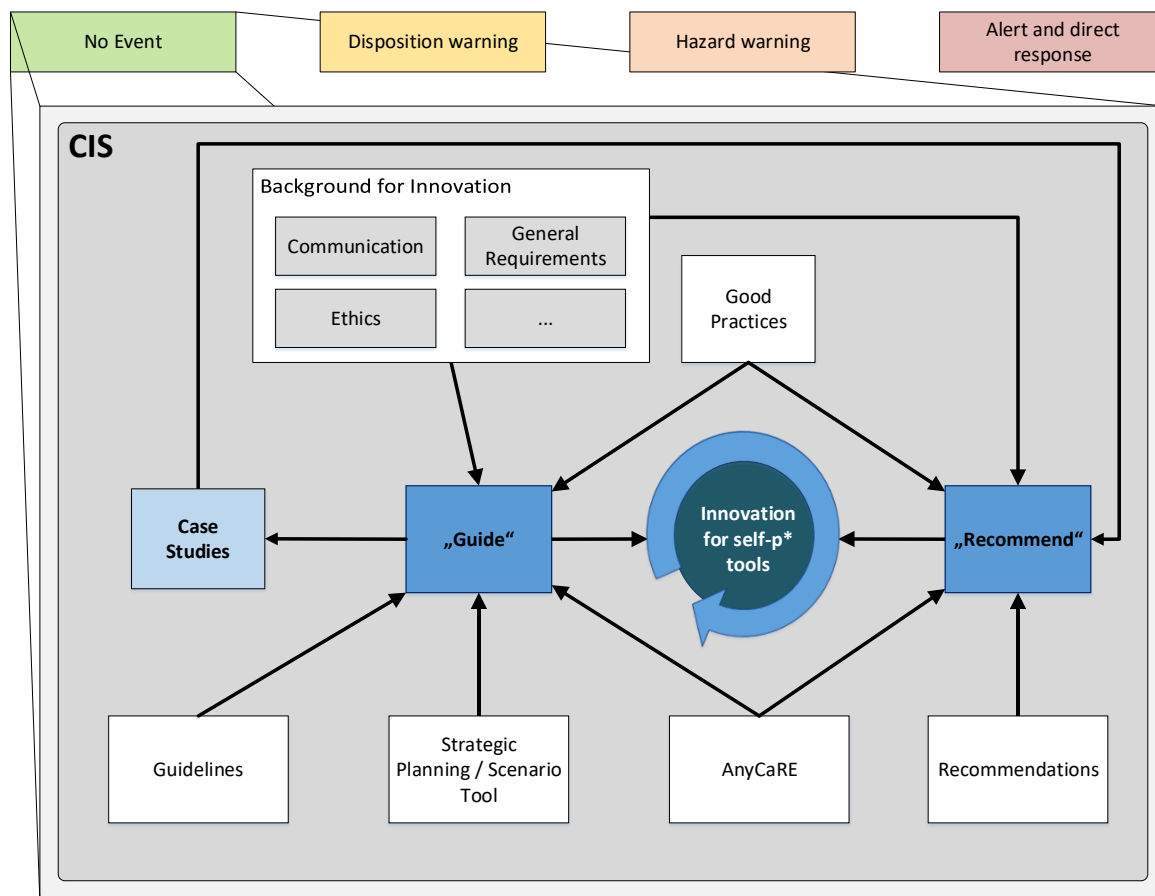
Figure 4 Concept to support innovation for self-p*

1.2   Guide

Regardless of the development methodology, whether an agile (e.g. SCRUM) or a more conservative approach (e.g. waterfall model, V-model; see the overall engineering approach in Figure 1) is used, outcomes of WP5 support the various tasks in designing and developing new self-p* tools, beginning from the strategic planning and reaching to the exploitation of the product.

Two main results in this period and a major support for IT-providers are the strategic planning and the guidelines:

- **Strategic planning**

  To enhance the capability for strategic planning, a tool for corporate foresight is included in this building block of the concept. Thereby, third-party tool providers shall be enabled to anticipate future market developments as a basis for a strategic planning of the market uptake of their products and services. To enable this corporate foresight, the scenario technique will be applied as a methodology. The development of a toolkit for strategic planning is described in section 4 of this document.

- **Guidelines**

  This building block addresses key challenges, regulations, and pitfalls. Starting with the addressing of end-user needs and a practical guidance towards business model development for third-party enterprises, further guidelines concerning the communication in case of an extreme weather event were developed. These are flanked by guidelines dealing with various aspects of ethical, legal, and social issues. All guidelines were authored by WP5 partners with expertise in the specific field. A more detailed description of the process of guideline development is given in section 3 of this document.

- **ANYCaRE game**

  Though the potential advantages of single ANYWHERE components can be validated and evaluated as part of the MH-EWS, and available on the A4DEMOS platform, the diffusion of these advantages to third-party tool providers but also to other stakeholder like citizen and companies is important. To outline the advantages of the ANYWHERE components and to make these more visible, a round based simulation game – the ANYWHERE Crisis and Risk Experiment (AnyCaRE) – has been developed. In this serious game, the scenario of an extreme weather event and the impact is simulated. In a first round, the event is handled without the ANYWHERE components. Followed by a second round where ANYWHERE components are implemented, the potential benefit of the application is outlined for potentially interested users. AnyCaRE is described in section 0 of this document.

1.3   Recommend

The focus here lies on "recommendations" that help citizens, companies and other organisations to select, to procure and to roll-out appropriate tools and services as part of preparedness activities. As shown in Figure 4, main outcomes are the recommendations themselves, and partially also the AnyCaRE game.

- **Good practices (initial set from Case Studies)**

  The four WP5 case studies regarding floods targeting schools or camp sites, storm induced electricity problems and food supply transportation provide a framework of good practices to demonstrate ways for dealing with self-p*. The case studies serve as a methodological approach to test the guidelines generated in the concept building block "Guide" as well as regarding additional research questions from other tasks and work packages. The results taken from

these case studies are immediately incorporated into the "Recommend" building block of the concept.

- **Recommendations**

  Within this building block, existing good practices are collected and recommendations are derived from existing approaches to increase self-p* of both, citizen, and companies. As the results of this work are part of Task T5.7, the detailed description of recommendations and good practices will be part of D5.3 and will not be covered in this deliverable.

- **ANYCaRE game**

  See section 1.2.

2 Background for innovation: Study output

In this section, studies on various fields serving as background for the innovation are described. These are taken as an input for the development of the guidelines described in section 3, to the scenario tool for strategic planning described in section 4 and the ANYCaRE game (see section 0). This section is structured into 3 subsections: Section 2.1 presents an introduction into the study on ethical, legal and social constraints. This is followed by a description of the studies on communication in section 2.2. In section 2.3, the study on generic requirements and good practices is described.

2.1 Ethical, legal and social constrains

Research targeting ethical, legal and social issues (ELSI) has been carried out in the scope of ANYWHERE Task T1.3. Part of the research outcomes have been included in ANYWHERE deliverable D1.2 and is now integrated in the WP5 guidelines (see Annex I of the present deliverable). In line with the key issues considered in Task T1.3, the ELSI guidelines cover the following topics:

- Ethical and societal issues: focusing on the digital divide, the role of trust in emergency response, the need to align to the principles of humanity and of self-determination in emergency operations that increasingly rely on technological tools;

- Respect for Human Rights: dealing with data protection issues (in line with the requirements under the EU Data Protection Regulation that will enter into force in May 2018), the right to privacy, the right to access to information and the obligation to ensure non-discrimination and protection of the most vulnerable groups;

- EU Law and Policy: covering the key aspects of relevant provisions of EU law dealing with protection from floods, forest fires and droughts.

It has to be mentioned that ELSI guidelines aim at raising awareness and proposing general advice on broad issues, and that they are not intended to substitute a case-by-case assessment of how to address ELSI issues under specific circumstances.

Research results targeting ethical, legal and social issues were already presented in D1.2 and are here integrated in the guidelines (see Annex II).

2.2   Communication

Communication is an important issue in disaster and emergency management. Therefore, research results were grouped in several guidelines (see Annex II) and a dedicated serious game, to explore effects of information sharing, was developed. Especially, guidelines #1 to #3 proposed from CNRS highlight critical aspects of effective communication of risk information, warnings and emergency messages. Communication refers to the exchange of public messages (i.e., from authorities to the public and vice versa). The guidelines focus on recommendations for the design of comprehensive and incentive messages to be delivered in relevant times as well as the main principles for the development of interactive communication tools.

2.3   Study on generic requirements and good practices

It is one important goal to define generic requirements for tools and services that shall support self-p* as well as corresponding good practices. The four WP5 case studies (Flood targeting schools or camp sites, storm induced electricity problems, food supply transportation under snow falls) provide a framework of good practices to demonstrate ways for dealing with self-p*.

Before presenting generic requirements for tools supporting self-p*, an in-depth analysis of goals, to use such tool for, will be conducted.

2.3.1   Definition of goals for using Self-P* tools

Defining goals to develop, support or use self-p* tools needs to take into account various different perspectives. Ultimately, the targeted (end-) users from WP5 perspective are third party enterprises providing new self-p* tools, citizens and companies using self-p* tools and Public Protection and Disaster Relief (PPDR; see Figure 12 WP5 stakeholder scheme). Third party enterprises, which develop such tools, are searching for guidance to fit user needs and especially want to explore business opportunities. These aspects and possibilities are discussed in sections 3 and 4. PPDR have interest in self-protection and preparedness by nature. In Germany for instance, the main task of the government is to:

- Maintenance of government functions

- Protection of the civil society

- Supply with needed goods and services

- Support to armed forces

A part of these tasks is the self-preparedness and self-protection of the population (§5 Gesetz über den Zivilschutz und die Katastrophenhilfe des Bundes (ZSKG)). Self-preparedness and protection is not a task of single countries alone. The EU for example supports self-preparedness and protection of its citizens financially as well

(see Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism).

In general, problem solving contains goal and situation analysis. Figure 5 illustrates the problem-solving cycle based on the VDI regulation 2206. This regulation is the starting point for the overall engineering approach of ANYWHERE. Independent of this starting point, whether the solution is based upon existing structures or on ideal concepts, goals of the users need to be considered. The regulation is focused on the design of mechatronic systems and therefore covers various domains involved in the development process. Due to the sheer range, the VDI regulation 2206 was chosen, demonstrating the balance between different research fields and technical background in performing one solution. Especially when designing self-p* tools similar situations can be expected.
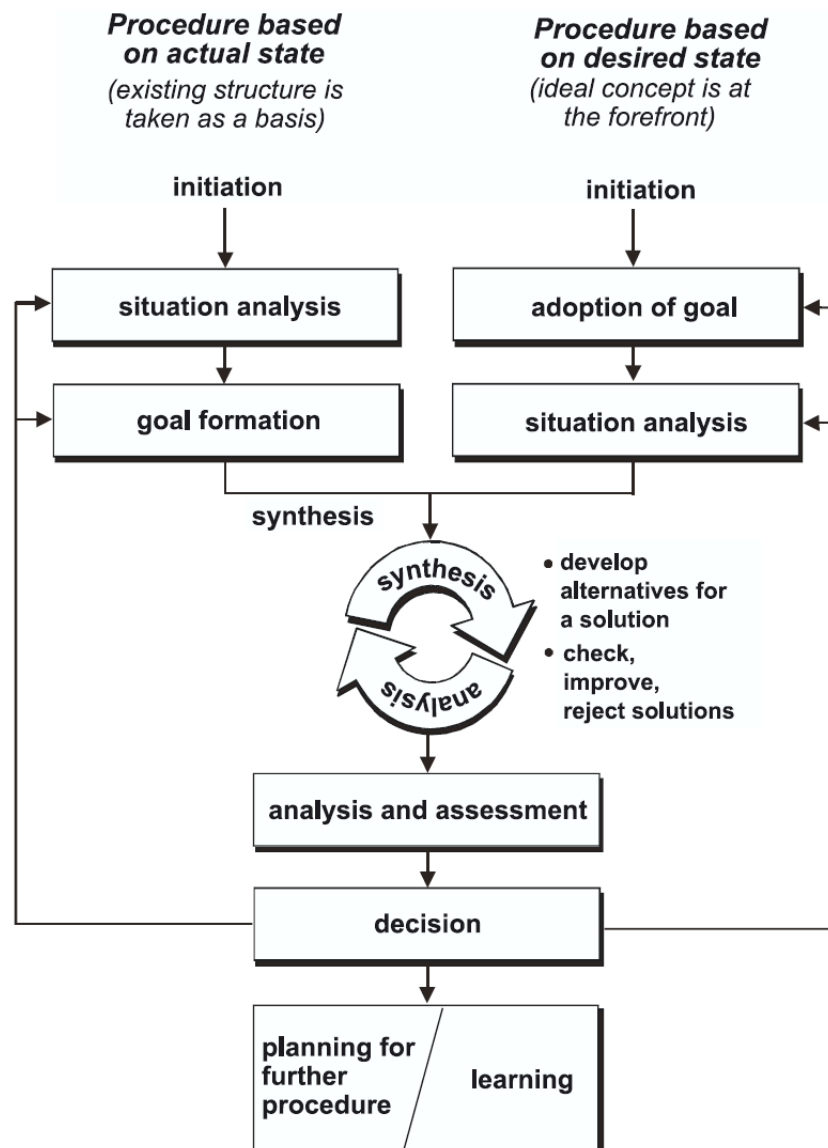
Figure 5 Problem-solving cycle (*VDI 2206 - Design Methodology for Mechatronic Systems* 2004)

For the following goal analysis, the approach of Endsley (Endsley and Jones 2012) was used. It was focused on users (citizen or companies), who want to use self-p* tools. The goal analysis is a vital part of the development process, as it supports the developer in understanding the requirements in a certain domain. To really gain that insight, the goal analysis is performed as a *goal directed task analysis*, which explicitly aims to identify goals as higher-order objectives, needed to ensure a successful performance within the domain. The approach by Endsley demands that groundwork needs to be laid before starting to identify goals. Usually this is achieved by conducting interviews with domain experts. In case of WP5, this foundation is built upon research of literature, existing solutions, good practices, and discussions with experts. Based on these, a goal hierarchy was created. The hierarchy generally aims to identify a major or overall goal, and then breaking it down into corresponding sub-goals that are needed to successfully complete the overall goal. Yet, these sub-goals can serve as overall

goals themselves and therefore be decomposed into another set of goals as well. The depth of this hierarchy varying with the complexity of the domain. The subsequently generated tree provides an at-a-glance overview of all goals, decisions and requirements associated with the domain or major goal. (Endsley and Jones 2012)

Therefore, in the following section goals for self-p* from a user perspective - someone who wants to perform actions to be prepared and protected - will be discussed. The following figures highlight an excerpt from the goal analysis.

Figure 6 Main goal and sub goals for self-p*

At first glance, a reason to run self-p* activities is to minimise the impact of an incident. Impact assessments target social, economic and environmental aspects (van Staalduinen 2015; *Guidance on Sustainability Impact Assessment* 2010). Based on that, sub-goals for minimising the impact of an incident are divided into consequences for life, especially of human-beings, goods, damages and destruction of materials and caused harm for infrastructure (see Figure 6).

Besides this obvious direct impact, an incident also has indirect impacts on processes and business among others. E.g. in case of an incident, it might be necessary to change underlying processes and storage places in order to safe goods.

In a next step, impact and measures for its minimization were detailed and self-p* activities from citizen and companies were differentiated. Results of the analysis are presented in Figure 8, Figure 9 and

Figure 10. Sub-goals with more relevance for citizens have a lighter blue then sub-goals dedicated for companies (see

Figure 7).
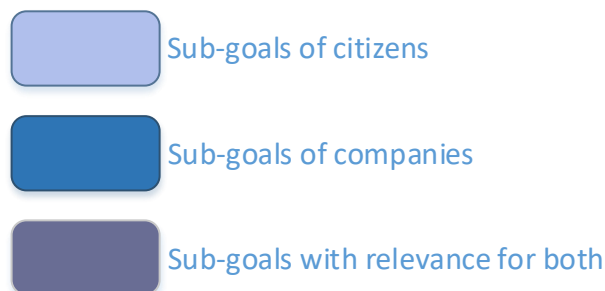
Figure 7 Colour key for goal analysis

All identified sub-goals are structured in the same way. First a brief notice about the possible impact is given and then following actions to minimise the impact are provided. In the first goal category "Safe life", own life and life of family members and friends, life of animals, life of employees and further of suppliers are listed. The deeper analysis is shown in Figure 8. The high-level actions to minimise the impact give first insight into possible support and tools for self-p* and therefore key aspects for third party enterprises.

Usually, private goods belong to a person. There is no change in the ownership, if the goods are transported by another person or are stored at a location where the owner is not present. In case of business goods, the land tenure changes if the goods are at the destination. Business goods belong to the company as long as they are at the company location and during transportation as well. During the transportation process the employers are responsible for the goods. Until the delivery arrives at the customer's location and the customer accepts it with a signature on the delivery note, the ownerships remains with the company. This need to be taken into account while defining goals for business parties.

The CRITIS project employs deals with the critical infrastructures which triggers a variety group of persons in case of a blackout. During the project potentially critically infrastructures were as identified at different settings. Although the sectors contains energy, water, food, health, communication technology, transportation and traffic among others. (KRITIS 2017) A few of them are also used in ANYWHERE and listed under the sub-goal safe infrastructure. Of course, there are a few more industrial sectors (see CRITICAL project) that are affected in case of an incident, but the used chosen ones (see figure 8) implicate the outage. If the transportation collapses, persons who need rely health assistance don´t get that may not receive it. So figure 8 shows the most important affected sector, but others ones are included indirectly.

Figure 8 Social Impact

1.2 Safe goods

1.2.1 Safe private goods

What is the impact?

- Financial losses
- Loss of home
- Emotional loss

How can I minimise the impact?

- Ensure safeguard for your goods
- Know what to take if you need to leave your home
- Have adaqute insirances

1.2.2 Safe business goods at business location

What is the impact?

- Financial losses
- Con-tinuation of business could be at risk

How can I minimise the impact?

- Ensure safeguard for business goods
- Have adaqute insurances
- Change storage place beforehand if possible

1.2.3 Safe business goods during transport

What is the impact?

- Financial losses
- Con-tinuation of business could be at risk

How can I minimise the impact?

- Ensure safeguard for business goods
- Have adequate insurances
- Change storage place beforehand if possible
- Change transport routes beforehand if possible

Figure 9 Economic Impact

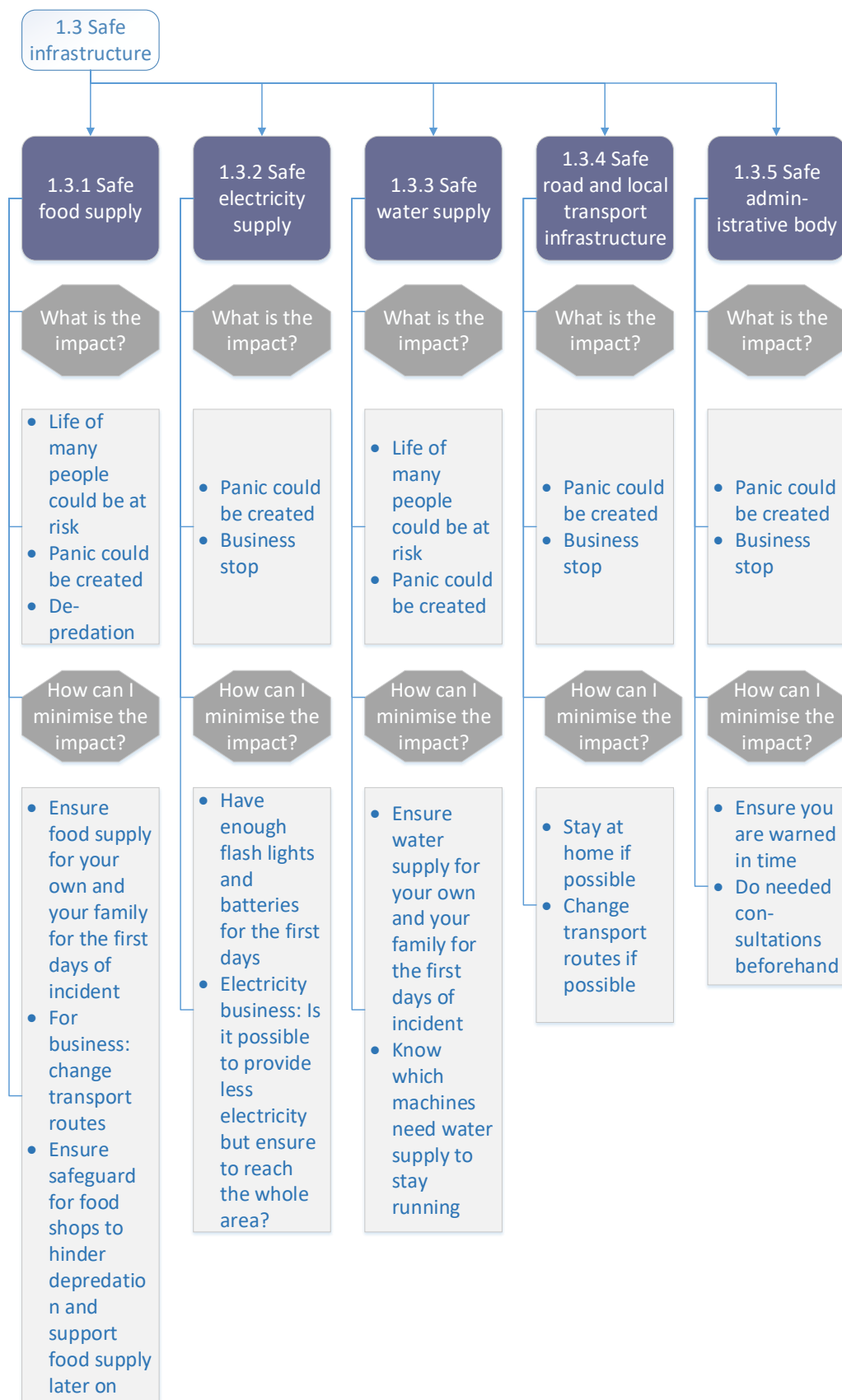| 1.3 Safe infrastructure				
1.3.1 Safe food supply	**1.3.2 Safe electricity supply**	**1.3.3 Safe water supply**	**1.3.4 Safe road and local transport infrastructure**	**1.3.5 Safe admin-istrative body**
What is the impact?	What is the impact?	What is the impact?	What is the impact?	What is the impact?
• Life of many people could be at risk • Panic could be created • De-predation	• Panic could be created • Business stop	• Life of many people could be at risk • Panic could be created	• Panic could be created • Business stop	• Panic could be created • Business stop
How can I minimise the impact?	How can I minimise the impact?	How can I minimise the impact?	How can I minimise the impact?	How can I minimise the impact?
• Ensure food supply for your own and your family for the first days of incident • For business: change transport routes • Ensure safeguard for food shops to hinder depredation and support food supply later on	• Have enough flash lights and batteries for the first days • Electricity business: Is it possible to provide less electricity but ensure to reach the whole area?	• Ensure water supply for your own and your family for the first days of incident • Know which machines need water supply to stay running	• Stay at home if possible • Change transport routes if possible	• Ensure you are warned in time • Do needed con-sultations beforehand

Figure 10 Impact with regard to infrastructure

2.3.2 Existing self-p* tools

To follow the approach of the VDI regulation 2206, the situation analysis will be represented by research work in the pilots and case studies, shown in D1.2, D5.2 and D6.1 and by research on existing self-p* tools was conducted in the following section to get a holistic overview about the current situation of self-p* tools.

2.3.2.1 Background of desktop study

Today, people are continuously connected and available on a global level. A recent study shows the increase of the smartphone usage and the subsequent increase in connectivity. In 2016 more than 49 million smartphone users were identified in Germany alone. In comparison to 2015 the number of smartphone users increased about 3 million. (Statista 2017a) Furthermore, usage of these devices is not limited to a certain age class. More than 90 % of people at the age of 14 till 64 own a mobile phone. Above the age of 65, currently 40% of people use this technique to stay connected and always available. (Statista 2017b) On this account the focus of research for different tools relating to self-p* constitutes apps that can be used on mobile devices.

Especially the wide distribution of mobile phones is helpful during an emergency or natural disaster and beforehand. Citizens can use different apps to get information about e.g. current weather conditions, disaster affected location and pattern behaviour. Aiming to cover each possible need of the user, more than 4,000 new apps are released each day (Jens 2016). Due to an increasing number of disasters, safety and security apps become more popular. Therefore, research to get an overview over these tools and the identification of functions, which apps for self-p* offer, was started. A few criteria had been defined to limit the infinite number of apps beforehand. At first the apps have to bear upon to disasters, emergency, incidents and every situation that is weather induced. Furthermore, the apps should be available for free. Ways for opening market options and economic benefit for self-p* tools will be discussed later in this deliverable but are excluded for this study. There is no restriction set regarding the app provider. So, the app collection contains agencies and companies as provider. Furthermore, selected apps can be used worldwide, in Europe (completely or particular), in a single country or just in one federal state or region.

2.3.2.2 Categorisation

Finally, the tool list contains 32 apps and provides a wide range of different functions. As a consequence of offering more than one function of each app, they can be assigned into more than one subcategory. So, the assignment is not disjunctive (see Table 1). Based on a multitude of functions a classification of them needs to be done. For this purpose, existing categories based on literature was taken into account. The result of the research for quantitative and qualitative evaluation methods for apps shows that there are no specific methods until now. But a similar research of (Groneberg et al. 2017), who analysed international civil defence apps with the focus on effects and changes within two years, indicates the four main categories `information`, `communication`, `preparation`, and `any other`. Because of the largely congruent content with the app list below (see Annex I), the usage of some of these categories will be adapted.

Information –The class of `information` will be used and contains each official information from agencies, general and real-time information about current hazards and forecasts, if possible. The pure information text will be supported through maps and pictures.

Preparation – The next similar category is named `preparation`. Apps that offer simulations, so that the user can play different roles during a disaster, e.g. fire, occurs, belongs into this class. In addition, each kind of information about behaviour pattern and predefined emergency plans, useful to be prepared for disaster, are listed in that category.

System functions – The class `system-functions` contains functions that the user can use, also independent of the current situation. The content of the ´system-function` - cluster and the `personalization`- cluster can also be found partial at the last two cluster (communication, any other) identified from (Groneberg et al. 2017).

Personalization – At least the `personalization`-cluster contains the possibility to create a personalised profile. There are apps that offer the possibility to insert medical history and current usage of medicine. In case of an accident the ambulance officers are able to get this vital information as fast as possible. Beside this function the user can exchange information with other users. Here it is possible to qualify a number of persons or to communicate with every user. Especially because the research subject is self-p* tools, actions to adapt a tool to individual needs are of interest.

Furthermore, the complete adaption of the cluster `communication` and `any other` (Groneberg et al. 2017) is not constructive, as all applications contain communication aspects. After the development process every provider will catch as much users as possible. But before the user decides to use an app there are a few decision criteria that the tool should match. The most common decision will be made based on the offered function volume itself and the possibility of an individual adaption. Therefore, we use these criteria for the continuing structure.

Out of literature research regarding classification and evaluation methods and the inclusion of the decision criteria of the user, four categories have been developed. Table 1 reveals each single function, its assignment and one available app for illustrating each example. An extensive list of the gathered tools is arranged in the appendix.

Table 1 Categorization of the function of existing safety and security tools (e.g. apps, websites)

Category	Subcategory	Description	Apps
Information	Official information	The app offers official information. If the agency publishes a warning on the basis of hurricane, the app transmits these information directly to the user.	NINA
	Real-time monitoring & information	This function contains a real-time monitoring of official services (e.g. German weather service) and agencies and social media channels to get information about current incidents. Apps that offers these function monitor disasters and incidents the whole time they depict danger for the public.	Road Master
	Forecasting	Especially weather apps contain a forecasting function. In case of an approaching storm, the app publishes an information with a forecast of the time the storm will touch different locatings.	MeteoGroup
	Map / satellite pictures / pictures	The app offers maps and satellite picture of affected areas in case of an event (e.g. flooding, hurricane, smoothness). Some apps enable to upload pictures of the disaster through their users.	WarnWetter
	Database	The database constitutes for example a reference book relating to chemical substances. In case of an accident with substances, the fire fighter can use these tool to get information about risks and precautions.	GSA
	Detailed information	The app offers detailed information about a current crisis situation and update it.	SafeMyPlace
	General emergency information	General emergency information include e.g. information about different incident types, characteristics of events, documentation of past disaster, and maybe lessons learned.	ubAlert
System function	Emergency-call- / Request-of-assistance- function	The app contains a button which the user can use to get in contact to the emergency service. If the user pushes the button maybe the app sends an emergency call and connect the user with the control centre. Otherwise before sending a request the user can choose the type of accident or the type of assistance.	WayGuard
	Hazard-categorisation-function	The user can choose the different types of hazards he wants to be informed about. For example, there are categories like natural disaster, terrorism, crime.	Natural Disaster Monitor
	Alert - function	The user can adjust to get an alert message relating to different criteria, e.g. location, incident type).	iSockets
	Locating - function	Through using the locating-function the App found out the current location of its user. It is helpful if a person is missing and the family members have got the permission to retrieve the location of the user.	AlertsPro
	Safety - function	The safety-function needs to be activated by the administrators in case of a major event. User who are located at the affected areas can push the "I´m safe"-button to inform their family and friends about their health.	Facebook
	Sharing – function	The user can inform family and friends about current events. For this purpose, he can share important information/ incidents by sending an email or post a link e.g. to Facebook or Twitter.	BIWAPP
	Watch – function	The watch-function offers the possibility to create a list of important incidents. To this the user save alerts to the watch list. So, the user gets a quick overview over the selected incidents and the current information.	WayGuard
	Feedback - function	The feedback-function offers the possibility to write comments and provide feedback regarding to the credibility of the posts respective to events. With it the app provider try to prevent fraudulent posts.	ubAlert

Category	Subcategory	Description	Apps
Personalization	Information exchange	The user can exchange information with other app users. Thereby the user talk about their experience during an event or offers support.	Allert4all
	Choosing the type of incident / hazard	The user can choose different types of incidents he wants to be informed if something happens. So the user gets only information about the selected events.	HandHelp
	Specification of the location	The user adjusts the location settings by specifying the current location and although the radius. If an incident occurs and affect the settings relating to the location and the radius the user will be informed. Most apps offer the possibility to select more than one location.	Katwarn
	Notification	By using the notification feature the user gets information about events at the selected areas or just about selected incident types. Some apps offer the possibility to inform the app provider about an ongoing incident, the affected area through the user.	umweltinfo
	User profile	This feature offers the possibility to create a personal profile. Depending on the app the user can specify special skills which can be helpful in case of an incident. Otherwise the user deposit his medical history and necessary medicine.	ICE
Preparation	Training	Some apps contain a simulation of different hazardous situations with a few roles the user can choose. During these games the user must solve exercises which differs relating to the selected role and the disaster type. This feature can be used through officials and citizens as a training to be prepared for an emergency.	Emergency
	Emergency plan	The emergency plan contains a lot of general information about e.g. safety locations and important telephone numbers relating to a county.	CrisisGo
	Behaviour pattern	The app provides general and specific behaviour patterns for the public which musts be obeyed in case of an incident.	SAIP

2.3.2.3 Examples and relations to user goals

Each tool with his diverse function volume tends to one or more identified goals mentioned in the goal analysis above. In the following there will be a junction of the tools and the goals.

NINA is an official app from the German Federal Office of Civil Protection and Disaster Assistance (BBK) and informs citizens about atmosphere disturbance, disaster, and possible danger. The user can define various locations and if something happens at one (or more) of these locations, the user will be informed through a push message. In late 2017 there was a blackmail of supermarkets and food retailing in Germany. After the investigators found poisoned food the population of the affected federal states was informed through NINA. After a few hours the warning was expanded, so that everybody in Germany knew about the danger. (Stuttgarter Nachrichten 2017) Through the publication of information and warnings, the app indicates the urgent danger to the citizens (see sub-goal 1.1.1).

The NINA app also warns the public about storms like `Xavier`, a windstorm that crossed northern Europe in October 2017. But the government was not the only organisation to use apps to inform the public. After the storm desolated nationwide train transportation, the German railway company *Deutsche Bahn* used the "**DB Navigator**"-app to inform travellers about the aftermath of the storm on train transport and about the damaged and existing infrastructure.

Another good practice represents the safety check button from **Facebook**. After the earthquake and tsunami 2011 in Japan the development team noticed the necessity of a tool that inform dependants about the health in case of a disaster. If a disaster occurs administrators of Facebook activate the "I´m safe"- function only for persons who have been located in the affected area. (Dredge 2014; McCormack 2015) After the severe 2015 earthquake in Nepal the button was activated for all Facebook user which are located in the affected earthquake area (McCormack 2015; Schiavenza 2015). Each person who had friends in the respective area, was informed through a list (Figure 11).
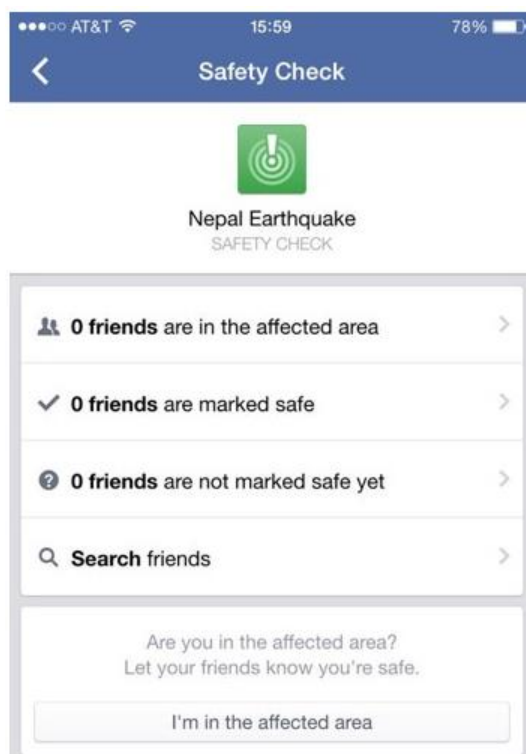

Figure 11: Screenshot of Facebook Safety Check [Schi15]

The family and friends get an overview over possibly affected friends and their health status. Through usage of Facebook and other news services and apps, they get information about the current situation and the existing or destroyed infrastructure. Without these information tools, the family members may try to get into the damaged area to find their dependents and put themselves in mortal danger.

The German National Meteorological Service (Deutscher Wetterdienst; DWD) provides the **WarnWetter** (weather warning) app, which focusses on providing information diffusion regarding severe weather events in an easily accessible. The app offers push notifications for fixed locations set by the user as well as the current position of the user, if events such as thunderstorms, snow or black ice, occurs. The notifications are customisable and the user can decide at which severity level a warning should be issued. Furthermore, the application allows to see all warnings nationwide and in detail up to a communal level. In addition to weather, the app also covers warnings for natural disasters, e.g. storm tides and avalanches, and other hazards,

e.g. UV intensity, and combines its information with additional, external data, such as Google's real-time traffic conditions.

The app helps citizens in preparing themselves and their belongings for severe weather, by providing early warnings and warning trends (see sub-goals 1.1.1 & 1.2.1). These early warnings also permit businesses and public institutions to prepare themselves. Upon a warning a business may decide to relocate their stored goods (see sub-goal 1.2.2) or reroute their transports (see sub-goals 1.1.3 & 1.2.3). Businesses and public institutions, in this case especially schools, may choose to shut down for a period of time, to protect the lives of their employees or students (see sub-goal 1.1.2).

An app that focusses on the current weather conditions is not only popular for citizens but also for logistics and transportation companies and specifically for companies which deliver foods to major customers. During the winter period the companies use **Road Master** to get information about the weather and road conditions, e.g. scattered or sprinkled streets, closed streets, clear ice. Based on this information the companies can prepare a new route for their drivers. In case of the transportation of highly perishable goods the use of such tools can safe goods (see sub-goal 1.2.3). During the winter period the amount of accidents and disruptions in traffic relating to the weather and road conditions increase. For example, the app contains concrete information about clear ice on specified roads. Without the usage of the app the drivers may not have this information and therefore use unsafe roads. The usage of information about weather and road conditions can save the life of the driver and the goods (e.g. food, car).

Weather may not only impact road conditions, but other public infrastructure as well. In case of a windstorm, the public transport companies may not able to offer their services. The ministry of education and the affected principles decide that it is too dangerous for the students to try to get to school. So, they announce that the educational establishments (e.g. schools, nursery schools, vocational schools) are closed for a defined period. To get information about closed schools the **Biwapp** can be used.

The examples above illustrate that each tool (see also the extensive tool list) achieves one or more of the identified goals and may safe life, goods and infrastructure (see Figure 5, Figure 7, Figure 8 & Figure 9).

2.3.3 Generic Requirements

Based on the goal analysis before and the gathering and analysis of existing examples of self-p* tools a broad overview about stakeholder needs are visible. A further and in-depth analysis from an overall project perspective targeting user needs is given in D1.2. Addressing high-level requirements of stakeholders for self-p* is divided in line with the stakeholder scheme of WP5 (see Figure 12).
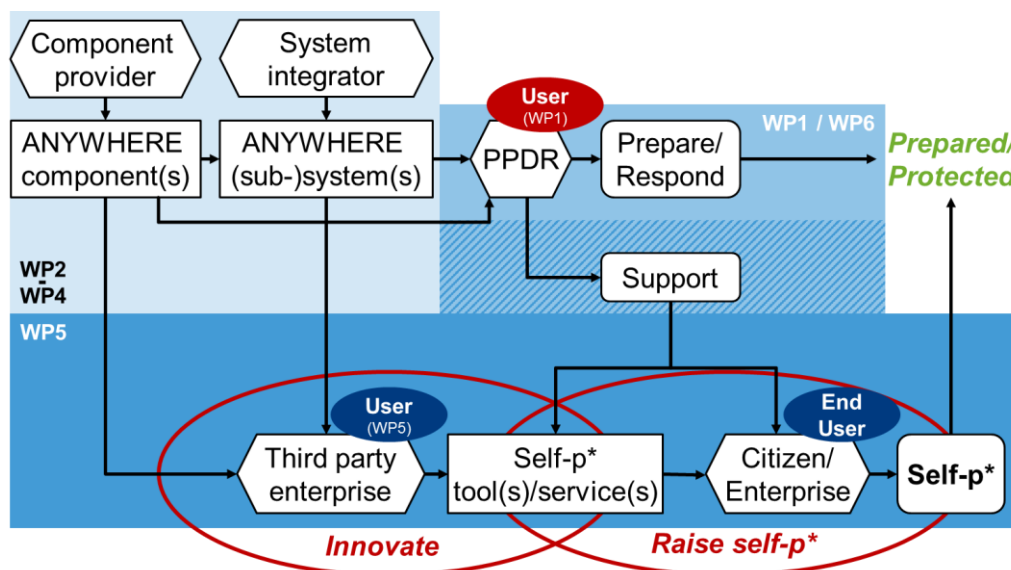
Figure 12 WP5 stakeholder scheme

From a WP5 perspective, three user groups as key stakeholders can be defined: Users as defined in WP1 (essentially PPDR: civil protections, first-responder and disaster relief authorities), users in the meaning of third party enterprises (according to the overall aim of WP5) and end users (citizens or enterprises to which provide added value services).

The first category of users (in line with WP1) can be PPDR which use ANYWHERE components (e.g. A4EU) for their own application to prepare for high impact weather and to improve the response to these events. From a WP5 perspective, users can also be third party enterprises who may connect with the ANYWHERE products and services produced by the MH-EWS to obtain information for self-p* tools or services to be provided by themselves to citizens or enterprises. In contrast to the PPDR users (in line with WP1), these users have to have a sufficient business model to generate revenues from the tools and services. Finally, citizens or enterprises with activities at risk are – from a WP5 perspective – considered as end users. Targeting an increase of self-p*, these end users can either be supported by PPDR or by third-party services developed by third-party enterprises. Requirements of all three user groups are presented below.

2.3.3.1 Citizen and Company perspective (End User):

Self-p* tools should…

1. **Reduce harm of an incident** – Companies as well as citizens are interested in saving own life, life of family members or other related people and further safe their belongings. In case of companies, knowledge about ways for robust business continuity are important. This also results from the goal analysis in the beginning of this section. This means that self-p* tools need to e.g. warn in time. This is often a problem of "warn-apps", as they are not specific enough for supporting people or not providing them with enough anticipation to influence the behaviour of people.

2. **Be easy to use** – Tools need to be easily accessible and usable for fulfilling user tasks. Particularly in emergency situations, there is no time for trial and error in the use of self-p*-tools. Otherwise the overall goal of minimising the impact of an incident, by being prepared and protected against a disaster, will fail.

3. **Be available 24/7** – Incidents occur regardless of business hours or current day of the week. This leads to a requirement of being available whenever it is needed. Issues targeting e.g. overloaded internet connections in emergency situations should be considered accordingly.

4. **Be in line with social acceptance and European data protection rules** – Citizens and especially companies keep data protection issues in mind, when deciding to use additional tools. But nevertheless studies targeting the use of e-governance also show that fears against misuse of data decreases. (Kromar et al. 2016)

5. **Allow use in daily routines** – Self-p* tools should be embedded in daily life to be in mind in emergency situations. Further Changes in the tool or new updates may hinder the use of the tool if the look and feel is not known by the end users.

2.3.3.2 Third party enterprise perspective (User in terms of WP5)[1]

Development of Self-p* tools should…

6. **Include a sufficient business model** – Main goal of IT-providers is to sell their products and find a stable way to potential markets. To be prepared and successful, a sufficient business model is required, especially for potential heterogeneous end user and emergency situations.

7. **Be in line with cost-effective project management, with clear and understandable requirements and reasonable project planning** – Clear statements and proper planning are one of the success factors for projects based on (Project Smart 2014). To not end up with high costs and not fitting products an experienced project management should consider these issues.

8. **Frame development costs** – Financial aspects are one of the main triggers when deciding about new projects. Nevertheless, the quality of the product should not be limited.

9. **Require short commercial launch time** – It is reasonable to have the launch time in mind during the development; what is needed to integrate the product in the end user environment; are training required to use it; or should the product be ready in a specific period because of environmental conditions (e.g. hurricane season)? All these issues should be considered.

10. **Be extendable or adaptable for various contexts (e.g. other EU countries)** – To be flexible in changing market situations or to be able to extend the own market option to e.g. other EU countries with slightly different requirements, it is

---

[1] "User" in terms of WP5 means third-party integrating ANYWHERE tools and services into existing products and services with the aim to provide self-p*.services to end users.

important to have modular and adaptable solutions in mind, even in the beginning of the development.

2.3.3.3 Public Protection and Disaster Relief perspective (PPDR)[2]

Self-p*-tools should …

11. **Support effective disaster response** – The main aim of emergency responders is handling the current incident, and therefore responding in an effective way.

12. **Include only useful measurements / behaviour pattern** – Recommendations included in self-p* tools should be in line of the response of emergency services and not be contradicting to these measures.

13. **Not be in conflict with the "Single Official Voice Principle"** – It is important to not provide the users of self-p* tools with conflicting information in emergencies, especially if the information would contradict the official voice. Yet, in case of a contradiction between emergency responders and self-p* tools, it should be clear that the PPDR's advice should be followed.

14. **Be in line with social acceptance and European data protection rules** – When deciding on the use of additional tools, citizens and companies especially consider data privacy issues. But fears regarding the misuse of data are decreasing. (Kromar et al. 2016)

15. **Include advices from official authorities** – Many countries require self-p* activities from citizen or companies as part of disaster response plans. The advices should be regarded when developing new self-p* tools. But this does not exclude other actions, ways of supporting business or preparation of people.

Requirements can conflict with each other and depend on the perspective of the respective (end-) user.

The guidelines presented in the following sections target requirements from third party enterprises and further include the PPDR perspective. In D5.3 recommendations representing the needs of citizens and companies will be provided.

3 Specification of guidelines

To support the development of meaningful, innovative and successful self-p* tools, guidelines for IT-providers were planned and realised in WP5 and are presented in this deliverable. The guidelines are based on the output of the studies on ELSI, communication and generic requirements and good practices described in the foregoing section.

---

[2] "User" in terms of WP1, as defined in Deliverable D1.2.

3.1 Procedure of guideline specification and publication

Activities detailing the guidelines approach as well as the beginning of a concrete development phase was started by the provision of a first draft of a template in March 2017 in Reading, UK, during a WP5 workshop. Throughout the workshop the template and related other guidelines and requirements were discussed. Based on the results of the workshop the template was updated and circulated within the WP5 group and the development of guidelines continue in a similar manner. First drafts of guidelines were provided at the end of May 2017 by all partners, followed by a brief QA process conducted by UPB. Based on the feedback of UPB, improvements were done for each guideline and results are be included in this deliverable. Therefore, a second version was accepted till the end of October 2017.

As part of a demonstration during the Helsinki project meeting, guidelines were published in the common information space (CIS) (further details of the CIS will follow in D5.3). Henceforth, the guidelines are available in the CIS and external parties can profit from the descriptions. Based on a collaborative authoring possibilities within the CIS, guidelines will be updated and improved throughout the project.

3.2 Structure and Templates

Before starting to define relevant sections and the overall structure of guidelines to enhance the development of tools raising self-p*, a review of existing other guidelines was conducted.

One example is www.usability.gov (see Figure 13)**:** The target audience of these guidelines are IT-developers creating web applications.

Each guideline is structured in a topic, the guideline itself and related comments and resources. The guidance is kept short, supporting the understandability and visibility of the advice (see Figure 13).

In addition, each guideline is marked with a rating, providing information about the importance and evidence of the guideline. The explanation of the rating and the way of defining the rating is given below:

- The 'Relative Importance' of Each Guideline (1 to 5):

  "To determine the 'Relative importance' of each guideline, 16 external reviewers were recruited. Half of these reviewers were Web site designers and half were usability specialists. Each reviewer evaluated each guideline and assigned a rating based on the question, 'How important is this guideline to the success of a Web site?' Those guidelines that were rated as having little importance to the success of a Web site were eliminated." (U.S. Department of Health & Human Services 2017)

- The 'Strength of Evidence' for Each Guideline (1 to 5):

  "A group of eight usability researchers, practitioners and authors were recruited to generate a 'Strength of Evidence' rating for each guideline. These reviewers were all published researchers with doctoral degrees, experienced peer reviewers, and knowledgeable of experimental design. These reviewers

constructed a set of criteria for judging the strength of the evidence for each guideline, which was used as the 'Strength of Evidence' scale." (U.S. Department of Health & Human Services 2017)

Another example is www.isITethical.eu (see Figure 14):
Here the target audience are developers but also end-users of a system, a common information space. These guidelines work out by using guiding questions, information targeting the topic and examples.

For structuring the anywhere guidelines elements of both examples are taken into account: Each guideline is dedicated to one question or issue in developing a tool to raise self-p*, that will be answered by the respective guideline. Based on the question a short introduction is given, to frame the targeted issue. In a next step the guidance is given, to overcome the problem and improve the development process. To strengthen the guidance a practical example is provided, to show what happened if not following the guideline or an example about how the problem was solved in a positive way. Resources and related guidelines are provided at the end of each guideline.

Based on the usability.gov approach, a ranking was also taken into account to indicate user of the guideline the relevance of the guideline. Therefore, three indicators were identified:

- Validity
- Used or relevance in context
- Consequences (if not following the guideline)

The structure of the guideline and the information, given to each section is illustrated in Figure 15. The guidelines are presented in the Annex II of this Deliverable.

1:2 Establish User Requirements

Relative Importance:

①②③④⑤

Strength of Evidence:

①②③④○

More about the Rating Scales

Document Type: Guideline

Topic:

UCD Process Requirements

Guideline:

Use all available resources to better understand users' requirements.

Comments:

The greater the number of exchanges of information with potential users, the better the developers' understanding of the users' requirements. The more information that can be exchanged between developers and users, the higher the probability of having a successful website. These could include customer support lines, customer surveys and interviews, bulletin boards, sales people, user groups, trade show experiences, focus groups, etc. Successful projects require at least four (and average five) different sources of information. Do not rely too heavily on user intermediaries.

The information gathered from exchanges with users can be used to build 'use cases'. Use cases describe the things that users want and need the website to be able to do. In one study, when compared with traditional function-oriented analyses, use cases provided a specification that produced better user performance and higher user preferences.

Sources:

↑

- Adkisson, H.P. (2002). Identifying de-facto standards for e-commerce Web sites. Proceedings of the IEEE International Professional Communication Conference, 22-45.
- Brinck, T., Gergle, D., & Wood, S.D. (2002). Designing Web sites that work: Usability for the Web. San Francisco: Morgan Kaufmann.
- Buller, D.B., Woodall, W.G., Zimmerman, D.E., Heimendinger, J., Rogers, E.M., Slater, M.D., et al. (2001). Formative research activities to provide Web-based nutrition education to adults in the upper Rio Grande Valley. Family and Community Health 24(3), 1-12.
- Coble, J.M., Karat, J., & Kahn, M.G. (1997, March). Maintaining a focus on user requirements throughout the development of clinical workstation software. Proceedings of CHI'97, 170-177.
- Keil, M. & Carmel, E. (1995). Customer-developer links in software development. Communications of the ACM, 38(5), 33-43.
- Li, Q. & Henning R. (2003). Integrating usability into use cases: An empirical study of user-centered object orientation. Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting, 759-763.
- Norman, M. (1993, December). What a task – Establishing user requirements! ACM SIGOIS Bulletin, 14(2), 23-26.
- Osborn, S. & Elliott, G. (2002). Standard creativity: Creating flexible web development standards. Proceedings of the IEEE International Professional Communication Conference, 1-21.
- Ramey, J.A. (2000). Guidelines for Web data collection: Understanding and interacting with your users. Technical Communication, 47(3), 397-410.
- Vora, P. (1998). Human factors methodology for designing Web sites. In C. Forsythe, E. Grose, & J. Ratner (Eds.), Human Factors and Web Development. Hillsdale, NJ: Lawrence Erlbaum.
- Zimmerman, D.E., Akerelrea, C.A., Buller, D.B., Hau, B., & LeBlanc, M. (2002). Integrating usability testing into the development of a 5-a-day nutrition Web site for at-risk populations in the American Southwest. Journal of Health Psychology.

Related Resources:

↑

- Title: Learn about your users
  Description: To design a site that works for you and your intended audiences, you have to know a lot about those audiences. They may be customers, consumers, researchers, or the public.
  URL: http://www.usability.gov/web-analytics?page=1
- Title: Determine user requirements now to avoid problems later
  Description: User requirements form the essential building blocks for IT projects. Use these best practices to make sure you have a good set of requirements for your project.
  URL: http://articles.techrepublic.com.com/5100-10878_11-5054103.html

---

Related Usability Guidelines:

↑

- Usability Guideline: Understand and Meet User's Expectations
- Usability Guideline: Use an Iterative Design Approach

Figure 13 Guideline from www.usability.gov

Digital Divides ⚙▾

Collaborative technological solutions, such as a CIS which requires a certain amount of connectivity, run the inherent risk of creating digital divides between those who can access the technology and/or the network (and hence participate in the collaboration) and those who cannot. Such digital inequalities and technological discriminations are not solely determined by socio-economic factors but can also be the result of the structurally unsound design of such technological solutions or cultural differences in 'digital literacy', for example between generations, or gender, class, ethnicity divides. So when setting up a CIS it is important to consider who might be cut off from the collaboration, how and when.

Guiding Questions

Does your CIS exclude specific stakeholders due to the simple fact that they have no means of accessing the technologies/network?

Are there ways to rectify this by introducing different channels of communication in order to broaden your reach?

What extra resources would you need to broaden your reach and overcome any potential digital divides and is such a move justifiable?

⊖ Further Information

There is a widespread concern that the explosive growth of new technologies such as the Internet and social media is intensifying existing inequalities. The term "digital divide" captures this concern highlighting disparities between the informational haves and have-nots. However, some argue that it also hides some of the necessary nuances of these inequalities by being too broad and oversimplified – for example, is it about access to ICTs, possession of hardware or lack of skills and know-how to access but also critically engage with digital technologies? (see Warschauer 2004).

According to Norris (2001) and van Dijk and Hacker (2003), the concept of the digital divide is a multidimensional, complex and dynamic phenomenon. Norris distinguishes it between three different aspects. The *global divide* which refers to the divergence of Internet access between industrialised and developing societies; the *social divide* which concerns the gap between information rich and poor in each country, and finally within the online community itself, the *democratic divide* which 'signifies the difference between those who do, and do not, use the panoply of digital resources to engage, mobilize, and participate in public life' (2001: 4). Van Dijk and Hacker (2003) explore the ways it is connected to age and gender.

Technologies have always played a key role in emergency management and response. The ongoing 'informationalisation' and 'datafication' of disaster risk management along with the advent of social media and digital humanitarianism urge us to consider the digital inequalities and technological discriminations that such new practices bring along. These challenges range from understanding that those you are usually most in need of support might be the ones who have least access and understanding of these technologies (Murthy 2011 a, b) all the way to considering how the development of technological innovations in humanitarian response, such as drones, Big Data, etc. might be reliant on existing inequalities between a tightly-regulated and privacy-sensitive global North and a mostly unregulated global South (see Taylor and Broeders 2015).

⊖ Examples

Focusing on organizational policies of banning mobile devices and their impact on crisis communication Ford, Stephens and Ford (2015) call for circumspect attention to the unintended consequences of technological exclusion and the subsequent digital divides. As they write, while some employees, especially knowledge workers, may be expected to carry mobile devices 24/7 to stay connected with their colleagues and managers, others are prohibited from using or even carrying their personal mobile devices. In crisis situations this can lead to severe communication difficulties. Ford, Stephens and Ford carried out focus group discussions with 46 participants from two very different organizations where such mobile device bans were in place and found many examples of lost information, disconnected and even forgotten workers, isolated and hard to locate. The employees of a fast food company and a company providing cleaning and janitorial services reported frequently missing critical information, for example about emergency drills. Their supervisors were so overwhelmed with the need to coordinate selective information flows that they missed informing some of their workers altogether, even in emergencies. In one situation, the distributed janitorial workforce was not informed of a severe weather event until all public transport had been suspended. While their supervisors, secretarial and managerial colleagues had been informed in a timely manner and were safely ensconced at home, cleaning crews and janitors were stranded and without means of communication. Apart from putting workers in discomfort or even danger, organizational policies and practices of banning mobile devices create experiences of inequality and relative deprivation, which are harmful to workers' sense of well-being and justice.

Figure 14 Guideline from www.isItethical.eu

TEMPLATE FOR GUIDELINE

1. **Title of the guideline**

Please provide the title of the guideline, describing key elements
How to …?

2. **Short description**

Please provide a short description of the guideline which you are describing. (Problems/challenges occurred in a case study, successful solutions for these, ways to overcome ethical or legal as well as social issues and business opportunities).

3. **Guidance or used methodology**

Please provide a detailed description of the way how to solve the described issue, methods used and recommendations to be taken.

4. **Practical example or use case**

Please provide a practical example to highlight and explain your guideline and support other understanding mechanisms behind.

5. **Sources or references**

Please provide sources, references or further information to explain your guideline and ensure validity (Literature, Law or regulations,…)

6. **Related Guidelines**

Is the guidelines related to other guidelines? Which guidelines have to be considered previously? Which guidelines should be considered subsequently?

7. Rating (experts or community)
   [Will be done after collection of all guidelines in a separate workshop]
   - Validity
   - Used or relevance in context
   - Consequences (if not following the guideline)

Figure 15 Template for guidelines to enhance development of tools raising self-p*

3.3 Relations of guidelines

To group guidelines, relations between single guidelines were assessed. On that basis, the guidelines were structured into five distinguished topics. Relations are presented in Annex II of this document.

3.4 Developed guidelines

Guidelines are provided in five distinguished topics to highlight the various needs that should be taken into account during the development process of self-p* tools. In addition, good practices are included to demonstrate exiting solutions.

The decision about which topics are to be addressed with the guidelines, and are key elements, is twofold: 1) The analysis of requirements from the perspective of the three different stakeholders in WP5 (see section 2). 2) The engineering approach in ANYWHERE, also highlighting the development of self-p* tools (see Figure 1).

- **Communication and Crowd Sourcing** - Within a disaster there is a high number of people involved, either an emergency service or those affected by the situation. Using the crowd to support e.g. decision making and knowing how to communicate with the population is an important point in disaster management. Therefore, this topic is directly addressed with guidelines.

- **Data Protection** – Use and provision of data is a main subject in the design of self-p* tools. Concepts like "privacy by design" cannot be implemented as an extra step after the rollout of a tool. Therefore, data protection issues need to be considered even during the development process.

- **Ethics and Human Rights** – In a similar sense like data protection issues, design decisions targeting ethics or human rights need to be taken within the development process and should be clear in an early phase. Otherwise required changes for the product will result in high costs.

- **User Perspectives** - Especially in the beginning of the development of new tools, needs and requirements must be clear. In a continuous validation and evaluation process, management of the requirements should be conducted based on the engineering approach in Figure 1.

- **Business Models and regulations** - To support developers and IT-providers in the process of entering new markets, guidelines to enhance knowledge about designing business models and to indicate ways how to deal with existing regulation within the EU are part of the overall guideline catalogue. Further the scenario tool was developed to provide a meaningful support for IT-providers.

- **Good Practices** – Supporting the realisation of good self-p* tools and indicating contemporary and well working solutions, good practices are an important part of the guidelines.

All guidelines are presented in their current status in the separate Annex document to this deliverable. Further the guidelines are published in the ANYWHERE "Common Information Space" (CIS) visible at: www.cis-anywhere.eu. The following Figure highlights the status of the CIS presented in Helsinki in September 2017.

Figure 16 ANYWHERE CIS (see www.cis-anywhere,eu)
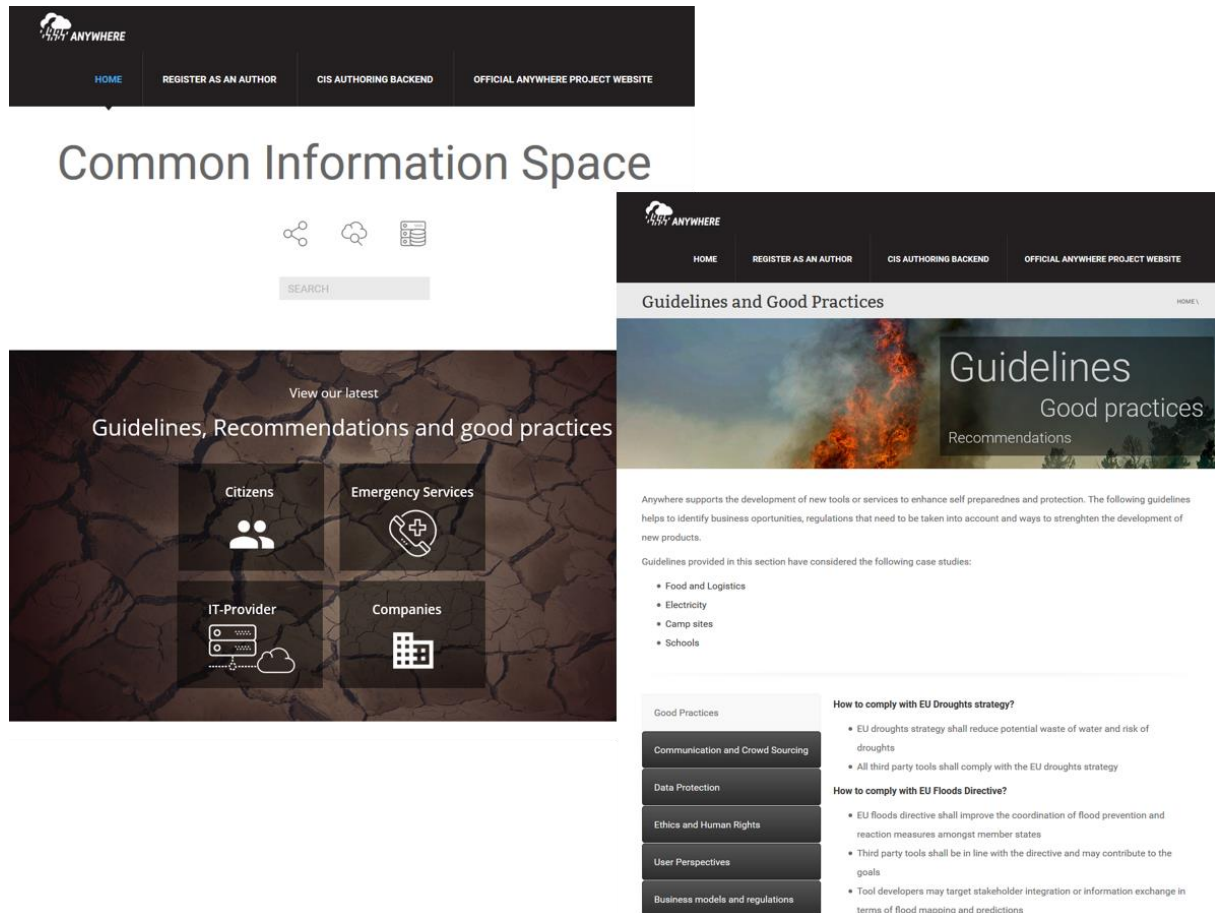
4 Strategic Planning

Despite the provision of guidelines, a broad innovation for self-preparedness and self-protection is envisaged by WP5. Based on the studies described in section 2 an approach for strategic planning has been developed. Strategic planning is flanked by the other building blocks in "Guide" in the concept for supporting innovation for self-preparedness and self-protection described in this deliverable. Complementary to the guidelines, the purpose of the approach for strategic planning is to enhance the strategic capabilities of third-party enterprises. These shall be supported in corporate foresight to assess future marked development, trends and influences affecting their business plans. On this basis, strategic decisions can be improved to increase the probability for a successful innovation of products and services.

Scenario-technique is one methodology for corporate foresight. Based on strategic management, various approaches have been developed: the intuitive logics, cross-impact analysis and consistency-based process models. Detailed information on the three schools of scenario-development can be taken from the literature (Pottebaum, Scholle, and Gräßler 2017; Mietzner and Reger 2005; Reibnitz 1991; Gordon and Hayward 1968).

Advantages and disadvantages of scenario-technique are widely discussed in the literature (Bradfield et al. 2005; Mietzner and Reger 2005; Millett 2003; Tapinos 2013; Mietzner 2009). The key advantage – the structured and methodological approach –

has to be compared with the high effort for the development of the scenarios. To enhance the ability to anticipate potential market developments for third-party products and services based on ANYWHERE components, the scenario-technique has been chosen as a methodological approach for supporting the innovation of self-p* tools.

4.1   Development of the ANYWHERE scenario process model[3]

As outlined before, the high effort for scenario development is considered a mayor disadvantage of scenario-technique in general and of consistency based-approaches in particular. The process model is illustrated in Figure 17.
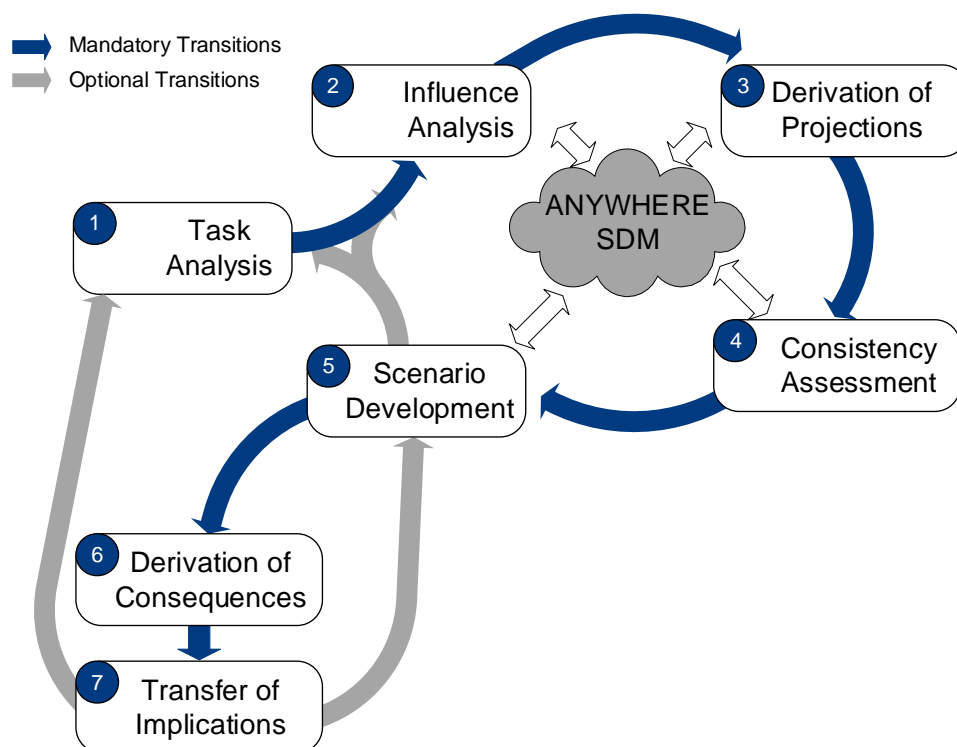

Figure 17 ANYWHERE scenario process model

The process model consists of seven process steps:
1. In the first step – task analysis – purpose and scope of the scenarios are defined. Scenarios can be focused on either market or technological developments or a combination of both. The scope of most scenarios is focused on market opportunities for innovative tools enhancing self-p* for population and enterprises.

2. Scenarios are based on future developments (projections) of influence factors. These are selected from the ANYWHERE scenario data model (see section 4.2) in the second process step. The ANYWHERE Scenario Data Model (ANYWHERE SDM) contains generic influence factors (e.g. concerning the development of technology for warning applications) and specific influence factors (e.g. the probability of extreme weather or the subjective threat of

---

[3] This section was published in Pottebaum et al 2017

individuals in the society). These may be enhanced by individual influence factors.

To reduce the complexity of the process, impacts between influence factors are assessed. Based on the impact matrix, key influence factors are selected. These selection rules were developed and formalized by UPB in order to reduce the required methodological expertise in this process step. Selection rules are based on the relative importance of an influence factors and the active and passive sum of an influence factor.

3. For key influence factors, projections are derived. Projections are potential future developments. For the influence factors selected from ANYWHERE SDM, projections are contained therein. These are derived from a set of statistical databases. Details are given in section 4.2. For all individual influence factors, projections must be defined by the user.

4. In the fourth phase - consistency assessment - the projections are assessed in pairs. This assessment aims at an estimation of the consistency of two projections occurring in a future scenario simultaneously. Consistency is assessed on a scale between total inconsistency [1] and high consistency [5]. Consistency assessment for influence factors (and their respective projections) selected from ANYWHERE SDM can be obtained automatically. For all individual influence factors, the consistencies must be assessed by the user. The user is supported by a neuronal network for a semi-automatized consistency assessment therein.

5. Scenario development is a two-step process: First, all potential scenarios are combined. Here, a scenario is a set of projections. This set contains one projection for each key influence factor. In a second step, the set of all potential scenarios is reduced. Selection rules for this are stored in the ANYWHERE SDM. Selection of scenarios is based on three criteria: the consistency, the stability and the variety of the different scenarios. The selection based on consistency is refers to consistency assessment from the foregoing process step. Variety and stability is included in the clustering algorithms for clustering scenarios. New selection rules have been developed based on a literature study. These are implemented in the scenario process model.

6. From the selected scenarios as result of the fifth process step, means and measures for are derived. Therefore, the scenarios as a set of projections are transferred into a textual description of the scenario. The textual descriptions are generated on the basis of the data stored in ANYWHERE SDM. Scenarios may be adapted by assessing potentially disruptive events. These can be unforeseen events with an extremely low probability, but a high impact on the scope of the scenarios. In this case, assumptions concerning selection of influence factors and their projections can be adapted.

7. In this last step, the textual descriptions of scenarios are taken as a basis to derive potentials, risks and reaction strategies for the selected scenarios. Selection rules in foregoing process steps may be adapted accordingly.

As shown in Figure 17 mandatory and optional transitions are differentiated in the process model. Guided through the process a first time by mandatory transitions,

premises and assumptions can be adapted later by the user the optional transitions. Hereby, intuitivism and transparency of scenarios is enhanced. By addition or omission of influence factors, the sensitivity of scenarios can be assessed.

4.2   Development of the ANYWHERE Scenario Data Model

To reduce the required effort for strategic planning, an initial ANYWHERE Scenario Data Model (ANYWHERE SDM) has been developed by UPB. The ANYWHERE SDM is based on previous work of UPB on the Integrated Scenario Data Model (see Pottebaum et al., 2016).

The ANYWHERE SDM contains generic influence factors (e.g. concerning the development of technology for warning applications) and specific influence factors (e.g. the probability of extreme weather or the subjective threat of individuals in the society), their projections and the impacts of these influence factors and consistency matrices. In addition, the ANYWHERE SDM contains selection rules for both, influence analysis (step 2 of the process model) and scenarios (step 5).

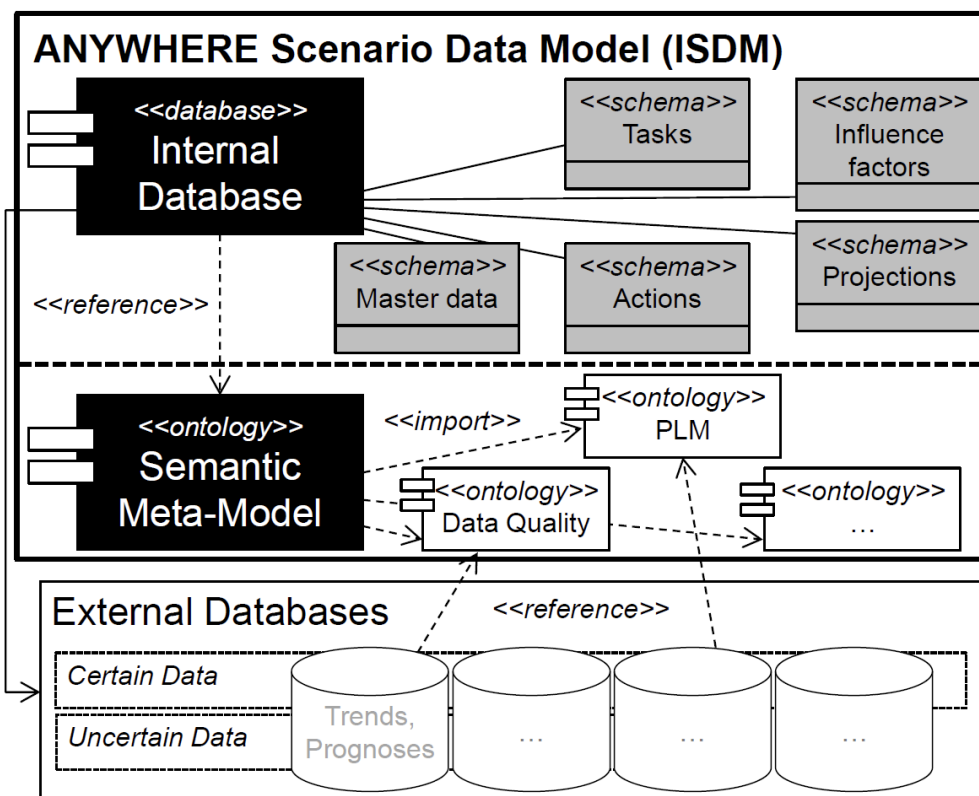The general structure of the ANYWHERE SDM is illustrated in Figure 18.

Figure 18: Structure of the ANYWHERE SDM based on (Grässler and Pottebaum 2016)

For an initial instance of the ANYWHERE SDM the influence factors from the following influence fields were considered:

- Market and customer

- Society

- Civil protection by public authorities

- Technology

- Competitors (regarding self-p* tools by third-party enterprises).

- Economic Development

In these influence fields, an overall number of 56 influence factors including the required projections were identified. A detailed list of the influence factors collected for the ANYWHER SDM can be found in Annex III.

These influence factors can be used for an initial scenario development by interested third-party enterprises. The catalogue can be updated and tailored by users individually. Third-parties will then be able to provide their input an link this to ANYWHERE SDM: Individual influence factors can be made available to the public later.

Influence factors were taken from various sources: Either, they were defined on the basis of the research by WP5 partners such as CNRS, SSSA or KAJO. Their work for the guidelines described in section 3 was taken as the basis for the influence factors. An example for such an influence factor taken from the research on ELSI conducted by SSSA is shown in Table 2 below:

Table 2: Example of an influence factor taken from research conducted by WP5 partners

Influence Field	Number	Name	Source	Description	Projection ID	Description of projection
Technology	D8	Data Protection Legislation	SSSA	This influence factor describes the development of data protection legislation.	D8-1	Data protection legislation is relaxed. Data protection is easier to sustain by application developers.
					D8-2	Data protection is on a constant level. Legislation is not changed.
					D8-3	Data protection is getting stricter. This means higher effort for application developers to sustain compliance with legislation.

Further influence factors were identified by an in-depth study of existing statistical databases such as Statista etc. An example for such influence factors is shown in Table 3 below.

Table 3: Example of influence factors taken from existing statistical databases

Influence Field	Number	Name	Source	Description	Projection ID	Description of projection
Society	B1	Potential threat by extreme weather events	Mu-nich RE	This influence factor describes the real (measurable) global threat by extreme weather events.	B1-1	The number of extreme weather events increases up to 825 per annum globally.
					B1-2	The number of extreme weather events remains constant at a number of 750 events per annum globally.
					B1-3	The number of extreme weather events decreases to 675 events per annum globally.
	B4	Concerns of the population regarding climate change	Statis-ta	This influence factor describes the concerns regarding the climate change in the population (here: Germany). Therefore, the share of the population with big, some and no concerns is measured.	B4-1	The question "Do you have concerns regarding climate change and the impact?" reveals that 60% of the population have some concerns. 30% of the population have big concerns regarding climate change.
					B4-2	The question "Do you have concerns regarding climate change and the impact?" reveals that 54,1% of the population have some concerns. 25,7% of the population have big concerns regarding climate change.
					B4-3	The question "Do you have concerns regarding climate change and the impact?" reveals that 45% of the population have some concerns. 20% of the population have big concerns regarding climate change.

The projections are derived on the basis of the developments from the statistical databases. For the influence factor B1 "Potential threat by extreme weather events", the related data counts the number of extreme weather events in the timeframe from 1980 to 2016 on a global scale. The related statistics is shown in Figure 19.
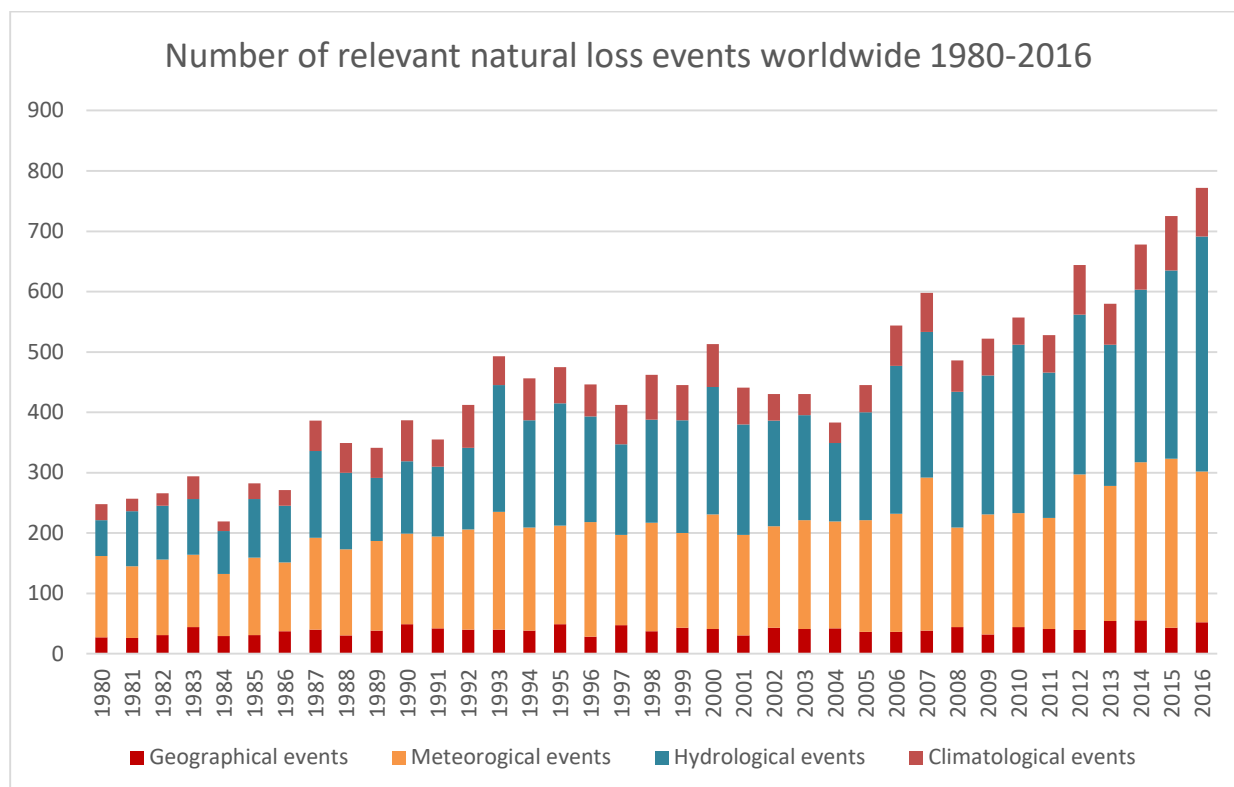
Figure 19 Related data for the influence factor B1 "Potential threat by extreme weather events" (Munich RE 2017)

Projections derived considered a stabilization as well as an in- and a decrease in the number of related extreme weather events. The related data for the influence factor B4 "Concerns of the population regarding climate change" is shown in Figure 20.
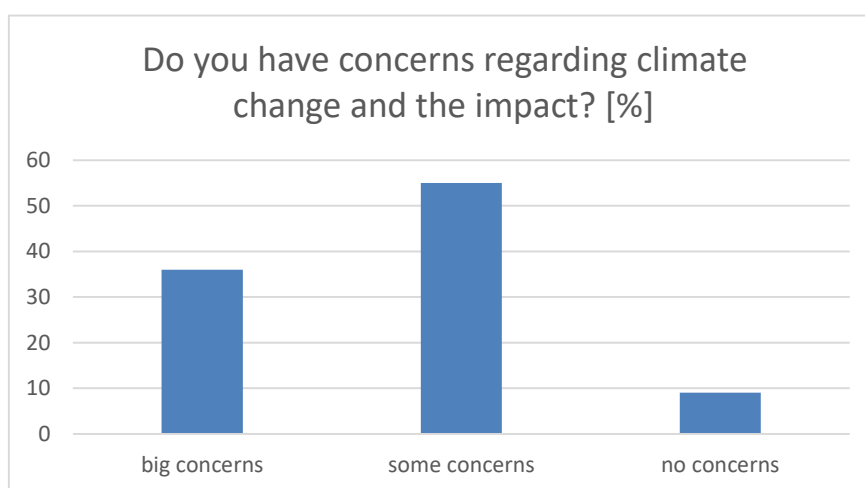

Figure 20 Related data for the influence factor B4 "Concerns of the population regarding climate change" (Statista 2017c)

The data related to this influence factor is not collected on an annual basis. Projections derived considered a stabilization in the share of the population with some and with big concerns as well as an in- and a decrease in these shares.

4.3   Implementation

The ANYWHERE scenario process model and the ANYWERE SDM have been implemented into a software prototype by UPB. The prototype is based on Mathworks MATLAB 2017a. Matlab as an environment was selected due to the pre-defined functions concerning neural networks used for consistency assessment. Additionally, MATLAB allows the export of stand-alone installations which will be required for a later application in the case studies. For each step in the scenario process model, a graphical user interface was developed. The user interfaces allow the selection of influence factors, the definition of projections (for influence factors not stored in the ANYWHERE SDM) and setting of all relevant parameters within the scenario process.
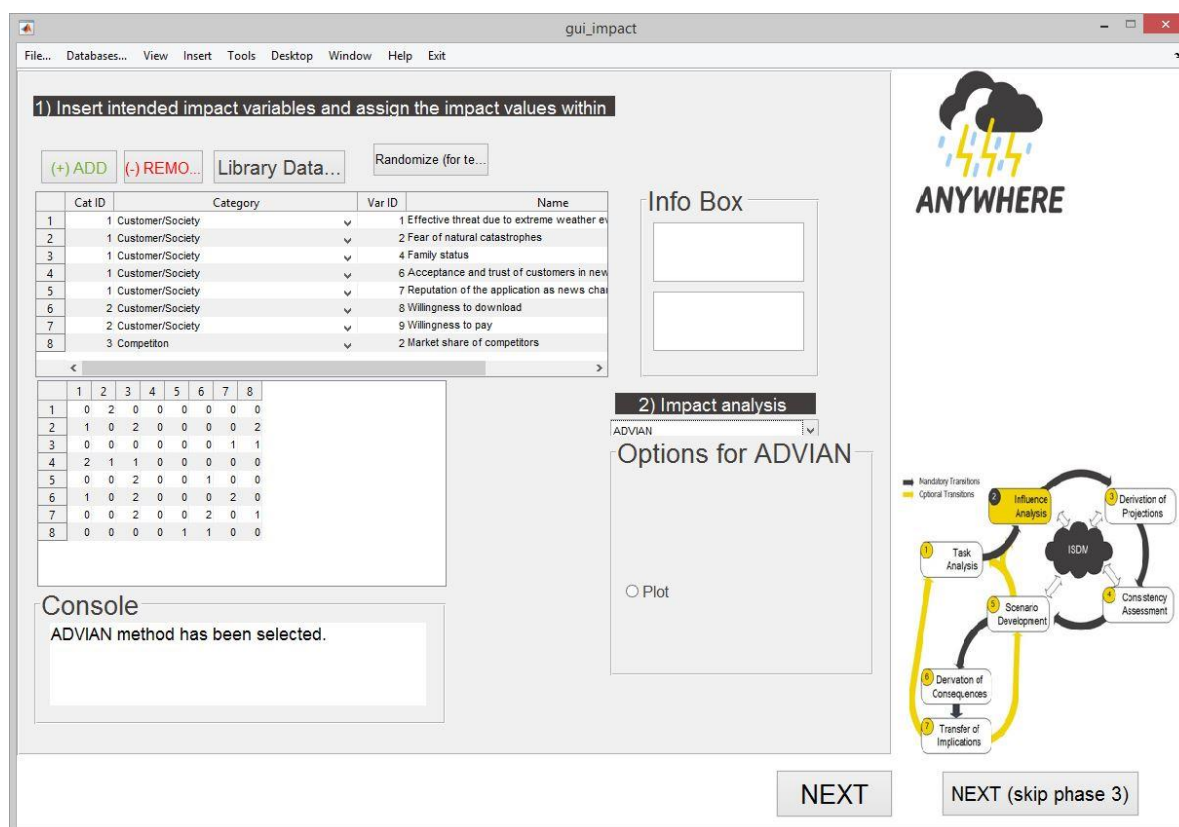

Figure 21 GUI for step 2: influence analysis in the ANYWHERE scenario tool

Starting with the first step of the process model, the user is guided through all steps of the process model. After having defined scope and purpose of the scenario, influence factors can be selected from the ANYWHERE SDM (see section 4.2 for details). To reduce the complexity of the scenario development, key influence factors are selected. All relevant selection rules are stored in the ANYWHERE SDM. Therefore, the ANYWHERE SDM contains an initial impact matrix with all influence values. If additional influence factors are defined by the user, influence values must be entered. After the selection of key influence factors, projections are loaded from the ANYWHERE SDM (in case of influence factors selected from here) or must be defined by the user. Consistency values are automatically loaded or must be defined and adapted. Selection for scenarios are implemented in the ANYWHERE SDM. Finally,

scenarios are selected and exported into a workshop-compatible format such as DOC, PPT or PDF. An exemplary scenario description is shown in Figure 22.

Results of the scenario process are presented in the scenario reports. Assumption taken are outlined, relevant influence factors are listed and scenarios are described as a bullet-point-summary for the end used. This document can then be used as an input for decision making, strategic planning or other workshops as well as discussions by third-party users.
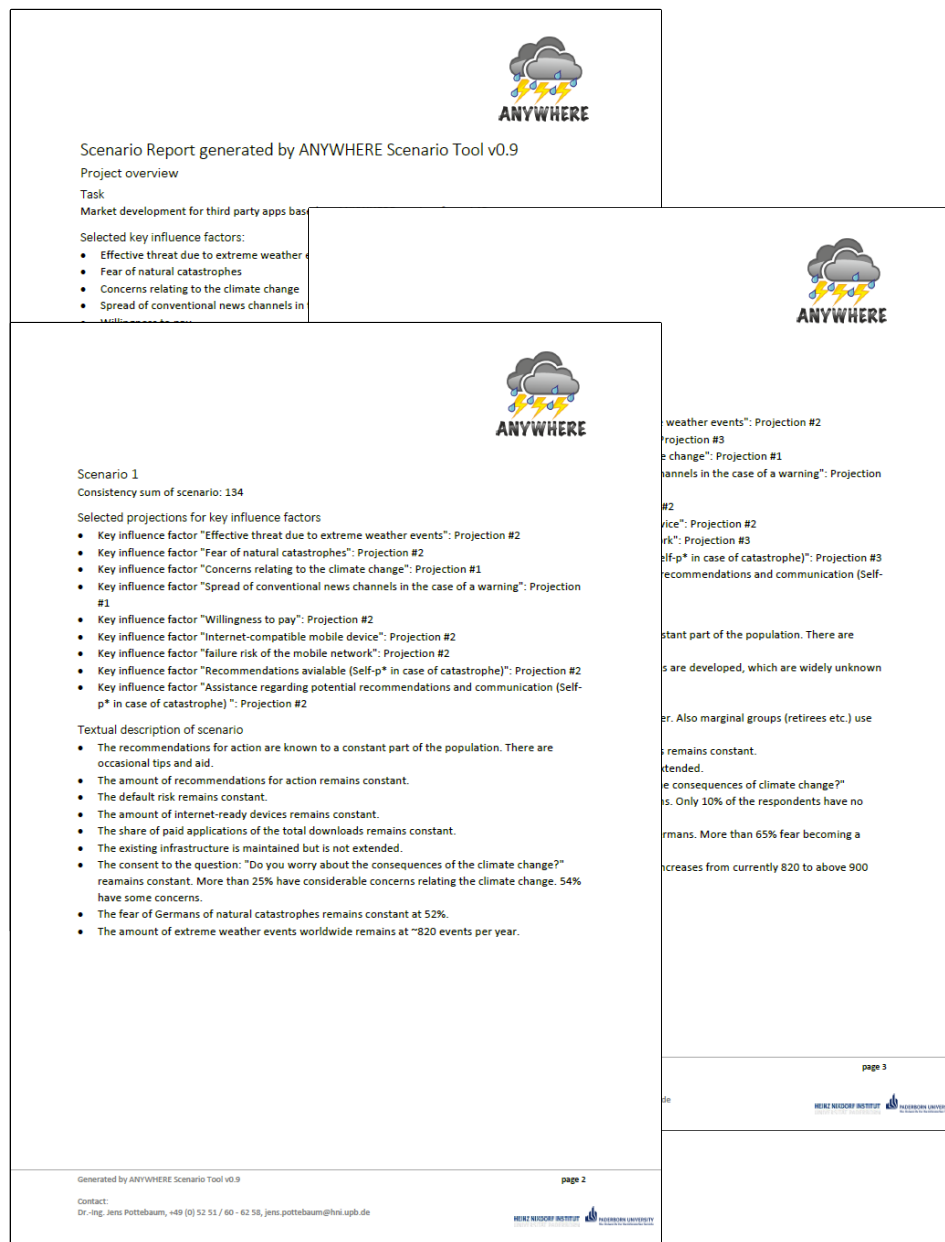

Figure 22 Scenario Report exported from ANYWHERE Scenario Tool

5 ANYCaRE Game

This section presents a role-playing game designed to investigate crisis decision-making in weather-related risks. ANYCaRE allows us to explore how decision makers and stakeholders interact with scientific and operational outputs considered primarily within ANYWHERE project. The main target of ANYWHERE is to provide civil protection authorities and regional institutions across Europe with a supportive tool to better anticipate and respond to extreme and high-impact weather and climate events. Therefore, Level 2 (i.e., emergency group) was considered as the most relevant one to be simulated in ANYCaRE's first implementation. Flooding was selected as a prototype case since it is the major weather-induced hazard in Europe and a common hazard under consideration in the six implementation sites of ANYWHERE (i.e., Canton of Bern in Switzerland, Catalonia in Spain, South Savo in Finland, Genoa in Italy, Stavanger in Norway and North Corsica in France). Though, applications to other weather-induced risks such as wildfires were encouraged by the participants during the ANYWHERE workshop in Helsinki and are considered for the future.

Rather than a single tabletop role-playing, we vision ANYCaRE as a broad experiment campaign that will encompass various versions of games to be applied at first within ANYWHERE project. A series of future expansions is considered to: i) adjust scenarios to other weather hazards including multi-hazard cases and complex cascading effects commonly challenging European cities; ii) test additional models and technological innovations (e.g., crowdsourcing tools, dialog systems, internet-based apps) to be developed as decision-support products in ANYWHERE platform; iii) establish other formats of serious gaming such as online or board games to attract different audience (e.g., stakeholders, general public, pupils) and subsequently, enlarge the amount and variety of feedbacks.

5.1 General Concept and hypotheses

ANYWHERE Crisis and Risk Experiment (ANYCaRE) is primarily developed to obtain conclusions on "if "and "how" an improved multi-model forecast output can support the decision chain in European warning systems towards better responses. The multi-model output provided in ANYWHERE platform includes information on i) live data on exposure and vulnerability derived from social media and crowdsourcing (WP4); ii) innovative self-preparedness and self-protection tools (WP5); iii) impact assessments and maps (WP6). ANYCaRE is first designed as a tabletop role-playing game (or pen-and-paper role-playing game) for adults in which participants act their role through speech while sitting in a comfortable setting (Cover 2005). Especially, we benefit from researchers, developers, and potential users and other stakeholders meeting frequently to define needs, capabilities and limitations in the frame of ANYWHERE project. Participants play the game exploring uncertainties and dilemmas embedded in the real-time warning and emergency response processes. Within Task 5.2 ANYCaRE aims to serve as a communication tool to i) enhance participants' understanding of the weather-related decision-making complexities (e.g., forecasting/warnings, official emergency actions, self-protection); ii) facilitate collaboration and coordination between players who have distinct field of expertise and belong to various national or local agencies/authorities across Europe. In the context of WP1, the role-playing game could also be used as an evaluation tool.

Participants are invited to play the roles of different actors of the warning system in order to decide about emergency actions to be taken in response to the threat of a weather hazard (here flooding) in a European context. The roles to be played and the potential decisions/actions to be chosen by the players are pre-defined based on qualitative evidence gathered during the ANYWHERE's pilot site workshops that took place in March and April 2017 (see Deliverable D1.2) and in previous research (Ruin et al. op. 2009; Ruin et al. 2014). Researchers and practitioners from WP5 who lead the game design provide expertise in flood and flash flood hazards and social vulnerability to short-fuse weather events. The game is built based on the hypotheses that:

1. ANYWHERE products may help forecasters, and emergency managers to better understand the nature and severity of the incoming hazard by a) improving the geographic and temporal specificity of the warnings, and b) providing information on the potential social impacts associated with the forecasted event.

2. ANYWHERE products may support forecasters, and emergency managers to better communicate warnings and emergency messages by providing answers to the questions of "what?", "where?", "when?", "why?", and "how to respond?" (*Public Response to Alerts and Warnings Using Social Media* 2013; Jacks, Davidson, and Wai 2010).

3. As a consequence of the preceding assumptions, ANYWHERE products may enforce the public's/targeted-users' (self-) protective actions for efficient emergency response.

5.2   Experiment set up

5.2.1   Roles for the players

ANYCaRE is designed to simulate one or more of the three main levels in the warning-system decision chain (i.e., 3 groups of roles to be played in the game) illustrated in Figure 1: i) Level 1: Weather Forecasters; ii) Level 2: Emergency managers/Authorities in charge of civil protection; iii) Level 3: General public and targeted users (private companies). Depending on the role group (e.g., forecasters, emergency managers, and citizens), we propose a series of realistic constrains and targets and we invite participants to choose some action(s) from a given list of options. Every group should be preferably played with 10 to 15 players. Each player is attributed a certain sub-role (e.g., expert hydrologist, mayor, first responder) with the objective of either contributing to the collective decision making (Level 1 and 2) or deciding individually what is the best protective option for the type of role that is played (Level 3). The collective or individual decision to be made consists in selecting a warning or emergency response activity according to the available information and related uncertainties. Following this first step, the players have to select (among some pre-established options) the best way to communicate those decisions to the targeted public. For example, forecasters' group (Level 1) need to interpret the hazard model outputs to choose the level of warning to be issued and communicated to the emergency managers (Level 2) and the general public (Level 3). Then, emergency managers evaluate the situation and decide what to do based on the forecasters' inputs and their own assessment of the

level of exposure, potentially supported by impact-based products and crowd-sourced information. The members of the general public may decide for their own self-protective actions based on their personal constraints by considering or ignoring the information communicated by Level 1 and/or Level 2. Although interaction between the various decision levels is an interesting component in ANYCaRE, as mentioned above, the game is designed in a way that independent game sessions can be also played for each role group, separately. To do so, the GM or another auxiliary non-player person provides relevant information required as inputs for the decision-making in the group.
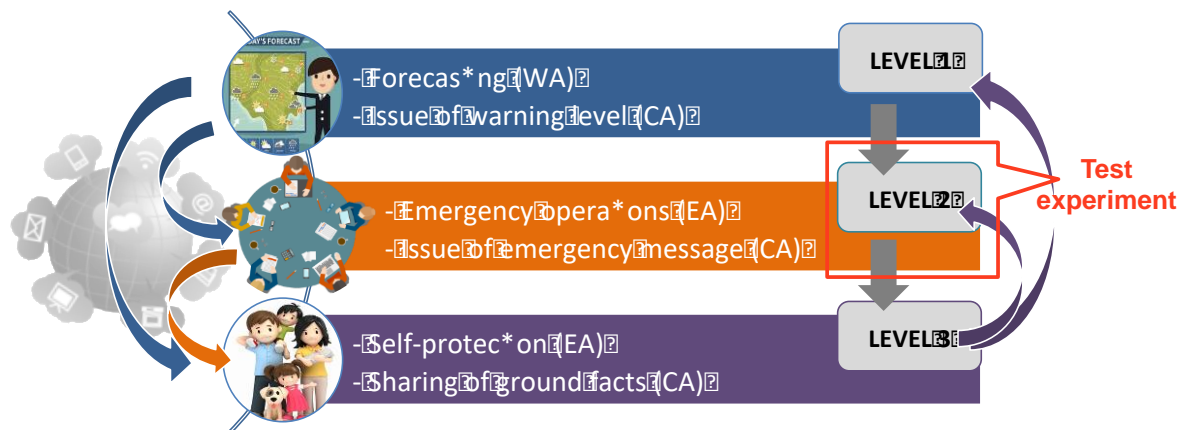

Figure 23 Illustration of the sequential levels considered in the simulated decision chain in ANYCaRE. Decisions of the players represented in the three levels may be related to warning activities (WA), emergency activities (EA) or communication activities (CA). The curved arrows depict the potential flow of information among the three levels.

5.2.2 Storyline related to flood threat

Inspired by European case studies we introduce "Anywhere City"; an imaginary agglomeration located at the foot of highlands drained by two fast-reaction rivers and three distinct areas: A, B and C (Figure 24). Many parts of the city are exposed to flooding of small to medium size catchments (few km^2 to few hundred km^2) with responses time ranging from few minutes to few hours, respectively. Area A is a mountainous residential area in a small basin. It is a flood prone zone close to the forest where campsites are located. Area B is the main urban area where the majority of schools, hospitals and other public services are located. Finally, area C surrounds the main bridge of Anywhere City. This includes a recreation place where the annual fall festival of Anywhere City named "AnyDay" is taking place. Areas B and C belong to bigger catchments with slower reaction. The game starts on a Monday, five days before the "AnyDay" festival takes place with activities across the river and a big concert with famous singers close to the bridge area (area C in Figure 24). The peak of the festival is planned for Saturday when participants are expected to reach the number of 10,000. Since it is an outdoor festival, everybody is checking out the weather to ensure that Anywhere City will keep its tradition in the festival and they will enjoy next weekend camping and celebrating in the region.
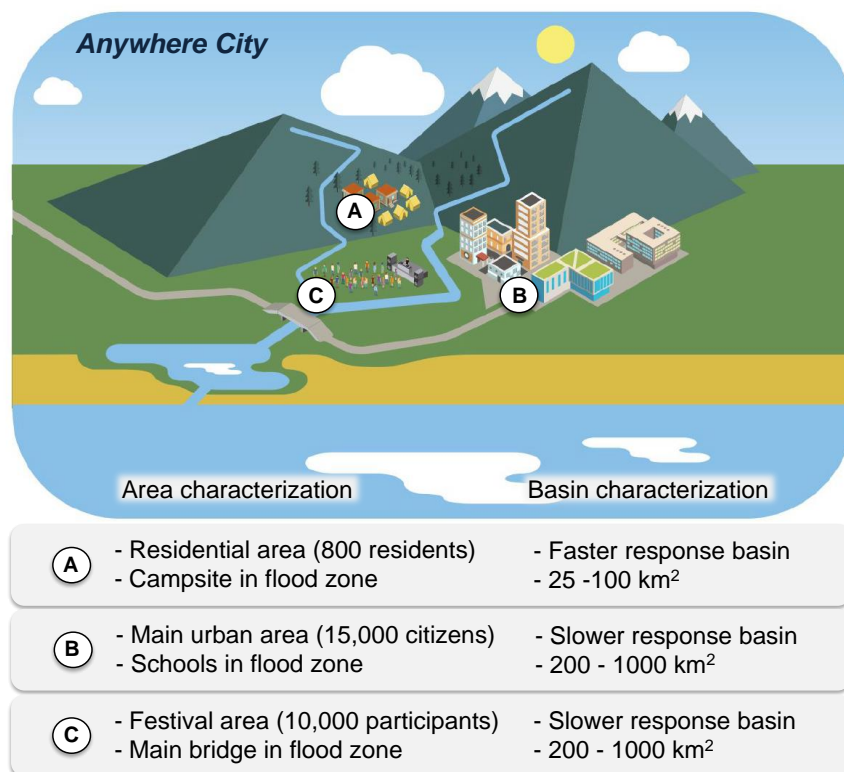
Figure 24 Presentation and brief description of the three areas considered in the virtual 'Anywhere City' of ANYCaRE. Each area includes attributes for special consideration in flood emergency decision-making (e.g., camping, schools, dangerous intersections) representing existing critical points in ANYWHERE's pilot sites.

5.2.3 Role-playing gaming simulations

Once the game moderator or master (GM) presents the storyline and the initial conditions in the city by assigning to the group a certain amount of

- citizens' safety credits;

- citizens' wellness credits;

- tokens (budget),

each player is provided with a sub-role defining his responsibility during the game. The period of concern for the game are the five days of the week (from Monday to Friday) preceding the day of the festival. On Monday and Tuesday, the GM provides and comments medium-range deterministic precipitation forecasts produced by the European Centre for Medium-Range Weather Forecasts (ECMWF) and hydrological forecasts in order to get the players familiar with the products and slowly put them in the context. Each of the three following days represents one round of the game for which collective decisions (selecting from the decision-reporting list) are requested from the players. By using three rounds we allow the players to experience evolving hydro-meteorological facets and test different decision-support tools, which give more and more accurate information as it gets closer to the event occurrence. Each game day (round) the players receive updated probabilistic forecasts for precipitation (mm) and river discharge (m^3/s and the corresponding return period) as well as contextual

information for each of the areas A, B, and C. These data mainly refer to flood early warning products released by the European Flood Awareness System (EFAS); the first operational European system monitoring and forecasting floods across Europe (Smith et al. 2016). As a second trial the players get new ANYWHERE products including improved probabilistic impact-based forecasts, risk assessments and ground observations from social media, and are given the opportunity to rethink and modify their decision if necessary. Collective decisions are recorded by filling up one worksheet for the all group in each game day. The game-designers' team acts as observers of the playing process and based on their observations they facilitate the post-experiment debriefing.

5.3 Testing: Helsinki Experiment

5.3.1 Playing ANYCaRE

The first implementation of ANYCaRE was carried out in the frame of ANYWHERE's 2nd workshop in Helsinki (September, 2017). This workshop gathered 161 attendees including researchers, forecasters, civil protection and representatives of related companies in Europe to follow up ANYWHERE's innovations and contribution to the response-to-weather-extremes era. As a beta testing, Helsinki experiment focused on Level 2 exploring decision-making in a virtual Emergency Operation Center (EOC). The game session was organized with a group of sixteen players to compose the EOC of Anywhere City. Among the players there were PhD students and researchers in weather-related hazards, developers and modellers, emergency managers and operational forecasters. Therefore, participants' experience in weather-induced risk modelling and management ranged from low (i.e., < 5 years) to high (i.e., > 10 years) providing a genuine diversity to be reflected in the game. Each player was given a specific sub-role to act as representative of one of the following institutions: i) hydro-meteorological services; ii) first responder services, iii) municipality; iv) school services; v) road services. Every player, therefore, had certain interests and aspects to address in the decision-making (e.g., weather warnings, evacuation of places, festival organization, school closure, road closures). One additional person was designated to act as the leader of the Emergency Operation room. Based on the discussion and advices from the others, he/she had to come up with a collective decision to be implemented and communicated.

The role of the emergency management group was to keep the population safe and ensure smooth execution of everyday life activities in Anywhere City while managing a given budget. In case of weather uncertainty, this is a challenging task including a set of dilemmas. Deciding to alert the population and push people to stop their daily activity to take protective measures in areas not hit by flooding might create unhappiness and loss of confidence in public authorities. People are looking forward to the "AnyDay" festival; potential cancelation requires careful consideration to preserve people's wellness without risking their security. We assume that the organization of the festival itself represents an expensive investment (20,000 tokens) from the municipality. Every decision taken by the emergency management group has a cost either in terms of economic value (token), human safety or wellness. The objective of the group was to undertake emergency activities avoiding "costly" decisions that might prove to be unnecessary at the end of the game. Distinct decisions

could be made for one or more of the three areas in Anywhere City (area A, B or C in Figure 2).

In Helsinki experiment, the game included three rounds simulating decisions from Wednesday to Friday in ANYCaRE scenario. In each round, the players received area-specific information so that they could make distinct safety choices adapted to the predicted hazard in each area of Anywhere City. For each round, the players would have two trials of decision. The first one is based on existing hydro-meteorological products. The second one proposes additional ANYWHERE products including high-resolution precipitation maps, and flooding probabilistic forecasts. Sometimes, ANYWHERE products would also include Rapid Impact Assessment map that combines event-based hazard maps with exposure information to assess several categories of impacts such as affected population and damages (Dottori et al. 2017) and Tweets and posts from a hypothetical crowdsourcing system especially drawn for the Helsinki experiment. In each round, the leader of the Emergency Operation room invited the role-players to express their opinion on the situation and decide what to do to insure citizens' security given each actor's constraint.

5.3.2 Preliminary results

In the debriefing phase after the simulation, the game observers invited the players to provide feedback on both the experiment set up and the ANYWHERE products presented in the game. The participants commented on either positive remarks or potential improvements related to those two aspects. Short post-it notes were gathered by the game observers and were placed in the corresponding category on the board to open discussion (Figure 25).

Figure 25 Role-playing session of ANYCaRE in Helsinki (20 September 2017). Players' a) debate during the simulation, and b) post-experiment debriefing notes.

5.3.2.1 Contribution of ANYWHERE products

In a broad view, the players complied well with the scenario requests. In the debriefing some players mentioned that detailed meteorological data are not trivial to non

forecasting-specialists: 'Difficult information for operators in emergency centres'; 'some of the products are very difficult to interpret if you haven't seen them before'. Yet, hydrometeorological forecasting was observed to dominate the decision-making and related discussion compared to impact estimations provided by ANYWHERE. Further examination is required to conclude if the limited use of the new impact-based tools in the game was due to lack of players' familiarity with the new products opposed to previously seen operational tools. Other potential explanations to be explored may include: i) inadequate understanding on how to handle the new impact information during crisis; ii) absence of trust in the new developments; iii) incapability of the adopted visualizations to convey helpful information.

On the other hand, the players seemed to largely rely on impact observations assumed to be reported through comments and pictures on social media. This was obviously the case in the third and last round where the players changed totally their emergency decision after receiving a crowdsourced image showing the bridge blockage with wood and debris. The payers shifted from "no action" to the set up of flood protection measures in area C, and finally, the cancelation of the festival in Trial 2. They agreed that online crowdsourcing tools might be a great provider of ground facts necessary to enhance situational awareness of authorities especially in cases of high hydrometeorological uncertainties and forecasting failures. Future developments were suggested to geolocate and present the social media content on a map to help emergency responders to clearly identify public's need for assistance and its expectations for official protection actions within the area of their responsibility.

Although still under development, the examples of ANYWHERE products included in the game were found to reduce the overall uncertainty in the decision-making process. The players acknowledged that the variety of new products increased their sureness about specific emergency activities to be chosen and communicated in particular areas. In all the three rounds they rated their confidence to maximum when they passed to Trial 2.

5.3.2.2 Gaming experience

According to the players and observers of the Helsinki experiment, this experience happened to be very well appreciated. Players found that 'very interesting to try roles different from the usual day-by-day experience'. Similarly to previous game studies, the personality of the player was observed to be an important factor during the game; with the more extrovert and talkative players to dominate the decision-making and the shyer ones to participate much less in the debate (Mossoux *et al.*, 2016). Shy players apposed their arguments though, when they felt the need to defend a specific priority related to their role (e.g., cancelation of school-related activities). To improve this aspect, it was suggested that more detailed responsibilities and constrains should be assigned to each role at the beginning of the game in future applications.

According to the players, the game 'was very fun' and 'clearly demonstrated the benefit of certain ANYWHERE data'. The players recognized ANYCaRE scenario as very realistic and presented a strong commitment to the storytelling. In the debriefing session, they mentioned that the simulation was motivating and 'kept the stress', and the whole set up was a 'very representative group exercise'. That made participants to appreciate the game and recommend it for play in future events. Players in Helsinki

introduced further aptitudes of ANYCaRE; emphasizing educational scopes such as coaching emergency services about the use and potentiality of ANYWHERE products for crisis management: 'The game can be used in my organization to test the emergency response'.

5.4 Conclusions and perspectives

ANYCaRE is developed in accordance with ANYWHERE's releases to provide a feedback loop for further improvements to developers. Although the experiment is basically created to value the contribution of new weather-related decision-support outputs, role-playing or serious gaming offers a promising setting to address multiple communicational or educational needs. Game implementations of ANYCaRE may be used in the future to inform stakeholders and the general public about ANYWHERE's advancements and availability and/or train experts and civil protection services on the use of modern decision-support tools. Furthermore, experiments may engage either experts or general public to draw more detailed conclusions on the effectiveness of forecast visualizations and delivered warning and emergency messages (i.e., content, structure and format) in terms of comprehension and mobilization of action; aspects currently studied through the guidelines proposed in WP5. Such knowledge is prerequisite for the anticipation of effective crisis communication strategies and relevant emergency responses to prevailing weather threats.

6 References

Bradfield, Ron, George Wright, George Burt, George Cairns, and Van Der Heijden, Kees. 2005. "The origins and evolution of scenario techniques in long range business planning." *Futures* 37 (8): 795–812. doi:10.1016/j.futures.2005.01.003.

Cover, Jennifer Ann Grouling. 2005. "Tabletop Role-Playing Games: Perspectives from Narrative, Game, and Rhetorical Theory." Master Thesis, North Carolina State University. https://repository.lib.ncsu.edu/handle/1840.16/424.

Dottori, Francesco, Milan Kalas, Peter Salamon, Alessandra Bianchi, Lorenzo Alfieri, and Luc Feyen. 2017. "An operational procedure for rapid flood risk assessment in Europe." *Nat. Hazards Earth Syst. Sci.* 17 (7): 1111–26. doi:10.5194/nhess-17-1111-2017.

Dredge, Stuart. 2014. "Facebook Safety Check will help tell friends you´re safe during." Accessed November 08, 2017. https://www.theguardian.com/technology/2014/oct/17/facebook-safety-check-friends-disasters.

Endsley, Mica R., and Debra G. Jones. 2012. *Designing for situation awareness: An approach to user-centered design.* 2nd ed. Boca Raton, FL: CRC Press.

Gordon, T. J., and H. Hayward. 1968. "Initial experiments with the cross impact matrix method of forecasting." *Futures* 1 (2): 100–116. doi:10.1016/S0016-3287(68)80003-5.

Grässler, Iris, and Jens Pottebaum. 2016. "Reliable Input for Strategic Planning: the Integrated Scenario Data Model." In *6th International Conference Production Engineering and Management*, edited by Franz-Josef Villmer and Elio Padoanao. 1 vol, 99–110.

Groneberg, Christoph, Thomas Knoch, Vitali Heidt, and Jutta Helmerichs. 2017. "Analyse internationaler Bevölkerungsschutz-Apps. Ergebnisse einer Längsschnittstudie (März 2016 und Februar 2017): Bericht im Rahmen des Teilprojektes Sozialwissenschaftliche Aspekte und Nutzerakzeptanz im BMBF-Verbundsprojekt „Smartphone-based Communication Netzworks for Emergency Response (smarter)"."

Guidance on Sustainability Impact Assessment. 2010. Paris: OECD.

Jacks, Elliot, Jim Davidson, and H. G. Wai. 2010. "Guidleines on early warning systems and application of nowcasting and warning operations." Accessed November 14, 2017. https://www.wmo.int/pages/prog/amp/pwsp/documents/PWS-21.pdf.

Jens. 2016. "Google Play vs. Apple App Store: Statistiken und Zahlen rund um die beiden App Stores." Accessed November 08, 2017. https://www.googlewatchblog.de/2016/11/google-play-apple-app-2/.

Kritis. "Kritische Infrastrukturen - Definition und Übersicht." Accessed November 23, 2017. https://www.kritis.bund.de/SubSites/Kritis/DE/Einfuehrung/einfuehrung_node.html

Kromar, Helmut, Marcus Dapp, Robert Zepic, Lena-Sophie Müller, Sabrina Dietrich, Michael Boberach, and Theresa Moy. 2016. "eGovernment Monitor 2016: Nutzung

und Akzeptanz digitaler Verwaltungsangebote – Deutschland, Österreich und Schweiz im Vergleich." http://www.egovernment-monitor.de/fileadmin/uploads/Studien/2016/160915_eGovMon2016_WEB.pdf.

McCormack, Simon. 2015. "People Are Abusing A Facebook Tool Ment To Help People In Nepal." Accessed November 08, 2017. https://www.huffingtonpost.com/2015/05/13/facebook-safety-check-nepal_n_7275802.html.

Mietzner, Dana. 2009. *Strategische Vorausschau und Szenarioanalysen: Methodenevaluation und neue Ansätze.* 1. Aufl. Gabler Research : Innovation und Technologie im modernen Management. Wiesbaden: Gabler.

Mietzner, Dana, and Guido Reger. 2005. "Advantages and Disadvantages of Scenario Approaches for Strategic Foresight." *Int. J. Technology Intelligence and Planning* 1 (2): 220–39.

Millett, Stephen M. 2003. "The future of scenarios: Challenges and opportunities." *Strategy & Leadership* 31 (2): 16–24. doi:10.1108/10878570310698089.

Pottebaum, Jens, Philipp Scholle, and Iris Gräßler. 2017. "Vorgehens- und Datenmodell zur strategischen Planung innovativer Dienstleistungen im Katastrophenschutz." In *INFORMATIK 2017. Gesellschaft für Informatik.* P-275, edited by M. Eibl and M. Gaedke, 1339–52. Lecture Notes in Informatics (LNI): Köllen Verlag.

Public Response to Alerts and Warnings Using Social Media. 2013. Washington, D.C. National Academies Press.

Reibnitz, Ute von. 1991. *Szenario-Technik: Instrumente für die unternehmerische und persönliche Erfolgsplanung.* Wiesbaden: Gabler.

Ruin, Isabelle, Jean-Dominique Creutin, E. Gruntfest, S. Anquetin, and Céline Lutoff. op. 2009. "Human vulnerability to flash floods: Addressing physical exposure and behavioural questions." In *Flood risk management: Research and practice : proceedings of the European conference on flood risk management research into practice (FLOODrisk 2008), Oxford, UK, 30 September-2 October 2008*, 1005–12. Boca Raton (Fla.), London, New York: CRC Press.

Ruin, Isabelle, Céline Lutoff, Brice Boudevillain, Jean-Dominique Creutin, S. Anquetin, M. Bertran Rojo, L. Boissier et al. 2014. "Social and Hydrological Responses to Extreme Precipitations: An Interdisciplinary Strategy for Postflood Investigation." *Wea. Climate Soc.* 6 (1): 135–53. doi:10.1175/WCAS-D-13-00009.1.

Schiavenza, Matt. 2015. "Updating Facbook to Say `I´m Safe." Accessed November 08, 2017. https://www.theatlantic.com/international/archive/2015/04/telling-the-world-youre-safe-through-facebook/391484/.

Schumpeter, Joseph Alois. 1997. *Theorie der wirtschaftlichen Entwicklung: Eine Untersuchung über Unternehmergewinn, Kapital, Kredit, Zins und den Konjunkturzyklus.* 9. Aufl., unveränd. Nachdr. der 1934 erschienenen 4. Aufl. Berlin: Duncker und Humblot.

Smith, P. J., F. Pappenberger, F. Wetterhall, J. Thielen del Pozo, B. Krzeminski, P. Salamon, D. Muraro, M. Kalas, and C. Baugh. 2016. "On the Operational

Implementation of the European Flood Awareness System (EFAS)." In *Flood Forecasting*, 313–48: Elsevier.

Statista. 2017a. "Anzahl der Smartphone-Nutzer in Deutschland in den Jahren 2009 bis 2016 (in Millionen)." Accessed November 09, 2017. https://de.statista.com/statistik/daten/studie/198959/umfrage/anzahl-der-smartphonenutzer-in-deutschland-seit-2010/.

———. 2017b. "Anzahl der Smartphone-Nutzer in Deutschland nach Altersgruppen im Jahr 2017." Accessed November 09, 2017. https://de.statista.com/statistik/daten/studie/459963/umfrage/anteil-der-smartphone-nutzer-in-deutschland-nach-altersgruppe/.

———. 2017c. "Survey: Machen Sie sich Sorgen um die Folgen des Klimawandels?" Accessed November 08, 2017. https://de.statista.com/statistik/daten/studie/261508/umfrage/sorgen-um-folgen-des-klimawandels/.

Stuttgarter Nachrichten. 2017. "Warn-App "Nina" springt an. Vorsicht vor vergifteten Lebensmitteln." Accessed November 08, 2017. http://www.stuttgarter-nachrichten.de/inhalt.warn-app-nina-springt-an-extra-wegen-vergifteter-lebensmittel-warn-app-nina-springt-an-foto-aktuell-geplant.e8cb7c3c-a3b7-49b9-b4e2-b8b38cb301ce.html.

Tapinos, Efstathios. 2013. "Scenario planning at business unit level." *Futures* 47:17–27. doi:10.1016/j.futures.2012.11.009.

"The Standish Group Report - CHAOS." 2014. Unpublished manuscript, last modified November 08, 2017. https://www.projectsmart.co.uk/white-papers/chaos-report.pdf.

U.S. Department of Health & Human Services. 2017. "Explanation of Ratings." https://webstandards.hhs.gov/guidelines/about_ratings?id=13.

van Staalduinen, Wileke. 2015. "Socio economic environmental impact tool (see-it) - Conceptual framework." Accessed November 08, 2017. https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiggYLZi6_XAhWJoqQKHXfQD5UQFggwMAA&url=http%3A%2F%2Fwww.ccre.org%2Fbibliotheques%2FgetFile%2F7a335c06ee703d4fbcb03aade7b3eed0208a8663&usg=AOvVaw3EbA7EsnbM8pcUpLwCjTCf.

VDI 2206 - Design Methodology for Mechatronic Systems. 2004, no. 2206. Düsseldorf: Verein Deutscher Ingenieure.

Annex I: Self-P* Tools

Tool	Way of receiving information	Use case: weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating	Type of communication	Information: Offical	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	System function: Emergency call-/ Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Personalization: Information	Choose type of	Specification of the (current)	Notification	User profile	Pre-pa-ration: Training	Emergency plan	Behaviour pattern	Area of application
Meine Pegel	App, Web	X											A2C	X	X																		X					nationwide (Europe)
NINA – Notfall-Informations- und Nachrichten App	App							X					A2C C2C	X					X	X			X										X				X	nationwide
WarnWetter	App	X					X						A2C	X	X			X					X								X			X				nationwide
KATWARN – Warn- und Informationsdienst für die Bevölkerung	App	X					X						A2C C2C	X					X	x			X			X	X				X					X	nationwide

Too	Way of receiving information	Use case: weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating	Type of communication	Information: Offical	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	System function: Emergency call-/Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Personalization: Information	Choose type of	Specification of the (current)	Notification	User profile	Pre-pa-ration: Training	Emergency plan	Behaviour pattern	Area of application
SAIP – Systeme d'Alerte et d'Information des Populations	App	X						X		X			A2C	X									X									X				X	france
Natural Disaster Monitor	App						X						A2C				X				X																	worldwide
Disaster Alert	App						X						A2C C2C		X		X		X							X												worldwide
ubAlert	App, Web	X			X			X					A2C B2C				X		X										X	X	X	X					worldwide
Google Maps	App, Web					X							A2C				X																				worldwide

Tool	Way of receiving information	weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating	Type of communication	Official	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	Emergency call-/Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Information	Choose type of	Specification of the (current)	Notification	User profile	Training	Emergency plan	Behaviour pattern	Area of application
Facebook	App, Web		X					X	X				B2C C2B											X	X													worldwide
MeteoGroup	Web	X														X																						worldwide
iSockets	App, SMS			X	X								C2A C2C		X		X							X									X					worldwide
allert4all	App							X	X					X	X									X						X			X					Europe
umweltinfo	App	X					X						A2C	X					X														X	X				Bavaria (Germany)

Tool	Way of receiving information	Use case: weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating	Type of communication	Offical	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	Emergency call-/ Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Information	Choose type of	Specification of the (current)	Notification	User profile	Training	Emergency plan	Behaviour pattern	Area of application
Allergiehelfer	App	X											A2C			X			X																			Germany
Luftqualität Niedersachsen	App	X											A2C					X																				Lower Saxony (Germany)
WayGuard	App			X								X	A2C B2C		X								X		X		X										X	Germany
SafeMyPlace	App, Web		X										A2C C2C	X				X	X		X					X		X									Germany
GSA	App								X				A2C			X	X																					Germany

Tool	Way of receiving information	Use case											Type of communication	Functions/ information																					Area of application
														Information							System function								Personalization					Pre-pa-ration			
		weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating		Offical	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	Emergency call-/ Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Information	Choose type of	Specification of the (current)	Notification	User profile	Training	Emergency plan	Behaviour pattern	
AlertsPro	App	X					X						B2C C2C	X	X								X	X	X							X					Europe USA
ERV travel & care	App										X		B2C	X				X					X									X					worldwide
BIWAPP	App						X	X	X				A2C C2A								X		X			X	X					X	X				Germany
Safeture	App	X									X		A2C	X												X						X					worldwide
Road Master	App	X											A2C	X	X								X														Germany

Too	Way of receiving information	Use case											Type of communication	Functions/ information																							Area of application
														Information							System function								Personalization					Pre-paration			
		weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating		Offical	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	Emergency call-/Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Information	Choose type of	Specification of the (current)	Notification	User profile	Training	Emergency plan	Behaviour pattern	
HandHelp - Notruf Nofall App	App, Web			X		X		X	X				C2A C2C							X	X			X	X				X				X				worldwide
ICE - In Case of Emergency (ICE - Im Notfall)	App					X							C2C					X			X			X								X	X				worldwide
CrisisGo - safety through communi-cation	App, Web	X	X				X	X	X				C2A C2C				X		X					X					X						X		worldwide
ReUnite®	App					X							A2C C2A													X											
Emergency	App, Web					X	X	X					C2C			X																			X		worldwide

Too	Way of receiving information	Use case											Type of communication	Functions/ information																							Area of application
														Information							System function								Personalization					Pre-pa-ration			
		weather	Terrorism	Crime	Epidemic	Emergency	natural disaster	incidents/ crisis	Hazardous	(major) event	Traveling	Locating		Offical	Real-time monitoring/	Forecasting	Map /satellite/	Database	Detailed	General emergency	Emergency call-/ Request-for-	Hazard-	Alert-function	Locating-function	Safety-button	Sharing-function	Watch-function	Feedback-	Information	Choose type of	Specification of the (current)	Notification	User profile	Training	Emergency plan	Behaviour pattern	
Earthquake Alert	App						X						A2C C2C	X			X		X										X								worldwide
ISIS-Alert	App	X	X		X			X	X	X			B2C	X			X						X											X			X	worldwide
Moovit	App, Web									X		X	B2C		X		X	X															X				worldwide

Annex II: Collection of guidelines and relations

The collection of guidelines can be found attached to this Deliverable at the end of the document.

Table 4: Key for Table 5: Relations between guidelines

#	Partner responsible	Title of the guideline
1	CNRS	How to ensure effective communication of risk information, warnings and emergency messages?
2	CNRS	How to promote interaction between authorities and the public?
3	CNRS	How to identify the most relevant timing to deliver emergency messages?
4	RINA	How to enhance self-response of distribution companies during severe weather events?
5	FMI	How to provide official information for private and public in different weather conditions?
6	FMI	How to design official self-p* tools?
7	HYDS	How to provide non-official self-protection tools for private activities at risk?
8	KAYO	How to establish a collaboration with established crowdsourcing initiatives?
9	KAYO	How to design a successful crowdsourcing initiative?
10	SSSA	How to respect people's right to access to risk and crisis informations
11	SSSA	How to include data protection by Design Tools?
12	SSSA	How to conduct a Data Protection Impact Assessment?
13	SSSA	How to designate a data protection officer?
14	SSSA	How to respect data protection principles?
15	SSSA	How to respect data subject rights?
16	SSSA	How to deal with digital divide in emergency situations?
17	SSSA	How to Comply with EU droughts strategy?
18	SSSA	How to control and deal with false alarms?
19	SSSA	How to comply with EU floods directive?
20	SSSA	How to Comply with EU forest fires action plan?
21	SSSA	How to mitigate the potential for mass surveillance and the principle of self-determination?
22	SSSA	How to ensure the non-discrimination/protection of vulnerable groups (elderly, disabled, children,…)?
23	SSSA	How to deal with the principle of humanity?
24	SSSA	How to resepct privacy in emergency situations?
25	SSSA	How to enhance trust in emergeny response?
26	UPB	How to use other business models or business model patterns for developing a Business Model?
27	UPB	How to develop Business Models for innovative products based on ANYWHERE components?
28	UPB	How to identify channels and customer relationships for a business model?
29	UPB	How to define revenue streams for a Business Model to capture value?
30	UPB	How to specify Key Resources, Activities and Partners for a Business Model?
31	UPB	How to build a cost structure suitable for the Business Model?
32	UPB	How to identify procurement regulations?
33	UPB	How to identify customer needs and market demands?
34	UPB	How to decide on a target group / market?
35	CDG	How to say the right thing at the right time: a guidance document to improve tools and services for self preparedness and self protection in eXtreme weather event -folding information-
36	CDG	How to say the right thing at the right time: a guidance document to improve tools and services for self preparedness and self protection in eXtreme weather event -mayor decree for schools-

Table 5: Relations between guidelines

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1		×	×														×					×			×											
2	×		×																						×											
3	×	×																							×											
4																		×								×							×			
5	×	×	×			×	×																		×											
6					×		×											×																×	×	
7					×	×												×	×							×									×	
8									×																											
9								×																												
10											×											×														
11										×		×	×	×	×						×			×												
12											×		×	×	×						×			×												
13											×	×		×	×						×			×												
14											×	×	×		×						×			×												
15											×	×	×	×							×															
16	×																					×														
17				×		×	×												×	×																
18					×		×	×																												
19							×											×		×																
20																		×	×																	
21											×	×	×	×	×									×												
22	×									×						×							×	×												
23																						×		×												
24											×	×	×	×							×	×	×													
25	×	×	×		×																															
26				×			×																				×	×	×	×	×					
27				×			×																			×		×	×	×	×		×	×		
28				×			×																			×	×		×	×	×					
29																										×	×	×		×	×	×				
30				×			×																			×	×	×	×		×					
31																										×	×	×	×	×						
32					×																								×							
33				×		×	×																				×									
34																											×									
35																																				×
36																																			×	

Annex III: Influence factors in the ANYWHERE SDM

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
Market / customers	A1	Willingness to download	Ifd Allensbach	The influence factor describes the willingness of users to download applications from third-party providers in the representative platforms e.g. Google Play Store or Apple Store. On this occasion free of charge and paid applications are considered.	A1-1	The number of customers which download apps increases. The share of customers spending money on apps increases simultaneously. 70 Mio. customers in Germany have already downloaded an app. A share of 45% has downloaded an app at their expense.	70 Mio / 45 %
					A1-2	The number of customers which download apps remains constant. The share of customers spending money on apps increases simultaneously. 56 Mio. customers in Germany have already downloaded an app. A share of 27% has downloaded an app at their expense.	55.81 Mio / 27%
	A2	Number of potential (app-) users	VuMa / Statista	This influence factors describes how often customers use apps nowadays and in the future.	A2-1	The usage of apps increases. ~75 % of the users use their apps frequently.	75%
					A2-2	The usage of apps remains constant. ~50 % of the users use their apps frequently	50%
					A2-3	The usage of apps decreases. ~25 % of the users use their apps frequently.	35%
	A3	Willingness to download fee-based apps	Axel Springer ; AndroLip	This influence factors describes the general willingness to pay for applications in stores such as Google Play etc. It is characterized by the relative share of downloads which required payment compared to the total number of downloads.	A3-1	The share of downloads were payment is required increases up to 11%.	11%
					A3-2	The share of downloads were payment is required remains constant at 7%.	7%
					A3-3	The share of downloads were payment is required decreases to 3%.	3%
	A4	Potential revenue through in-app advertisement	Nielsen @ Statista	This influence factors describes the potential revenue which can be achieved by in-app advertisement. The indicator is gross revenue in Germany in million €.	A4-1	Revenue by in-app advertisement increases to 550 Mio. €.	550 Mio €
					A4-2	Revenue by in-app advertisement remain constant at 450 Mio. €.	450 Mio €
					A4-3	Revenue by in-app advertisement decreases to 400 Mio. €.	400 Mio €
	A5	Potential revenue streams for smartphone applications.	Starting-Up.de	The influence factor describes the potential revenue streams for smartphone applications.	A5-1	The choice of potential revenue streams increases due to further development of technology.	
					A5-2	Potential revenue streams are advertisement, in-app purchases, affiliate networks, time licenses or freemium versions.	
					A5-3	By legislation, potential revenue streams are banned. The choice of revenue streams decreases.	
	A6	Acceptance and trust in new communication/news channels.	European Commission / IMWF	This influence factors describes the acceptance and trust in new channels for communications and news in general.	A6-1	More people trust online channels. Online-based channels are preferred. More than 40% trust in these channels.	40%
					A6-2	Trust in online-based channels remains constant. About one third of the population trust in this channels. In contrast, the trust in conventional channels such as radio or to remains higher.	32%
					A6-3	Only 24% of the population trust in online-based channels.	24%

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
	A7	Demand for support offered by third-party enterprises in emergency situations and self-preparedness and self-protection.		This influence factor describes the potential demand for support in emergency situations. The support is offered by third-party enterprises. Demand for support by civil authorities is not considered.	A7-1	The demand for support in emergency situations and to achieve self-preparedness or self-protection increases. Two thirds of the population have the demand for support.	65%
					A7-2	The demand for support in emergency situations and to achieve self-preparedness or self-protection is constant. About one half of the population demands for support.	51% / 48%
					A7-3	The demand for support in emergency situations and to achieve self-preparedness or self-protection decreases. One third of the population have the demand for support.	35%
	A8	Achievable impact of a service by implementation of crowd-based sourcing	Facebook	The influence factor describes the impact of an implementation of crowd-based sourcing on the spreading and accuracy of warnings in case of an emergency	A8-1	By implementing crowd-based sourcing (even from third parties such as social networks), the spreading and accuracy of warnings in case of an emergency can be improved. The cooperation is beneficiary for both parties.	
					A8-2	The cooperation is neglected by either of the parties. Therefore, implementation of crowd-based sourcing requires a high effort.	
	A9	Potential revenue for social media operations	Statista Digital Market Outlook	The influence factor describes the potential revenue through social media operations.	A9-1	Potential revenues are increasing sharply to 15 € per user per annum.	15€ / user in 2021
					A9-2	Potential revenues are increasing by 50% to 11€ per user per annum.	11€ / user in 2021
					A9-3	Potential revenues are stagnating at a value of 7,50 € per user per annum.	7,50€ / user in 2021
	A10	Overall revenue of applications in app stores per annum.	APP Annie @Statista	The influence factor describes the global development of the overall revenues generated on platforms such as Google Play or iTunes by apps.	A10-1	The global revenue increases sharply up to 130 Mio. $ per annum.	130 Mill. $
					A10-2	The revenue increases slowly up to 100 Mio. $ per annum.	101.1 Mill $
					A10-3	The global revenue stagnates at a value of 50 Mio. $ per annum.	50 Mill. $
	A11	Customer structure for B2B-apps for increasing self-preparedness and self-protection offered by third-party enterprises		This influence factor describes the customer structure	A11-1	Enterprises of all sized (small, medium as well as large global companies) show an interest in services for increasing self-preparedness and self-protection.	
					A11-2	Mainly large enterprises have an interest in increasing self-preparedness and self-protection. Medium enterprises show an occasional interest.	
					A11-3	Only few large enterprises have an interest in increasing their self-preparedness and self-protection.	
Society	B1	Potential threat by extreme weather events	Munich RE	This influence factor describes the real (measurable) global threat by extreme weather events.	B1-1	The number of extreme weather events increases up to 825 per annum globally.	825
					B1-2	The number of extreme weather events remains constant at a number of 750 events per annum globally.	750
					B1-3	The number of extreme weather events decreases to 675 events per annum globally.	675
	B2	Fear of extreme events	R+V ; Statista	This influence factor describes the subjective threat by extreme weather	B2-1	The subjective threat of extreme weather events increases. More than 60% of the population are afraid of the impact of extreme weather.	60%

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
				events of both, population and companies in Germany.	B2-2	The subjective threat of extreme weather events remains constant. More than 52% of the population are afraid of the impact of extreme weather.	52%
					B2-3	The subjective threat of extreme weather events decreases. More than 45% of the population are afraid of the impact of extreme weather.	45%
	B3	Impact of the occurrence of extreme weather events onto the fear of these		This influence factor describes the relation between the occurrence of an extreme weather event and the impact on the subjective fear of extreme weather events.	B2-4		
					B2-5		
					B2-6		
	B4	Concerns of the population regarding climate change	SOPE (Statista)	This influence factor describes the concerns regarding the climate change in the population (here: Germany). Therefore, the share of the population with big, some and no concerns is measured.	B4-1	The question "Do you have concerns regarding climate change and the impact?" reveals that 60% of the population have some concerns. 30% of the population have big concerns regarding climate change.	60% & 30%
					B4-2	The question "Do you have concerns regarding climate change and the impact?" reveals that 54,1% of the population have some concerns. 25,7% of the population have big concerns regarding climate change.	54,1% & 25,7%
					B4-3	The question "Do you have concerns regarding climate change and the impact?" reveals that 45% of the population have some concerns. 20% of the population have big concerns regarding climate change.	45% & 20%
	B5	Self-preparedness and self-protection in case of extreme weather events	BMUB, European Commission (Statista)	This influence factor describes the degree of self-preparedness and self-protection in the population.	B5-1	More people aim at self-preparedness and self-protection. Around 30% feel prepared. 25% want to self-prepare and self-protect in the near future.	30%
					B5-2	The number of people which aim at self-preparedness and self-protection is constant. Around 20% of a population are prepared, other 15% aim at raising their self-preparedness and self-protection.	20%
	B6	Will to self-prepare and self-protect	BMUB, European Commission (Statista)	This influence factor describes the will to self-prepare and self-protect for the case of extreme weather events and other emergency situations.	B6-1	The share of the population willing to self-prepare and self-protect increases to 25%.	25%
					B6-2	The share of the population willing to self-prepare and self-protect decreases to 10%.	10%
	B7	Demand for consistent warnings in case of emergency throughout the EU	European Commission / TNS (Statista)	This influence factors describes the demand of the population for consistent warning in case of emergency throughout the EU.	B6-1	A majority of the population demands consistent warning in case of emergency on a pan-European scale. 72% of the population strongly demand these warning. 24% would appreciate.	72% (60) and 24% (33)
					B6-3	The demand for consistent warning in case of emergency on a pan-European scale decreases. 50% of the population strongly demand these warning. 35% would appreciate.	50% (35)

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
	B8	Urbanization	World Bank (Statista)	The influence factor describes the urbanization of the population. The degree of urbanized population is measured in relation to the share of the population living in rural areas.	B7-1	The degree of urbanization increases up to 90%. More and more urbanized areas are developing.	90%
					B7-2	The degree of urbanization remains constant at around 75%	75%
					B7-3	Urbanized areas are shrinking. Only 60% of the population are living in urban areas.	60%
	B9	Family Status	Statistisches Bundesamt	This influence factor describes the development of the family status of the majority of the population in Germany.	B8-1	More and more people are living in family-like environments. Around 10 Mio. people are living in single households, 72.3 Mio. people in family-like structures.	72.3 Mio/ 10 Mio
					B8-2	The family status of the population remains constant. Three quarters are living in family-like structures. One quarters is living in single households.	63.7 Mio/ 18,6 Mio
					B8-3	Less people are living in family-like structures. One third of the population is living in single households, Two third in family like structures.	72.3 Mio/ 10 Mio
	B10	Understanding for new technologies	Ifd Allensbach	This influence factors describes to understanding and capability in the population to use new technologies, especially IT-based services.	B9-1	The question "How good are your skills in using IT?" is answered by more than half of the population with "advanced or better".	50%
					B9-2	The question "How good are your skills in using IT?" is answered by more than 42% of the population with "advanced or better".	42%
					B9-3	The question "How good are your skills in using IT?" is answered by more than 35% of the population with "advanced or better".	35%
	B11	Trust in new technologies	European Commission (Statista)	This influence factor describes the trust of the population in new technologies. This includes aspects such as data protection in IT in general and online in particular.	B10-1	The trust in new technologies increases. More than 45% of the population trust in information available online.	45%
					B10-2	The trust in new technologies remains constant. More than 32% of the population trust in information available online.	32%
					B10-3	The trust in new technologies decreases. More than 20% of the population trust in information available online.	20%
	B12	Acceptance of an app as a communication channel in case of a warning	BBK	The influence factor describes the acceptance of a smartphone application as a channel in case of a warning.	B11-1	Users accept an app as a communication channel in case of a warning. The information provided is considered trustworthy.	
					B11-2	Users do not accept an app as a communication channel in case of a warning. The information provided is not considered trustworthy.	
Disaster Management	C1	State and development of the BOS-Network	BDBOS	This influence factor describes the state and the development of the BOS-network in Germany.	C1-1	Additional money is invested into the BOS-network. The number of participants is increasing.	
					C1-2	The BOS-network is maintained, but not enhanced. Infrastructure and number of participants remains on the actual level.	
	C2	Commitment and awareness of the		The influence factor describes the commitment of the population to self-	C2-1	More and more people agree with the published guidelines. 45% of the population follow these guidelines.	45%

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
		population of the need to self-prepare and self-protect	Stern @Statista	prepare and self-protects. This is measured by the agreement of the population with the official guidelines published by civil authorities.	C2-2	The agreement with published guidelines remains constant. Guidelines are followed by one third of the population.	33%
					C2-3	Guidelines by public authorities are not accepted by the population. Only 20% of the population follow the guidelines.	20%
	C3	Existence of guidelines published by civil authorities	Bundes-amt für Katas-trophen-und Bevöl-kerungs-schutz	This influence factor describes the availability and quality of guidelines for self-preparedness and self-protection published by civil authorities.	C3-1	The number of guidelines increases as well as the quality of these. More and more guidelines are being published.	
					C3-2	The number and the quality of the guidelines remains constant.	
					C3-3	Existing guidelines are not updated. No new guidelines are being published.	
	C4	Acceptance of guidelines by civil authorities		This influence factor describes the acceptance of guidelines for self-preparedness and self-protection published by civil authorities.	C4-1		
					C4-2		
					C4-3		
	C5	Availability of tools for self-preparedness and self-protection published by civil authorities	Bundesamt für Katastrophen- und Bevölkerungsschutz	This influence factor describes the availability of tools for self-preparedness and self-protection offered by civil authorities.	C5-1	Civil authorities offer both, preventive and reactive tools for raising self-preparedness and self-protection.	
					C5-2	Only reactive tools are offered by civil authorities. Preventive tools are not offered.	
					C5-3	Only little guidance how to behave in case of emergency is offered, but neither reactive nor preventive tools.	
	C6	Spread of conventional channels in the case of a warning		The influence factor describes the spread of conventional channels (Radio, public address systems) in case of warnings of extreme weather events and the consequent catastrophes.	C6-1	Conventional channels are extended. In case of emergency, information is widely available through radio and tv channels. Battery-powered receivers are widespread in the population. Public address systems are widespread.	
					C6-2	Conventional channels are remained, but not extended. Despite offering information through radio and tv channels, public address systems are available in bigger cities and important places.	
	C7	Development and further innovation of new channels in case of a warning		This influence factor describes the development and further innovation of new channels in the case of a warning.	C7-1	New channels are developed and offered by civil authorities to reach broader parts of the population.	
					C7-2	Existing channels are maintained, but new channels are not offered.	
	C8	Practical support of civil authorities in	Bundesamt für		C8-1	In case of emergency, civil authorities are reacting quickly, reducing the necessity to self-prepare and self-protect.	

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
		case of an emergency	Katastrophen- und Bevölkerungsschutz	This influence factor describes the necessity for the population to self-prepare and self-protect in case of an emergency.	C8-2	Only in case of huge events, civil authorities offer practical support. The population is responsible for an increased level of self-preparedness and self-protection.	
	C9	Public expenses for civil protection	Bundeshaushalt-info.de	This influence factor describes the expenses for civil protection by the government.	C9-1	The government is increasing the expenses on civil protection.	130 Mio €
					C9-2	The expenses are remaining constant.	ca. 109 Mio €
					C9-3	Expenses are cut down by the government.	90 Mio €
Technology	D1	Internet compatible devices	Stat. Bundesamt	This influence factor describes the spread of internet compatible devices in the population.	D1-1	The number of users which have permanent access to internet compatible devices increases. Throughout all societal milieus, more than 65% have access.	
					D1-2	The number of users which have access to internet compatible devices remains constant. Around 55% younger than 34 years have access. 20 to 40% of the older population have access.	
					D1-3	The spreading of internet compatible devices decreases. In the age group younger than 34 years, 50% have access. For all other age groups, less than 25% have access to internet compatible devices.	
	D2	Failure risk of mobile network		This influence factor describes the future development of the failure risk of the mobile cell phone network in case of emergency.	D2-1	The failure risk remains constant.	
					D2-2	By redundant infrastructure, the failure risk is reduced further. In case of an emergency, the availability is guaranteed.	
	D3	Integration of multi-channel access to services (in general)		This influence factor describes the preference of the user which device to use for accessing services. The development towards cross-platform applications is considered by this influence factor.	D3-1	The users prefer a cross-platform application. Services must be accessible online, in a desktop and a mobile application.	
					D3-2	The users prefer only a mobile application.	
	D4	Failure risk of critical infrastructure in case of extreme weather	KRITIS	This influence factor describes the risk of failure of critical infrastructure in case of extreme weather.	D4-1	By dedicated strategies, the failure risk of critical infrastructure is decreased.	
					D4-2	The failure risk remains constant.	
					D4-3	The failure risk increases due to a lack of preparation and maintenance of critical infrastructures.	
	D5		DWD	This influence factor describes the quality of forecasts of extreme weather. The	D5-1	Forecasting quality is improved. More than 95% of the forecasts are correct.	95%

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
		Quality of forecasting of extreme weather		indicator is the number of forecasted extreme weather events in relation to the occurred number.	D5-2	Forecasting quality is constant. Around of 85% of the forecasts are correct.	85%
					D5-3	Forecasting quality decreases. Only 70% of the forecasts are correct.	70%
	D6	Availability of impact assessment tools	BBK	This influence factors describes the availability and the quality of impact assessment tools for extreme weather events.	D6-1	Impact assessment tools are widely available. The quality of the results is accurate.	
					D6-2	Impact assessment tools are rarely available. The accuracy is not convenient.	
	D7	Availability of (accessible) meteorological information	DWD	This influence factor describes the availability of accessible meteorological information for tool providers. Here, the available of the infrastructure maintained by the German Weather Service (DWD) is taken as an indicator.	D7-1	Infrastructure is improved. Meteorological information is widely available on a local scale.	
					D7-2	Infrastructure is maintained, but not extended. The availability of meteorological information is constant.	
	D8	Data Protection Legislation	BDSG	This influence factor describes the development of data protection legislation.	D8-1	Data protection legislation is relaxed. Data protection is easier to sustain by application developers.	
					D8-2	Data protection is on a constant level. Legislation is not changed.	
					D8-3	Data protection is getting stricter. This means higher effort for application developers to sustain compliance with legislation.	
Competition	E1	Number of potential competitors	BBK - Bund Katwarn Google Store	This influence factor describes the number of potential competitors in the market. This includes both, private and public services for increasing self-preparedness and self-protection.	E1-1	Both, public and private enterprises offer an increasing number of services and apps.	
					E1-2	No further public entity enters the market. Complementary, more and more private enterprises start to enter the competition.	
					E1-3	No further public entity enters the market. Due to the market development, services by private enterprises are discontinued.	
	E2	Availability and acceptance of competing services by public entities.	BBK-Bund Katwarn	This influence factor describes the availability and acceptance of competing services such as NINA or KATWARN published by public entities.	E2-1	Services can offer information for the whole country. The information is considered reliable and is widely accepted.	
					E2-2	Services can offer information on a superregional level. These information is reliable and widely accepted. On a local level, information are not available.	
					E2-3	Services can offer information on a superregional level. These information is reliable and widely accepted. On a local level, information are not reliable.	
	E3	Distribution speed of warnings		This influence factor describes the distribution speed of warnings in case of an emergency situation.	E3-1	The services cannot comped with social media concerning the distribution speed of warnings in case of an emergencies.	
					E3-2	The services can comped with social media concerning the distribution speed of warnings in case of an emergencies.	
					E3-3	The services are faster than social media concerning the distribution speed of warnings in case of an emergencies.	

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
	E4	Quality of guidance of competing services in case of an emergency	Katwarn BBK-Bund	The influence factor describes the quantity and the quality of guidance in competing services.	E4-1	The services offer guidance developed by experts in the field. The guidance is specific to each potential hazard. Users are supported further by checklists and emergency contacts.	
					E4-2	Services offer generic guidance for the case of emergency. The guidance is identical to publically available information.	
					E4-3	Services offer warnings only. Guidance is sparely offered.	
	E5	Acceptance of competing services	Google Play Apple Store	The influence factor describes the acceptance of competing services in the population. The acceptance is measured by the user ratings on platforms such as Google Play and iTunes.	E5-1	Services are improved further and further. The user rating is high.	4.5 / 5
					E5-2	Services are supported on a regular basis. The user rating is medium.	3.5 / 5
					E5-3	Services are not supported and not developed further. The user rating is low.	2.5 / 5
	E6	Market share of competitors	Google Play Apple Store	This influence factor describes the market share of both, public and private competitors.	E6-1	The market share of private services increases. The market share of private services succeeds the market share of public services.	
					E6-2	The market is dominated by public services. The share of private services is low	
	E7	Pace of innovation of competitors	Google Play Apple Store	This influence factor describes the pace of the innovation of potential competitors.	E7-1	Services are improved further and further. The pace of innovation in the competition is high.	
					E7-2	Services are improved on a regular basis. The pace of innovation is unsteady. New features are only added occasionally.	
					E7-3	Services are improved occasionally. New features are only added seldom.	
	E8	Potential competition by new players from other business fields		This influence factor describes the potential competition by competitors originating from user business fields (such as metrological services)	E8-1	Many providers of services such as weather forecasting enhance their portfolio towards guidance for improving self-preparedness and self-protection.	
					E8-2	There is no or only low competition by new players from other business fields.	
	E9	General development of the business field		This influence factor describes the general development of the business field for tools and services to self-prepare and self-protect in case of emergency situations induced by extreme weather events.	E9-1	The development of the business field is above the development of the GDP.	
					E9-2	The development of the business field is similar the development of the GDP.	
					E9-3	The development of the business field is below the development of the GDP.	
Economic situation	F1	Development of the household income	Stat. Bundes-amt	This influence factor describes the development of the annual household income (gross normal income)	F1-1	Gross normal income is increasing by 4% per annum,.	4%
					F1-2	Gross normal income is increasing with a rate of 2,5% (above the inflation rate).	2,5%
					F1-3	Gross normal income is stagnating. Due to an increased inflation rate, the real income is decreasing	1%

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
	F2	Damages by extreme weather events	Munich RE	This influence factor describes the damages by extreme weather events per annum.	F2-1	The average cumulated damage by extreme weather per annum increases up to 2,75 billion € globally.	2750 Mio €
					F2-2	The average cumulated damage by extreme weather per annum increases up to 2 billion € globally.	2000 Mio €
					F2-3	The average cumulated damage by extreme weather per annum decreases to 1,25 billion € globally.	1250 Mio €
	F3	Unemployment rate	Stat. Bundes-amt	This influence factor describes the unemployment rate (in Germany)	F3-1	Unemployment rate increases up to 4,2 % of the population.	4,2%
					F3-2	Unemployment rate is constant at 3,7 %.	3,7%
					F3-3	Unemployment rate decreases to 3,2 %.	3,2%
	F4	Development of the gross domestic product	Stat. Bundes-amt Eurostat	This influence factor describes the development of the gross domestic product in Germany and the EU.	F4-1	GDP is increasing by 3,2 % in Germany and by 2,9 % in the EU.	3.2% / 2,9%
					F4-2	GDP is increasing by 1,8 % in Germany and by 1,6 % in the EU.	1.8% / 1,6%
					F4-3	GDP is decreasing by 1,0 % in Germany and by 1,3 % in the EU.	-1% / -1,3 %
	F5	Development of federal tax income in Germany	BMFI	This influence factor describes the development of the annual federal tax income in Germany.	F5-1	The tax income in Germany increases up to 875 Mio. € in 2020.	875 Mill. €
					F5-2	The tax income in Germany increases up to 820 Mio. € in 2020.	820 Mill €
					F5-3	The tax income in Germany increases up to 760 Mio. € in 2020.	760 Mill. €
	F6	Development of the sector of services to raise self-preparedness and self-protection		This influence factor describes the development of the sector of services to raise self-preparedness and self-protection	F6-1	The sector is developing with annual growth rates bigger than the growth of the GDP.	
					F6-2	The sector is developing with annual growth rates equal than the growth of the GDP.	
					F6-3	The sector is developing with annual growth rates less than the growth of the GDP.	
	F7	Investment level of enterprises	Statista	This influence factor describes the investment level of enterprises.	F7-1	Enterprises increase their investments. About 40% of the enterprises want to increase their investments in the future.	
					F7-2	About 25% of the enterprises will increase their investments in the future. Simultaneously, about 15% want to cut their investments.	
					F7-3	Investments are decreasing in general. No enterprises want to increase their investments. 35% want to cut down their investments.	
	F8	Corporate structure		This influence factor describes the corporate structure in the market (here: Germany).	F8-1	Many medium.sized companies are merged with bigger enterprises. The number of start-ups and small enterprises decreases.	
					F8-2	The corporate structure is not changing. There is a broad variety of enterprises of different sizes. The majority of the enterprises is medium-sized.	

Influence field	#	Name	Source	Description	Projection ID	Description of projection	Numerical Value
					F8-3	Many small enterprises and start-ups remain small in their sector by differentiation. Larger enterprises tend to split up to be able to act more agile.	
	F9	Public Debt Level	Statistisches Bundesamt	This influence factor describes the public debt level in Germany and in the EU.	F9-1	The debt level decreases to 50% of the GDP in Germany and down to 65% of the GDP in the rest of the EU.	50%
					F9-2	Debt level in relation to GDP remains constant at 70% (Germany) respectively 83% (rest of the EU).	70%
					F9-3	The debt level increases up to 90% of the GDP in Germany and 105% in the rest of the EU.	90%
	F10	Private Debt Level	Statistisches Bundesamt	This influence factor describes the debt level of private households (in Germany, in €).	F10-1	Private debt level decreases. Only 6 Mio. people are indebted and have an average debt of 28000 €.	28.000,00 €
					F10-2	Private debt level remains constant. 6,5 Mio. people are indebted and have an average debt of 36000 €.	36.000,00 €
					F10-3	Private debt level increases. 7,5 Mio. people are indebted and have an average debt of 42000 €.	42.000,00 €

ANYWHERE

Project Number 700099

Call: H2020-DRS-01-2015

Project Title:

ANYWHERE

EnhANcing emergencY management and response to extreme

WeatHER and climate Events

Subject:

Deliverable 5.1:

Report describing good practices, approaches, guidelines and constraints supporting innovation for self-preparedness and self-protection as a summary of results from Tasks 5.1-5.2

Dissemination Level: PU

Delivery date: **31**[th] **December 2017**
Month: **Month 19**
Organisation name of lead contractor for this deliverable: **UPB**

Document Information

Title	**Report describing good practices, approaches, guidelines and constraints supporting innovation for self-preparedness and self-protection as a summary of results from Tasks 5.1-5.2**
Editors	Schäfer, Christina; Matthias Habdank
Contributors	Christina Schäfer; Scholle, Philipp; Habdank, Matthias; Pottebaum, Jens; Ruin, Isabelle; Terti, Galateia; Capone, Francesca; Venier, Silvia Lorini, Valerio; Marras, Irene; Pylkkö; Pirkko; Sancho, David; Tesfai, Ivan; Brune, Michaela; Rodehutskors, Nikolai; Nowak, Rene Philipp
Distribution	PUBLIC
Document Reference	D5.1

Document History:

Date	Revision	Prepared by	Organisation	Approved by
17.11.2017	Rev_0_12	Scholle, Philipp	UPB	
01.12.2017	Rev_0_13	Christina Schäfer, Matthias Habdank	UPB	

Related Documents:

This report and others are available from the **ANYWHERE** Project Website at: http://www.anywhere-h2020.eu/

Table of Content

1 Communication and Crowd Sourcing

1.1 How to ensure effective communication of risk information, warnings and emergency messages?

- Ensure **understandable and usable messages** for the public

- Ensure that all of the population at risk, **receive the risk/warning information** and emergency messages

- Ensure the **timing and geographic specificity** of the messages, to interrupt the public's daily routine activities in favour of crisis-related preparedness and protection

Responsible Author: CNRS

In a Nutshell

This guideline aims at providing the main elements necessary to design effective crisis communication strategies before and during the crisis in order to trigger the relevant response of citizens. Here, communication refers to the exchange of public messages (i.e., from authorities to the public and vice versa). Therefore, exchanges between experts and organizations are out of the scope of this guideline.

Guidance or used Methodology

The guideline is based on literature review and best practices in risk and crisis communication. It could, therefore, support the construction of *guidance with basic principles and good practices for stakeholders in the format of a checklist*. We vision that such a checklist could be potentially used from national agencies or community organizations when implementing or evaluating dissemination and communication procedures in place.

Basic principles:
Risk communication deals with hazards that might happen sometime in the future. Risk education campaigns inform the public for the threat associated with a certain hazard during the inter-crisis with the ultimate goal to enhance individuals' resilience to weather-related risk situations. Crisis communication is a type of risk

communication that takes place in response to an immediate and imminent danger. Warnings and emergency messages then, provide the specificities of the occurring event that are critical to help people in the emergency time. Instructive emergency messages are of high importance especially in short fuse, dynamic hazards with little or no warning. Though, warnings and emergency messages have more chance to be followed by relevant responses if people are educated about the hazard and have prepared an action plan before the actual crisis (Liu et al. 1996). Therefore, risk education campaigns are essential to increase public's awareness especially for hazards with adequate warning lead-time that allows for preparedness.

To reach individuals at risk and empower them to act appropriately before and during the disaster event in order to protect their life, livelihood, and property, *communication strategies should positively respond to the following requests:*

1. **Are the delivered messages understandable and usable for the public?**
2. **Does all of the population at risk receive the risk/warning information and emergency messages?**
3. **Are the timing and geographic specificity of the messages appropriate to interrupt the public's daily routine activities in favour of crisis-related preparedness and protection?**

Choosing the appropriate presentation of risk, warning and emergency messages (i.e., message content, structure and format) is the main attribute of effective communication. This guideline focuses on the first question to present a list of fundamental requirements in the design of comprehensive and incentive messages (see sections 1, 2 and 3 below). Then, it is important that these messages are disseminated to the public in an interactive and dynamic way and through effective communication channels. Generally, multimodal warnings and alerts (i.e., through different communication channels) are expected to increase the chance that the targeted public will receive the necessary information (Sorensen 2000). A *separate guideline* is dedicated to the second question discussing interactive communication tools shared through multiple channels highlighting modern interactive technologies such as social media (e.g., blogs, social networks). Finally, the third question is explored in a *third guideline* that addresses temporal and spatial aspects related to the personalization of warning messages and the motivation of recipients to take relevant actions. These three guidelines present the basis for the construction of relevant sub-checklists that will compose the final checklist to be delivered and discussed within WP5.

Good practices:

1. **Content of the messages**

☑ **Describe adequately the hazard and the imminent impact to the public.** The content of warnings should explicitly i) characterize the physical phenomenon and ii) explain how this may affect people's safety (Drabek 1999; Mileti and Peek 2000; Jacks, Davidson, and Wai 2010). Mileti and Peek (2000) state, "If a hazard is well described, people are better able to understand the logic of protective actions".

☑ **Define the message geographically and temporally.** According to the World Meteorological Association (WMO), effective communication relies on warnings that provide answers to the questions of *"what?", "where?", "when?", "why?", and "how to respond?"* (Jacks, Davidson, and Wai 2010). Similarly, the National Research Council of the National Academies indicates that the information important to the public is *"what (the protective actions that should be taken); when (by what time the protective actions should be taken); where (the geographic area that will be affected); wh y (the risks and how protective action would reduce their impact); and who (the individuals or entities providing the information)"* (National Research Council (NRC) 2013).

☑ **Include information and guidance that are of specific interest to the recipients.** Messages may include advice and support in respect to controlling activities and priorities in the risk area (e.g., recommendations for dealing with power outages).   Considering major concerns as well as prior experiences and knowledge of the targeted public is important to formulate useful messages that stimulate and direct people's response (Murray-Johnson et al. 2001; Jacks, Davidson, and Wai 2010).

☑ **Support the message with official documentation.** Public is more likely to trust and believe messages that include official reports, graphics and other documents that support the warning statement.

2. **Structure of the messages**

☑ **Use simple wording within short sentences.** When messages are accurate simplicity signifies clarity, which serves as an indicator of people's ability but also willingness to read and absorb the conveyed information. (Harbach et al. 2013) examined how much linguistic characteristics (i.e., grammar, and terminology) affect people's perception and understanding of warning

message text. Using a set of 28 browser security warnings[1] that were evaluated by 311 students in Germany they found that technical terms in warning messages complicate the comprehension process even for people with high technical expertise. The participants indicated also the positive contribution of short-length phases to the readability of the message. Even if the warnings designers may use technical words to construct shorter sentences, their usage is not appropriate to convey the information to the recipients. Although browser-based warnings differ from disaster warnings in content these findings support that simple and common wording speeds up the message understanding; an important presupposition for timely self-preparedness and self-protection in case of natural hazards.

☑ **Begin the message with the main information using standardized headlines.** Clear and dynamic headlines attract the public's interest and convey the key message (*Effective Disaster Warnings: Report by the Working Group on Natural Disaster Information Systems Subcommittee on Natural Disaster Reduction* 2000). Usually the headline describes who (which source) is issuing what (which hazard) in a standardized way so that people get familiar with the message style.

☑ **Use positive statements instead of negative.** To make people feel capable to take relevant actions the message should focus on what one could/should do (e.g., "Move to higher ground and, if necessary, climb as high as possible on a sturdy object"; FEMA's message for individuals trapped in outdoors flooding)[2].

3. **Format of the messages**

☑ **Include reasonable graphics (only if necessary).** As we noted above, accompanying text messages with official documentation such as weather maps from the corresponding national weather services may enhance the credibility of the provided text information. In addition to that, graphics might delineate the severity and the location of the event and therefore, help people to personalize the risk and make sense of their situation[3] (e.g., a radar image indicating the area exposed to a big storm). However, the literature suggests that the inclusion of graphics is not explicitly linked with the efficiency of warning and emergency messages (Savelli and Joslyn 2013). (Casteel and

---

[1] The sample included 24 warning texts (15 warning texts for Chrome, 9 for Firefox) and four certificate warnings (hostname verification or unknown root CA warnings) from Internet Explorer 8, Safari, Outlook and iTunes.

[2] More action messages from FEMA are available at https://www.fema.gov/media-library-data/1409002852888-3c5d1f64f12df02aa801901cc7c311ca/how_to_prepare_flood_033014_508.pdf.

[3] See guideline no 3 for further discussion on the importance of geographic specificity to the increase of risk personalization and motivation for protective action.

Downing 2013) found no difference between the times that participants spent to decide if a critical town was in the warning area when the weather warnings sent to a smartphone included graphics compared to when they did not. Their experiment indicates that the presence of a graphic does not increase the comprehension of the weather warnings being issued by the National Weather Service (NWS) in the U.S. Prior research studies show that graphics are not useful when the users are not aware of fundamental scientific principles behind the illustrated element (e.g., meaning of pressure isobars for the indication of wind direction) (Hegarty, Canham, and Fabrikant 2010) or when the illustrations are too complex to be interpreted in a given time (Peters 2008; Hegarty et al. 2009).

☑ **Suggest numeric levels instead of colour codes as a pre-defined coding scheme for the representation of risk.** Usually, weather services adopt the common colours of traffic lights (i.e., green, yellow, red) and add orange to create an additional level between yellow and red if needed to illustrate risk levels. Even if the use of a sequence of numbers or colours to present the risk graduation from low to high seem logical, its interpretation may vary depending on personal constrains of the recipients emerging form cultural, linguistic and/or demographic attributes. Tang and Rundblad (2015) found that young Bangladeshi and older white British participants associated the "magnitude" of the numbers (i.e., bigger to smaller numbers) and the "intensity" of the colours (i.e., darker to lighter colours) with the scalarity of the information (i.e., high to low) presented in emergency messages during heat waves in the UK. On the contrary, older Bangladeshi participants adopted a completely different conceptualization ignoring the scalarity of the warnings and thus, they failed to link the colours with any other information. Yet, even when the sequence of colours was identified, it was noticed that the majority of the participants tended to misinterpret the colour scheme as levels of temperature instead of risk. Since similar results were observed when participants confused colour coded risk with flooding probabilities in (Bye and Horner 1998), the authors state that colour coded warnings are not understandable by the general public.

Supplementary comment: To moderate failures in interpretation of coding schemes, authorities need to ensure that the targeted population is familiar with the format of the illustrations currently used by the national meteorological and hydrological services in official warnings to the public[4]. In addition to that, authorities should clearly define the terms that are used within the illustrations. Such terminology may be confusing even for the official actors involved in the weather-related warning procedure and civil

---

[4] See guideline no 2 for further discussion on the education of the public through interactive communication tools.

protection. What do the authorities mean by the term "risk"? Does risk refer to the likelihood of an imminent hazard (e.g., flooding after heavy precipitation) or to the likelihood of certain impacts to the population and property (e.g., injuries or damages due to flood waters)? How are the different colour or number categories linked to the level of risk (e.g., darker colour depicts highest risk in terms of area affected, number of affected people or type of impacts)? It should be noted that hazard maps might illustrate the magnitude (e.g., discharge, accumulated rainfall) or intensity (e.g., rainfall rate) of the hazard event. The hazard should be combined then with vulnerability proxies (e.g., exposed people, sensitive characteristics of the environment) through relevant functions or models to present the integrated risk to life or property (*2009 UNISDR Terminology on Disaster Risk Reducation* 2009). Therefore, it is very important for experts to present risk identification procedure in a transparent way including adequate details for its definition and estimation in every situation. Colour categories for risk representation should be adjusted and clearly stated in order to avoid confusion with other information conveyed to the public.

Practical example

Example of guidance for warning/emergency messages in natural disasters:

- **"Talking About Disaster: Guide for Standard Messages":** The American Red Cross and multiple partners produced a guide to assist those who provide disaster safety information to the general public. The report was based on historical data for the United States and is appropriate for use in the United States and its territories. This guide contains awareness and action messages intended to help people reduce their risk of injury or loss in the event of natural and human-caused disasters. Users of this guide may include emergency managers, meteorologists, teachers, disaster (natural and human-caused) educators, public affairs/public relations personnel, mitigation specialists, media personnel, and communicators. The messages and the related information are intended to be used in educational presentations, displays and bulletin boards, print and electronic media, radio and television, and any other medium in which disaster safety is communicated to the public. Caution is required because some of the information may not apply to other countries. The guide is available online at: http://www.crh.noaa.gov/Image/bis/AmericanRedCross_TalkingAboutDisaster.pdf.

Example of checklist for warning systems including communication practices:

- **"Developing Early Warning Systems: A Check-List":** Building upon the discussions and practical examples raised during the Third International Conference on Early Warning (EWC III), the International Strategy For Disaster Reduction (ISDR) proposed warning-related recommendations in the format of a checklist ("Developing Early Warning Systems: A Check-List" 2006). The checklist is structured around four key elements of effective early warning systems and aims to be a simple list of the main elements and actions that national governments or community organizations can refer to when developing or evaluating early warning systems, or simply checking that crucial procedures are in place. Still, the report is very generic, and thus, it is not intended to be a comprehensive design manual. The checklist is available online at http://www.unisdr.org/2006/ppew/info-resources/ewc3/checklist/English.pdf.

References

2009 UNISDR Terminology on Disaster Risk Reducation. 2009. Geneva, Switzerland: United Nations International Strategy for Disaster Reducation (UNISDR).

Bye, Peter, and Michael Horner. 1998. "Easter 1998 Floods: Volume I: Report by the Independent Review Team to the Board of the Environment Agency."

Casteel, Mark A., and Joe R. Downing. 2013. "How Individuals Process NWS Weather Warning Messages on Their Cell Phones." *Weather, Climate, and Society* 5 (3):254–65.

"Developing Early Warning Systems: A Check-List." 2006. In *Third International Conference on Early Warning (EWC-III) from Concept to Action, 27-29 March 2006, Bonn, Germany*, 13pp. International Strategy for Disaster Reduction (ISDR), Federal Foreign Office. http://www.unisdr.org/2006/ppew/info-resources/ewc3/checklist/English.pdf.

Drabek, Thomas E. 1999. "Understanding Disaster Warning Responses." *The Social Science Journal* 36 (3):515–23. https://doi.org/https://doi.org/10.1016/S0362-3319(99)00021-X.

Effective Disaster Warnings: Report by the Working Group on Natural Disaster Information Systems Subcommittee on Natural Disaster Reduction. 2000. National Science and Technology Council (NSTC); Committee on Environment and Natural   Resources. http://tap.gallaudet.edu/emergency/nov05conference/EmergencyReports/EffectiveDisasterWarnings.pdf.

Harbach, Marian, Sascha Fahl, Polina Yakovleva, and Matthew Smith. 2013. "Sorry, I Don't Get It: An Analysis of Warning Message Texts." In *Financial Cryptography*

and Data Security: FC 2013 Workshops, USEC and WAHC 2013, Okinawa, Japan, April 1, 2013, Revised Selected Papers, edited by Andrew A Adams, Michael Brenner, and Matthew Smith, 94–111. Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-41320-9_7.

Hegarty, Mary, Matt S. Canham, and Sara I. Fabrikant. 2010. "Thinking about the Weather: How Display Salience and Knowledge Affect Performance in a Graphic Inference Task." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 36 (1):37–53. http://dx.doi.org/10.1037/a0017683.

Hegarty, Mary, Harvey S. Smallman, Andrew Stull, and Matt S. Canham. 2009. "Naïve Cartography: How Intuitions about Display Configuration Can Hurt Performance." *Cartographica: The International Journal for Geographic Information and Geovisualization* 44 (3):171–86.

Jacks, Elliot, Jim Davidson, and H.G. Wai. 2010. *Guidelines on Earls Warning Systems and Application of Nowcasting and Warning Operations*. World Meteorological Organization (WMO). http://www.wmo.int/pages/prog/amp/pwsp/publicationsguidelines_en.htm.

Liu, Simin, Lynn E. Quenemoen, Josephine Malilay, Eric Noji, Thomas Sinks, and James Mendlein. 1996. "Assessment of a Severe-Weather Warning System and Disaster Preparedness, Calhoun County, Alabama, 1994." *American Journal of Public Health* 86 (1):87–89. https://doi.org/10.2105/AJPH.86.1.87.

Mileti, Dennis S., and Lori Peek. 2000. "The Social Psychology of Public Response to Warnings of a Nuclear Power Plant Accident." *Journal of Hazardous Materials* 75 (2):181–94.

Murray-Johnson, Lisa, Kim Witte, Wen Ying Liu, Anne P. Hubbell, Joe Sampson, and Kelly Morrison. 2001. "Addressing Cultural Orientations in Fear Appeals: Promoting AIDS-Protective Behaviors among Mexican Immigrant and African American Adolescents and American and Taiwanese College Students." *Journal of Health Communication* 6 (4):335–58.

National Research Council (NRC). 2013. *Public Response to Alerts and Warnings Using Social Media: Report of a Workshop on Current Knowledge and Research Gaps*. Washington, DC: The National Academies Press. https://doi.org/10.17226/15853.

Peters, E. 2008. "Preferred Data Visualization Techniques May Not Lead to Comprehension and Use of Hazard Information: Commentary on Pang." In *Risk Assessment, Modeling and Decision Support: Strategic Directions*, edited by Ann Bostrom, Professor Steven French, and Sara Gottlieb, 296–306. Heidelberg, Germany: Springer-Verlag.

Savelli, Sonia, and Susan Joslyn. 2013. "The Advantages of Predictive Interval Forecasts for Non-expert Users and the Impact of Visualizations." *Applied*

Cognitive   Psychology   27   (4):527–41.
https://doi.org/http://dx.doi.org/10.1002/acp.2932.

Sorensen, J. H. 2000. "Hazard Warning Systems: Review of 20 Years of Progress."
Natural Hazards Review 1 (2):119–25.

For more information, see:

How to promote interaction between authorities and the public?

How to identify the most relevant timing to deliver emergency messages?

How to enhance trust in emergency response?

1.2 How to identify the most relevant timing to deliver emergency messages?

- Attract the population's attention in the midst of daily life

- Consider the location/situation of recipients.

- Ensure the **timing and geographic specificity** of the messages

Responsible Author: CNRS

In a Nutshell

The aim of this guideline is to help service providers and public authorities to address the right message at the right time to the public in need of information to adapt their daily routine to potentially dangerous situation. The ultimate goal is to trigger behavioural change enhancing individuals' resilience to weather-related risk.

Guidance or used Methodology

Delivering of direct real-time alerts and detailed warning messages at desired times could be supported by several traditional or modern communication tools such as:

- **Reverse-dialling systems.** Authorities may use telephone calls to deliver recorded emergency messages to subscribed telephone users in a certain region. For example, the reverse 9-1-1 system developed by Airbus DS Communications is currently used by public safety organizations in Canada and the United States to communicate with groups of people in a defined geographic area.

- **Radio systems.** Radio is one of the most common tools used by authorities to inform the people of a stricken area. That is because radio is a media highly preferred from the public for acquiring information during daily life activities (e.g., working, driving, leisure). Authorities in many countries worldwide have also developed disaster-related radio systems to enable communication between the organizations responsible for public safety or between the

organizations and the public. As an example, the *"National Oceanic and Atmospheric Administration (NOAA) Weather Radio All Hazards"* is a system of radio stations in the United States that allows for the transmission of alarms in specified areas[5].

- **Modern information and communication technologies (ICTs)**. *Mobile and interned-based technology solutions* such as alerts SMS, email, web apps and social networks facilitate the communication of massive messages still allowing for targeting their distribution in relevant times and locations.

To reach people timely and efficiently alerts and warnings should be developed based on the following **main principles:**

☑ **Attract the population's attention in the midst of daily life.** In the threat of natural hazards, perception of environmental cues and warning messages strongly depend on contingent conditions (e.g., rush hours when there are errands to run and children to pick up and lots of other cars on the road, or working hours when people feel they must be at work regardless of the conditions) (Ruin 2007, 2010). Alerts and warning messages should be simple and straight, and be issued at certain hours, considered as critical for the execution of daily routines, to increase the self-efficacy[6] of the population and stimulate public action. For example, to avoid unnecessary mobility that would increase the risk of deaths and injuries during flooding, emergency warnings should motivate the cancelation of school-related travels in adequate time before the usual times that going-to-school activities are undertaken by the families in the exposed area (e.g., specific early morning hours). Repetition of the messages should be also considered to ensure that the population in need receives the information before the critical hours.

☑ **Consider the location/situation of recipients.** Specific alerts and warning should be defined not only temporally but also geographically. (Terti et al. 2015) adopted the term "coupled place-activity processes" to point out that the nature and dynamics of the individuals' reactions will differ according to the location and activity they were performing when they felt the need for action, and their capability to connect with their relatives or to have social interactions allowing a group response (Denis S. Mileti 1995; Drobek 2000; Lindell and Perry 2004; Ruin et al. 2014). In their vulnerability conceptual framework, the "coupled place-activity" concept refers to the temporality of the daily life (i.e., sequence of activities of people); an important vulnerability driving force that has to be considered when warnings and emergency

---

[5]The radio stations broadcast continuous weather information directly from a nearby (<40 miles) Weather Forecast Office of the service's operator, the National Weather Service (NWS), an agency of the National Oceanic and Atmospheric Administration (NOAA) within the United States Department of Commerce.

[6] Self-efficacy concerns the belief that the recommendation can be carried out.

messages are issued at certain hours of the day or days of the week. According to the National Research Council (National Research Council (NRC) 2013a), geotargeting alerts and warnings i) prevents overloading the public with information that can not be triaged and leveraged, and ii) ensures that the recipients are turned to relevant protection actions depending on where they are at the time of the warning (e.g., evacuating versus staying in place). Specific warnings, issued for a recipient's own location, are expected to foster risk personalization and thus, prompt an attempt for confirming their content more than general warnings (Nigg 1987). Especially, it is postulated that such personal warnings would create a greater motivation for action and a consequent disposition for seeking sense making of the situation (Dennis S. Mileti 1975). On the other hand, warning population that is not at risk leads to misconception and ignorance of warnings in future events.

Supplementary comments: (Denis S. Mileti 1995; Dennis S. Mileti and Peek 2000) states that warning response is based on a social psychological process that includes several stages from receiving the warning until deciding to take a protective action. A person i) hears the emergency information, ii) forms an understanding of what is being said, iii) defines a level of belief in what is being said, iv) determines a level of risk personalization, and then v) behaves based on the personal perceptions formed. This process implies for a lag time between warning reception and action. Therefore, the time that the alerts and warnings are delivered in advance should be adequate for people to realize their situation and decide how to respond on that. To complete their understanding and belief before acting, people inquire social confirmation of warnings; a process known as "milling" (sometimes referred also as "sense-making"). During this process people "mill" around to get information and confirmation from others to create new ideas about safety and risk. Milling adds extra time for informal communication to take place before protective actions are planned and performed. All these delays increase the time period required between the dissemination of warnings from the authorities and the daily activities to be interrupted with protective actions by the public. Considering that modern technologies, and especially social media services, allow access to a great volume of information not restricted spatially or temporally (e.g., limited area of transmission service, cancelation of prior announcements and replacement by updates) like traditional communication channels (e.g., radio, tv), their contribution in reducing the milling time is questionable. In this direction, targeting geographically the delivered emergency message becomes a key aspect in the designing of interned-based warning platforms (National Research Council (NRC) 2013a).

Practical example

Examples of personal safety apps for natural disasters:

- **"Safety Check" tool on Facebook:** Since October 2014 Facebook announced a tool that automatically sends users in the affected area a notification asking if they're safe, notifies Facebook friends when a user clicks "Yes, let my friends know." Facebook determines the users' location by looking at the city listed in their profile, or by seeing where they checked in if they use the "Nearby Friends" feature. An example of Facebook's Safety Check page for the Nepal earthquake is available at https://www.facebook.com/safetycheck/nepalearthquake.

- **"Guardly":** Launching Guardly activates its location detection capabilities, transmitting real-time GPS location and indoor positioning within buildings (for select enterprise customers), while providing two-way communication with private security, 911 authorities and safety groups (http://www.guardly.com/technology/mobile-safety-apps.html).
  Administrators may also send mobile alerts based on location or user-group, ensuring relevant and reliable messages in case of an emergency. Especially, with its "Mobile Mass Notification System" emergency communications can send about 500,000 push notifications to Guardly mobile safety applications in just seconds. The system allows for location-based distribution: the distribution of mass notifications to one or more georeferences to ensure communications are only sent to people within one or more affected regions, and limit unnecessary communications to others outside targeted geographies. The system is demonstrated online at http://guardly.com/technology/mobile-mass-notification-system.html.

- **"Disaster Alert":** The mobile application from Pacific Disaster Center's World Disaster Alerts "Disaster Alert" provides mobile access to multi-hazard monitoring of and early warning for natural disasters around the globe (https://index.co/company/disasteraware). By accessing the "DisasterAWARE" platform, it provides users with near real-time access to data on active hazards globally showing events that are designated potentially hazardous to people, property, or assets (http://www.pdc.org/solutions/products/disasteraware/). The app is currently used by almost 1.5 million worldwide.

- **"GDACS":** Global Disaster Alert and Coordination System (GDAS) is a cooperation framework between the United Nations, the European Commission and disaster managers worldwide (http://www.gdacs.org/default.aspx). By developing mobile tools GDAS aims at improving alerts, information exchange and coordination in the first phase after major sudden-onset disasters (http://portal.gdacs.org/Expert-working-

groups/Mobile-technology). Especially, iGDACS is a mobile app that allows users to get the latest GDACS alerts and key statistics right on their iPhone or iPad. In addition, it allows users to provide feedback on GDACS events, which is communicated to the GDACS community (after moderation). However, this service is still in experimental mode and caution is needed because GDACS is not engaged in responses to requests for assistance.

- **"SirenGPS":** This application links collaborative emergency communication, management and response by connecting everyone in a U.S. community to first responders and allowing first responders to communicate with each other, all on a single platform (https://www.sirengps.com). Although over 70 percent of 911 calls are made from cell phones, emergency responders can only track a caller's location to the nearest cellphone tower. SirenGPS allows first responders to determine the precise location of 911 callers. The app also enables real-time, two-way communication in a crisis, even when cell phone service is down. Additionally, first responder agencies — such as fire, police and EMTs — allows credentialed first responders to communicate and share tactical awareness tools when they arrive on a scene.

References

Drobek, I. 2000. "Responses to Flood Warnings." In *Floods Vol. 1*, 361.

Lindell, Michael K., and Ronald W. Perry. 2004. *Communicating Environmental Risk in Multiethnic Communities*. Vol. 7. Sage Publications.

Mileti, Denis S. 1995. "Factors Related to Flood Warning Response." *U.S.- Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods*. Perugia (Italy).

Mileti, Dennis S. 1975. *Natural Hazard Warning Systems in the United States: A Research Assessment*. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Mileti, Dennis S., and Lori Peek. 2000. "The Social Psychology of Public Response to Warnings of a Nuclear Power Plant Accident." *Journal of Hazardous Materials* 75 (2):181–94.

National Research Council (NRC). 2013a. *Geotargeted Alerts and Warnings: Report of a Workshop on Current Knowledge and Research Gaps*. Washington, DC: The National Academies Press. https://doi.org/10.17226/18414.

———. 2013b. *Public Response to Alerts and Warnings Using Social Media: Report of a Workshop on Current Knowledge and Research Gaps*. Washington, DC: The National Academies Press. https://doi.org/10.17226/15853.

Nigg, Joanne M. 1987. *Communication and Behavior: Organizational and Individual*

Response to Warnings. Edited by R. R. Dynes, B. de Marchi, and C. Pelanda. *Sociology of Disasters: Contribution of Sociology to Disaster Research*. Vol. 11. Collana dell'Istituto di Sociologia Internazionale, Franco Angeli.

Ruin, Isabelle. 2007. "Conduite À Contre-Courant. Les Pratiques de Mobilité Dans Le Gard: Facteur de Vulnérabilité Aux Crues Rapides." Université Joseph-Fourier-Grenoble I.

———. 2010. "Conduite À Contre-Courant et Crues Rapides, Le Conflit Du Quotidien et de L'exceptionnel." *Annales de Géographie* 4 (674):419–432.

Ruin, Isabelle, Céline Lutoff, Brice Boudevillain, Jean-Dominique Creutin, S. Anquetin, M. Bertran Rojo, L. Boissier, et al. 2014. "Social and Hydrological Responses to Extreme Precipitations: An Interdisciplinary Strategy for Postflood Investigation." *Weather, Climate, and Society* 6 (1):135–53. https://doi.org/https://doi.org/10.1175/WCAS-D-13-00009.1.

Terti, Galateia, Isabelle Ruin, Sandrine Anquetin, and Jonathan J Gourley. 2015. "Dynamic Vulnerability Factors for Impact-Based Flash Flood Prediction." *Natural Hazards* 79 (3):1481–97. https://doi.org/10.1007/s11069-015-1910-8.

For more information, see:

How to promote interaction between authorities and the public?

How to ensure effective communication of risk information, warnings and emergency messages?

How to enhance trust in emergency response?

1.3 How to promote interaction between authorities and the public?

- Interactive two-way communication is a key component of effective risk and crisis communication

- Interactive communication during the **crisis/response phase** is interrelated to the use of *social media*

Responsible Author: CNRS

In a Nutshell

The value of interactive two-way communication versus the traditional one-way information flow (i.e., from authorities to the public) is recently highlighted in the disaster literature as a key component of effective risk and crisis communication (Chan 2013; Wendling, Radisch, and Jacobzone 2013). This guideline introduces interactive processes that may support the evaluation and therefore, the potential improvement, of the practices currently used by the authorities to enhance public's self-preparedness and self-protection. More specifically, the tools proposed in this guideline can be developed and applied in several ways serving two main purposes:

1. **Collection of feedbacks from the public in the preparedness (p) and/or the crisis (c) phase.**
   Among others, feedbacks may refer to the:

- Public's perceptions and knowledge on a certain hazard and the associated risk **(p)**.

- Public's understanding and reliance on the current warning system and the existing emergency services (e.g., trust on the information provided by experts, understanding of warnings and weather information, trust on the national or local emergency management and expectations for official protection actions) **(p)**.

- Self-preparedness and self-protection activities being currently adopted by individuals (i.e., measures and decisions considered in past events or expected to be considered in future events) **(p)**.

- Ground facts enhancing situational awareness of authorities **(c)**

- Public's need for assistance during the crisis response **(c)**.
2. **Education/Information of the public in the preparedness (p) and/or the crisis phase (c).**
   Among others, educational/informative efforts may refer to the:
- Increase of public's risk knowledge/awareness for different hazards and the associated risks **(p)**.
- Explanation of the structure of the illustrations currently used by the national meteorological and hydrological services in official warnings to the public (e.g., colour codes, maps legends) **(p, c)**.
- Guidance on specific actions to be taken by individuals in certain situations (e.g., reaching higher ground or avoiding driving in case of (flash-) flooding) **(p, c)**.
- Advise for self-protective activities during the crisis response **(c)**.

Guidance or used Methodology

The dialogue between institutions and individuals in the **preparedness phase** may be achieved by integrating *mini surveys or serious games* into face-to-face conversations, telephone calls, websites or interactive social media such as Twitter, Facebook and YouTube. Serious games are the virtual simulation of real-world events especially designed to educate, inform and train the players for the purpose of solving a specific problem, unlike entertainment games. In the field of disaster risk management, serious games are used to increase public awareness as well as to promote preparedness and prevention of losses.

The **questionnaires and/or games** should be built based on the following **main principles**:

A. **Use practical/problem-based scenarios to coordinate with experiential learning about risk.** It has been shown that adults learn from and through experience and therefore, their situated cognition should be triggered (Merriam, Caffarella, and Baumgartner 2007). In other words, "what if…" scenarios may put individuals to "imagine" a certain situation and provide feedback for their potential response to that. The scenarios can be developed in a way relevant to stress certain aspects such as the dynamics of the hazard, the (un)predictability of the physical phenomenon, the capabilities/limitations of the official warnings and emergency response, and the effects of individual behaviour/response on the final outcome (e.g., loss of property and livestock, health problems, loss of human life).

B. **Be integrated in every-day used communication channels** (e.g., official websites such as the municipality webpage or certain groups followed in Twitter or Facebook). Relating the risk topics to means that people are familiar

with, is important to i) access multiple participants that can provide an adequate sample for understanding the level of risk awareness and perception developed in the area of interest, and ii) gradually develop trust and reliability in information exchange (Wendling, Radisch, and Jacobzone 2013).

Supplementary comments: Since realistic scenarios lead the public to personalize the risk and consider their personal reaction to warnings and emergency messages about a specific hazardous event, the proposed tools (e.g., games) can be used also as means to educate people and potentially change beliefs that are based on prior experiences and learning. Generally, people try to explain occurring circumstances according to their former understanding or ideas (Russo et al. 2008) and they tend to follow decisions that appeared to lead to positive outcomes in past experiences (Fazio, Eiser, and Shook 2004). For example, somebody who successfully crossed a flooded intersection with his vehicle in one or more past flood events, he/she may believe that such flood occurrence is not threatening for himself/herself and so, may feel safe to redo that when a future event seems to have "similar" characteristics to the previous one(s). Though, according to (Eiser et al. 2012) learning is a dynamic process allowing for new information to replace older ones strengthening or weakening existing beliefs. Therefore, informing-explaining-highlighting that some certain decisions may have catastrophic consequences - even if they did not have such outcomes in a phenomenally "similar" event in the past - is crucial to eliminate false assumptions. Certain actions that are relevant to avoid harm from the hazard under concern should be promoted then to improve public's preparation and protection choices in the future. Except for the adults such considerations are relevant for children and teenagers as well, when building quiz and games to train them against natural disasters.

Interactive communication during the **crisis/response phase** is interrelated to the use of *social media*. Social media used recently in emergency communication and management strategies include social networks (i.e., personal pages such as Facebook supporting content sharing and online contact between people), blogs (i.e., online journals or discussion sites such as Twitter posting information and updates), and content communities (i.e., online communities such as YouTube or Vilmeo sharing photos, audio, videos), to name but a few[7]. Public commenting on social media may serve as a useful tool not only to collect feedback on the effect of the

---

[7] For an overview of social media most used in emergency management see Table 1 in (Wendling, Radisch, and Jacobzone 2013).

provided risk information and messages, but they also allow for a deeper understanding of risk perceptions to be incorporated in future developments. During the crisis situation social media is increasingly used from the authorities in communication strategies to i) exchange information useful for the public, and/or ii) monitor and respond to what is happening in the community, through photos, videos, comments and online conversations.

The communication strategies that rely on social media should be built based on the following **main principles**:

A. **Ensure the availability of resources for the social media use in the authority in charge.** It is important to verify the ability of the organization/service to receive and react to public demands through social media. That implies for the existence of means such as RSS systems, twitter accounts, Facebook pages dedicated to the case of crisis as well as human resources to support uploading of information and online conversations during the crisis.

B. **Indicate the authority's liability to maintain online communication paths.** For example, how often the organization updates the Question-Answer forum of its website, the opportunities for real-time responses etc.

C. **Clarify the purpose of each communication practice.** Different practices may be designed depending on the communication goals of the authority (e.g., provide information and updates, learn about the public's needs, monitor for situational awareness, and mobilize volunteers). The goal will define which social network, blog or community will be used, what will be the content of messages and their update frequency, which links or retweet options will be promoted, which information is to be solicited from the public etc.

D. **Encourage feedback provision on the authority's communication.** Giving to the public the opportunity to express its satisfaction or complains on their interaction with authorities during crisis is a direct and fast way to improve the authority's reputation and enhance trust. Feedbacks may be also used in post-crisis time to identify strong or weak points to be considered in future communication tools.

E. **Educate/train both the authority employees and the public on the relevant usage of social media in crisis communication and management.** Training includes explanation of the language used in social media promoting meaningful keywords as well as a guidance for the abilities and limitations of each media. Employees are challenged to assess the reliability of information conveyed by the social media, diminish rumours and avoid misinformation. On the other hand, the public should be well informed on both how to use social media to become providers of information and also what should be their expectations for official response to their commenting/messaging.

F. **Manage high amount of information exchanged through social media.** Trending and data mining techniques (e.g., Trendistics, Google analytics) are

required to remove irrelevant comments and consider inherent bias in crowdsourcing to get a good understanding of what is happening in the field. The availability of experts and technicians who can support the archiving and analysis of inputs and trends from the elaborated social media is important for the exploitation of interactive communication in all the emergency phases.

G. **Take into account confidentiality issues.** Legal experts are necessary to support the right use of the open data provided by the social media for crowd sourcing. Certain legislations should be developed and followed to ensure that both citizens' privacy and commercial interests are respected when third-party developers build crowd-sourcing tools for emergency managers. For example, some countries such as Netherlands constructed laws that allow for the analysis of massive information coming from multiple pages on social media but forbid the monitoring of individuals.

Supplementary comments: The importance of social media in crisis communication lies on the ability to reach a wider audience in real-time while providing also personalized messages to individuals for self-preparedness and self-protection. This point is strengthened when social media are used in combination with Smartphones to send information from the site of the crisis. However, social media is not a panacea. Social media should not replace but rather complement traditional communication means such as emergency calls, sirens, wallpapers, radio and television (i.e., multichannel approach). The literature highlights that certain population groups such as elderly, people with disabilities and people in low-income households, which are generally considered as the most vulnerable ones to natural disasters, may have less access to specific communicative technologies than others. Thus, the communication needs vary for the different target public (Howard et al. 2017). It is shown, for example, that although younger people tend to use social media, mobile phone apps and websites, the majority of elderly rely still on traditional channels such as radio and phone calls on their landline (DeYoung et al. 2016; Feldman et al. 2016; Howard et al. 2017). The social media manager in an authority may set the relevant communication channels regarding the targeted audiences.

Practical example

Examples of online games for natural disasters:

- **"STOP DISASTERS!":** The United Nation's International Strategy for Disaster Reduction (UN/ISDR) developed a disaster simulation game for children between 9-16 years old (although anyone can play) with the ultimate goal to increase their risk awareness and subsequently the probability to survive during disasters. The on-line game is structured as a single player game including five scenarios (i.e., tsunami, hurricane, wildfire, earthquake, flood) with three levels of difficulty. The player needs to make decisions to reduce the impacts of natural hazards (i.e., damages and losses of life) building upon an established community (e.g., by providing defences and upgraded housing to prepare for inevitable disaster). To support the player's decision making the Information Panel shows important statistics about the population and the budget, along with a mini map and a vital "PROBABILITY" indicator for the occurrence of the hazard. The game is available at http://www.stopdisastersgame.org/en/playgame.html.

- **"Be a hero!":** The U.S. Department of Homeland Security (DHS) in association with the Federal Emergency Management Agency's (FEMA) Youth Preparedness Program provides an interactive website for kids to learn more about disasters. These games assist kids in learning about disaster situations and making informed choices as well as learning what to put in preparedness kits (http://www.ready.gov/kids). Especially, the "DISASTER MASTER" game a single player game including 8 levels where each level correspond to different hazard(s) (i.e., Wildfire, Tornado, Hurricane/Blackout, Home Fire, Winter Storm/Extreme Cold, Tsunami/Earthquake, Thunderstorm/Lightning, The Hot Seat). The game is available at https://www.ready.gov/kids/games/data/dm-english/.

- **"FloodSim":** The Norwich Union in cooperation with PlayGen developed an interactive policy simulation game which aims to raise public awareness of flooding problems in the United Kingdom. The game puts the player in control of flood policy in the UK for three years. Players decide how much money to spend on flood defenses, where to build houses and how to keep the public informed. But as in real life, money is limited. The player must weigh up flood risks in different regions against the potential impact on the local economy and population. In this way, the game tries to bring to life the complexity of the issue and the trade-offs that policy-makers are grappling with in real life. The simulator is available at http://playgen.com/play/floodsim/.

Examples of online guidance and educational videos for natural disasters:

- **"STORMSTRUCK":** The mission of the Federal Alliance for Safe Homes (FLASH) fosters public awareness and education on extreme weather events, and educates people on how to take measures to mitigate their homes against extreme weather. The online resource allows people to learn about some of the severe weather most likely to affect their state and is available at http://stormstruck.org/. There is also a hands-on site at INNOVENTIONS at Epcot® at the Walt Disney World® Resort featuring realistic weather scenarios and opportunities to learn about safe building techniques. FLASH provides also instructive videos for adults' preparedness and response to various natural hazards (e.g., earthquake, flood, hail, hurricanes, lightning, and tornados) that are occasionally embedded in FLASH's accounts on social media such as twitter (@stormstruck). A list of those videos is available at http://www.flash.org/video.php.

Examples of social media used in crisis communication and management:

- **FEMA on Twitter:** The U.S. Federal Emergency Management Agency's (FEMA) actively participates in Twitter and uses it to announce messages during emergencies (https://twitter.com/fema). According to OhMyGov media data analysis, FEMA belongs to the 50 most-followed agencies on Twitter. With 591,000 followers FEMA has a broad audience to communicate when public seeks information and assistance during a crisis. FEMA not only publishes its own information but also retweets a large amount of relevant messages originally delivered by other federal agencies such as meteorological institutions, health departments. For example, on May 2017 FEMA circulated many messages from the NOAA's National Weather Service account to make people aware of the flood risk. Examples of those tweets are "Half of all flood fatalities are vehicle-related. Turn Around Don't Drown. http://tadd.weather.gov #FloodSafety" (4 May 2017) and It is impossible to know how deep the water is just by looking at it. https://tadd.weather.gov #FloodSafety (1 May 2017) which were accompanied with relevant educating videos.

- **Australian Alert SA:** The Alert SA Website and Mobile App gather information shared from multiple sources (e.g., fire services, the state emergency services, police and health centers, transportation and environmental departments, meteorological agencies, power and water networks) in various social media (e.g., Twitter, Facebook RSS) and map them across South Australia (SA). The target is to provide the most comprehensive view of event and warning information to keep public up to date and help them make informed decisions about their safety (https://www.alert.sa.gov.au/map).

References

Chan, Jason Christopher. 2013. "The Role of Social Media in Crisis Preparedness, Response and Recovery." http://www.oecd.org/governance/risk/The role of Social media in crisis preparedness, response and recovery.pdf.

DeYoung, S. E., T. Wachtendorf, A. K. Farmer, and S. C. Penta. 2016. "NOAA Radios and Neighbourhood Networks: Demographic Factors for Channel Preference for Hurricane Evacuation Information." *Journal of Contingencies and Crisis Management* 24 (4): 275–85.

Eiser, J. Richard, Ann Bostrom, Ian Burton, David M. Johnston, John McClure, Douglas Paton, Joop van der Pligt, and Mathew P. White. 2012. "Risk Interpretation and Action: A Conceptual Framework for Responses to Natural Hazards." *International Journal of Disaster Risk Reduction* 1 (Supplement C): 5–16. doi:https://doi.org/10.1016/j.ijdrr.2012.05.002.

Fazio, R. H., J. R. Eiser, and N. J. Shook. 2004. "Attitude Formation through Exploration: Valence Asymmetries." *Journal of Personality and Social Psychology* 87 (3): 293–311.

Feldman, David, Santina Contreras, Beth Karlin, Victoria Basolo, Richard Matthew, Brett Sanders, Douglas Houston, et al. 2016. "Communicating Flood Risk: Looking Back and Forward at Traditional and Social Media Outlets." *International Journal of Disaster Risk Reduction* 15 (Supplement C): 43–51. doi:https://doi.org/10.1016/j.ijdrr.2015.12.004.

Howard, Amanda, Kylie Agllias, Miriam Bevis, and Tamara Blakemore. 2017. "'They'll Tell Us When to Evacuate': The Experiences and Expectations of Disaster-Related Communication in Vulnerable Groups." *International Journal of Disaster Risk Reduction* 22 (Supplement C): 139–46. doi:https://doi.org/10.1016/j.ijdrr.2017.03.002.

Merriam, Sharan B., Rosemary S. Caffarella, and Lisa M. Baumgartner. 2007. *Learning in Adulthood: A Comprehensive Guide*. 3rd Editio. Hoboken, NJ: John Wiley & Sons, Inc.

Russo, J. Edward, Kurt A. Carlson, Margaret G. Meloy, and Kevyn Yong. 2008. "The Goal of Consistency as a Cause of Information Distortion." *Journal of Experimental Psychology: General* 137 (3): 456–70.

Wendling, Cécile, Jack Radisch, and Stephane Jacobzone. 2013. "The Use of Social Media in Risk and Crisis Communication." *OECD Working Papers on Public Governance, No. 25, OECD Publishing*. http://dx.doi.org/10.1787/5k3v01fskp9s-en.

For more information, see:

How to ensure effective communication of risk information, warnings and emergency messages?

How to identify the most relevant timing to deliver emergency messages?

How to enhance trust in emergency response?

1.4 How to design a successful crowdsourcing initiative?

- Crowd-sourcing initiatives can be set up by developing
a Digital Response Network (DRN)

  - Collect basic information about the DRN (needs, solutions, risks and benefits) and comply to humanitarian and legal principles

  - set up the network hub

  - success factors are vision & strategy, infrastructure, usability, (acceptance and support By) external environment and control

Responsible Author: KAYO

In a Nutshell

The term crowdsourcing is a neologism combining the words crowd and outsourcing. It was introduced by Jeff Howe in 2006 and referred to "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" (Howe 2006).

This guideline aims at suggesting steps to take and mistakes to avoid in order to profit from human intervention when needed or wanted to improve the quality of the task performed.

Due to nowadays Technological Resources, crowdsourcing has widened its definition to include multiple ways to collect and distribute information. Examples of crowdsourced tasks are classification or annotation of tweets, digitalization of documents from paper, rating of AI processes results, text translation among many others. But volunteers can also be tasked with specific tasks required for a single purpose (sending template information) using mobile phones, smartphones or other devices.

Guidance or used Methodology

Information to be collected before the creation of a Digital Response Network (DRN) for an initiative.

Identify the NEED about the problem to solve (i.e. lack of information)

Identify the SOLUTION: Do we need to create a new network or can I ask help to an existing ones?

Identify the risks and benefits associated with creating a DRN and compare them with the benefits

Identify the resources needed for the establishment of a DRN in terms of time, resources, and skills for the short and for the long term.

Respect the humanitarian principles (humanity, impartiality, neutrality and operational independence)?

Based on the analysis of the above questions, it should be clear if the creation of a new DRN would be beneficial. If this is the case then the best practice should be:

Network Hub

First thing to be done is to establish and sustain the core of the network which is called Network Hub. It is responsible for developing the larger DRN. It must be able to administer, sustain and promote the DRN. A Leader group must be defined with the responsibility to create and sustain the network, making key decisions about the design, implementation, and operation.

Often, a Core Team is identified, in order to manage administrative, outreach, legal, funding elements of the DRN; External operations - Develop, collaborate, coordinate, communicate and sustain the larger DRN. In the regions with relatively good coping capacity and well established crisis response organization, the leading role in DRN development and coordination remains at the national crisis response authorities. In less developed regions with limited disaster coping capacity or in case of extremely large scale events, where transboundary assistance and coordination is required, DRN development and coordination could be done at the higher level (EC, UN, etc.).

Network Hub definition steps:

- Design the operating environment for physical and/or virtual coordination

Physical: Prior to crisis, use site(s) to meet people, host workshops etc., and during crisis, as a focal point for communication and coordination. At a minimum, ensure one site and one alternate site are identified (in case relocation is required). Potential locations could include tech labs or co-working spaces.

Virtual: Tools and platforms to facilitate communication (email, web conferencing, chat), collaboration, coordination, data creation, storage and analysis, data visualization, social media tools, decision making, online promotion, project management and hazard specific situational awareness.

- Decide whether you will be centralized, decentralized, or a hybrid between the two
- Identify how decisions will be made, who will have authority and responsibilities, and how authority will be assigned, revoked and distributed across organizations
- Define a process and frequency for regular contact, and a mechanism and protocol to ensure discussions are captured, open and available to all members
- Create terms of membership including how to join, participate and leave the network. If applicable, identify different types of membership (e.g. volunteers, staff, technologists, data providers, and activating partners)
- Identify the types of data the DRN will work with and how it be collected, stored and shared. Specify who will collect, own and have access to it. Isolate potential sensitive data and determine data security measures
- Ensure the network can continue to function during crisis through development of Standard

Operating Procedures (SOPs) (e.g. Handoff plans), call trees, emergency plans, risk analysis, exercising plans and protocols, etc.

- Identify the different levels of activation for escalating crises, including triggers and activities for each level, and which external supports and stakeholders will be activated at each level.

Once a functional hub is established, you can create the broader Digital Response Network. The DRN will consist of physical and digital responders, i.e. individuals and organizations capable of providing support in crisis, and local response individuals and agencies that will require help.

Volunteer and Technical Communities (V&TC)

CHANNELS FOR RECRUITMENT & SUSTAINABILITY

- Face-to-face meetings
- Awareness and training workshops
- Hackathons / Random Hacks of Kindness
- Crisis Camps / Unconference / SkillShares

- Meetups

The DRN should consist of an eclectic blend of individuals, organizations and networks from V&TCs, local responders and the community. Suggested members include:

- Formal Responders – Civil Protection, Met offices;
- Informal Response Community - NGO/NPOs, VOSTs, VOADs, CERTS, RRNs, etc. 5;
- V&TCs - Local and global V&TCs (e.g. the Digital Humanitarian Network);
- Regional / International Responders - international organizations, humanitarian response organizations, relief and response agencies, iNGOs/NPOs;
- Local Community - Local Leaders e.g. head of a community organization, local groups, universities and schools, community groups / churches, tech labs & co-working spaces, etc.

In order to build and keep a fruitful collaboration between physical and digital responders and the local community:

- Local Responders should share Operational Requirements & Workflows, identify needs for V&TC support, channels for decision making / permission; They should define an official role to coordinate with V&TCs and mandate the DRN as an emergency support function for formal response organizations;

A Memorandum of Understanding (MOU) should be defined to specify the workflow of the operation and level of service expected between networks;

Volunteer and Technical Communities should state what they can do, how to access their service, whether and how they provide or accept volunteers, how they engage with the community;

Both V&TC and Local Responders should identify overlaps in workflow between capacity, level of preparedness and needs, and scope opportunities for collaboration. They should ensure regular, ongoing face-to-face meetings. A fundamental key aspect for keeping the initiative in 'good shape'

Is the practice through simulated crisis activate during remote emergencies or during non-crisis events that could benefit from V&TC. They should share knowledge and involvement in projects in order to feel engaged

From a 'political' perspective, Local Responders should encourage the local community to engage by promoting V&TCs since participation can help build skills & knowledge to make them more employable. Volunteers should be acknowledged through compensation / thank you's.

Key Factor for Successfully Deploy a DRN

Being sure the nature of the tasking is crowd-friendly: Local Responders face many challenges and these challenges can certainly be crowdsourced. But that doesn't mean the crowd can solve all those problems on time. The tasks should be met on time with adequate resources by Digital Volunteers, else in better to give up. It's of the utmost importance defining problems at the right level so responders need to split an issue into smaller and more abstract problems to a micro tasking manageable by the crowd.

In humanitarian disaster settings, volunteers rely on open data and open civic technology platforms. The main role of such platforms is to bridge collaboration and information gaps between the various communities that play a role in disaster management, and provide an overview of the division of labour and a common mechanism for a more focused collaboration and cooperation of all actors involved.

Key factors are:

- Vision & strategy. If the set of ideals, goals and objectives supported by the platform is important to the crowd, people will inform others about the crowdsourcing application and encourage them to use it
- Usability. Especially after a disaster, it is crucial that relief workers, survivors and decision makers are able to interact with the platform as quickly and easily as possible. The design of the crowdsourcing platform should enable and facilitate this interaction and the system should be easy to use, with no need for extra education or training.
- Infrastructure. To make sure the crowd can participate in crowdsourcing and to minimise the effort expectancy for participation there should be a sound technical infrastructure an easily accessible and reliable internet connection
- External environment. Governing agencies should be supportive of the platform and facilitate its efforts.
- Control. The sense of self-control is a major factor in disaster recovery. The affected community should be able to set their own goals, make their own decisions and guide the events of their own lives and the platform should not create a state of dependency

Practical example

The biggest attempt to use the social media in the crisis management was the activation of the Digital Humanitarian Network by the United Nations Office for the Coordination of Humanitarian Affairs in response to Typhoon Yolanda (November 2014). Yolanda was one of the most intense tropical cyclones on record which devastated portions of Southeast Asia, particularly the Philippines, killing at least 6,300. During Yolanda, the network of volunteers performing rapid needs & damage assessment by tagging reports posted to social media which were then used by machine learning classifiers as a training set to automatically identify tweets referring to both urgent needs and offers of help.

Similarly, during the Balkan floods in 2014 with more than 60 people losing their lives and over 3 billion Euro damage, Serbian government was developing the system during the ongoing flood crisis. Government created system for monitoring social media and reports submitted via SMS and emails. During the crisis, government provided to public set of official hashtags to be used to report ongoing crisis situation development, people in need, infrastructure damage, response action coordination, volunteer organization, humanitarian and medical assistance coordination.

References

Capelo, Luis, Natalie Chang, and Andrej Verity. 2012. *Guidance for Collaborating with Volunteer & Technical Communities*. Creative Commons Attribution 3.0.

Howe, Jeff. 2006. "The Rise of Crowdsourcing." *Wired Magazine* 14 (6). http://www.wired.com/wired/archive/14.06/crowds.html.

Phillips, Jennie, and Andrej Verity. 2016. "Guidance for Developing a Local Digital Response Network."

Simperl, Elena. 2015. "How to Use Crowdsourcing Effectively: Guidelines and Examples." *LIBER Quarterly* 25 (1): 18–39. doi:http://doi.org/10.18352/lq.9948.

For more information, see:

How to establish a collaboration with established crowdsourcing?

Further Literature

(Phillips and Verity 2016; Simperl 2015; Capelo, Chang, and Verity 2012)

1.5 How to establish a collaboration with established crowdsourcing?

- Collaboration with existing crowd-sourcing initiatives is dependent on the type of initiative
    - there are various types of crowd-sourcing initiatives
    - consider best practices for taking into account the stages of crisis management
    - there are numerous key factors for successfully integrating existing digital response networks (vision & strategy, infrastructure, ...)

Responsible Author: KAYO

In a Nutshell

The term crowdsourcing is a neologism combining the words crowd and outsourcing. It was introduced by Jeff Howe in 2006 and referred to "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" (Howe 2006).

This guideline aims at suggesting steps to take and mistakes to avoid in order to profit from human intervention when needed or wanted to improve the quality of the task performed.

Due to nowadays Technological Resources, crowdsourcing has widened its definition to include multiple ways to collect and distribute information. Examples of crowdsourced tasks are classification or annotation of tweets, digitalization of documents from paper, rating of AI processes results, text translation among many others. But volunteers can also be tasked with specific tasks required for a single purpose (sending template information) using mobile phones, smartphones or other devices.

Guidance or used Methodology

To help organizing existing initiatives, a model has been proposed (Poblet, García-Cuesta, and Casanovas 2014) that categorizes crowdsourcing efforts according to

the possible role of the crowd. The model depends on the specific tasks assigned to the crowd, the type of data being processed and the level of participation (effort) involved:

Crowdsourcing roles based on users' involvement and level of data processing (Poblet, García-Cuesta, and Casanovas 2014)

- Crowd as sensors: people generate raw data by sensor-enabled mobile devices which can be later on used for a purpose (i.e. mobile phone coordinates for positional triangulation, traffic flow estimates, etc.). On the side of participants, this is the most passive role in the contributing information chain.
- Crowd as social computers: people generate unstructured data mostly by using social media platforms for their own communication purposes (e.g. sharing contents or socializing in Facebook, Twitter, Instagram, etc.). As in the previous role, there is no explicit participatory effort.
- Crowd as reporters: people offer first-hand, real-time information on events as they are unfolding (e.g. they tweet about a hurricane making landfall and the reporting damages in a specific location). This user-generated content

already contains valuable metadata added by users themselves (e.g. hashtags) that can be used as semi-structured, preprocessed data.

- Crowd as microtaskers: people generate structured, high quality, interpreted data by performing some specific tasks over raw data (e.g. labeling images, adding coordinates, tagging reports with categories, etc.). This role requires an active participation of users in the crowdsourcing effort and it may exploit special skills or require different levels of previous training.

Crowdsourcing technologies and communities

There is a vast and growing field of established initiatives, organisations and companies that are able to offer crowdsourcing services and crowdsourcing platforms to formal institutions that take part in coordinating the response to a disaster such as humanitarian organisations, international NGO's, governments, etc.

Like any partnership between two organisations, the collaboration with existing crowdsourcing initiatives or so called "Volunteer & Technical Communities" benefits from a well defined structured workflow that has been agreed on and thoroughly tested.

"Guidance for Collaborating with Volunteer & Technical Communities" (Capelo, Chang, and Verity 2012) is developed by the Digital Humanitarians initiative, addressing many of the challenges that this topic involves.

Motivations that move an individual to use its expertise or spare time at the service of a V&TC are:

- Open-Source ideology:
- Collaborative Workflow:
- Altruistic Nature
- Desire to Learn or extend their knowledge
- Enthusiasm for Partnership

Therefore cultivating these aspects should be essential to the collaboration between Requesters and V&TC

Best Practices suggest to take into account the several the stage of the Crisis Management

Pre-Deployment

Develop relationships with V&TCs before disaster, rather than waiting until overwhelming needs push the organization to seek external help. Network with

V&TCs in your area of work and make contacts within each group. This establishes a foundation for a future working relationship and enables a better understanding of each V&TC's internal processes and expertise. Once these partnerships are established, activations and deployments can proceed more smoothly.

Understand how V&TCs are organized and governed by studying their materials (i.e. website, code of conduct, protocols, work flows, membership and administration and documentation of previous deployments).

Ensure that your information needs match the V&TC's capacity to meet them. There will always be tasks that professional humanitarian actors can accomplish more efficiently given their access to the field and their response experience. Decision makers must not only identify what tasks can be efficiently delegated to V&TCs, but also clearly demonstrate why the deployment cannot be accomplished with current staff capacities and how V&TCs represent an added value.

Organizations should be mindful that collaboration is not simply about leveraging volunteers for free: it is rather a mutual beneficial relationship that should benefit both sides.

Activation

Designate focal points within your organization to liaise with V&TC focal points. These people should be available for the duration of the deployment. Within the organization, there should be focal points that are consistently available to answer questions and inquiries from the V&TC focal point.

Clearly specify the tasks to be accomplished and set an estimated timeline for requested participation. Use simple and accessible language to draft instruction guidelines and workflows, and continue to illustrate the broader picture of why the deployment is important and how individual tasks will support the overall objective.

Establish a clear workflow in collaboration with the V&TC and specifically define what training and support are required from the requesting organization.

Liaise with the V&TC to reach consensus on the appropriate number and profile of volunteers to recruit for the project.

Deployment

Perform regular quality-control checks, especially early in the deployment so that any mistakes can be corrected quickly.

Post-Deployment

Conduct a wrap-up of the operation with the V&TC. When a deployment ends, V&TCs often use blog posts to highlight the successes and failures encountered over the operation. It is important for organizations to conduct a similar post-deployment evaluation.

In order to build and keep a fruitful collaboration between physical and digital responders and the local community:

- Local Responders should share Operational Requirements & Workflows, identify needs for V&TC support, channels for decision making / permission; They should define an official role to coordinate with V&TCs and mandate the DRN as an emergency support function for formal response organizations;

A Memorandum of Understanding (MOU) should be defined to specify the workflow of the operation and level of service expected between networks;

Volunteer and Technical Communities should state what they can do, how to access their service, whether and how they provide or accept volunteers, how they engage with the community;

Both V&TC and Local Responders should identify overlaps in workflow between capacity, level of preparedness and needs, and scope opportunities for collaboration. They should ensure regular, ongoing face-to-face meetings. A fundamental key aspect for keeping the initiative in 'good shape'

Is the practice through simulated crisis activate during remote emergencies or during non-crisis events that could benefit from V&TC. They should share knowledge and involvement in projects in order to feel engaged

From a 'political' perspective, Local Responders should encourage the local community to engage by promoting V&TCs since participation can help build skills & knowledge to make them more employable. Volunteers should be acknowledged through compensation / thank you's.

Key Factor for Successfully Integrate a DRN

Being sure the nature of the tasking is crowd-friendly: Local Responders face many challenges and these challenges can certainly be crowdsourced. But that doesn't mean the crowd can solve all those problems on time. The tasks should be met on time with adequate resources by Digital Volunteers, else in better to give up. It's of the utmost importance defining problems at the right level so responders need to split an issue into smaller and more abstract problems to a micro tasking manageable by the crowd.

In humanitarian disaster settings, volunteers rely on open data and open civic technology platforms. The main role of such platforms is to bridge collaboration and information gaps between the various communities that play a role in disaster management, and provide an overview of the division of labour and a common mechanism for a more focused collaboration and cooperation of all actors involved.

Key factors are:

- Vision & strategy. If the set of ideals, goals and objectives supported by the platform is important to the crowd, people will inform others about the crowdsourcing application and encourage them to use it
- Usability. Especially after a disaster, it is crucial that relief workers, survivors and decision makers are able to interact with the platform as quickly and easily as possible. The design of the crowdsourcing platform should enable and facilitate this interaction and the system should be easy to use, with no need for extra education or training.
- Infrastructure. To make sure the crowd can participate in crowdsourcing and to minimise the effort expectancy for participation there should be a sound technical infrastructure an easily accessible and reliable internet connection
- External environment. Governing agencies should be supportive of the platform and facilitate its efforts.
- Control. The sense of self-control is a major factor in disaster recovery. The affected community should be able to set their own goals, make their own decisions and guide the events of their own lives and the platform should not create a state of dependency

Practical example

Nepal Earthquake (Nepal, 2015)

On 25 April 2015 an earthquake occurred in Nepal. Almost 9000 people were killed and more than were 20,000 injured. The earthquake triggered avalanches and buildings collapsed. As the focus was first on the capital Kathmandu, it became clear that the rural districts were severely hit as well. Entire villages were flattened, roads were impassable, communications infrastructure was damaged and aftershocks kept the threat of collapsing buildings and landslides ongoing.

In the aftermath volunteers from across the world like Standby Task Force, Crisismappers, the OpenStreetMap project (OSM), ... used crisis mapping to support the relief work. They gathered information via social media and added it to maps and reporting tools (3W). As the situation on the ground among relief workers was chaotic, getting the right information to the right users was difficult. Not only Kathmandu airport seemed to be clogged, but also the digital humanitarian information flow.

In Nepal a strong contribution from local volunteers was witnessed, like Kathmandu Living labs. These young Nepali technology experts even took the lead with their open source crisismap (Quakemap.org). They did a tremendous effort in verifying and curating data from social media, satellite imagery, crowdmapping, drone imagery, etc. The data included (im-)passable roads, collapsed houses, people in need for shelter or food and offers for aid and assistance. Local military and relief workers ended up using this data.

Local photojournalists collected images to give an idea of the degree of earthquake damage. Some of these photographers were among the first to report from hard-to-reach regions, using motorcycles to get there. Using hashtags like #nepalphotoproject and the dedicated Instagram account made it easier to collect the imagery.

Including existing or spontaneous local volunteer groups in the crowdsourcing efforts seems to be a key factor to success. Remote contributors and local actors should share base maps, data platforms, big data and coordinating mechanisms. Sharing knowledge and adding local details will add to the accuracy of reports and crisis maps.

References

Capelo, Luis, Natalie Chang, and Andrej Verity. 2012. *Guidance for Collaborating with Volunteer & Technical Communities*. Creative Commons Attribution 3.0.

Howe, Jeff. 2006. "The Rise of Crowdsourcing." *Wired Magazine* 14 (6). http://www.wired.com/wired/archive/14.06/crowds.html.

Poblet, Marta, Esteban García-Cuesta, and Pompeu Casanovas. 2014. "Crowdsourcing Tools for Disaster Management: A Review of Platforms and Methods." In *AI Approaches to the Complexity of Legal Systems: AICOL 2013 International Workshops, AICOL-IV@IVR, Belo Horizonte, Brazil, July 21-27, 2013 and AICOL-V@SINTELNET-JURIX, Bologna, Italy, December 11, 2013, Revised Selected Papers*, edited by P. Casanovas, U. Pagallo, M. Palmirani, and G. Sartor, 261–74. Berlin Heidelberg: Springer-Verlag.

For more information, see:

How to design a successful crowdsourcing initiative?

2   Data Protection

2.1 How to conduct a Data Protection Impact Assessment?

- For activities with high risk, i.e. the storage of personal data in a large scale, Data Protection Impact Assessments (DPIAs) are required. For other activities, these are recommended.
  - these have to be carried out by the Data Protection Officer (DPOs)
  - components of a DPIA are: risk assessment, ensuring and securing information consent and the implementation of security protocols with respect to data collection routines and secured data storage

Responsible Author: SSSA

In a Nutshell

One of the main novelties introduced by the GDPR is the inclusion of rules on data protection impact assessments (DPIA) (European Parliament and the Council 2016, article 35), which are expected to improve considerably the implementation of data protection principles and the prevention of possible breaches of data protection rights. Conducting DPIAs will require the allocation of time and resources in order to conduct risk assessments, to engage and secure informed consent, and to implement informational security protocols with respect to data collection routines and secure data storage.

Under the GDPR, DPIAs are required for high risk activities, including the processing on a large scale of special categories of data or the systematic monitoring of publicly accessible areas. The Article 29 Working Party has identified a set of criteria to assess whether the activity is likely to pose a high risk for data protection, and recommends to conduct DPIAs in case of doubts (Article 29 Data Protection Working Party 2015). The activities recognised by the Article 29 WP as requiring a DPIAs may include hospital information systems (processing sensitive data), or the gathering of public social media profiles data to be used by private companies generating profiles for contact directories (processing large amounts of personal data). The DPIA shall be carried out prior to the processing and shall be understood as an on-going process, subject to review.

The requirement to carry out a DPIA applies to processing operations initiated after the GPDR becomes applicable on 25 May 2018. It has to be noted however that a DPIA is required where a significant change to the processing operation has taken place after May 2018, for example because of the adoption of new technologies.

The GDPR sets out the minimum features of a DPIA, including a description of the envisaged processing operations and the purposes of the processing, an assessment of the necessity and proportionality of the processing, an assessment of the risks to the rights and freedoms of data subjects, and the measures envisaged to address the risks and demonstrate compliance with this Regulation.

Guidance or used Methodology

National authorities shall establish guidelines on conducting DPIAs in specific sectors, including emergency prevention and response.

Data controllers shall comply with their obligation to conduct a DPIA for high risk processing. They should consult the national data protection authority in case of doubt.

Practical example

Examples of existing DPIA frameworks in Europe include those available in Germany (Unabhängiges Landeszentrum für Datenschutz Schleswig-Holstein, n.d.), France ("Privacy Impact Assessments: The CNIL Publishes Its PIA Manual" 2015), United Kingdom ("Conducting Privacy Impact Assessments Code of Practice" 2014) and Spain ("GUÍA Para Una Evaluación de Impacto En La Protección de Datos Personales" 2014).

References

Article 29 Data Protection Working Party. 2015. "Guidelines on Data Protection Impact Assessment (DPIA) and Determining Whether Processing Is 'likely to Result in a High Risk' for the Purposes of Regulation 2016/679."

"Conducting Privacy Impact Assessments Code of Practice." 2014. https://ico.org.uk/media/for-organisations/documents/1595/pia-code-of-practice.pdf.

European Parliament and the Council. 2016. "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC." *Official Journal of*

the European Union L119: 1–88.

"GUÍA Para Una Evaluación de Impacto En La Protección de Datos Personales." 2014. https://www.agpd.es/portalwebAGPD/canaldocumentacion/publicaciones/com mon/Guias/Guia_EIPD.pdf.

Hert, Paul De, Dariusz Kloza, and David Wright. 2012. "Deliverable D3: Recommendations for a Privacy Impact Assessment Framework for the European Union." http://www.piafproject.eu/ref/PIAF_D3_final.pdf.

"Privacy Impact Assessments: The CNIL Publishes Its PIA Manual." 2015. CNIL. https://www.cnil.fr/fr/node/15798.

Unabhängiges Landeszentrum für Datenschutz Schleswig-Holstein. n.d. "No Title." https://www.datenschutzzentrum.de/uploads/SDM-Methodology_V1_EN1.pdf.

Wright, David. 2011. "A Framework for the Ethical Impact Assessment of Information Technology." *Ethics and Information Technology* 13 (3): 199–226.

Wright, David, and Paul De Hert. 2012. *Privacy Impact Assessment*. Dordrecht Heidelberg London New York: Springer Science+Business Media B.V.

For more information, see:

How to respect data protection principles?

How to respect data subject rights?

How to designate a data protection officer?

How to mitigate the potential for mass surveillance and the principle of self-determination?

How to include Data Protection by Design and by Default Tools?

How to design a successful crowdsourcing initiative?

How to mitigate the potential for mass surveillance and to comply with the principle of self-determination?

Further Literature

(Hert, Kloza, and Wright 2012; Wright and De Hert 2012; Wright 2011)

For more information, see guidelines ….

2.2 How to include Data Protection by Design and by Default Tools?

- General Data Protection Regulation (GDPR) requires the implementation of data protection principles by design of tools
- Privacy-supporting specifications or privacy enhancing technologies shall be considered in the specification of tools
- When required, technologies such as secure communication protocols or encryption as well as private searches of databases may be implemented during tool development

Responsible Author: SSSA

In a Nutshell

One of the main novelties introduced by the General Data Protection Regulation (GDPR) is the inclusion of rules on data protection by design and by default under article 25 (European Parliament and the Council 2016, article 25). Data protection by design refers to the practice of incorporating privacy-supporting specifications (or privacy enhancing technologies, PET) into the planning of technological design and throughout its on-going implementation. Privacy enhancing technologies include encryption, protocols for anonymous communications, attribute based credentials and private search of databases. Data controllers shall implement DP by design taking into account the state of the art, the cost of implementation and the nature, scope, context and purposes of processing as well as the risks of varying likelihood and severity for rights and freedoms of natural persons posed by the processing. In addition, the Regulation introduces an obligation to adopt technological and organisational measures that ensure DP by default, i.e. that only personal data which are necessary for each specific purpose of the processing are processed. Such measures shall ensure that by default personal data are not made accessible without the individual's intervention to an indefinite number of natural persons, therefore implementing data protection minimisation principle.

These responsibilities mean that Data Protection will become an integral part of both the technological development as well as the organisation structure of a new product or service. In this respect, it is important to emphasise that the GDPR embraces a risk-based approach to DP, i.e. data controllers are encouraged to implement protective measures corresponding to the level of risk of their data processing activities. High-risk activities, i.e. activities that involve large-scale processing and automated evaluation of the personal characteristics of data subjects, are subject to stricter requirements, such as to carry out a data protection impact assessment and to consult the national data protection authority.

Guidance or used Methodology

National authorities need to support the development of new incentive mechanisms for privacy friendly services and need to promote them. Data protection authorities should play an important role providing independent guidance and assessing modules and tools for privacy engineering.

Tools developers and data controllers shall ensure that data protection by design and by default approaches are taken into account while developing and deploying new services and tools that process personal data. Data controllers shall be aware of the risk-based approach adopted by the GDPR, which requires them to adopt strict data protection measures in case of activities that pose a high Data Protection risk.

The research community needs to further investigate in privacy engineering, especially with a multidisciplinary approach.

Practical example

Past examples

The use of anonymized mobile data in Nepal, before and after the 2015 earthquake, was one of the success cases where data helped humanitarians deliver critical aid to displaced populations (The Flowminder Foundation 2015).

References

Cavoukian, Ph.D. Ann, and Jeff Jonas. 2012. "Privacy by Design in the Age of Big Data."

Danezis, George, Josep Domingo-Ferrer, Marit Hansen, Jaap-Henk Hoepman, Daniel Le Métayer, Rodica Tirtea, and Stefan Schiffner. 2014. "Privacy and Data Protection by Design – from Policy to Engineering."

European Parliament and the Council. 2016. "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC." *Official Journal of the European Union* L119: 1–88.

Gellert, Raphaël. 2016. "We Have Always Managed Risks in Data Protection Law: Understanding the Similarities and Differences Between the Rights-Based and the Risk-Based Approaches to Data Protection." *European Data Protection Law Review (EDPL)* 2 (4): 481–92.

Maldoff, Gabriel. 2015. "The Risk-Based Approach in the GDPR: Interpretation and Implications."

The Flowminder Foundation. 2015. "Case Study: Nepal Earthquake 2015." http://www.flowminder.org/case-studies/nepal-earthquake-2015.

For more information, see:

How to respect data protection principles?

How to respect data subject rights?

How to designate a data protection officer?

How to conduct a Data Protection Impact Assessment?

How to mitigate the potential for mass surveillance and the principle of self-determination?

How to design a successful crowdsourcing initiative?

Further Literature

(Cavoukian and Jonas 2012; Danezis et al. 2014; Gellert 2016; Maldoff 2015)

2.3 How to designate a data protection officer?

- According to the General Data Protection Regulation (GPDR) a Data Protection Officer (DPO) has to be designated
  - Applicable to all organizations and enterprises that process data on a large scale
  - The DPO has to be given the required resources to ensure the compliance of all activities with the GPDR
  - Data Protection Impact Assessment (if required) has to be carried out

Responsible Author: SSSA

In a Nutshell

The General Data Protection Regulation (GPDR) establishes the duty to designate a Data Protection Officer (DPO) for all public authorities and bodies (irrespective of what data they process), and for other organisations that, as a core activity (and not simply as an ancillary function), monitor individuals systematically and on a large scale, or that process special categories of personal data on a large scale. It is important to note that private organisations carrying out public functions may be subject to the same requirements of public authorities, depending on the relevant national law provisions.

The GDPR recognises the DPO as a key player in the new data governance system and lays down conditions for his or her appointment, position and tasks. It is important to note that DPOs are not personally responsible in case of non-compliance with the GDPR, which is responsibility of the data controller or processor. The GDPR requires the organisation that has designated a DPO to support him or her by providing resources necessary to carry out his or her tasks and access to personal data and processing operations, and to maintain his or her expert knowledge. It is also mandatory that a certain level of autonomy is guaranteed. The main tasks of a DPO is to monitor compliance with the GDPR, to assess whether a Data Protection Impact Assessment is required for specific activities, to maintain records of these assessments, and to act as a contact point with the national data protection

supervisory authority. In line with the broad risk-based approach of the GDPR, in performing his tasks the DPO shall have due regard of the risk associated with the processing operations, taking into account the nature, scope, context and purposes of processing.

The Article 29 Working Party has recently published a guidance to designate DPOs (Article 29 Data Protection Working Party 2017). In this guidance, it is recommended that controllers and processors document the internal analysis carried out to determine whether or not a DPO is to be appointed, in order to be able to demonstrate that the relevant factors have been taken into account properly. Nothing prevents an organisation, which is not legally required to designate a DPO and does not wish to designate a DPO on a voluntary basis, to nevertheless employ staff or outside consultants with tasks relating to the protection of personal data.

Guidance or used Methodology

National authorities shall designate a DPO to monitor their compliance with the GDPR. Data Protection authorities shall provide specific guidance on whether the designation of a DPOs is mandatory in specific areas, including emergency prevention and response, when public functions are carried out by private parties.

Data controllers and processors shall document the internal analysis carried out to determine whether or not a DPO is to be appointed, in order to be able to demonstrate that the relevant factors have been taken into account properly.

Practical example

Good practice

In 2010, the network of Data Protection Officers of the EU institutions and bodies adopted a Professional Standards for Data Protection Officers of the EU institutions and bodies working under Regulation (EC) 45/2001, which deals with the protection of individuals with regard to the processing of personal data by the EU institutions and bodies (European Parliament and the Council 2001).

References

Article 29 Data Protection Working Party. 2017. "Guidelines on Data Protection Officers ('DPOs')."

European Parliament and the Council. 2001. "REGULATION (EC) No 45/2001 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2000 on the Protection of Individuals with Regard to the Processing of Personal Data by the Community Institutions and Bodies and on the Free Movement of Such Data." *Official Journal of the European Union* L8.

———. 2016. "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC." *Official Journal of the European Union* L119:1–88.

For more information, see:

How to respect data protection principles?

How to respect data subject rights?

How to conduct a Data Protection Impact Assessment?

How to mitigate the potential for mass surveillance and the principle of self-determination?

How to include Data Protection by Design and by Default Tools?

How to design a successful crowdsourcing initiative?

Further Literature

Legislation

(European Parliament and the Council 2016, article 37, 38, 39)

2.4 How to respect data protection principles?

- All services and products based on A4Demos have to comply with EU data
  protection principles
    - The General Data Protection Regulation has to be applied
    - fundamentals are: purpose specification, lawfulness, fairness and
      transparency,
      data minimization, quality and security and storage limitation
    - the processing of sensitive data is prohibited

Responsible Author: SSSA

In a Nutshell

Personal data, defined as any information relating to an identified or identifiable individual, represent a highly valuable commodity in the information society. In consideration of advances in digital technologies that allow faster and easier processing of personal data, data protection legislation has been developing rapidly in recent years and further legislation in this regard is currently being developed. In the European Union, protection of personal data is established as a fundamental right by the Lisbon Treaty (article 16(1)) and by the CFREU (article 8). This is not an absolute right: according to Art. 51 of the CFREU, any restrictions must be provided for by law, must be necessary and proportionate, and must respect the essence of the right. The new EU General Data Protection Regulation (GDPR), which will be directly applicable to Member States from 25 May 2018, will apply to any situation in which personal data are processed, with few exceptions (i.e., household exception, law enforcement and intelligence activities).

The GDPR addresses technologies in neutral way and is flexible enough to accommodate the use of new technologies in different situations, including emergencies. Pursuant to Article 6(1), personal data processing is lawful if the data subject has given his explicit consent, if it is necessary in order to protect the vital interests of the data subject or of another natural person, or if the processing relates to data which are manifestly made public, or to perform a task in the public interest. In emergency situations, sharing of personal data is providing an immense potential

for improving emergency preparedness and response, and is increasingly seen as critical in all phases of the emergency management cycle. However, along with these opportunities, there come also risks for individuals, which have been not completely understood yet.

The GDPR confirms the principles of the previous Data Protection framework, including:
- purpose specification: the processing and use of data for specified, explicit and legitimate purpose;
- lawfulness, fairness and transparency: all processing must be lawful, fair and transparent to the data subject;
- data minimization, quality and security: all data must be adequate, relevant and not excessive in relation to the aim for which they are processed, and they must be protected against unauthorised use or accidental loss, destruction or damage.
- storage limitation: all data must be kept for no longer than is necessary for the purposes for which the personal data are processed;

The processing of sensitive data, i.e. revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation, is in principle prohibited.

Guidance or used Methodology

European Union authorities shall provide further guidance on the implementation of the data protection principles in specific contexts, including in emergency situations.

National authorities shall adopt guidelines to implement data protection principles in practice, including in emergency situations.

Tools developers shall make sure to comply with data minimisation, quality and security principles.

Practical example

<u>Example</u>

During the July 2005 terrorist attack in London, there were huge delays in information reaching survivors about the support services available. This was due to the concern that the Data Protection Act was preventing the sharing of personal data between police and humanitarian agencies without the explicit consent of those concerned. However, the data protection legislation allows flexibility when dealing with emergencies.

<u>Best practice</u>

The International Committee of the Red Cross (ICRC) has recently elaborated a framework establishing rules on personal data protection ("ICRC Rules on Personal Data Protection" 2016), which is an example of guidance specifically adopted to deal with data protection in emergency situations.

References

Article 29 Data Protection Working Party. 2013. "Opinion 03/2013 on Purpose Limitation."

European Parliament and the Council. 2016. "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC." *Official Journal of the European Union* L119:1–88.

"ICRC Rules on Personal Data Protection." 2016. International Committee of the Red Cross. 2016. https://www.icrc.org/en/publication/4261-icrc-rules-on-personal-data-protection.

For more information, see:

How to respect data subject rights?

How to designate a data protection officer?

How to conduct a Data Protection Impact Assessment?

How to mitigate the potential for mass surveillance and the principle of self-determination?

How to include data protection by Design Tools?

Further Literature

<u>Legislation</u>

(European Parliament and the Council 2016, article 5)

<u>Opinions</u>

(Article 29 Data Protection Working Party 2013)

2.5 How to respect data subject rights?

- Users' data subjects rights have to be considered when designing tools and services for increasing self-p*
- Individuals have the right to get any data stored erased
- this right has to be considered against the public interest and further fundamental rights

Responsible Author: SSSA

In a Nutshell

Under chapter III, the General Data Protection Regulation (GDPR) clarifies the rights of the data subjects, including the right to receive information whenever personal data is collected and to consent to such processing, to access the data, to have data corrected if needed, and to object to certain types of processing. They also have the right to data erasure (right to be forgotten), to data portability and not to be not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects.

In relation to data subject consent, it is important to emphasize that ICTs used in emergencies have the potential to erode this basic right, since persons affected by an emergency may have little opportunity to refuse consent without putting themselves in information disadvantage in a situation in which information is essential. On the other hand, it is evident that during a crisis, it is not always possible to gather consent, for instance because a victim is too badly injured, or because gathering consent would take so long as to place the subject in serious danger. It is important to emphasise that, pursuant to the GDPR Article 6(1), personal data processing is still lawful if it is necessary in order to protect the vital interests of the data subject or of another natural person, therefore including in situations of emergency.

As per the right to be forgotten, individuals have the right, under certain conditions, to ask for instance search engines to remove links with personal information about them. This right is not absolute and must be balanced against other fundamental rights, such as freedom of expression. A case-by-case assessment is therefore needed, taking into account the type of information and its sensitivity for the private life of the individual, as well as the interest of the public in having access to this information. It is interesting to note that if the controller is obliged to erase the data that was made public, the controller must also inform other controllers who are processing the data that the data subject has requested erasure of those data, a provision which may have wide-ranging implications in the online environment.

Guidance or used Methodology

Data controllers, including public and private actors, shall be aware of data subjects' rights and shall put in place mechanisms to implement them.

Citizens shall be aware of their data protection rights, including in the online environment and in disaster situations.

Practical example

Recent cases

In recent times, the most important cases related to implementation of data subject rights in the online environment concerned the transfer of personal data to countries outside Europe (the Schrems cases ("Europe versus Facebook" 2017) concerning the transfer of Facebook data) and the right to be forgotten (Google v. Spain case ("Judgment of the Court (Grand Chamber)" 2014)).

References

Article 20 Working Party. 2014. "Guidelines on The Implementation Of The Court Of Justice Of The European Union Judgment On 'Google Spain And Inc V. Agencia Española De Protección De Datos (Aepd) And Mario Costeja González' C-131/12."

Article 29 Data Protection Working Party. 2016. "Guidelines on the Right to Data Portability."

European Parliament and the Council. 2016. "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of

Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC." *Official Journal of the European Union* L119: 1–88.

"Europe versus Facebook." 2017. Europe versus Facebook. Accessed November 16. http://europe-v-facebook.org/EN/en.html.

"Judgment of the Court (Grand Chamber)." 2014. http://curia.europa.eu/juris/document/document_print.jsf?doclang=EN&docid=152065.

For more information, see:

How to respect data protection principles?

How to designate a data protection officer?

How to conduct a Data Protection Impact Assessment?

How to mitigate the potential for mass surveillance and the principle of self-determination?

How to include data protection by Design Tools?

Further Literature

<u>Legislation</u>

(European Parliament and the Council 2016, chap. III)

<u>Opinions and recommendations</u>

(Article 29 Data Protection Working Party 2016; Article 20 Working Party 2014)

3   Ethics and Human Rights

3.1 How to deal with the digital divide in emergency situations?

- Digital Divide deals with potential difference in both, capabilities and potential access to digital infrastructure

- Tool providers shall consider potential problems caused by digital divide

- User needs should not only include the needs of persons capable of using digital technologies, but also of people groups not capable of doing so

Responsible Author: SSSA

In a Nutshell

'Digital divide' refers to gaps in access to and use of Information and Communication Technologies (ICTs), caused either by the lack of relevant infrastructures in e.g. remote areas, or by the different motivations and capabilities in using ICTs among different groups of persons. In the emergency management field, digital divide may imply that the most vulnerable groups in society (including elderly, less educated individuals, disabled persons, children), who are likely to be hugely affected by a disaster, may also be potentially excluded from the benefits of information sharing through ICTs in both the prevention and response phases.

Recommendations on how to address this challenge refer to adopting both short and long-term measures. In the short term, for instance, the European Group of Ethics (EGE) recommends that additional mechanisms unrelated to ICT are established in areas where access to essential services are predicated on ICT use. This is particular relevant in case of emergency prevention and response, which increasingly relies on ICTs. Empowering programmes and training for those groups who are likely to be digitally excluded are of paramount importance in these contexts.

Furthermore, as a dynamic concept digital divide evolves along with the rapid advances in digital technologies, which create not only new opportunities but also

new risks of exclusion for those groups who do not embrace them. In the long-term, national authorities shall monitor the evolution of digital exclusion and foresee instruments capable of addressing the challenges it poses.

Guidance or used Methodology

The right to access to ICTs shall be promoted and secured at both the national and European Union levels, particularly in cases when ICTs are deployed to implement risk mitigation measures and to issue emergency warnings. Special attention must be put on identifying the needs of the most vulnerable groups, such as elderly, children, disabled individuals or less educated persons.

National authorities shall establish mechanisms to monitor the current status and the evolution of digital divide, as well as measures to fill existing gaps. Authorities responsible for risk and crisis communication shall establish additional measures to reach people that are likely to be excluded from ICTs in emergency situations. Complementary emergency warning communication methods shall be foreseen and redundancy of information and of communication channels established.

Tools developers should be aware of the problems raised by the digital divide, particularly in the case of ICTs used for emergency prevention and response. In these context they should address the needs of users, taking into account also the needs of the most vulnerable groups, and shall adopt user friendly settings.

National and regional authorities shall support further research on the implications of the digital divide in Europe in relation to emergency situations.

Practical example

Practical example

An example of the digital divide implications in the aftermath of a disaster is provided by the fragmented and uneven recovery following Typhoon Haiyan in the Philippines in 2013. Victims from low socio-economic backgrounds had limited or no access to the internet and other media, which contributed to their slow recovery compared to middle-income families who were able to navigate the media landscape and tools offered by digital data and technologies (Madianou 2015).

<u>Lessons learned</u>

The IFRC recalls that, in a project carried out in Sri Lanka, mobile phones provided to the population for early warning were abandoned once the project ended, and notes the importance of taking into account the users' needs, motivations and capabilities ("Community-Based Early Warning Systems: Guiding Principles" 2014).

<u>Good practices</u>

The EGE points out as good practice the measures established in South Korea to monitor and deal with the digital divide, including the Digital Divide Act (2001), the Digital Divide Index and the establishment of the Korean Agency for Digital Opportunity and Promotion ("Ethics of Information and Communication Technologies, Opinion No. 26" 2012). The European Union has recently established the Digital Economy and Society Index (DESI), to monitor digital inclusion in European countries.

References

"Charter of Fundamental Rights of the European Union." 2009.

"Community-Based Early Warning Systems: Guiding Principles." 2014.

"Digital Agenda for Europe." 2014. doi:doi:10.2775/41229.

Dijk, Jan A.G.M. van. 2012. "The Evolution of the Digital Divide: The Digital Divide Turns to Inequality of Skills and Usage." In *Digital Enlightenment Yearbook 2012*, edited by J. Bus, M. Crompton, M. Hildebrandt, and G. Metakides, 57–78. Amsterdam: IOS Press. doi:10.3233/978-1-61499-057-4-57.

Easton, Dr. Catherine. 2014. "The Digital Divide, Inclusion and Access for Disabled People in IT Supported Emergency Response Systems: A UK and EU-Based Analysis." In *Proceedings of the 11th International ISCRAM Conference*, edited by S. R. Hiltz, M. S. Pfaff, L. Plotnick, and P. C. Shih, 257–78.

"Ethics of Information and Communication Technologies, Opinion No. 26." 2012.

Floridi, Luciano. 2001. "Information Ethics: An Environmental Approach to the Digital Divide." *Philosophy in the Contemporary World* 9 (1).

Madianou, Mirca. 2015. "Digital Inequality and Second-Order Disasters: Social Media in the Typhoon Haiyan Recovery." *Social Media + Society* 1 (2): 1–11. doi:10.1177/2056305115603386.

"Sendai Framework for Disaster Risk Reduction: 2015 - 2030." 2015.

For more information, see:

How to ensure the non-discrimination and the protection of vulnerable groups?

How to respect people's right to access to risk and crisis information?

How to promote interaction between authorities and the public?

Further Literature

International legal framework
("Sendai Framework for Disaster Risk Reduction: 2015 - 2030" 2015)

EU legal and policy framework
("Charter of Fundamental Rights of the European Union" 2009, "Digital Agenda for
Europe" 2014)

General Literature

(Easton 2014; Floridi 2001; Dijk 2012)

3.2 How to mitigate the potential for mass surveillance and to comply with the principle of self-determination?

- when developing tools and services for increasing self-p*, the potential for mass surveillance has to be mitigated

- tool developers must consider the potential of their tools to cause new digital divide

- tool developers may conduct an ethical impact analysis

Responsible Author: SSSA

In a Nutshell

Mass surveillance can be defined as the indiscriminate monitoring of a targeted population or of a group within that population. It may result in the collection of huge amounts of data (big data), which can be used for descriptive, predictive and diagnostic purposes. This can be done through data mining techniques, i.e. the computational process of discovering patterns and models in large volumes of data.

Advances in ICTs are making the potential for mass surveillance more likely, raising at the same time delicate ethical and legal challenges. Mass surveillance may involve a systematic interference with the rights to privacy and to protection of personal data and may impact on the principles of autonomy and individual self-determination, i.e. the ability or power to make decisions for oneself. Furthermore, the automatic processing of data may encourage the establishment of erroneous correlations and gives a false perception of objectivity, since data interpretation is still necessary and may be biased by subjective filters when developing algorithms. Another issue concerns the fact that bigger data are not always better data and there is the risk of information overload. Finally, the limited access to databases may give rise to new forms of digital divide.

In the emergency management field, when data collection and mining may be performed as a preparedness or response measure, it is still important to take into account the unintended consequences of large scale, ubiquitous surveillance. In emergency situations, it is crucial that the collected data is reliable and it is used for specific purposes. In particular, there is a pressing need to clarify the extent to which privacy and data protection rules apply during an emergency. Any infringements on human rights must be justified as necessary and proportionate, with the effectiveness of the proposed surveillance measure being a key element to assess its proportionality. If less intrusive alternatives are available that would meet the same goal of pervasive surveillance measure, these have to be preferred. Generally speaking, it has been suggested that a new ethics for contemporary surveillance is needed and should be based on the dignity of the person and on the key concepts of autonomy and personhood (Lyon 2001).

Guidance or used Methodology

National authorities shall conduct a privacy and ethical impact assessment of their mass surveillance programmes and prefer least intrusive means, if available.

ICTs tools developers shall be aware of the ethical implications and potential impact on human rights of big data technologies. To this end, ethical impact assessment may be conducted to understand ethical implications of such technologies. In particular, designers of algorithms should, as far as possible, leave ethical choices to users, and when this is not possible, the ethical assumptions in the algorithm should at least be transparent and easy to identify by users.

Citizens shall be aware of the existence of mass surveillance programmes that may have an impact on their rights.

Practical example

Recent revelations of mass surveillance programmes in the United States and the United Kingdom have raised concerns in relation to the impact of indiscriminate data collection on privacy and protection of personal data. In the emergency management field, the potential implications of surveillance and big data have not been completely understood yet.

References

Kraemer, Felicitas, Kees van Overveld, and Martin Peterson. 2011. "Is There an Ethics of Algorithms?" *Ethics and Information Technology* 13 (3): 251–60. doi:10.1007/s10676-010-9233-7.

Liegl, Michael, Alexander Boden, Monika Büscher, Rachel Oliphant, and Xaroula Kerasidou. 2016. "Designing for Ethical Innovation: A Case Study on ELSI Co-Design in Emergency." *International Journal of Human-Computer Studies* 95 (Supplement C): 80–95. doi:https://doi.org/10.1016/j.ijhcs.2016.04.003.

Lyon, David. 2001. "Facing the Future: Seeking Ethics for Everyday Surveillance." *Ethics and Information Technology* 3 (3): 171–80. doi:10.1023/A:1012227629496.

Mittelstadt, Brent Daniel, Patrick Allo, Mariarosaria Taddeo, Sandra Wachter, and Luciano Floridi. 2016. "The Ethics of Algorithms: Mapping the Debate." *Big Data & Society* 3 (2): 1–21. doi:10.1177/2053951716679679.

Wright, David. 2011. "A Framework for the Ethical Impact Assessment of Information Technology." *Ethics and Information Technology* 13 (3): 199–226.

Wright, David, and Paul De Hert. 2012. *Privacy Impact Assessment*. Dordrecht Heidelberg London New York: Springer Science+Business Media B.V.

Wright, David, Inga Kroener, Monica Lagazio, Michael Friedewald, Dara Hallina, Marc Langheinrich, Raphael Gellert, and Serge Gutwirt. 2014. "Deliverable 4.4: A Guide to Surveillance Impact Assessment — How to Identify and Prioritise Risks Arising from Surveillance Systems."

For more information, see:

How to respect data protection principles?

How to respect data subject rights?

How to designate a data protection officer?

How to conduct a Data Protection Impact Assessment?

How to include Data Protection by Design and by Default Tools?

How to design a successful crowdsourcing initiative?

Further Literature

(Kraemer, van Overveld, and Peterson 2011; Mittelstadt et al. 2016; Liegl et al. 2016; Wright and De Hert 2012; Wright 2011; Wright et al. 2014)

3.3 How to comply with the principle of humanity?

- Tool developers may consider the principle of humanity when developing
- Standards for applying ICTs In disaster situations are not yet studied
- Tool developers shall define their own "code of conduct" and assure alignment with existing ethical and legal aspects

Responsible Author: SSSA

In a Nutshell

The principle of humanity implies an inherent worth and dignity of the person. In the emergency response context, it is one of the key principles upon which humanitarian action is based. It refers not only to the obligation to prevent and alleviate human suffering in emergency situations wherever it is based, but also to pay attention to the methods in which help is provided (Fast 2015).

The increasing use of ICTs is impacting on humanitarian principles, including on the principle of humanity, although these implications have not been studied in detail yet. One of the major impact is related to the reliance on technological tools that are likely to increasingly substitute human beings in providing aid, to the remoteness of some digital humanitarians from the affected people on the ground, or to the potential for the huge amounts of data collected on victims to endanger the dignity and privacy of the person. The turn to ICTs is changing the perception of what it means to provide help (i.e. information is now seen as crucial as food, water and shelter), and is implying a redistribution of responsibilities among different actors. Concerns are raised in relation to the need to identify and apply ethical and legal standards on the use of ICTs in disaster situations.

Guidance or used Methodology

International, regional and national authorities shall support further research on the ethical and legal implications of the increasing use of ICTs in humanitarian settings.

Emergency response actors shall adopt ethical and legal standards currently available on ICTs use or develop their own standards of conduct.

Tools developers shall take into account that any technology can never completely substitute action carried out by human beings.

Practical example

Case studies are not available on the ICTs' implications for humanitarian principles. The development of such case studies would be of extreme importance to provide a base of evidence for developing technical best practices and ethics codes.

Examples of code of conduct for tools developers include the GIS code of ethics, approved in 2003.

References

"Code of Conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations (NGOs) in Disaster Relief." 1994. International Federation of Red Cross and Red Crescent Societies and the ICRC.

Fast, Larissa. 2015. "Unpacking the Principle of Humanity: Tensions and Implications." *International Review of the Red Cross* 97 (897–898). Cambridge University Press: 111–131. doi:10.1017/S1816383115000545.

Raymond, Nathaniel, Ziad Al Achkar, Stefaan Verhulst, and Jos Berens. 2016. *Building Data Responsibility into Humanitarian Action*. Edited by Lilian Barajas and Matthew Easton. United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

Sandvik, Kristin Bergtora, Maria Gabrielsen Jumbert, John Karlsrud, and Mareile Kaufmann. 2014. "Humanitarian Technology: A Critical Research Agenda." *International Review of the Red Cross* 96 (893): 219–42.

Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response. 2011. The Sphere Project.

For more information, see:

How to ensure the non-discrimination and the protection of vulnerable groups?

How to respect privacy in emergency situations?

Further Literature

International Standards

(*Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response* 2011, "Code of Conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations (NGOs) in Disaster Relief" 1994; Raymond et al. 2016)

General Literature

(Sandvik et al. 2014)

3.4 How to enhance trust in emergency response?

- especially in emergency situations, trust in communication is important

- tool providers shall prevent false alarms, regardless they are triggered automatically or by users

- ethical integrity of tools and their providers is important to establish a trustful relationship to users

Responsible Author: SSSA

In a Nutshell

In general terms, trust refers to the optimistic expectations on the outcome of an event or action that exists among individuals or between individuals and organisations. On one side, trust is correlated with stability in personal relationships and societal orders; on the other, it implies a relationship of dependence to others and to some extent a condition of vulnerability. As a complex, multi-faceted, dynamic and context-dependent concept, trust has been examined by many researchers in several disciplines. In particular, it has been argued that it may be the connecting link between ethics, as the branch of philosophy exploring what is right, and organisational theory, which investigates what is effective and practical (Hosmer 1995). More recent research has explored the concept of trust in the virtual sphere (e.g., Zou and Park 2011).

Trust constitutes an important asset in the process of coping with disasters (Hommerich 2012). In emergency response, building and maintaining a relationship of trust is crucial, both between authorities responsible for crisis management and the public and among individuals themselves. In these contexts, trust refers for instance to the expectation that public authorities are open and transparent regarding potential risks as well as clear and coherent in their warning messages. During major emergencies trust has an important role to play in social media networks (Thomson et al. 2012). In consideration of the increasing important role of

ICTs in disaster settings, trust may also imply that messages shared online are verified and reliable. In this respect, it is important to note that domestic legislations usually establish the obligation for citizens not to spread false alarms.

Trust may also involve the expectation that personal data, which may be of sensitive nature, are processed in a way that respects existing regulations and ethical standards. ICTs are indeed revolutionising the emergency prevention and response practices, and the related ethical and legal implications have still to be understood. Therefore, trust may also relate to the expectation that attention is devoted to these implications, and solutions are found to ensure the ethical use of ICTs both before and during an emergency. Some examples of ways to address these implications include to envisage ethical co-design (Liegl et al. 2016), or to conduct privacy and ethical impact assessments for ICTs (Wright 2011).

Guidance or used Methodology

National authorities shall include ethical standards in risk communication strategies and emergency warning procedures.

ICTs providers shall take into account ethical standards in the development of ICTs used for emergency prevention and response and should conduct ethical impact assessments for large-scale projects.

National authorities shall make sure that the emergency response strategy complies with data protection regulations and shall conduct privacy and ethical impact assessments for large-scale ICTs projects.

National and regional authorities shall support further research on how ICTs are impacting upon the concept of trust in the online realm, particularly in relation to emergency situations.

Citizens, especially when sharing information through social media networks, shall be aware that domestic legislation punish the distribution of false alarms.

Practical example

Recent major emergencies, such as Hurricane Katrina in the United States or the Fukushima Nuclear Power Plan accident, have had a deep impact on citizens' trust in governments (Nicholls and Picou 2013). Given the importance of trust for the long-term health of political systems, it is critical that governments enhance their effectiveness in dealing with such disasters, including by clarifying and adopting ethical and human rights standards.

References

Geale, Sara Kathleen. 2012. "The Ethics of Disaster Management." *Disaster Prevention and Management: An International Journal* 21 (4): 445–62. doi:10.1108/09653561211256152.

Hommerich, Carola. 2012. "Trust and Subjective Well-being after the Great East Japan Earthquake, Tsunami and Nuclear Meltdown: Preliminary Results." *International Journal of Japanese Sociology* 21 (1): 46–64.

Hosmer, Larue Tone. 1995. "Trust: The Connecting Link between Organizational Theory and Philosophical Ethics." *The Academy of Management Review* 20 (2). Academy of Management: 379–403. http://www.jstor.org/stable/258851.

Liegl, Michael, Alexander Boden, Monika Büscher, Rachel Oliphant, and Xaroula Kerasidou. 2016. "Designing for Ethical Innovation: A Case Study on ELSI Co-Design in Emergency." *International Journal of Human-Computer Studies* 95 (Supplement C): 80–95. doi:https://doi.org/10.1016/j.ijhcs.2016.04.003.

Nicholls, Keith, and J. Steven Picou. 2013. "The Impact of Hurricane Katrina on Trust in Government." *Social Science Quarterly* 94 (2): 344–61. doi:10.1111/j.1540-6237.2012.00932.x.

Sabou, John, and Simeon Videlov. 2016. "An Analysis on the Role of Trust in Digital Humanitarian Actor Networks." In *Proceedings of the ISCRAM 2016 Conference*.

Thomson, Robert, Naoya Ito, Hinako Suda, Fangyu Lin, Yafei Liu, Ryo Hayasaka, Ryuzo Isochi, and Zian Wang. 2012. "Trusting Tweets: The Fukushima Disaster and Information Source Credibility on Twitter." In *Proceedings of the 9th International ISCRAM Conference*, 1–10.

Wright, David. 2011. "A Framework for the Ethical Impact Assessment of Information Technology." *Ethics and Information Technology* 13 (3): 199–226.

Wright, David, and Paul De Hert. 2012. *Privacy Impact Assessment*. Dordrecht Heidelberg London New York: Springer Science+Business Media B.V.

Zack, Naomi. 2009. *Ethics for Disaster*. Rowman & Littlefield Publishers.

Zou, Qing, and Eun G. Park. 2011. "Understanding Trust in Virtual Communities:

Revisited." In *ICT Ethics and Security in the 21st Century: New Developments and Applications*, edited by Marian Quigley, 1–26.

For more information, see:

How to identify the most relevant timing to deliver emergency messages?

How to decide on target group/market?

How to design a successful crowdsourcing initiative?

Further Literature

Literature on trust and disasters

(Geale 2012; Zack 2009; Sabou and Videlov 2016)

Literature on ethics and ICTs

(Wright and De Hert 2012)

3.5 How to respect people's right to access to risk and crisis information?

- Tool developers have to ensure an access to information free of discrimination and other barriers

- single official voice principle is widely discussed but not compulsory

- tool providers have to ensure the receiving and understanding of provided information by all population groups including vulnerable groups
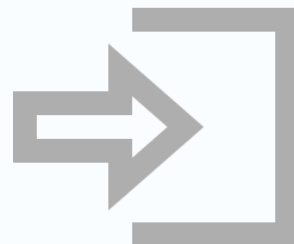
Responsible Author: SSSA

In a Nutshell

Citizens of European States have the right to be informed about disaster's risks, to be adequately warned of an imminent emergency, and to receive clear information during a crisis. The European Court of Human Rights has identified State's positive obligations related to access to information in a set of cases dealing with natural and man-made disasters, particularly under Article 2 (right to life) and 8 (Right to private life) of the European Convention on Human Rights.

National authorities have a legal obligation to provide risk information to the population, an assessment that shall be based not only on hazard forecasting but also on the identification of vulnerabilities and expected impacts. To some extent, domestic legislations foresee the involvement of the public in the elaboration of related emergency plans. These plans shall cover crisis communication aspects, and shall foresee the adoption of ad hoc measures to prepare for disasters such as the establishment of multi-hazard early warning systems. It is important that national authorities make sure that the risk is understood by the population, including the most vulnerable groups, and that the population is trained to respond adequately.

In relation to early warning, national authorities are often called to adopt the single official voice principle (SOVP) as a method to ensure that warning messages are clear and coherent. However, there is no widespread acceptance of the effectiveness of

this principle in any situation. On the contrary, some international organisations have emphasised that redundancy in communication may support self-protection mechanisms. The possible tensions between warnings coming from authoritative voices and the benefits of more dispersed information sharing have not been explored and clarified in detail yet.

Guidance or used Methodology

National authorities shall conduct disaster risk assessments taking into account vulnerability aspects and shall involve the local population in the elaboration of emergency plans. Emergency plans elaborate by national authorities shall cover also crisis communication aspects.

Multi-hazard early warning systems shall be established, having regard to ensuring that the information is received and understood by the population, including the most vulnerable groups in society. Citizens shall be trained to follow the instructions provided by public authorities to adequately respond to an emergency.

More research shall be conducted on to what extent the SOVP is a matter of concern for public authorities responsible for risk and crisis management, how it is implemented in practice and what are the implications for its application to specific contexts.

Practical example

The jurisprudence of the ECtHR identified different cases in which national authorities in Europe have failed to comply with their positive obligations to ensure the right to access to risk information. These cases involved natural disasters, such as floods (Budayeva ("ECtHR Jurisprudence, Budayeva and Other v Russia" 2008) and Kolyadenko ("ECtHR Jurisprudence, Kolyadenko and Others v. Russia" 2012) cases), and man-made disasters (Oneryildiz ("ECtHR (GC) Jurisprudence, Öneryildiz v. Turkey" 2004)).

References

Clarke, Lee, Caron Chess, Rachel Holmes, and Karen M O'Neill. 2006. "Speaking with One Voice: Risk Communication Lessons from the US Anthrax Attacks." *Journal of Contingencies and Crisis Management* 14 (3). Blackwell Publishing Ltd: 160–69. doi:10.1111/j.1468-5973.2006.00491.x.

"Community Early Warning Systems: Guiding Principles." 2012.

"Developing Early Warning Systems: A Check-List." 2006. In *Third International Conference on Early Warning (EWC-III) from Concept to Action, 27-29 March 2006, Bonn, Germany*, 13pp. International Strategy for Disaster Reduction (ISDR), Federal Foreign Office. http://www.unisdr.org/2006/ppew/info-resources/ewc3/checklist/English.pdf.

"ECtHR (GC) Jurisprudence, Öneryildiz v. Turkey." 2004.

"ECtHR Jurisprudence, Budayeva and Other v Russia." 2008.

"ECtHR Jurisprudence, Kolyadenko and Others v. Russia." 2012.

Golnaraghi, Maryam. 2012. "Synthesis of Seven Good Practices in Multi-Hazard Early Warning Systems." In *Institutional Partnerships in Multi-Hazard Early Warning Systems: A Compilation of Seven National Good Practices and Guiding Principles*, edited by Maryam Golnaraghi, 217–38.

Rauh, Peter, Frank Kroonenber, Gerhard Steinhorst, and David Richardson. 2007. "'Single Voice Principle' - Experiences of Different European Countries." In *Severe Storms over Europe: A Cross-Border Perspective of Disaster Reduction*, edited by H. Schmitz-Wenzel, G. Tetzlaff, B. zum Kley-Fiquet, B. Deschamp, and D. Dräbing, 28. DKKV publication series.

For more information, see:

How to deal with the digital divide in emergency situations?

How to ensure the non-discrimination and the protection of vulnerable groups?

Further Literature

International Organisations' recommendations

("Community Early Warning Systems: Guiding Principles" 2012, "Developing Early Warning Systems: A Check-List" 2006)

Literature

(Clarke et al. 2006; Rauh et al. 2007; Golnaraghi 2012)

ANYWHERE

3.6 How to ensure the non-discrimination and the protection of vulnerable groups?

- Tool providers shall consider vulnerable population groups
- Receiving and understanding of a message can be a problem
- To solve this, tool developers may offer redundant dissemination channels to ensure receiving and understanding by each vulnerable group

Responsible Author: SSSA

In a Nutshell

Vulnerable groups, including children, elderly, disabled persons, marginalised groups are likely to be disproportionally affected by a disaster. The IFRC defines vulnerability as a relative and dynamic concept referring to 'the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard'. Vulnerability depends on a variety of factors, including age, education, poverty, physical conditions.

In the disaster preparedness phase, it is crucial that vulnerability assessments are carried out along with the assessment of natural and man-made hazards. In precisely the same way indicators are chosen to monitor hazards, indicators can be identified that track evolving vulnerability levels. It is also important that vulnerability is taken into consideration in the acute response phase, and that warning information is distributed according to the needs of those at risk.

At the international level, Human Rights Law is particularly relevant to protection of vulnerable groups. For instance, the Convention on the rights of persons with disability establishes the obligation to take 'all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural

disasters' (Article 11). The Convention on the right of the child establishes the obligation to ensure to the maximum extent feasible the survival and development of children (Article 6).

Guidance or used Methodology

National authorities responsible for disaster risk mitigation shall take into account a vulnerability assessment along with hazards monitoring.

Actors responsible for emergency preparedness and response shall engage with communities to ensure that people's priorities are included in the disaster management plans.

Actors responsible for MH-EWS shall take into account existing vulnerabilities that may have an impact on how the warning message is received and understood. Redundancy of dissemination channels shall be established to reach vulnerable individuals.

Practical example

<u>Lessons Learned</u>

Research has demonstrated that the tremendous impacts of Hurricane Katrina, which hit New Orleans in 2006, was mainly due to pre-existing conditions of social vulnerability, including in terms of age, gender, income and minority status (Laska and Morrow 2006).

In Europe, during the 2003 unprecedented heatwave, the lack of careful consideration of vulnerability indicators (age, isolation, etc.), resulted in 15,000 dead in less than two weeks, although alerts were continuously sent through a large number of communication channels ("Community-Based Early Warning Systems: Guiding Principles" 2014).

<u>Good Practices</u>

The British Red Cross (BRC) carried out a study in inner cities, depressed industrial areas and isolated rural areas to define who were the most vulnerable groups and to use this information to develop a new national strategy.

References

"Charter of Fundamental Rights of the European Union." 2009.

"Community-Based Early Warning Systems: Guiding Principles." 2014.

Contreras, Diana, and Efan Kienberger, eds. 2011. *D.4.2: Handbook of Vulnerability Assessment in Europe*. EU-project MOVE.

"Convention on the Rights of Persons with Disability." 2006.

"Convention on the Rights of the Child." 1989.

EU eHealth Action Plan 2012-2020. n.d. European Commission.

Inter-Agency Standing Committee (IASC). 2011. *IASC Operational Guidelines on the Protection of Persons in Situations of Natural Disasters*. The Brookings – Bern Project on Internal Displacement.

International Federation of Red Cross and Red Crescent Societies (IFRC). 2006. *Vulnerability and Capacity Assessment: Lessons Learned and Recommendations*.

Laska, Shirley, and Betty Hearn Morrow. 2006. "Social Vulnerabilities and Hurricane Katrina: An Unnatural Disaster in New Orleans." *Marine Technology Society Journal* 40 (4): 16–26.

Zakour, Michael J., and David F. Gillespie. 2013. *Community Disaster Vulnerability: Theory, Research, and Practice*. New York: Springer-Verlag.

For more information, see:

How to respect privacy in emergency situations?

How to comply with the principle of humanity?

How to provide official information for private and public in different weather conditions?

How to deal with the digital divide in emergency situations?

How to respect people's right to access to risk and crisis information?

Further Literature

<u>International legal framework</u>

("Convention on the Rights of the Child" 1989, "Convention on the Rights of Persons with Disability" 2006)

<u>EU legal and policy framework</u>

("Charter of Fundamental Rights of the European Union" 2009, *EU eHealth Action Plan 2012-2020*, n.d.)

<u>Opinions and recommendations</u>

(Inter-Agency Standing Committee (IASC) 2011; International Federation of Red Cross and Red Crescent Societies (IFRC) 2006; Contreras and Kienberger 2011)

<u>Literature</u>

(Zakour and Gillespie 2013)

3.7 How to respect privacy in emergency situations?

- tool developers may sustain a "privacy by design" approach
- privacy enhancing technologies (anonymization) shall be applied whenever possible

In a Nutshell

The right to privacy refers to the respect of the most private and intimate aspects of one person's life. It includes both the right to be free from unreasonable constraints (i.e. the anti-oppression argument: privacy functions by separating individuals from others, limiting the access of oneself body, mind, information) and to be free to build one's identity (i.e. the flourishing argument: privacy provides individual with control over certain aspects of her life). More recently, privacy has been conceptualised as contextual integrity (Nissenbaum 2004), a definition that puts emphasis on the fact that several contextual variables may concur in a violation of this right and that privacy is a dynamic concept that changes over time.

Privacy is linked to but different from the right to protection of personal data (often described as 'informational privacy'), which has more recently emerged as a distinct fundamental right mainly as a result of the digital revolution. Privacy is not an absolute right, meaning that it may be balanced against other individual rights or community interests. However, any infringements on the right to privacy must be justified as necessary and proportionate and must not impact on the core elements of this right, including the respect for the dignity of the person. In Europe, the right to respect for private and family life is protected by article 7 of the Charter of Fundamental Rights of the European Union (CFREU) and by article 8 of the European Convention of Human Rights (ECHR). The European Court of Human Rights has

developed an extensive jurisprudence on what privacy means in different contexts and also in relation to the development and use of new technologies.

Indeed, the opportunities provided by ICTs may easily result in the erosion of privacy and, over time, also change the notion of social norms or the overall concept of the public sphere. In emergency situations, ICTs may for instance facilitate and multiply the use of narratives of suffering. In these contexts, respect for privacy means for instance that attention must be devoted to the risks of publicizing the victims' images and stories, or that specific caution must be put on sharing images of deceased persons. Furthermore, new technologies deployed in disaster settings such as drones may collect huge amounts of data and capture high resolution images without the consent or even knowledge of individuals. Anonymisation techniques are to be used whenever possible and access to collected personal information has to be provided to concerned individuals.

Guidance or used Methodology

National authorities shall make sure that existing laws are flexible to accommodate the needs of emergency response operations without infringing upon the right to privacy in a disproportionate or unnecessary way. They shall ensure that all levels of government are aware of privacy laws and of their implementations in emergency situations. They shall conduct privacy impact assessment of new technologies for disaster preparedness and response.

Technology developers shall adopt a privacy by design approach (e.g. favouring false negatives instead of false positives) as well as privacy enhancing technologies (e.g. anonymization techniques) whenever possible.

Citizens shall be aware of the privacy implications of new technologies and shall share personal data with caution.

Practical example

Best practices

As a result of reviews following the Bali bombing and Indian Ocean Tsunami, Australia made special provision in its privacy law to ensure sufficient discretion exists to release information for disaster related purposes. See Australian Privacy Legislation Amendment (Emergencies and Disasters) Act adopted in 2006.

References

Article 29 Data Protection Working Party. 2009. "Opinion 5/2009 on Online Social Networking."

———. 2015. "Opinion 01/2015 on Privacy and Data Protection Issues Relating to the Utilisation of Drones."

Cavoukian, Ph.D. Ann, and Jeff Jonas. 2012. "Privacy by Design in the Age of Big Data."

"Charter of Fundamental Rights of the European Union (EU CFR)." n.d.

"European Court of Human Rights (ECHR)." n.d.

Nissenbaum, Helen. 2004. "Privacy as Contextual Integrity." *Washington Law Review* 79 (1): 101–39.

Solove, Daniel J. 2002. "Conceptualizing Privacy." *California Law Review* 90 (4): 1087–1156. doi:http://dx.doi.org/https://doi.org/10.15779/Z382H8Q.

Wright, David. 2011. "A Framework for the Ethical Impact Assessment of Information Technology." *Ethics and Information Technology* 13 (3): 199–226.

Wright, David, and Paul De Hert. 2012. *Privacy Impact Assessment*. Dordrecht Heidelberg London New York: Springer Science+Business Media B.V.

For more information, see:

How to respect data protection principles?

How to respect data subject rights?

How to designate a data protection officer?

How to conduct a Data Protection Impact Assessment?

How to mitigate the potential for mass surveillance and the principle of self-determination?

How to include Data Protection by Design and by Default Tools?

How to design a successful crowdsourcing initiative?

How to comply with the principle of humanity?

Further Literature

Legal sources

("Charter of Fundamental Rights of the European Union (EU CFR)," n.d., "European Court of Human Rights (ECHR)," n.d.)

Opinions and recommendations

(Article 29 Data Protection Working Party 2009, 2015)

Literature

(Solove 2002; Wright and De Hert 2012; Wright 2011; Cavoukian and Jonas 2012)

4   User Perspectives

4.1 How to identify customer needs/ market demands?

- Detailed analysis of requirements and needs of costumer
- Methods to understand and analyze user

Responsible Author: UPB

In a Nutshell

After the identification of a target group (see Guideline XYZ), a detailed analysis of requirements and needs of costumer and user have to be conducted.
This analysis can be based on:

- Already existing knowledge and experiences within the development team
- Interviews and information exchange with respective costumer and user
- Literature review

A combination of the before mentioned methods is helpful to have a comprehensive overview. Subsequently available information need to be analysed and compromised to adequate requirements. Several methods or procedures are known in literature to solve the problem, build cluster of needs and define the requirements. For example the PDMA Handbook[8] supports by focusing on the "Four C´s": customer words, clear, concise, contextually specific. By providing and using such criteria the description of requirements is more understandable, specific and includes situational details (Griffin 2013). Other methods are available in the ANYWHERE method tool kit.

---

[8] Source: Kenneth B. Kahn: "*The PDMA handbook of new product development*"; 2013 by John Wiley & Sons, Inc.; ISBN: 978-1-118-46642-1

Description: The PDMA handbook is an "guide for the identification and execution of critical new product development (NPD) practices"

Guidance or used Methodology

The literature contains multitude methods for gathering, clustering and analysing user needs ("User Research: Learning about Users and Their Needs" 2017). Table 1 summarise the most common ones.

Classification	Method	Description	Source
Research methods	Interviews	Questioning of target group members regarding to their requirements and needs	(Gibbert 2013) (Taentzer 2014) (Várnai 2015)
	Questionnaires	Elevation of requirements through a list of questions	(Taentzer 2014)
	Self - Immersion	Be a user: development team members take the role of the user	(Várnai 2015)
	Observation	Watching users critically/ feedback regarding to similar products	(Taentzer 2014) (Várnai 2015)
	Focus group	Discussion about a topic within a bigger group	(Gibbert 2013)
Structuring methods	Card Sorting	Provision of the information architecture/ structure	(Gibbert 2013)
	Functional and non-functional	Classification of the elevated user needs into functional and non-functional requirements	(Taentzer 2014)
	MoSCoW - method	Prioritization of the user needs on the basis of four categories: must, should, could and would needs	(DSDM Atern Handbook 2008)
Analysis methods	User Value Test	Development team has got ideas of the functions and start a discussion with the target group members	(Gibbert 2013)
	Usability Test	Test of a prototype (product or a website function) regarding to its usability	(Gibbert 2013)
	User Journey	Analysis of the interaction with the product	(Várnai 2015)

	Eye tracking	Provision of the distribution of the user attention on a (web)site or a product	(Gibbert 2013)

Table 1: Classification of methods for identification, structuring and analysing customer needs

There are several methods usable at different points of the product development. Furthermore, the methods are qualified for various fields. Here the classification is made by the three classes researching, structuring and analysing. The researching tools assist by the identification of user needs and their requirements. For example interviews, observation and self-immersion are helpful if the product development is located at the beginning. Card sorting, functional and non-functional and MoSCoW-method serve by structuring and prioritization the user needs. The analysing tools are used for the evaluation of prototypes and possible functions. By using the usability test or eye tracking, information about the utilisation and handling of the new product will be gathered.

The ANYWHERE method tool kit provide an overview about several methods for the use of requirement engineering and prioritization.

Practical example

The aftermath of hurricane Katrina 2006 also concerned people with disabilities. The emergency management plan not include people with disabilities. This was a huge problem, so the emergency plan had to be adjusted. Later on, an evaluation of the problems and needs of the target group (people with disabilities) during the hurricane had to be done. The result was the Emergency Management Reform. This reform take following special needs into account: "inclusion of people with disabilities in every phase of emergency management at all levels of government; planning for recovery services to victims and their families; accessibility of temporary and replacement housing; non-discrimination on the basis of disabilities; and the establishment of a national disability coordinator position at FEMA." (Reilly and Markenson 2011)

This small example shows special needs of a target group and modifications in emergency management. A transfer in terms of customer / user –driven design is possible.

Notice that a distinction between customer and user can be done. If the customer is not the user, the requirement of both should be recognized. Whereby the user should be targeting because it´s his daily job to work with it.

References

DSDM Atern Handbook. 2008. "Chapter 10: MoSCoW Prioritisation." Agile Business Consortium. 2008. https://www.agilebusiness.org/content/moscow-prioritisation-0.

Gibbert, Rainer. 2013. "Nutzerbedürfnisse, Nutzwert Und Usability – Der Richtige Einsatz von User Research." Produktbezogen: Der Blog für Produktmanagement und User Experience Design. 2013. http://www.produktbezogen.de/nutzerbeduerfnisse-%09%09nutzwert-und-usability-der-richtige-einsatz-von-user-research/.

Griffin, Abbie. 2013. "Obtaining Customer Needs for Product Development." In *The PDMA Handbook of New Product Development*, edited by Kenneth B. Kahn, 3rd Revise, 213–31. John Wiley & Sons Inc.

Hsu, Chih-Hung, Shih-Yuan Wang, and Liang-Tzung Lin. 2007. "Using Data Mining to Identify Customer Needs in Quality Function Deployment for Software Design." In *Proceedings of the 6th WSEAS Int. Conf. on Artificial Intelligence, Knowledge Engineering and Data Bases, Corfu Island, Greece, February 16-19*, 170–74.

McLaughlin, Hugh. 2009. "What's in a Name: 'Client', 'Patient', 'Customer', 'Consumer', 'Expert by Experience', 'Service User'—What's Next?" *The British Journal of Social Work* 39 (6):1101–17. https://doi.org/10.1093/bjsw/bcm155.

Reilly, Michael J., and David S. Markenson. 2011. *Health Care Emergency Management: Principles and Practice*. Jones and Bartlett Publishers, Inc.

Taentzer. 2014. "Grundlagen Der Anforderungsanalyse." https://www.uni-marburg.de/fb12/arbeitsgruppen/swt/lehre/files/est1415/EST141028.pdf.

"User Research: Learning about Users and Their Needs." 2017. User research community. 2017. https://www.gov.uk/service-manual/user-research/start-by-learning-user-needs.

Várnai, Anna. 2015. "Zielgruppe Und Nutzerbedürfnisse Zu Verstehen Führt Zu Langfristigem Erfolg." relaio c/o Hans Sauer Stiftung. 2015. http://www.relaio.de/topics/artikeluebersicht/zielgruppe-und-nutzerbeduerfnisse.html.

For more information, see:

How to identify target groups?

4.2 How to decide on target group/market?

- Identification of Target groups

- Methods to understand and analyze target groups

- Categories of target groups

In a Nutshell

The identification of the target group is one of the main points in the early phase of the product development. Each following step, e.g. the description of the customer needs should be based on it. If you want to sell your products to a huge company or to individuals makes a difference for the developing process, marketing of the product or sales strategies. These differences directly results in deviating requirements, also within one dedicated target group. The design and development process should cover the requirements and needs of the target group.

From a high-level perspective ANYWHERE distinguish between target groups interested in self-preparedness and self-protection (self-p*) in:

- Citizen – individuals who wants to be prepared for possible high weather impact events or need direct support in such a case
- Companies – especially manager of companies who aim to hinder financial losses or dwindling production during a disaster and to save respective goods
- PPDR – emergency services need to protect their own infrastructure and have the task to support and protect other in case of emergency

All target groups have different motivation to be interested in self-p* and therefore deviating needs and constrains. Different subcategories of the target groups are visible in the following Figure.
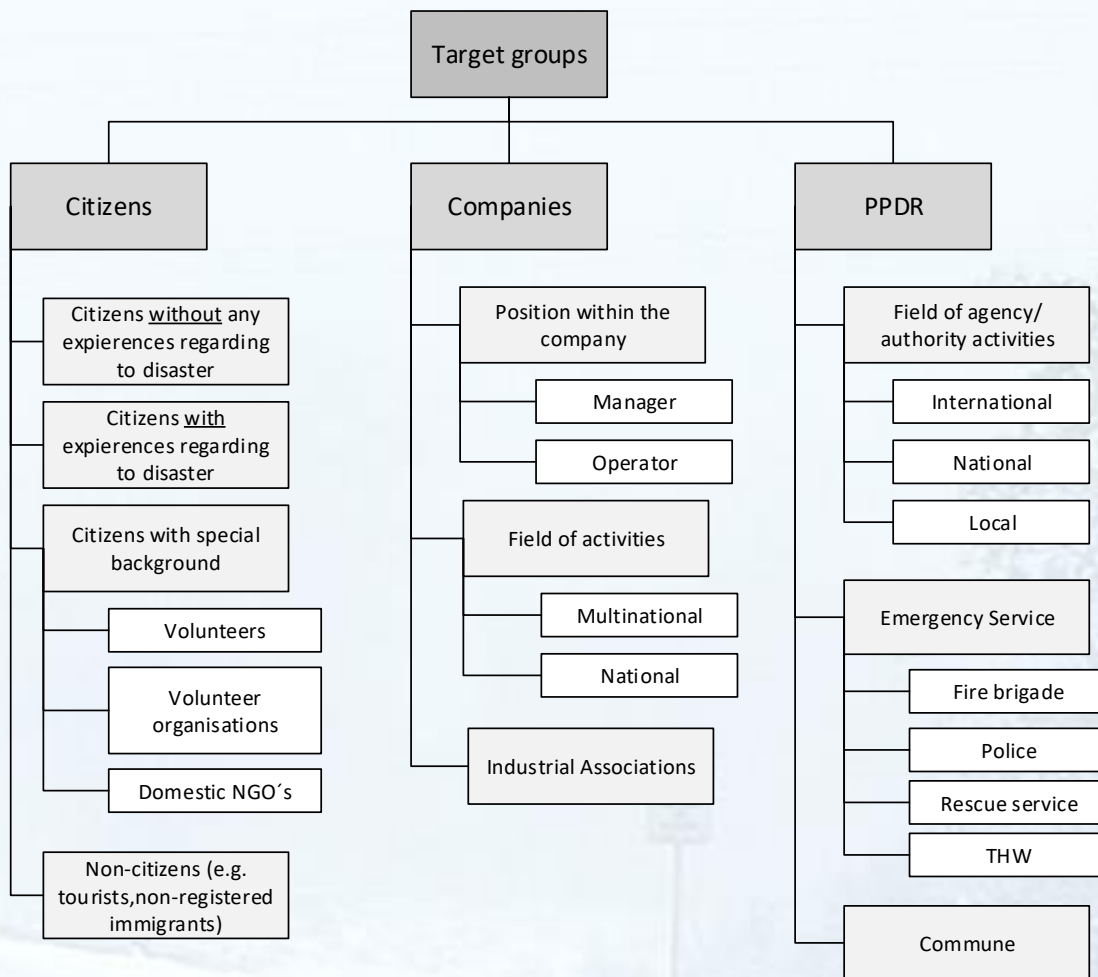
Figure 1: ANYWHERE target groups

One important point is to divide between the identification of target groups and user of the product. Citizen will normally buy and use the product supporting self-p* but companies are represented by an owner or manager but will not use the tool directly. Here features and marketing campaign need to attract manager but the product also should fulfil the requirements of the end-user. The early identification of different potential users and customer within the target groups save a lot of time and work at the next steps of the development. (McLaughlin 2009)

Guidance or used Methodology

The identification of the target groups could be difficult, especially at the beginning of the development process. Independent from the chosen process model for the development (e.g. traditional like XXX, agile like SCRUM) basic knowledge of future user and costumer need to be identified. The literature offers some methods for this early phase of design and development. Possible methods are: brainstorming, ABC-

classification, portfolio analysis or a question table. Methods and use of the methods are described in method catalogue (will be published at www.cis-anywhere.eu in a near timeframe). Furthermore, there are research methods to concretize the potential target groups. Thereby the development team member (structure and required roles in the team depends on the process model) can use internal and external research, interaction with customers, focus groups, interviews or questionnaires, also explained in the method catalogue (will be published at www.cis-anywhere.eu in a near timeframe). (Mollenhauer et al. 2007)

In general, a classification or clustering of the target group is possible. Thereby, used types of variables for describing individuals (user-oriented) from (Cooper, Reimann, and Cronin 2007) or criteria from (MaGee n.d.) (consumer-oriented) overlap. Following criteria can be taken into account:

- geographical variables (e.g. location, country),
- demographical variables (e.g. age, gender, citizen´s interests, size of company, age of employees),
- physiographical variables (e.g. companies technical, citizens family stage) and
- behaviouristic variables (e.g. how often do the customer use it?)
  - activities, attitudes, aptitudes, motivation, skills (subcategories of behaviouristic variables based on (Cooper, Reimann, and Cronin 2007)

In most cases, companies define standard operating procedures or have workflows, which can be seen as behavioural variables. Citizen vary in what they are doing in case of emergency and may have an individual behaviour.

Nevertheless, by using the four characteristics as a starting clustering process it´s easy to narrow the groups down and to understand potential customers. (MaGee n.d.)

Practical example

Defining specific technologies, used for the realisation of new self-p* tools, narrow already the target group. E.g., Facebook is used by 70% of people in the age between 14 years and 29 years, but only 6% of people older than 70 years use this kind of social media [statista]. Therefore, the target group of such technologies is influenced by this distribution.

Example: In case of a disaster, Facebook identifies affected people and provide a special feature, the "safety check" button. During or after an incident people want to

exchange information by posting a message. If Facebook notice that something happened and recognize of lot of messages with regard to a disaster, they activate the safety check button, like at the attack in France 2016. Only people in the affected area are able to use this feature to inform their family and friends that they are in safe place. ("Crisis Response" n.d.)

References

Cooper, Alan, Robert Reimann, and David Cronin. 2007. *About Face 3: The Essentials of Interaction Design*. Indianapolis, IN: Wiley Publishing, Inc.

"Crisis Response." n.d. Facebook. Accessed November 24, 2017. https://de-de.facebook.com/about/safetycheck/.

Freter, Hermann. 2009. "Identifikation Und Analyse von Zielgruppen." In *Handbuch Kommunikation Grundlagen - Innovative Ansätze - Praktische Umsetzungen*, edited by Manfred Bruhn, Franz-Rudolf Esch, and Tobias Langner, 397–411. Wiesbaden: Gabler Verlag.

MaGee, Susan. n.d. "How to Identify a Target Market and Prepare a Customer Profile." Edward Lowe Foundation. Accessed November 24, 2017. http://edwardlowe.org/how-to-identify-a-target-market-and-prepare-a-customer-profile/.

McLaughlin, Hugh. 2009. "What's in a Name: 'Client', 'Patient', 'Customer', 'Consumer', 'Expert by Experience', 'Service User'—What's Next?" *The British Journal of Social Work* 39 (6):1101–17. https://doi.org/10.1093/bjsw/bcm155.

"Moderne Tätersuche: Wie Handyvideos Die Polizeiarbeit Verändern." 2016. Augsburger Allgemeine. 2016. http://www.augsburger-allgemeine.de/panorama/Moderne-Taetersuche-Wie-Handyvideos-die-Polizeiarbeit-veraendern-id38273657.html.

Mollenhauer, Jens-Peter, Christian Staudter, Renata Meran, Alexis Hamalides, Olin Roenpage, and Clemens von Hugo. 2007. *Design for Six Sigma+Lean Toolset: Innovationen Erfolgreich Realisieren*. Berlin Heidelberg: Springer-Verlag.

Strupat, Ralf R. 2015. "Zielgruppendefinition – Wie Bestimme Ich Meine Zielgruppe?" 2015. http://www.onpulson.de/169/zielgruppendefinition-wie-bestimme-ich-meine-zielgruppe/.

For more information, see:

How to identify procurement regulations?

5   Business Models and Regulations

5.1   How to identify procurement regulations?

- Identification of procurement regulations in Europe

- The purpose of regulations

- Rules into public procurement regulations

Responsible Author: UPB

In a Nutshell

Generally "procurement regulations are rules that local, state, and federal government must follow when they award contracts for services to private companies" ("What Are Procurement Regulations?" n.d.). The purpose of regulations consist in a fair and cost-efficient manner by catching four general obligations. These commitments are transparency, equal treatment, non-discrimination and proportionality ("Public Procurement Law: The Basics" n.d.).

The public sector occupies with emergencies, disasters and also the prevention and protection of people, so the focus has to be on the field of public procurement regulations. (Passani et al. 2015)

The European Union build 27 service categories and split them into two areas (part A and part B) regarding to the interests. The purpose of the classification consists in the exemption of services which don´t have "cross border interest from the strict EU publication rules". Part B is "essentially exempt from the rules" (Postlethwaite 2015)

In the following (see table 1) there is an overview over most important differences and characteristic of these service types.

	Part A	Part B
Type of service	Priority services	Residual services
Including services	- Computer & related services - Accounting services - Architectural & consultancy services	➢ "Services that largely be of interest only to bidders located in the Member States where the contract was to be performed" - Health services - Education services - Recreational, cultural & sporting services
Caught by the Regulations	Fully	"caught by lesser regime, with only a few of detailed rules of Regulations applying"

Table 1: Types of services – EU procurement regulations ("Guidance: Social Impact Bonds" 2017, "Public Procurement Law: The Basics" n.d.)

Dependent on the field of action the service provider have to consider different rules.

The EU use two instruments to implement rules into public procurement regulations:

- "The Treaty on the Functioning of the European Union (TFEU) [formally Treaty establishing the European Community (TEC)], and
- The procurement directives" (Arrowsmith et al. 2010)

These instruments has to be known and the procurement rules has to be implemented into the guidance of the EU member states. In case of public health care section, a part of the rules comes from the EU and the other ones are from local governments (see table 1, Part B). So the provider can ask the relevant authorities of the member states (the product should be offered) for the procurement regulations. Another weak point represents the difference between nations and consortia. The European Union prescribe other regulations than the United States.

At the end the potential service provider has to think about the area/country he wants percolate and find out about the regulations.

In the following there is a list of links which provide more information on public regulations of different countries:

Country	Link
Germany	https://uk.practicallaw.thomsonreuters.com/8-521-5162?transitionType=Default&contextData=(sc.Default)&firstPage=true&bhcp=1
UK	https://www.gov.uk/guidance/transposing-eu-procurement-directives
France	https://uk.practicallaw.thomsonreuters.com/1-520-8570?transitionType=Default&contextData=(sc.Default)
Italy	https://uk.practicallaw.thomsonreuters.com/9-521-2163?transitionType=Default&contextData=(sc.Default)

Guidance or used Methodology

In case of services of Part A, the primary services, there are four procedures which can be used to award a contract: ("Guidance: Social Impact Bonds" 2017, "Public Procurement Law: The Basics" n.d.)

- Open
    - Often used for procurement of commodity products
    - No negotiation with suppliers
    - No restrictions for the usage of this procedure
- Restricted procedure
    - Identification of a shortlist of suppliers
    - Suppliers invitation for responding and evaluation of the results
- Competitive dialogue
    - Used for more complex procurements
    - authority negotiates with companies to develop suitable solution(s)
    - chosen companies will be invited to tender
    - after that only discussion about clarifying or fine-tuning the tender will be allowed
- Negotiated
    - Only used in limited circumstances
    - "public sector body may enter into contract negotiations with one or more suppliers"

"In practice, Part B Services do not need to follow any of the four procurement processes" ("Guidance: Social Impact Bonds" 2017).

Practical example

The EU compiles rules in directive procurement regulation regarding to specific themes. Examples of the current public regulation are:

- Directive 2014/24EU on public procurement (`classic directive`)
- Directive 2014/25EU on procurement by entities operating in the water, energy, transport and portal services sectors (`sector specific directive`)
- Directive 2014/23EU on the award on concession contracts

After the EU decided the directives the EU countries had to transpose the new regulations into national law. ("A Few Questions about Implementation of the EU Public Procurement Directives" 2016, "EU Public Procurement Directives" 2016) (The directives are usually available on the website of the European Union)

The United States Environmental Protection Agency (EPA) contains a short list of links regarding to procurement regulations. The list includes EPA-Specific Procurement Policy, Government Wide Procurement Policy and Federal Acquisition Virtual Library. ("Federal Procurement Regulations and Resources" 2016)

References

"A Few Questions about Implementation of the EU Public Procurement Directives." 2016.

Arrowsmith, Sue, Bordalo Faustino, Baudouin Heuninckx, Steen Treumer, and Jens Fejø. 2010. *EU Public Procurement Law: An Introduction*. Edited by Sue Arrowsmith.

"Emergency Preparedness for State Procurement Officials Guide." 2013. http://www.naspo.org/dnn/portals/16/documents/EmergencyPreparednessforStateProcurementOfficials.pdf.

"EU Public Procurement Directives." 2016. European Commission. 2016. http://ec.europa.eu/environment/gpp/eu_public_directives_en.htm.

"Federal Procurement Regulations and Resources." 2016. United States Environmental Protection Agency (EPA). 2016. https://www.epa.gov/contracts/federal-procurement-regulations-and-resources.

"Guidance: Social Impact Bonds." 2017. gov.uk. 2017. https://data.gov.uk/sib_knowledge_box/procurement-regulation-european-

union.

Passani, Antonella, Simona De Rosa, Alexander Georgiev, Maike Kuhnert, Monika Buscher, Katrina Petersen, Jens Pottebaum, and Olivier Paterour. 2015. "D6.01. Standardisation Strategy Incl. Identification of Relevant Standardisation Bodies."

Postlethwaite, Kim. 2015. "'Part B Services' Verses 'Light Touch Regime.'" 2015. https://blog.tendersdirect.co.uk/2015/03/30/part-b-services-verses-light-touch-regime/.

"Procurement Guidance for Recipients and Subrecipients under 2 C.F.R. Part 200 (Uniform Rules). Supplement to the Public Assistance. Procurement Disaster Assistance Team (PDAT) Field Manual." 2016.

"Public Procurement." 2017. European Commission. 2017. https://ec.europa.eu/growth/single-market/public-procurement_de.

"Public Procurement Law: The Basics." n.d. Pinsent Masons LLP. Accessed November 23, 2017. https://www.out-law.com/page-5964.

"What Are Procurement Regulations?" n.d. wiseGEEK clear answers for common questions. Accessed November 23, 2017. http://www.wisegeek.com/what-are-procurement-regulations.htm.

For more information, see:

How to define Channels and Customer Relationships for a Business Model?

5.2 How to define revenue streams
for a Business Model to capture value?

- According to Osterwalder, revenue streams are the fundamental definition of how an organization can capture the value it delivers by fulfilling its value proposition

- Osterwalder's Business Model canvas can be used to define the revenue streams

- The questions within the building block help to sharpen the definition

Responsible Author: UPB

In a Nutshell

In order to maintain long and prosperous customer relationships adequate and accepted revenue streams are of high importance. Identifying revenue streams can be supported using the St. Gallen Business Model Navigator and the Business Model Pattern cards.

Guidance or used Methodology

Revenue streams represent the way a company translates value streams into monetary income. The company should define how to generate revenues from each Customer Segment. In general, two different types of revenue streams can be identified, either one-time or ongoing purchases/payments. This classification helps then to decide on the way how to generate the Revenue Stream. Various ways are conceivable. Usage fees, selling physical products, subscription fees, licensing, lending/renting/leasing, brokerage fees and fees for advertising can be identified as possible ways to generate Revenue Streams. These Revenue Streams can differ in their pricing mechanism. Fixed and dynamic pricing are the two main types of price mechanisms (Osterwalder and Pigneur 2010).

References

Osterwalder, Alexander, and Yves Pigneur. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley Desktop Editions. Hoboken, NJ: John Wiley & Sons Inc.

"The Business Model Canvas." 2017. Strategyzer AG. https://strategyzer.com/canvas/business-model-canvas.

"The Value Proposition Canvas." 2017. Strategyzer AG. https://strategyzer.com/canvas/value-proposition-canvas.

> *For more information, see:*
>
> *How to identify the most relevant timing to deliver emergency messages?*
>
> *How to design a successful crowdsourcing initiative?*

Further Literature

("The Business Model Canvas" 2017, "The Value Proposition Canvas" 2017)

5.3 How to define Channels and Customer Relationships for a Business Model?

- After the definition of the value proposition and the identification of costumer segments using the value proposition canvas by Osterwalder, customer relationships and channel have to be defined
- Osterwalder´s business model canvas may be applied for defining these building blocks
- The question within the building blocks help to sharpen the definition of both

Responsible Author: UPB

In a Nutshell

Channels are the link between customers and the company. Their main objective is to deliver the value proposition and establish the relationship to the customer which is the best for both sides.

Guidance or used Methodology

Channels and customer relations both describe the interaction between the enterprise and the customer segments. The description of value streams describes potential profits generated by customers' payoff for the value proposition provided by services or products. Communication, distribution and sales *Channels* are the companies' touch points to the customer. The functions of channels can be described as follows: Channels raise awareness of the companies' value proposition, help customers evaluate it and operate the process of purchasing/ delivering the products or services to the customer as well as providing post-purchase services. Channel types and phases can be identified for further insights (Osterwalder and Pigneur 2010; "The Business Model Canvas" 2017).

The *Customer Relationships* are divers for different *Customer Segments.* Various types of relationships are required. The range of relationships go from personal to automated. Examples are self-services, sales through sales persons or also communities (Osterwalder and Pigneur 2010).

References

Osterwalder, Alexander, and Yves Pigneur. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley Desktop Editions. Hoboken, NJ: John Wiley & Sons Inc.

"The Business Model Canvas." 2017. Strategyzer AG. 2017. https://strategyzer.com/canvas/business-model-canvas.

"The Value Proposition Canvas." 2017. Strategyzer AG. 2017. https://strategyzer.com/canvas/value-proposition-canvas.

For more information, see guidelines

How to ensure effective communication of risk information, warnings and emergency messages?

How to promote interaction between authorities and the public?

Further Literature

("The Value Proposition Canvas" 2017)

5.4 How to develop Business Models for innovative products based on ANYWHERE components?

- The value proposition is the initial starting point
  for business model development

- To define the value proposition,
  the Value Proposition Canvas by Osterwalder can be applied

- Hereby, the definition of both,
  value proposition and customer segments is facilitated

Responsible Author: UPB

In a Nutshell

In this guideline, a brief introduction the business model canvas developed by (Osterwalder and Pigneur 2010) is given. Users of A4Demos Services and entrepreneurs are supported in defining their business model. The core of the business model canvas is the value proposition which can be defined using the Value Proposition Canvas (VPC). The VPC supports the finding of a value proposition by identifying customer needs, description of other business model components and the application of business model patterns.

Guidance or used Methodology

According to Osterwalder, a business model is "the rationale of how an organisation creates, delivers and captures value" (Osterwalder and Pigneur 2010). The central role of the business model for the economic success of an enterprise is outlined by various authors (see (Gassmann, Frankenberger, and Csik 2013; Osterwalder and Pigneur 2010; Zott, Amit, and Massa 2011). Various descriptions of business models have been developed (Zott, Amit, and Massa 2011). All descriptions consist of basic components ("building blocks") describing key components of the business model. In this guidelines, the building blocks defined by (Osterwalder et al. 2014) are used.

The Value Proposition is the central element of a business model. Here, the aggregated benefits an enterprise is offering to its customers are described. In order

to define the Value Proposition, the Value Proposition Canvas (VPC, see ("The Value Proposition Canvas" 2017)) has been developed by Osterwalder (Osterwalder et al. 2014). Here, the customer segments are mapped with the value proposition.

Filling of the VPC starts with identifying customer jobs. These are jobs customers have to see fulfilled. Customer jobs can either be functional, social or emotional (Osterwalder et al. 2014). Prioritization of jobs is recommended (Osterwalder et al. 2014). After identification of customer jobs, major pains and gains of the customer are identified. Pains can be problems such as unexpected results, pitfalls or undesired potential events (risks). Gains can be all types of advantages or revenues customers may want to achieve by using a certain service or product. Secondly, the value proposition itself is defined. Here, products and services as well as pain relievers and gain creators are defined. All three aspects have to be consistent to customer jobs, pains and gains (Osterwalder et al. 2014). Key questions for both, pain relievers and gain creators defined in the VPC serve as inspiration for defining these parts of the value proposition.

Results from the VPC are then transferred into the Business Model Canvas (BMC, see ("The Business Model Canvas" 2017)). After the transfer of the customer segments and the value proposition from the VPC, the seven other building blocks have to be filled. Here, key inspirational questions are provided by Osterwalder (see related guidelines).

References

Gassmann, Oliver, Karolin Frankenberger, and Michaela Csik. 2013. *Geschäftsmodelle Entwickeln: 55 Innovative Konzepte Mit Dem St. Galler Business Model Navigator*. München: Carl Hanser Verlag.

Osterwalder, Alexander, and Yves Pigneur. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley Desktop Editions. Hoboken, NJ: John Wiley & Sons Inc.

Osterwalder, Alexander, Yves Pigneur, Gregory Bernarda, and Alan Smith. 2014. *Value Proposition Design: How to Create Products and Services Customers Want*. Hoboken, NJ: John Wiley & Sons, Inc.

"The Business Model Canvas." 2017. Strategyzer AG. https://strategyzer.com/canvas/business-model-canvas.

"The Value Proposition Canvas." 2017. Strategyzer AG. https://strategyzer.com/canvas/value-proposition-canvas.

Zott, Christoph, Raphael H. Amit, and Lorenzo Massa. 2011. "The Business Model: Recent Developments and Future Research." *Journal of Management* 37 (4): 1019–42. doi:doi:10.2139/ssrn.1674384.

For more information, see:

How to identify the most relevant timing to deliver emergency messages?

How to promote interaction between authorities and the public?

How to design a successful crowdsourcing initiative?

5.5 How to specify Key Resources, Activities and Partners for a Business Model?

- After having defined Value Proposition, Revenue Streams and all building blocks referring to the customer, assets, actions and partners required to deliver the value to the customer have to be defined

- The assets, actions and partners can either be internal or external to the company offering the value proposition

- Osterwalder's Business Model canvas can be used to define these

- The questions within the building block help to sharpen the definition

Responsible Author: UPB

In a Nutshell

In order to operate the business model resources, activities and partnerships are of high importance. They are the key enablers for all the beforehand defined strategic decisions.

Guidance or used Methodology

Key Resources, Key Activities and Key Partnerships are the assets needed to execute the business model. They are required to provide the Value Proposition, reach the desired Channels, establish and maintain the type of Customer Relationship and generate the Revenue Streams defined before. The Key Resources consist of different categories. The physical, intellectual, human or financial resources. These categories may help identifying the resources needed. Resources can be owned or provided by a Key Partner. Key Activities can be the production of a product, problem solving e.g. by services of various kinds or network and platform activities. Since both, Key Resources and Key Activities may be provided by external partners' indispensable for the business model. Key Partnerships are used to describe these relationships (Osterwalder and Pigneur 2010).

References

Osterwalder, Alexander, and Yves Pigneur. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley Desktop Editions. Hoboken, NJ: John Wiley & Sons Inc.

For more information, see:

Guideline 1 Value Proposition Guideline

How to define Channels and Customer Relationships for a Business Model?

How to define revenue streams for a Business Model to capture value?

How to build a cost structure suitable for the Business Model?

How to use other business models or business model patterns for developing a Business Model?

5.6 How to build a cost structure suitable for the Business Model?

- The cost structure defines the required costs for all assets, activities and partners required to deliver the value specified by the value proposition

- all costs indispensable for the business model are specified here

- Osterwalders Business Model canvas can be used to define the cost structure

- the questions within the building block help to sharpen the definition

Responsible Author: UPB

In a Nutshell

The cost structure differs depending on the Business Model and its competitive environment. It is of importance to align the cost structure to the beforehand described parts of the Business Model.

Guidance or used Methodology

The cost structure describes all the costs obtained through executing and in the following operating the Business Model. Therefore, the cost structure relates to all parts of the Business Model described in the other building blocks. In general, costs should be minimized, but for some business models, it is more important than for others. Business Models can be classified on a scale between cost-driven and value driven. This classification plus the identification of different characteristics such as fixed or variable costs, but also possible economies of scale and scope help in designing the cost structure according to the needs of the Business Model (Osterwalder and Pigneur 2010).

References

Osterwalder, Alexander, and Yves Pigneur. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley Desktop Editions. Hoboken, NJ: John Wiley & Sons Inc.

For more information, see:

Guideline 1 Value Proposition Canvas

Guideline 2 Channels and Customer Relationships

Guideline 3 Revenue Streams

Guideline 4 Key Resources, Activities and Partners

Guideline 6 Business Model Navigator and Pattern Cards

5.7 How to use other business models or business model patterns for developing a Business Model?

- For inspiration or the development of new business models, Gassmann's Business Modell Patterns can be applied

- These are patterns of similar business models which have proven to be successful. Patterns were identified on an empirical basis

- Tool developers may adapt or modify these patterns for their services or tools

- Business model pattern cards can be used as a workshop tool

Responsible Author: UPB

In a Nutshell

Besides the Business Model Canvas, (Gassmann, Frankenberger, and Csik 2013) developed a method to support the development of Business Models. To develop new Business Models existing ones are analysed and if applicable compared to current Business Models.

Guidance or used Methodology

The St. Gallen Business Model Navigator developed by (Gassmann, Frankenberger, and Csik 2013) supports the development of new Business Models and the innovation of existing ones. The core idea is that new innovative Business Models can be developed through creative imitation or recombination of existing Business Models. In the first phase (Design) the key questions are used to guide the development of the Business Model (see Figure 1). In the second Phase (Realisation) the Business Model is implemented and tested (see Figure 2) (Gassmann, Frankenberger, and Csik 2013). To apply the St. Gallen Business Model Navigator, the Business Model 55 Pattern Cards are useful. The two basic principles for applying the Navigator can be presented as: The principle of similarity and the principle of confrontation. The first principle starts with the current Business Model and searches for similar industries. If these are found, the Business Models are selected from the pattern cards. Then the patterns are analysed from the most similar towards the least. The second principle starts with the comparison with the most contradicting Business Model. An attempt is made to

capture the relevant aspects of the Business Model at hand. Due to the contradiction, the current Business Model is challenged and new ideas besides existing ones should be encouraged. Both principles aim for developing a new Business Model operating better than the one designed before (BMI, Business Modell Pattern Cards).
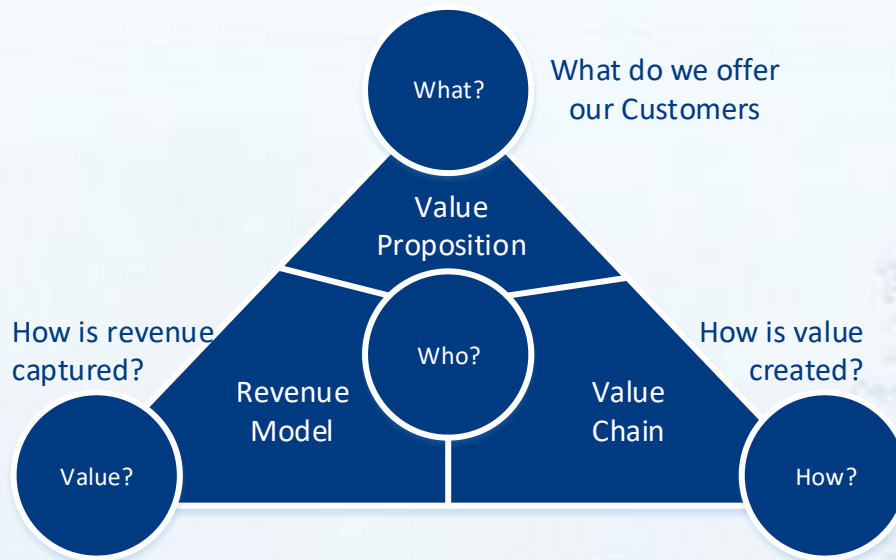

Figure 1: Magical triable with four dimensions of a Business Model, (Gassmann, Frankenberger, and Csik 2013, 6)
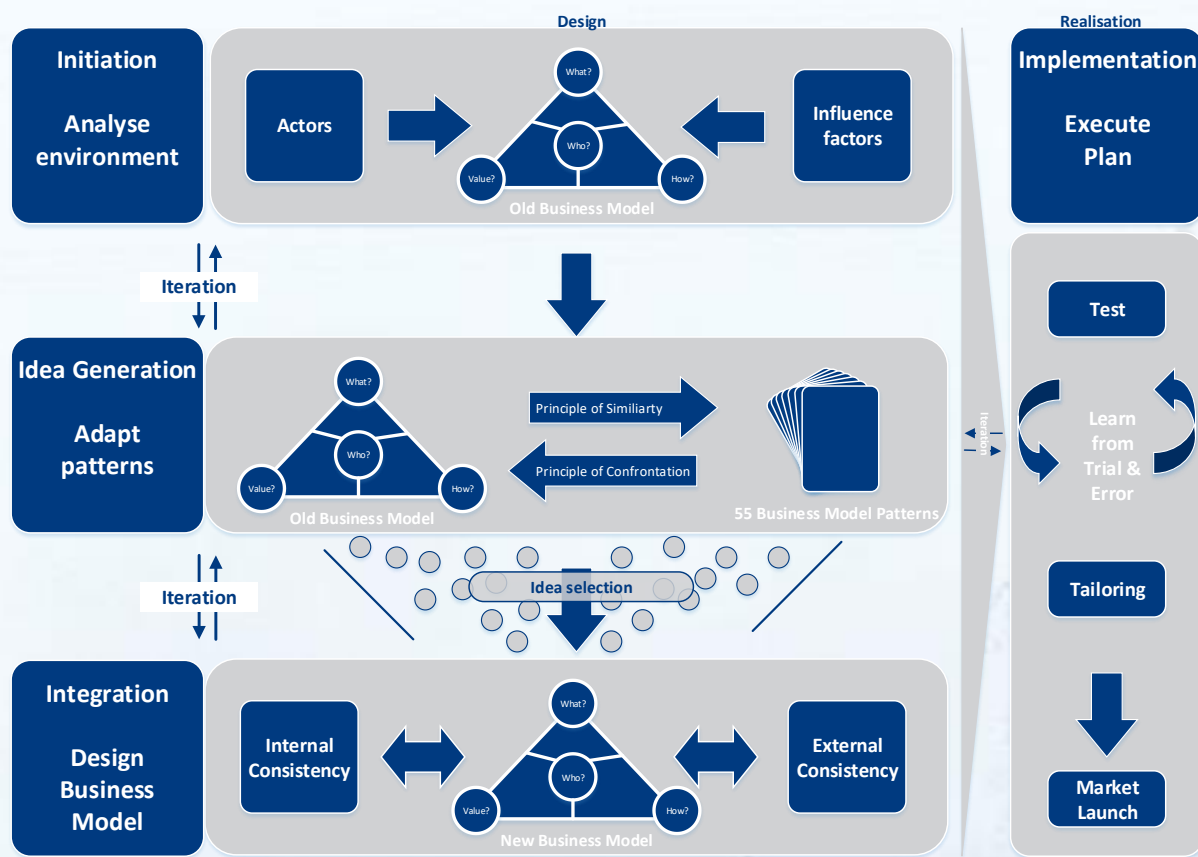
Figure 2: Business Model Navigator™, (Gassmann, Frankenberger, and Csik 2013, 16)

References

Gassmann, Oliver, Karolin Frankenberger, and Michaela Csik. 2013. *Geschäftsmodelle Entwickeln: 55 Innovative Konzepte Mit Dem St. Galler Business Model Navigator*. München: Carl Hanser Verlag.

For more information, see:

How to ensure effective communication of risk information, warnings and emergency messages?

6   Good Practices

6.1 How to say the right thing at the right time: a guidance to improve tools and services for self-p* in extreme weather event - folding information

- Strategic choice: for the Civil Protection it is important to have **a simple and clear image** to communicate
- Visual language: The **visual identity** is based on some markers that produce a unique aspect of all Information

Responsible Author: CDG

In a Nutshell

The Civil Protection of Municipality of Genoa (CDG) manages a number of activities aimed at the development of a culture of civil protection through sensitization campaigns, leaflet, folding information, etc., which describe various types of natural hazard, how to prepare for them, specific actions to take in the course of an actual event, and what authority to call for them.

In this way CDG studied a basic style guide to do a specific "identity" of the information.

Guidance or used Methodology

The basic style guide ("Proposal of Corporate Design Manual – Basic Style Guide," n.d.), define how to create the leaflet or folding information that describe various types of natural hazard and what do before, during and after the event.

The main points of the basic style guide are:

1. **Strategic choice:** for the Civil Protection it is important have a simple and clear image to communicate what to want to say. Since the massage to say could be different, and the levels of civil protection are several (Regional, Local, Volunteer, etc...) it is necessary that the style follow this way. So the

project strategy follow a modular principle to express the idea of union in diversity.

2. **Visual language:** The visual identity is based on some markers that produce a unique aspect of all information from Civil Protection.

    a. **Image:** the image shows a real situation and can be:

        i. **Photographic.** The photographic image shows real situation and moments of real life (during alert situation, during emergency situation, etc.). They are useful to draw attention, to show a specific situation and to inspire a specific emotion. The image to use for the Civil Protection should be real and clear because they had to show real and painful situation. There are three different types of image:

            1. **Image that shows place and situation.**
            2. **Image that show people**
            3. **Still life - analogy**

        ii. **Graphic.** The graphic image shows information in clear and easy way. There are different types of graphic image:

            1. **Explicative graphic image**
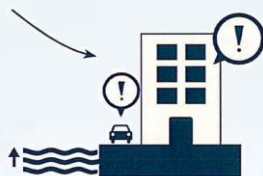
            2. **Normative graphic image**

            3. **Illustrative graphic image**
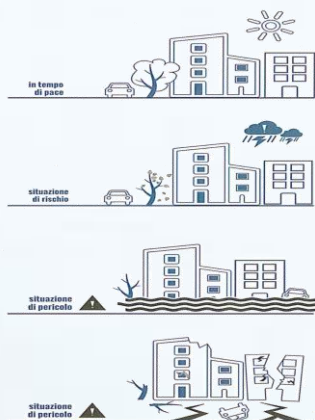
b. **Box of contents:** the box contents give information to citizen. This element is flexible in size and colour. For example: the blue boxes are present in all leaflet and, on one hand, they are useful to bring attention on the other they give useful information.

3. **Basic elements:** There are some elements that characterise the format.
   a. Logo
   b. Font

font TITOLI:
Trade Gothic Bold Condensed
(LT Std-Condensed No. 20)
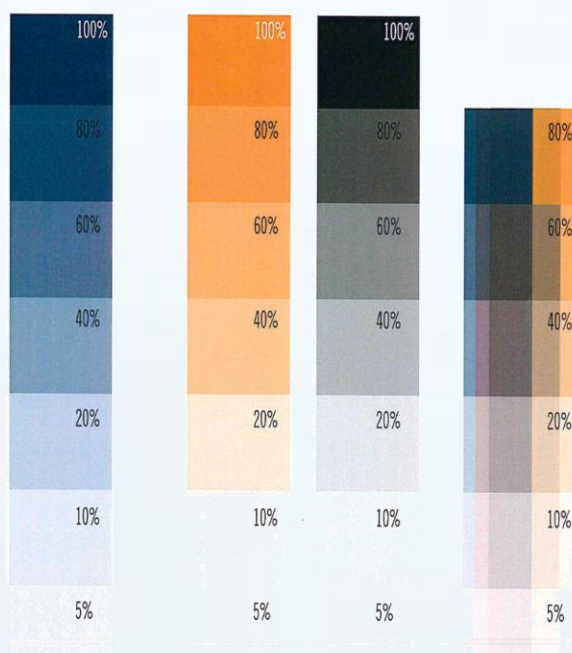
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

font SOTTOTITOLI / font TESTI:
Trade Gothic Bold Condensed
(LT Std-Condensed No. 18)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

   c. Colours

100%	100%	100%	
80%	80%	80%	80%
60%	60%	60%	60%
40%	40%	40%	40%
20%	20%	20%	20%
10%	10%	10%	10%
5%	5%	5%	5%
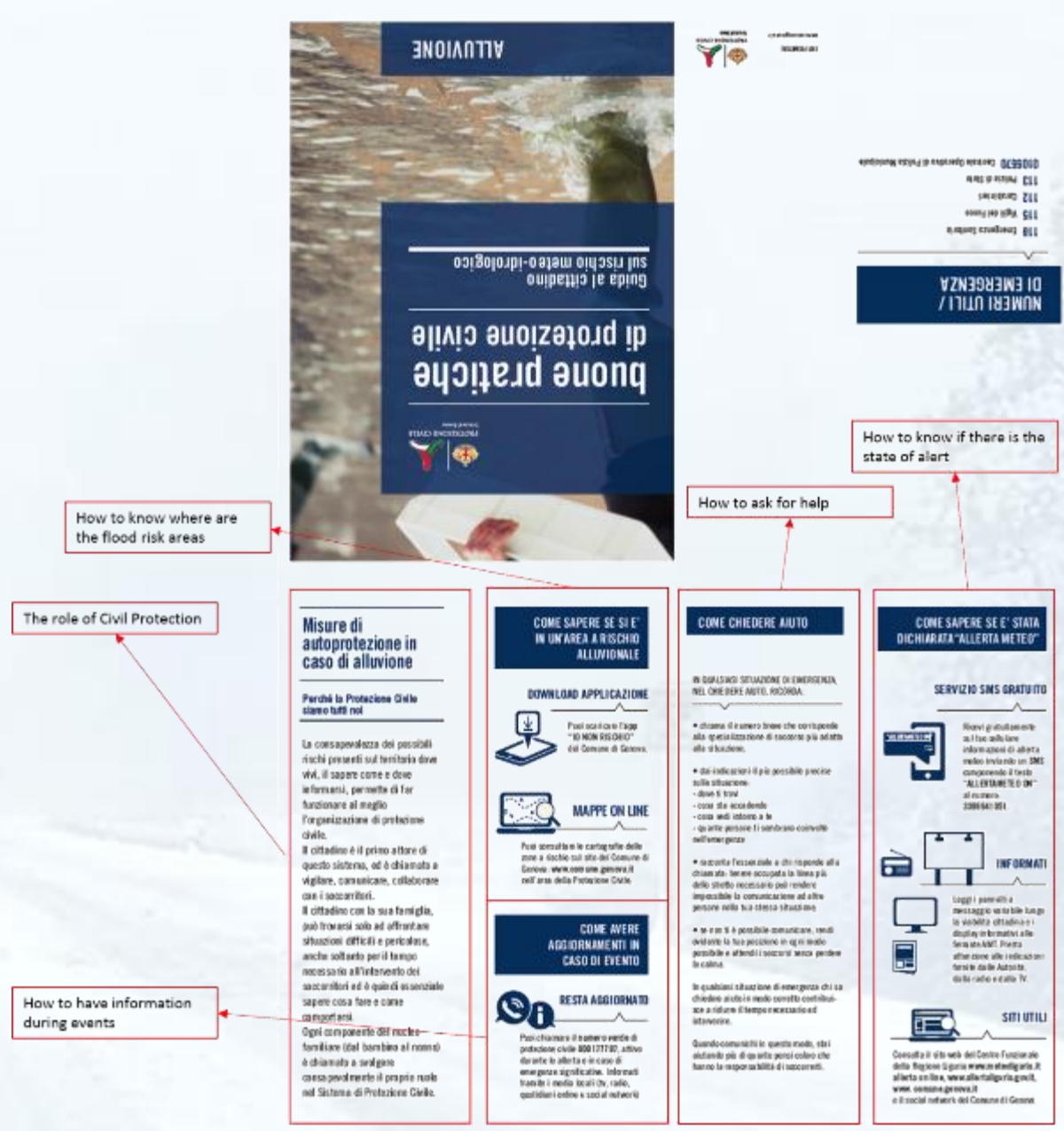
Figure 1:The aim of this picture is to do some quickly and useful information to increase self p*
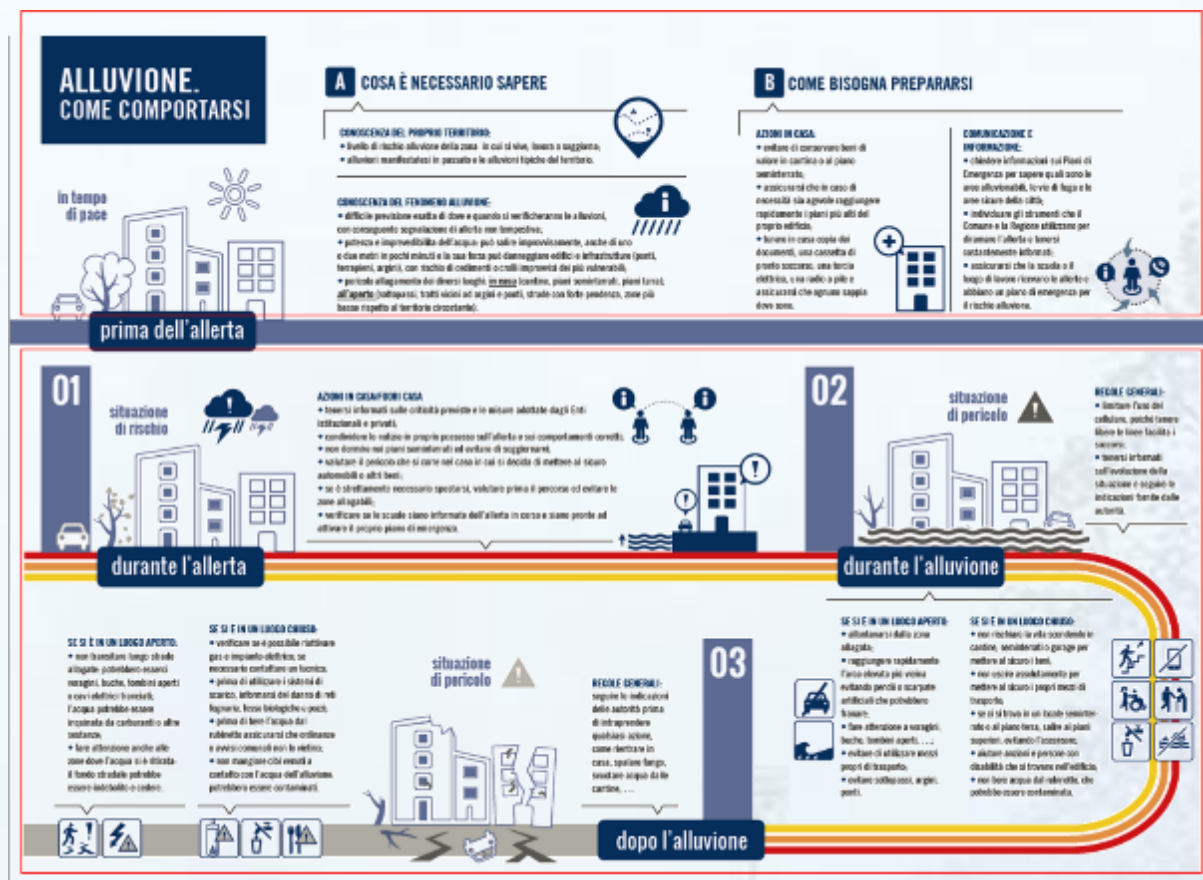
Figure 2: The aim of this picture is explain what do before, during and after a flooding event. The first box shows what is possible do in a peace time, to arrive ready at the event. Whereas the second box shows what to do: 1. during the state of alert; 2. during the flooding event; 3. after the flooding event

Figure 3: format of folding information

References

"Proposal of Corporate Design Manual – Basic Style Guide." n.d. University of Genoa
– Department DSA; Graphical Project by Clarissa Sabeto.

6.2 How to provide official information for private and public in different weather conditions?

- Ways FMI informs security authorities about extreme weather events
- Structure of FMI Warning messages
- When to increase Thread-level in Finland

Responsible Author: FMI

In a Nutshell

In case of extreme weather event, FMI informs other security authorities as early as possible. Especially so called LUOVA-report and LUOVA coordination are used. LUOVA coordination gives an overview of five to ten days forecast in Finland using traffic light colours. Clicking specific day gives verbal description of type and severity and probability of extreme weather for that day. LUOVA-report will be issued as early as possible, when the severity or likelihood of phenomenon is estimated to be enough high level. The report will be repeated and updated, whenever new more detailed information is available of timeliness, severity, location strength, impacts etc.

It is the task of civil protection to take action according to the information issued by FMI. They have their own procedure, which may vary in different parts of the country. Some areas are more urban, some have big airports, sea areas, merchant ports etc, which means different type of preparedness than sparsely populated countryside, where the protection of electricity network is one of the most important topics (and working together with electricity distribution companies).

Warnings to citizens are provided via and together with media (web, tv broadcast, newspapers etc). Action plans and advice for citizens in different weather conditions (in Finland) are provided via webpage (Ilmatieteenlaitos.fi)

Plans provide guidelines to take into account before, during and after the extreme weather event. Also information on rules, when certain warning will be issued by FMI. For instance

- Strong gusts (storms)
- Lightning
- Snow storms
- Big hails
- Tornadoes
- Down bursts (convective storms)
- Flooding
- Extreme temperatures both heat and cold – health impacts (Hot spell warning will be issued in 3 different categories, if daily max temp exceeds 27, 30 and 35 C during three consecutive days. Extreme cold warning will be issued also in 3 categories, but the country is subdivided to south middle and north. Limits for south are -20, -30 an -35 degrees)
- Strong UV radiation

- Guidance for small vessels (mainly private boats, sailing boats etc).
- FAQ evening sessions together with National Broadcasting Company radio channels
- Giving guidance during boat exhibitions
- Leaflets (see example ⬚)
- Weather book for seamen

Guidance or used Methodology

- General information of FMI warnings
  There is a guidance page on FMI web (http://en.ilmatieteenlaitos.fi/information-on-warnings), where the reasoning of web page for warnings is explained.
  - o How to change between different dates (5 day warning maps),
  - o Zoom for more details
  - o More local info by opening the text boxes below the map
  - o Descriptions of the used colours:
    - ▪ yellow - dangerous weather may occur. You are advised to take the weather conditions into account when you are exposed to

weather. You should also keep an eye on the weather and avoid risks.

- orange - dangerous weather. The weather may cause injuries and material damage. You should avoid risks that may be caused by weather. You are advised to keep an eye on the weather on a regular basis and follow the instructions issued by the authorities.
- red - very dangerous weather. Injuries and material damage can be expected over a wide area. You should keep a constant eye on the weather and the awareness level. You should also follow the instructions issued by the authorities and be prepared for exceptional measures. The red colour appears on the warning map very rarely.

- o Updates of the warnings: Warnings are issued separately for each day of the week. For example, on Monday, warnings will be issued for Monday, Tuesday, Wednesday, Thursday and Friday. The warnings are normally updated at 6, 9, 12 and so on. If necessary, the warnings are also updated at other times. The warning map on FMI website is kept up to date and it shows all warnings. Other media (television, radio, other websites) may not show all the warnings and those shown are not necessarily up to date.
- o This general guidance is available in Finnish, Swedish and English
- o Warning concerning certain topic are available in Finnish and Swedish

Twitter is also used by the forecasters at FMI (Ilmatieteen laitos@meteorologit). Twitter is used as well for daily forecast issues with clarifying imagery as any guidance the forecaster finds useful.
New way in use of social media at FMI are the Periscope and Youtube broadcasts provided especially before significant or possibly dangerous weather events.

Practical example

As a practical example, let us take the strong winds and gusts. Other phenomena follow approximately same procedure. Advice of course changes according to the weather phenomena. Advice is strongly dependent on location of Finland and it's climate being between latitudes 60 and 70

degrees. For instance temperature limits: we warn people of heat, when it is still "acceptable" in southern Europe, but our limits for extreme cold might make your eyebrows raise!

- Guidance for Strong gusts
  Precautions before the storm (Self preparedness)

  o Postpone travelling by car: trees may fall on roads and wind may influence steering of the car. If driving is necessary, take warm clothing, food and drink with you
  o Do not go to sea or sailing
  o Check electric charge of your mobile, drinking water supply and batteries of your torch beforehand
  o Clean away or secure garden furniture and other movable stuff, which may cause damage during the storm. Check regularly also the condition of the trees in your garden
  o Keep doors and windows closed. Especially check for roof windows and balcony glasses
  o Keep or take pets inside
  o Drive the car to garage or away from trees
  o Switch off all possible electric devices, which may be damaged during sudden power failure
  o Check and secure boats

During the storm (Self-protection)

  o Stay inside and away from windows
  o Tents and light sheds are not safe
  o Do not try to fix damage to property during the storm
  o Avoid using lifts, if power shortages are foreseen
  o Watch for falling trees and electricity lines, if outside
  o Take cover from falling trees between big rocks, at the feet of steep cliff or in a ditch
  o Strong gusts can blow vehicles off the road (especially bikes, motorcycles etc.). Park you vehicle away from trees and electricity lines. Mind the side wind, if you drive from the woods to open area.
  o If you are on sea, get to the closest shore, if possible.

After the storm (Self-protection)

  o Avoid travelling, unless necessary

ANYWHERE

> o Mind the fallen trees. Warn other about fallen trees or other obstacles
> on the road for instance using the warning sign of your car.
>
> Also other weather hazards are handled in similar way to inform and give advice to
> the public.
>
> FMI is delivering weather information to civil protection authorities in Finland and
> several ministries. They have their own procedures about weather hazards. FMI is
> in many cases the authority, which

References

	Ke 31.5.	To 1.6.	Pe 2.6.	La 3.6.	Su 4.6.	Ma 5.6.
👁 Sääkatsaus						
🌬 Tuulet	100 %	20 %	30 %	100 %	100 %	100 %
☁ Sateet	100 %	10 %	10 %	100 %	100 %	100 %
🌡 Lämpötila	100 %				100 %	100 %

⚡ Ukkospuuskat	❄	🟥 Erittäin vaarallinen
🌬 Voimakkaat tuulenpuuskat	❄	🟧 Vaarallinen
🌊 Myrskyä merellä	🌡	🟨 Mahdollisesti vaarallinen
🏠 Tulvavaara	🌡 Erittäin kylmä sää	🟩 Ei vaaraa
💧 Rankkasade		⬜ Ei tietoa

Sateet

Perjantai 2.6.2017

Torstai-iltana perjantain vastaisena yönä Lappiin leviää lumisateita koillisesta. Sadekertymä aamuun mennessä pääsoin 5-10 mm vedeksi muutettuna, lumikertymät enimmillään 10 cm. Ajokeli voi näin ollen muuttua huonoksi etenkin Lapin itäosissa ja Koillismaalla. Tuuli huonontaa keliä osaltaan.

Figure 3 LUOVA coordination (available only in Finnish unfortunately)

Figure 4 *LUOVA report part 1 (available only in Finnish)*

Maan pohjoisosa:
Sadealue liikkuu sunnuntain aikana Pohjois-Lappiin asti, ja myös maan pohjoisosaan kertynee lunta paikoin luokkaa 10 cm.

TUULI JA MAHDOLLINEN TYKKYLUMI:
Etelänrannikon maakunnissa esiintyy lauantaina iltapäivällä 15-20 m/s koillistuulen puuskia. Keskiosassa esiintyy itäpainotteisesti 10-15 m/s puuskaa. Tuuli itsessään voi aiheuttaa yksittäisiä vahinkoja lähinnä etelässä, mutta yhdessä märän lumisateen kanssa joitain tykkyvahinkoja voi syntyä myös maan keskiosassa.

Sadealueen etupuolella sateen noustessa pohjoiseen lähinnä Keski-Lapissa voi esiintyä sunnuntaina päivällä noin 20 m/s puuskia. Niistä voi syntyä yksittäisiä tuulivahinkoja.

Suomenlahdella ja Pohjois-Itämeren itäosassa koillismyrskyä ja kovaa aallokkoa.

1. Lumi- tai räntäsateen kokonaiskertymä sunnuntai 30.4 klo 15 mennessä.

2. Mahdollisten tykkyvahinkojen alue ulottuen Pirkanmaalta Keski-Suomen kautta Kainuuseen.

3. 20 m/s puuskien esiintymisalue lauantaina 29.4 klo 15.

Figure 5 LUOVA report part 2 (available only in Finnish)

Figure 6 Factors effecting UV exposure, guideline for public (In Finnish only)

For more information, see guidelines

How to identify the most relevant timing to deliver emergency messages?

How to promote interaction between authorities and the public?

How to enhance trust in emergency response?

6.3 How to enhance self-response of distribution companies during severe weather events?

- ANYWHERE components supplied by A4Demos can be used to facilitate new services for improving self-p* for enterprises
  - the impact of extreme weather onto supply networks can be assessed
  - logistic chains can be adopted on the basis of scenarios
  - operational performance of enterprises is improved and new business models are facilitated

Responsible Author: RINA

In a Nutshell

The guidelines are related to a service based on a logistic platform to enable self-response of logistics companies dealing with distribution tasks (i.e. food distribution companies) during severe weather events. By cross-correlating the weather forecasts and a representative model of the road network, the service will be able to estimate the extension of the affected area and in particular of the network capacity. Based on the continuous improvement of weather forecasts as input, the service will simulate and evaluate different transport scenarios and logistic configurations, analysis of the demand assignment, the modal diversion, considering a multi and intermodal supply. The outcome will be indications for logistics-related companies (i.e. food distribution) useful to find or choose the best route (i.e. alternative road, multimodal path) between two locations. The platform underlying the service is conceived as support to companies dealing with distribution tasks, without affecting nor changing procedures and legacy systems in place.

The support and indications provided by this service will positively affect logistics companies' capabilities in urban planning and safety over severe weather events that can potentially have a negative impact on operational performance. Supply chain entities will be able to lower overall operating costs, create and test newer business models, develop and maintain a higher standard in customer service and attain

unsurpassed efficiency (i.e. better shipping options, reduced operational costs, predictive operations, etc.).

Guidance or used Methodology

The tool allows to simulate and evaluate different transport scenarios and logistic configurations, analysing the demand assignment, the modal diversion, considering a multi and intermodal supply, in correlation with weather-based forecast information coming from other ANYWHERE tools.

The current tool is a macroscale transport chain planner that foresees in input the definition of the demand (one or more Origin/Destination (O/D) matrices in terms of total freight/user movements) and of the supply (a multimodal transportation network represented by a series of graphs of mono-modals and mono-directional oriented links). The procedure of simulation consists in searching the routes (mono- and/or multimodal) that satisfy each O/D relation and to distribute on them, proportionally to the total generalized cost associated with each route, the total flow of the O/D considered, appraising, in this way, the individual modal flows in the transport links, and the transfer flows in the modal interchange (transfer) links.

Practical example

The application fields on which the tool can be used are:

- Scenarios comparative analyses in urban, regional, national and international context
- Influence and efficiency of road (and area pricing policies) on the users behaviour
- Evaluation of the effects of new infrastructures and transport policies on the mobility and on the demand
- Detailed analysis of the use of intermodal resources (ports, inter-ports, parking places, stations, logistic nodes, etc.)

Practically, once a travel graph model is defined by inserting: nodes coordinates in accordance with a geographic reference system adopted in a GIS, additional user information to describe the characteristics of the net links (e.g. modal type, crossing time, monetary extra cost, number of vehicles per time, etc.) and origins/destinations (O/D); the results produced by the tool are:

o summary of total flows for all links in the net, per type of freight/users and the totals, as well as the time and the equivalent costs;

o for each assigned O/D relation, this results includes the definition of all the routes in which the flow is distributed and, for each route, additional values relevant to the costs and to the travelling/transfer times;

o visualization of nodes, links and paths on which the user can select itineraries for GIS output and/or export in other suitable format (e.g. shape files) in order to transfer useful information on viability and so to enhance freight/passenger delivery and planning under defined weather conditions.

References

"Logistic System of South Italy, Ship-Rail-Road- Models for Energetic Evaluation of Technological Scenarios." n.d. Italian Ministry of Research and University.

Further Literature

("Logistic System of South Italy, Ship-Rail-Road- Models for Energetic Evaluation of Technological Scenarios," n.d.)

6.4 How to Comply with EU droughts strategy?

- EU droughts strategy shall reduce potential waste of water and risk of droughts
- all third party tools shall comply with the EU droughts strategy

Responsible Author: SSSA

In a Nutshell

Even though Europe is traditionally considered as having adequate water resources, water scarcity and drought is an increasingly frequent and widespread phenomenon in the European Union. Water scarcity occurs where there are insufficient water resources to satisfy long-term average requirements. It refers to long-term water imbalances, combining low water availability with a level of water demand exceeding the supply capacity of the natural system. Water availability problems frequently appear in areas with low rainfall but also in areas with high population density, intensive irrigation and/or industrial activity. Large spatial and temporal differences in the amount of water available are observed across Europe. Beyond water quantity, a situation of water scarcity can also emerge from acute water quality issues (e.g. diffuse or point source pollutions), which lead to reduced fresh/clean water availability. Droughts, instead, can be considered as a temporary decrease of the average water availability due to e.g. rainfall deficiency. Droughts can occur anywhere in Europe, in both high and low rainfall areas and in any seasons. The impact of droughts can be exacerbated when they occur in a region with low water resources or where water resources are not being properly managed resulting in imbalances between water demands and the supply capacity of the natural system.

It was estimated that by 2007, at least 11 % of Europe's population and 17 % of its territory had been affected by water scarcity, putting the cost of droughts in Europe over the past thirty years at EUR 100 billion. The major challenge from water scarcity

and droughts has been recognised in the Communication Addressing the challenge of water scarcity and droughts. The Communication has identified seven policy options to tackle water scarcity and drought issues, namely: putting the right price tag on water; allocating water and water-related funding more efficiently; improving drought risk management; considering additional water supply infrastructures; fostering water efficient technologies and practices; fostering the emergence of a water-saving culture in Europe; improve knowledge and data collection. Relying on the information submitted by the MSs as well as on its own research, the Commission prepares annual Follow-up Reports that assess the implementation of the policy options throughout the EU, however the latest Follow-up report dates back to 2010.

Guidance or used Methodology

The Communication on Water Scarcity and Droughts includes options related to 'putting the right price tag on water', 'allocating water more efficiently' and 'fostering water efficient technologies and practices'. These water efficiency measures in principle would fit into the overall resource-efficiency objective of Europe 2020.

However, as evidenced by the Commission's Review of the Policy on Water Scarcity and Droughts, it shall be noted that limited progress has been achieved in implementing the policy instruments identified in the 2007 Communication. The Review highlights the high untapped potential for water efficiency measures in all the main water-using sectors (agriculture, industry, distribution networks, buildings and energy production). It states that bringing in water accounting and water efficiency targets at sectoral level would provide a stronger basis for effective and targeted water protection measures.

Practical example

A European network of experts on water scarcity and droughts produced a report in 2007 on drought management plans as part of the Common Implementation Strategy of the Water Framework Directive. This report was endorsed by the Water Directors of the Member States in November 2007. The report sets out recommendations in preparing operational drought management plans to prevent and mitigate the impact of droughts on the environment, society and the economy. The report includes examples of drought management plans in place in some Member States such as Spain, the United Kingdom and Portugal. According to the report effective information, early warning systems and drought risk maps are the foundation for

effective drought policies and plans, as well as effective networking and coordination between competent authorities in water management at different levels. In addition to an effective early warning system, the drought management strategy should include sufficient capacity for contingency planning before the onset of drought, and appropriate policies to reduce vulnerability and increase resilience to drought.

Furthermore, the Commission continues to develop the European Drought Observatory to act as an early-warning system to increase Member States' and stakeholders' preparedness. It also enforces relevant requirements under the Water Framework Directive and encourages Member States to better integrate drought risk management and climate change aspects in their future   River Basin Management Plans (RBMPs) and when developing cross sectoral and multi hazard risk management plans.

References

Commission of the European Communities. 2007. "Communication from the Commission to the European Parliament and the Council: Addressing the Challenge of Water Scarcity and Droughts in the European Union (COM/2007/0414 Final)." http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52007DC0414&from=EN.

European Commission. 2012. "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Blueprint to Safeguard Europe's Water Resources (COM(2012) 673 Final)." http://ec.europa.eu/transparency/regdoc/rep/1/2012/EN/1-2012-673-EN-F1-1.Pdf.

Schmidt, Guido, and Carlos Benítez Sanz. 2012. *Topic Report on: Assessment of Water Scarcity and Drought Aspects in a Selection of European Union River Basin Management Plans*. Study by Intecsa-Inarsa for the European Commission (under contract "Support to the implementation of the Water Framework Directive (2000/60/EC)" (070307/2011/600310/SER/D.2)). http://ec.europa.eu/environment/water/quantity/pdf/Assessment WSD.pdf.

"Water Scarcity and Droughts Expert Network: DROUGHT MANAGEMENT PLAN REPORT: Including Agricultural, Drought Indicators and Climate Change Aspects." 2007. http://ec.europa.eu/environment/water/quantity/pdf/dmp_report.pdf.

Further Literature

EU Legal and Policy Framework

(Commission of the European Communities 2007; European Commission 2012; "Water Scarcity and Droughts Expert Network: DROUGHT MANAGEMENT PLAN REPORT: Including Agricultural, Drought Indicators and Climate Change Aspects" 2007)

General Literature

(Schmidt and Benítez Sanz 2012)

6.5 How to comply with EU Floods Directive?

- EU floods directive shall improve the coordination of flood prevention and reaction measures amongst member states

- third party tools shall be in line with the directive and may contribute to the goals

- tool developers may target stakeholder integration or information exchange in
terms of flood mapping and predictions

Responsible Author: SSSA

In a Nutshell

Due to the fact that between 1998 and 2009 Europe suffered over 213 major damaging floods, including the catastrophic floods along the Danube and Elbe rivers in summer 2002, the EU institutions worked to ensure a better response to these events. Those efforts ultimately led to the adoption in 2007 of the Floods Directive, which aims at reducing and managing the risks that floods pose to human health, the environment, cultural heritage and economic activity.

More in detail the Directive, which applies to inland waters as well as all coastal waters across the whole territory of the EU, requires Member States (MSs) to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding; for such zones, MSs would need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015. The Directive shall be carried out in concert with the Water Framework Directive, i.e. by coordinating flood risk management plans and river basin management plans, and through coordination of the public participation procedures in the preparation of these plans.

Guidance or used Methodology

The Directive establishes that Member States shall coordinate their flood risk management practices in shared river basins, including with third counties, and shall in solidarity not undertake measures that would increase the flood risk in neighbouring countries. Member States shall take into consideration long term developments, including climate change, as well as sustainable land use practices in the flood risk management cycle addressed in this Directive.

According to Article 10 of the Directive all assessments, maps and plans prepared shall be made available to the public. Concerning the actual implementation of the Directive, MSs have drafted their Preliminary Flood Risk Assessments (PFRAs) and Flood Hazard & Risk Maps (FHRMs), submitted respectively in 2012 and in 2013. Currently MSs embarked on the 2nd cycle of implementation of the Floods Directive and are preparing for potential reviews/updates of their reports ahead of 2018. To support the implementation of the Directive a Working Group on Floods has been established under the Common Implementation Strategy (CIS). The Working Group focuses on three key aspects:

- Floods Directive Implementation: Development of reporting formats
- Water Framework Directive: towards joint implementation with the Floods Directive
- Flood risk management information exchange

Practical example

The development of reporting formats responds to the requirement of the Floods Directive, and it is envisaged that this reporting will be carried out via WISE (Water Information System for Europe), available at: water.europa.eu. Furthermore, in order to monitor and inform about how well Member States follow the reporting obligations outlined above, an informal Floods Directive scoreboard has been developed and it is available here: http://ec.europa.eu/environment/water/flood_risk/implem.htm.

With regard to the synergies with the Water Framework Directive, it shall be noted that the CIS for the Water Framework Directive supports the implementation of the Floods Directive through the Working group on Floods.

Concerning information sharing, the Directive clearly asks for the co-ordinated development and promotion of best practices, as well as increasing the awareness of

flood risks through wider stakeholder participation and more effective communication. This includes the facilitation of information exchange on topics such as flood forecasting and flood risk mapping, involving stakeholders within the framework of the Common Implementation Strategy of the Water Framework Directive and of facilitating information exchange between researchers and practitioners on flooding (e.g. research projects like EFAS and FLOODsite). A targeted approach to the best use of EU funding tools for the different aspects of flood risk management also entails information exchange, for example via the Common Agricultural Policy, the new Cohesion Policy, and the European Union Solidarity Fund.

References

"Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy." 2000. *Official Journal of the European Union* L327: 1–72. http://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF.

"Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks." 2007. *Official Journal of the European Union* L288: 27–34. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007L0060&from=EN.

"Mapping the Impacts of Natural Hazards and Technological Accidents in Europe: An Overview of the Last Decade; Technical Report No 13/2010." 2010. Copenhagen. doi:doi:10.2800/62638.

Molinari, D., G. Minucci, M. T. Mendoza, and T. Simonelli. 2016. "Implementing the European 'Floods Directive'': The Case of the Po River Basin." *Water Resources Management* 30 (5): 1739–56. doi:10.1007/s11269-016-1248-3.

Nixon, Steve. 2015. "EU Overview of Methodologies Used in Preparation of Flood Hazard and Flood Risk Maps." doi:doi : 10.2779/ 204606.

Nixon, Steve, Ennifer Horn, Edith Hödl-Kreuzbauer, Arjan ter Harmsel, Dominique Van Erdeghem, and Thomas Dworak. 2015. "European Overview Assessment of Member States' Reports on Preliminary Flood Risk Assessment and Identification of Areas of Potentially Significant Flood Risk." doi:doi : 10.2779/ 57645.

Nones, Michael. 2017. "Flood Hazard Maps in the European Context." *Water International* 42 (3). Routledge: 324–32. doi:10.1080/02508060.2016.1269282.

For more information, see:

How to comply with EU droughts strategy?

How to comply with EU forest fire action plan?

Further Literature

<u>EU Policy and Legal Framework</u>

("Mapping the Impacts of Natural Hazards and Technological Accidents in Europe: An Overview of the Last Decade; Technical Report No 13/2010" 2010, "Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks" 2007, "Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy" 2000)

<u>Literature</u>

(Molinari et al. 2016; Nones 2017; Nixon et al. 2015; Nixon 2015)

6.6 How to comply with EU Forest Fires Action Plan?

- EU forest fire action plan aims at combining efforts to reduce the risk and impact of forest fires on a pan-European scale

- the plan includes efforts to monitor and protect forest against fires by implementing the European Forest Fire Information System (EFFIS)

- tool provider may align their efforts with the forest fire action plan to combine efforts and contribute to a risk and impact reduction

Responsible Author: SSSA

In a Nutshell

Forest fire prevention and control represents a long-standing commitment of the EU. The serious impacts of fires on forests have led decision makers to recognise that prevention at European level is one of the most efficient ways to face these threats. The number and extent of forest fires vary considerably from one year to the next, depending on the seasonal meteorological conditions. Some multi-annual periodicity in the burned area trend can also be partially attributed to the dead biomass burning/accumulation cycle typical of the fire-prone regions. The historical trend of the number of fires is difficult to analyse because fire frequency is strongly affected by the significant changes that occurred in past years in the statistical reporting systems of the countries. In 2014, a large forest fire severely damaged more than 15 000 ha of forest land in Västmanland County, Sweden. Forest fires are also affecting new areas. For example, in 2007, wildfires moved to previously non-fire-prone ecosystems in southern Greece

Competence for forest policy lies primarily with the MSs under the subsidiarity principle, meaning that the role of the EU is limited and designed principally to add value to national forest policies and programs by: monitoring and possibly reporting on the state of EU forests; anticipating global trends and drawing MS' attention to emerging challenges; and proposing and possibly coordinating or supporting options for early action at EU scale. The Communication on an EU Forest Action Plan issued

in 2006, which builds on the Council Resolution of 15 December 1998 on a forestry strategy for the European Union, provides a framework for forest-related actions at Community and Member State level and serves as an instrument of coordination between Community actions and the forest policies of the Member States. Broadly speaking the main objective of the EU Forest Action Plan is to support and enhance sustainable forest management and the multifunctional role of forests. In 2010 the EC issued a further communication, i.e. the Green Paper on Forest Protection and Information in the EU. The goal of this Green Paper is to launch the debate on options for a EU approach to forest protection and information in the framework of the EU Forest Action Plan.

Guidance or used Methodology

The following principles inform the EU Forest Action Plan: national forest programmes are regarded as a suitable framework for implementing international forest-related commitments; the increasing importance of global and cross-sectoral issues in forest policy calls for improved coherence and coordination; the need to enhance the competitiveness of the EU forest sector and good governance of EU forests; respect for the principle of subsidiarity. Furthermore, since forest fires, biotic agents and atmospheric pollution have a sizeable influence on the ecological condition and productive capacity of forests in the EU, the Communication lists the protection of forests against biotic and abiotic agents as one of the main priorities of forest policy. In particular the Commission identifies two key actions that are essential to have up-to-date information about the state of forests in the EU: *(i)* working towards the further development of the European Forest Fire Information System (EFFIS); *(ii)* and carrying out a study to analyse the main factors influencing the evolution of forest condition in Europe (including forest fires), the efficiency of current instruments and measures for forest protection, and potential future options to improve the efficiency of the measures.

The 2010 Green Paper instead surveys the existing tools available for forest protection stressing that all EU MSs have national (and sometimes regional) legislation on forest management. With regard to fires, the Green Paper lists among the sustainable forest management practices a number of fire prevention measures, which include: management of combustible material; establishment and maintenance of fire breaks; forest tracks; water supply points; appropriate choice of tree species; fixed forest fire monitoring facilities; and communication equipment to prevent catastrophic fire spread.

Practical example

In 1998 DG Environment established the Commission's Expert Group on Forest Fires. This group meets twice a year in Brussels and Ispra (Italy) and in exceptional cases in other European countries. The members of the Expert Group are the national correspondents to the European Forest Fire Information System (EFFIS), which is jointly managed by the Commission's Joint Research Centre and DG Environment. In 2015, the Expert Group on Forest Fires became a sub-group of the new expert group on forest information, besides a new sub-group on forest health and pests.

The aim of EFFIS is to provide EU level assessments of situations before and after fires and to support fire prevention through risk mapping, and promote preparedness, fire fighting and post-fire evaluations. The objective of EFFIS is not to duplicate or substitute national databases, but to provide information with a European scope. EFFIS analyses past trends of fire danger by processing series of meteorological fire danger indices, which are routinely used to rate the fire potential owing to weather conditions. The Canadian Fire Weather Index (FWI) is used in EFFIS to rate the daily fire danger conditions in Europe [iii]. Daily severity values can be averaged over the fire season obtaining a Seasonal Severity Rating (SSR) index. The index is dimensionless and allows objective comparison of fire danger from year to year and from region to region; SSR values above six may be considered in the extreme range.

References

Commission of the European Communities. 2006. "Communication from the Commission to the Council and the European Parliament on an EU Forest Action Plan (COM(2006) 302 Final)." https://ec.europa.eu/agriculture/sites/agriculture/files/fore/action_plan/com_en.pdf.

European Commission. 2010. "Green Paper on Forest Protection and Information in the EU: Preparing Forests for Climate Change (COM(2010)66 Final)." http://ec.europa.eu/environment/forests/pdf/green_paper.pdf.

Khabarov, Nikolay, Andrey Krasovskii, Michael Obersteiner, Rob Swart, Alessandro Dosio, Jesús San-Miguel-Ayanz, Tracy Durrant, Andrea Camia, and Mirco Migliavacca. 2016. "Forest Fires and Adaptation Options in Europe." *Regional Environmental Change* 16 (1): 21–30. doi:10.1007/s10113-014-0621-0.

Moreno, José M., ed. 2014. *Forest Fires under Climate, Social and Economic Changes in*

Europe, the Mediterranean and Other Fire-Affected Areas of the World: Lessons Learned and Outlook. Project FUME. http://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers15-08/010065139.pdf.

For more information, see:

How to comply with EU floods directive?

How to comply with EU droughts strategy?

Further Literature

<u>EU Policy and Legal Framework</u>

(Commission of the European Communities 2006; European Commission 2010)

<u>General Literature</u>

(Moreno 2014; Khabarov et al. 2016)

6.7 How to say the right thing at the right time: a guidance to improve tools and services for self-p* in extreme weather event -mayor decree for schools-

- Activities to prepare schools (including children and parents) for major flood incidents

Responsible Author: CDG

In a Nutshell

During 2011 Flash Flood in Genoa, 4 out of 6 casualties induced by W&C emergencies were related to schools. The Municipality of Genoa since then started a program to guarantee the safety of children in all the schools in its territory. This program include:

- Mayor decree for schools
- Civil protection simulation Exercise – training activities -
- Meeting
- Games

As regarding mayor decree for schools, now exist some rules that define what to do in the schools, during the alert state and during the alarm phase.

The aim of training activities is to check the procedures defined by mayor decree for schools, activation and intervention of the schools for coordinating and managing the emergency. These exercises are held on local level and actively involve the population. The meeting in the schools have as aims the improve of knowledge about our territory, the extreme events that hit Genoa in the past, the alert system. The games for the schools are use during the meeting or during the public events, the gamers, playing with this game, can improve their knowledge about risks, hazards, exposures and vulnerabilities.

Guidance or used Methodology

The main aim of this decree is define the behaviour of the schools during a flooding event. The flooding event can be an foreseen flooding event (case A – state of alert the day before) or an unforeseen flooding event (case B – none state of alert). It is important define these two macro categories, because the path to follow is several different in these two cases.

The main difference between case A and case B, and what define these differences is the time. The time that the citizen have to respond in these two cases is different.

Therefore for the schools the actions to do in case A or in case B are hugely different.

Practical example

The mayor organises:

- **During the red alert:** the closure of all schools and university in the Municipality of Genoa (Comune Di Genova 2016)
- **During the orange alert:** the postponement of all school trips
- During the yellow and orange alert: the observance of behavioural norms of internal emergency plans
- **During the meteorological extreme event that could cause high criticality, when the COC declare the warning phase**: the observance of follow security measures:
  - To stay in the school until the end of emergency phase
  - The observance of behavioural norms of internal emergency plans (e.g. climb to the top floors during the event)

References

Comune Di Genova. 2016. "Ordinanza Del Sindaco N. Ord-2016-13 Data 14/01/2016." https://intranet.unige.it/sites/intranet.unige.it/files/ORDINANZA SINDACO n. 13_2016.pdf.

6.8 How to design official self-p* tools?

- To design adequate self-protection tool it is important to respect user needs

Responsible Author: FMI

In a Nutshell

Self-protection tools have to be designed according to special user groups. For general public one can give general straight forward guidelines and tools (web-tools, mobile tools, sms, email etc), which are available for everybody and can be understood/fulfilled by everybody. For special user group one has to start from the user needs, find out the security issues via user needs and finally give guidance accordingly. Still self-protection guidance by FMI cannot be totally overwhelming and "official" in the sense that the responsibility of actions is on individuals themselves. It is a different issue, if/when public security gives evacuation orders etc.

General self-preparedness tools

Campaigns (boatmen, pedestrians, downhill or cross country skiing etc)

FMI is working on self-protection guidance by campaigns, which are focused to special user or activity groups. Campaigns can be exercised via media (web, tv, radio, news papers, magazines, books, seminars, scientific articles etc)

Practical example

Weather information for Boatmen:

- Finland has pretty unique Baltic sea, with shallow waters, archipelagos, complex wave formation. We also have thousands of lakes, which are very scattered and complex to navigate. Those together severe weather conditions may lead to unpredicted danger situations. FMI has been working already decades together with coast guard, civil protection, defense force and boatmen associations, for guidance on seas
- Examples are:
  - Yearly boat exhibition, where FMI and other authorities distribute information and give short introductory talks
  - Book for boatmen of weather and climate
  - Leaflets, which are undated regularly
  - Yearly discussion forum together with National Broadcasting Company, where experts are giving answers to people
  - Taking part to sailing competitions both as advisory capacity, but also as a competitor.
  - Having special "Weather for seamen" broadcast daily.

Fig 1. Front and rear page of the book for boatmen on weather and climate

For more information, see:

How to provide official information for private and public in different weather conditions?

How to identify customer needs/ market demands?

How to decide on target group/market?