



iSAR+ Guidelines

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iSAR+ Guidelines

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Abstract: iSAR+ Guidelines & Roadmap intend to provide guidance to the adoption of an appropriate behaviour and a specific course of action towards the effective and efficient use of mobile technology and social media in crisis situations, for the benefit of PPDRs and citizens. The iSAR+ guidelines incorporate recommendations produced throughout the project by each dedicated research dimension. It includes a roadmap to facilitate the PPDRs and citizens adoption process of mobile technology, online social media and the iSAR+ services in crisis situations as well as search and rescue actions.

¹ Nature of deliverable: **R** = Report; **P** = Prototype; **D** = Demonstrator; **O** = Other

² Dissemination level: **PU** = Public; **PP** = Restricted to other programme participants (including the Commission Services); **RE** = Restricted to a group specified by the consortium (including the Commission Services); **CO** = Confidential, only for members of the consortium (including the Commission Services).

³ Sensitive content: **Y** = Deliverable contains sensitive material; **N** = Deliverable does not contain sensitive material.



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Executive Summary

iSAR+ is an European Collaborative Project, running in the scope of the 7th Framework program, developed by a consortium composed by 16 partners from 9 European Countries, and involving a wide end-users community from these countries, namely organizations from each nation responsible for Public Protection and Disaster Relief, so called PPDR.

iSAR+ aims at research and develop of set of guidelines that, in crises situations, enable citizens using new mobile and online technologies to actively participate in the response effort, through the bi-directional provision, dissemination, sharing and retrieval of information essential for critical PPDR intervention, in search and rescue, and medical assistance

These guidelines shall help enable smooth integration of iSAR+ solutions into the current CONOPS of PPDRs and into citizens' life, through technological, organizational, ethical & legal and human perspectives.

In this document section 1 presents a **project overview** and summarizes the **research activities** performed over the course of 30 months on each of the four iSAR+ research dimensions – Technological, Human, Ethical & Legal, and Organizational, so called THEO dimensions.

Section 2 details the **guidelines and roadmap** within each of the THEO dimensions.

Finally section 3 and section 4 present brief **conclusion** and **acknowledges** to those partners and end-users that contribute for the success of this project.



Table of Contents

Executive Summary	4
1 Introduction	7
1.1 iSAR+ Showcases.....	11
1.1.1 Portuguese Showcase	11
1.1.2 French Showcase	12
1.1.3 Finnish Showcase	16
1.2 iSAR+ outcomes	18
1.3 Research Activities performed for the Human dimension	19
1.4 Research activities performed for the Organisational Dimension.....	20
1.5 Research Activities performed for the Technological dimension	21
1.5.1 iSAR+ platform overview	21
1.5.2 Technology evaluation through live showcases.....	23
1.6 Research Activities performed for the Ethical & Legal dimension	26
2 iSAR+ Guidelines & Roadmap	31
2.1 Human dimension guidelines	31
2.1.1 Media and new media in crisis situations.....	33
2.1.2 Accessibility	38
2.1.3 Type of crisis.....	45
2.1.4 PPDRs needs in crisis and new media.....	53
2.1.5 Citizens needs and new media.....	57
2.1.6 Level of involvement and distance to incident	61
2.1.7 Phase specific approach	69
2.2 Organisational Guidelines	76
2.2.1 Operational Process and Organisational System	76
2.2.2 Human Factors.....	81
2.2.3 PPDR – Public Engagement	88
2.3 Technological Guidelines & Roadmap.....	91
2.3.1 Technological Guidelines	91
2.3.2 Technological Roadmap.....	93
2.4 Ethical & Legal considerations	95
3 Conclusions.....	99
4 Acknowledges	100
References.....	100



List of Acronymes

Acronym	Meaning
COP	Common Operational Picture
CONOPS	Concept of Operations
BSPP	Brigade des Sapeurs Pompiers de Paris (Paris fire brigades)
COTS	Commercial of the shelf
CPX	Command Post Exercise
FD	Fire Department
FR	First Responders
HAZMAT	Hazardous Material
ICT	Information and Communication Technology
IPS	iSAR+ Portal Software
iSAR+	Online and Mobile Communications for Crisis Response and Search and Rescue
MONET	Mechanisms for Optimization of hybrid ad-hoc networks and satellite NETworks
MORE	Model Once Run Everywhere (Tekever platform, the basis of IPS)
NGO	Non Governmental Organisation
PD	Police Department
PPDRs	Public Protection and Disaster Relief (organisations/operators)
SGZDS	Secrétariat Général de la Zone de Défense et de Sécurité (General Secretariat of the Defence and Security Zone). Located in Paris, France, depending on the Paris Police Prefecture
SMS	Short Messaging System
THEO	Technological, Human, Ethical & Legal and Organizational (iSAR+ dimensions)
UN	United Nations
WHO	World Health Organization

Table 1 – List of acronymes.

1 Introduction

The iSAR+ project aims to research and develop a set of guidelines (the subject of this document) that, in emergencies or crises situations, enable citizens using new mobile and online technologies to actively participate in the response effort, through the bi-directional provision, dissemination, sharing and retrieval of information essential for critical PPDR intervention, in search and rescue, as well as medical assistance.

These guidelines shall help enable smooth integration of iSAR+ solutions into the current concept of operations (CONOPS) of PPDRs (e.g. through technological, organizational, ethical & legal and human perspectives). To accomplish this iSAR+ aims to **demonstrate and validate its main concepts** by means of technological platform presented to end-users in an interactive exercise.

iSAR+ involved **16 European partners** from 9 European countries, and a wide set of officially involved end-users which constituted the **iSAR end-users community**.

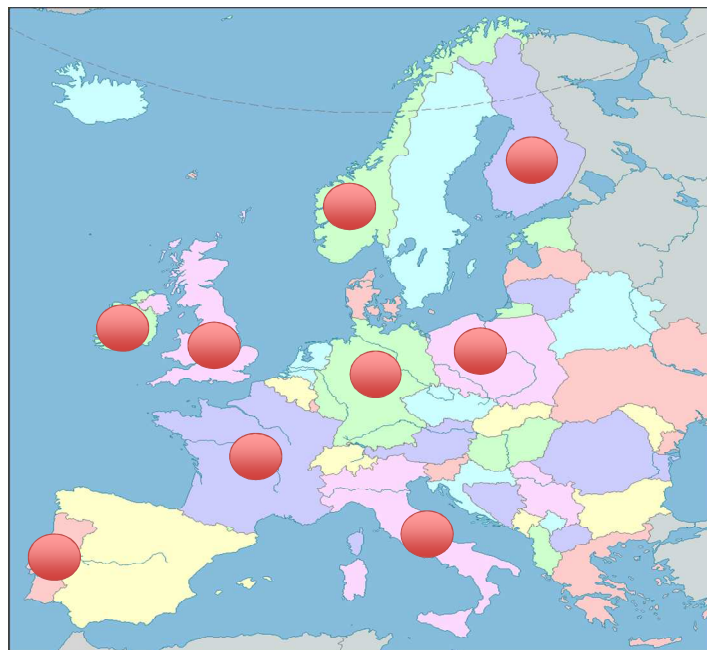


Figure 1 - iSAR+ partners

iSAR+ partners:

- **Tekever** – Tecnologias de Informação, S.A., Portugal, the **project coordinator**;
- **Area7** , Italy;
- Deveryware (**DEV**), France;
- Emergency Services College (**ESC**), Finland;
- Ernst-Moritz-Arndt-Universität Greifswald (**EMAUG**), Germany;
- **ITTI** Sp. Z.o.o., Poland;
- Helse Bergen Hf Haukeland Univeristy Hospital (**KOKOM**), Norway;
- North Savo Rescue Department (**PSPELA**), Finland;
- Portuguese National Safety Police (**PSP**), Portugal;
- Police and Crime Commissioner for North Yorkshire (**PCCNY**), United Kingdom;
- Pole Pilote de Sécurité Locale (**PPSL**), France;
- Poliisiammattikorkeakoulu (**POLAMK**), Finland;
- The Provost, Fellows, Foundation Scholars & The Other Members Of Board Of The College Of The Holy & Undivided Trinity Of Queen Elizabeth near Dublin (**TCD**), Ireland;



- **Thales** Communications & Security SAS, France;
- Itä-Suomen Yliopisto (**UEF**), Finland;
- Zanasi Alessandro Srl, Italy.

The iSAR+ project has paid particular attention to the integration of the end-user perspective into the iSAR+ vision, welcoming them into the iSAR+ Consortium or, alternatively, into the End-Users Advisory group.

The following end-users have participated in several iSAR+ activities:

Finland	Police College of Finland
	North-Savo Rescue Department
	Lapland Rescue Department
France	National police from Elancourt town
	French Red Cross
	General Directorate for Civil Security (SDIS 13)
	Municipal police from Elancourt town
	SDIS 78 (Fire brigade from the Yvelines department)
	Brigade des Sapeurs Pompiers de Paris
	Paris Zone de Défense
	Paris SNCF
	Paris RATP
Germany	Red Cross
	German Police
Ireland	Dublin Fire Brigade
	Kildare Fire and Rescue Service
	East Regional Working Group on Major Emergency Management
Norway	National Centre on Emergency Communication in Health
Poland	Wielkopolska Voivodship Office
Portugal	Autoridade Nacional de Proteção Civil (ANPC)
	Local Civil Protection of Cascais
	Alcabideche Fire-Department
	Cascais Fire-Department
	Carcavelos e São Domingos de Rana Fire-Department
	Estoril Fire-Department
	Parede Fire-Department
	National Safety Police
UK	North Yorkshire Police
	Police Service of Northern Ireland (PSNI)

The commitment and interest of all end-users was crucial to the success of the exercises, helping to build a deeper insight into what iSAR+ guidelines and platforms can be in the near future and how PPDRs entities shall organize to face a new reality of crisis management policies, tools and processes.

iSAR+ consortium was also supported by three independent experts on ethical issues, constituting the Ethical Advisory Board: **John Bustard**; **Roberto Satolli**; and **Daniel Trottier**.

Over the course of 30 months, iSAR+ performed research activities in four dimensions (the THEO dimensions), the four pillars on which the project is structured and representing the recognition that these four factors are the key to understanding needs in terms of major crises, especially within the social and mobile media age:

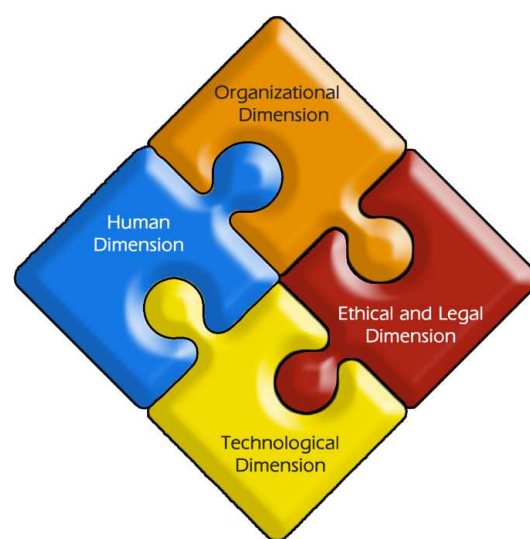


Figure 2 - The four integrated THEO strands

Technological: Dedicated to the analysis of ICT systems, social networking platforms and mobile technology employed in crisis situations in order to select the most appropriate tools and identify existing insufficiencies and lack of interoperability.

Human: Based on the comprehensive review of evidence and recommendations on the citizens' acceptance and employment of state-of-the-art mobile and social media communication technologies in crises, focusing the human factors' analysis on the efficiency and effectiveness of selected channels and message contents, in full consideration of the human behaviour and cognitive performance in crisis situations.

Ethical and Legal Framework: Concerned with the ethical and legal framework issues related to the use of social media and mobile technology in crisis situations, namely data privacy, data ownership, technology providers' responsibility and the potential misuse and abuse of ICT tools, a concern that will also be considered during the implementation of all iSAR+ Project activities., focused on the Organizational (PPDRs), Human (citizens), Technology (platforms for PPDRs and citizens) always taking into consideration all the relevant ethical concerns and the legal framework issues

Organisational: Focused on the analysis of the use of mobile technology and social media by PPDRs (including governmental, NGOs and volunteer organisations), considering the organisations' processes, structures, responsibilities, resources and culture.

iSAR+ work was divided into interconnected work packages with common project objectives:

- WP1 – Management, lead by Tekever, Portugal;
- WP2 – Integrated Analysis and Guidelines, lead by Tekever, Portugal;
- WP3 – Organizational Analysis, lead by TCD, Ireland;
- WP4 – Human Analysis, lead by EMAUG, Germany;
- WP5 – Ethical and Legal Analysis, lead by PSP, Portugal;
- WP6 – Development of iSAR+ Platform, lead by Thales, France;
- WP7 – Dissemination and Exploitation, lead by ITTI, Poland,

Additionally, the iSAR+ project progressed in three iterations (concept, basic and enhanced) and six development stages (in months 6, 8, 18, 24 and 30):

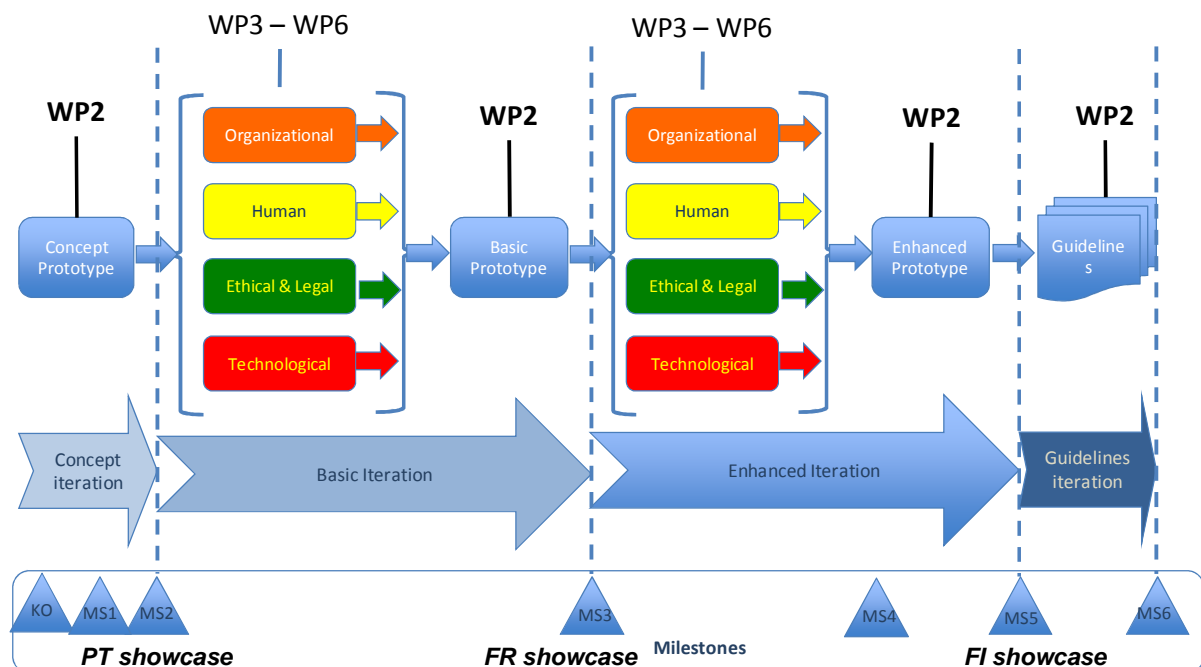


Figure 3 – iSAR+ work plan

1.1 iSAR+ Showcases

All prototypes were, without exception, delivered in a process tightly coupling iSAR+ technical developments with end-user community feedback through continuous validation, through official **showcases** and scenarios as milestones.

Performed in synchronization with the project's official iterations, the showcases were planned to act as advanced validation means of the iSAR+ prototypes. Carried out in the end-users' environment, user showcases were designed to include the active participation of the iSAR+ end-users community, particularly considering the definition of new CONOPS and the citizens' involvement.

The outcomes of each showcase were discussed in a **workshop** performed in the day after to promote a discussion between iSAR+ observer and the involved end-users. The results of these workshops were crucial to refine user requirements and the iSAR+ project roadmap, and to effectively contribute to the work performed within each THEO dimension.

1.1.1 Portuguese Showcase

During the first iteration, iSAR+ built a set of complex end-users' requirements as a result of an intense work performed together with the iSAR+ end-users community. These requirements allowed iSAR+ to build its first prototype, the Concept Prototype.

The "*concept prototype*" was intended to elicit end-users needs and retrieve further feedback in order to consolidate existing ones and/or identify new requirements. However the prototype preparations in its technical dimension were not solely focusing on software development but rather providing a **rational mix of software services** (whether proprietary, open-source or COTS) that were well aligned with the core messages (i.e. preliminary requirements).

The prototype scope was basically defined in terms of a subset of the overall iSAR+ requirements, selected under two main criterias: it's **contribution to the most important functionalities**; and the **risk associated with each requirement's implementation**, selecting and implementing first the most risky requirements and validating them with the iSAR+ end-users community.



Figure 4 - The Ops Room of the CPX exercise, with PPDRs and iSAR+ partners (as observers)

The prototype was then used in the scope of an CPX (Command Post Exercise), the PT Showcase, performed in Portugal together with local end-users (PPDR) Protecção Civil de Cascais and Polícia de Segurança Publica do Distrito de Lisboa.



Figure 5 – One of the rooms of the CPX exercise (communications room)

The iSAR+ prototype was used to exchange information to/from citizens and served also as an Information Management System in support to PPDR activities, such as managing resources (ambulances, emergency and other operational vehicles, etc), controlling traffic, defining restricted areas, defining meeting points, asking for backup forces, etc.

The exercise ended with a debrief and discussion session where the iSAR+ partners had the opportunity to interview the local end-users and collect as much information as possible to produce further analysis.

The “concept iteration” therefore allowed iSAR+ THEO work packages to start their activities supported by a consistent and validated basis.

In the time period following the Portuguese Showcase additional interviews were undertaken with Showcase end-users (PSP) and other PPDRs, specifically the Autoridade Nacional de Protecção Civil (ANPC). This provided a deeper understanding of the emergency management systems of Portugal, the use of communication technologies, including social media, and importantly how iSAR+ capabilities might be realised by Portuguese PPDRs.

1.1.2 French Showcase

The French showcase took place during the evening of September 24th 2014 in Paris, both in Paris fire brigades operational centre (hereafter called “Champerret”) and Montparnasse train/metro station (hereafter called “Montparnasse”), which is a large public transport hub.

The operational centre was used according to its real role in day to day life – a call center receiving emergency calls (112/18) and coordination of the resources sent to deal with the emergency.

Partners and players were given by SNCF and RATP free access and use of Montparnasse train/metro station where the crisis occurred.

As the event occurred during opening hours of the station, it required specific attention from the players, not to create panic among real travellers. Players were asked not to run or shout and they had to wear a distinctive sign (ribbon around their arm).



Figure 1 - BSPP Operational centre



Figure 2 - Montparnasse train station

The showcase scenario comprised two phases:

- First, citizens report to the authorities an unattended luggage in the train station close to the platforms. SNCF agents decide to investigate and find the luggage. Meanwhile a terrorist attack rumor appears on Twitter. Authorities send a message to the citizens in the train station area about the unattended luggage and ask the owner to make himself known. The owner sees the message and goes to the security agents to claim his luggage back. Authorities inform the population about the falseness of the rumour;
- Right after this first event's closure, an alarm is raised from the metro area, signalling a smoke emission which starts the 2nd phase of the scenario. Citizens send a number of messages on Twitter about a fire spreading in the corridor. Others tweet about their respiratory problems due to smoke ingestion. Authorities send fire brigades to intervene. They inform population around the train station and especially around the close-by Montparnasse tower not to go in the train station. In the meantime, Authorities inform the citizens inside the train station to regroup at a specific place where they will get assistance from emergency services.

Typically all operations concerning a major crisis occurring in a hub like Montparnasse is centrally coordinated by the Paris Zone de Défense et de Sécurité which is under the authority of the Paris Prefect. For such a crisis, they would work in close cooperation with the Paris fire brigades (BSPP - Brigade des Sapeurs Pompiers de Paris), the SNCF (French railways) and the RATP (Paris underground, bus and Tramway company).

Consequently, the FR Showcase scenario required the participation of these four main actors with a fifth type of actor, the citizens, played by Red Cross volunteers and students from the Sorbonne University (around 50 citizens altogether).

The citizens, the animation team, SNCF and RATP were located in Montparnasse as well as the fire brigades intervention team.



Figure 3 - The animation team and PPDRs in Montparnasse

BSPP and Paris Zone de Défense were located in Champerret. Messages from SNCF and RATP were also sent from there with the iSAR+ platform during the showcase.

The basic prototype was tested during the French showcase. At this stage of the project, the platform was already entirely integrated and it was possible to see the social networks information being gathered and brought to the platform and all the alerts generated based on that information being broadcasted to the field, either to PPDRs or citizens. It was also possible to check what could be done in terms of information geolocation without latitude and longitude coordinates. The iSAR+ platform integrated IPS, developed using TEKEVER MORE platform with “myPublicAlerts” webservice and Notico App from Deveryware, OSintlab from Thales with IPS and TAT2 from ITTI with IPS. Also, IPS integrated with Sahana Vesuvius, an open source people finder and TAT2 integrated with translation tools from Google.

During the showcase the use of four components of the iSAR+ platform was demonstrated:

- Collaborative crisis coordination platform to collect, validate and disseminate information (IPS);
- Geographically targeted alerting towards citizens (myPublicAlert – mPA);
- Social media monitoring (SMM-OSintLab);
- Translation and geolocation of tweets (TAT2).

The iSAR+ complete platform was used in Champerret and a mobile platform (IPS mobile) was used in Montparnasse.

Citizen players were asked to use social media (Twitter) and one of the tools integrated through iSAR+ (Notico application). To ensure data privacy and not create a panic on social media, French public authorities asked that a private network was created on Twitter, only visible by participants of the showcase (specific accounts were created for all the citizens). It was not possible to use Facebook as it does not provide appropriate privacy settings.

Notico and mPA were used to disseminate information and alerts coming from PPDRs, based on the Citizens location. Also SMM was able to crawl through Twitter using the geolocation information coming with the tweets.

Before the showcase and in order to train the actors and validate/correct timeline details, a first Dry Run test was performed six days before the showcase, with the tools installed in the different partners' premises. A second Dry Run was performed in the showcase location one day before the showcase, with the participation of almost all the showcase participants. This was also a good opportunity to review objectives and plans, and to request some participants

to answer a pre-questionnaire developed in the scope of task 3.2, aiming at better understanding the handling of the iSAR+ platform by end-users.

PPDRs involved in the showcase were trained on the tools the day before. Citizens playing in Montparnasse were asked to come one hour before beginning of the showcase to be briefed on the objectives of the exercise and trained on the two Apps they would have to use (Twitter and Notico). They were asked to bring their smartphones and download Twitter and Notico before the showcase; they received specific instructions for that a few days before but those who didn't have time to do it were able to download the Apps during the briefing/preparation.



Figure 4 - Briefing of citizens in Montparnasse



Figure 5 – Citizens players in Montparnasse

Participants were informed that they were under no obligation to participate and that their participation was entirely voluntary. All participants were asked to sign consent forms explaining the details of the live exercise and their rights. They declared to have understood the information provided and their right to withdraw from the exercise at any time.

The showcase started at 22:00 with a briefing conducted in Champerret by the iSAR+ French partners, explaining the players and observers what were the main objectives of the exercise, appealing to the critical spirit in relation to the project guidelines as well as regarding the usage of the iSAR+ platform and the way it was designed.

The exercise was performed using French language with French partners providing a non-professional translation support when necessary.

During the exercise, iSAR+ Observers were allowed to closely follow the step-by-step execution of the exercise, either in Champerret or Montparnasse. They were free to move among the players.

At the end of the showcase, PPDRs were interviewed by iSAR+ partners to collect their feedbacks on the tools, and citizens filled in questionnaires prepared by EMAUG. The inputs collected were then discussed in a workshop performed the day after.

The feedbacks revealed several suggestions for the future, namely suggestions for improving the user experience of PPDRs working with iSAR+ platform during stressful situations.

Decisions were taken to improve the prototype, mainly change some of the interfaces in order to present the information in a better way and add some functionalities to have a more efficient event validation process.

At the end of the French showcase, the basic prototype was considered VALIDATED and the next phase (enhanced prototype) could start.

In the time period following the French Showcase additional interviews were undertaken with Showcase end-users, the BSPP and Zone de Defence. This provided a deeper understanding of the emergency management systems of France, the use of communication technologies, and importantly how iSAR+ capabilities might be realised by French PPDRs.



1.1.3 Finnish Showcase

The Finnish showcase took place at the end of the Enhance Iteration, at Emergency Services College facilities. ESC offers various simulators both at the college and at ESC training ground.

The Finnish showcase was the last of iSAR+ showcases and was based on the results from the previous iterations and user showcases performed in Portugal (to validate the project's concept) and France (to conclude the basic iteration).

Its objective was to finalize the enhanced iteration and emphasize the interactivity between the citizens and the PPDRs. Aiming the fulfilment of this objective, the following goals were planned to be achieved:

- To demonstrate the iSAR+ concept, namely the focus on the use of social media information to support PPDR on crisis management scenarios;
- To extract comments and collect feedback from the end-users' community participating in the showcase and to use this information to derive recommendations;

The showcase was then focused on monitoring the following elements:

- Type of information provided by the citizens to the PPDRs and vice versa, via social media channels during crisis situations;
- PPDR procedures for utilizing the information provided by the citizens through the social media channels;
- Procedures to validate the information received from citizens through social media (eliminate rumours, duplication, location of the crisis, etc.).

The showcase was organized along with Emergency Services College's Crises and Large Scale Emergencies exercise (Krisu exercise). This exercise is carried out twice a year and it is a part of studies of Rescue Activities Management of the graduating course of fire sub-officers and fire officer students. The aim of the Krisu exercise is to practice management of crises and large scale emergency situations in which several public authorities take part, and in which rescue services is the authority responsible for the overall management of the situation. Because of the nature of the situations simulated in Krisu exercise, lasting for two days, representatives of several public authorities (e.g., Finnish border control, Finnish defense forces) take part in the exercise. Communication management is one part of the exercise, but social media has not been previously utilized. iSAR+ showcase utilized the settings of Krisu exercise by bringing new tools for the players to support communication and crisis management. Krisu exercise is focused on command and control activities, so the live demonstrations carried out in the training ground and the citizen players brought new perspectives to the exercise.

The three scenarios of the Finnish showcase were hazardous material accident, aviation accident and storm related emergency. The hazardous material accident begun when a tank wagon of a freight train containing ammonium was noticed to be leaking at the rail yard close to a border crossing point where several people were waiting for exiting or entering Finland. The setting of the second scenario, major aviation accident, was an Airbus 320's landing fallen short 200 meters before runway. During the storm scenario, PPDR where dealing with few hundred tasks reported to 112, one of them a traffic accident with two cars and a tank truck. During the storm scenario it was also tested whether an emergency would be detected from social media without a call to 112. This was a building fire caused by lightning / damaged power line.

Special attention was paid to training the players, both the citizens and the PPDRs for using iSAR+ tools before the showcase. The participating PPDR representatives were briefed about the iSAR+ project and the aims of the showcase well before the event and trained few

days prior to the exercise. Part of the citizen players were trained for using Notico before the showcase, and all of them briefed about the project on a dedicated website and also in the beginning of the showcase. All of the citizen participants signed an informed consent form on their participation, where they were informed that participating the showcase is fully voluntary and they have the right to withdraw from the exercise at any time. The showcase started with a briefing of participants at 15.30 and the live demonstrations were carried out from 18.00 to about 21.30.

During the exercise, the PPDR players were located at the emergency management simulation environment at the College.



Figure 6: Emergency management simulation and Korvaharju training ground

The citizen players were located at the ESC Korvaharju training ground ten kilometres from the College. Korvaharju training ground is a 36-hectare wide area with over 100 training and testing facilities for training for fire fighter skills.

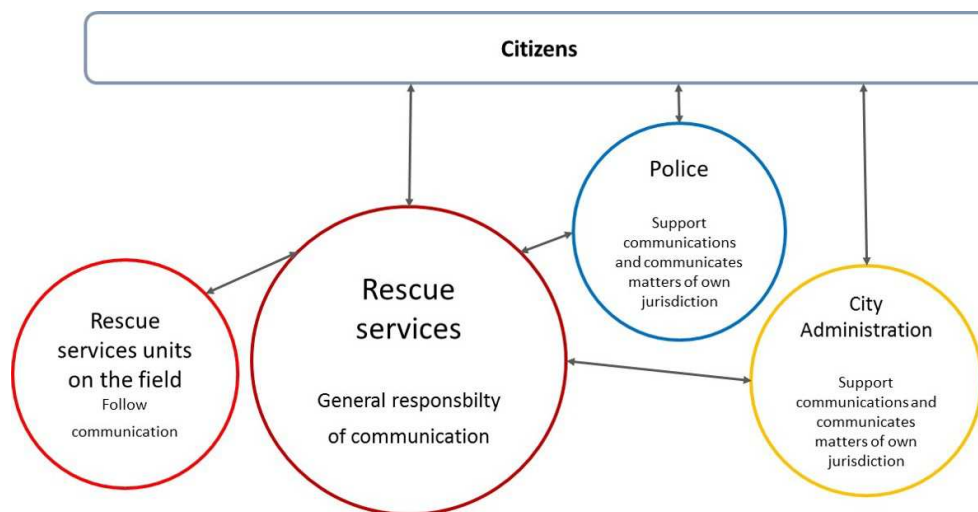


Figure 7: Communication between different showcase actors

Part of the data used in the FI showcase was gathered and created in advance, but mainly produced real time by the citizen players and posted to a closed Twitter network. Closed Twitter network was selected as the social media platform for the same reasons as in the French showcase: to ensure data privacy and not to create panic in social media. The citizen players published scenario-related information in social media. Part of the citizens were directly involved in the crisis situations, and others were following and sharing information outside the situation.

The PPDR players used the iSAR+ portal software (IPS), iSAR+ alerting services (My Public Alerts), and iSAR+ fusion centre services (social media monitoring, SMM crawler, text analysis tool). The observers were following and monitoring the showcase activities.

The main findings showed that the iSAR+ platform was easy to use and enabled the PPDRs to find the most essential information from the information flow in social media. According to the showcase observations, **using this kind of tools enhances the situational awareness of PPDRs by providing information (photos, videos and tweets from emergency sites) directly from the citizens involved in the crisis.**

The citizens considered the presence of PPDRs in social media and the bidirectional communication valuable and reassuring during and after a crisis. PPDRs provided citizens with various types of information, such as announcements, instructions and notifications.

Additionally, it was pointed out that in real situations the correct information would supersede the false information. The PPDRs, citizen players and observers found the showcase valuable, valid and interesting.

In the days before and following the Finnish Showcase additional interviews were undertaken with Showcase end-users and other PPDRs. This included interviews with the Lapland Rescue Service, as well as senior and operational officers of the North Savo Rescue Service. This provided a deeper understanding of the emergency management systems of France, the use of communication technologies, including social media, and importantly how iSAR+ capabilities might be realised by Finnish PPDRs.

1.2 iSAR+ outcomes

The research carried out within the iSAR+ project across the THEO work packages was intended from the outset to be an integrated research framework combining four inter-related and integrated strands of research looking at the technological, human (citizen), organisational (PPDR) aspects of a single but multi-faceted phenomenon, namely the use of social and mobile media for crisis management.

While these THEO dimensions have been conducted separately, because they deal with qualitatively different aspects, they have produced research findings and recommendations for the implementation of iSAR+ and other comparable platforms that need to be considered collectively and in an integrated manner due to the fact that they each have a direct influence on each other. For example, the possibilities for data processing and intelligence gathering that is afforded by technologies designed for that purpose need to be used in a restrained manner in accordance with national and EU privacy laws. Likewise, the extent to which PPDR organisations can and will be able to utilise meaningful and actionable information from the iSAR+ platform must also consider the human behavioural characteristics at both individual and societal levels. This includes but the receiving of information about the status of a crisis as well as the sharing of information to with the public and the issuing of public safety announcements, and so on.

Therefore, during the final iteration, the Guidelines Iteration, the main objective was to look at how the recommendations produced during the THEO work strands can be harmonised but also acknowledging the fact that in some cases there are necessarily issues of conflict that need to be resolved carefully through a managed process of integration

Before proceeding to prepare the final Guidelines and Roadmap, iSAR+ had the opportunity to organize a workshop in Boston (US) involving the most relevant PPDRs of this City to discuss and share knowledge regarding iSAR+ research dimensions.

In this workshop participated:

- Boston Emergency Medical Services (EMS);
- Boston Police Department (PD);
- Boston Fire Department (FD);



- McCall Ambulance;
- PSNet (Interisle).

The main objective defined for this workshop was the **Sharing of Knowledge** by

- Presenting and discussing iSAR+ platform and recommendations;
- Analysing Boston EMS experience on the use of Social Media in Crisis/Emergency Management

This successful workshop was another very important contribution to the already mature knowledge base.

The final step is the consolidation of this knowledge and production of the **iSAR+ Guidelines and Roadmap**, this document.

1.3 Research Activities performed for the Human dimension

Two sets of guidelines were developed in the human section of iSAR+. These guidelines include comprehensive recommendations for PPDRs reflecting on the use of social media in crisis situations and quick and accessible recommendations for citizens to match the level of involvement these two groups have in crisis situations. For PPDRs crisis preparation and action are part of their daily work. For most citizens a crisis is a rather rare, low likelihood event.

Both guidelines for the human section were developed using literature and online reviews of existing data as well as the feedback from PPDRs and two large European surveys on PPDRs and citizens views on social media in crisis situations conducted by EMAUG in the course of the iSAR+ project.

The PPDRs guide consists of seven sections: communication in crisis in general with a particular focus on new media; accessibility, particular types of crises; the PPDRs needs in crisis and benefits of new media; the citizens perspective and needs in crisis situations; new media and different levels of involvement in a crisis, a phase specific view on new media in crisis, focusing on preparation, response and aftermath of crises.

It is based on the PPDRs survey conducted by EMAUG with the help of its iSAR+ partners for recruitment. A total of more than 1400 European PPDRs from eight different countries took part in the survey. Participants were members of six different institutions: firefighters, EMS personnel, paramedics, Red Cross THW and the police.

Their contribution formed a solid basis for PPDRs recommendations and guidelines. The same is true for the citizen survey analyzing the responses from more than 1600 participants from eight different countries, allowing differentiations between the major contributors in the study: Germany, UK and Poland.

The PPDRs guidelines reflect on important issues on citizen's involvement in crisis situations taking into account the fact that citizens often are very interested in information *during* a crisis whereas the topic is less on their agenda before an incident has taken place. Several strategies to engage citizens before a crisis, in the preparation phase, are discussed.

The citizen's guide addresses citizens directly showing them options to properly prepare and behave in a crisis as far as the usage of social media is concerned. It thus has a normative nature making suggestions on what to do and what to omit in case of a crisis. The difficulty here is that proper guidelines must be read and implemented by citizens to have any effect in a crisis.



Only individuals already very interested in the topic will engage in crisis related actions prior to a crisis. PPDRs thus should make up strategies how to properly engage the citizens before a crisis to minimize its impact rather than (rightly, but ultimately ineffectively) claiming that citizens are often uninterested in the first place.

The PPDRs guide analyses various types of crisis it includes sections on citizen's engagement and involvement. Guidelines are based on the data gathered and feedback from PPDRs in the course of the iSAR+ project reflecting on other content provided.

1.4 Research activities performed for the Organisational Dimension

WP3 addressed the organizational activities of PPDRs. It primarily concerned the activities of PPDRs in major emergencies and crises, and focused on their use of various communication media, including social media. A series of research activities were undertaken to support the effort of WP3 and these are described in this section.

The initial work performed in WP3 was primarily desk based, but also included scoping interviews with Irish PPDRs as well as expert knowledge from iSAR+ end-user partners (e.g. Finnish, French and UK). It involved a survey and review of emergency management information resources (e.g. reports, websites, frameworks, guides etc.), particularly official resources on emergency management in Europe. This survey and review examined the emergency management information resources in several countries including:

- Finland
- France
- Germany
- Ireland
- Norway
- Poland
- Portugal
- United Kingdom

The survey and review provided a high-level understanding of the breadth and depth of publicly available resources on emergency, disaster and crisis management. From this survey a subsample of countries were selected for a deeper examination and analysis of emergency management systems. The selected countries were: Finland; France; Ireland; Portugal; and the United Kingdom. Finland, France and Portugal were selected for inclusion in the analysis because of their participation in iSAR+ Showcase events. This oriented the data analyzed and findings produced to be more relevant to these countries. Ireland and the UK were selected due to the availability of PPDR organizations and their personnel to participate with the research. The wide availability and accessibility of emergency management resources (e.g. plans, reports, frameworks etc.) meant that a solid understanding of emergency management approaches and models could be elicited from these countries, which could be used to establish baseline standards to examine the countries participating with the iSAR+ Showcase activities. The outputs of this resulted in D3.1.1 'Analysis of European Emergency Plans'.

In parallel with the desk review and research activities an appropriate methodological framework was developed for the purposes of an empirically derived organizational analysis of PPDR activities and processes. This effort was coordinated with the survey, review and analysis work on European emergency management systems to ensure that the proposed methodology was an appropriate approach. The SCOPE framework was understood to provide a high level structure for examination the structure and organisation of PPDRs in the major emergency management context. Cultural Historical Activity Theory was identified as

the approach that was best suited to the examination of PPDR emergency management activities. The outputs of this resulted in D3.1.2 'Organisational Data Collection Tool'.

The research activities that culminated in D3.1.1 provided the basic model and framework to develop the approach toward preparing a concept of operations (CONOPS) for PPDRs using social media in major emergency and crisis events. The research undertaken to develop the CONOPS approach primarily involved direct participation of PPDRs in interviews, focus groups, through observation of activities (e.g. iSAR+ Showcases) and through participant observation in emergency management training activities. The latter of these activities included Trinity College Dublin researchers being trained as Information Management Officers within the Irish system for Major Emergency Management. This provided the research with a unique insight into the information management processing activities of PPDRs, which are crucial to major emergency and crisis management. Importantly it helped to build on the strong research relationship that Trinity College Dublin has with Irish PPDRs and to use this experience to extend good working relationships to other PPDRs involved with iSAR+. These research activities were integral to the objective of understanding how iSAR+ could fit within and function as part of an emergency management system. This is essentially what the CONOPS aimed to achieve. The results of this work extended the understanding developed in D3.1.1 and culminated in D3.1.3 'PPDR Future CONOPS Basic and Enhanced Prototypes'. Taken together these deliverables have informed D3.3.1 'Organisational Recommendations for iSAR+ Dimensions: Basic and Enhanced Prototypes'. These are, in turn, used to contribute to the guidelines and roadmap for iSAR+.

1.5 Research Activities performed for the Technological dimension

In this section we describe the research activities conducted within the iSAR+ WP6 to address the technological issues related to the integration of online & mobile communications for crisis management. We first briefly present the technological platform which has been developed to take into account citizen and PPDR requirements. Then we describe the experimental evaluations of this platform from which we derived most of the technological guidelines given in section 2.

1.5.1 iSAR+ platform overview

iSAR+ platform has been designed to enhance PPDR's ability to communicate bi-directionally with the citizens in crisis situation. It consists of various components or modules which are interconnected together through Web services and which target one or the other following key functionalities

- 1 - collection of information coming from the citizens
- 2 - information analysis and validation
- 3 - exchange of information between PPDRs
- 4 - communication towards the citizens

The platform is extensively described in the various deliverables of WP6: D6.611 details its architecture while D6.621, D6.631, D6.641, D6.651 and D6.661 describe the various modules integrated in the platform. Finally D6.681 gives more details about the integration of these components which are reminded hereafter:

- **IPS:** The iSAR+ Portal Software works as an integration portal for all events published by citizens directly on the portal or coming from different external systems (SMM, SFR for instance) and users (through the iSAR+ mobile app for both citizens and PPDRs). It provides the tools for event validation and decision support for the field actions to be taken. All information is showed using coloured lists in



representation of the event severity and can also be showed in a map view to allow the user to check for information clusters, risk maps, dangerous areas or even pin point new information points like meeting points or service hospitals. It also enables the dissemination of information towards citizens, either directly on social media or through Notico on their mobile devices.

Therefore IPS acts the central integration node of the platform which allows offering all 4 key functionalities to the PPDRs, either directly or through one or the other components of the platform.

- **SMM:** The Social Media Monitoring component is a global, end-to-end, social media monitoring platform which ensures collection, processing, analysis and visualisation of information published by citizens on social media. PPDRs through the dynamic and highly interactive visualization frameworks offered by SMM can sift social media data in order to detect critical events, analyse information propagation patterns in order to validate the information. Once relevant events have been identified, SMM users can push alerts to the crisis management collaborative portal (IPS).

Therefore SMM acts as an information filtering tool which allows preventing crisis managers using the IPS from being overwhelmed with the flow of social media data. It addresses mainly the key functionality 1 and 2.

As social media feeds contain are and contain personal data, consent of citizens is required before processing them. When this is not possible, anonymity of online users has to be preserved as stated in technological guideline T32.

- **IMS:** The Information Mining and Synthesis component aims at providing a semantic synthesis of information items originating from different sources. Integrated into SMM, IMS allows for the aggregation and reconciliation of social media feeds related to the same crisis situation, so as to provide PPDRs with a synthetic and non-redundant description of the situation. Besides, thanks to its semantic capabilities, IMS is able to detect inconsistencies between social media feeds reporting the same critical event, in which case alerts are issued within SMM as such inconsistencies are commonly observed in the propagation of rumours.

It addresses key functionality 2.

- **TAT2:** Text Analysis Tool Tweet IOcatOr component aims at estimating localization of non geotagged tweets based on their contents and metadata. As a result TAT2 gives the list of possible locations connected with the tweet message. Interfaced with the SMM, it enables to enrich the description of tweets hold by the SMM which will in turn be able to provide geolocated alerts to the IPS.

It therefore contributes to key functionality 2.

While ensuring more information is geolocated is crucial to enhance situation awareness, automatic geolocation of social media feeds may be in contradiction with the intent of online users who wish to remain ungeolocated. Therefore consent of users has to be obtained before TAT2 performs such an automatic computation. Whenever this will not be possible anonymity of the users has to be preserved as stated in technological guideline T29.

- **SFR:** The Smoke and Fire Recognition component enables to scan CCTV video streams in order to detect smoke or fires both in wide indoor spaces and outdoor environments. Interconnected with the IPS, this module raises alerts, upon smoke or fire detection, to the crisis management collaborative portal IPS. It therefore enables to fulfil an extended version of functionality 1, as fires are critical events directly concerning citizen safety.
- **mPA: “myPublicAlerts”** is a secured web application to edit geo-defined alerts and broadcast them to all active smartphones in a specified area along the crisis management, provided these smartphones are equipped with the Notico application.
- **Notico** (formerly **PermiLoc**) is an innovative application designed to manage its own permission to be located by a third party (person or mechanism). For the “iSAR+” project, Notico allows bidirectional transmission of position information, the location of

a user to PPDR, or geo-located information from PPDRs to the end-user. Notico is available on multiple devices or operating systems like iOS, Android. Therefore mPA and Notico contribute to fulfil key functionalities 1 and 4.

PPDRs can use mPA interface to edit the alerts to be sent towards the citizens, or they can also edit these alerts through the IPS which is interfaced with mPA.

- **MTA:** The Multi-language Text Analytics component provides the capability for in-depth analysis of multi-lingual text messages either automatically collected from social media by the iSAR+ platform or directly fed in input via alternative means (typed, automatically collected from online repositories/databases, etc.).

The MTA implements a dedicated methodology for assessing the severity of an emergency, based upon sentiment analysis. The assumption underlying this approach is that, during an emergency situation, it does exist a positive correlation between the degree of severity of the situation and the negativity of the predominant sentiments expressed while talking about such situation. Consequently, by assessing the general sentiment emerging from a certain set of messages (for example those coming from a specific geographic area experiencing a crisis situation, those dealing with a certain kind of emergency, etc.), it becomes possible to accurately infer the (perceived) severity of the associated emergency.

The MTA specifically addresses key functionality 1.

1.5.2 Technology evaluation through live showcases

The platform described in the previous section has been set up, integrated and tested incrementally through 3 live experimentations with, in chronological order, Portuguese, French and finally Finnish end users. Although the outcomes of these showcases go beyond the sole technological dimension, we will in this section focus only on the specific technology-related research activities and lessons learnt from these experimentations.

1.5.2.1 Portuguese showcase

The Portuguese showcase was a command post exercise during which IPS and SMM were available for end users, forming the implementation of what we referenced as the **concept prototype**. However, because this showcase occurred less than 10 months after the beginning of the project, these two components were not integrated. Besides SMM was used by iSAR+ partners on simulated tweets and not by PPDRs on live social media feeds.

IPS was extensively used

- To provide an integrated communication platform between PPDRs who exchanged information by email, directly on the Portal.
- To provide crisis mapping capabilities (projection of all the critical events on a geographic map)

End users, met during the preparation of the showcases and interviewed, focused on end users' requirement collection, expressed the need of having multiple available open source tools already developed, integrated in iSAR+ platform. To fulfil this need, IPS, which is iSAR+ platform central integration node, used Sahana Vesuvius People Locator (<https://pl.nlm.nih.gov>) as a proof of concept for this kind of integrations.

It was chosen because it was a missing person finder, one key desired functionality by end users. The tool itself provides a single point entrance for asking and providing information regarding a certain person that is believed to be missing.

Thanks to this integration we managed to demonstrate the importance of this "missing person finder" functionality but more importantly, because Vesuvius was integrated in the same interface as IPS, it was really easy to access for PPDRs who considered as a major

advantage the use of a single interface (easier in crisis situation where time and stress are critical and also simpler for training).

1.5.2.2 French showcase

For this showcase we deployed a much broader platform, referenced as the **basic prototype**, integrating much more components and addressing therefore much more end users' needs.

Besides this showcase was not a command post exercise but a live experimentation with:

- **volunteers** playing the roles of citizens, equipped with smartphones on which Notico and Twitter apps had been installed. They were dispatched in Montparnasse train and metro stations with two crisis scenarios to play. During the crisis they had to chat and report surprising events on Twitter⁴ and to follow PPDRs alerts and guidelines sent on Notico app;
- **PPDRs** were mostly deployed in Paris Fire Brigade Operational Command Centre while some of them were located in Montparnasse station acting as first responders. Operational lead was ensured by Paris fire brigade which used traditional communication means (including 112 call centre) plus mPA to deliver operational alerts to citizens based on their geolocation. Paris Zone de Défense, in charge of the strategic coordination was devoted to communication issues: collecting, analysing, validating information from citizens and deciding which information to push towards the citizens on social media. Besides these two organizations, French railway and metro operators were also involved, especially on the field and with observers in the crisis management centre. This showcase therefore helped us to test the usefulness of an integrated platform to help coordinating multi-organization interventions.

IPS was truly used as the central integration node, receiving information from

- **SFR**: artificial fire videos were used to feed SFR which sent automatically alerts to the IPS when smoke or fires were being detected;
- **SMM**: social media feeds pushed by "citizens" were collected live and analysed by PPDRs from the communication cell, who pushed alerts to PPDRs in charge of crisis management. These alerts were automatically geolocated based on the geolocation of the tweets used to create the alerts, provided these tweets were geotagged (a Twitter metadata) To illustrate the interest of capturing live social media feeds in crisis situation, we decided to use Twitter, one of the important social network in France, which is very dynamic and easy to use in real scenarios as most of the published information is public. In order not to create panic on the social network, it had been decided to create and use a private Twitter network;
- **TAT2**: for timing reasons, integration between SMM and TAT2 had not been realized. TAT2 was used therefore independently and was interconnected with IPS to enable the sending of relevant non geotagged tweets which were automatically translated and geolocated (based on the tweet content and some user metadata). Because SMM/TAT2 interface was not implemented we had to use artificial tweets but the

⁴ Volunteers gave their consent for iSAR+ partners to scan with SMM & automatically geolocate with TAT2 the discussions they had during the showcase on the private Twitter network set up specifically for the showcase. Twitter accounts created by iSAR+ partners had been randomly assigned to the volunteers. iSAR+ partners officially announced before the exercise the data published on this private Twitter network would be erased.

direct interface between TAT2 and IPS enabled to illustrate the interest of text translation and automatic geolocation;

- **IPS mobile app**: First responders on the field used the IPS mobile app to report regularly information they directly observed on the field to the crisis management centre.

Conversely **IPS** was used to send information to

- Citizens through **social media** (Twitter in our case);
- Citizens equipped with **Notico** through **mPA** as both components were interfaced;
- PPDRs on the field through the **IPS mobile app**.

1.5.2.3 Finnish showcase

The final version of the platform, the **advanced prototype**, which has been deployed in Kuopio for the Finnish showcase, was extending the capabilities of the basic prototype in the following ways:

- **SMM** and **TAT2** were interconnected which allowed us to feed TAT2 with real tweets collected live by SMM, to enhance the automatic geolocation of SMM alerts which was then based not only on Twitter metadata but also on the results of TAT2 computations.
- Regarding **SMM**, while French end users had suggested to experiment with Facebook in the Finnish showcase and while there was no technical obstacles, we eventually stuck with Twitter. Indeed Facebook terms & conditions appeared to be in contradiction with our SMM component⁵.
- **IMS** was integrated within SMM to aggregate automatically all tweets used to build an alert in order to provide a default description of the alert (which was otherwise left blank and had to be completely filled by SMM users). Besides, as it appeared during the preparation of the showcase that such an automatic fusion could also usefully catch inconsistencies between tweets reporting the same events, we decided to use artificial tweets to illustrate this capability which can be interpreted as the detection of potential rumour propagation.
- **IPS** interface was extended to allow external services (SMM, SFR, IPS mobile app) to send binary files including videos or images. However during the showcase we did not offer this capability as for legal & privacy preserving reasons, pictures and videos published on social networks may often correspond to personal data and are subject to copyrights. To enable partially this transmission of pictures from SMM to IPS, the URL of the media file was included in the alert sent from the SMM.
- **IPS** and **mPA** were configured for a multi-user usage, enabling PPDRs from different organizations to use both IPS and mPA with different accounts.
- Test of **Skype live translation** (audio to audio): this technology had been identified in task T6.7 (opportunities stemming out of social media). Spanish ↔ English was tested with rather impressive results.

Just like the French showcase, the Finnish showcase was organized as live experimentation, but this time it was not an independent event, it was part of a national live fire brigade training exercise. In addition, the city of Kuopio and the Eastern Finland Police department also participated in the exercise, having in charge the communication for their own entities.

⁵ Just like for the French showcase, a private Twitter network had been set up and volunteered citizens gave their consent for iSAR+ partners to scan & geolocate their discussions on this network. Data from this showcase will also be erased at the end of the project.



They were allowed to use both IPS and mPA. So it was really a good opportunity to test multi-organization coordination

During the showcase we had the pleasure to see that PPDRs participating to the national exercise but which were not part of the iSAR+ showcase decided to use the IPS to improve their own situation awareness. This was probably the best proof of success for us.

1.6 Research Activities performed for the Ethical & Legal dimension

The beginning of the XXI century has been deeply marked by the repetitive occurrence of large-scale natural disasters and human-induced emergencies, events commonly known as crises. Crises come in many forms – natural disasters, economic collapses, infrastructural destructions and terrorist actions. What prevails is a common understanding of the disturbance of stability that a crisis situation entails, that is, the threat to fundamental priorities, the challenge of making the right decisions under severe pressure and the fatality of loss of control, property and life.

In the last decades, the internet and mobile technologies have been assuming a very important role in everyone's day life. Nowadays, in the so called developed countries, there are few people that do not own a computer with internet access or even a mobile phone, so, it is possible for a big part of the world population, to connect someone in seconds. Not denying the importance of this kind of technologies, and the improvement many of it brought to our lives, there are some legal and ethical issues resulting from this widespread usage.

With a century old history of investigation and research, the sociological study of crises is aware that ICT has expanded the reach of disaster sociology and now is particularly focused on the emerging trend of expanding citizens' participation through online and mobile communications (computer-mediated interaction), providing, seeking and brokering information, connecting those within and outside the geographical space of the crisis and having implications for both informal and formal response.

In fact, it already is impossible to downplay the role emerging online and mobile trends play in crises communications, but there is still the opportunity to improve these trends' benefits to promote a faster, more efficient and better performed crisis response effort. Indeed, throughout History, several overwhelming natural disasters and human-provoked actions have prompted immediate crisis response efforts that have made their mark, providing valuable lessons on crisis management systems, plans and organizations.

The iSAR+ consortium considers that analyzing the reality that surrounds us is the best way to come to any conclusion, therefore, we chose to analyze four case studies: the 2005 London tube bombings, the 2005 Katrina Hurricane, the 2010 Haiti Earthquake and the 2010 Chilean earthquake and establish the major guidelines that were involved in the overall crises response efforts.



The 2005 London Tube Bombings

EVENT	DESCRIPTION	ORGANIZATIONAL ASPECT	HUMAN ASPECT	TECNOLOGICAL ASPECT	ETHICAL AND LEGAL ASPECT
2005 London Tube Bombings	On July 7 th 2005, at 8:50 a.m., three bombs detonated on three London Underground trains and a fourth bomb on a double-decker bus, killing 52 people and injuring more than 700 others	<p>The City of London Police restricted cell phone network access to specific areas to reduce network traffic and improve first responders' access – this also cut off access for many responding agencies, including the London Ambulance Service</p> <p>Non-interoperable radio system between London Underground staff and emergency services prevented information and requests for help to reach the surface</p>	<p>Citizens with difficulty to get information on the status and location of injured or victims</p> <p>Victims trapped underground took photos and filmed (information later forwarded to police and broadcasted through the media)</p> <p>Citizens collected and sent mobile phone footage to TV news (citizens' journalism)</p>	<p>Non-interoperable radio system between London Underground staff and the emergency services.</p> <p>London Ambulance Service functioned with mobile phone networks</p> <p>Intermittent availability of both mobile and landline telephone systems</p>	<p>Legal issues complicated the agencies' response, for the United Kingdom's Data Protection Act prohibits sharing personal data without the consent of those concerned, thus limiting what information officials could give agencies and families on the identity and status of victims.</p>

The 2005 Katrina Hurricane

EVENT	DESCRIPTION	ORGANIZATIONAL ASPECT	HUMAN ASPECT	TECNOLOGICAL ASPECT	ETHICAL AND LEGAL ASPECT
2005 Katrina Hurricane	In August 2005, Hurricane Katrina caused severe destruction, including 53 different levee breaches in greater New Orleans that devastated the city and flooded 80% of the region for weeks, forcing 1.2 million residents to evacuate and killing 1,836 people	<p>New Orleans Police Department's communications system inoperative for 3 days</p> <p>Authorities monitored local and network news, and internet sites to coordinate rescue efforts</p> <p>Absence of authoritative believable information from public officials</p> <p>Field reporters</p>	<p>The absence of authoritative and believable information from public officials created a climate of rumour, misinformation and speculation, and added to the loss of citizens' confidence and the government's inability to maintain public order.</p>	<p>Severely damaged emergency 911 overwhelmed by calls.</p> <p>Non-interoperable radios between different emergency services</p> <p>Land mobile radio and wireless capabilities degraded and satellite phones worked (short supply)</p> <p>Amateur Radio Emergency</p>	<p>Climate of rumour, misinformation and speculation added to the loss of citizens' confidence and the government's inability to maintain public order.</p>

EVENT	DESCRIPTION	ORGANIZATIONAL ASPECT	HUMAN ASPECT	TECNOLOGICAL ASPECT	ETHICAL AND LEGAL ASPECT
		<p>were conduits of information between victims and authorities, often using internet sites such as blogs, wikis, fora and community journalism</p> <p>Shelters were information hubs for seeking and providing information</p>	<p>Shelters had computers to access the internet but many did not know how to use it (volunteers assisted them)</p>	<p>Service provided communication and located survivors</p> <p>Motorola, Craigslist, BoingBoing.net, Freedom4Wireless and specially NOLA.com were vital for rescue operations, posting SMS rescue pleas⁶</p>	

The 2010 Haiti Earthquake

EVENT	DESCRIPTION	ORGANIZATIONAL ASPECT	HUMAN ASPECT	TECNOLOGICAL ASPECT	ETHICAL AND LEGAL ASPECT
2010 Haiti Earthquake	<p>On Tuesday, January 12th 2010, a 7.0 magnitude earthquake struck Haiti, killing 316,000 people, injuring as many as 300,000, destroying 300,000 houses and leaving 1,600,000 people homeless. All critical infrastructures collapsed.</p>	<p>Part of the local emergency structure destroyed, including hospitals and morgues</p> <p>Authorities were assisted by humanitarian organisations working in Haiti (Red Cross and Red Crescent)</p> <p>Rescue work intensified with the arrival of doctors, police officers, military personnel and firefighters from various countries two days after the earthquake.</p> <p>Ten days after, the UN and US formalised coordination of relief effort</p>	<p>Locals use text messaging (SMS) as primary communication</p> <p>Because literacy rate in Haiti is about 62%, radio is the most popular media</p> <p>Thousands of Kreyol-speaking volunteers translated and categorised SMS messages</p>	<p>Communications withstood considerable damage</p> <p>4636 Mission received millions of SMS distress messages (about 1000 received per day) and plotted the senders' location in a map. Triage messages were streamed to relief units</p> <p>The Ushahidi Haiti platform linked directly to the "4636" live feed and used by all organisations in the field</p> <p>Social networking sites, (Twitter and Facebook) spread messages and pleas for help. Facebook was even blocked by continuous updating messages</p>	<p>It was clear from the very beginning of the relief effort, that initiatives like "Ushahidi- Haiti" and "Mission 4636" would deal with mass amounts of very specific and sensitive data of a big population at risk with many vulnerable groups, this generated privacy and data protection considerations that had to be considered seriously. It is worth noting that some of the problems related to privacy and data protection are also tied to the crowdsourcing nature of the initiatives</p>

⁶ <http://www.technologyreview.com/computing/14780/>



The 2010 Chilean earthquake

EVENT	DESCRIPTION	ORGANIZATIONAL ASPECT	HUMAN ASPECT	TECNOLOGICAL ASPECT	ETHICAL AND LEGAL ASPECT
2010 Chilean Earthquake	On February 27, 2010, south-central Chile was struck by an 8.3 magnitude earthquake. It lasted for about three minutes and was felt in six Chilean regions (from Valparaíso in the north to Araucanía in the south), that together make up about 80 percent of the country's population. 500 deaths were registered, half a million homes were destroyed and at least one million and a half damaged leaving more than 2 million homeless.	<p>As the main earthquake occurred, the failures in the basic services that were supposed to be delivered to the citizens began: the electricity's distribution network failed and, along with it, the services that depended on it, such as mobile and stationary telephones but also the provision of potable water in places requiring the use of pumps, and the gas distribution was disrupted. Establishing the supply of this basic services took several hours, in some places, even days.</p> <p>Internet service appeared to have the most resistant infrastructure, despite the report, later on that day, of some problems in the national servers that virtually erased Chile of the world map for hours.</p>	The citizens themselves, showed the power of social media and its potential to work as a tool to obtain relevant real-time information. They also started to access social media for help, information on affected cities and to locate family and friends.	<p>Despite the internet and mobile coverage malfunctioning, the social media such as Twitter, Facebook, Ushahidi or Mixi, played an important role by being widely used by the authorities as coordination tools for relief and aid (not for the search and rescue efforts), as well as by the citizens to obtain information about where to search for help.</p> <p>Social media were used to provide the population with essential information regarding, for instance, tsunami alerts, missing or deceased people, available and uninterrupted services, road conditions or functioning gas stations.</p>	<p>People publish and allow the use of the data by the social network where they post it, so, it may be hard to legally justify the usage by other social media, news desks or even people. Nevertheless, and once again, it depends on the legal system of the country. The law of precedence is beginning to establish (in Portugal for instance), that something posted online and therefore made available for everyone to see is no longer on the private domain, but belongs to the public domain and therefore, if anyone can see it, anyone can use it.</p> <p>European law may fill the gap left by the law in this kind of situations, so, the law of precedence is suitable of being surpass in a near future, as Member States will have to implement any European regulation regarding data protection that may come into</p>



EVENT	DESCRIPTION	ORGANIZATIONAL ASPECT	HUMAN ASPECT	TECNOLOGICAL ASPECT	ETHICAL AND LEGAL ASPECT
					<p>force.</p> <p>The main concern when it comes to the information becoming public relies on the fact that, as seen during the Boston Marathon bombings, citizens may disseminate information that is not accurate and use it to make justice by their own means.</p>



2 iSAR+ Guidelines & Roadmap

2.1 Human dimension guidelines

The following guidelines address two important groups involved in crisis: PPDRs and citizens. The PPDRs guide consists of seven distinct chapters. Its structure is shown in the table below. The citizens guide is a more concise document intended to directly involve and interest citizens in crisis preparation. PPDRs are encouraged to use both documents and adapt them to their particular needs, cultural backgrounds and types of crisis situations relevant for the particular region they work in.

Developing a strategy for using new media in crisis situations starts by considering the issue so important that it is worth for PPDR organisations to deploy personnel and resources to it. This includes the adoption of new technologies but also a comprehensive strategy which focuses on the benefits (and potential problems) of new media in all phases of a crisis situation.

The particular type of incident is another important aspect to consider since it interacts with the possibility to use new media during a crisis at all. A comprehensive strategy thus should consider technological, human, ethical and organisational dimensions alike. The human guideline provides one aspect but encourages potential users to reflect on the complete set of iSAR+ dimensions to develop the best solution for a particular region, organisation and crisis situation.

1) Media and new media in crisis situations

- a) Media and new media in crisis
- b) Situational benefits and drawbacks of social media
- c) Trust in communication and new media
- d) Listening to ongoing communication
- e) Generating message content
- f) The availability of new media in crisis

2) Accessibility

- a) The importance of meeting citizens abilities and expectations
- b) Using new media *in* crisis
- c) Generating new media tools *for* crisis
- d) Information, activation and coordination of rescue activities

3) Type of crisis

- a) Interactions
- b) General Features
- c) Different types o crisis

4) PPDRs needs in crisis and new media

- a) Providing information to citizens
- b) Getting an overview of the situation
- c) Coordination of local helpers
- d) External support
- e) Rescue activities
- f) Rumor control
- g) Sense making

5) Citizens needs and new media

- a) Information about the incident
- b) Information about dos and don'ts
- c) Information on background
- d) Information about PPDRs status and activities
- e) Information about relatives, friends and loved ones



6) Level of involvement and distance to incident

- a) Generals about involvement
- b) At the scene and affected
- c) At the scene but not involved (yet)
- d) Distant and involved
- e) Distant and uninvolved
- f) Nearby and involved
- g) Nearby and uninvolved

7) Phase specific approach

- a) Phases
- b) Preparation Phase
- c) Detection and warning
- d) Acute phase / crisis response
- e) Aftermath and recovery

The guide includes a citizen section written with the intention to provide a concise document easily accessible for citizens.

- iSAR+ recommendations for citizens (overview)
- Preparation – the phase before an incident
- Warning – an incident is about to happen
- Acute incident – the disaster is at hand
- Aftermath – the incident is over, is it?

The citizen part was developed under the focus of accessibility to ensure no excessive recommendations would hinder citizens to adopt and read it. A phase driven approach was chosen for the citizen's guide to ensure better orientation along the time line. Both guidelines are meant to be adapted to local necessities depending on the very demands a particular region has to face in terms of crisis situations. The recommendations therefore give examples with respect to particular types of crisis situation and try to generalise as well as to point out mechanisms which can help for a successful crisis preparation if taking new media into account.



2.1.1 Media and new media in crisis situations

Guidelines Summary Comment/Explanation		
Media and new media in crisis situations	Media and new media in crisis situations	<p>The mix of traditional and new media in modern societies is in a constant flux and chance. Many new forms of communication have been developed in the last decade. Integrating new media in a modern crisis communication and crisis management poses great opportunities and great challenges for today's PPDR personnel and organisations.</p> <p>Challenges are the multiple directions of data flow and the multitude of stakeholders involved in sending, receiving, forwarding, duplicating messages, the access to and usage of existing platforms, the speed of information flow, the involvement of users in crisis relevant information, the lack of trust in social media, and being aware that social media only complements but does not substitute classic media in crisis situations. Social media can be used in a variety of crisis situations. Each can have a unique impact on the usage of new media. PPDRs seek to fulfil a certain set of tasks within each type of crisis for instance to inform, to coordinate, to rescue etc. PPDRs and citizens have a unique view on new media that overlaps in some cases but does not in others.</p> <p>One important factor for the usage of new media is the <i>level of involvement</i> in a particular crisis. A citizen does not necessarily have to be directly affected by an incident. He or she could be highly involved from a distance, as well.</p> <p>Crisis can be categorized into phases such as preparation, detection, response and recovery phases. Specific types of information and qualities are perceived as more or less valuable depending on the particular phases a crisis is in. Suggestions regarding specific phases and new media conclude the human iSAR+ recommendations.</p>
	<p><i>New and classic media mix in modern societies</i></p> <p><i>New media offers specific ways to address a crisis</i></p> <p><i>Crisis can be broken down into different phases while citizens share different levels of involvement in a crisis.</i></p>	



Media and new media in crisis situations	<p>Situational benefits and drawbacks of social media</p>	<p><i>It is important to consider the full situation to judge new media benefits and challenges in crisis</i></p> <p><i>Technological solutions can help to maintain social media functionalities during crisis</i></p>	<p>The benefit of social media cannot be judged without considering the contextual features of a particular incident or crisis situation. Given that – especially in a big incident – many of the citizens involved in a crisis will have access to mobile technology and use it actively for crisis relevant information, it makes sense to provide the means to actively engage these citizens. However, major crisis may severely affect the infrastructure thus especially render online based communication useless.</p> <p>Setting up mobile replacement transmitters or the means to generate a live network between the individual devices can be an option. Again these options rely on the particular scenario: the dimensions of the area affected and the density and closeness of affected citizens, as well as their willingness and capability to use the devices (also see section on scenarios).</p> <p>Other ways of communication – especially in an affected area – must be found that do not include new media to meet the particular challenges to address those not engaged rapidly as well as to compensate a loss of online based solutions for those that would otherwise rely on new media in case of a crisis. Other citizens (not directly involved) but engaged from a distance can still benefit from social media in supporting PPDRs, for instance by providing information for maps like Ushahidi, other crisis mapping solutions and collaborative projects.</p>
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Media and new media in crisis situations	Trust in communication and new media	<i>Successful crisis communication relies on trust</i>	<i>Gaining and maintaining citizen's trust</i> in messages, organisations and media channels is very important in crisis. Trust in an organisation and its credibility is essential for successful crisis communication. Plans must consider building and maintaining trust as a key element in crisis communication. Trust is influenced by several factors such as: the familiarity with source of information, consistency of the content, faith in the source, perceived honesty and competence in the particular field.
		<i>Specific properties such as competence and honesty of a source increase trust</i>	New media, however, is usually perceived as less trustworthy by the general public and PPDRs in comparison to other media. Especially the possibility for anybody to generate content at will makes the information doubtful in comparison to bigger portals or networks which filter news for relevance before making it available. Negative attitudes hinder new media to come to their full potential in case of emergencies. Both PPDRs and citizens state to be reluctant regarding its usage. Still many people use and trust social media.
		<i>New media is not so much trusted in general but this can vary between user groups</i>	The perception of new media's trustworthiness is influenced by the involvement with the medium on a day to day basis. On a national level perseverance and availability of mobile devices as well as mobile contracts including 3G or 4G/LTE serve as a basis for constant usage. This means frequent users have fewer reservations possibly due to heightened skills in evaluating messages within the social platforms regarding trustworthiness. <i>Medium</i> and <i>source</i> of information in a crisis must be distinguished to get the full picture. Citizens might trust information within a rather non-official medium such as twitter (in comparison to TV news of major news stations) to the extent that they trust the source of the information and believe in its credibility within the medium. So a general mistrust stated in a new media channel might be less severe as expected if the source itself (firefighters for instance) are well trusted. Still the credible source might lose trust due to the particular medium. An all channels approach is recommended to overcome these issues.
		<i>Trust is always based on sources as well</i>	



Media and new media in crisis situations	Listening to ongoing communication	<i>Listening to communication and predeveloped communication strategies should go hand in hand</i>	Modern crisis communication considers listening to ongoing communications as important as sending messages in a crisis situation. The circular process recommends developing communication strategies in accordance to actual need and worries in a particular situation by analysing the ongoing activities in social media networks and by developing a strategy based on this analysis. Analysis should complement and match pre-existing strategies. The effects of implemented communication strategies then get reassessed to see if intended effects occurred. New and social media provide an excellent basis for this innovative communication circle since monitoring, implementing and reassessing of impact can be easily followed. This is especially true for Twitter where communication content is public and can be analysed rather easily. A comprehensive strategy can lead to communication instruments such as press communication, websites, newsletters, leaflets. The most direct way of communicating and sharing is within the social media itself. Communication specialists for social media are recommended to be part of every staff involved in crisis management.
	Content attributes What to consider when generating content	<i>Content should be simple to understand</i> <i>It should provide information and promote action</i> <i>The source of the content should be easy to identify</i>	<p>When generating content for crisis situations it is beneficial to keep in mind, that crisis situations are usually very stressful for those involved and affected. This is true regardless of what medium is used to inform citizens about the crisis. New media can have certain limitations, however, which can interact with the properties of good message content.</p> <p>Specific attributes make it easier to conceive, process, and understand messages in. This is especially important if time and cognitive resources are limited. Several aspects must be kept in mind: content must be simple and understandable, avoid jargon, be brief, concise and clear, be consistent, inform about the threat and appropriate actions, providing facts honestly, no speculative content, state why certain information is not available or cannot be given, must be adequate and address those in need for information and not disturb those who are unaffected, be issued regularly if the threat is ongoing. In addition clearly visible logos and other means which make it possible to identify the source of a message are very important. Written material can be easily reviewed again while acoustic info is more ephemeral.</p>



Media and new media in crisis situations		<i>Multitude of options in new media to transmit content</i>	New media can provide a multitude of possibilities in crisis situations which can help to increase the effectiveness of PPDRs activities and recommendations. Especially the possibility for a media mix allows tailored solutions for specific types of crisis at their demands. Since crisis situations are rare only little preparation is done by the general public. Procedures to be applied are not well documented, if available at all in an ordinary household. Online based videos, and guidelines can easily illustrate how to behave in a crisis, for instance how to purify water, how to set up a tent, where to go, what road to take etc.
	Availability of new media in crisis Be aware that communication channels may not be available thus rendering plans useless	<i>Communication needs a coordinated concept</i> <i>The concept needs to take into account limitations springing from the crisis itself</i> <i>Communication channels can be cut off for reasons rooted in the crisis itself</i>	The best planning is useless if citizens are not reached or get addressed by mixed, conflicting content. Often several players and organizations have differing goals in a crisis situation. For this reason it is important to align communication concepts with existing procedures to ensure no unexpected interactions jeopardize preparations done in advance. When planning for crisis communication it is important to keep in mind that it is not a normal situation. Crisis effects may render elaborated plans useless. This could for instance be the case when mobile networks are cut off to prevent remote ignition in case of terrorism. Tools will be useless then no matter how well designed and prepared. Therefore a complete communication strategy must be aware of other stakeholder's actions in case of a crisis.

Table 2 - Guidelines, summary and comments concerning media and new media in crisis situations



2.1.2 Accessibility

	Guidelines	Summary	Comment/Explanation
Accessibility	The importance of meeting citizens abilities and expectations	<p><i>Technologies must be accessible</i></p> <p><i>Information must be available beforehand</i></p> <p><i>Information about communication systems should be distributed in early crisis preparation</i></p>	<p>Technological solutions are only as good as their perseverance and ease of use. This is especially true for (new) media platforms. No matter what features a system may offer or include, it is useless if the intended users do not perceive, understand or interact with it. Official institutions educate and train their staff on systems they use. Being aware of how to operate a system is not the case for most citizens, however.</p> <p>A new service allowing people to not only call the police but also to SMS (or use an instant messenger) on 112 emergency numbers to interact with rescue forces could be of great benefit. PPDRs have a well established system of emergency related communication. A much larger amount of data can be received and processed than using only the existing telephone lines. Geo-tags can be embedded into messages making it easy to identify the location of its sender. However, only having the features installed will not make citizens adopt a system they do not know or are not acquainted with. Emergency situations call for immediate, reliable connections and information transmission therefore senders will primarily use known technologies. The initial reaction is to use a mobile phone for calling in on emergency centres.</p> <p>If a system is set in place it is therefore very important to make potential users aware and acquainted with of it before a crisis situation comes up. Involvement in new system will be easier if it is based on day to day usage of a system rather than an exclusively crisis related mode. It is therefore recommended to use and integrate a system in a daily emergency context. Thus citizens will be used and accustomed to it. It is possible to gather data form platforms primarily intended for emergency related communication in crisis as well.</p>



Accessibility	<p>Using new media in crisis</p>	<p><i>Known social media platforms will also be applied by their users in case of crisis</i></p> <p><i>Bringing citizens and relevant content together must be prepared beforehand</i></p>	<p>Individuals well accustomed to new media will also relate to it in crisis situations. This includes using it for information gathering such as browsing news websites and actively providing information such as uploading videos, contacting friends on Facebook, or tweeting about an incident. Usually this information is not directed to PPDR organisations but to friends and relatives or the general public. In particular, Twitter provides the opportunities to relate to a particular topic along with unknown other using the same hash tag, thus generating a kernel of information about an incident.</p> <p>The possibilities to gather particular information from these freely accessible sources relate mainly to the technological solutions involved in data mining and information gathering. Benefits are in the detection phase of an incident since an event may trigger specific search words that are posted as a reaction to an incident “earth quake / earth shaking” for instance. The possibilities to relate to citizens are limited to the systems / platforms feature used (160 characters for instance) but can be largely expanded if a platform is used as a starting point to redirect citizens to more detailed platforms which provide richer content and information on particular crisis.</p> <p>However, a strategy relating to the usage and integration of well established platforms relies on external content and crisis information or platforms which must be prepared beforehand as well.</p>
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Accessibility	Generating new media apps / tools for crisis	<i>The benefit of new media for crisis must be communicated in advance</i>	<p>In addition to the usage of existing new media in crisis, software and apps can be developed especially <i>for</i> crisis situations. Software designed for crisis intervention faces the additional challenge that incidents are rare but diverse. From an individual point of view crises are rather perceived as unique incidents which are too unlikely to be taken into account in day to day life and routines - even if considered to have severe consequences. Software and applications designed for crisis management must therefore explain what benefit they offer to the individual. If it is necessary to preinstall a device it is unlikely that this will actually be done <i>before</i> an incident. Lack of familiarity with a device or application, however, makes using it more prone to failure. Alternatively it is not used in the first place. Several ways to face this problem exist:</p>
		<i>New media should be designed in an easy and understandable way</i>	<p><u>Design for high usability</u></p> <p>Unknown procedures and interactions make users reluctant to use unfamiliar tools. Very simple steps and designs (single or minimal buttons, concise explanations and step by step procedures) can help overcome these limitations. Still, it must be expected that even excellent designs might not be used. A user could simply <i>expect</i> it to be tricky and never approach the tool in the first place. This reluctance to use an unfamiliar tool is contrasted with the high motivation to get help or adequate information in a crisis situation. The motivation might spur even reluctant users to use a device if it seems to be the only possibility to get relevant information.</p> <p>Large numbers of untrained users put emphasis on <i>usability</i> since motivated users can nevertheless easily ignore mishandling or software which isn't clear and understandable to them. It is very likely that users will stick to known access-ways and procedures if those promise the same amount of information. Having experience with a tool will greatly minimise reluctance (see next point).</p>
		<i>Familiar designs minimize usability problems and irritation</i>	<p><u>Install according to known interaction patterns and looks</u></p> <p>People often interact with a limited number of devices. They are well accustomed to their look and interaction patterns. Software innovations often simply add features rather than radically changing a design when updating a program or app. Even minor changes can</p>



Accessibility	<p><i>A possibility to maximize the usage of new media for crisis is to pre-install the new tool as an “opt-out model”</i></p> <p><i>Data protection is an important issue for adopting new technologies</i></p>	<p>cause irritations and need extra time to get accustomed as well.</p> <p>Especially major players feature unique designs and interaction patterns which can be used to familiarize look and feel of a crisis related tool to the user’s needs and interaction mind-sets. It is recommended to use familiar designs and patterns to minimize dropouts and interaction difficulties. Given an appropriate and familiar design the question still remains how citizens come into contact with potential tools in case of an incident. Downloading, or online access is one option, another one is to pre-install an application on the device.</p> <p><u>Pre-installment</u></p> <p>To pre-install software means that the acquisition of a tool is no concern to a user in case of a crisis since the approach on crisis relevant software and app would be an opt-out model. Everybody who does not want to have the tool available can uninstall it rather than install it specifically (opt-in). Having a tool ready in case of an unexpected crisis - especially with a rapid onset - is an advantage in comparison to install them then. Ethical and practical questions, however, rise from this approach. Who does this pre-installation? The manufacturer, the telephone companies, providers?</p> <p>Given heated debates in the general on personal data it is very important to offer possibilities to easily opt out or even better to opt in very easily and install it without any big hindrances. In addition it would be important to ensure that no personal data is or can be gathered via a tool that would enable others to read out information about a user (such as positions, calendars, address books etc.). This would greatly minimize trust into a crisis relevant feature before a crisis even occurred. A good approach for an opt-in model might be to promote a crisis relevant feature once download portals are approached or when the device is set-up the first time. Opting-in might generate less possible users than pre-installment. The actual approach has to be decided depending on national legislation, security and safety and data protection. Especially tools that collect no or only minimal data will have an advantage if taking a pre-installment approach.</p>
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Accessibility	<i>Provide software or tools for daily usage with added value in crisis situations</i>	<p><u>Install added value</u></p> <p>Having a tool that provides information <i>in crisis</i> is not very attractive on a daily basis. Neither is the idea to face a crisis nor is the fact that the tool seems quite useless most of the time. So either the acquisition or installation involves a onetime action of reassuring nature, comparable to purchasing a fire-extinguisher or the tool itself should feature an added value that makes it attractive to acquire.</p> <p>A reassuring action that leads to the acquisition of a tool is primarily driven by the wish to minimize a possible, certain or imminent harm. Potential crisis situations are of little concern to the general public, which means that crisis preparation is not a primary concern. It even gets neglected. In case of an incident anywhere in the world - especially those nearby or closely connected to the individual - the need for reassurance and the necessity for preparation get emphasized. For the promotion and distribution of crisis related tools the time frame after a crisis is a very promising one since the benefits of a crisis tool and the necessity to install it seem logical.</p> <p>Another approach, which emphasises daily routines, rather than single crisis events, for the promotion of tools is to integrate features which are beneficial on a daily basis. The non-software equivalent would be to give away silver-ion pills for water disinfection encapsulated in a pen. Regarding software it could be a free application, with day to day advice, which also includes advice in crisis situations. In the past the combination of an application that does not relate to crisis at all including with crisis relevant features would have been possible given the financial benefit of saving money on software. Today this approach gets flawed by many free applications making the financial aspect obsolete. However, reductions in high price software might still be an option. Still the integration in features seems promising.</p>
	<i>The crisis tool should be integrated to the functions of existing programs and apps</i>	<p><u>Integrate in other features</u></p> <p>Possibly the best approach to provide software and apps to citizens who can help and support in crisis situations before an incident occurs is to integrate it into another software or app which gets used on a daily basis. The crisis tool itself should be related to the very functions the established tool provides. This means that message related features should apply to messenger tools location related crisis features should apply to apps and software which concerns location and way finding (Google Maps for instance or any other related</p>



Accessibility		<p><i>To maximize the availability of the new tool it should be accessible beforehand and during crisis situations.</i></p>	<p>functionality).</p> <p>However, while this approach ensures good accessibility for persons who are familiar with particular programs it excludes those who are not very experienced in operating such features. Having all features in one application is convenient and reassuring in case of an actual incident since everything is in one spot. Both approaches seem contrary and not easily to integrate. An application or software can be designed to integrate both features. To provide a standalone platform but at the same time integrate itself into other programs which are used on a day to day basis to allow experienced users to stick to their well-established usage modes.</p> <p><u>Make tools accessible via ordinary pathways and platforms</u></p> <p>If an application or software is not installed prior to an incident it can still be made available online in many cases. It could be downloaded once accessed on the web. This approach would call for small sized tools which do not take too long to download and does not burden available band width too much as the need for it would arise very condensed, especially if the onset of an incident is very sudden. A clear disadvantage of online based tools is that they cannot be used if no connection is available. This poses no problem if the incident does not affect transmission but greatly does if it is the case. Especially in case of crisis situations that can be foreseen it is possible, to advertise the download in advance (see part on <i>type of incident</i>).</p>
	Information, activation and co-ordination of rescue activities	<p><i>New media can be used to provide information about the crisis and to coordinate the help of volunteers.</i></p>	<p>Crises that go along with extensive destruction such as earth quakes, tsunamis, floods, large fires etc. often stress PPDRs capacities to the limit. Citizens often are not mere victims of a crisis but willing and capable to help. They lack, however, the organized structure of rescue organisations to deliver manpower and abilities in accordance to the particular needs of a situation in many cases. New media has been used for information, activation and coordination in case of a crisis. In addition to informing about a crisis new media has been used to coordinate activities like filling and stacking sandbags, building and securing dikes, setting up tents, providing food and shelter etc.</p> <p>Citizens not directly affected by a crisis and those affected but still capable of doing things other than rescuing themselves often feel obliged to help and are very motivated to do so. Social networks have been used in the past to organise and coordinate rescue activities.</p>



Accessibility			<p>Future crises will benefit from such activities as well. Crisis software can address these issues by a twofold and combined strategy: providing a platform which helps to coordinate activities and collaboration with existing external platforms and networks. If running an own PPDR platform it makes sense to provide access and inform citizens about the possibility to use it for coordination activities by making them aware of its existence via radio, TV and social networks. In twitter it is for instance possible to post external links to an existing portal. At the same time communication exerts should seek and get in contact with groups that have started to self-organize crisis related activities (Facebook groups for instance). Providing information about ongoing activities, linking and updating own and external platforms are an important topic to avoid redundancies, to ensure that externally planned activities do not conflict with own activities, and make sure that people willing to help do not endanger themselves (such as filling sandbags in an area soon to be flooded).</p>
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Table 3 - Guidelines, summary and comments concerning accessibility



2.1.3 Type of crisis

Guidelines Summary Comment/Explanation		
Type of crisis	Interactions	<p><i>Crisis types differ in their demands and needs</i></p> <p>A crisis poses a severe challenge to existing capabilities in crisis management. It can exceed existing local, even national capabilities. Several types of incidents can cause such severe stress to crisis management capabilities but not necessarily all of them are alike. The type of incident may interact with the benefits and demands offered by social media in particular. The following section discusses general features of crisis relevant for the usage of social media and specific types of crisis with respect to new media solutions in crisis.</p>
	General Features	<p><i>Natural disasters can have a large impact on infrastructure. Manmade disasters often have a bigger psychological impact since the cause of an incident is of human nature</i></p> <p>Crisis can be greatly diverse. Their impact on new media shows similarities, however, which can be analyzed and considered for preparation and planning.</p> <p>A classic distinction is between natural and manmade disasters. Natural disasters would be for instance: earthquakes, landslides, storms, flooding, heavy snow, bushfires, heat waves, volcanoes. Manmade disaster would be: Heavy traffic incidents (cars, trains, and ships), terrorism, HAZMAT incidents, power failure, or riots. Natural disasters usually have the potential for a heavier and more extensive impact on infrastructure than manmade disasters since they can affect large areas for instance in case of flooding or heavy storms. This statement is put into perspective realizing that certain manmade incidents can easily affect central infrastructures as well for instance if an important power plant fails to operate or drinking water is intentionally polluted by an act of terror. Still due to the vastness of naturally caused crisis they have the potential to effect infrastructure not only locally but in a nationwide scope. Natural disasters may affect both infrastructure and housing at the same time. Manmade disasters on the other hand usually tend to have bigger psychological effects, since someone is considered to be responsible, might even have caused it voluntarily, and repetition seems more likely. Still, major technological incidents (especially nuclear power plant damages) could have nationwide, transborder effects, as well. Classifying between natural and technological/ manmade incidents is thus just partially</p>



Guidelines		Summary	Comment/Explanation
Type of crisis		<i>Incidents can have a direct or indirect impact on the operability of technologies</i>	helpful in classification in terms of new media usage in crisis incidents. One important point for classification with a focus on social media is the question whether an incident - either directly or indirectly - has an impact on the operability of technological means to provide and sustain networks necessary for the usage of new and social media. The impact on a particular area should be analyzed and addressed in a crisis management plan which includes the hardening of infrastructure and means to quickly replace damaged technology to get networks running again.
		<i>An integrated approach should address to the different groups of affected citizens and the different channels used by those citizens in coordination with the relevant type of crisis</i>	Another important aspect is the type of crisis and particular types of citizens affected by the very crisis. Each channel will reach its particular user group of users. These groups can be diverse or homogeneous. A gap might exist between heavy users of mobile technology and particular media channels and the actual target group. Particularly younger users are found predominantly, but not exclusively, in newer channels. An integrated approach should have the means to disseminate and collect information from all channels. Still, it should not address all types of users uniformly but in accordance to a strategy which takes interactions between incident and target groups into account. Adequate communication strategies must be applied to reach the citizens in question especially during incidents in which very young or elderly citizens face a heightened threat (heat waves, influenza, contaminated food etc.). This included an analysis of the user structure of particular channel within a country / region and adaptation on message content for particular channels. For instance, to emphasize the need for grandchildren to approach grandparents if the user structure does not include a high percentage of the target group (elderly in this case) but rather their grandchildren.



Guidelines		Summary	Comment/Explanation
Type of crisis		<i>No incident can affect the entire world wide web but the basic elements for web based media (e.g. infrastructure and electricity) can be affected</i>	<p>With respect to social media the central question is <i>if and how</i> an incident affects the possibility to use. Taking a very broad view on the topic the usage of new media is always possible. No matter where an incident takes place it will not hit the entire world-wide-web at once (excluding a solar flare, maybe). So people not directly affected can still use web based features to assist in a crisis from a distance. Examples would be to use new media for fund raising, map building, damage assessment etc., as it was the case in the Philippines – typhoon Haiyan – or in the Tahiti earthquake.</p> <p>Even if the internet, as the natural basis for new media, usually works at a distance an important question is if a crisis inflicts damage to the net in the area where an incident has taken place. Several types of incidents can severely damage infrastructure necessary for internet usage or the ability to run an appropriate device in the first place if those were destroyed, as well. Another important factor – if not the most important one – is electricity. Without power devices cannot work or only for a limited amount of time. Mobile devices may benefit from their battery charge but cannot work if antenna poles are out of energy. Different crises affect the possibilities to use new media, particularly by effecting infrastructure in the first place. Thus the usage of new media in crisis, particularly in the very region of an incident, also becomes a strategic one that concerns not only food and shelter but also public communication for the sake of civil protection.</p>
	Different types of crisis	<i>Considerations for earthquakes include excessive damage on infrastructure</i>	<p><u>Earthquake</u></p> <p>High risk regions for earthquakes are usually well known in advance. The very onset of an earthquake remains still unpredictable. Often long periods exist between two incidents letting most citizens forget about the actual threat of an incident in their day to day life.</p> <p>Earth quakes can severely damage infrastructure in a wide area including PPDR buildings and equipment. The actual damage depends on the magnitude and infrastructures</p>



Guidelines		Summary	Comment/Explanation
Type of crisis			<p>resilience to the shock waves. In case of high magnitudes infrastructures might be severely damaged rendering new media useless in the first place. This includes all kinds of mobile transmitter antennas even electricity itself. In case of local internet access is affected by the crisis, activities can be ongoing from a distance. Local activities and interests in an earthquake possibly provided and supported by new media solutions would be: Aftershock warnings, recommendations to sleep outside, not to enter structurally weak buildings, location of possible shelter or evacuation points, emergency calls and SMS, Apps and messengers including geo tagging, information on PPDR arrival times, information on how to protect oneself inside houses, information on weather conditions and their direct relation on behavior (freezing-> go for blankets) heat-> water is important...). Information on the locations of relatives and close others, means to tell others that one is OK, technological solutions to get informed about injured and dead citizens, allowing data to be protected at the same time. The multitude of content makes it apparent that especially the ability to use new media is an important asset in case of an earthquake. This emphasizes the need to ensure and set up access to new media as quickly as possible.</p>
		<p><i>Considerations for flooding include information about water levels and dam breaches</i></p>	<p><u>Flooding</u></p> <p>Unless caused by tsunamis or dam breaches, flooding usually has the benefit of a rather slow onset. The detection and warning phase is prolonged due to weather forecasts and steadily rising waterlines. Making citizens aware of an actual threat in time is more likely in case of flooding compared to incidents with a more rapid onset. However, in case of flooding it is often the case that one may know about the incident in general but not about specifics: where exactly is the water now, when exactly will it reach a particular area or vital spot, will (makeshift) dams hold or not. Infrastructure necessary for the usage of new media applications is usually less (or at least less quickly) affected than in other incidents. New media can be used for various tasks within a flooding. An easy task is to keep citizens informed about the threat of flooding itself like he present water line and forecasts on the water-level. Giving advice will benefit from linking possible incidents to the water line to give citizens an understanding what the level actually means. This information should be at best related to an area relevant for them. For instance by showing endangered areas or the</p>



Guidelines		Summary	Comment/Explanation
Type of crisis			<p>possibility to put in an address and get feedback for it. Advice can be made available in written format and via video explanations. While routine or highly tasks can be easily just put down in written format (if you live in this area secure your belongings in the first floor) video advice is especially helpful when performing more complex tasks (how to properly fill and place sandbags). Especially breaches call for rapid action. In this case one possibility is to send out warning SMS to anyone able to receive it.</p>
		<p><i>In case of flooding, new media can provide information about the present situation for specific areas and advice for affected citizens on time</i></p> <p><i>With systems using new media, help and shelter provided by other citizens can be coordinated with the professional help of PPDRs</i></p>	<p>Another option is to encourage citizens to sign into a breach warning system. Such a system can have the benefit that a user has given the possibility of a breach some thought and (partly) considered appropriate actions in such a case. A system can provide early recommendations. When the alarm comes it is not so much a surprise as in case of the general SMS message since one has actively opted in. Both strategies complement each other rather than promoting a single one over the other. Giving appropriate advice is as important as giving a warning, especially as far as save routes and exit ways are concerned. Again a system could give advice depending on a citizen's present location and the route he is planning to take. This includes naming alternative routes if it can be foreseen that a certain road might experience trouble due to heavy usage. Citizens should be provided information about the systems "reasons" for a proposal to consent more easily (like <i>route blocked</i>). Another possibility to use social media is related to providing shelter. The easiest way is to inform citizens about the location of large shelters such as gyms or public schools. New media also has the possibilities to connect citizens willing to let single individuals or families into their home and those in need due to the flooding. Flooding are major incidents which have a slow pace and can be foreseen rather well citizens are willing to participate in filling sandbags and the like especially if no imminent danger exists for helpers. Reasonable weather conditions and seasons like the summer enhance the willingness to help. New media offers PPDRs the possibilities to get in contact with self organizing groups which seek to help to face the flooding. Getting in good contact is both helpful and necessary for PPDRs since they have the possibility to direct public efforts in the right direction and at the same time prevent citizens to endanger themselves in case of (unknowingly) taking action in an endangered area. Since flooding seems a fairly simple concept many citizens are not aware of secondary associated dangers in case of flooding. In particular, electrocution (possibly fatally) is a regularly overlooked issue which could turn a seemingly wet but harmless</p>



Guidelines		Summary	Comment/Explanation
Type of crisis		<i>The preparation phase in case of a snowstorm is important (stockpiling supplies running heating systems). Establishing local networks, new media can help to connect neighbours for sharing supplies and information</i>	<p>incident into a live threatening issue. Again new media can help to rapidly inform those endangered.</p>
			<p><u>Snowstorm</u></p> <p>Snowstorms are another example of crisis that can be forecast rather well. They have a detection and warning period of some sort. Contrary to flooding in which water levels can be forecast quite precisely forecasting the weather is less precise and subject to possible last minute changes. This is especially true for storms but also for snowfall. Large amounts of snow can be forecast but the situation is tricky since the situation might be considered severe when it is too late. The reason for this is that large amounts of snow might pile successively thus once it becomes apartment that even more snow will follow a substantial amount has already fallen. Taking actions might be difficult in this situation since large amount of snow already block the streets. Large amounts of snow falling in a short period of time also pose a problem if the particular area is underprepared.</p> <p>Particular problems arise from heavy snowfall. This includes blocked roads and railways, collapsing roofs, failing and freezing heating systems, shortage of supplies and medication and failure of electricity. Contrary to other scenarios evacuation is less an issue due to the fact that no imminent danger exists for a particular area and road blockage makes it impossible to evacuate most citizens. Heavy snow might also affect citizens on the road caught in their cars by the unexpected weather.</p> <p>New media and PPDR platforms can support citizen's needs. More so than in other scenarios the preparation phase is very important for a snowstorm. Being sheltered at home relies on stockpiled supplies and running heating systems. Extensive stockpiles are nonexistent in many household when a snowstorm hits. PPDRs can't reach every citizen thus providing means to connect (distant) neighbors becomes very significant. Usually social networks are not tied locally but connect friends and colleagues not necessarily living next to each other thus are separated by the snow. Establishing a local network can be very beneficial since it allows citizens to share supplies, heating and other necessities like medication if particular individuals run out of stock. The system can also provide information</p>



Guidelines		Summary	Comment/Explanation
Type of crisis			<p>about PPDR activities in the area and information about the distribution of important supplies. But not only are those in save shelter concerned. Citizens might be stuck on the road as well. Being caught in a car is still better than being out in the snow. This is especially true since white-outs make it impossible to detect the proper direction in case of a storm. Mobile applications allow positioning and way finding but they can be better used to inform those stuck on the road about the necessities to stay put and provide means to submit exact location and additional information about the number of people stuck in a car. This allows PPDRs to put emphasis on particular areas when attempting to rescue citizens from the storm.</p> <p>Excessive snow is also a heavy burden on roofs which might collapse under it. Citizens in areas not accustomed to heavy snow are usually not aware of this and greatly benefit from the information. However, cleaning a roof from snow brings along other risks like falling from the roof which is rather apparent but fortunately less severe than in non snowy times (given the height of the building, of course). Another underestimated risk is heart attack due to overexertion when shoveling snow, not necessarily on the roof but even in the streets. Ambulances of course will arrive with great delay at best. Citizens will need information to make proper judgments on what to do and not to do in their very situations which can be provided via social media as an expansion to other more classic types of media such as the radio, available in most cars.</p>
		<p><i>New media should provide information about protective measures in the beginning of a heat wave. Message recipients should be encouraged to address others as long as not</i></p>	<p><u>Heat waves</u></p> <p>Ongoing hot weather conditions can severely stress infrastructure and pose a threat especially to elderly and children. Running fans and air condition stress power lines. Areas generally low on water could run completely out of it. Since heat waves are a weather phenomenon they can be only partially forecast. It is possible to foresee hot weather for a few days even weeks are hard to foresee and it is impossible to foresee them in spring already. Consequently preparation is not commonly found especially if hot weather is an exception. Additionally the (usually legitimate) assumption that heat is only a temporary phenomenon hinders timely preparations. Contrary to other incidents infrastructure will not be damaged unless temporarily affected by power outages, possibly by fires as a secondary</p>



Guidelines		Summary	Comment/Explanation
Type of crisis		<i>endangering themselves</i>	<p>effect of the draught. Distribution of limited goods especially water and self-limitation in consumption (for instance electricity) is one major issue the other is to keep citizens from overstraining in the sun while performing physical activities / work. Extremely high temperatures might even damage (poorly constructed) roads if the asphalt melts.</p> <p>New and social media can be of benefit in heat waves if applied properly. Straight forward they can be used to provide advice and make citizens aware of protective measures in a heat wave. This can include personal advice how to protect against the sun as well as advice on saving water and electricity. Especially in peak times it is possible to ask users to minimize their consumption using mobile applications or SMS. Even in case of power outage it can still be possible to send SMS about the assumed duration of the incident on cell powered mobile devices. One issue has proven tricky, however, in case of heat waves. Since most users of twitter and social networks themselves are neither extremely young or old they do not feel endangered by a heat wave at all but rather enjoy the weather. Thus none of the primal target groups are reached via these channels. Instead a comprehensive strategy has to emphasize the messenger function of the primal recipients, who do not feel addressed in the first place. It is therefore important to raise their awareness for the responsibilities they have for others to make a beneficial dissemination of message content possible even in case of heat waves.</p>

Table 4; Guidelines, summary and comments concerning type of crisis



2.1.4 PPDRs needs in crisis and new media

Guidelines Summary Comment/Explanation		
PPDRs needs in crisis	Providing information to citizens	<p><i>Making citizens aware of the situation, communicate do's and don'ts.</i></p> <p>A straight forward need for PPDR organizations in case of major crisis is to make citizens aware of an upcoming or ongoing threat. Especially if citizens are unfamiliar with a particular threat it is important to inform them about dos and don'ts in case of a crisis. Depending on the crisis specifics content may vary. New and social media offers excellent ways of information dissemination. However, several aspects are important to consider. For PPDR organizations, an <i>information strategy</i> is of utmost importance since crisis situations generate a bottle neck situation for communication content. This means that excessive amounts of information are needed in a short period of time. The less common the particular situation will be the more extreme needs for information must be expected. These situations call for thorough preparation in advance of an actual crisis and early engagement of citizens into crisis communication.</p>
	Getting an overview of the situation	<p><i>Get detailed information about territory status and actors activities</i></p> <p>PPDRs in crisis need a comprehensive overview of the situation. This includes critical areas and infrastructures but also information about endangered citizens, damaged buildings, rising tides, pollutions, riots etc. depending on the type of incident. Particularly large incidents make it necessary to deploy resources where they are needed most. New media can have a big impact on the positive outcome of a crisis. Situational overview is important for PPDR organizations to make good judgment and decisions in a crisis. Own capabilities are not always sufficient to get a full situational picture. New and social media offer many possibilities to integrate citizens in a situational awareness concept. One major issue is the verification of information from the very location of an incident. A multitude of equivalent info from different sources can help to verify information even if no own forces are available there. Modern smartphones include a variety of sensors and positioning systems which can help to provide valuable data. Citizens are very willing to help others and authorities if properly addressed and hurdles in operating the devices are low. In addition to monitoring</p>



PPDRs needs in crisis			the net online platforms should provide means to integrate and connect citizens and PPDRs to involve the citizens rather than just collecting collect their activities and seek for appropriate content. Monitoring often is not a legal option, anyhow. Status reports and requests by citizens, as well as emergency messages, can already provide a basis for situational overview if properly visualized and provided accordingly to PPDRs. Reaching out to citizens, however, offers even further possibilities.
	Coordination of local helpers	<i>Get in contact with citizens on rescue activities</i>	Social networks and new media offer many opportunities and means to connect and share information. This enables citizens to self-organize rescue and support activities for instance filling sandbags or organizing shelter. At the same time official PPDRs engage in related (or the same kind of) activities and have other - usually more advanced or at least structured - means for crisis management. PPDRs are often well informed of their own strategies and have a situational overview. They know well what types of activities are beneficial and which ones on the citizen's site are (despite best intention) rather hindering to the overall situation. PPDRs should therefore be interested in getting in contact with citizen networks to share information about ongoing activities save zones and location in which help is really needed and in which it is not. This helps to channel the best intentions and resources of citizens into the right places at the right time. At best PPPDRs should try to provide the very platform or closely tie themselves to the platforms at which citizens coordination activities take place.
	External support	<i>Integrate external helpers not at the scene but in the online community</i>	Not only citizens at the scene can support PPDR activities but also the community of citizens in the World Wide Web. Recent examples are the use of Ushahidi in Haiti or the Syrian conflict to collect and visualize ongoing activities and conflict in interactive maps. External platforms provide access to civil experts 24/7 and helpers which provide distant support in a crisis for instance by giving advice, building maps, checking for destructions etc. This crowd-sourcing allows PPDR organizations to benefit from human expertise on tasks that cannot be automated but need human skills to be mastered, like assessing the extent of damage in satellite or airplane images of an incident. These tasks mostly concern analysis and information building. They are less about collecting local information which can be gathered by other means. PPDRs should apply proper means to provide data to the web for analysis or translation and ensure that they are well connected to receive the outcomes of these processes. Data then can be integrated into their crisis management strategies. In



PPDRs needs in crisis			addition to promotion such activities by the portals PPDR organizations can advertise the need for public participation especially if activities are easy but need a lot of manpower. Strategies must be developed to assess what kind of activities can and shall be crowd sourced and which can't to meet ethical standards.
	Rescue activities	<i>Information about victims, their status and locations</i>	One of the most important activities in a crisis situation is the protection and preservation of live and care of victims. Rescuing citizens in crisis situations needs individualized information such as their status, specific needs and location. In addition to standard call centers new media offers means to provide information in addition to the common notifications. In the simplest form chats can enhance the capacity of call centers but ultimately it must be considered that severe incidents make it hard for victims to write text messages in length. Alternatively apps and software can collect existing data (such as localizations) from smartphones and other devices. Especially preinstalled information can be send very easily with a single push of a button followed by a set of simple emergency related questions which make it easy to decide for PPDRs which citizen to address and what means to provide for a particular incident. Having particular answers for crisis situations seems very tempting but face the problem of data protection and security since a set of highly relevant data in crisis (such as health status, prescriptions etc.) is very interesting for hackers and agencies in non crisis times. Proper tools must carefully weigh benefits vs. risks and should only address the most important information necessary and additionally ask for more critical information if necessary, rather than storing it beforehand. However, especially if citizens who have severe conditions they might be interested to store and share this with PPDRs to ensure proper care and attention from the first minute on.
	Rumor control	<i>Detecting and countering false information in social networks and other media</i>	Ambiguity about a crisis situation can lead to speculation and rumor. This is especially true if the subject is ambiguous or unknown, which is the case in many crisis situations: "Is the water still rising?", "Is an aftershock to be expected?", "What is the nature of a substance released?", "Who is the perpetrator?" Speculation and rumor is initially not labeled thus but presented as facts which can lead to false conclusions and subsequent actions. PPDRs must therefore engage in social networks and platforms in addition to the mere provision of information. It is necessary to monitor ongoing communication and address false assumptions with correct data or request patience if information is not available, yet. This



PPDRs needs in crisis		<p>active rumor control needs PPDR personnel involved in monitoring and proactively addressing rumors in social networks which are a rapid multiplier of rumor. Corrective information can spread very fast as well if someone is taking care of this task.</p> <p>On the other hand, rumor in social networks is not always taken serious. Low trust in social networks often drives citizens into verification of rumors by other sources rather than acting on a single tweet or post. It is also important to note that a lack of information invites to speculate. Thus PPDR strategies should always be to inform as openly as possible about an incident weighting consequences of holding back information vs. omitting it publically. This is especially important, if particular citizens related to minority groups are involved in an incident. Omitting a name of a perpetrator is prohibited for good reasons: to protect his relatives from trouble. However, a missing name might encourage speculations about the origin of perpetrators suspecting them to be foreigners in case of a terror incident (even if this is not the case). Thus is possible to keep an identity secret but counter rumors at the same time by stating that the person is of no foreign origin (after finding this rumor on the networks). It is advised to give an explanation for statements made. Thus rather than just stating “There is no need to be worried” or “No terrorism seems involved” it makes sense to state good reasons for this assumptions (if possible).</p>
	<p>Sense making</p> <p><i>Providing a platform to actively engage in mourning or support it in other platforms</i></p>	<p>Crises, especially such that involve casualties, do not end with the acute crisis itself. The effects of a crisis may be ongoing for a long time, involve political consequences and the tendency to shape events retrospectively in a way that seems adequate. Citizens will use new and social media to express their feelings about an incident such as grief, prayers, and calls for justice and clarification of an incident. This process can be given space and accompanied by PPDR organizations or other organization involved in the management of a crisis: probably psychosocial emergency response personnel specialized new media. Having a place to discuss and mourn about the incident gives citizens the feeling of regaining control and sense behind an incident. It is not necessarily for PPDRs to involve themselves in these measures themselves. They could also relate to organizations involved and counseling which should be integrated into the online management of sense making and coping with the after effect of a crisis. Also links could be provided to independent platforms on the very topic.</p>

Table 5 - Guidelines, summary and comments concerning needs in crisis



2.1.5 Citizens needs and new media

Guidelines Summary Comment/Explanation		
Citizens needs	Information about the incident	<p>Citizens wish to receive information about the incident itself such as impact, duration, consequences.</p> <p>Crises are not on the day to day agenda of many citizens since they constitute rare incidents of negative connotation which seem to be disconnected from daily live. This effect becomes stronger depending on the time that has passed since the last incident. The situation rapidly changes once an incident has taken place. Then the need for information is suddenly very high. It gets even stronger the higher the personal involvement in the particular crisis is. Information needs concern the specifics of the very crisis at hand. Information relevant for the citizens includes all parts of the crisis. In particular those parts that have relevance for the individual and his close others. This concerns especially information about the impact or magnitude of a crisis, its duration in case it is an ongoing incident like a storm or flood and the consequences that arise from the incident such as no electricity, or evacuation etc. Information should be concise and easy to understand but offer opportunity for in depth search and expansion.</p> <p>Credibility is another key factor in crisis communication and information provided. New media offers a multitude of ways to provide information to citizens and allows them to get into detail on specific subjects much as they want to. However, two prerequisites are mandatory: available information and access to that information. PPDR organizations should structure information in advance and - if they do not generate content themselves - seek and assess information available online and distribute it in case of a crisis. At the same time citizens wish to see that particular information has been qualified by trusted sources. This should be visualized in the information using easily recognizable logos at best.</p> <p>To deliver information a functioning communication network is very important. Its features should be aligned with telecommunication experts to meet high need for information and limited broad width in a crisis. It must also be noted that new media is not the only channel to inform the general public. New media communication concepts must be in line with established concepts for other types of media already in place.</p>



Guidelines		Summary	Comment/Explanation
Citizens needs	Information about dos and don'ts	<i>Citizens wish to receive information about appropriate actions in case of an incident. This is especially important if the incident is unfamiliar.</i>	Especially incidents with severe imminent consequences and / or a long duration raise the question what to do and what to omit. Usually citizens care little about preparation for an incident unless it seems certain, severe and relevant to them. Even in this case they need proper skills to act. However, once an incident has taken place or is about to happen, citizens are keen to know more about the situation at hand. Particular crisis situations come along with particular aims and conflicting goals at the same time: saving property but not endangering life, seeking shelter but not staying at home. Citizens seek advice on what to do in general but also how to decide and especially what not to do (despite best intentions or the strong feeling that it's necessary to do so). This includes information about dangers and advice as well as unknown facts of any kind. Particular types of incidents such as stroke while shoveling snow or unintended electrocution in case of flooded houses are of great importance as well. Social and new media are helpful to provide information about dos and don'ts in crisis situations. Systems provide means to supply citizens with the most critical information as well as procedural details on tasks which are particularly tricky or hard to accomplish if done for the first time. Information should be concise yet comprehensive if needed and explain the very reasons for a particular behavior. This is important especially if it is advised to act or omit behavior which is contrary to initial ideas a common citizen has about the situation.
	Information on background	<i>Especially man made incidents (but others as well) ask for detailed information on the case. This can easily generate rumors if not addressed</i>	Knowing the background or the reason for an incident is of interest for most people since it helps them to sort things out and put them into perspective. Several types of incidents are (at least seemingly) self-explanatory as far as their cause and background is concerned. This is especially true for natural disasters and incidents which have a natural cause. In this case citizens consider the incident to be obviously related to the natural phenomenon. However, especially if an incident is uncommon then even natural disasters get an interesting background for instance a weather phenomenon or heavy rain and melting snow in another region upstream making rise. Phenomenon which have a man made cause, or are at least partially related to human actions such as dam breaches or HAZMAT incidents



Guidelines		Summary	Comment/Explanation
Citizens needs		<i>properly.</i>	are very interesting for citizens to be informed about. The very cause of an incident is sometimes less important PPDRs concern than dealing with its consequences. It is still important to engage in explaining it. This is especially important if new media is involved. Rumor can spread within very short time intervals. Terrorist incidents with a clear human perpetrator are very unsettling for citizens because repetition seems likely. The search for the perpetrators becomes a pressing matter. In particular, information which contradicts spontaneous assumptions (such as perpetrators are no foreigners) is relevant to share with the general public. Strategies, however, must be closely coordinated with other agencies involved in crime investigation for instance rather than distributed freely. Until then rumors should be controlled and corrected since especially unknown situations generate false assumption which can easily have severe consequences for victims or seemingly related minorities.
	Information about PPDRs status and activities	<i>Citizens wish to receive information about PPDRs actions. This is especially important if problems will get addressed successively.</i>	Crisis situations are very stressful for citizens. Even if they have managed to inform PPDRs about their current status it may take some time until help arrives. In crises situations citizens cannot easily rely on a rather fixed time interval to expect help from PPDRs. Rather than expecting PPDRs to arrive within 15-20 minutes the actual time interval is unclear. Waiting for help is a very stressful. Hanging up the phone means the end of contact between PPDRs and citizens in an ordinary setting. This must not be true using new media applications. Information about the distance between PPDRs and citizens can be very reassuring and calming for citizens. PPDR organizations of course will not completely share situational details and strategies with citizens. Still, new media allows giving certain information about the status of rescue activities. It can inform about the status of a process and can give reassurance and options to check the status of the own request for help. Prolonged waiting periods can be structured like this especially if the time intervals are enriched with relevant information. This shortens the subjective time interval since something can be done in the meantime about it rather than just waiting for help.



Guidelines		Summary	Comment/Explanation
Citizens needs	Information about relatives, friends and loved ones	<i>Citizens are especially interested in information about the condition of close relatives. It is important to know if the loved ones are alive, injured or unharmed. This can also include pets</i>	<p>Citizens are not only interested in an incident out of curiosity but in its consequences - especially <i>individual</i> consequences. Such personal consequences are not limited to the individual but include family, friends, close others, important items, and living-beings of relevance such as livestock and pets. Not knowing about the status of close others is unsettling especially over a prolonged period of time. Citizens will try to contact close others and seek information about their status by themselves not waiting for PPDR organizations to provide them with information. The most common way of citizen to citizen communication is the one used on a daily basis. Especially personal contact can provide reassurance. Using the phone is the basic strategy for citizens deeply concerned about the status of close others. This heightened and condensed need for communication conflicts with capacities of communication networks, especially if an incident has a sudden onset. An incident could have completely destroyed capacities or the communication needs exceed those capacities left available. PPDRs should therefore consider enhancing capacities in affected areas for citizens to communicate. Reasonable strategies to properly use limited broad width should be communicated including explanations for the behavior and recommended emergency procedures such as: "Phone lines have been temporarily disabled to prevent a breakdown. Please use SMS instead".</p>
			<p>A lack of information and communication in crisis must not only be caused by technological difficulties. It could also be caused by the inability of the individual to communicate for instance due to injuries or even death. PPDR crisis management platforms should provide citizens means to search for relatives and close others. A good system would allow to match requests of close others and the citizens willingness to disclose information about his status. If a citizen has lost his phone and important papers he still is looking for means to communicate to anybody whose number he does not remember by heart. A system must give citizens the opportunity only to disclose or seek requests that are especially relevant for him rather than publishing lists of survivors and their status. Also it is important to make PPDRs - for instance personnel running shelters - aware that such systems exist. They can make survivors aware of thus systems giving them an opportunity to communicate with relatives and close others as soon as possible. This sensitive functionality must not be taken lightly, however. Rather than directly publishing information about citizens location, people should be given the opportunity to opt into these procedures. Otherwise ethical difficulties</p>



Guidelines Summary Comment/Explanation		
Citizens		
		might arise as the system could be misused - under the cover of a crisis situation - to find or track persons which would rather prefer to stay anonym.

Table 6 - Guidelines, summary and comments concerning citizens and responder

2.1.6 Level of involvement and distance to incident

Guidelines Summary Comment/Explanation		
Level of involvement		
	Involvement	<p>Crises, especially big incidents with a high number of casualties, concern a wide variety of citizens. Big incidents by their very nature involve more citizens and personnel than small ones. In particular, new media provide platforms for all kinds of actors to get involved in an incident from the first minute on. A multitude of different levels of involvement is given for the different citizen actors in a crisis. The next sections describe the citizen's involvement by two axes: The first axis is the personal involvement in the incident, whether somebody is actually facing personal consequences from an incident or is involved without having to face such consequences. The second axis is the distance to the incident. The first axis is divided in <i>involved</i> vs. <i>not involved</i> the second one consists of <i>direct</i>, <i>nearby</i>, and <i>long distances</i> to the incident.</p> <p>Since personal involvement may consist of many forms the distinction between involved and non involved citizens is ultimately hard to draw. Somebody who is not affected and does not care much about an incident is not involved. The very opposite would be citizens in the center of a crisis experiencing its impact first hand.</p> <p>Distance to an incident is easy to estimate if an incident has a clear localization but</p>



Guidelines				Summary	Comment/Explanation
Level of involvement					becomes more and more complicated if an entire country or region is affected by a heat wave for instance. Distinction as <i>nearby</i> and <i>distant</i> therefore cannot be set in kilometers or meters but reflect the possibility to get involved in the crises physically. The next points give examples for the involvement and the role new media can play for the particular actor as far as citizens are concerned.
	At the scene and affected			<i>Citizens affected by the very incident, several possibilities on how this impact can look like</i>	Citizens directly or possibly affected by an incident are the classic target group for PPDRs as far as warning, recommendations, search and rescue, provision of shelter, decontamination and other activities are concerned (depending on the nature of the very incident). These citizens can greatly benefit from timely, easy to understand and comprehensive information by PPDRs. They are also willing to help and to provide information about their own status, given that they are not too preoccupied with their own situation, a case of emergency in which they will most likely seek the help or assistance of PPDRs anyhow. Especially if an incident is to happen for sure or has happened already and the citizens expect or experience personal consequences the willingness to comply and listen to advice and recommendations is high. However, proper advice must consider the citizens <i>ability</i> to comply in the first place. This could include for instance a given lack of cars for evacuation or demolished roads making it impossible to pass them. Applying new media in this particular case is discussed in the various sections of the guide. However, other not that common groups, take part in a crisis, as well. They are discussed in the following sections.
	At the scene but not involved (yet)			<i>In the center of an incident but unaffected by it due to specific circumstances</i>	In the very hot zone of an incident, particular individuals or areas may be kept unharmed and unaffected even if right next to it massive destruction has occurred. These persons or spots may function as a resource for other individuals. Depending on the nature of an incident this can include, for instance: non-affected buildings (earthquakes), extensive water supplies or cooling devices (draught, heat wave), good physical conditions or immunity by



Guidelines		Summary	Comment/Explanation
Level of involvement			<p>vaccination (pandemic), living in upper floors (flooding), even pure luck like having the windows closed when a toxic gas plume passes by (HAZMAT incident) or other conditions which distinguish between affected and non-affected citizens. Still, being unaffected in the first place does not negate the possibility to become a subsequent victim but it also provides resources for those suffering from effects of the incidents such as finding shelter, sharing supplies, providing first aid, digging out victims, rescuing important goods etc. Given the fact that an extensive crisis might affect the entire infrastructure on the long run even those labeled as <i>unaffected</i> are only so for a certain period of time until these effects will grow onto them, as well.</p>
			<p>New media can be beneficial for directly not involved citizens in several ways: They can make citizens actually aware of an incident in the first place. Given that specific individuals remain unharmed they may have entirely missed an incident. This case is more likely if the specific nature of an incident allows it of course (for instance an ongoing HAZMAT incident with invisible substances) but could even be the case for easily perceivable incidents like flooding after a dam breach if it occurs at night and citizens can't see affected areas from his apartment in the morning. Messages sent to smart phones thus could make citizens aware of such missed incidents. New media also offers means to assess the individual status of citizens not only focusing on emergency situations they are in but could also assess their resources and possibilities to aid others. This resource based approach should allow making others aware of these possibilities but only if the specific citizens actively agree to communicate them. In case that citizens were not affected in the beginning of an incident they might falsely believe to be subsequently unaffected as well. New media can then be used to assess the individual status of citizens and make them aware of their individual risk by directly addressing false assumptions about the own safety. New media might also incorporate functions which allow citizens to report the status of other citizens possibly in danger and need for help. These features could include geo tagging and other means to provide relevant data about the incident.</p> <p>Non-affected citizens in the very center of an incident might also come to false conclusions about their individual need for evacuation. In this case new media solutions can provide means to make calculations about individual supplies and if they are sufficient to stay or leave an area.</p>



Guidelines		Summary	Comment/Explanation
Level of involvement			
	Distant and involved	<i>Not directly affected but highly involved due to family or other ties with victims or general interest</i>	<p>Despite the existence of long distances between an individual and a crisis, high involvement is possible, even likely. High involvement may spring from various reasons for instance actually living in the area (but being on vacation or a business trip) or having friends and relatives there. Citizens might also be involved from the distance if they assume that the crisis might reach them eventually as well for instance if they are in the line of a tornado, live downstream of a river with high moving watermarks, fear to be next victims of an infection taking place or are afraid of radioactive leaks and food contamination. People might also be engaged in the solution of a crisis from the distance even if not a PPDR themselves: a possibility which came up lately with the availability of new media to citizens.</p> <p>Citizens can be motivated to help others even if no former bonds apply for instance out of pure sympathy or the reassuring feeling to be able to do something in a seemingly uncontrollable world. Specific types of disasters allow engaging large crowds of citizens willing to do something about an incident. This is particularly helpful in cases which require perceptive skills computers cannot provide easily. For instance in case of extensive, yet heterogeneous damage in a large area satellite pictures may be available. The area in question may be too large to get a quick overview. Several new media based systems like <i>MapMill</i> allow to easily integrating citizens into picture assessment. The speed of assessment can be largely increased by the number of participants. New media applications of PPDRs therefore should allow easy access for citizens to such system. Their use in a crisis should be accompanied by a media strategy which makes citizens and news networks as mediators of information (also in other parts of the word!) aware of the systems and the assistance they can provide (beyond donating money) from afar.</p>



Guidelines Summary Comment/Explanation		
Level of involvement	Distant and uninvolved	<i>Distant actor not particularly involved</i>
		<p>A major crisis causing extensive damage or many casualties can reach a wide, distant audience not directly involved in the incident. For these people the incident is merely news which - depending on various factors - touches them more or less. Especially similarity to the victims and uncontrollability of an incident makes citizens very aware, concerned and consternated. Compassion with victims is another predominant emotion. Beyond mere sympathy or disinterest citizens might be motivated to donate for the victims of as disaster depending on factors like (seemingly) self-inflicted vs. accidental cause of an incident, negative stereotypes about the victims or the perception that other authorities will take care of the incident anyhow. The last point explains rather low donations for other industrialized countries in comparison to underdeveloped ones that are less related to European countries than their neighbors. If not involved in an incident people can still be very interested in an incident. Some will feel the need to express sympathy even to donate. Directing citizens to web pages where it is possible to (merely) express grieve and sympathy for victims of a disaster can be very helpful. New media systems should provide means to do so either directly or by providing links to well established NGO organizations or charity organizations. Getting proper donations is affected by parameters described above. Another important factor, however, is the easiness of executing a transaction. New media mobile applications have developed easier means of donating than filling out a bank form - especially after the introduction of the IBAN system. Sending SMS for instance or using PayPal for donations. Winning citizens to donate relies on outstanding incidents which are usually given in case of a crisis. Easily donations via well-known systems to trusted institutions, which make it clear that the majority of money (the whole amount at best) will directly go to those in need, can encourage distant uninvolved citizens to donate in case of an incident. This approach can be enhanced if properly explaining why money is rather helpful in comparison to donating private possessions and why particular areas are in need for help despite the assumption that they could properly provide for themselves. New media can combine both strategies by systems for easy donation which can be enriched with information for those unsure about whether to donate or not.</p>



Guidelines Summary Comment/Explanation		
Level of involvement	Nearby and involved	<p><i>Citizens nearby not directly affected yet involved. Close enough to potentially assist</i></p>
		<p>Citizens nearby and involved are a diverse group. They partially consist of persons actually coming from the area of the incident but are not present at the moment a crisis situation occurs. Often they are close by but not directly affected. This constellation is likely for citizens who have left an area or city to go to work, school, study elsewhere or simply went shopping to another location. Being abroad is another, rather distant, possibility. Once a crisis occurs these nearby citizens are highly involved in the crisis either via close others who are still in the area or by personal property. They are very interested in information about the incident yet capable, at the same time able to reach the area, and possibly willing to do so to get a first hand overview, even to deal with the situation themselves.</p> <p>Depending on the very nature of the incident nearby citizens must be well taken care of as they are likely to take action themselves especially if no or little information is available. Due to personal involvement their goals might not be completely altruistic (want to help) but focused on their own belongings, kin etc. This is perfectly understandable behavior and must not be a problem if the incident permits self-help. It can, however, become problematic if the nature of the incident rules out to engage in self organized help without endangering oneself.</p> <p>The motivation for action in such cases springs from worries and uncertainties about the own properties, or status of kind and family. New media can help to provide information about the actual status of particular areas and thus prevent uniformed actions. If citizens from a particular area or institution (a school for instance) have been evacuated to a save spot already no parents will have to fetch up anybody at the school. If a particular area is defended against the water not at the own gate but at a particular damn citizens will be very willing to help there if provided with appropriate information. Also reasons to exclude citizens from particular areas can be mapped and disseminated. New media devices can be set to address citizens if approaching the particular area and inform them about the safety zone and reasons not to go there. Mere information not to go to a particular area will be in conflict with own goals – will still feel the need to save and protect – new media systems will rather have to supply means to inform about safety measures and provide contact to PPDRs to get information and the status of close others.</p>



Guidelines				Summary	Comment/Explanation
Level of involvement					<p>Another common option would be that citizens do not come from the area in the first place but live nearby are willing and possibly have the capacities to do something. These individuals are either motivated themselves to help and assist or are easy to reach and integrate into crisis management strategies if properly addressed and approached with requests that fit their impulse to help (see section <i>nearby uninvolved</i>).</p> <p>Also make clear that it is not necessary to go oneself but leave responsibility to PPDRs and other rescue personnel. If that is the actual case.</p>
		Nearby and uninvolved		<i>Citizens not affected by the crisis itself, yet close enough to potentially assist</i>	<p>Individuals nearby but uninvolved can be a big resource for PPDRs. They are close enough to engage in the incident but will do so only if properly addressed and motivated. Otherwise (unlike those nearby and affected) they are not willing to engage in the incident. This attitude can be very beneficial if it is not advised to enter the crisis zone and leave PPDRs to cope with the situation themselves. Still, a lot depends on the nature of the crisis at hand. If those nearby might be the next in line it is important to make them aware about the risks they face. If they are actually save it is important to address any rumor that states otherwise. These unaffected citizens might offer shelter to those affected or take part in crisis preparation in another area nearby. PPDRs strategy on new media concerning these citizens should depend on a thorough analysis on the situation best done in advance. This analysis should take into account the crisis at hand the own capacities to handle it respectively the need to call for public support to handle it even better.</p> <p>If help is beneficial then new media can be part of a complete media strategy that encourages nearby uninvolved citizens to provide aid and shelter. The approach should emphasize the actual need, the benefit for others and address potentially hindering facets and provide a solution (like false claims of pollution in an area or means to be transported to the area via shuttle busses for those that do not own a car). Messages on smartphones might encourage citizens to take part in any activities if they got time and resources by providing an overview of the needs and the opportunity to join a community of helpers in an incident. Alternatively devices can be used to reassure citizens in their decisions not to</p>



Guidelines	Summary	Comment/Explanation
		engage but to let PPDRs deal with a task that is best met with proper equipment and experience.

Table 7 - Guidelines, summary and comments concerning level of involvement



2.1.7 Phase specific approach

Guidelines Summary Comment/Explanation		
Specific phases	Phases in Crisis	<p>Crises can greatly differ and be very unique given the particular type of incident, involved groups, weather conditions, actual location of an incident etc. Other aspects are stable at the same time. New media can be classified and evaluated depending on their benefits and drawbacks with respect to these general features:</p> <p><u>Crises Phases</u></p> <p>Crises include several different phases which greatly impact strategies and opportunities to use new media within the crisis. Four major phases are: preparation phase, detection and warning phase, emergency phase and the recovery / aftermath phase of an incident.</p> <p><i>Preparation phase</i></p> <p>Maybe the most important phase for a crisis is the preparation phase since subsequent activities and procedures will build upon it. Subsequent communication and interactions between PPDRs and citizens will rely on crisis related knowledge and trust build in advance of a crisis situation. Especially the preparation phase offers the opportunity to make people aware of dangers the population faces in case of a crisis and appropriate countermeasures. At the same time PPDR organizations have the opportunity to involve and bind citizens to information platforms. This approach ensures that citizens are well acquainted with tools which will become relevant in crises as well. It includes getting connected in social networks, making citizens aware of alternate connection to PPDRs in addition to dialing in, disseminating online information and tutorials on preparation and behavior in crises situations and information about risks, tailored to the specific threats a particular area has to face.</p>
	<i>During the preparation phase, it is important to make people aware of dangers and to introduce them to appropriate platforms</i>	



Specific phases

Detection and warning

The importance of detection and warning for a particular crisis situation can be mixed. The reason for this is that specific types of crises either have prolonged or very short, even nonexistent, detection and warning phases. Incidents such as heavy storms, hurricanes, or flooding can be forecast in most cases. Others such as earthquakes, collisions, or terrorist attacks have a sudden onset.

In case of incidents which have a certain time interval to their onset social media offers opportunities to ensure contact and information flow between PPDRs and citizens. New media can also be beneficial if the warning period is very short. In incidents that show a delay of several minutes, even seconds, new media can save lives if applied properly. Warning systems directly tied to sensors can initiate the sending of warning messages the very moment an incident is detected. This may give citizens the crucial moment to hide under a table, the door frame or leave the entire building, etc. It is very beneficial to tie such warning messages and incident related information to information campaigns in the preparation phase. This ensures that citizens will understand messages properly. A message out of the blue might not be taken seriously even if sent by an official institution. A citizen might think that being contacted by an unfamiliar route or channel is not a genuine message but in fact a hoax. Unfortunately there would be no time for repetition which excludes the opportunity to get necessary attention in a second or third round.

Prolonged warning periods are of high benefit for new media and crisis communication. Adequate information meets high interest and receptiveness, due to the imminent crisis at hand. It is necessary that individuals consider the threat to be real and relevant for themselves or close others. New media offers several ways to address citizens by sending them information or links to relevant information hosted in the net. Another way to disseminate information is to use social media. If the time horizon is longer than just a few minutes, like hours or even days - information can be disseminated via social networks contacting those related to PPDRS at first and waiting for the information to disseminate through the network. Particularly vulnerable individual might be addressed by contacting networks related to the group. For instance information on how to keep medication fresh and usable via disease related networks or addressing localized groups to make them aware of dangers in their particular area. New media in crisis situations complements existing media channels such as TV or radio. It should be part of a complete strategy which gives global



Specific phases		<p>and important fact in the big news but uses internet based communication platforms, social networks and video archives for additional content.</p>
	<p><i>For the acute phase plans for a quick repair of new media networks should be in place</i></p> <p><i>In the recovery phase people retrospect the incident and the crisis response.</i></p> <p><i>New media provide information collected from many sources</i></p>	<p><i>Acute phase crisis response</i></p> <p>Once an incident has taken place the acute phase begins. The detection and warning period could have been long or short. A longer warning period, however, might affect the acute phases since more citizens could have evacuated, safely sheltered or taken other precautions to withstand a crisis. Depending on the incident the usage of new media in crisis might be impaired, especially if necessary infrastructure has been affected as a direct or indirect consequence of the incident. Crisis management should analyze the threat to relevant infrastructures and plan for countermeasures to ensure quick re- installment of emergency online access. This might include plans to prioritize repair or technological means to substitute it quickly.</p> <p>Advice in crisis situations can be immediately made available via the channels which report an incident in the first place. This calls for a plan to generate the relevant information online before an incident has occurred to make it immediately available if needed.</p> <p><i>Aftermath and Recovery</i></p> <p>The aftermath or recovery phase of an incident officially starts when the actual incident is over. Depending on the nature of an incident it is more or less clear when this phase begins. The line is often hard to draw. An incident gradually develops into this phase. The acute, initial threat is over and major consequences have substantially decreased. In some cases restoring to normal is done quickly like putting power back on and dealing with the consequences of the blackout. In other cases infrastructure could be completely destroyed, including many homes and buildings. In the aftermath of an incident more and more details about it will become visible and the initial failure of systems (if a man made incident) or the handling with the situation will be thoroughly analyzed. Now the initials communication strategies will be assessed and false or insufficient advice or measures can be criticized. Especially the amount of individually collected data about incidents (like pictures or videos from smartphones) gives eyewitness like information about incidents that would have been subject to subjective recall. This emphasizes the need for an open and honest information strategy of PPDRs about incidents and failures made in the process of fighting the crisis.</p>



Specific phases		<p><i>Information from the recovery phase can be used for the next preparation phase</i></p>	<p>Still much information is needed by citizens about the aftermath concerning progress of clean up, long term effects and countermeasures for upcoming rumors about the incident (for instance concentrations of toxins in mud after a flooding, half-life of substances released in a HAZMAT incident). New media can offer citizens options to relate to newsletters and other forms of information (RSS feeds, SMS, messenger news) about an incident thus giving PPDRs the possibility to provide information first hand to those interested about it. These measures should be part of a wider communication strategy that starts early - possibly in the preparation or warning period - thus allowing those interested in the incident not only to follow its course but the aftermath, too.</p> <p>It is fair to state that “after the incident is before the (next) incident” - this means that particularly areas affected by an incident might be affected again like suffering another draught next year or being flooded again etc. After the incident many citizens are very aware and receptive to information related to prevention. This chance to disseminate information should be used. Citizens could be provided checklists and information on how to be better prepared next time.</p> <p>Not only actions or future actions are important in the aftermath of a crisis situation. It is also the time to grieve for what is lost, especially if citizens have died in the course of the incident. Unexpected incidents with large numbers of dead, including children and otherwise healthy individuals, involve large public involvement. Rituals often help citizens to better understand and cope with the loss. New media can provide means to engage in this process of mourning allowing citizens to write condolences or take part in such activities from the distance even if not present at the ceremony itself.</p>
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Table 8 - Guidelines, summary and comments concerning specific phases

iSAR+ Recommendations for Citizens

Crisis situations are rare incidents but can have severe consequences for you, your family and close friends. While preparation for crisis situations usually plays no important role in daily life it can be very beneficial if a crisis situation is at hand.

This guide provides recommendations and explanations on how to prepare for a crisis situation, what to consider when the incident is about to happen, ongoing, and when it is over. Its focus is on the preparation and the usage of **mobile devices and social media** in case of a crisis event. The short guide provides first insights to the topic. It is not exhaustive, nor does it include information on specific crisis, but we hope to encourage you to engage in the topic for better safety and security.

Preparation – the phase before an incident

Why is preparation so important? A crisis can be a very stressful experience especially if you are affected personally. If a crisis situation is at hand everybody hopes to be well prepared and to know what to do. Many things that would become handy in a crisis situation, however, are only available if taken care of in advance. This is the same for new media as it is with a fire extinguisher: you only can use it if you have got one. It is important to note that these actions concern *new media*, not preparation in general. The following actions can help you to be better prepared:

- Get acquainted with emergency numbers relevant for you. Special numbers might exist in addition to 112. Save them in your phone. If you are going abroad do the same with foreign numbers
- Many websites give valuable advice in case of a crisis. Collect links where you can get information relevant for the area you live in. You will not have to search for it when time is short
- Consider that apps might be provided which give you an early warning. Download them to your smartphone and familiarize yourself with their functionality
- Get acquainted with #hashtags relevant for particular crisis if you are on Twitter
- Consider to join crisis related groups in social networks
- Get acquainted with your smartphone and become aware of the functionalities your smartphone offers to send geo-locations. This can be very helpful to let helpers know where you are or where a particular picture has been taken
- Get batteries for devices which depend on them. Consider charging devices which are operated manually or by solar panels.

Warning – an incident is about to happen

Some incidents happen suddenly, without warning, while others can be foreseen. Earthquakes usually have little or no warning time but severe storms do. Many things relevant in the preparation phase are important in the warning period as well, especially if they have not been done yet. Depending on the length of the warning period – which depends on the particular crisis at hand – different preparations can be done:

- Identify and join groups which share news about the crisis event to enable you to access relevant information



- See if relevant #hashtags have already established and start to follow these for information and warning
- Search for local institutions and see what they are preparing for. See if they have any recommendations for the crisis event or seek volunteers to prepare for the incident
- Join RSS feeds and other news systems to be informed first hand by institutions releasing information about the crisis situation.
- Think about how you could provide the information you acquire via new media to friends and family members who are not familiar with such devices
- Charge up all your mobile devices to be prepared in case of a power outage

Acute incident - the disaster is at hand

Once a crisis has started getting proper information and following advice from public protection and disaster relieve personnel (PPDR) becomes very important. The situation will be unclear and confusing therefore being up to date about the incident and PPDR actions and plans can be very beneficial.

If you are directly involved in the crisis:

- Actively seek information rather than waiting to be contacted or just assuming everything is all right since you have not been told otherwise
- Consider new media as a possibility to inform about your status if communication is complicated in the area you are in
- Be aware that the Internet is not the only source of information. Focusing just on the Internet might make you unaware of what is going on around you
- Social media is not a substitute for the emergency number if you need to use it. Try to reach PPDRs via their call centers to make them *directly* aware of your situation
- Consider social media as an *additional* option when not able to reach help otherwise
- Channels might be jammed. SMS or LTE might work better than a call. So consider asking someone else to make the call for you, but actively keep trying yourself unless you have been informed that help is on the way
- Do not block limited bandwidth if possible. If unaffected or waiting for the PPDRs, use SMS or other means to inform family and friends rather than blocking limited sources with additional calls
- If you are willing to help in the crisis look out for coordinated activities promoted in social networks rather than acting out of best intentions but possibly unaware what is really needed.
- Provide others with knowledge about resources you can offer in a crisis, so they are aware of it (shelter, electricity etc.)

If you are not directly involved in the crisis:

- Help others in need rather than being a mere bystander (if not endangering yourself, of course)
- Do not endanger yourself or others by taking pictures or filming
- Do not hinder or slow any official activities just to film or take pictures
- Consider the personal rights of victims when taking pictures or filming. Sensationalism has no place in a crisis. Not every picture must go on social media
- Identify the hashtags relevant for the particular incident and use them when providing or searching information
- Use technology to make others aware of your exact position (geo location)
- Check the information you receive for 'believability'. Not all content must be true



- Use reliable networks (for example, ones you might have joined in advance) and other trustworthy sources
- Share information but try to verify what you share. If you are in doubt about information consider not sharing it, or making sure the unconfirmed nature of the information is highlighted
- Be especially sensitive if sharing information about possible perpetrators. This could easily initiate an unjustified witch-hunt and subsequent charges against you
- Concentrate on the crisis itself rather than using it to make a political statement or to prove a controversial point

Aftermath – the incident is over, is it?

Be aware that an incident might not be over even though it seems to be. This could include aftershocks in case of earthquakes, a second squall line, or delayed effects of toxins and consequences which follow an initial event like contagion due to polluted water or problems arising from power outages. Even if an incident is actually over its psychological aftereffects may not wear off easily.

- Keep yourself informed, be alert and aware that the incident might not be over, though it seems to be
- Consider correcting information sent by yourself during the incident that has proven to be false, to ensure nobody bases decisions on inaccurate or outdated information
- Keep using new media to inform about ongoing consequences such as the destruction of infrastructure and try to receive and share information how to cope with it
- Be aware that the internet offers means to console and mourn in the aftermath of the incident. This can be helpful for many not able to grieve at the exact location where an incident occurred. Other citizens might be able to grieve and discuss with you. Together you may come to a better understanding of what has happened
- Look out for and provide others with information about clean-up activities in your area. Try to coordinate your activities with others and official institutions
- The time after an incident is the best moment to engage in building networks for future incidents. Many people usually not engaged in preparation will do now since the experience is still fresh
- Try to establish hashtags and get followers on new media channels which relate to crisis situations relevant for your particular area
- Take the chance to learn from the incident. This means a social media based warning system or application that has worked well in a particular incident might be beneficial in your area as well (even if the threat profile in your region is a different one)

2.2 Organisational Guidelines

The guidelines presented here are based on the research undertaken with PPDRs in Finland, France, Ireland, Portugal and the United Kingdom, as well from documentary knowledge elicited about emergency management systems and practice in other European countries. They are based primarily on the on the knowledge derived from the iSAR+ Showcase events in Portugal, Paris and Finland, and on the experiences of PPDRs in the UK and Ireland. Although similarities in the emergency management systems across these jurisdictions have been observed, the local operational variability noted between PPDRs across organisations type and locations means that these guidelines should be interpreted in the context of local operational realities. They should be considered as a set of heuristic guidelines to be adapted to the local needs of a specific PPDR intending to optimise the capabilities provided by on-line communication and social media resources. The Organisational Dimension guidelines are structured according to three sections that address:

- Operational Processes and Organisational Systems
- Human and Organisational Factors
- PPDR and Citizen Engagement

Each of the guidelines is presented with roadmap descriptions to explain how they may be implemented. Each of the guidelines should be considered in the wider context of the other Organisational Dimension guidelines presented below, and in relation to those of the Technological, Ethical and Legal, and Human Dimensions included in this deliverable.

2.2.1 Operational Process and Organisational System

2.2.1.1 Human-Centred CONOPS Implementation

To fully understand how a computer mediated communication system such as social media capability like iSAR+ can be integrated into the emergency management system a human-centred concept of operations (CONOPS) is proposed. This implies that an integrated system representation is developed to enable the implementation and change-management processes necessary to realise the new system capability that optimally meets the needs of the system users. From the work carried out it is anticipated that the main impact of iSAR+ and similar tools would be at the Strategic Command Level as here is where sufficient time is afforded to develop an emerging situational picture over the duration of an incident. However, the Tactical Command Level may also be appropriate to accommodate these capabilities. Existing systems for transfer of distilled information to the Operational Command Level could be employed.

To achieve this it is important also to consider the vertical relationship between the iSAR+ users and other emergency management system actors at strategic, tactical and operational levels as well as horizontal coordination within and between different PPDRs. To achieve this, clear lines of responsibility, leadership and agreed levels of participation from the system stakeholders needs to be obtained across the whole system, its actors and their PPDRs. Through this collective effort a sufficiently detailed description (mapping) of the current inter-agency CONOPS including the existing human, technological and informational resources available can be undertaken. This can be done in line with existing PPDR inter-agency activities such as working groups on emergency coordination, planning meetings for specific events (e.g. major sporting, cultural and political events), and the enactment of table top and live exercises. Similarly proposed implementation of new system assets such as

social media capabilities can be modelled and trialled in these off line scenarios. The careful implementation of new solutions need to be clearly communicated and include opportunities for continued feedback to allow new solutions to settle into the overall CONOPS and functioning system.

2.2.1.2 Using iSAR+ in Crisis and Non-Crisis Modes

The iSAR+ platform has been developed for the sole intended use during major emergency incidents and crisis events. However, it is proposed to extend the use of iSAR+ capabilities into 'normal' emergency management operational activities. The rationale for this is to help ensure normalisation of use by PPDRs and citizens rather than being required to activate a tool that users may be unfamiliar with. Therefore, one of the aims of this guideline is to help ensure competence, trust and acceptance of the use of the capabilities of iSAR+. In addition, in line with resilience concepts that are increasingly being adopted by PPDRs, the everyday continued monitoring of social media trends can help identify emerging threats (especially in slow onset emergencies) that can possibly be actioned earlier with fewer resources required and less disruption to society. Through this approach it is anticipated that in the event of a crisis the impact of iSAR+ can be optimised.

To realise the necessary infrastructure and organisational policies, procedures and practices would need to be available for normal situations that can also be escalated for larger emergencies and crises. The awareness, trust and competence required for citizens to use iSAR+ can be achieved through greater public awareness campaigns through the tradition and social media outlets as well as through educational programs with schools, workplaces, community groups and other organisational settings. The daily use of iSAR+ by PPDRs could include observation in times of increases in volume of calls to the communication centre, or that pertain to a specific incident or region may be picked up by the platform. In such situations the system could be used as a way to contact citizens who are directly affected and provide them with relevant information on how to respond to the event. This information could include preparatory advice, instruction to leave the area, announcements that the call centre is experiencing a high volume of calls, alternative agencies to contact for relevant information, expected duration of the event, or updates on PPDR activities to manage the event.

2.2.1.3 Enabling Familiarity and Positive Attitude of Social Media by PPDRs

To help enable and understanding, trust, acceptance and positive regard of iSAR+ the members of PPDRs are likely to benefit from access to and use of computer mediated communications such as social media applications as part of their normal organisational activities. This can be part of a strategic training and educational approach that firstly familiarises and eventually helps to normalise the use of iSAR+ and similar capabilities for emergency response. The benefits and limitations of these iSAR+ and social media in general can be understood through their experiential use. This understanding can be captured through CONOPS development and applied to further system improvement projects.

2.2.1.4 Integrating iSAR+ Within Emergency Management Systems

There are a range of EU emergency planning resources in the form of protocols and frameworks that provide guidance for PPDRs on emergency incidents in their respective jurisdictions. While in many cases these tend not to be prescriptive in terms of what PPDRs

must do, they offer PPDRs an understanding of their activities of vis-à-vis the activities of other PPDRs. Therefore, these frameworks provide the basis of coordinated actions from an all-hazards perspective. As a tool that can be used to enhance mutual awareness iSAR+ has the potential to support the coordinating activities of PPDRs. However, one of the challenges to both aligning and integrating iSAR+ into emergency management frameworks and protocols is that they tend not to make direct reference to any particular tools or technologies. No specific mention of such technologies is required, however the structures and functions of PPDRs should be designed to be flexible to accommodate capabilities like iSAR+. One means to achieve this is to gain experience using the platform for large scale events. These can include simulated use in training exercises and planned events such as festivals, marathons or parades. Including the platform as part of training exercises gives PPDR members familiarity with the use of this tool during a major emergency event. Its role within the management of a crisis can then be evaluated and any shortcomings or operational difficulties can be detected.

2.2.1.5 Locating and Configuring iSAR+ in Emergency Management System

The inherent flexibility of iSAR+ means that it can be located and configured within an emergency management system as determined to best fit the needs of system actors and iSAR+ users. The CONOPS approach is designed to enable PPDRs to determine this. However, some considerations may include locating the tools and platform interface(s) at a Communications Centre level. This implies iSAR+ being used to undertake similar and complimentary activities to emergency call taking and dispatch operations. Here, the platform could play a role in sourcing information from citizens and receiving reports. Relevant information could then be passed on to PPDR members at tactical or strategic levels in order to enhance the situational picture of the emergency. Alternatively, and as suggested earlier the system could be located in proximity to the Strategic Command Level and/or Tactical Command Levels and monitored by an information analyst team in order to provide situational information for decision making and the strategic management of the crisis. Another potential configuration in line with the 'non-crisis' and 'crisis' modes of operation is to configure the system to filter and feed information to users needs at any of the levels as required to meet the demands of the emergency event.

2.2.1.6 Planning For and Resourcing iSAR+ Use Within and Between PPDRs

In crisis situations resources and personnel are often scarce and need to be efficiently managed. As one of the pillars of emergency management (WHO, 2013) information management resources, including those required for operating iSAR+, should be given due consideration. The flexibility of iSAR+ means that it can be configured, located and operated by personnel as best fits the needs of the situation of the responding PPDRs. Without prior planning however the resource needs for iSAR+ could be overlooked if available personnel are allocated to other emergency management activities (e.g. first responder) and/or if assumptions are made by PPDRs that other agencies are responsible for operating iSAR+. One means to ensure this is through a CONOPS that integrates iSAR+ into the emergency management activities. Having a sufficiently large number of personnel trained and competent in the use of iSAR+ to consistent standards of practice can offer the emergency management system actors the flexibility to operate optimally in all conditions and circumstance.

2.2.1.7 Cross-Jurisdictional and Cross-Border Interoperability of iSAR+

PPDR coordination within and across jurisdictions, including regional and national borders, is possible through the alignment of CONOPS approaches (such as the iSAR+ approach). This can be enabled through familiarisation activities that can include collaborative events and projects. These may include, but are not limited to: desk-based reviews of emergency frameworks and specific plans; international collaborative exercises (e.g. civil protection exercises); conferences, workshop and structured discussions. In addition, the value of social and cultural activities (e.g. emergency services sporting events, significant anniversaries etc.) should be considered as mechanisms that can build the positive working relationships that can facilitate better international coordination.

2.2.1.8 Legal and Regulatory Frameworks for Data Management

Monitoring of social media for emergency and crisis events necessitates consideration of legal and regulatory frameworks for data management and citizen privacy rights. For some events national emergency powers may allow these activities for the duration of the incident. EU and national regulation and legislation can be used to inform PPDRs of the allowable conditions and limitations of the use of iSAR+.

2.2.1.9 Establishing Information Requirements Through CONOPS

Running realistic scenario exercises (e.g. table-top, live events, blended approaches etc.) while undertaken CONOPS development can elicit information and knowledge requirements for PPDR personnel within the emergency management system. Through this approach differential information management needs of system actors can be identified and the opportunities for iSAR+ to provide these can be established. Different information needs of PPDRs can include: the status of a fire and location of casualties for fire and rescue services; the number of reported casualties and injury types for emergency medical services; logistical information for access and egress for police services. Within each of these services and others who may attend there are also likely to be discrete information needs specific to roles, responsibilities and associated activities of responders.

2.2.1.10 Information Access, Usage Permissions and Rights

This consideration concerns the configuration and management of information within the iSAR+ system. If the platform is used by multiple agencies at the communication level it may be necessary to create partitions so that information received by the system can be independently manipulated by each PPDR agency for their own purposes. (With further consideration given to whether the platform is housed in multiple groups within an agency.) In addition, if each agency is extracting information that they consider to be uniquely important to their own agency's operational needs then iSAR+ may only be offering an enhanced view of the emergency from the perspective of this group alone, rather than creating overall improved situational awareness of the crisis. If the platform is used at the highest level of emergency management, the need to partition the system becomes less of a concern as the information will be centralised and available to all PPDR agencies, allowing it to be acted up in a top-down manner. However, this approach may present its own issues, particularly with regard to sensitive information that might be detected by the system; for example, if information regarding the police investigation of the crisis was visible to information managers of other PPDR agencies.

2.2.1.11 Establishing a Common Operational Picture Through iSAR+

Shared situational awareness (understanding among PPDRs of what is going on) and mutual awareness (understanding of what each PPDR is doing in response to the situation) can be enabled through a Common Operational Picture (COP). This is dependant on good information management systems and tools to support knowledge generation, distillation and transfer. Structured information management processes, such as the system used by Irish PPDRs (see figure 1 below; Irish Government, 2006), could be incorporated into iSAR+ and related information analysis activities as one means to help achieve this. For iSAR+ the information flows between PPDRs and citizens with associated rules would need to be established.

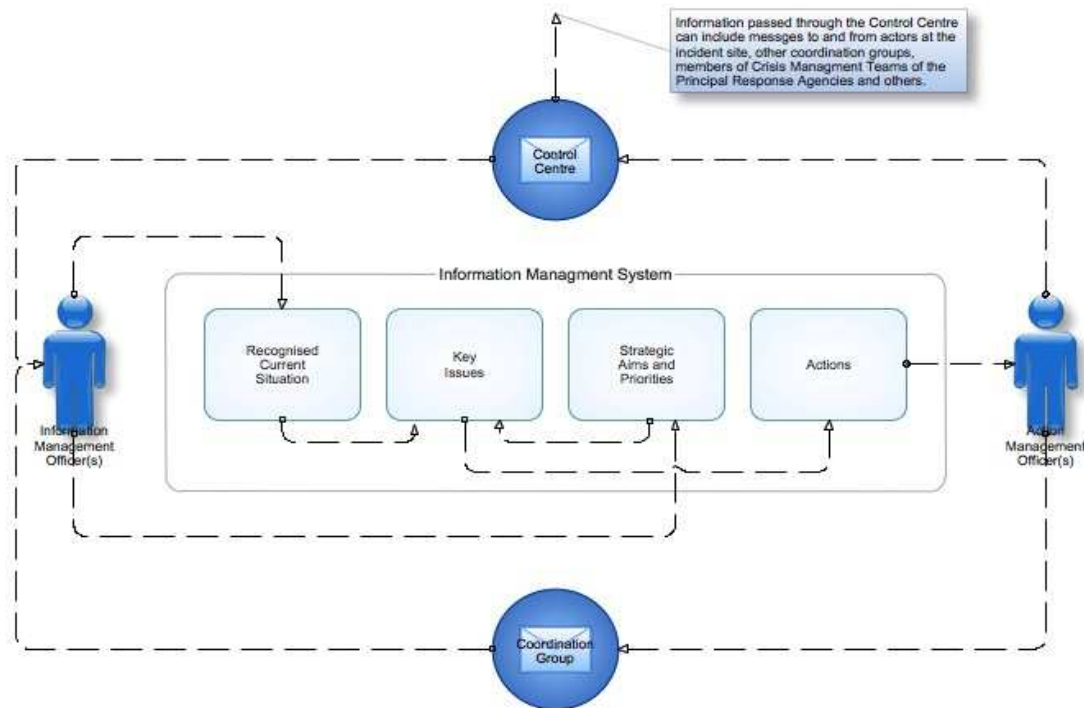


Figure 1. The Information Management System used by Irish PPDRs

2.2.1.12 Clear, Consistent and Correct Communication Standards

This can be achieved by agreeing up front or by setting out in emergency plans and frameworks what the agreed communication rules are. Non-technical nor PPDR specific terminology should be used. This is critical to maintaining a common operational picture (COP). This can also depend on the skill set and experience of the iSAR+ information analyst. Therefore, the appropriate competence requirement needs to be met.

2.2.1.13 Interoperability of iSAR+ With Existing (Information) Tools

In order to identify opportunities for value added capabilities through the iSAR+ it is useful to understand interoperability with existing emergency management communications systems and tools. This can help ensure that iSAR+ functions harmoniously with existing systems. The location, configuration and intended use of iSAR+ will determine the specific interoperability issues and these can be examined through the CONOPS development. For example, if iSAR+ is used as a means to receive emergency incident reports from citizens it is important to ensure that the system can identify which reports have been made through

i112 and/or 112. This can help to avoid duplication of mobilisation and dispatch, and potentially misdirection of resources. One of the potential benefits of an iSAR+ i112 type feature could be realised during times of high call volumes or loss of phone lines. Citizens could be directed to pass non-emergency information to PPDRs using social media. They could also continue to make reports using text-based systems that tend to be relatively more resilient to failure. As mentioned above iSAR+ could also be aligned with information management systems to aid the development of a Common Operational Picture.

2.2.1.14 Performance Feedback System

This evaluation should occur to assess the contribution of the platform to managing the event and whether it provided added value to citizens or PPDRs. These evaluations can also be useful in the future development of the platform. This can be achieved during debriefing after exercises and real events.

2.2.1.15 Evaluating the Contribution of iSAR+ to the Resolution of Crises

PPDR members should identify desired outcomes from using the platform, for example 'enhanced situational awareness' or a 'decrease in the volume of calls' to the emergency response centres. Ideally these outcomes should be measurable, perhaps as KPI. In this way the performance and contribution of the platform can be assessed. This feedback can also be used to identify future developments for the use of the platform, such as additional capabilities that could be added or improvements to the organisational management of the tool.

Because the introduction of a new tool requires organisational adjustment in many respects, monitoring its performance and fit within the organisation is important. Team members with a higher level of responsibility for the platform, in other words team leaders, may be the best placed candidates for monitoring the progress of the platform within their own organisation. In this way they can report to senior staff members whether the platform is meeting expectations and offering a substantial benefit. Additionally, they may be in a position to comment on how iSAR+ can be developed further, both in terms of its functionality and in terms of its position within the organization, to render additional value.

2.2.2 Human Factors

2.2.2.1 Examining the Effects of Automation

Human sensitivity to emergency information, particularly that which is reported by citizens to PPDRs by telephone, cannot be readily automated. For PPDRs their capability for sensitivity analysis of the human voice can be used to determine the severity of an emergency, whether or not the call is genuine, providing reassurance or information (e.g. CPR instruction) to the caller. It is recognised in itself that it is important for citizens to be able to connect to another human when making emergency calls. In situations where citizens make reports to iSAR+ that are calls for assistance the monitoring of these messages needs to be overseen by a human operator so that they can be appropriately handled until reliable and trustworthy automated systems can be developed. Social media monitoring activities can be automated to a certain extent. For example, thresholds can be set for the volume of reports on an issues and/or coming from a specific area. Once a threshold is exceeded an alarm may alert PPDRs to attend to the iSAR+ interface.



Computer aided decision making with effective displays of information which reduce the attentional effort required to process information are available and used by PPDRs. Such semi-automated systems used in Communication Centres often use decision tree type software for the selection and mobilisation of required emergency response. Automation could also be considered for use to assist in aspects of a task that present PPDRs with excessive cognitive demands. Some of these are readily available. For example, phone number recognition instead of requiring to manually capture a callers phone number and geo-location of callers rather than manually capturing an address (although this must be undertaken with caution as a caller may not be at the address of an emergency they are reporting). Within the suite of iSAR+ tools key words can be used to capture reports that contain the selected terms. This can then be used to summarise information or to remind the user of the relevant information.

It is important to note that an overreliance on systems that involve a high level of automation may cause personnel to lose manual competencies over time. For example, the use of iSAR+ relies on online communication and if connectivity is lost then the platform is no longer capable of receiving new information or connecting to citizens. Additionally, the enhanced situational picture that the system aims to provide will also be unavailable to PPDRs. This will require PPDRs to revert to manual practices for managing citizen information in emergencies. If these fundamental skill sets are decayed the overall information analysis activities of PPDRs can be severely adversely affected. Therefore, the continued maintenance of basic communications systems and skills is warranted.

Should intelligent data management systems become fully automated this could also adversely impact shared situational awareness. The engagement with analysis of raw data and citizen reports by PPDRs offers the opportunity to take the citizens' perspective and develop a more accurate mental model of the emergency event. Heavily summarised and filtered information from an automated system may reduce this capability. Achieving a balance between reducing the cognitive and workload demands of high volumes of raw data and possible noise against the enabling processes of visualisation and conscious awareness of the data coming in, its nature and importance, need careful consideration.

Through the evaluation of iSAR+'s contribution to emergency management potential developments for automation may be uncovered. CONOPS development, including through both in training exercises and real world use, can identify activities and processes that would be suitable for automation that can lessen the demand on PPDR personnel resources.

2.2.2.2 Team Design & Structure

In line with the configuration and location of iSAR+ in the emergency management system, the human resource requirements and team composition requires due consideration. This involves identifying the right numbers of people with diverse yet complimentary skills who can work cohesively to ensure emergency response decision makers are adequately supported. It is also important to perform adequate tasks analysis to ensure that the articulation of work, roles and responsibilities is optimised with and between teams at various levels of command. The competence of iSAR+ operators and their wider competence and responsibilities in emergency management will have significant implications for this. An experienced senior PPDR officer is likely to be able to process information more efficiently to

develop a suitable situational picture than a relatively inexperienced member of the emergency management community.

Regardless of the number of iSAR+ platform operators, iSAR+ users will constitute a team. For example, an iSAR+ operator processing reports will filter and refer information to decision makers in the system, who in turn will use this to action the activities of other PPDR personnel. There are interdependencies across the information analysis, distillation and transfer across the system that can affect the activities of PPDRs. Therefore to achieve effective team working the PPDRs will require:

- the ability of team members to successfully integrate their individual actions;
- their ability to operate adaptively when coordinating their actions;
- and team leadership.

2.2.2.3 iSAR+ Roles and User Definition

The use of social media by PPDR organisations is a relatively recent development with relatively little known about the personnel requirements associated with its use. It is becoming clearer what this capability can potentially offer and what role it can fulfil. However, currently there appears to be no established role or section that could readily adopt iSAR+ capabilities into its remit within PPDR organisations. It is not the same as a 112 call answering or PPDR Communications Centre function nor is it a C2 function in and of itself, but it can be understood and utilised as a support tool and system for these types of functions.

Whether an iSAR+ operator should be a member of a particular PPDR or whether it should be a cross-agency role remains open to question. This consideration has extended to which PPDR should have overall responsibility for its use. Additionally, it would need to be established whether the iSAR+ operator(s) should have competence in crisis response or whether they could be taken from the non-PPDR population and trained as many Communications Centre personnel are. There may be advantages to having Communications Centre who have not got an operational background, particularly in terms of human resource rationalisation. Also having non-PPDR personnel operating iSAR+ should mitigate against potential informational and heuristic biases of PPDRs from a particular agency (e.g. police, paramedic, fire and rescue), which should enhance the perceived sense of objectivity in the system. Some PPDRs posit that on balance a deeper knowledge of operational reality is valued more as this enabled information analysts to visualise and construct more accurate mental models of the emergency, which in turn supports a more effective response. This varies among PPDRs and is reflective of an interaction of policy, operational and cultural factors. These considerations also have implications for responsibility and answerability. Whichever approach is taken, a clear understanding of what decision-making responsibility the iSAR+ operator has and what the potential liabilities are should be established. Given that an iSAR+ operator will rarely be dealing with precise and unambiguous information and will constantly have to make judgements about either responding or forwarding information to responders and/or decision makers. The decision-making responsibilities of an iSAR+ operator will need to be established also.

Therefore it is proposed that the staff and organisational positioning of the iSAR+ system be considered within the broad context of the overall CONOPS including a clear communication chain and organisational structure. This can be initially established according to existing emergency management models and developed through working groups, exercises and practice.



2.2.2.4 Team Development Programme

Teams are not created overnight and building and maintaining a cohesive well functioning team takes time to establish and continued effort to maintain. Well-coordinated cross agency working groups and specialized teams made up of multiple PPDRs are often proposed in EU emergency frameworks and protocols (e.g. UK JESIP report). In some jurisdictions it is assumed that services will operate in the same ways regardless of the scale of an emergency. Within this model the responsible authority (lead agency) will coordinate communication among PPDRs. There are already many examples of established emergency management coordination model set out in set out in emergency management guidance materials to support their implementation. The implementation of iSAR+ and social media capability in general can follow the practice and frameworks already available to support iSAR+ team development programmes.

2.2.2.5 Competences for iSAR+ Operators

Consideration should be given to the type of individuals who might be suited to using the iSAR+ platform for major emergency management. There is no prescribed model for who these operators should be or if they should be part of a permanent team. However, it would be considered to be good practice that the coordination of a team established to use iSAR+ is overseen by a team leader. Depending on the organisation's vision for the use of iSAR+ there is the potential for this role to be a career opportunity within the organization.

This individual could be responsible for evaluating the contribution of the system to major emergency management, assessing how well the platform integrates with current organizational practice and identifying skill sets necessary for using the platform that are specific to that organization. Additionally, because this individual would have a lot of familiarity in using the platform they may be best placed to identify future capabilities and developments that would make the tool more efficient and effective in assisting with major emergency and crisis management.

The integration of any new system into an existing organisation would necessitate training of personnel. In the case of emergency management, where training is heavily emphasised, this is particularly the case. In addition to ensuring technical competence, an iSAR+ training programme should identify specific desired outcomes that are sought in order to determine that a user is sufficiently competent to effectively manage the system. This should cover the secure and ethical use of social media, social media literacy skills and an understanding of the purposes for which social media could be used as aligned with the PPDRs mandate.

As discussed above, the personnel necessary to effectively operate the system should be determined by the needs of the emergency management system (taking into account regional, national and international factors). It is also undecided if responsibility for the platform should fall to a single individual, available staff members with the necessary skills or if the platform should be managed by a dedicated team. This personnel decision is at the discretion of the PPDR organisations, and may ultimately be determined by the organisations' availability of human resources. However, consideration of the latter two options presents the issue of leadership.

At the strategic level of major emergency management the members of the iSAR+ team may be distributed across agencies and involve PPDR members who have not previously worked together. As such, it may be difficult to quickly establish an efficient and cooperative team. In



this respect, effective leadership is important in order to ensure that the work of team members is coherently organised towards the overall objective.

A PPDR organization may be represented on the iSAR+ team by several members. Arguably leadership of the iSAR+ team should be chosen from the PPDR agency charged with managing the crisis as these members may be more adept at identifying information from the system that is of value. Again, this recommendation returns to the issue of identifying the skill set required by the standard iSAR+ operator, whether they are of an operational background or a trained civilian staff member. As the platform is a new tool, experience in using it obviously cannot be assumed. Leadership then may be determined by the organisation on the basis of operational management or public communication experience, whichever the organisation regard as more critical for their envisaged use of the platform.

2.2.2.6 Human Performance Capabilities and Limitations

Human factors often identify people as the source of most variance in a system. People can perform well in challenging situation, often overcoming inadequacies or failings in the system to achieve required outcome. The competence of individuals is a key contributor to optimal and enhanced performance. In addition, characteristics of individuals such as motivation, attitude, competence and conscientiousness, the interactions with others in a social system, and the use of information and materials can all affect performance of activities. The influencing factors on positive performance should be noted and can be incorporated into training and models of best practice.

Substandard performance has been a focus of human factors and key drivers of human performance limitations are considered below.

Human performance decreases over time with respect to monitoring and data processing tasks due to:

- Stress which can be caused by high volumes and concentration of work within a short period of time as well as the anxiety of making errors;
- Workload, which refers to the limitations of memory, attention and perceptual capability for data processing;
- Vigilance, which refers to the fact that human beings are poor at performing vigilance-related tasks with a rapid decrement over time.
- Responsibility and answerability, which results from the situation where responsibility or actions and decisions is not clear and can result in increased anxiety and stress and may lead to an overly conservative approach to decision-making tasks. Incidentally, decision making as a task does not relate solely to the decision module. It is also the case that a person working in the sensing module decides on the veracity or importance of a message.

It is suggested that the use of iSAR+ platform could also include indicators of performance levels. This may be in the form of a clock that records how long the user has been logged into the system, or perhaps a prompt to the user to take breaks after a certain period of time has elapsed. The purpose of these functions is not to assess users' performance per se but to indicate the extent of their engagement with the system in order to provide advice or guidance on working limitations. This could be self-monitored by the iSAR+ operator(s) or by an iSAR+ manager.



People are more proactive in task management when workload is low, they tend to be more reactive when faced with a high workload. Task management can help with the prioritization of important tasks by identifying key goals or strategic aims. It can also ensure that tasks are coordinated and delivered in a timely fashion. Automation can also help with task management by monitoring performance and reminding users of outstanding tasks or tasks that have been temporarily put on hold.

Workload is essentially determined by the relationship between available resources and the demands of the task. A workload index could be utilised to assess workload. This could indicate when the level of work can vary and also identify the causes of this variation. For example, there may be particular time periods when iSAR+ is more likely to receive large volumes of information, for example at the beginning of the crisis when there is a large public demand for information. This increase in volume of content increases the workload and may require additional personnel resources.

It is important for iSAR+ operators to be aware of switching between tasks that have a high degree of similarity, where the pre-switch and post-switch tasks are highly similar the new task may be susceptible to interference. For example, when making content updates to similar reports concerning similar incidents there is a potential risk that attentional interference can occur. This is particularly important to iSAR+ as the 'Sensing' and 'Decision' modules have similar layout and functionalities. One expectation is that different actors will operate each of the iSAR+ modules separately. However, the competence of iSAR+ operators may affect the means of use and it is feasible that one operator may use all modules of the platform (not least due to human resource limitations).

Sometimes operators can persist with one set of tasks longer than necessary and postpone task switching. External reminders to perform and/or switch a task are useful and more effective than relying on reminders in memory.

More complex decisions require more time to execute. In addition, approaching several small decisions is not necessarily an easier task than managing a single complex decision. Cognitive capacity limitations mean that there is a limit to information processing and decision making capacity that is independent of decision or situation complexity. Therefore, factors such as the volume, rate and content of information iSAR+ operators need to process will impact on their effective performance. Additionally, while expertise in a particular field can lead to quick decision making it does not ensure that the decisions are of a high quality. Time pressure is an important consideration in decision-making and situational awareness is one of the most important components for effective decision making. This has implication for the competence of iSAR+ operators and also a level of flexibility to allocated more human resources to iSAR+ when required.

For iSAR+ operators the task of identifying correct and useable reports (signal detection) is complex; it is not simply a case of detecting the presence of a report, rather it is recognising a message as potentially useful and interpreting its content to determine whether it is. PPDR members may experience difficulty in being able to ascertain genuine distress reports through iSAR+ (e.g. using it as an i112 portal) as certain contextual cues such as tone of voice, background noises and a direct communication line with the citizen are absent. The



risk of interpretation difficulties for operators may result in reports being classed as misses or false alarms.

Stressors will adversely impact on performance may include influences such as noise, vibration, heating, lighting, as well as psychological factors such as fatigue, frustration and anger. Time pressures may also serve as a stressor. They can provoke both affective and physiological effects, which can in turn have an internal or external influence on human performance by affecting the quality with which information can be processed. It is difficult to predict the way in which stress can affect performance as its effects are mediated by personal factors, skill levels and other cognitive factors. Therefore, where possible external stressors should be removed from the working environment. Where possible design solutions should be implemented to minimise frustrating aspects of the system, as even the tool itself can serve as a stressor. Extensive training of key procedures may help to mitigate internal sources of stress and reduce the impact of psychological stressors by ensuring that key procedures become habitual.

Human error can be categorised as errors of commission or errors of omission. Alternatively, they can be categorised as mistakes (an error in intention or choice), slips (where the understanding of the situation is correct but the wrong action is executed) and memory failures. Lack of knowledge is an important source of mistakes, and so extensive training (technical and human factors) may assist to identify and raise awareness of these types of errors. The performance of activities should be visible to users so they are aware of what has taken place; this may help to mitigate slips. Reminding users of steps that are often forgotten in tasks can help them to avoid lapses and failures of memory. People are capable of monitoring their own performance for error even when the tasks are heavily automated.

2.2.2.7 Fatigue Management (Working Time, Shift and Task Limitation)

Fatigue can be considered in the context of human performance limitations, but warrants special attention in the context of major emergency and crisis managements as this can be especially problematic due to the prolonged nature and high demands of crisis situations. With particular relevance to iSAR+, fatigue can be caused by continuous monitoring tasks and prolonged use of computerised systems. The nature of the tasks associated with the iSAR+ operator's role are likely to involve a high volume of reading, viewing (e.g. imagery) and mentally updating the situational picture of several simultaneous events. This work may be mentally taxing for iSAR+ operators and they should be made aware of the potential for stress, fatigue and adverse affective outcomes. Frequent breaks can help ensure that iSAR+ operators can maintain a good level of performance.

Users of the system should be made aware that prolonged use of the system is likely to adversely affect their performance and psychological state (e.g. stress, fatigue etc.). The continued and relatively high volume monitoring of information received by iSAR+ during a major emergency could be overwhelming for one individual. Added to this is the possibility that some content from individuals at the scene or in need of assistance may be distressing for the operator. As is common practice in emergency response centres, frequent breaks and rotation of staff are advised. This approach can be extended to iSAR+ operators.

2.2.2.8 Handover Protocols

Training for shift and task handover can support operators in the use of iSAR+ and associated tools. As with any monitoring task fatigue and performance decrement sets in relatively quickly and necessitates short shifts and frequent breaks. However, it is important for continued situational awareness that the outgoing person gives a standardised and comprehensive briefing to the relieving person to ensure that they can come up to speed quickly on the on-going event. Good practice guidance to ensure adequate handover is publicly available in sectors where human factors are mandated (e.g. aviation UK CAP-716).

2.2.2.9 Training Operators in Human Factors

It has becoming increasingly important in many safety and security critical industries and services that human-factors is not simply a design or management issues but is an issues that must be tackled at every level and stage in the life-cycle model of a system innovation (Cromie et al., 2015). This can include training the operational staff in basic human factors that addresses awareness of the various conditions under which human performance is attenuated (awareness of one's own strengths and limitations and how to mitigate against them). Heightened awareness of human factors can empower operational staff to flag situations which are unsafe, dangerous or performance reducing and seeking a mitigation to the problem before it develops. The potential risk however is that such training is perceived as resulting in a shift in responsibility for errors from system-design errors to human performance errors, such as missing an important incoming message due to fatigue or workload. It is important therefore to address this early to ensure that people understand that support is available.

2.2.3 PPDR – Public Engagement

2.2.3.1 Ethical and Privacy Guidelines

The online presence of PPDRs through social media requires guidelines for what information should be released to the public. There are instances whereby the public can assist PPDR efforts, such as volunteering for local clean-up efforts or through the awareness of missing persons. However, there may be a risk in that the accounts of different PPDR agencies may publish conflicting information. In addition, the release of sensitive information is generally not appropriate through social media. There is also a need to establish and maintain control over how PPDRs are represented on social media. There is evidence to suggest that PPDRs have been conservative in their approach to social media and are concerned about the risk to their organisation's reputation and the receipt of backlash through engagement with communities through social media. Guidance on managing the on line presence of PPDRs has been developed (e.g. Mergel, 2014) and can be adapted to suit local contexts.

2.2.3.2 Training Staff in Ethical and Privacy Aspects

The sensitive and ethical treatment of personal data by PPDR personnel is extremely important. However, while organisations need to be collectively aware of and compliant with ethical and privacy aspects of data processing and management it should be acknowledged that iSAR+ as a system involves these kinds of tasks. Therefore, as is currently the case with training for Communications Centre personnel, adequate training provided to iSAR+ operators can ensure that the organisation is compliant in these respects. However, such training does not mean that the responsibility for ethical and privacy aspects becomes the sole burden of iSAR+ operators. It remains an organisational wide responsibility. It is important to be aware of what can be perceived as unfair punitive measures toward operator



errors of information management. These can negatively affect operator performance and lead to an over-conservative information management approach. Training should therefore emphasise the constructive sense of regulation rather than the punitive aspects of non-compliance.

2.2.3.3 Control and Restriction of Information Received by the System from the General Public and/or Media

Access to the PPDR version of the platform by non-PPDRs is not advisable as it may contain sensitive content, hence there are separate log-ins for citizens and PPDRs. A clear separation between the versions of iSAR+ helps to reduce potential risks to operational activities as well as helping to ensure ethical and legal issues of sensitive information being released into the public domain. Media access should also be controlled and can be limited to the citizen version of the iSAR+ platform. The citizen version of the iSAR+ platform could be used as a channel to issue press statements. It may be acceptable for certain media briefings for direct interaction with the media to be by-passed and situational information publicised through the citizen version of the platform alone. This information could then also be accessed and utilised by the media. Alternatively, accounts held by the media for the citizen version of the platform can be modified to receive information directly from PPDRs.

2.2.3.4 Use of iSAR+ as a Normal-Day Resource for Educating and Informing the Public

Beyond the original intended use of iSAR+ for crisis situations only, there is an opportunity to use the platform as a means of communicating instruction or educating citizen groups about responsible emergency management behaviours. PPDRs currently use social media platforms to provide general guidance on safety campaigns etc. In some contexts and scenarios they issue specific operational advice to citizens in this way. There are also educational programmes in some jurisdictions that target specific groups. This includes the provision of educational materials to school aged children using mixed media (text, graphics and electronic materials). Safety visits are undertaken by PPDRs to schools to educate school children on positive safety behaviours. This type of engagement through iSAR+ could help enhance citizen safety and iSAR+ engagement.

2.2.3.5 iSAR+ Citizen Education Plan

PPDR groups need to develop and implement plan to provide education and instruction to the public on how to use iSAR+ during a major emergency or crisis situation. The principal goal of this should be to educate members of the public about how best to make use of the iSAR+ platform and should focus on iSAR+ information content. This can include: technical guidance on how to use the systems capabilities; what kind of messages will be accepted by PPDRs (e.g. only providing information on an incident or whether '112 calls' are acceptable); and importantly what information citizens can expect to receive in return.

Use of the system needs to be publicly promoted so that citizens are aware of the iSAR+ platform and how to use it in advance of a major emergency event. This can help ensure that the system can be efficiently used by citizen end-users when necessary. Online help and support should also be made available. During a large scale crisis the platform may receive a large volume of reports from citizens, and while citizens may expect a response it may not be possible for these messages to be responded to individually. Citizens should be made aware of the communication policies.

2.2.3.6 Incorporating and Integrating iSAR+ and Similar Tools with Continuous Community Relations and Engagement Outside of Crises

PPDR organisations should try to foster a public relations channel through social media to enhance familiarity, trust and share knowledge with citizens. This will facilitate the enactment of crisis mode in the event of a major disaster utilising not only existing technological resources but also ready established human community networks and relationships. This involves also establishing communication standards. Messages need to be coherent, concise and unambiguous and familiar. For example, some police services have been developing social media for use in community policing and crime prevention.

2.2.3.7 Informing the Public About Operationally Useful iSAR+ Content

The provision of instruction on content that would prove operationally useful would be helpful guidance for citizen users on what they should submit to the system. For example, the type of problems PPDRs experience with nuisance or error calls to 112 could be exacerbated through social media given the relative anonymity the internet can offer. Without good guidance iSAR+ could also become clogged with relatively trivial reports. Awareness and education for citizen use of iSAR+ can discourage sending messages that are not useful. While this is not an unassailable strategy for ensuring the quality of information in the system it can improve citizens' use of the system and how PPDRs can use this information.

2.2.3.8 Implementation of Automated Messaging for Citizens

It will be necessary to decide whether citizens should receive automated messages in response to the reports and messages they send to the system. Automated messaging presents potential benefits and risks. Feedback is important to people who make reports, therefore confirmation of a report received by iSAR+ may be appropriate. Not receiving a response may prompt citizens to repeatedly send messages and clog the system. In the case of a citizen user who seeks to use the system exclusively to supply information an automated response should be sufficient once the message has been received by the iSAR+ operator. Conversely, an automated 'report received' message may not mean that the report is being attended to by PPDRs, but a citizen may assume it is and this may deter them from persisting in a call for assistance. During a crisis situation high volumes of citizen messages could be received and it is unreasonable to expect PPDR operators to dedicate time to providing individual responses.

The management of response to calls for assistance made through the iSAR+ platform is more complex and should be decided by the inter-organisation guidelines. There are obvious advantages and disadvantages to each option. Citizens can be instructed through education programmes as to what the practice will be. In addition, guidelines on automated receipts or responses to citizen messages can also be established as inter-organisation standards.

2.3 Technological Guidelines & Roadmap

2.3.1 Technological Guidelines

Based on the evaluation of the iSAR+ performed through three live experimentations with end users, we managed to collect important feedback from PPDRs, from which the recommendations were elaborated independently from other THEO dimensions' recommendations and integrated into another iSAR+ deliverable (D241). In this deliverable in addition to this listing, a comparison with recommendations coming from the three other dimensions has been performed in a holistic approach and contradictions between recommendations underlined. In this section, we provide guidelines based on these recommendations after having resolved the observed conflicts.

#	Recommendation (30)
PLATFORM	
T0	The IPS should be modular and offer easy integration with external systems.
T1	The IPS should support role-based access control and a per module access right configuration.
T4	The modules should be integrated into one interface.
T6	The IPS should be easy to use.
T7	The IPS should be integrated with GIS, MPA, SMM and SFR tools for enhanced performance and information collection.
INFORMATION DISPLAY	
T3	The IPS should display information visually, using map features to display reports, and colour-coding schemes to denote severity.
T17	Social media monitoring should provide easy ways to visualise images and videos and to search media feeds including images and videos.
T24	Social media monitoring should visually flag texts that have been already handled by the crisis management portal, to avoid analysing the same content twice.
T23	Social media monitoring should provide a dashboard for displaying and highlighting the most recent and salient events.
T21	Social media monitoring should integrate a GIS system to map data and allow geographic enquiries.
COMMUNICATION	
T8	My Public Alerts should be interoperable with Short Message Service Centre capabilities offered by network providers.
T5	The IPS should be integrated with social networks so that there can be bidirectional communication between PPDRs and citizens.
T9	Messages released through My Public Alerts should comply with the protocol standards provided by CAP.
ADD-ONS / FUTURE DEVELOPMENT	
T2	The IPS should use a generic API to allow extensions to the platform to be easily added.
T19	Social media monitoring should integrate translation capabilities.



T20	Social media monitoring should allow for cross-lingual analysis.
T31	Social media monitoring should integrate image processing capabilities to automatically annotate & index pictures
T22	Social media monitoring should allow for the automatic real time detection of critical events
T30	TAT2 may benefit from integration with other data-mining, text-analysis and geolocation tools such as AIDR, Geofidia, SocialLifeRaft and What 3 Words.
ACCESSIBILITY	
T12	All iSAR+ services should be accessible as Web applications, compatible with a wide variety of web browsers (at least Firefox, IE, Safari and Chrome).
T13	My Public Alerts should be capable of automatically translating alerts into the native language of the safety operator of the device.
T15	The architecture of MPA should be capable of withstanding a high load of users and still ensure service quality.
T16	Social media monitoring should collect data from various social media sources including Twitter, Facebook, Instagram and Youtube...
EQUIPMENT	
T27	Cameras for SFR capabilities should be correctly placed to avoid reflections, direct sunlight and hard shadow in order to reduce the false positive alarms.
T28	Cameras for SFR should be fixed IP rather than dome cameras.
PRIVACY	
T29	Consent must be provided by a user before the geolocation of a message is established by TAT2, or where this is not possible the user's anonymity must be preserved.
T32	Consent must be provided by a user before his social media feeds or where this is not possible his anonymity must be preserved.
T33	The platform data management policy, and in particular that of SMM should be checked against national legislation about personal data protection
T14	A platform that integrates the My Public Alerts and Notico capabilities or social media monitoring should be amended to comply with public authority security policies.
ORGANISATIONAL CONCERNS	
T11	The GIS available for PPDRs should comply with security bodies' requirements or even rely on the one imposed by PPDRs when this is the case. For citizens, the GIS should be one that resembles those widespread on the Internet.
T25	Social media monitoring should allow a list of alerts and messages to be exported to the crisis management platform (for the purpose of RETEX analysis).
T26	Social media monitoring should be capable of adapting crawling configuration to suit the demands of a specific crisis.
T18	Social media monitoring should provide support in the assessment of informational credibility and detecting rumours.
T10	My Public Alerts should implement geocoding based on national address databases.

2.3.2 Technological Roadmap

The iSAR+ platform follows most of the technological guidelines mentioned above. Therefore the roadmaps of technological components, which are presented in public deliverable D7.751 - iSAR+ Final Business Plan, provide useful insights on the roadmap towards the achievement of these guidelines.

To summarize these elements, we list hereafter the most important steps. Please note that this roadmap intends to be generic, i.e. it aims at detailing the necessary steps before implementing and running an iSAR+-like platform, not necessarily the iSAR+ platform:

- Technical dimension related steps
 - Define the roles and access rights of the different platform⁷ users to match the operational constraints of the target organization in which these components have to be deployed
 - Predefine geographic areas on which you want to issue geo-targeted alerts (through mPA in the case of iSAR+). Each role may be associated with different geographic areas which may correspond to their geographic competence areas
 - If needed, preload the geographic data and GIS layers you want to be displayed within the platform
 - Possibly define linguistic resources which could be specific to your needs or to your language (for social media monitoring component)
 - Predefine crawling configurations within the implemented social media monitoring component (search terms, persons to follow...)
 - Predefine alert criteria for social media monitoring (boolean expression combining various terms, volume of information thresholds...)
- Organizational steps
 - Properly allocate the right tools to the rightly skilled and trained persons
 - Public Communication (Communication part of the collaborative crisis management portal – IPS/Communication in the case of iSAR+)
 - Operational communication (geotargeted alerting component – mPA in the case of iSAR+)
 - Open source scanning – information management – intelligence (social media monitoring and part of the collaborative portal dedicated to information validation – SMM & IPS/sensing in the case of iSAR+: similar profiles for the two tools but it is highly recommended you don't have the same person behind both tools)
 - Crisis management, operational or strategic coordination (part of the collaborative portal dedicated to situation awareness and workflow coordination – IPS/decision in the case of iSAR+)
 - First responders (mobile app enabling citizens to push information on the crisis management collaborative portal – IPS mobile app in the case of iSAR+)
- Human dimension related steps
 - Promote the use of a single mobile app on which citizens can receive geotargeted alerts (Notico in the case of iSAR+). The more people using this app on a regular basis, the more efficient your geo-targeted alerting mechanisms will be
 - Communicate often on this app to favor regular usage of the application
 - Identify the most promising social networks (popular, with meaningful contents)
 - Publicly available – not snapchat, whatsapp for example, on which no piece of information is publicly accessible. If you wish to capture information from

⁷ In the case of the instantiation of iSAR+ platform, IPS & mPA are the impacted components.



these networks you have to create an account, promote it, mainly through other “open” social media and engage regularly with citizens)

- Promote widely on social media your organisation whose avatar should be known & trusted by the population before any crisis happens. Don't restrict yourself to social media on which information is made public and focus the ones which are more likely to be used in case of emergency in your country.
- Promote on these social media best practices, like hashtags to use in crisis situations on Twitter...
- Ethical dimension related steps
 - Train on technical but also ethical/legal aspects social media monitoring users
 - Review your platform instantiation with your national agency in charge of security and privacy issues
 - Social media monitoring activities must be publicly stated and users should have the possibility to opt out in which case their social media feeds won't be scanned

2.4 Ethical & Legal considerations

Privacy is an aspect of “human dignity”. It can be conceived as the right not to suffer intrusion into one’s physical or emotional “private spheres” (this is related to the so-called “anti-oppression” argument in privacy literature).

The scholarly literature offers no comprehensive and fully satisfying definition of privacy. The main difficulty in isolating a single, unobjectionable definition is that the concept of privacy seems to cut across a range of rights and values. The contemporary notion of privacy is mainly associated with the concepts of dignity⁸ and autonomy.

Privacy is increasingly commonly conceived as a relational concept which can be appropriately defined only with reference to specific contexts. Privacy has thus recently been defined in terms of “contextual integrity”.⁹ On this now influential view, the standards of privacy one might reasonably expect to enjoy derive from the nature of, and societal norms governing, specific contexts. Hence what is an acceptable exchange of information in, say, a healthcare context (e.g. the context of a doctor-patient relationship) may well constitute a privacy violation in, say, an employment context (e.g. the context of an employer-employee relationship). The contextual approach to privacy is currently in vogue; however it should be remembered that the privacy literature contains many competing views.

Privacy is a significant issue for iSAR+. Technologies such as image and video processing and, especially, text mining, can potentially be extremely intrusive of the privacy rights guaranteed in, e.g. the EU Charter on Fundamental Rights. It must be ensured that individuals’ privacy rights are not infringed to any extent when such an invasion is not justified by the crisis context. The crisis situations falling within the scope of the iSAR+ project raise significant ethical issues concerning the balance between the individual right to privacy and the wider crisis response and security needs of society. The first great ethical principle inscribed in the Universal Declaration of Human Rights is that “All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood”. It is then expected that every human being should treat the other as a brother contributing to his/her wellbeing. In a catastrophe scenario, this means saving lives or the physical integrity of others, so, it may be of the utmost convenience to by-pass privacy in order to guarantee that those who are at stake may be saved. The convenience of obtaining information may by-pass the right to privacy in such cases. We should ask ourselves what is more important, one’s privacy or one’s life?

This balance is being researched to ensure that the iSAR+ platform lives up to European ethical standards. The public/private status of data housed and shared online will also be investigated. The iSAR+ consortium recognises that even if data is considered public, ethical issues can still arise from its very close monitoring and diffusion. The possibility of people choosing not to participate at all through the social media must be accepted as we live in a democratic world where people really are free. In addition, if people share information but decide that the information may not be used, this must be accepted and respected in compliance with the European data protection regulation. Nevertheless, we do have the ethical obligation to do our best to save our “brothers” lives or physical integrity.

The crisis situations falling within the scope of the iSAR+ project raise significant ethical and legal issues concerning a “trade-off” between the individual’s right to privacy on the one hand, and the wider societal need for effective crisis response and security on the other. Generally speaking, it should be ensured that individuals’ privacy rights are not infringed to

⁸ Dignity is not only a fundamental right in itself, but also constitutes the basis of other fundamental human rights.

⁹ Helen Nissenbaum, “Privacy as contextual integrity”, *Washington Law Review*, 79(1), 2004.

any extent not justified by the crisis context. Despite it, the possibility of by-passing privacy regarding the convenience of the information to be gathered, shall be analysed case to case.

Based on the analysis provided in the previous section on different conceptualisations of privacy, in this section we will focus on two sensitive ethical issues which are of particular relevance for ISAR: the ethical concerns of sharing personal information through social media, and the issue of anonymity in the online environment.

Data mining for the purpose of search and rescue efforts when disaster strikes, using huge databases which are potentially gathering very sensitive information is a big concern for iSAR+ consortium.

Data mining refers to “the computational process of discovering patterns in large data sets involving methods at the intersection of artificial intelligence, machine learning, statistics, and database systems”¹⁰. In iSAR+, data mining procedures (especially, but not only, where these involve medical data mining) are ethically sensitive and must be carefully handled. The abovementioned ethical issues of privacy and data protection are of course relevant, and are rendered perhaps more serious by, firstly, the fact that data mining and fusion tend to be automated and on-going, but also by the blurred boundaries between public and private content (say, content on social media services).

Mechanisms within data mining technologies must also be monitored. Feature extraction during text analysis can raise ethical issues depending on which features are monitored and extracted (e.g. issues of discrimination on the basis of lifestyle, political, philosophical, religious beliefs, and so on). Similarly, the varieties of data mined can raise issues: e.g. image/visual analysis or localisation techniques can be extremely intrusive. The potential for behavioural profiling is large and implies a potential for discrimination on the basis of background, lifestyle (etc.). As with all technological developments, the potential for function creep¹¹ must be given serious attention.

As a side-effect of engaging in discussions regarding obtaining relevant data from online media services for search and rescue purposes the discussion steers towards a contemporary debate: if we share our personal data on a social networking site restricted to a big group of friends, should we consider that data public for the purposes of processing that personal data (i.e. without consent from the data subject)?

The law of precedence, at least in Portugal, seems to point the way that what is posted online, even if to a restricted group of friends, stops belonging to the private sphere, and becomes part of the public sphere. The user who posts the information is, or at least should be aware that from the moment he posts something, he stops having over the posts. In the future, the law of precedence may have to stop being taken into consideration as European law, which may eventually come into force to fill this gap, must be implemented by every European countries. The Boston Marathon bombings made the world look at the information from a different perspective, providing people with the information they needed to do justice by their own hands, and act as *vigilantes*. This is a concern of the consortium so, people shall be educated to the need of allowing the PPDR's to do their job without interference from the public in general.

The anonymity in an online environment, from one standpoint, could make people more comfortable and willing to provide information, as they are not easily identifiable. This applies to providing information for help as well as to committing crimes. From the other standpoint, it has the risk of hindering disaster response if the information provided is false.

¹⁰ In http://en.wikipedia.org/wiki/Data_mining.

¹¹ Function creep relates to the issue of a technology that was designed for one purpose being used for a completely different purpose. The term can also refer to data being collected for one purpose and then used for another.



Nevertheless, considering that people have the right to keep their identity secret and that, generally, in disaster situations, people gather to help, as long as the information is accurate it does not really matter if the person is not willing to give up their anonymity. Of course there are variables that cannot be controlled, e.g. anonymity may be used to willingly delay the search and rescue operations, but we have to be aware that, in any situation, it is not possible to reduce the risk to zero, so, we have to be able to accept some risks - the question is to what extent can we accept it.

iSAR+ as any online social media or platform is capable of impacting on fundamental human rights and freedoms. It is therefore of the utmost importance to obtain the consent of the social media users, before gathering their information with iSAR+. Consent, under the Data Protection Directive is defined as “any freely given specific and informed indication of his wishes by which the data subject signifies his agreement to personal data relating to him being processed” (article 2 (h)). Therefore, as long as the person is aware that the data posted will be used and processed in search and rescue efforts, and willingly posts it, consent is given. This situation may be significantly changed if, by any means, the European data protection regulation becomes more strict and imposes the explicit consent, so, explicit consent shall be considered.

The information must be used for the purpose it is being gathered for, that is, to help in search and rescue efforts by PPDR entities and not for any other purpose. It shall also be gathered in an adequate, necessary and proportional way. It is vital to create protection mechanisms that may allow people to trust the platform, knowing they are protected against the misuse of the information provided and that the data gathered is the strictly needed to provide rescue.

Anonymity shall be accepted. People do have the right to not be known and to keep their privacy if that is their wish. Anonymity does not seem to constitute a major problem but some kind of triage shall be considered in this case.

In case of being necessary to violate some fundamental rights, such as the right to privacy, in order to guarantee the rescue of those in need, this violation shall be proportional and necessary to the aim to be achieved.

There does not seem to be the need to define a European mechanism for declaring a public emergency, State of Emergency or State of Siege, because this is something that is closely linked to each country's sovereignty, and shall be kept this way. There does not seem to be anyone better to decide about these kinds of issues than those who constitute the Government of the country facing the catastrophe.

Ethical Considerations

In crisis situations, alternative means such as social networks become an important way for information gathering and sharing. Experience in recent disasters shows that even though communication networks collapse, the internet is able to continue operating and may enable communication channels even when other channels are disrupted.

As expected, there are legal and ethical aspects to take into account, but this happens, not only with internet and ICTs such as social media, but also with mobile phones and even with each and every one of us who shares information with somebody else. Yet, ethical and legal issues are clearer when we speak about ICTs.

The fundamental human rights, such as the right to image, privacy or non-discrimination (for example), need to be ensured until the last minute, but it may be necessary, when lives or even physical integrity are at stake, to by-pass them. This possibility is usually safeguarded

by the rule of law of each country, as well as by international law¹², but in any case, these situations must be properly justified.

When it comes to a platform like iSAR+, a very good way of keeping things lawful is to be transparent and obtain users' consent (explicit or tacit) to gather, analyse and process the information he/she provides. Nonetheless, it is of the utmost importance to guarantee safety mechanisms that are to prevent the gathering of personal data for purposes different from the ones they are willingly providing the data to, providing protection against identity theft and fraud, limiting the data collection to the extent necessary or, if not desirable, as it may be justified by the need to reach a victim, denying access to the user's location. At the same time, these safety mechanisms are suitable of increasing people's trust in the platform, encouraging them to provide the much needed information.

The possibility for the user to maintain anonymity or even allow pseudo-identities shall be taken into consideration as people do have the right to keep their identity secret and, despite the possibility of false information being provided easily when it is anonymous, we have to consider that the risk exists one way or another and it is just a matter of knowing if we are willing to accept that risk for a great good, e.g. the dignity of the human being, the right to life and to physical integrity.

Digital platforms do have the potential to improve the efficiency of disaster response by gathering real-time information delivered by victims or people who experienced the catastrophic situation, providing PPDRs with the information they need to allocate much-needed assistance or direct people away from certain areas and to organise the chaos.

Guidelines concerning key data protection standards that should be embraced by the iSAR+ Project in particular include:

1) Participation of Volunteers and Informed Consent

- a) Participation in iSAR+ was strictly voluntary;
- b) Volunteers had to agree to participate on the basis of genuinely informed consent and volunteers unable to give genuinely informed consent (e.g. minors) were not considered.
- c) Informed consent was documented through consent forms collected from participants.
- d) Volunteers were verbally briefed on the project, its nature and scope, and aims and they received written documentation of the same. Jargon-free briefings and documentation were available in a language in which the subject was at home. Volunteers for whom this cannot be assured didn't take part in the project.
- e) It was given to Volunteers the names of responsible project members, including an assigned personal data controller. Responsible partners were available to advise participants on any issues, questions, doubts or comments.
- f) Volunteers were briefed as to the possible risks or benefits of participation. Volunteers were fully understand what they are required to do and they understood that they will not be placed in any situation in which there was a likelihood of physical, mental or emotional harm. Volunteers were fully briefed as to their right to withdraw.
- g) When volunteers were introduced to the project through their employers (e.g. emergency service personnel) it was ensured that they weren't under undue explicit or implicit pressure to take part.

2) Right to Withdraw

- a) Participants retain the right to withdraw themselves and their data from the project, without prejudice or consequence, at any point and without need of explanation. They

¹² For instance, the International Covenant on Civil and Political Rights and the Convention for the Protection of Human Rights and Fundamental Freedoms.

could be inquired for a reason, but it was clear that there is no obligation, and that they are under no pressure whatsoever, to answer.

- b) Volunteers were briefed, from the outset, on the procedures for ending their participation in the project. There were clear guidelines and procedures for indicating withdrawal.
- c) Organizers were sensitive to outward signs of distress, discomfort or fatigue, and they proceed at all times in the best interest of volunteers.

3) Data Protection

- a) Data gathered from individuals was handled in accordance with relevant EU and national legal standards. No sensitive data was collected or shared.
- b) Data was gathered only for specified, legitimate purposes and used for those purposes only as stated in the article 6.1.b) of the Directive on the Protection of Individuals With Regard to the Processing of Personal Data and on the Free Movement of Such Data. Data was not excessive relative to the purposes for which it was gathered. If redundant data was gathered, it should be destroyed. On completion of the project, data should be erased (article 6.1.d) of the same Directive).
- c) Data was accurate and stored securely (article 6.1.d) and e) of the same legal instrument). As far as possible, data was anonymized.
- d) A named data controller was responsible for data management (article 4.1.a)).
- e) Data subjects had the right of access to their data (article 10.c)).
- f) Data aggregation/categorization that could in principle be used for discrimination against ethnic, religious, cultural (etc.) groups would be identified and prevented.
- g) Data retrieved by “crawling” social media outlets should be gathered only on the basis of serious investigation of the relevant ethical standards and legal frameworks. All relevant standards would be followed to rigorously.
- h) Volunteers’ participation was not revealed to any person or organization outside the project. Reasonable steps towards confidentiality and anonymity should be taken. If it was necessary to mention particular individuals in research outputs, either permission was sought prior to dissemination, or data would be anonymized.
- i) The consent of the social media user must be obtained even if in an implicit way, nevertheless, future changes to the European data protection regulation may bring us more strict rules when it comes to consent, demanding a written consent, so, this shall be taken into consideration (article 7.a)).

4) Validation and Field Testing

- a) Field testing in the form of user showcases took place in Portugal, France and Finland, always subject to national data protection legislation.

3 Conclusions

This consolidated and integrated set of guidelines represents the distillation of a huge amount of research and development work carried out throughout all iSAR+ core work packages into a manageable and usable set of guidelines.

These guidelines should not be considered as hard and fast rules for a quick implementation of iSAR+ or similar platforms and tools, but rather as a set of heuristics to adapt social and mobile media resources for their optimal use in local, regional and national contexts.

This also needs to be considered in the light of the overall concept of operations for major emergency and crisis management which seeks to represent the perspectives of various different actors and voices within the whole emergency management framework.



The adoption of iSAR+ guidelines and platform might lead to a business scenario. For this purpose iSAR+ also developed a **Business Plan** in a separate document, where a set of offers are presented.

4 Acknowledges

This deliverable represents the combined efforts of **all iSAR+ partners** directly, through the identification of recommendations, or indirectly through the contributions made to field work and the showcase events.

Appreciation needs to be shown particularly to the **end-users participants** (PPDRs and citizens) who voluntarily gave their time and expertise throughout the fieldwork, survey and showcase phases of the project.

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