iSAR+

Final Report

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PROJECT PERIODIC REPORT

iSAR+

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Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate):
  - ☑ has fully achieved its objectives and technical goals for the period;
  - ☐ has achieved most of its objectives and technical goals for the period with relatively minor deviations[4];
  - ☐ has failed to achieve critical objectives and/or is not at all on schedule[5].
- The public website is up to date, if applicable.
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator

Mr. Pedro Sinogas

Date: 08 / 07 / 2015

Signature of scientific representative of the Coordinator

Pedro Sinogas

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[4] If either of these boxes is ticked, the report should reflect these and any remedial actions taken.

[5] If either of these boxes is ticked, the report should reflect these and any remedial actions taken.

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Executive Summary

This document constitutes the final report of project iSAR+. It describes the project objectives, main work performed, achievements and reports on any problems encountered during the period as well as the strategies used by the consortium to solve them.

The first section presents a summary of the project, its objectives, and summarizes the activities performed in each of its four iterations.

Section 2 presents the objectives specific to each work package.

Section 3 details the activities performed and the problems and deviation that occurred in the scope of each work package.

Section 4 list the deliverables prepared by iSAR+ and submitted to EC, their submission dates (planned and actual) and some remarks.

Section 5 is dedicated to management activities and risk management.

The consortium is confident that iSAR+ has achieved its objectives.

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List of Acronyms

Acronym	Meaning
API	Application Programming Interface
CCTV	Closed Circuit Television
CEP	Complex Event Processing
CONOPS	Concept of Operations
COTS	Commercial Off-The-Shelf
CPX	Command Post Exercise
DGSCGC	National Authority For Crisis Management
EAG	Ethical Advisory Group
EU	Europe
EXIF	Exchangeable Image File Format
GIS	Geographic Information System
HMI	Human-Machine Interface
ICT	Information and Communication Technologies
IMS	Information Mining & Synthesis
IPS	iSAR+ Portal Software
LPR	License Plate Recognition
MCS	Maximum Common Sub-graph
MORE	Model Once Run Everywhere
MTA	Multi-language Text Analytics
NOTICO	Previous Permiloc
ORSEC	Organisation Du Secours
RATP	Régie Autonome des Transports Parisiens

SAIP	système d'alerte et d'information aux populations
SARS	Sedentary Acute Respiratory Syndrome (virus)
SFR	Smoke and Fire Recognition
SMART	Specific, Measurable; Attainable, Realisable, Traceable
SME	Small and Medium Enterprise
SMM	Social Media Monitoring
SOTA	State-of-the-art
SSAG	Security Screening Advisory Group
TAT2	Text Analysis Tool Tweet Locator
THEO	Technical Human Ethical Organizationl (iSAR+ dimentsions)
WP	Work Package

Table 1 – List of acronyms.

1 Summary

The iSAR+ Project aims at researching and developing of a set of guidelines that, in emergencies or crises, 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. Those guidelines shall among all enable smooth integration of iSAR+ solutions into the current CONOPS of PPDR (e.g. through technological, organizational, ethical and legal and human perspectives). To accomplish this iSAR+ aims at **demonstrating and validating its main concepts** by means of technological platform presented to end-users in an interactive exercise – namely a prototype that was delivered according to a spiral model of system design (i.e. successful iterations).

iSAR+ work is divided into interconnected work packages aiming common project objectives as defined in the Description of Work, and progressing in three iterations (concept, basic and enhanced) and 6 development stages (in months 6, 8, 18, 24 and 30), as depicted in the next figure.

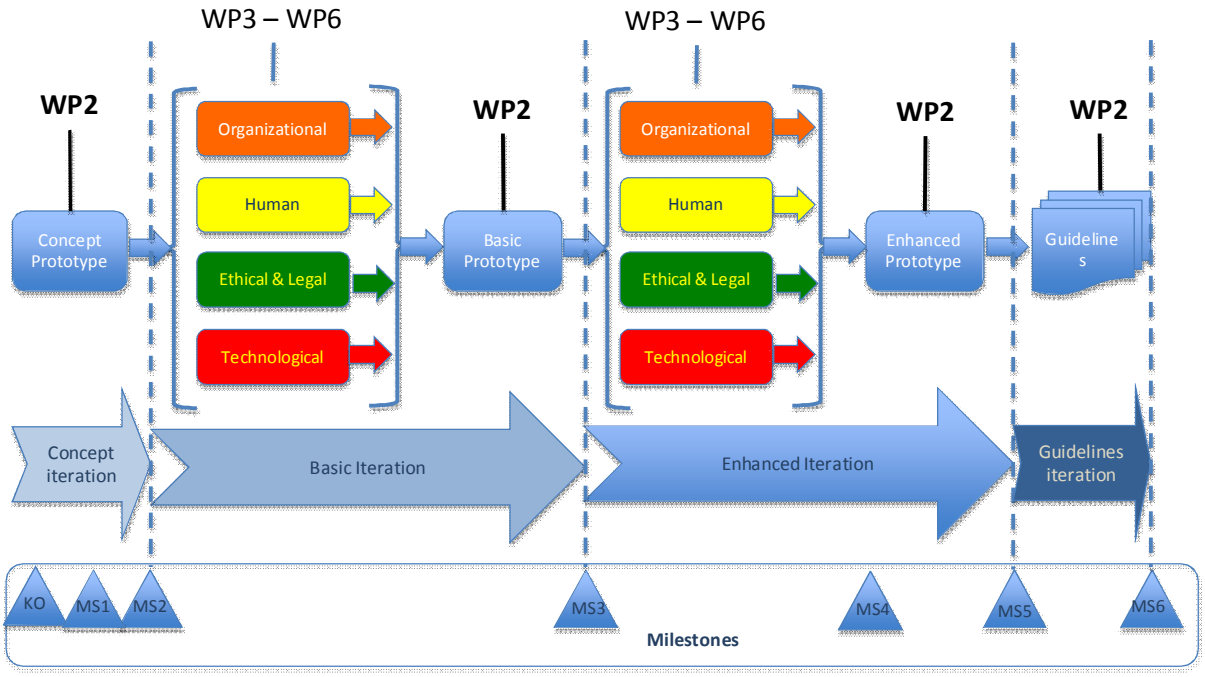


Figure 1 - iSAR+ methodology

Work Package 2 (WP2) activities had the main role in the project definition phase, analysing scenarios and case studies, defining User Requirements and the project concept. In other words, preparing the baseline to support the work of the so called THEO work packages (Technical, Human, Ethical and Organizational). Once the other work packages started WP2 acted as an integrator of each iSAR+ dimensions' analysis, recommendations, and other results like technological components, in order to develop iSAR+ guidelines and associated technological platform, to be validated together with iSAR end-users community through the execution of exercises – iSAR+ Showcases.

Work packages 3-6, the THEO work packages, entail each of the 4 iSAR+ dimensions, the four pillars on which the project is structured and represent 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:

- **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.

- **Human**: Based on the comprehensive review of evidence and recommendations on the Humans' (citizens or PPDRs) 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.

- **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.

- **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 was taken into consideration during the implementation of all iSAR+ Project activities., focused on the Organizational (PPDRs), Human (Citizens), Technology (platforms for PPDR and Cittizens) always taking into consideration all the relevant ethical concerns and the legal framework issues.

First Iteration

The first iteration, the "Concept Iteration", started with an integrated analysis of a set of different inputs like Case Studies, Evidences, Interviews performed with end users, iSAR+ DoW, and online Questionnaires. As a result two main outputs came up: the End-User Requirements (deliverable D221) and a first prototype of iSAR+ platform created in order to **respond to a subset** of already identified **core user requirements**, providing the baseline for subsequent prototype versions (i.e. Basic and Enhanced Prototypes).

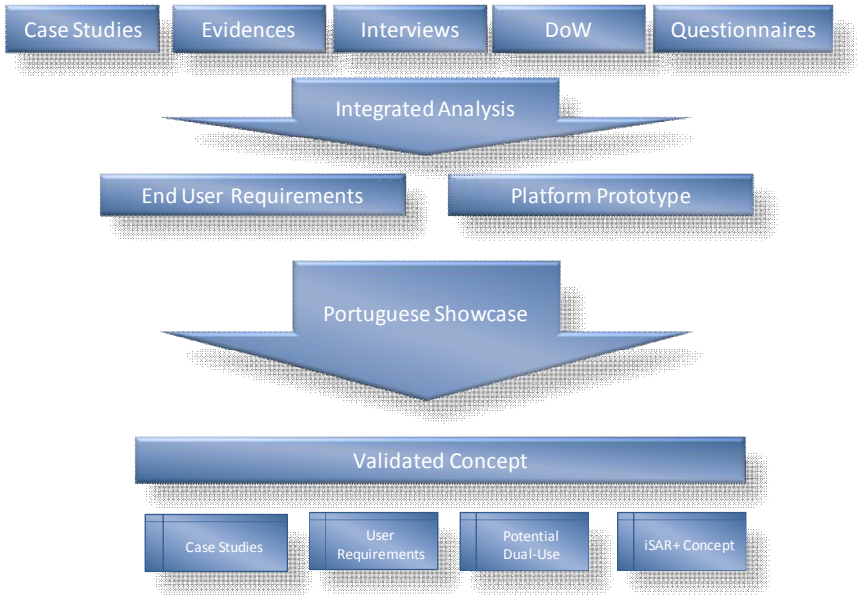


Figure 2 - Concept Iteration

This 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 Pública do Distrito de Lisboa. iSAR+ was used to exchange information to/from Citizens and served also as an Information Management System in support to PDPR 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 debriefing and discussion session, in the Portuguese workshop, where the iSAR+ partners had the opportunity to interview the local end-users and collect as much information as possible to produce further analysis.

During this iteration, among other deliverables, a set of important research documents were also produced with an emphasis the following:

- D2.1.1 – Case Studies Analysis Report;
- D2.2.1 – User Requirements Document;
- D1.6.1 – iSAR+ Potential Dual-use Technologies and Associated Mitigation Strategy;
- D2.3.1 – The iSAR+ Concept Prototype.

This first phase allowed iSAR+ THEO work packages to star their activities supported by a consistent and validated baseline.

Second Iteration

The second iteration, the “Basic Iteration”, was mainly focused on the start of the THEO work packages based on the results of the previous iteration.

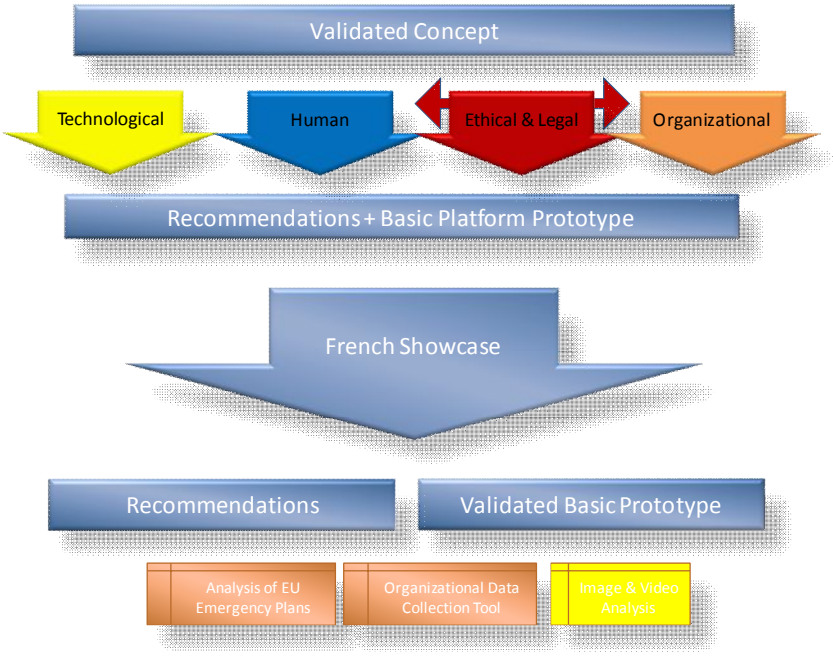


Figure 3 - Basic Iteration

Besides already started in the first iteration by developing the first technological prototype, the Technological research dimension started officially its work in this iteration by designing the platform architecture and then developing its first modules. All the tasks of this work package started during this iteration.

Simultaneously, Human and Organizational work packages have also started their activities by analysis the results of the first iteration, interviewing end-users, producing and launching questionnaires and providing recommendations for the second exercise.

The Ethical & Legal work packages started the analysis of case studies, from the point of Ethical & Legal eyes, and acted mainly as a "monitoring service" of all activities and results produced by any project activity ensuring the compliance with the demanding European Ethical & Legal framework.

At the end of this iteration iSAR+ project had the opportunity to perform a second exercise to validate the prepared recommendations and the evolved platform, now in its second version – the "basic prototype".

This exercise, the French Showcase, took place during the evening of September 24th in Paris, both in Paris fire brigades operational centre (hereafter called "*Champerret*") and Montparnasse train/metro station (hereafter called "*Montparnasse*"), which is a big public transport hub.

It was a second opportunity to get closer to end-users sharing knowledge, validating iSAR+ outcomes and collecting important inputs. These were then discussed in the day after during the French workshop, another important event towards to support the research activities performed in the third iteration.

Several other documents were delivered, especially the following:

- Analysis of EU Emergency Plans

- Organizational Data Collection Tool
- Image and Video Analysis

Third Iteration

The third iteration, the "Enhanced Iteration", aimed at adjusting the outcomes produced in the previous iteration and finalizes the THEO research activities.

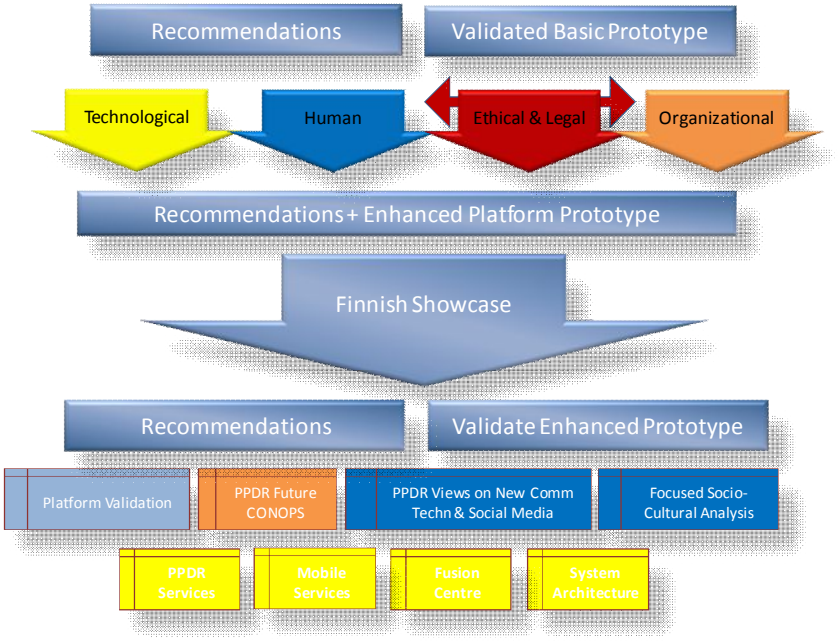


Figure 4 - Enhanced Iteration

All the THEO work packages continued their research activities towards to the third and last exercise, the Finnish Showcase.

This third and final showcase was organized on 10th February, 2015, at the Emergency Services College, located in Kuopio, Finland. The Finnish showcase aimed at validating the enhanced iSAR+ requirements. Showcase participants were located in two places of Emergency Services College facilities: the PPDR players at the emergency management simulation environment at the College and the citizen players at the ESC Korvaharju training ground ten kilometres from the College.

The exercise concluded the most relevant research activities and THEO work packages had therefore the opportunity to produce their final recommendations.

The most part of iSAR+ deliverables were finalized in this iteration, some were:

- iSAR+ platform validation;
- PPDR Future Conops;
- PPDR Views on New Communication Technologies and Social Media;
- Focused Sociao-cultural analysis;
- PPDR Services;

- Mobile Services;
- Fusion Centre;
- System Architecture.

Fourth Iteration

The last iteration, the "Guidelines Iteration", was mainly dedicated to consolidate all research outcomes and produce THEO recommendations.

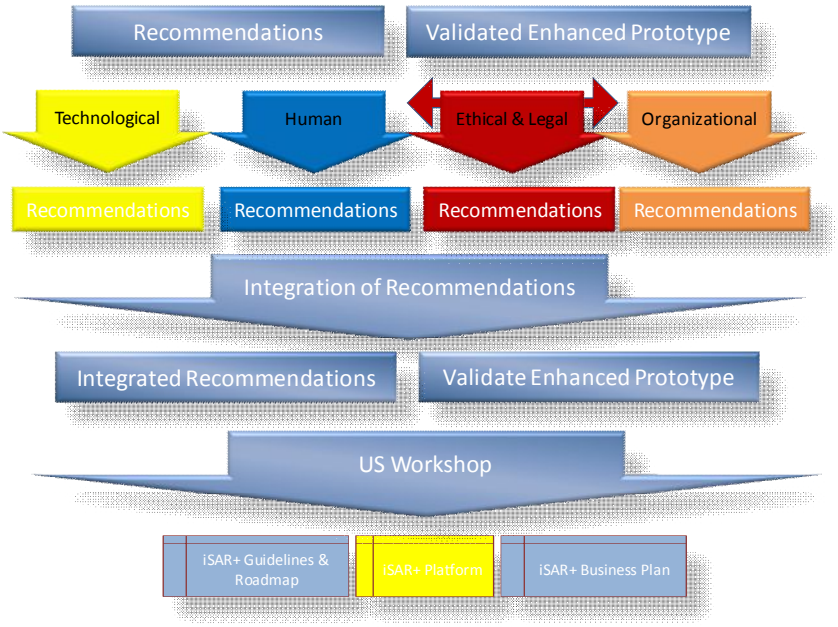


Figure 5 - Guidelines Iteration

As expected, these recommendations had to be analysed and integrated to identify and solve "conflicts" between different dimensions' points of view.

Based on the integrated recommendations, iSAR+ organized a workshop in Boston, United States, looking for expanding the research beyond EU level and aiming at sharing of knowledge with US end-users.

The workshop occurred on May 8th, in the Boston EMS facilities, with the participation of THEO WP leaders, the iSAR+ coordinators and the following end-users' entities:

- Boston Emergency Medical Services (EMS);
- Boston Police Department (PD);
- Boston Fire Department (FD);
- Mccall Ambulance;
- PSNet (Interisle).

The last period of iSAR+ was only dedicated to produce the most important project results: the iSAR+ Guidelines & Roadmap, and the Final Business Plan.

A summary of these Guidelines & Roadmap as well as the Business Plan were presented in the iSAR+ Final Workshop, organized in Lisbon, Portugal, at the Police Sciences and Internal Security's High Institute, the "Academy" of PSP (Portuguese Safety Police) officers.

2 Specific objectives for each work package

Each work package performed its research activities in an objective oriented methodology:

Work package 2 (Integrated Analysis and Guidelines):

- Analyze past events, case studies and evidences related with the scope of iSAR+.
- Prepare and submit deliverable D2.1.1 Case studies Report;
- Collect evidence, lessons learned and best practices of crises response efforts, highlighting citizens' involvement and the use of mobile technology and online social media from a multi-dimensional perspective (human, organizational, technological and ethical and legal);
- Generate reference scenarios to identify user requirements and needs;
- Prepare and submit deliverable D2.2.1 User Requirements Document;
- Prepare and submit deliverable D2.3.1 The iSAR+ Prototype;
- Organize and execute the three Showcases towards the validation of iSAR+ THEO recommendations and platform;

Work package 3 (Organizational Analysis):

- Carry out preparatory explorations towards this work, including literature reviews, requirements gathering and building up the PPDR network.
- Carry out analyses of available EU crisis management plans and frameworks;
- Conduct field research with PPDR personnel and organizations to build up a picture of real-world concept of operations (CONOPS) representing the as-is operational context leading ultimately to the "to-be" CONOPS in the second half of the project;
- Develop the organizational data collection methodology for guiding fieldwork towards the definition of a data collection tool for organizational analysis;
- Participate in and observe showcase activities and analyze data emerging;
- Identify best practices, current gaps and needs for new public communication systems in PPDRs engaging in the international PPDR survey;
- Survey and report including an effectiveness rating of message channels and messages to ensure broad feedback in a European sample;
- Produce the final recommendations in the scope of this work package.

Work package 4 (Human Analysis):

- Assessment of the citizen's perspective on new communication technologies and social media in crisis communication. Preparation of the citizen's survey including literature research to identify the high relevance topics in crisis communication;

- Preparation and implement the citizens' survey platform;
- Preparation of platform analysis from the citizens perspective;
- Produce the final recommendations in the scope of this work package.

Work package 5 (Ethical and Legal Framework Analysis):

- Detailed analysis of four crisis case studies, deemed representative of the ethical and legal concerns related to the use of new mobile and social media communication technologies;
- Analysis of the potential use of the iSAR+ platform and its associated tools in crisis events, from the perspective of ethics and fundamental rights;
- Supervise the iSAR+ Project's technical activities with respect to ethics and fundamental rights considerations;
- Production of recommendations, supported by lessons learned and best practices that, from the ethical and legal perspective, enable and encourage new media users to contribute to security in crisis situations and search and rescue actions.

Work package 6 (Development of the iSAR+ platform):

- Identification and specification of the components integrated in the three platform prototypes;
- Refinement of the technology-related user requirements;
- State of the art of the architecture frameworks able to cope with iSAR+ requirements;
- Elaboration of the three prototypes' logical architecture;
- Specification of the interfaces between the various components to be integrated in the basic prototype;
- Full development of the Smoke and Fire Recognition (SFR) component;
- Full development of the License Plate Recognition (LPR) component;
- Produce the final recommendations in the scope of this work package.

Work package 7 (Dissemination and Exploitation):

- Participate in dissemination activities where opportunities arise;
- Implement the iSAR+ Business and Marketing Plan ;
- Communicate widely and through multi-channels the iSAR+ results;

3 Work progress and achievements during the period

This section provides an overview of the progress of work for all project Work Packages except management and coordination

3.1 WP2 – Integrated Analysis and Guidelines (led by TEK)

3.1.1 Work Progress

Task 2.1 Case Studies and Evidence (led by TCD):

Towards the main objective of this task, to collect evidence and lessons learned, the task leader in collaboration the partners responsible for the project's THEO dimensions prepared a methodology document indicating the criteria for selecting exemplary cases to be applied by the THEO partners based on their respective subject matter expertise.

The results of this task were stated in the deliverable D2.1.1 – Case Studies Report, which included the flowing elements:

- A detailed description of the theoretical/methodological approach including the Activity Theory socio-technical framework employed;
- An analysis of exemplary cases based on the subject matter expertise of THEO dimension leaders with a synthesis of important issues across all dimensions;
- A set of criteria based on the analysis of past events for the construction of future scenarios;
- The following Case studies where analysed from the different THEO point of view:
  - 2001 Terrorist Attacks on USA
  - 2002-2003 China SARS Epidemic
  - 2004 Madrid Train Bombings
  - 2004 Indian Ocean Tsunami
  - 2005 London Tube Bombings
  - 2005 Hurricane Katrina
  - 2007 Virginia Tech Shooting
  - 2007 Southern California Wildfires
  - 2010 Haiti Earthquake
  - 2011 Great Japan Earthquake
  - 2011 England Riots
  - 2011 Norway Terrorist Attacks
  - 2011 Middle East Upheavals
  - 2011 Polish Air Incidents
  - 2011 St. Stephen's Day Storm (Finland)

- 2008 Kauhajoki school shooting
- 2007 Water-Borne Emergency at Nokia Municipality

- A set of questions based on the analysis and also the activity theory framework for the elicitation of requirements from PPDRs;

Task 2.2 Reference Scenarios and User Requirements (led by PCCNY):

This task aims at specifying requirements and scenarios for the further development of the iSAR+ concept.

The general approach to achieve this goal was based on first investigating information coming from multiple existing sources within the project (i.e. DoW, D2.111, scenarios). Please refer to the following methodology of iSAR+ user requirements definition.

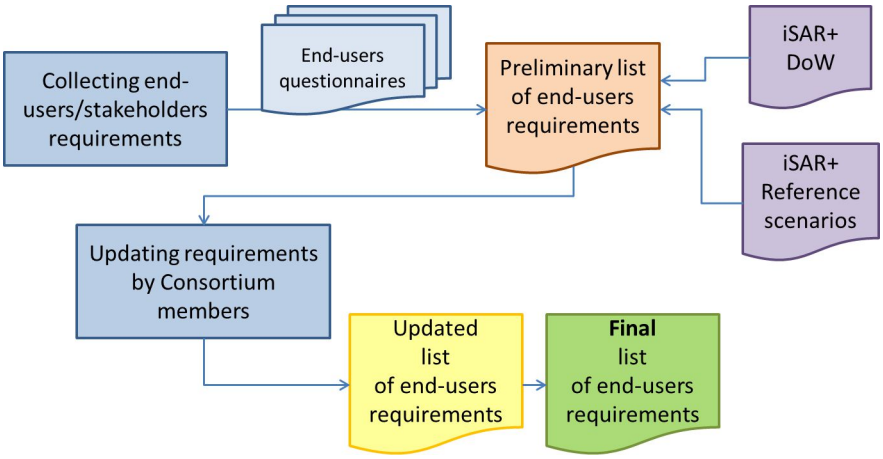


Figure 6 - Process of defining end users' requirements

This first step has delivered a valuable list of requirement candidates. Based on this "bootstrap" phase and actually in parallel to it a questionnaire-based approach to collect end-users needs and validate requirement candidates has been defined. Equipped with the good evidence of historical large scale crises (D2.111) as well as representative scenarios that have been created based on the interaction with internal end-users a first iteration of "requirement gathering" was done with partners representing end-users in the consortium.

After this first internal round has validated the approach the consortium has managed to contact external groups of PPDRs and citizens. An effort has been made to interview around 500 end-users (70% citizens, 30% PPDRs) to be able to validate requirement candidates devised from DoW / D2.111 but also to identify emerging ones. The interviews have confirmed that 95% of requirement candidates are actually good representatives of end-user needs.

As regards the respondents it has to be indicated that the detailed roles and responsibilities (considering PPDR) of the interviewed parties was often opportunistically composed considering the maturity of business relation between particular institution and a partner responsible for interviewing end-users in a given country. With respect to citizens the selection was quite straightforward and beneficial to the project and the requirements

collection process due to good contacts of some of the consortium partners with academia. Regarding the expert respondents they consisted of individuals falling into various groups:

- Rescue Departments (FI)
- Crisis centre of the Ministry of Foreign Affairs (FR)
- Central Directorate of Public Safety / C2 commanders (FR)
- National Gendarmerie (FR)
- Fire brigade operational centre (FR, PL)
- Fire Brigade (IR)
- Prefecture Innovation Lab (FR)
- Voivodeship Centre of Emergency Information (PL)
- Public Security Police (PT)
- Police (FI, IR)
- Civil Protection Services (PT)
- Management of digital media (UK)
- Operators and managers at medical communication centre (NO)
- Public administration (PL).

In general, in all the countries were iSAR+ partners are involved, the major PPDR entities were interviewed and the questionnaires were collected and analysed, contributing to the quality of the deliverable D2.2.1. As an example of the type of activities performed in each country, the following are highlighted:

- In UK, a series of focus group discussions were conducted with representatives from the three branches of first responders – Fire (Dublin Fire Brigade), Paramedic (Dublin Fire Brigade) & Police (Police Service of Northern Ireland). These discussions provided useful information about:
    - Current use of social media;
    - Limitations of its use;
    - Potential future role of social media;
    - Major challenges and opportunities faced by organisation in relation to social media use.

  Among the main results from this initial requirements gathering process have been the following:
    - The importance of social media for community engagement, not only in crisis situations but continuously;
    - The need for clearer guidelines and policy to support the legal and ethical use of social media to allow for more effect tactical and strategic use;

- The need for greater public education about the citizens role in a crisis and how they might more effectively use social media;
- The potential for intelligent data fusion and decision support based on analysis of online traffic;
- The potential added value of instant image and video feed in real time for preparing to arrive at crisis scene (provided by public) as well as the ability to locate victims using GPS (smart phones).

- In Finland, Finnish partners made together electric questionnaires and distributed those by e-mails and social media. The citizen questionnaire produced about two thousand answers, from which two hundred were picked up for the international analysis, because a data need to be comparable with other countries data. The rest of the data was utilized in a national research (reported as exploitation and dissemination of iSAR+).

  The PPDR questionnaire yielded about a hundred answers. In addition, a national workshop was organized in Emergency Services College of Finland to gather further ideas from both citizens and authorities. These ideas were used along with the questionnaire data to formulate user requirements for iSAR+.

- In France, French Partners conducted several interviews with various and diverse PPDRs organisations. A short overview of the project was sent to the PPDR organisations before meeting them, in order to trigger their ideas on the subject. People interviewed included members of fire brigades, police, foreign affairs ministry and Gendarmerie nationale (French military police) representing different hierarchical levels in the organisations, in order to gather the most relevant information corresponding to various crisis management levels.

  Additional feedback could be collected in two other interviews:

  - one with Paris town community manager (more than 2 million fans on Facebook) in order to understand how such an organisation interacts with its community online, and how useful they consider social media for crisis management,
  - another with the head of crisis communication of the RATP (Paris underground).

The requirements provided as the main delivery of D2.2.1 has the rank of “preliminary requirements” and should be understood as important basis for specifying baseline requirements in the on-going work delivered by work packages WP3-6.

The level of details captured so far enables clear identification of key needs but requires further efforts to turn current set of requirements into a SMART (Specific, Measurable, Attainable, Realisable, Traceable) requirements that laid down the foundation for delivering iSAR+ platform and guidelines.

The scenarios presented in D2.2.1 were first of all issued to deliver the additional inputs (and inspiration) to requirements but the consortium has made an effort to structure them in a way that it can easily be used in the on-going activities related to the end-user community engagement. The approach used for scenarios is based on a clear definition of its objectives,

actors, but also vignettes and storylines that altogether are arranged to enable easy use by showcases that could benefit from a clear definition of scenarios to prepare a demonstration based on that.

Task 2.3 The iSAR+ Concept Prototype (led by ITTI):

To accomplish a smooth integration of iSAR+ solutions into the current CONOPS (Concept of Operations) of PPDR (e.g. through technological, organizational, ethical and legal and human perspectives) iSAR+ aims at **demonstrating and validating its main concepts** by means of technological platform presented to end-users in an interactive exercise – namely a prototype that was delivered according to a spiral model of system design (i.e. successful iterations).

In the first stage of the reporting period, the concept prototype was created in order to **respond to a subset** of already identified **core user requirements** and needs that have been identified in the Task 2.2 and reported in the deliverable D2.2.1.

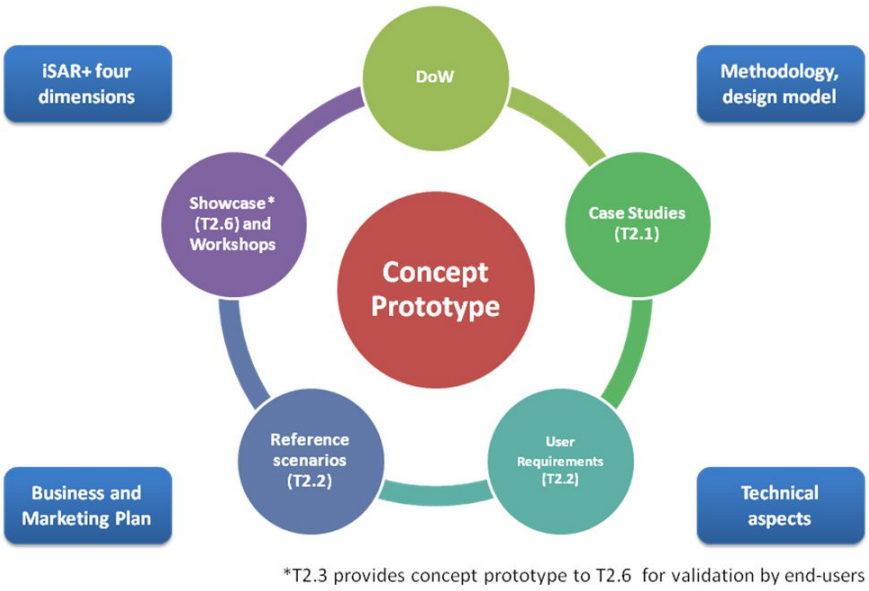


Figure 7 - Concept prototype in context of concept iteration

These requirements were selected based on two main criteria: its **contribution for the most important functionalities** (as suggested by the traditional Pareto principle) and the risk associated with each requirement as a **risk effects mitigation strategy** by trying first the most risky requirements with the iSAR+ end-users community.

The prototype was then **used and validated** in the scope of an exercise (**showcase**) performed in Portugal together with local end-users (PPDR) Protecção Civil de Cascais and Polícia de Segurança Pública do Distrito de Lisboa. These activities were the subject of tasks 2.5 and 2.6.

The results from the validation activity performed during this showcase were than discussed in the scope of a workshop performed (activity 7.3) between the iSAR+ work package leaders.

This prototype provided a baseline for subsequent prototype versions (i.e. Basic and Enhanced Prototypes).

For more information regarding the Concept Prototype, please refer to deliverable D2.3.1.

Task 2.4 Integration of iSAR+ Dimension's (led by TCD):

Task 2.4 began in M16 of the project and was undertaken iteratively over the period through continued collaboration between the THEO work package leaders. In order to produce the deliverable D2.4.1 the task was primarily concerned with gathering and integrating the findings from the recommendations developed during each of the THEO work packages. To undertake this the recommendations from each of the THEO WPs were examined for overlap, redundancy and points of potential conflict. This enabled a consolidated set of iSAR+ recommendations that were based on all four THEO work packages. The integration of recommendations fed directly into the development of the consolidated guidelines in D2.7.1.

Task 2.5 Validation of the iSAR+ Dimension (led by TEK): TBD - TEK

At the first phase of iSAR+ it was prepared a document describing the User Requirements identified in the scope of task 2.2, Reference Scenarios and User Requirements and Needs, resulting from (1) the analysis of Case Studies, end-users (PPDR and Citizens) interviews and questionnaires, and analysis of iSAR+ DoW. This document (D221) materializes iSAR+ objectives in terms of Requirements.

Those requirements were implemented (or achieved) in three different prototypes (Concept, Basic and Enhanced) and validate in the iSAR+ showcases performed in Portugal, France and Finland (refer to corresponding showcase reports).

It is then of utmost importance to report the results of the validation of each requirement which was the objective of deliverable D2.5.1. In this document is presented a traceability matrix in which for each requirement is stated how it was validated (if it is the case), in which showcase, and additional remarks complement iSAR+ compliance with identified end-user needs.

Task 2.6 User Showcases (led by PPSL):

This task is interconnected with the previous one as the showcases, performed in synchronization with the platform development, were planned to act as advanced validation means of the iSAR+ platform prototypes.

Carried out in the end-users' environment, user showcases are meant to have an active participation of the iSAR end-users community particularly considering the definition of the new CONOPS and the citizens' involvement.

The Portuguese Showcase

The first user showcase took place in Cascais, Portugal in October 9th, 2013, in the facilities of Cascais Civil Protection, located in the city of Alcabideche, Portugal.

The Showcase meeting was divided in two stages. The first stage consisted on a display of the technology and the tools that have been integrated so far: the MORE platform developed by Tekever, and OsintLab (a data crawler) developed by THALES; and, the second stage was a discussion with the end-users who provided feedback relating to the functionality of the platform.

The Concept Prototype of the iSAR+ platform was displayed to 12 participants external to the iSAR+ consortium. The participants were chosen on the basis of their role in a PPDR agency (e.g. civil protection, police, fire brigades, etc.). Before the actual showcase of the technology the end-users participating in the in display were briefed concerning the objectives of the exercise. Participants were also informed that they were under no obligation to participate and that their participation was entirely voluntary. The information concerning the details of the exercise and their rights, as participants in the showcase, was accompanied by informed consent forms that were signed by the 12 participants and, are being kept at CSSC for the records concerning the ethical validation of the iSAR+ platform and the research activities undertaken by the iSAR+ consortium resulting in the showcase.

All participants declared to have understood the information provided and their right to withdraw from the exercise at any time. The briefing meeting for participants began at 10.00 AM and, by 10.30 the participants were already located in the three outposts reserved for the Showcase: the command room, the communications centre, and the mobile communications centre. The observers (members from the different organisations of the iSAR+ consortium) were able to move between different outposts to see the interaction between the different participants and the iSAR+ platform.

This showcase mainly consisted of a CPX exercise to demonstrate and use the concepts defined on the first iteration of iSAR+ project. The exercise was thus expected to elicit end-user needs and retrieve further feedback in order to consolidate existing ones and/or identify new requirements.

Figure 8 – The Ops Room of the CPX exercise, with PPDRs and iSAR+ partners (as observers)

The participants followed a story-line devised by the members of the iSAR+ consortium. The story-line portrayed a fictitious scenario of a disaster that took place at the fictitious "iSAR+ Hotel" in the city of Alcabideche. During the showcase there were incoming messages received by radio and through the iSAR+ platform. End-users were able to upload messages onto the platform and to target those messages to a specific audience (e.g. PPDR, citizens), the purpose of such messages was to provide updated information concerning the fictitious disaster, or to communicate with the different end-users representing the PPDR agencies and to give instructions to the citizens.

Although the iSAR+ platform was already enabled to post messages on Facebook, no messages were posted on Facebook to prevent the spread of rumours (several Facebook users have "liked" iSAR+ on Facebook and they could have gotten a false impression if the showcase messages would have been really posted on the Facebook page of iSAR+).

There were no citizens participating in the showcase. PPDR personnel were acting as citizens sending alerts through the iSAR+ platform. Some of these alerts included graphic images of the disaster. Because the showcase was based on a mock-up scenario, there were no posted photos, all the graphic images were represented by simple drawings in order to show how the images would be fed (onto) and displayed by the platform.

Figure 9 – One of the rooms of the CPX exercise (communications room)

After the initial stage of the exercise, the members of the consortium moved to the communications centre to be shown how a "data crawler" developed by THALES (Osint lab) would be integrated into the platform (this is one of the many tools to be integrated). In order to provide coherence to the development of the showcase, many real and "fake"[6] tweets were gathered by the "data crawler" days before the showcase. The real tweets collected were made anonymous prior to the exercise and, instead of showing the username of the authors an ID number was shown on the screen. This is a powerful tool that can be used both for making the search and rescue activities more agile as well as for enhancing citizen surveillance by State authorities. A number of recommendations concerning this "data crawler" were drafted for the guidelines and recommendations for the basic prototype.

The purpose of having real and fake tweets was to show the filtering capabilities of the "data crawler". The tweets were filtered in such a way that the PPDR personnel at the communications centre would only receive those tweets that concerned the fictitious disaster. These tweets were then validated by the PPDR personnel so that only those of practical importance were fed onto the iSAR+ platform, keeping thus a "human in the loop" for assessing the relevance of the information received. It was explained to us that, due to the complexity of the "data crawler" that was integrated (Osint lab), it is necessary for end-users using the iSAR+ platform to have somebody with special training in order to be able to use the tool properly (e.g. filtering the information and dividing it in clusters in order to spot relevant tweets).

The other tool that was shown (to be integrated, but not yet operational) was a missing person finder platform. Although it had not been integrated, the example provided was the "Vesuvius People Locator" system. This tool has been preliminary integrated through the MORE platform (e.g. there is a tab on the MORE platform called "person finder" which prompts the "Vesuvius" system if clicked on it). However, because the "Vesuvius" system

[6] By fake we mean tweets that were specifically posted in relation to the fictitious disaster on which the showcase was based (e.g. messages about the situation: explosion at iSAR+ Hotel in Estoril).

had not been integrated into the iSAR+ Concept Prototype, it was only shown as an example. There were a few concerns surrounding the "Vesuvius" system (e.g. reports of dead persons are available for the public eye to see, hence making it possible for family members to find out prior to official confirmation by the authorities). Recommendations for the person finder were included as part of the guidelines and recommendations for the basic prototype – that was displayed during the 2nd Showcase in Paris, France – in order to prevent potential ethical issues.

Given the performance of the tools presented in the architecture of iSAR+'s Concept Prototype, and the way in which research activities were carried out (including the participation of volunteers in the showcase), the Concept Prototype is hereby **VALIDATED** (in compliance with Task 5.3) as ethically compliant.

Figure 10 – A briefing to iSAR+ partner (observers of the PT Showcase)

iSAR+ partners have participate in this exercise as observers. At the end they were able to interview the end users and collect useful inputs to be discussed in a internal workshop, performed in the day after in the scope of task 7.3. Besides the impact of the results in the iSAR+ concept and requirements, each partners was able to get inputs useful for the THEO work packages' activities like task 3.2, which is focused on the qualitative assessment of PPDRs views on the use of the technologies like those used in this showcase. For this specific purpose it was possible to get some answer to questionnaires prepared by EMAUG which had also the possibility to interview the PPDR participants.

The French Showcase

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

The operational centre was used according to its real role in day to day life, that is call center receiving emergency calls (112/18) and coordination of the means 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.

It was decided to start the showcase at 22:00 to have less activity in the station (less trains arriving/departing and less travellers in the station than during day time) and still allow participants to go home by public transportation (which stops around 00:30 in Paris) at the end of the showcase.

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 11 - BSPP Operational centre

Figure 12- Montparnasse train station

The showcase scenario comprised 2 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 get 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 get assistance from emergency services.

Typically all operations concerning a major crisis occuring 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 4 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 13 - 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 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 Notico 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 4 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).

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

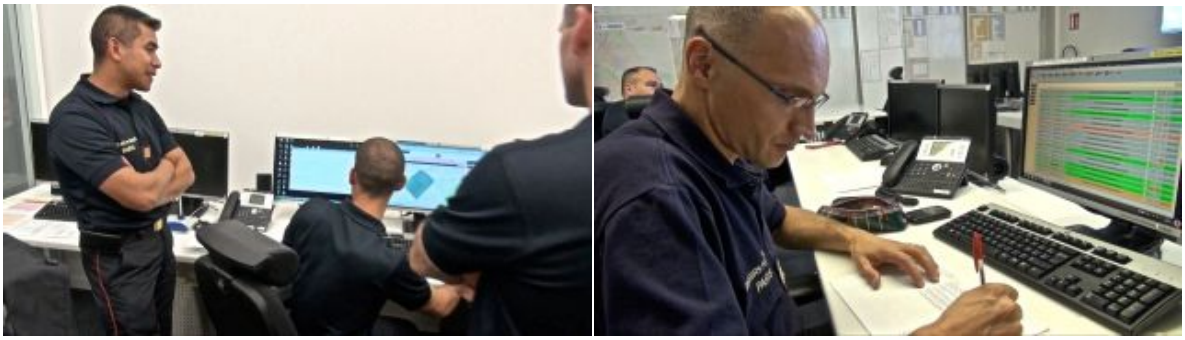


Figure 14 – PPDRs using iSAR+ platform in *Champerret*

Citizens 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 which doesn't provide that kind of "privacy" possibility.

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 geo-location 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 6 days before the showcase, with the tools installed in the different partners' premises. A second Dry Run was performed in the showcase location 1 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 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 1 hour before beginning of the showcase to be briefed on the objectives of the exercise and trained on the 2 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 15 - Briefing of citizens in Montparnasse

Figure 16 – 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 in the scope of task 7.3.

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 iteration (enhanced prototype) could start.

The Finnish showcase

The third and final showcase was organized on 10th February, 2015, at the Emergency Services College, located in Kuopio, Finland. The Finnish showcase aimed at validating the enhanced iSAR+ requirements. Showcase participants were located in two places of Emergency Services College facilities: the PPDR players at the emergency management simulation environment at the College and the citizen players 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 17 - Korvaharju training ground

Figure 18 - Emergency management simulation environment

Finnish user showcase was organized alongside 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 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. 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+ joined the Krisu exercise in three exercise scenarios, where iSAR+ tools were used to bring new features 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 actual citizen players brought new perspectives to the exercise.

The three scenarios of the FI 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.

Figure 19 - Hazardous material accident

The iSAR+ FI showcase scenarios were such where the competent authority is Rescue Services. Rescue Services lead the operational side and intersectoral co-operation bodies supported Rescue Services. The authority responsible for situation management is also responsible for communications, so in the showcase the responsibility for communication was on Rescue Services. In the showcase scenarios the other participating authorities, Police and City Administration, supported the Rescue Services communication especially on matters of their jurisdiction (e.g., the city administration published information on crisis counseling for people affected). (see figure below).

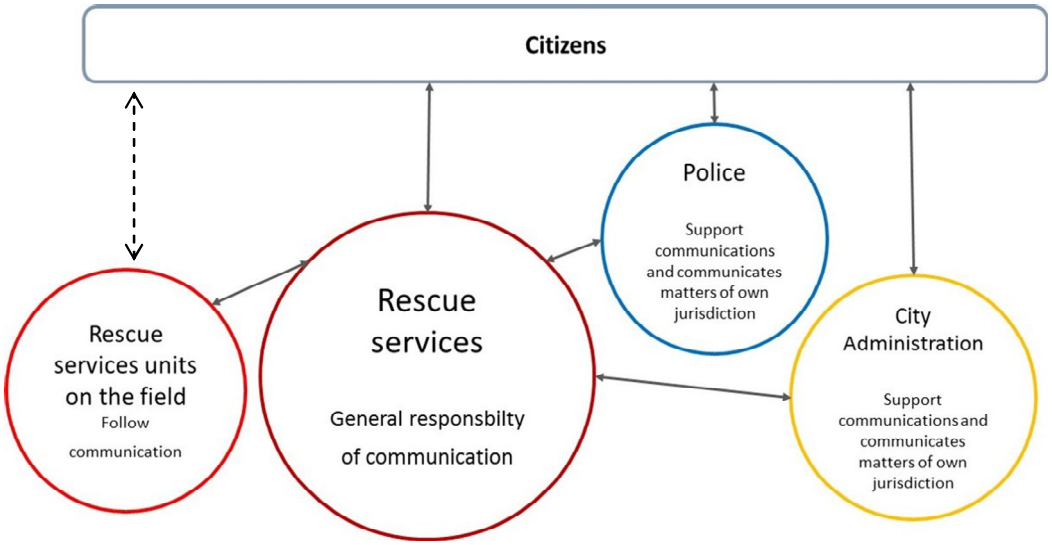


Figure 20 - Communication flows between the participating actors

The PPDRs that participated the Finnish user showcase were ESC fire officer students and personnel from North-Savo Rescue Department, Eastern Finland Police Department and the City of Kuopio. Citizen players, total of 35, were recruited among the students from the University of Eastern Finland, Emergency Services College and from Kuopio Red Cross and Voluntary Rescue Services (VAPEPA). iSAR+ project partners observing the showcase situated mostly at the command and control centre.

Figure 21 - Citizen players at an accident scene

Figure 22 - iSAR+ platform at use

Figure 23 - Showcase briefing

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.

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. An approval for the data use was requested at the planning phase of the showcase from the Finnish Data Protection Ombudsman.

Data (names, locations, and events) used in the showcase were fictive. The simulated data included:

- real time messages (e.g. tweets, photos and video streams of the events, tweets with geolocation data) generated by the players
- photos from real life emergency situations provided by ESC
- updates created in advance and posted during the scenarios
- rumors and trolls produced intentionally by the citizen players.

The showcase was executed mainly in Finnish, some English and Swedish was also utilized in the communication of both citizens and PPDRs. Finnish project partners provided translations for project observers where needed.

The components of the iSAR+ platform demonstrated in the FI showcase were social media monitoring (SMM – OsintLab); collaborative crisis coordination platform to collect, validate and disseminate information (IPS) and geographically targeted alerting towards citizens (myPublicAlert – mPA, Notico). Additionally Microsoft Skype Translator was tested. The citizen players used both their own smartphones and equipment provided by iSAR+ project. Wireless internet connection was provided.

After the showcase feedback was collected from the participants (PPDRs, citizens and observers), in order to capture user experiences and potential improvements regarding the iSAR+ platform. The feedback was then analysed and discussed in an iSAR+ workshop by iSAR+ participants, observers, citizens, and PPDR representatives. 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. Although considered useful, the available resources were pointed out as a challenge for introducing these kind of tools in crises management.

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. More specific report of Finnish Showcase can be found in D2.265.

Task 2.7 The iSAR+ Guidelines and Roadmap (led by TEK):

This task started in the last project iteration. Based on the recommendations produced in the scope of each THEO dimension, task 2.4 prepared an integrated view identifying and suggesting solutions for “conflits” in those recommendations.

THEO work packages where then able to produce the final recommendations in terms of Guidelines, the main objective of iSAR+.

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.

They were presented in the deliverable D2.7.1.

As explained and agreed with the Roadmap, the definition of the guidelines adoption process, was merged into this deliverable

3.1.2 Problems and deviations from planned work

iSAR+ had a strong dependence on the end-users community’s availability, namely to prepare and perform the Showcases.

The Portuguese Showcase was delayed from August 2013 to October 2013, mainly due to the involvement of the Portuguese PPDRs in the unfortunately normal emergency operations related with the forest fires that normally occur during the summer.

Nevertheless it was possible to minimize the impact of this delay in the THEO work packages which have started according to the initial plan.

The same happened with the French showcase. All main organisations involved in major crisis happening in Paris were very interested and willing to participate (Paris fire brigade, Paris Police, French railways, Paris underground, Paris city hall, Red Cross...). but due to European elections that took place end of May, it was not possible to organise the showcase in June (M18) as most of these organisations have an obligation to remain silent and not participate in any event with private companies during all the pre-election period.

The showcase was therefore postponed to September 2014 having an impact in the work plan of some tasks and deliverables.

Zanasi & Partners (Z&P), upon agreement of the project coordinator and within the context of WP2, prepared a report (presented as an annex to the present document) in which the results of additional research carried out by the beneficiary have been reported. The report describes, in terms of guidelines, how to perform multi-language text analysis on tweet through open-source software tools (extending the work carried out in WP6). Although the preparation of such report was not foreseen in the DoW and the additional effort spent by the company for its production (and the associated work therein described) was communicated to the PO according to the standard reporting practices, Z&P didn’t ask for an increase in the available budget.

3.2 WP3 – Organizational Analysis (led by TCD)

3.2.1 Work Progress

Task 3.1 Current and Future CONOPS for PPDRs (led by TCD):

In the first six months, in advance of WP3 TCD was actively engaging with PPDRs on the island of Ireland including the Dublin Fire Brigade and the Police service of Northern Ireland who both agreed to participate as external end users. Also, TCD reviewed the literature on major emergency planning in anticipation of WP3 deliverables. TCD also presented the iSAR+ project to the East Regional Working Group on Major Emergency Management in Ireland with a view towards engaging them for the project. Irish Regional Working Groups on Major Emergency Management are made up of representative of a range of PPDRs including: Fire and Rescue Services; Health and Emergency Medical Services; Police Services; Civil Defence and Defence Forces (by invitation); municipal authorities (city an county councils). The members of the group responded with interest and it was anticipated that this group would be of assistance to the project. These efforts served to build up awareness of the iSAR+ project and its work as well as secure the goodwill of PPDRs locally which would prove to be an important resource throughout the project.

From M7, following the work package kick-off, TCD initially focused on Task T3.1 (as Task Leader) Current and Future CONOPS for PPDRs, and the deliverables associated, namely, the D3.1.1. 'Analysis of European Emergency Plans, D3.1.2 'Organisational Data Collection Tool,' and D3.1.3 'PPDRs Future CONOPS Incorporating Mobile Technology and Social Media: Basic Prototype and Enhanced Prototype. Work towards these deliverables has involved working closely with PPDR organisations carrying out field research activities such as ethnographic study, focus groups, workshops and engaging in training activities (e.g., participation in a certified Information Management Officers Course) to learn how crisis response is enacted operationally, tactically and strategically. Work towards the deliverables has been as follows:

- **Analysis of European Emergency Plans (D3.1.1)** One of the initial tasks for this deliverable involved a survey and review of European emergency management resources (e.g. official protocols, frameworks, guidance, websites etc.). This was provided an understanding of the breadth and depth of available resources on emergency, disaster and crisis management in Europe. And importantly the comparative analysis of these resources enabled a comparative analysis of the high level approaches to emergency management systems in Europe. The countries involved in the survey were:
    - Finland
    - France
    - Germany
    - Ireland
    - Norway
    - Poland
    - Portugal

- United Kingdom

A sub-set of countries included in the survey were selected for deeper examination and analysis the emergency management systems. The countries selected were: Ireland; the UK Finland; France; and Portugal. Ireland and the UK readily provided sources of information and participants from PPDRs, which enabled a solid baseline understanding to be developed in WP3 that could be used for the Showcase events. 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. The analysis examined the scope and content of emergency planning materials with a focus on the structures and functions of PPDRs in large emergencies and crises. This analysis paid particular attention to the role of information and its management in emergencies, and how this can contribute to a coordinated effort within and between PPDRs responding to an emergency event. While this was not an exhaustive review of European emergency planning resources (for some jurisdictions and/or PPDRs these were not available), it was sufficient to provide a good understanding on the range of emergency management issues across a sample of different countries and/or regions. This analysis provided us with a clear set of questions that were used to guide the task of integrating social and mobile media within future concepts of operations (CONOPS).

- **Organisational Data Collection Tool (D3.1.2)** Coming from the emerging results from analyses of plans and field work with PPDRs TCD developed a data collection tool based on the SCOPE analytic framework and informed by the Activity Theory approach to the analysis of complex sociotechnical systems. This was developed iteratively and was continually revised as a working tool throughout the project. The SCOPE tool is a high-level heuristic approach to guide enquiry into organisational dynamics. It is not intended to be deployed as a questionnaire or a survey, but rather it posits an organised set of theory-driven constructs that can be employed to guide the examination and analysis of relevant data sources. SCOPE is designed in this way due to the need for flexibility when examining different types of organisations. However, it may be used as a foundation for generation questionnaire or survey instruments for specific contexts, or as in the case of iSAR+ it can be used to guide the framing of a qualitative research protocol. D3.1.2 describes the initial state of the tool as adapted for the purpose of iSAR+ and the analysis of PPDR and associated agencies. See the figure below for the high-level schematic of analytical categories:

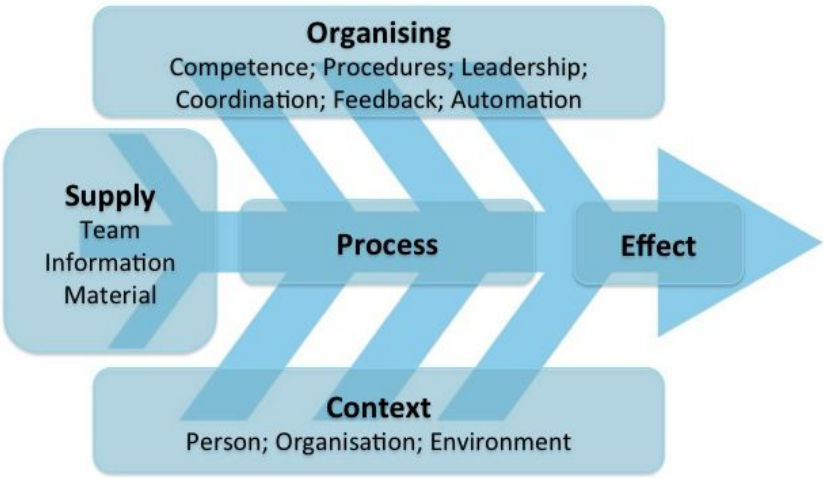


Figure 24 - High-level schematic of analytical categories

- **PPDRs Future CONOPS Incorporating Mobile Technology and Social Media: Basic Prototype and Enhanced Prototype (D3.13)** The research activities that culminated in D3.1.1. were integrated with the methodological framework defined in D3.1.2 and these provided the baseline information and approach to the development of the concept of operations (CONOPS) approach for PPDRs using online and mobile communication technologies in emergency management systems.

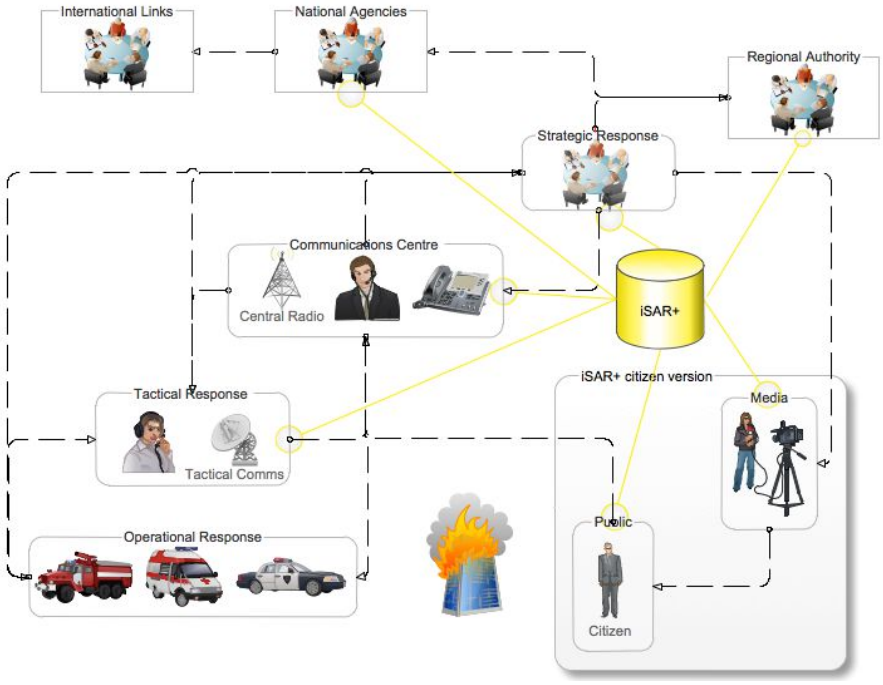


Figure 25 – iSAR+ Reference CONOPS Model

The CONOPS approach was developed iteratively over the three iSAR+ Showcase events and further evolved through related research activities. The research undertaken to develop the CONOPS followed an ethnographic fieldwork approach and included interviews, observation of operational activities, and through participant observation in emergency management training activities. The earliest iteration of the CONOPS was developed through the Portuguese Showcase and this was evolved through the French and Finnish Showcases, and related research activities. This was augmented through on-going participation with Irish PPDRs. These research activities were integral to the objective of understanding how social media capabilities, and particularly iSAR+, could fit within and function as part of an emergency management system. This is essentially what the CONOPS aimed to achieve.

Task 3.2 Qualitative Assessment of PPDR's view on New Communication Technologies and Social Media in Crisis (led by EMAUG):

After a thorough literature review an online questionnaire has been developed. The aim of the questionnaire was to assess the PPDRs view on new, mobile, and online communication channels as well as perceived usefulness of information provided to them in crisis situations. The development included theoretically driven development of the questionnaire, focussing on the comparison between classic and modern channels. The questionnaire was validated and thereafter implemented on an online platform. In close partnership with iSAR+ partners the process of questionnaire translation was conducted. The final survey included all relevant languages to ensure a broad European perspective. The survey was finalized and put online to be accessed by all participating consortium member states.

In the course of the survey extensive data has been gathered in more than eight European countries. This data includes feedback from five different types of PPDR organisations: the Red Cross, Federal agencies for disaster relief, Police, Fire-fighters and Emergency Medical services/ Paramedics.

Central topics of the survey were background information on the PPDRs (demographics, years of service practical experience, experience with different types of incidents), assessment of communication channels, with respect to usage behaviour in private and work related contexts, information credibility if provided by citizens via different channels, self rated computer usage behaviour, anticipated citizen channel preferences and Technology Acceptance Model driven assessment of different communication channels with respect to their usefulness for communication in case of a crisis.

Survey data has been analysed and was provided in deliverable D3.2.1. The deliverable highlighted distinctions and similarities for countries and PPDR organisations with respect to all topics addressed in the survey. A total of 1410 European PPDRs took part in the survey. About a third of participants (36%) were fire-fighters, about one quarter (22%) worked at Emergency Medical Services and another quarter at the Red Cross (25%). The rest were THW (8%), police (6%), and others (3%), details see Figure 26.

Survey outcomes highlighted important distinctions between PPDRs private and official usage of new media. Data was extensively analyzed with respect to distinctions between the different countries and organizations that took part in the survey. The survey found distinctive evaluations of trust in social media predominantly between well established types of media and new media, the latter scored substantially lower than the others. One important finding was that especially the *usage* of new media builds trust in a channel. Consequently

organizations and countries more engaged in new media channels showed higher trust values for channels like twitter, facebook, or YouTube. The evaluation of channels, however, strongly relied on the specific function they were meant to serve from the PPDRs point of view. While new media channels were rated mediocre at best when *receiving* information was concerned the same channels got higher values in *sending out* information. Again the issue of trust in information is important here and highlights the need to develop systems able to manage new media in crisis situation. Acting with such applications is important to diminish reservations rooted in unfamiliarity with such sources. Selected outcomes of the survey feature the distinction between general and work related usage of new media (Figures 27 and 28), differences between organizations (Figures 29 and 30) and the strong preference for new media over other channels regarding the distribution of information (31). The complete set of data for PPDRs is reported in D3.2.1.

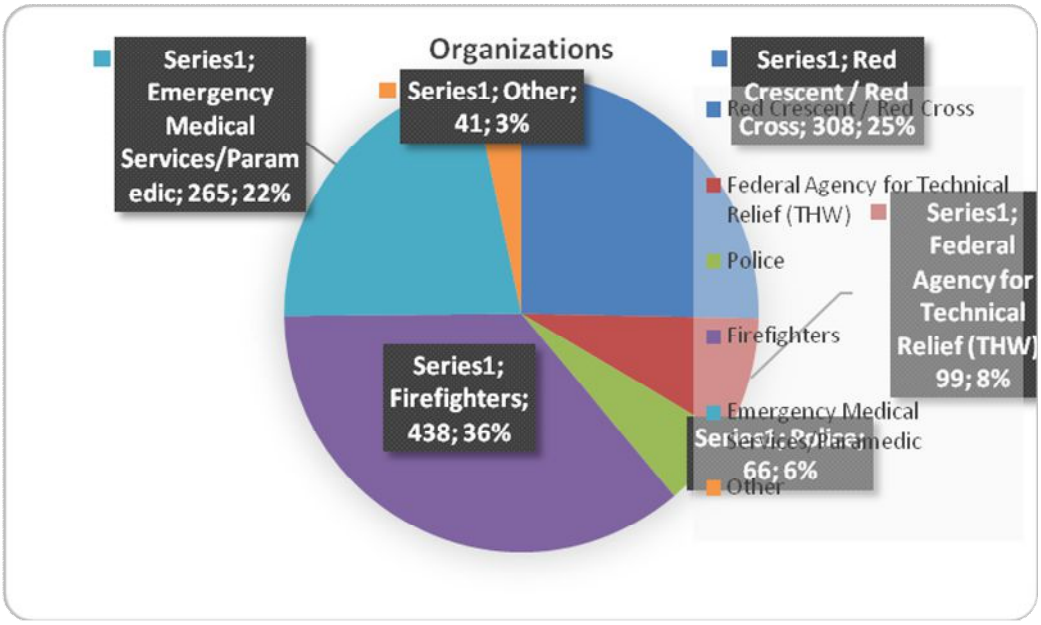


Figure 26 - PPDR survey participants by type of organization

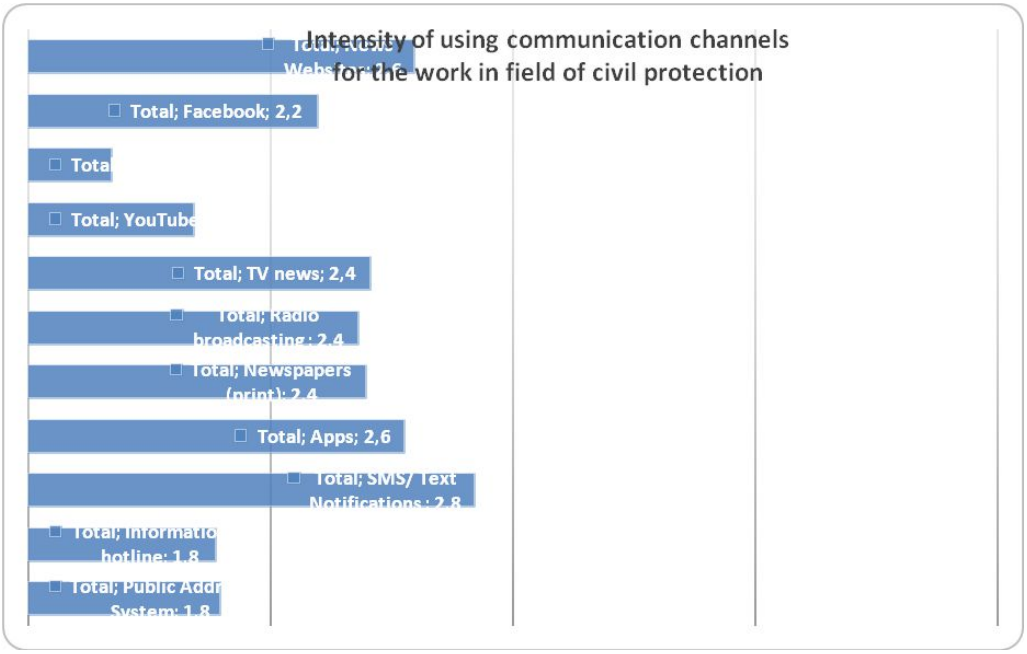


Figure 27 - Total intensity of using different communication channels in general (N = 1410)

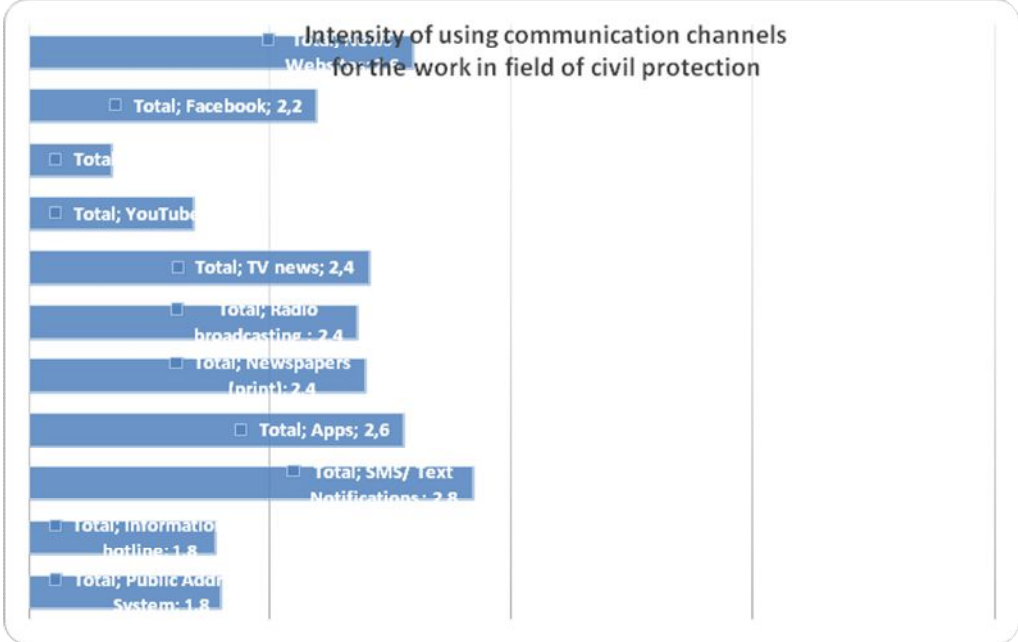


Figure 28 – Total intensity of using communication channels for the work in the field of civil protection (N = 1410)

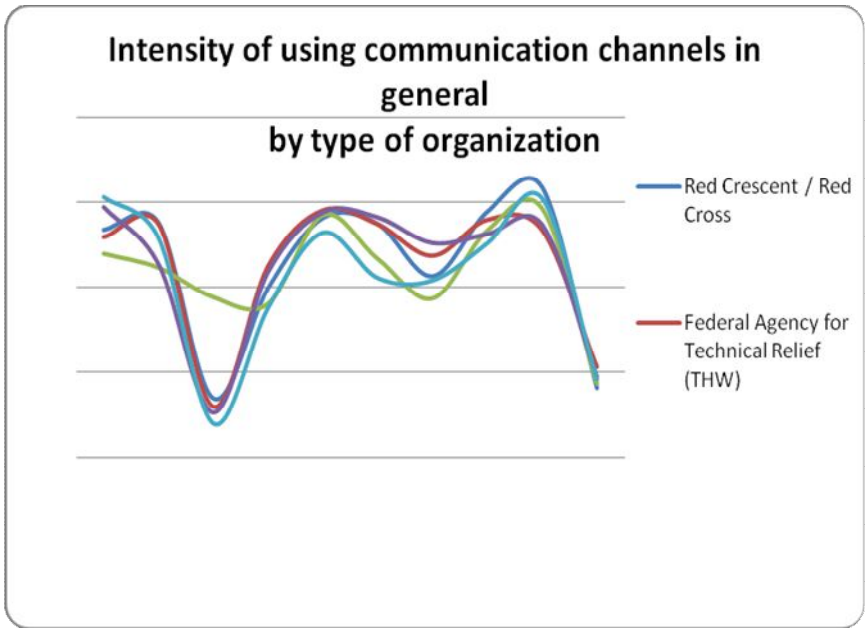


Figure 29 – Intensity of using different channels in general by type of organization (N = 1217).

Reduced N due to exclusion of PPDRs, that worked in more than one organization

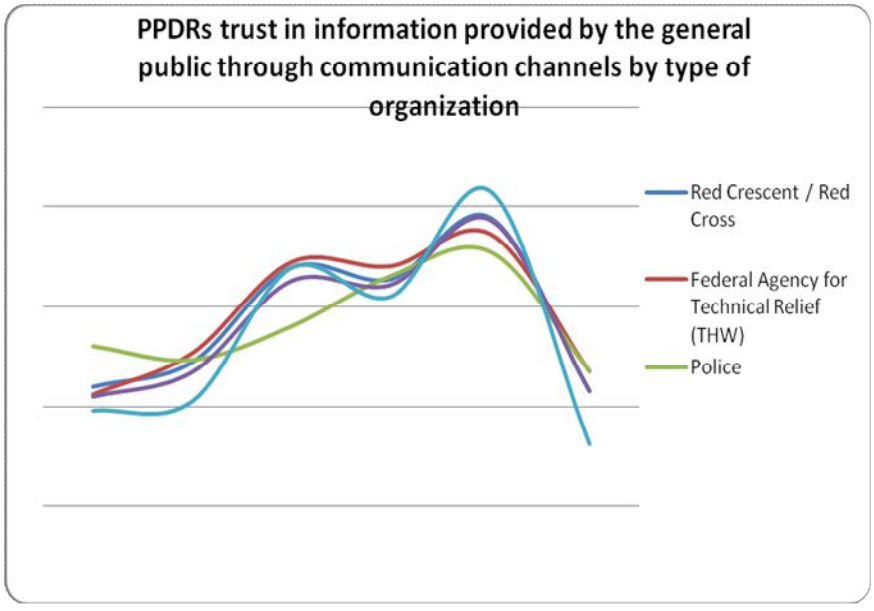


Figure 30 - PPDRs trust in information provided by the general public through communication channels by type of organization (N = 1217). Reduced N due to exclusion of PPDRs, that worked in more than one organisation

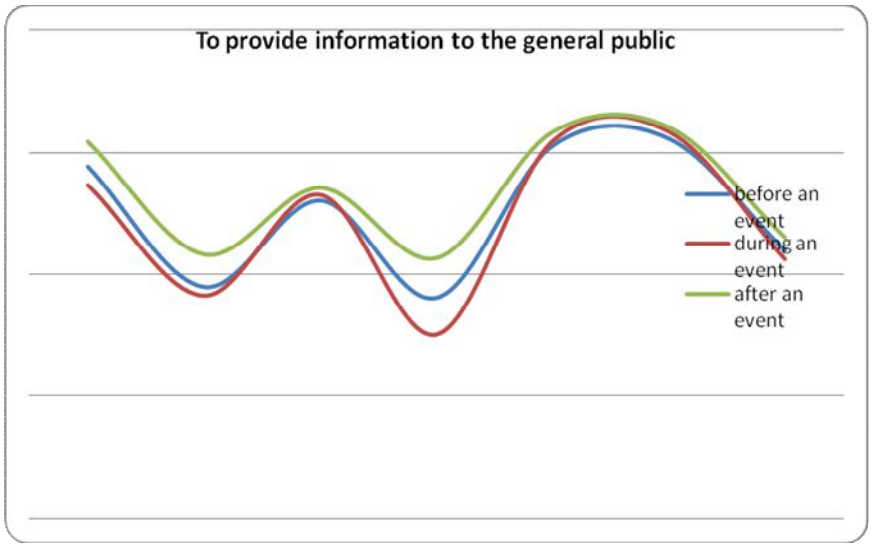


Figure 31 - Evaluation of different channel before, during and in the aftermath of an Event according to the function "To provide information to the general public"

TCD worked closely with EMAUG (task leader) on the development of the PPDR survey instrument, contributing sections, reviewing and proposing revisions. They were also involved in piloting activities with the Dublin Fire Brigade.

UEF and ESC carried out a review of the survey developed by EMAUG, providing information on Finnish PPDR organisations.

Task 3.3 Recommendations for iSAR+ (organisational recommendations)

The efforts of WP3 were consolidated to produce a set of 'Organisational Recommendations for iSAR+: Basic and Enhanced Prototype' (D3.3.1). These recommendations were elicited from the lessons learned through the WP3 findings. They identify the need for a human-centred CONOPS approach that enables an evolving and dynamic understanding of the role of social media in the emergency management system at all levels (e.g. strategic, tactical, and operational). The recommendations are structured around three sections that propose:

1. Operational Processes and Operational System Recommendations
2. Human Factors and Team Recommendations
3. PPDR – Public Engagement Recommendations

A list of the Guidelines and Roadmap topics is shown in Figure X below.

An important conclusion drawn from this work emphasises the need for greater inter-agency and cross-jurisdictional coordination and collaboration to help ensure that social media capability can be optimally realised in order for useful content to be harnessed for PPDRs responding to emergencies and crises.

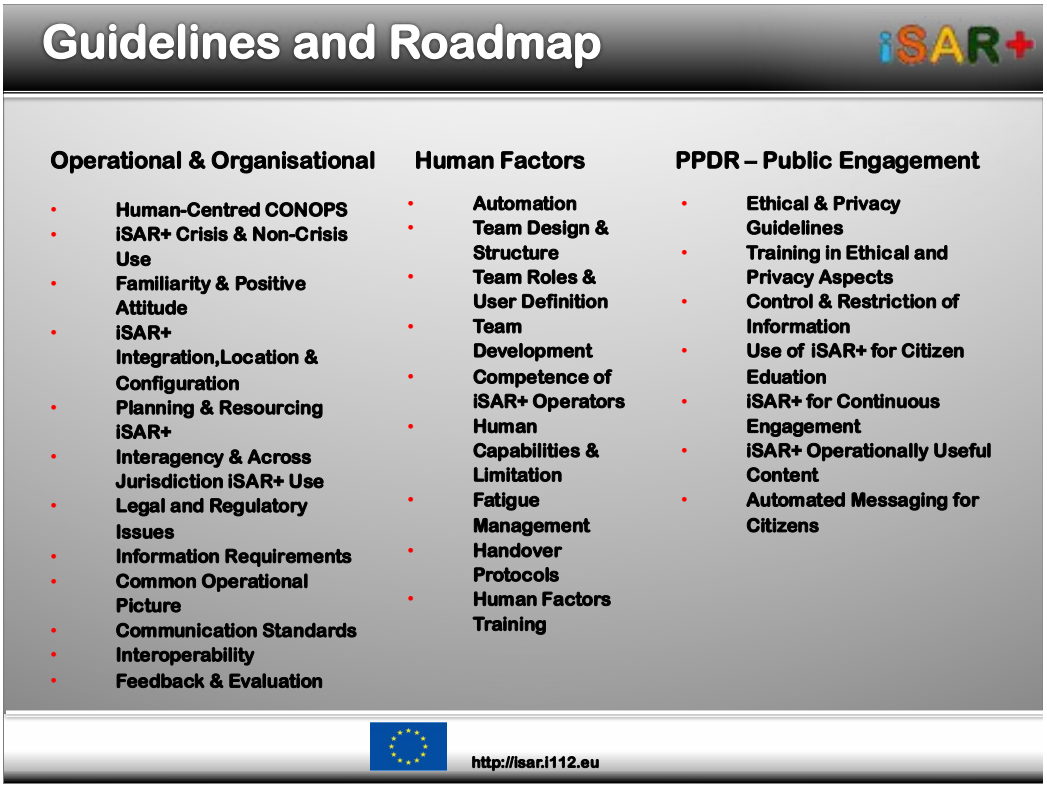


Figure 32 - The Guidelines and Roadmap topics identified in Task 3.3

3.2.2 Problems and deviations from planned work

T3.1 Current and Future CONOPS for PPDRs

The analysis of European Emergency Plans (D3.1.3) was delayed one month as more time was required to collect emergency management resources and discuss them with end-users than had been set out in the DoW. This was in part down to language issues (i.e. availability of 'plans' in English) and the non-availability of some resources in the public domain. Because of the interdependence between D3.1.1. and D3.1.2 'Organisational Data Collection Tool' both of these deliverables had been delayed by one month (M15). The PPDRs Future CONOPS Incorporating Mobile Technology and Social Media: Basic Prototype and Enhanced Prototype (D3.13) was submitted in M29 rather than M22 as per the revised deliverable plan. The adjusted schedule for the French iSAR+ Showcase (to September 2014) also meant that follow up research with French PPDRs was not undertaken until December 2014. The period for data analysis needed to be extended because of this. The

delay to the submission of D3.1.3 also afforded more time to better integrate the findings from the Finnish iSAR+ Showcase event.

T3.2 Qualitative Assessment of PPDRs' View on New Communication Technologies and Social Media in Crises

Generating a comprehensive survey for PPDRs and translating it into the various languages took longer than indicated in the Dow due to extensive coordination efforts. As the time frame for the collection of participants in the survey had been planned with much confidence only in the best case a complete set of participants could have be gathered in a short amount of time. Alternatively an extensive set of international participants required more time than initially laid down in the DoW. Since successive tasks, such as analysis and interpretation of results rely on a comprehensive data set, the whole task T3.2 toko longer than indicated in the DoW.

3.3 WP4 – Human Analysis (led by EMAUG)

3.3.1 Work Progress

Task 4.1 Assessment of the Citizens' Perspective on New Communication Technologies and Social Media in Crisis Situations:

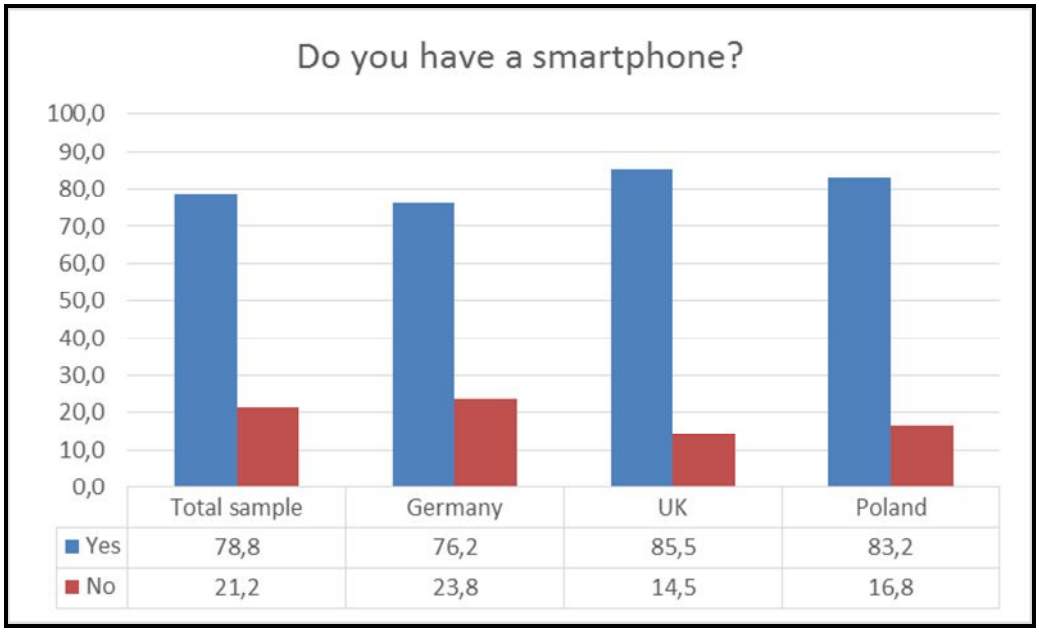
WP 4 aimed to assess Human aspects in crisis situations. It started in month nine. One central aspect of Human analysis was to consider PPDRs as important stakeholders in a crisis situation. This human aspect has been addressed in WP3 as part of the organisational analysis. It formed one of the pillars of human analysis. The second set of stakeholders is the general public, thus, people affected and involved in a crisis situation. A literature research on the use of new and social media in crisis situations was conducted and finalized from the citizen's point of view. It identified central topics with respect to crisis situations and the general public's communication needs. Based on this input the citizen's questionnaire was generated to assess acceptance levels and willingness to use mobile and online communication channels in case of crisis situations to be informed by PPDRs or to provide information to them. The general public´s attitudes and behaviours were gathered by different language versions of an online questionnaire to identify useful and relevant information. This online questionnaire was concluded in March 2015. Like in the earlier PPDR survey extensive translation and coordination activities were conducted due to the demanding task of gathering information from several European countries in their mother tongue. A total of 1631 European citizens took part in the survey. Especially German, Polish, and Irish participants were involved. They totalled about 95% of the sample. The other participants were from Finland, Portugal, Norway and France.

Task 4.2 Focused Socio-Cultural Analysis of the Survey Results

Citizen's survey was thoroughly analysed with respect to general media use, trust in particular channels, risk perception and concern, past experiences from actually crisis situations, as well as differences in age groups, gender, and between countries. Analysis

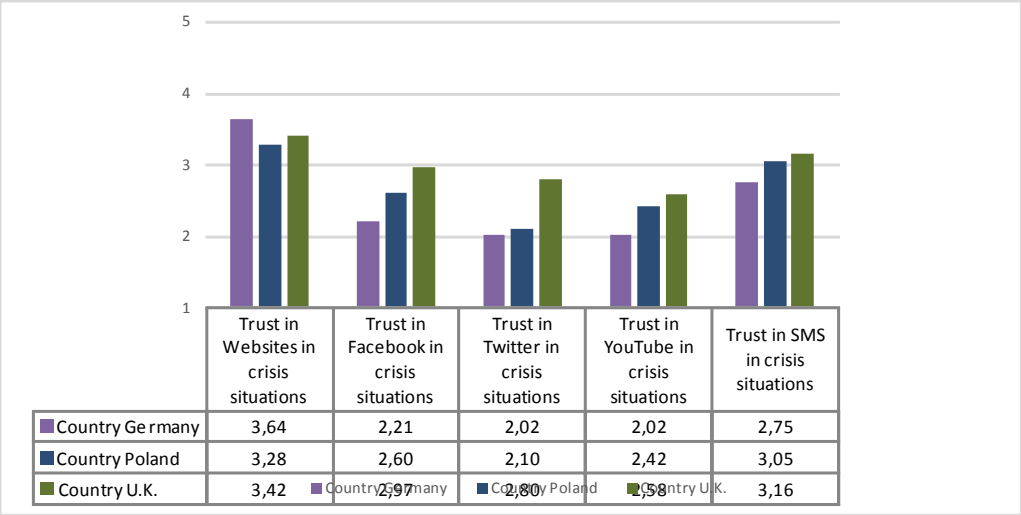
revealed that the participants of the survey stated to be well acquainted with many social media channels and 75-85% of the participants stated to have a smartphone. Thus, data indicates that disseminating crisis relevant information via social media is a possibility that could reach many recipients in the general public.

Further, the results show that participants indicated to trust more in traditional media (TV, radio) than social media (Facebook, YouTube) during crisis situations. Trust in websites of newspapers was rated in between traditional and social media, but they had distinctly higher trust values than other web based platforms. This lead to the conclusion to reference to websites when using other forms of web based communication to benefit from higher trust in the information provided. Trusted organisations should be chosen to disseminate information if available. What particular organisations are well trusted can vary between countries. This puts emphasis on the development of strategies that fit for a particular country and region rather than applying one strategy to every member state. Risk perception was found to vary between countries. This makes it evident to consider the specific threat for a country or region as well. Using particular channels in general was positively associated with the perceived helpfulness in crisis situations indicating that day to day use of social media impact the use of social media during crisis situations. This means that a particular channel is perceived as more useful the better citizens are acquainted with it. Given the growing perseveration of new media it indeed becomes more and more important not only more and more common. Specific new media channels were rated differently with respect to specific crisis phases. While messengers, SMS and social networks were considered more helpful prior and during a crisis (flooding in this case) YouTube was considered to be more helpful in the aftermath. These findings seem to reflect to a stronger need for fast up to date information in the early phases, which citizens considered to be better provided by messengers, SMS and Facebook.



	Total sample	Germany	UK	Poland
Yes	78,8	76,2	85,5	83,2
No	21,2	23,8	14,5	16,8

Figure 33 - Ownership of a smartphone by country in percentage



	Trust in Websites in crisis situations	Trust in Facebook in crisis situations	Trust in Twitter in crisis situations	Trust in YouTube in crisis situations	Trust in SMS in crisis situations
Country Germany	3,64	2,21	2,02	2,02	2,75
Country Poland	3,28	2,60	2,10	2,42	3,05
Country U.K.	3,42	2,97	2,80	2,58	3,16

Figure 34 - Trust: Country by media channel (websites, new media & sms)

Task 4.3 Human Factors Analysis of the iSAR+ Platform:

TCD undertook a Human Factors evaluation of the iSAR+ platform with PPDRs and citizens to understand from a human-centred perspective the performance of the isAR+ system in terms of the user-interface and functionality. This involved the use of a technique known as 'Cooperative Evaluation', which involved participants performing a series of tasks on the iSAR+ platform and 'thinking aloud' as they do this. The thinking aloud approach enables the researchers to gain an insight into the user's mental model, what they are intending to do, how they are approaching it, what barriers, facilitators they are experiencing, and problem-solving methods they are employing etc. The aim of Cooperative Evaluation is not to assess a participant's performance, but to examine how well the iSAR+ platform supports participants when using it. The Cooperative Evaluation was undertaken with participants from Finland, France and Ireland.

Assessment of the online platform from the citizen's perspective was conducted in an experimental setting using eye tracking technology. Feedback was gathered on the initial perceptions of the early system prototypes look & feel and of its features. An initial assessment of the platform using the eye-tracking system and questionnaire based was finalized in March 2014. The analysis concentrated on the systems ad hock perception in the eyes of lay users to give feedback and recommendations for the final platform.

In addition the eye tracking system was used for a thorough assessment of new media content provided by different PPDR organisations - the police and fire fighters. Of special interest are the distinction found between the evaluations of organisations in general and the evaluations of the same organisations online channels. Even though police and especially fire fighters are very well trusted in general it showed that this effect hardly carries over to the new media channels they provided, see figure 35. This indicates that the general public's reluctant trust and use of new media in crisis situations (twitter and facebook in this case) is not simply negated by high trust in a PPDR organisation. PPDRs rather have to build new ties with citizens and must not only simply rely on existing reputation. PPDR organisations must rather provide content and solutions via the online media which are beneficial for

citizens even and especially in times when no crisis is imminent to get in contact with citizens. This positive connection then can be activated in a crisis rather than expecting to reach citizens that have not been in contact via new media, yet.

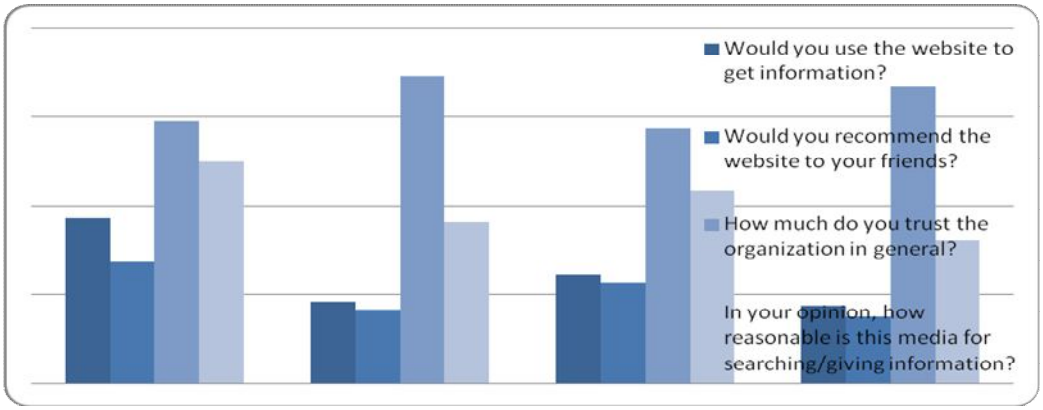
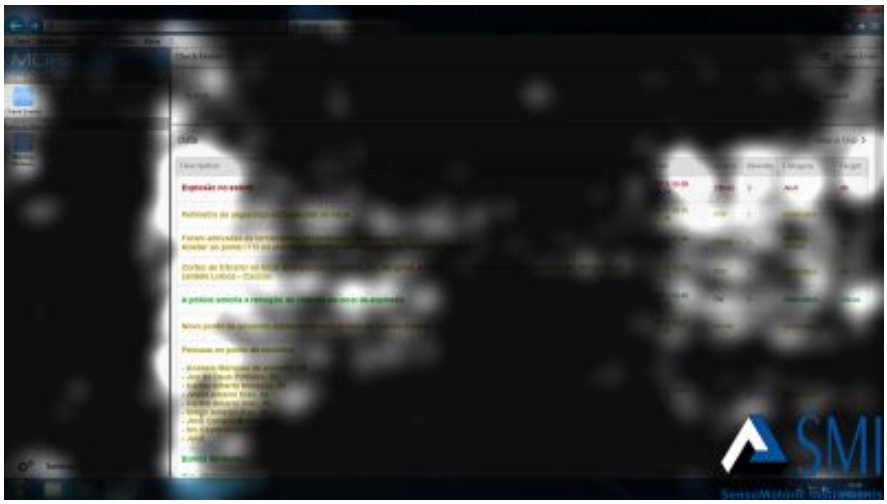


Figure 35 - Further questions concerning the use of Facebook and Twitter (N = 45)



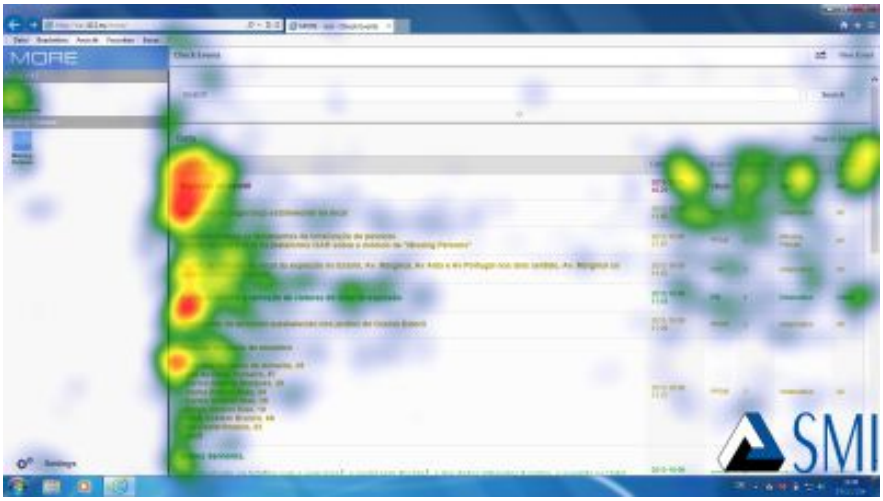


Figure 36 - Exemplary focus and heat maps of iSAR+ platform analysis

Figure 37 - Facebook-website of police and fire fighters

Task 4.4 Recommendations for iSAR+ (human perspective)

EMAUG generated a complete document on recommendations from the human perspective on the use of new media in crisis situations. The document was the basis for subsequent guideline development. It included a variety of topics relevant for PPDRs preparations in crisis situations. The document took the perspectives of new media into account. Seven distinct and interwoven topics were addressed as well as a section for citizen recommendations. These topics included:

PPDRs Guide

- Media and new media in crisis situations
- Accessibility
- Type of crisis
- PPDRs needs in crisis and new media
- Citizens needs and new media
- Level of involvement and distance to incident
- Phase specific approach

and Citizens recommendations

- iSAR+ recommendations for citizens
- 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?

Each section was subdivided in sections making the recommendations easily accessible for PPDRs. Feedback of internal partners, including PPDRs was very good. In addition to the PPDRS guidelines recommendations were developed for the citizens. This document was developed under the focus of accessibility to ensure no excessive recommendations would hinder citizens to adopt and dread 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. The recommendation therefore gives examples with respect to particular types of crisis and tries to generalise as well pointing out mechanisms which can help for successful crisis preparation if taking new media into account.

3.3.2 Problems and deviations from planned work

Striving to have samples of considerable size to ensure the possibility for comparisons between organisations and countries, the deliverables in the human work package were postponed. This allowed acquiring adequate sample sizes in citizen's surveys from several European countries. Other Deliverables were postponed due to the shifting of workshops and demonstrations in the iSAR+ project. This shifting included all deliverables in WP4 which were moved to month 27 rather than month 24 or 22 respectively. This extra time ensured larger sample sizes and better subsequent analysis of data. As expected sample sizes grew substantially and allowed deep data analysis, leading to better recommendations and guidelines.

3.4 WP5 – Ethical and Legal Analysis (led by PSP)

3.4.1 Work Progress

iSAR+'s ambitious goal is to create guidelines and a platform to achieve these ends, while respecting existing organisational cultures of crisis response, as well as **European Union legislation and concerns regarding fundamental rights and privacy**. The iSAR+ guidelines and platform incorporated the related *organisational*, *human*, *technological*, and ***legal and ethical*** dimensions of crisis response to enable an evolution towards the full implementation of the iSAR+ services. That is to say, exploiting a multi-dimensional approach, iSAR+ developed an efficient and effective solution to enable the involvement of new media users in efforts to ensure citizens' security in SAR and crisis situations.

According to article 6 (§1) of Decision No. 1982/2006/EC: "[a]ll research activities carried out under the Seventh Framework Programme shall be carried out in compliance with the fundamental ethical principles" of the European Union.

Two key requirements for research projects funded at the European Union (EU) level are:

- Awareness of the ethical implications of the proposed research;
- Respect for the ethical rules and standards of FP7.

The iSAR+ consortium acknowledges that the technologies and practices involved in the project raise a number of ethical issues. These has given all due attention throughout the lifecycle of the project. iSAR+ devoted T1.4 (Ethical Advisory related activities) and WP5 entirely to the investigation of ethical and legal aspects of the proposed research. Actual and potential ethical issues were subjected to further analysis through the scrutiny of the Ethical Advisory Group (cf. Task 1.4), which included independent, external experts. The Ethical Advisory group had a veto right over the approval of each of the Project's deliverable and decisions, in case critical ethical and legal aspects are disregarded.

Task 5.1 Ethical and Legal Framework Analysis of Crisis Case Studies (led by PSP):

The partners involved in this task (CSSC replaced by PSP, ITTI and TCD) have conducted research into 4 case studies: 2007 London bombings; 2005 Hurricane Katrina; 2010 Haiti earthquake and 2010 Chile earthquake.

The documents informing this analysis were academic papers, reports issued by relief organisations, interviews with experts, reports issued by the UN and other experts in disaster risk reduction, and news desks releases.

PSP has conducted interviews with experts from the fields of: disaster response, human rights, privacy experts, security

The in depth case studies were included in D541.

Task 5.2 Ethical and Legal Analysis of the iSAR+ platform and associated tools (led by PSP):

Preliminary research has been conducted in support of T5.2. These activities have grown out of and been developed from activities in T5.1 (hence work in T5.2 started earlier than anticipated).

Detailed analysis of the existing legal framework for (a) disaster response and (b) ICT (DP, HR laws, directives for electronic communications, e-Privacy laws, etc).

PSP has also conducted interviews with experts from the fields of: disaster response, human rights, privacy experts, security.

Task 5.3 iSAR+ Project's Internal Ethical and Legal Framework Validation (led by PSP):

This task was dedicated to monitoring of all other project activities namely from the other THEO work packages, guiding them to a compliance to European ethical framework and ensuring that all legal issues are solved.

In the scope of this task PSP has reviewed all project deliverables, including iSAR+ platform, and raised up legal and ethical issues. Main activities performed in this period were:

- Ensure the rhe respect of the legal terms of use regarding the integration of commercial tools like Twitter and Facebook;
- Participation in a confcall with Facebook representatives to discuss solutions for technological and legal barriers (with the kind support from Dr Soren Ostergard);
- Interface with EAG members;
- Review of all project deliverables, giving ethical and legal advices on them..

Task 5.4 Recommendations for iSAR+ (ethical and legal perspective) (led by PSP):

Preliminary research has been conducted in support of T5.4. These activities have grown out of and been developed from activities in T5.1 (hence work in T5.4 has started earlier than anticipated).

PSP prepared and issued a deliverable (5.4.1) containing recommendations and guidelines for iSAR+, in order to help detecting and solving legal and ethical issues that may arise with the iSAR+ use.

3.4.2 Problems and deviations from planned work

The first deviation has been to begin ethical monitoring work (Task 5.3) in M1 rather than M9. This had no impact on resources

Work in T5.2 and T5.4 has started earlier than anticipated, due to elements of those tasks growing out of research activities in T5.1. This deviation is only problematic in the sense that it threatens to very slightly delay CSSC's internal deadline for placing the Case Studies (T5.1) in the project shared folder (a delay of, at most, 5 working days is likely). This didn't affect any deliverable submissions. This did not have any implications for the budget.

It revealed necessary to substitute CSSC by the PSP and update the new partner on the project, nevertheless, this did not cause significant delays in the planned work.

This replacement had only a slight impact in the analysis of case studies. Nevertheless PSP was able to complete this activity and included its outcomes in the deliverable 5.4.1.

3.5 WP6 – Development of iSAR+ Platform (led by THA)

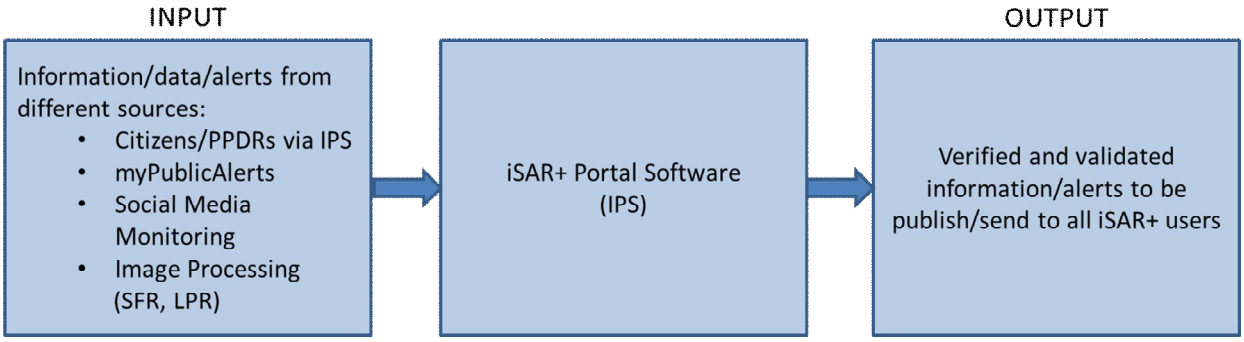
3.5.1 Work Progress

Task 6.1 System Requirements & Architecture (led by ITTI):

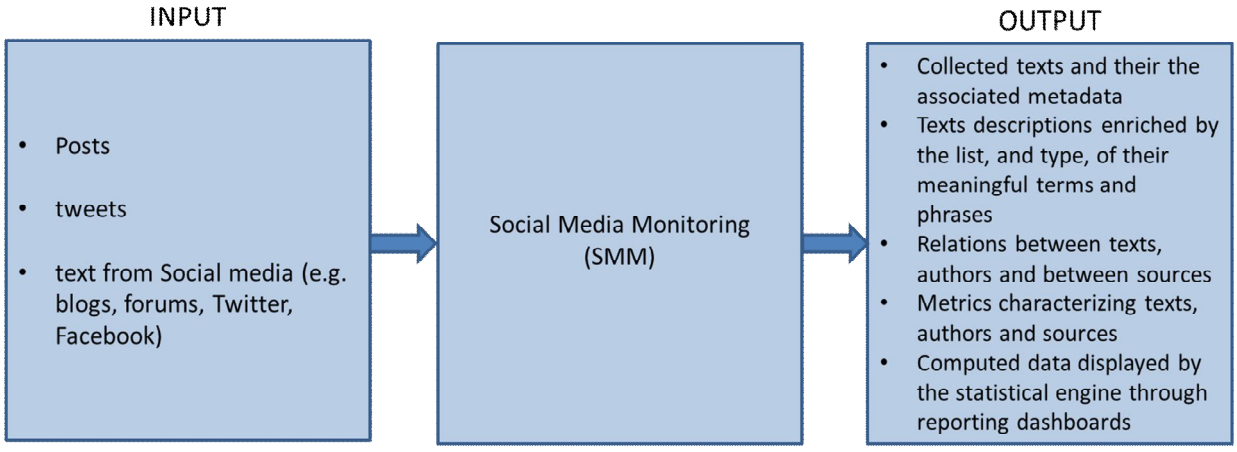
This task aims at designing the architecture of the iSAR+ platform. This architecture must result from the matching between the components of the platform brought by the different partners and the user requirements collected in Task 2.2. These requirements impose a set of constraints that must drive the specific adaptations of the platform components and also the choice of the architectural framework. In addition the technological constraints identified while designing the architecture must help refining the user requirements. It is therefore a mix of a top-down and bottom-up methodologies which has been applied in this task.

In a first step the components brought by the different partners have been listed and detailed in order to identify for each of them the different capabilities they offer and the inputs and outputs they require. The development of these components is done in the different tasks of the WP6, we present hereafter a simple overview of their inputs/outputs because it impacts the design of the global architecture.

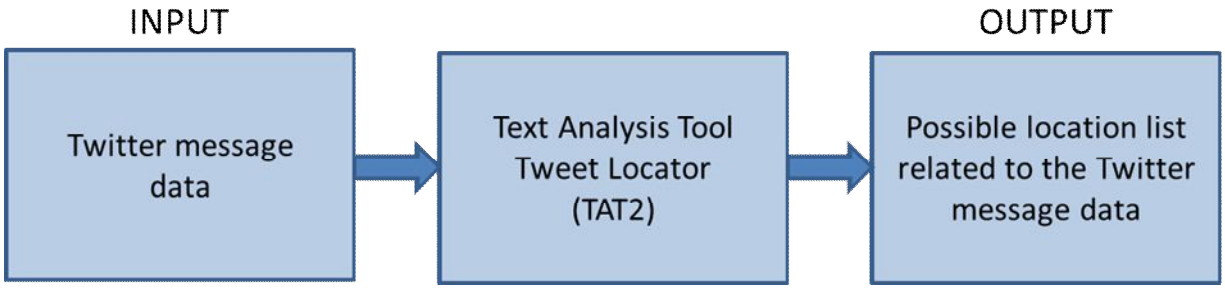
- IPS (iSAR+ Portal Software)



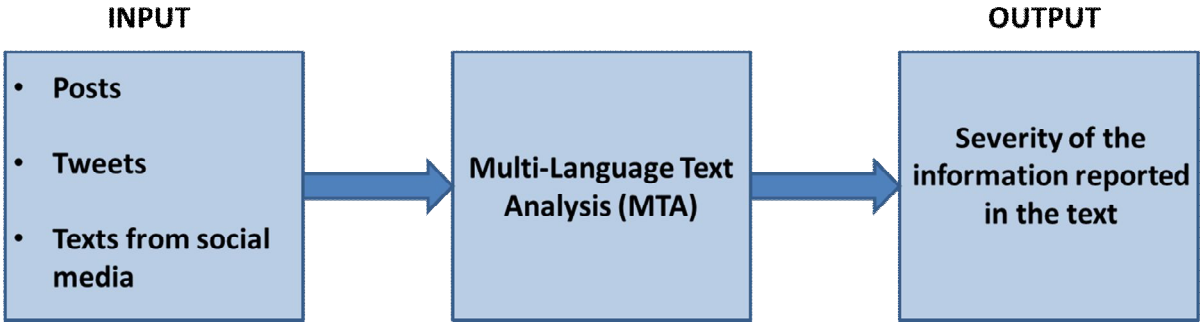
- Fusion Center Services
    - SMM (Social Media Monitoring)



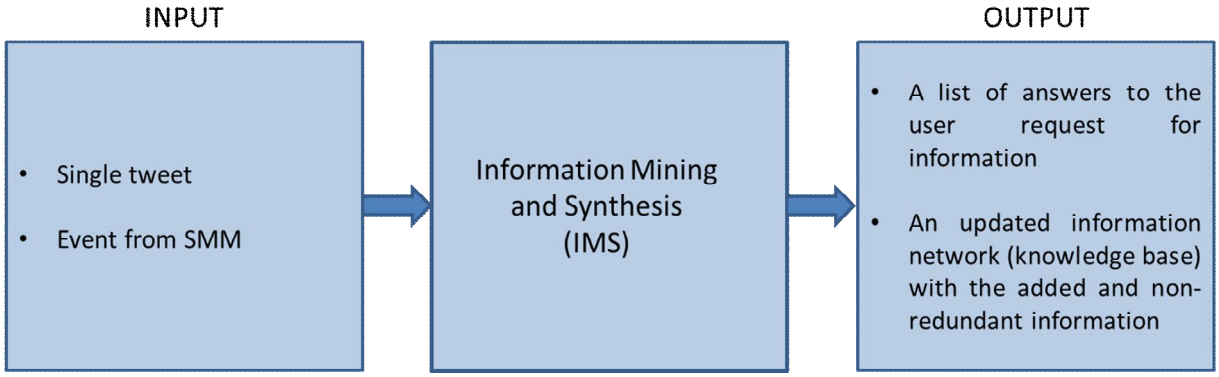
- TAT2 (Text Analysis Tool Tweet Locator)



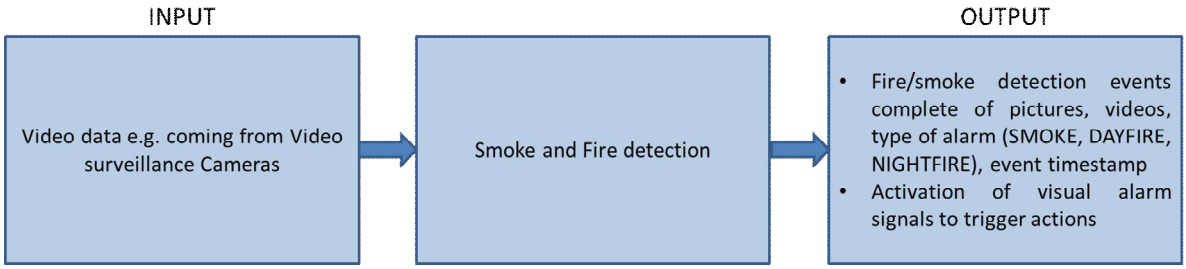
- MTA (Multi-language Text Analytics)



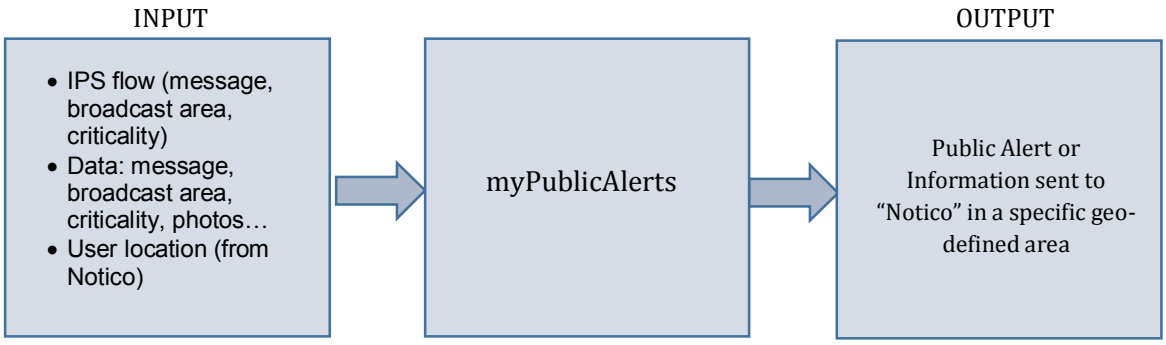
- IMS (Information Mining & Synthesis)



- Image & Video Processing
  - SFR (Smoke and Fire Recognition)



- Mobile Services
    - Notico and myPublicAlerts (mPA)



In a second step, the major user requirements for the platform have been reviewed and matched to the capabilities offered by the different components. On the one hand a majority of integration and service requirements were implemented by the iSAR+ Portal Software (IPS) and myPublicAlerts (mPA). These components are responsible for the distribution of information. That is why most of the services offered by the system will be realized by these modules. On the other hand, data requirements were provided mostly by the Fusion Centre, including Social Media Monitoring (SMM), Information Mining and Synthesis (IMS) Multi-language tool (MTA) and Text Analysis Tool - Tweet Locator (TAT2). These modules provide data processing capabilities like data mining, data analysis and data fusion. Except the IMS, they are text-oriented. More specific processing for image & video data were handled by the Smoke and Fire detection (SFR) component.

Not all the requirements were covered by the iSAR+ platform, sometimes because of technological limitations and more often because of ethical/legal constraints like for instance "Personal health data to be automatically transmitted by citizens during emergency situations" or because these requirements lie at the border of the project's scope. For instance, even though the SMM could be used to track criminal activities, which is of interest to police departments, it is more a matter of law enforcement than of crisis management as it is defined in the iSAR+ project.

In a third step, a state of the art of the different architectural patterns able to cope with the main technological constraints imposed by iSAR+ use cases has been established. The identified constraints mainly concerned the data to be processed and the expected processing constraints:

- Large volumes of data;
- Heterogeneous data (texts, images, videos, structured meta-data including geolocation);
- Intense data flows implying that the platform should be able to deal with large volumes of data in motion, and not data at rest.

Analysing these constraints we recognized the typical 3V's characteristics of Big Data (Volume, Variety, Velocity). Consequently, the state of the art includes an analysis of the main Big Data processing & storage frameworks:

- Hadoop which ensures distributed processing. It is however better suited for batch processing than for real-time processing of event streams;
- CEP (Complex Event Processing) which is an event stream processing framework able to cope with data velocity;
- NoSQL databases: such storage systems provide fast ways of storing/querying large amounts of data, with a low latency.

This state of the art provides guidance for the development of the different components. The IMS has for instance already taken the recommendations into account, with the integration of an Hadoop architecture.

The MORE framework developed by Tekever has also been included in the state of the art. It is indeed also well suited to cope with Big Data constraints. They were therefore used to develop the IPS component which was under the responsibility of Tekever.

In a fourth step, a global logical architecture has been designed to elicit the interconnections between the various iSAR+ platform components. The methodology used to elicit these interconnections is also a mix of top-down and bottom-up approaches. In the top-down approach we tried to respect end user requirements: those identified in Task 2.2, plus those inferred from end users feed-back after the Portuguese showcase plus those extracted during the preparation of the French showcase. In this sense it is user or use-case driven. But we also used a bottom-up approach, trying to limit as much as possible the number of interconnections and therefore the complexity of the architecture in order to ensure the feasibility of the overall integration while respecting the time constraints of the basic prototype (the one which has be used during the French showcase). The basic iteration of architecture is depicted hereafter in Figure 38.

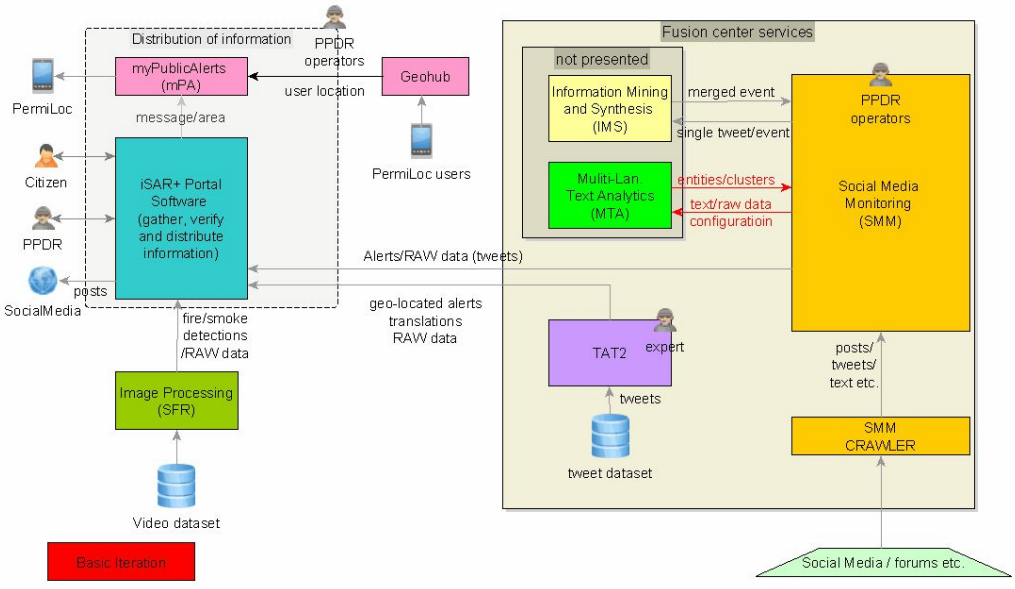


Figure 38 – Logical architecture – basic iteration

In a fifth step, the software interfaces corresponding to the various interconnections depicted in the logical architecture have been formalized and agreed bilaterally, by pair of components.

Finally a first intermediate version of the deliverable D6.611 has been released internally in M13. This intermediate deliverable details the aforementioned steps and was the reference document for the integration of the basic prototype to be demonstrated during the French showcase.

Findings of French showcase had led to revised design of the architecture in to the enhanced one, demonstrated in the final project showcase in Finland. The iSAR+ platform for both the basic and enhanced iterations was divided into two main parts – Gathering and distribution of information and the Fusion centre services, responsible for retrieving information from social media and analysing and preparing alerts.

Distribution of information includes the following modules:

- iSAR+ Portal Software (IPS);
- myPublicAlerts (mPA) – supported by GeoHub and Notico;
- optional 3rd party modules (e.g. crowdsourcing platform);

Fusion centre services include the following modules:

- SMM Crawler (Social Media Monitoring Crawler);
- Social Media Monitoring (SMM);
- Information Mining and Synthesis (IMS);
- Text Analysis Tweet Locator (TAT2);
- Multi-Language Text Analytics (MTA).

The main differences between the basic prototype and the enhanced prototype are the following:

- In basic iteration TAT2 was provided as a standalone component; thus provided with its own user interface; in enhanced iteration the TAT2 is a part of the whole Fusion Centre chain, operates as a service and therefore no user interface is introduced;
- SFR in basic iteration was operating in stand-alone mode, and thus it was feeding the alerts directly into the IPS; in enhanced architecture SFR is considered to be able to provide data to the Fusion Centre;
- In basic iteration no configuration manager was implemented (manual configuration of the components); in enhanced iteration the configuration is to be handled automatically by configuration manager;
- In basic iteration some of the components were operating using local-stored data sources; in enhanced iteration the data is usually crawled from social media, thus local datasets are not necessary in such cases:

- Finally, enhanced iteration of iSAR+ platform may allow external systems used by PPDRs to be integrated with the platform.

Logical architecture of enhanced iSAR+ platform is presented in Figure 39.

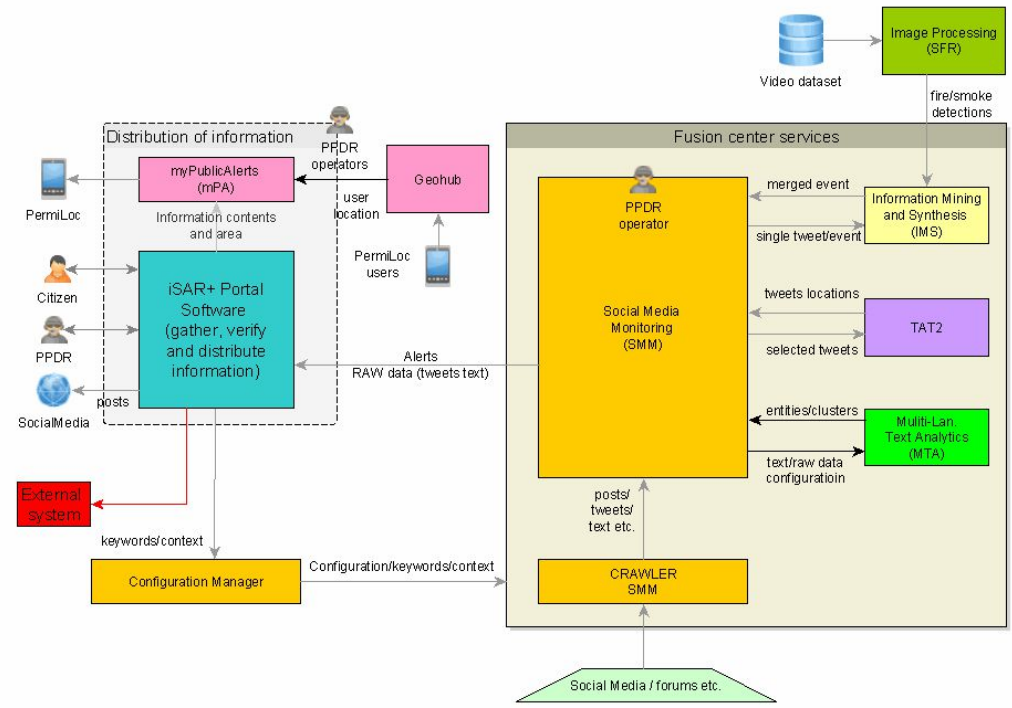


Figure 39 – Logical architecture – enhanced iteration

The main achievements of ITTI work within the T6.1 are:

- Identification of the target set of iSAR+ platform components preceded by preparation of the template to capture information about their inputs/outputs/operations;
- Identification of the two alternative versions of the iSAR+ logical architecture plus identification of the inter-component data flows;
- Identification of technical architecture that enabled exchange of data between components.

Final version of deliverable D6.611 summarized results of Task 6.1 and has been delivered to EC.

Task 6.2 Development of the iSAR+ i112 Platform (led by TEKEVER):

Task 6.2 aims at developing the iSAR+ Portal, the core component for the bi-directional communication between PPDRs and Citizens. This portal indeed allows citizens to push information to PPDRs, PPDRs to push information to the citizens. It is also through this platform that PPDR's develop and share among the various stakeholders a common operational picture (COP) enriched with situation awareness and decision support capabilities.

Prior to the M1 meeting in Lisbon, some developments were made by the Tekever development team in order to bootstrap the discussion regarding the concept prototype.

A preliminary prototype with the objective of showing partners what could be done to validate the general guidelines achieved during the iSAR+ project.

During the first months of development, the prototype had some changes resulting from end users and partners feedback, until a first usable version was considered adequate to present during the Portuguese showcase. This first prototype version, implemented most of the requirements gathered during WP2.

After the Portuguese showcase, all feedback collected from the end users was taken into account and the prototype was modified accordingly. A new version started to emerge along with the changes resulting from task 6.1 that also had major developments after this first showcase.

Most of the functionalities implemented were, in fact, because of the changes in the system architecture in order to prepare the entire iSAR+ platform to inter-communicate between modules.

The main achievements within the Task 6.2 were:

- Implementation of most of the user requirements gathered in WP2.
- Implementation of a multichannel usable prototype for both PPDR and Citizen usage with all functionalities defined and pre-validated by partners.

The iSAR+ Portal Software was developed using the TEKEVER MORE platform (Model Once Run EverywhereTM). The MORE platform is a model-driven application in which only one model is implemented to configure the interactions in any channel, providing a distributed, controlled, scalable and secure execution environment. The MORE platform is based on five core components:

- MORE Designer: the graphical modelling tool of the process;
- MORE Business Process Execution Server: the runtime environment, i.e., a process executor that upon a request from a client (through the channels), loads the structure of the process and determines the next process to execute;
- MORE Connectors: the interfaces between the platform and other systems like databases, etc.
- Communication channels: the multi-channel interfaces to the users;
- Technical interfaces: the integration of the platform with other external processes and systems..

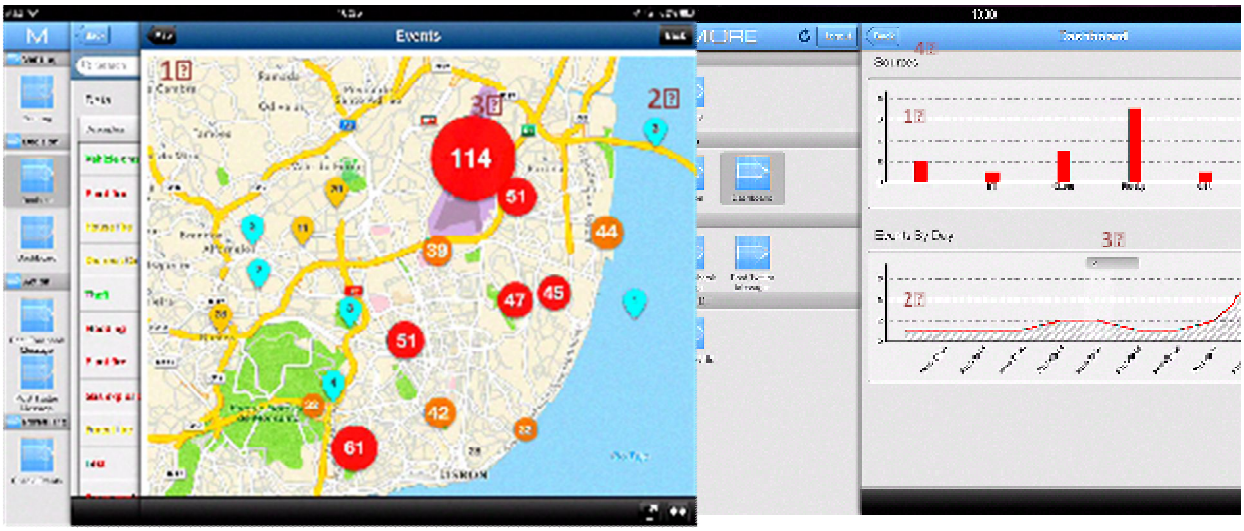


Figure 40 – IPS HMI

IPS was developed to be a modular system. This means that in any instance of IPS, multiple different profiles for data access can be defined, based on user role and/or user clearance. Also, IPS can be configured to only make available certain types of roles and certain modules. The different modules present in IPS are deeply described in the deliverable D621.

Task 6.3 Fusion Center Services (led by Zanasi & Partners):

The task 6.3 is devoted to the specification and development of the Fusion Center. This fusion center is made of four components:

- The social media monitoring component,
- The multi-language text analytics component,
- The information fusion module,
- The geo-visualization module.

During this first part of the project, the different partners involved in the T6.3 defined the role of each component with regard to the overall iSAR+ platform, defined the dataflow and communication streams, in collaboration with the partners of task T6.1, and started the implementation of the different components.

Following sections give details about the work achieved within each component.

T6.3.1 Social media monitoring component (SMM)

The SMM is a platform which provides an end-to-end processing chain to collect, analyse, exploit & visualise textual information published in the social media like blogs, forums, Twitter or Facebook. Semi-automated, relying on highly interactive man-machine interfaces to allow analysts investigate large amounts of textual information, it aims at helping them to uncover potential threats. Through a search engine, a reporting engine and a graph visualisation interface, all interconnected, it provides various ways to dig in the data. For each of the social media mining tool provided in the platform, several filters are available to sift the data.

The SMM is dedicated to open source analysts. It aims at helping them managing large amounts of data published by citizens in order to ease and speed-up the identification of critical events. Once identified relevant contextual information has to be disseminated to crisis managers to enrich the COP (Common Operational Picture). The SMM being based on a background asset of Thales, the development of this interconnection between the SMM and the IPS (which holds the COP) has been the first achievement for task 6.3.1, prior to the official start of WP6. This allowed us to integrate the SMM in the concept prototype for the Portuguese showcase.

After this showcase, the SMM capabilities have been extended in order to cope with iSAR+ user requirements in three main directions:

- Stream-based (incremental) update of all the statistics generated by the platform in order to be able to process new data on the fly in near real time. This incremental update has also been applied to the real time detection of emerging topics.
- Integration of pattern-based alerting mechanisms. Users can define alerting patterns based on a combination of keywords, metadata (including geolocation) which triggers an alert as soon as the pattern is matched enough times in a given time frame. This mechanism helps analyst to monitor known patterns, so that they can focus on the detection of unexpected patterns, using the various visual analytics components offered by the SMM.
- Development of a basket functionality to enable analysts to manually specify the pieces of information they consider as meaningful and export them to an external application which can be
    - Either Excel when users wish to rework a small data subset in a more traditional framework, to build reports for instance;
    - Or an external command & control system, IPS in the context of iSAR+, through a generic Web service.
- Integration with other components from the fusion center:
    - IMS (cf. T6.3.3): all the pieces of information considered as relevant are sent to the IMS which performs information fusion in order to provide a synthetic description of these pieces of information. This synthetic description is then used within the SMM to automatically suggest a description for alerts which are to be raised to the IPS.

- TAT2 (cf. T6.3.4): when SMM is used to monitor Twitter feeds[7], each tweet which is not geo-tagged is sent to TAT2 which returns the inferred geolocation of the tweet based on the tweet metadata and location named entities extracted from the tweet.
- MTA (cf. T6.3.1): SMM can call MTA to extract more relevant features from the collected tweets, like a severity score for instance.

Snapshots of the SMM graphical user interfaces (GUI) are provided in task 6.5 description (in this report).

T6.3.2 Multi-language Text Analytics component (MTA)

The MTA 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.).

Zanasi & Partners has developed (and implemented on the MTA) 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.

D6.3.1 presents a comprehensive description of such methodology.

At the same time it shows its application to a real use case scenario (iSAR+ French showcase in Montparnasse).

T6.3.3 Information Mining & Synthesis (IMS)

The IMS is an information fusion component which aims at providing means for semantic fusion of observations of events that are collected within the iSAR+ platform, by the SMM component. The component is based on an approach that enables to handle redundancy and discrepancies between information sources thanks to the use of fusion heuristics. The fusion heuristics use an ontology that describes the types of crises that are supervised, as well as tunable similarity measures between atomic pieces of information that are contained in the gathered observations.

The IMS is mainly composed of a generic information fusion algorithm on the one hand, and libraries of fusion heuristics on the other hand.

[7] For all three showcases Twitter has been used to demonstrate the social media monitoring capability.

The fusion process is based on fusion of graph structures. It relies on the search for matches between sub-graphs and more precisely for a maximal matching sub-graph.

The most difficult graph matching problem in our case is to find the set of sub-graphs that maximize the matching. This maximum common sub-graph isomorphism problem (MCS) is known to be NP-hard, which makes it intractable on large graphs.

During an early phase of the project, preliminary tests of an existing implementation of the fusion algorithm were conducted. They aimed at giving clues whether this implementation could be used for the information fusion component.

These tests showed that because of the computational complexity, a simplistic implementation of the algorithm for the fusion component would not be satisfying within iSAR+ project. Indeed, the amount of observations of a single event through social media leads to a huge amount of data to be processed and potentially fused. Therefore, the execution time would become too long to satisfy user requirements, in a context of crisis management.

A second phase was devoted to the study of existing approaches and algorithms for the MCS problem. This study led to a third phase that consisted in transforming the simplistic fusion algorithm to a “big data” algorithm.

To do that, we followed the Map/Reduce programming model and specified a new parallel algorithm. The algorithm was developed based on the Hadoop framework and integrated in the fusion component. Preliminary tests were performed on a test database. They confirmed the fact that the component may now scale up and manage sufficient amount of data to be used within the iSAR+ platform.

Finally the newly developed big data fusion algorithm was tested on Twitter data collected by the SMM. Those collected during the French showcase were first used a posteriori to tune the algorithm and define the domain ontology. Then IMS was integrated within the SMM component through a direct and tight linkage as explained in T6.3.1. The goal was to process in real time the set of tweets included in SMM alerts to be sent to the IPS in order to

- provide a synthetic description of these tweets through the aggregation of the pieces of information conveyed by these tweets;
- perform a consistency check among the processed pieces of information in order to detect contradictions in the way various tweets may report the same event. In case of conflict, a rumor warning is issued to the SMM user. The underlying idea being that in such cases the fact the event has actually happened is being questioned.

This integration and the rumor detection mechanism has been eventually demonstrated live during the Finnish showcase.

T6.3.4 Text Analysis Tool Tweet Locator (TAT2)

Currently only about 2% of tweets are geo-tagged. TAT Tweet lOcatOr (TAT2) at enriching the available information by attempting to estimate localization of given tweets based on the tweet contents and potentially fusing information also from other available sources. The TAT2 uses especially the information contained in the message body in order to extract possible location names (toponyms). Moreover metadata information (given its availability – E&L and feasibility aspects need to be considered) could be used to enhance the process of

toponym resolution. As a result the tool provided the list of possible locations connected with the tweet message.

In the first phase, SOTA (State of the Art) analysis has been performed to assess the most promising solutions with regard to estimating the tweets localizations. The analysis included the monitoring of the recent developments in the research area (research papers, scientific news, other relevant sources). A special attention has been given to solutions applying multi-indicator approaches. Moreover also the identification of relevant data-sources (databases for IE (Information Extraction), knowledge bases, sample datasets, etc.) have been performed.

Next, given the results of the literature analysis, we have assessed the (preliminary) possibility of employing and configuring existing information extraction tools to cope with the problem of toponym resolution. In particular, comparative tests have been performed to compare the toponym-resolution performance of the two most promising IE tools. These tests included configuring the tools to cope with extracting the toponyms from sample tweeter messages and then performing the toponym resolution. Sample of representative short tweeter messages has been created to test how the compared tools perform in messages that use place names in different (sometimes misleading) semantic context.

Based on the results of these tests, the most promising solution has been selected for further implementation and extension toward improving the toponym resolution performance. For the purposes of showcases both French and Finnish, the most effective solutions and methods identified during the tests have been used within TAT2.

Task 6.4 Image and Video Analysis (led by Area7):

The Image and Video Analysis task aims at developing some processing components for image & video data, specific to crisis management needs. Two components had been initially selected. The first one, called Smoke & Fire Recognition (SFR) is dedicated to the online detection of smoke and fires in videos produced by video-protection cameras (CCTV). The second one, called Licence Plate Recognition (LPR), is dedicated to the recognition of licence plate numbers on static images.

First versions of these two components have been developed and tested. First interviews with French end users during the preparation of the French showcase confirmed the need and strong interest for the SFR component. However, regarding the interest for the LPR was less clear and more difficult to include in the French showcase scenario. Thus, in a second step only the SFR has been enhanced, finely tuned and integrated in the basic prototype. For this prototype it has been agreed to interconnect directly the SFR component with the IPS. Integration has been done through an interface able to retrieve real time smoke & fire events from SFR database and send them to IPS.

Next figure gives a snapshot of the configuration HMI for the SFR component.

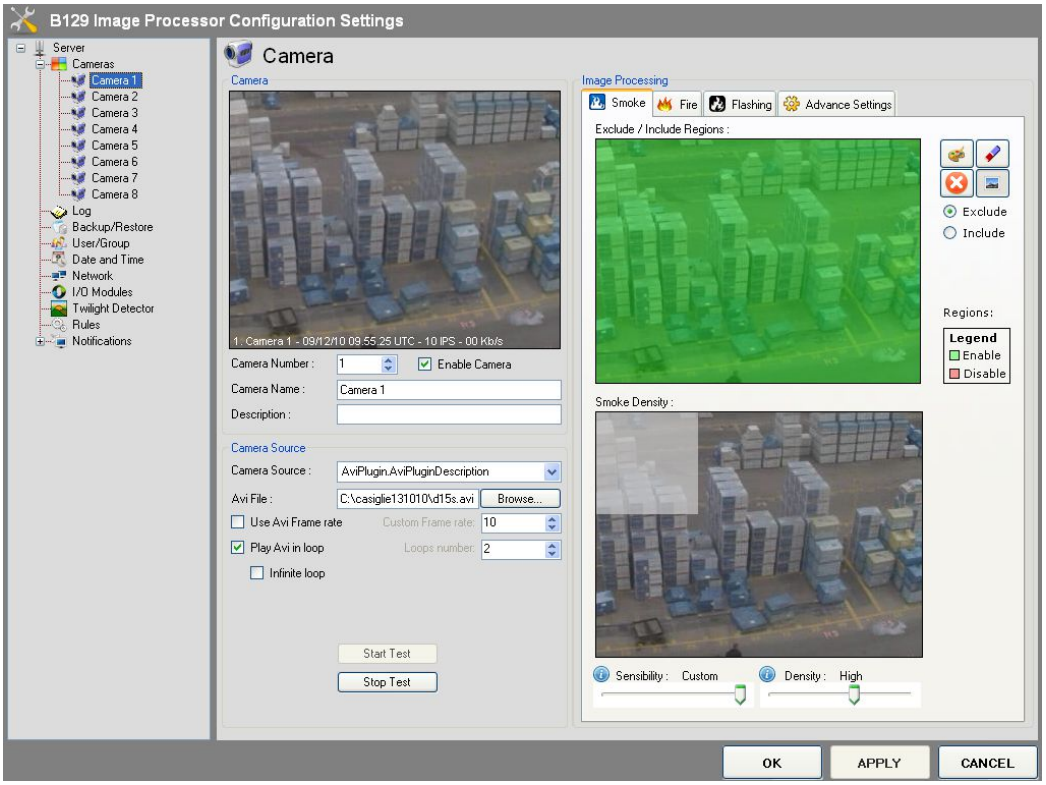


Figure 41 - SFR configuration GUI

Task 6.5 Visualization & Decision Support Tools (led by THALES):

Task 6.5 was focused on the elaboration of decision support tools and the associated visualization tools for SMM analysts having to deal with large volume of data published by citizens on social media in order to identify and roughly evaluate as quickly as possible relevant critical events. These analysts play the role of information filters for crisis managers and decision support is key for them to avoid cognitive overload while not missing any critical information.

Note that decision support is also required at the crisis management level and this has been dealt directly in the corresponding tasks: T6.2 and T6.6 with specific visualization developments, respectively for the IPS and mPA/Notico (mobile services).

In task 6.3, the SMM is mainly included for its crawling, pre-processing & storage capabilities. But to help data analysts explore the large amounts of data, specific visual analytics components were also developed during the iSAR+ project, the corresponding developments being undertaken in this task 6.5.

Actually two main sub-components of the SMM are concerned: a reporting engine providing various dashboards on social media data and a graph visualization engine able to provide highly interactive views of large and interconnected graphs – the graph of the relations between the collected texts, the graph of the relations between the authors of those texts and the graph of the relations between the topics addressed in those texts. A snapshot of the corresponding HMI is given in the next figure.

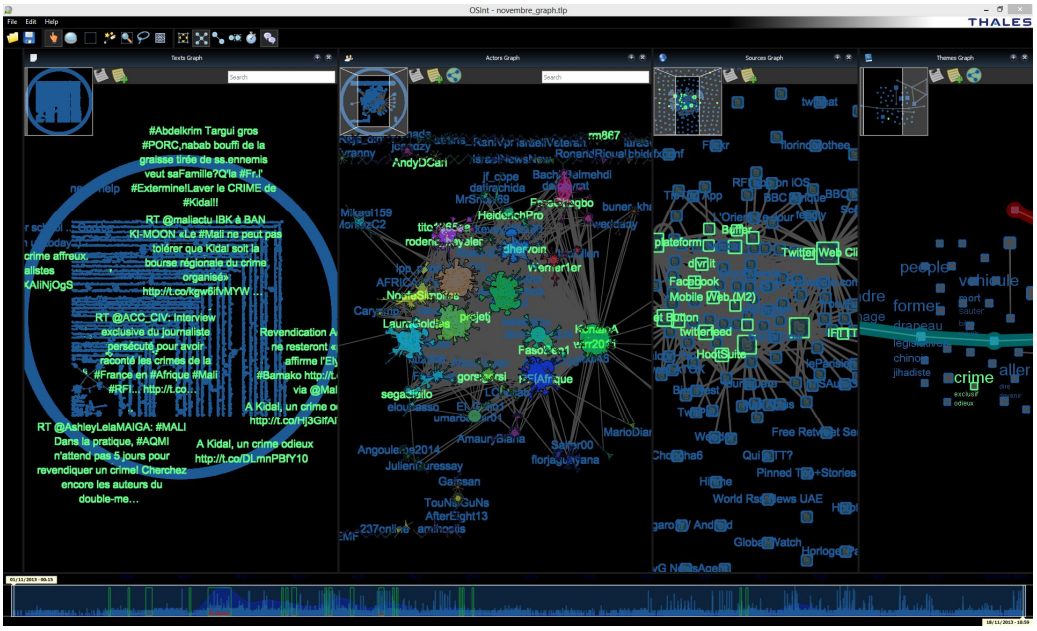


Figure 42 - SMM HMI

To cope with the needs expressed by various end users during the Portuguese showcase, we have adapted the reporting engine so that users can update on-demand the various proposed dashboards according to the newly collected documents. This was an important step towards the move from static to real time stream processing.

Besides we have added specific visualizations to highlight emerging topics. Topics are automatically detected using clustering algorithms. In order to give insights on the dynamics of these topics and in order to help analysts immediately grasp emerging trends, a specific dashboard has been developed to display, with refresh on demand, the 5 more important new topics, the top 5 topics whose growth is the highest in the last x minutes, where x can be manually chosen directly on the GUI.

To allow users export & disseminate their findings while investigating data with SMM, a basket functionality has been integrated. Thanks to this functionality users can select any element considered as relevant within the SMM and add it to a basket. Elements can be selected from a search engine, from the dashboards view or from the multigraph visualization tool. From the basket users can then choose either to export the selected information in an Excel sheet to prepare a report using a more traditional reporting tool or to send an alert to the crisis management portal, IPS in the case of iSAR+. When alerts are to be sent, thanks to the integration of TAT2 & IMS within the SMM, the messages included in the alert can be gelocated more extensively which allows to infer the geographic area covering the alert and a synthetic description can be proposed. Next figure provides a screenshot of the basket GUI which is used to raise alerts to the IPS.

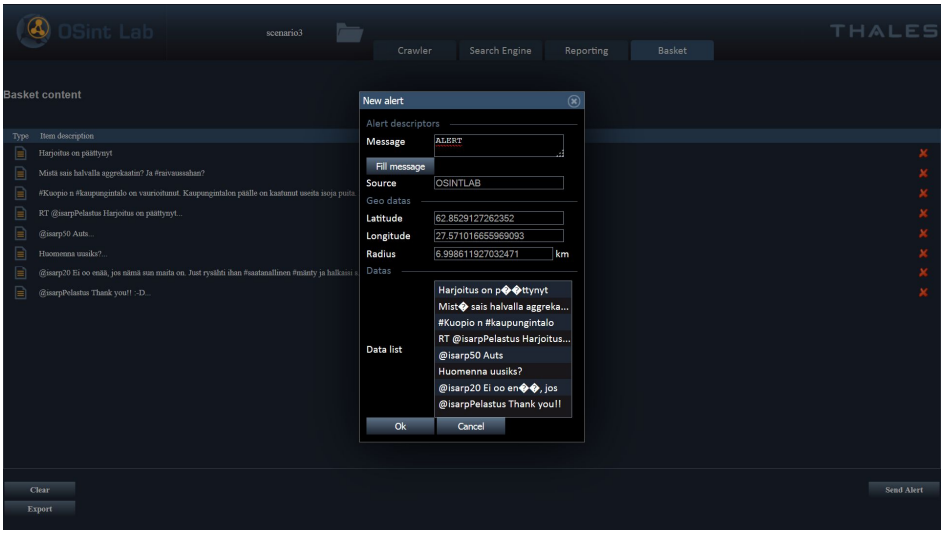
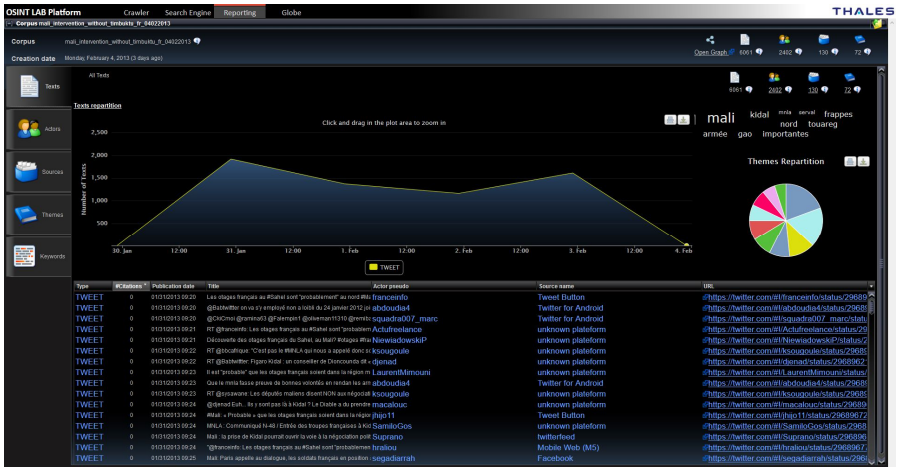


Figure 43 - Sending alerts from the basket storage to the crisis management portal

Last important point to be mentioned is that we have completely reworked the design of the HMI with ergonomists to better cope with human factors which are essential for decision support. We provide hereafter a first figure depicting the HMI as it was during the Portuguese showcase and another one describing the new HMI used in the last two showcases.



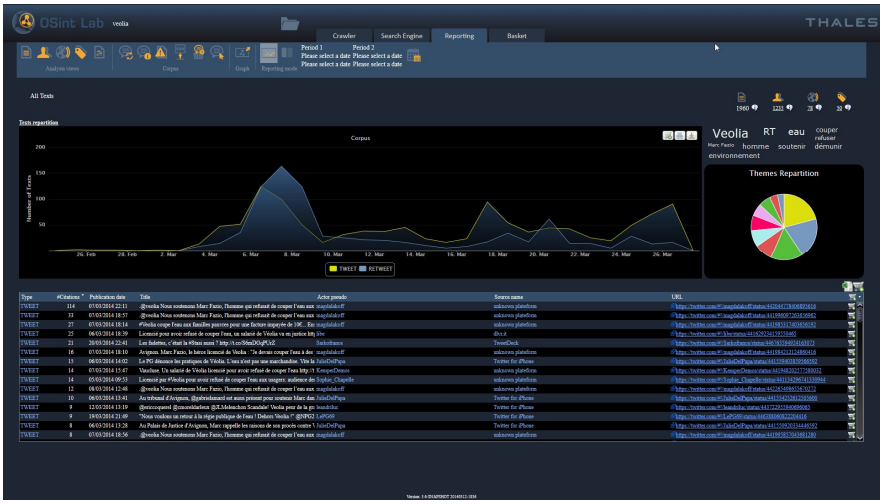


Figure 44 - SMM HMI in the PT showcase

Task 6.6 Development and Integration of Mobile Services (led by DEVERYWARE):

This task aims at adapting the development of mobile services, Notico[8] and myPublicAlerts, developed by Deveryware, in order to match the specific requirements of end users and to integrate these developments within the iSAR+ platform.

Notico is an innovative application designed to manage its own permission to be located by a third party (person or mechanism).

«Notico» is a mobile application for smartphones or tablets that offers many services including receiving alerts messages developed in iSAR+. «Notico» integrates "Notico" engine which is a patented innovation allowing a user to finely manage the dissemination of its location to third parties (persons or materials). «Notico» application broadcasts regularly to the PSO the user's position (if he gave permission), which allows to know whether he is in a danger zone or not.

«myPublicAlerts» (mPA) is the back office used to send information and warning messages to all users with a mobile and 'Notico', based on their location and categories of information they opt in to receive.. “mPA” also allows capturing and sending to Notico of external dataflows that may interest the users for their safety or health.

Prior to the French showcase the development of the interconnections between the mobile services and the IPS which has been designed and formalized in task 6.1 has been totally finalized. This allowed during the French experimentation the Notico users to receive in real time notifications from iSAR IPS platform.

It has to be also noticed the completion of the specific requirements expressed by French end users as well as those of Finnish partners after the Finnish showcase (e.g. design of multiplex geographic authority areas and the possibility for an operator to use predefined alerting messages according to specific use case).

[8] “Notico” is the trademark for the mobile application incorporating the reception of alert and information messages. “Notico” integrates “Permiloc” engine.

During the Finnish showcase two mobile alerting configurations have been tested in parallel, the one used by the control room with IPS API and the one used by Kuopio police operator with myPublicAlerts web service.

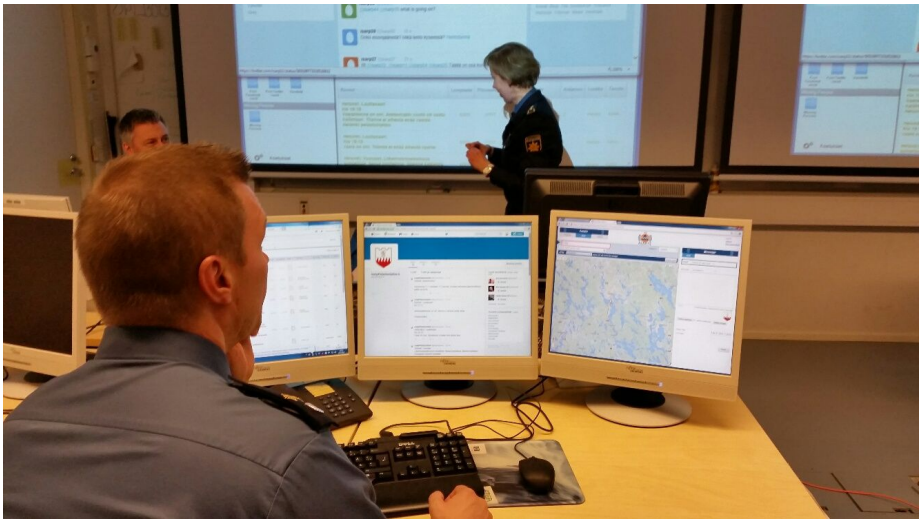


Figure 45 - PPDR using mPA during the Finnish showcase

Task 6.7 Opportunities Stemming out of Social Media Study Report (led by ITTI):

In this task the study and experimentation of emerging technologies that can be exploited for crisis response purposes have been performed. From the constantly growing set of emerging technologies, those which could be used in the area of crisis management have been identified. They were not included in the basic/enhanced iterations due to multiple reasons – e.g. the project budget and time limitations vs. the project scope or still low maturity level of some of the solutions. Summary of the all technologies, which have been selected and then studied and/or experimented within this task is presented in table 2.

Various technologies have been analysed in the aspects of applicability to the crisis management purposes, both to the actual response actions and training activities. Moreover, integration of iSAR+ solutions with existing ICT for Crisis has been analysed.

Technology	*Study*	*Experiment*
Interfaces with existing ICT for Crisis	YES	YES (e.g. integration with existing translation tools)
Risk Maps	YES	YES (mock-up presented in showcases)
SMS Services Gateway	YES	YES (presented in showcases)
Text-to-Speech and Speech-to-Text Services	YES	YES (workshop / showcases)
Automatic translations	YES	YES (showcases)
Virtual reality	YES	YES (workshop)

Augmented Reality	YES	YES (workshop)
Recent developments e.g. in image processing	YES	NO
UAV – drones	YES	NO
Wearable User Interfaces	YES	NO

Table 2 - Study / experimentation summary

Experimentations have been realized during the official project showcases (in Portugal, France and Finland) and during the workshops with end-users in Poland. In both cases, end-users external to the project have been asked about their opinions on the technologies. Technologies have been presented together with the scenarios/use cases of applying particular technology for the crisis management purposes. Examples of use of those technologies have been taken from the real-world cases as well as proposed by iSAR+ Consortium. End-users opinions have been collected in the form of open discussions and written questionnaires. Feedback received from end-users provided important insights on the subject, because it showed the potential of actual use of presented technologies by public protection and disaster relief services (PPDRs). It led to the final conclusions on which technologies (from the candidates presented) have future in the crisis response. In both cases, real-life crisis response and training mode, respondents claim that **UAVs would be the most useful solution**. On the second place – **augmented reality** such as "Google glass" (or similar) has been placed. However in the training mode virtual reality has been assessed to be very useful in the opposite to a real-life crisis response, where it scored the lowest. It should be underlined that UAVs are already used by some public safety services to an extent, thus maybe that is the reason that respondents are so sure about their usefulness.

Considering data/information provided by citizens via emerging technologies, around half of respondents would trust images from UAVs or spherical photos, e.g. from event scene, from individual users. Participants of the workshops agreed they would gladly use social media for informing people on how to act during a crisis situation, which is consistent with previous iSAR+ study described e.g. in the D2.221 User Requirements deliverable. However, information provided by citizens though social media could be helpful during rescue actions rather as additional information, which need to be confirmed by PPDR services.

Based on the analysis performed in this task an extended use case concept of iSAR+ system has been proposed. It includes the concept of iSAR+ Micro-tasking platform and providing support and information using emerging technologies by citizens (see Figure below).

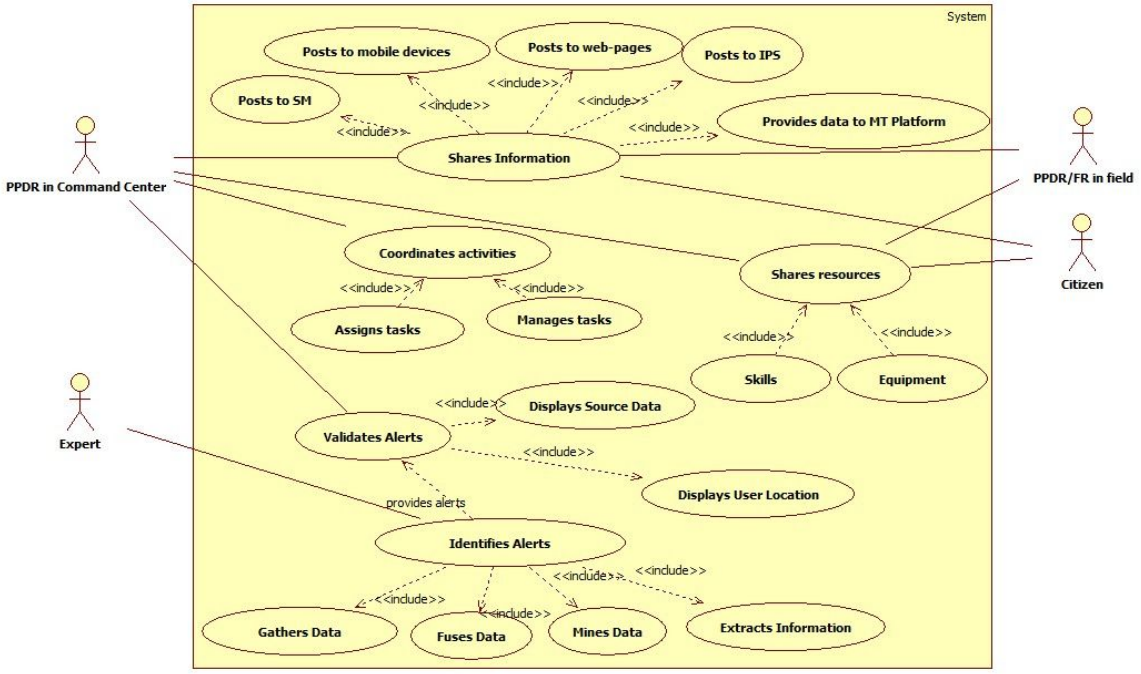


Figure 46 - EXTENDED iSAR+ system use cases

Additionally, within this task an idea of experiment using automatic real-time translation has been defined. It was evaluated using Skype Translator during the Finnish showcase Two cases of communication between PPDR and citizen speaking in two different languages (English and Spanish) has been realized during the showcase. First with the support of professional interpreter and the second with the use of Skype Translator application. In this way real-time automatic translation has been validated during final iSAR+ showcase in Finland.

Results of this task have been summarized in deliverable D6.7.1 - Opportunities Stemming Out of Social Media Study Report and delivered to EC.

Taks 6.8 Integration, Testing & Technological Evaluation (led by TEKEVER):

For this task an iSAR+ API was developed for the IPS module that allows this central module to both receive and send information from/for the remaining modules. Received information has the format of an alert that can have associated all the raw data that generated that alert, in case the alert is received from any crawler module. This version was prepared to receive only text messages.

During the first showcase, the developed API was put to test, by sharing information between Thales tool the SMM, and the IPS. Some alerts were created, based on crawled tweets and then sent to IPS, where they were shared among PPDRs and by user action sent to citizens in mobile devices.

The used integration API was a first approach for the information sharing among modules and it was made in the most generic way possible, so it could be extended after the Portuguese showcase to communicate with the other modules. This means that, after the showcase, the API was discussed among partners in order to send and receive more information that could be used by the remaining partners.

The current API version can receive information from the remaining iSAR+ platform modules in all media formats, as well as text messages. It is also possible to define action radius for the alerts sent.

The main achievements of Tekever work within the T6.8 are:

- Implementation of a generic API, able to exchange information with multiple modules
- IPS able to receive all media formats and present them to the user in a generic way without explicit actions.

3.5.2 Problems and deviations from planned work

The needs expressed by end users during the preparation of the French showcase have lead us to revise a bit the scope of the iSAR+ platform. Indeed TeamLoc, a mobile service developed by Deveryware and LPR, the license plate recognition module of Area7, which were meant to be integrated were eventually discarded from the platform because end users preferred to put the emphasis on the other components developed by these partners. If mobile services development has not been impacted, a slight delay has been observed in the delivery of D6.641. Contrary to mobile services development planning, the one for the development of image & video processing services was much stricter (delivery at T0+16 versus at T0+22)

In the second half of the project, the 3 months delay in the organisation of the French showcase (at T0+21 instead of T0+18) led iSAR+ partners to ask for a global three months extension of the deadlines for all remaining WP6 deliverables. We voluntarily assumed this delay as it was justified by the opportunity to organise a much larger French showcase with 4 different PPDR organizations plus an NGO providing volunteered citizens playing live their roles in one the biggest Paris transportation station (Montparnasse). What's more this led only to delivery delays but we managed to organize the last showcase as scheduled at T0+26 which allowed us to keep the project in line within the original 30 month timeline.

Regarding the design and development of all the iSAR+ platform components, no specific problem has been encountered. An integration issue has however arisen. Because of the short interval between French and Finnish showcase, it turned out to be too difficult to implement on time the integration of SFR within the Fusion centre processing chain. While we had planned to feed the IMS not only with text messages (tweets actually) collected by the SMM but also with smoke & fire alerts provided by SFR component, we eventually decided to keep a direct connection between SFR and IPS and focus the information fusion on text messages processing.

The last encountered problem concerned the SMM or more precisely our ability to demonstrate SMM with Facebook feeds. After the French showcase, PPDR feedback clearly suggested to demonstrate SMM capabilities on a social media different from Twitter and more precisely on Facebook which is the most popular one.

From a technological point of view Facebook API integration was indeed achieved on time before the Finnish showcase. However we faced two issues which prevented us from using Facebook in Finland and led us to stick with a Twitter experiment.

- Facebook terms & conditions seem to prevent the collection of Facebook feeds for an integration within a search engine like the one used within the SMM. This impression was partly confirmed after the Finnish showcase in a discussion with Facebook representatives.
- It is difficult to create private groups on Facebook and have the possibility to crawl feeds published on these groups with Facebook API (when the group is public there is no such issue). Finnish PPDRs were absolutely against the use of public groups to publish information about the fake crises played during the showcase as it could have created panic among real citizens not aware of the iSAR+ exercise[9].

[9] French PPDRs imposed the same constraints which led us to choose Twitter at the time, choice we had to make once more in Finland.

3.6 WP7 – Dissemination and Exploitation (led by ITTI)

3.6.1 Work Progress

T7.1 iSAR+ Business and Marketing Plan (led by ITTI)

The work of T7.1 is tightly connected to the tasks T7.2 and T7.5. While the T7.1 provides business oriented analysis for further development and exploitation of iSAR+ the T7.2 complements its "marketing plan" and T7.5 further analyses and deepens its findings.

The figure below presents the general relation between Business Model, Business Plan and Marketing Plan. Task 7.1 has started with identification of relevant business models: (a) multi-sided markets (b) "long tail", (c) "free" and (d) "open source". Most appealing business model the "multi-sided sided markets" has been identified as well as revenue streams for the target products (this is similar to the approach that Google and Android are following). The multi-sided BM is suitable because there are two major sides of the "iSAR+ market" – namely citizens and PPDR's – i.e. there is no value for one side in the market if the other side is not present. The Free and Open Source models could be used to extend the multi-sided market business model (e.g. in technological domain). As regards the "multi-sided market" in iSAR+ especially the role of third parties has to be further analysed in the development of business plan. Third parties and insurance companies may play a vital role in assuring appropriate revenue streams and also help by subsidizing citizens, who by definition will not be willing to pay for iSAR+ and its services. 3rd party developers could also benefit iSAR+ platform by providing additional value-added services to the Citizens, thus increasing citizens' interest in iSAR+ platform. In iSAR+ project this relates to Deveryware Notico-based applications, which provide also other services (such as e.g. mapping services) alongside crisis-related functionalities.

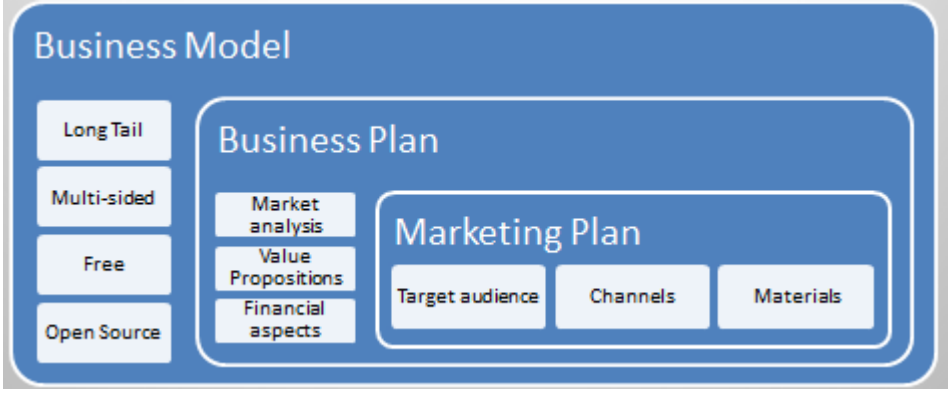


Figure 47 - Key ingredients of business and marketing plan covered by T7.1

A comprehensive analysis of worldwide market has been performed together with market trends. The competitive landscape shows that there is a potential for services (guidelines and technical solutions) which iSAR+ is currently addressing in the preparation of the current prototype and future showcase. Although there is no product that directly competes with iSAR+ there is a number of potential new entrants (integrators of legacy crisis management platforms, EMNS operators, GIS vendors, social Web monitoring platforms, etc). That is why T7.1 performed a SWOT analysis of iSAR+ and provides PESTEL analysis performed by

WP-leaders responsible for each THEO dimension of ISAR+. Finally T7.1 defines value propositions that describe the bundle of products and services that create value for our customers – citizens and PPDRs.

No.	WP exploitable result	Responsible partner(s)	Type of product	Target on the Market	Market Scope
T.01	iSAR+ platform	THA et al.	Prototype	citizens and PPDRs	EU, international possibilities may be considered (e.g. Brasil, US, etc)
T.02	Training & simulation on social media monitoring for crisis management	THA et al.	Service	PPDRs, communicatio n agencies	EU, international possibilities may be considered (e.g. Brazil, US, etc)
H.01	iSAR+ Guidelines (IG) D4.4.1	EMAUG	Report	citizens and PPDRs	EU – wide, especially in endangered areas
E.01	iSAR+ Guidelines (IG) D5.541	PSP	Report	citizens and PPDRs	EU – wide (since the legal/ethical framework is EU-centric)
O.01	SCOPE analytic framework	TCD and end-users	Methodology	PPDRs, R&D, consulting, training	National, EU, International, Worldwide
O.02	CONOPS	TCD, ESC, UEF, ITTI and end users	Report	PPDRs and technology developers	National, EU, International, Worldwide
O.03	Survey	EMAUG, TCD, ESC, UEF and end users	Method/tool	PPDRs and technology developers	National, EU, International, Worldwide
O.04	Organizational Recommendations	TCD, ESC, UEF, ITTI and end users	Report	PPDRs and technology developers	National, EU, International, Worldwide

Table 3 - Preliminary identification of project main deliveries & results

Moreover, Zanasi & Partners has identified a list of four services that could be developed together with the iSAR+ platform and then offered as standalone services (and possibly further developed as spin-off projects):

- Information extraction: the application of text mining tools allows to automatically extract the main topics from the textual messages collected. Examples of topics that could be extracted are: names of people struck by the disaster, type of incident (flooding, fire, etc.), geographical area affected, and specific aid needed (e.g., ambulances, fire-fighters, policemen);

- Unsupervised clustering: the textual messages can be automatically classified in not-predefined categories. A specific text mining tool analyses all the messages collected, look for similarity traits amongst them, and consequently create the required number of categories into which divide the entire dataset;
- Supervised categorisation: similar to service 2, in this case the categories are predefined by the users. Examples of categories are: type of incident, type of requested aid, urgency level, geographical area, date/time.
- Video metadata analysis: supervised categorisation methodologies can also be applied on the metadata information associated to video contents uploaded by users on social media websites (YouTube and similar). The metadata that can be analysed comprises: video description, comments, low-level information (as for example EXIF data).

However the above mentioned exploitable results were verified in the frame of work of the T7.5 to validate all foreseen results. The D7.711 deliverable provides detailed analysis of the value propositions for each THEO dimension and the anticipated project result/delivery separately. Separate section in the deliverable presents the preliminary identification of the most probable revenue streams, resources and associated costs. It is the role of D7.5.1 to revaluate and provide a final statement on the financial aspects identified in this section and especially indicates on the way to maximize the revenues in the two-sided business model.

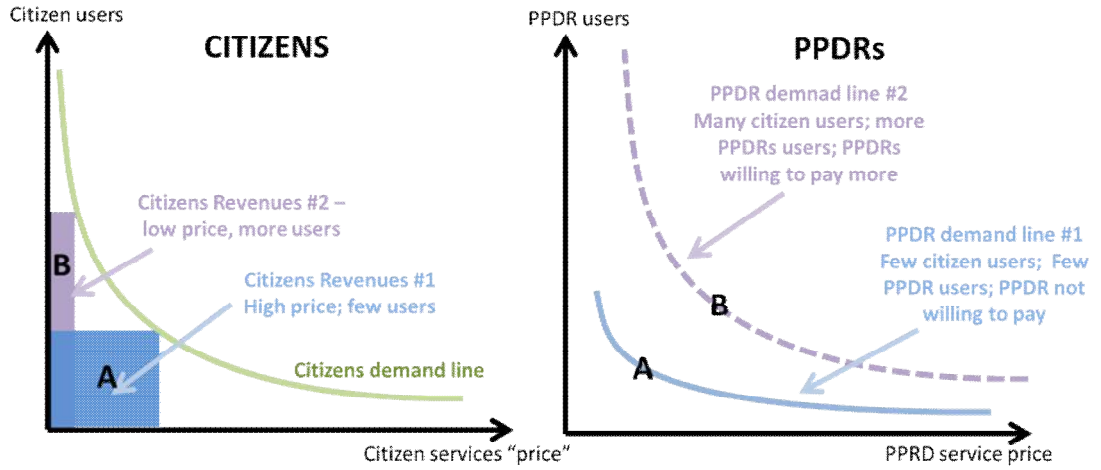


Figure 48 - Demand curves in iSAR+ multi-sided market model

This analysis clearly shows that it is of key importance to engage (e.g. via subsidizing) as many citizens as possible because they simply argument the use of the platform by the PPDR experts (see Figure 16). The preliminary version of the Business and Marketing Plan (to be further developed in T7.5) has been developed and reported in the D7.711 deliverable. The D7.711 has been sent to EC for review. With the delivery of D7.1 1 an important approach to the next step which is the implementation of Business Plan has been done.

D7.711 has managed to collect overall understanding of the exploitable knowledge that originated from the iSAR+ consortium..

Task 7.2 iSAR+ Communication Plan (led by ITTI)

With the delivery of D7.721 most appropriate communication channels have been identified. Actions connected with exploitation of those channels have been defined in order to appropriately plan necessary activities of the project with respect to the communications of its results. Especially number of dissemination events (conferences, journals) have been carefully selected and analysed from the perspective of networking capabilities for building the community of project and sharing research findings. Each partner has been asked to provide information on the rationale for attending particular conference or event to assure there is always a concrete (measurable) purpose behind the attending the event and the cost-benefit trade-off is maximized. ITTI has moderated the identification and evaluation of most valuable events from the perspective of dissemination iSAR+ results and those interesting but either outside Europe or yet without clear rationale of a partner wanting to attend. Roles and responsibilities that assure efficient implementation of communication plan have been defined as well.

Highlights of dissemination achievements:

- The iSAR+ brochures, one with the project objectives and ideas at the beginning of the project and second with the project achievements and results in the final phase of the project have been successfully released and handed-in to partners who were disseminating project results on conferences/meetings as well as disseminated through iSAR+ online channels (website and social media).
- The “Top 3” conferences with highest impact in the area of iSAR+ research have been selected by the consortium (ISCRAM, WCDM, ICWSM). The papers to ISCRAM 2014 and ISCRAM 2015 have been accepted and have been presented during both conferences in Pennsylvania State University US in 18-21.V.2014 and University of Adger, in Kristiansand, Norway in 24-27.V.2015 respectively.
- The iSAR+ newsletter has been designed and successfully released (over multiple channels) to external stakeholders.
- Press Release has been issued after the French Showcase and published at iSAR+ project website (http://isar.i112.eu/downloads/files/Press_release_iSAR.pdf) and CORDIS website (http://cordis.europa.eu/news/rcn/122896_en.html). Moreover, Press Release has been published in local/national journals and Consortium partners company websites, e.g. in Finland, Portugal, Norway and Poland:
    - Translated iSAR+ press release disseminated to Finnish media and ESC stakeholders, published also on ESC website and social media (9 January 2015)
    - TEKEVER website
    - ITTI website here and here.
    - Press Release announcing iSAR+ FI showcase and inviting media (14 January 2015)

  - Press Release on iSAR+ FI user showcase and results on ESC website (16 February 2015)

- iSAR+ movie has been produced, it includes general information about the project as well as highlights from French showcase. This move has been disseminated through iSAR+ project website as well as social media pages (Facebook and Twitter).
- iSAR+ consortium established cooperation with the following FP7 projects related to the area of crisis management:
  - ATHENA – Empowering citizens, protecting communities (http://www.westyorkshire.police.uk/athena)
  - EmerGent - Emergency Management in Social Media Generation (http://www.fp7-emergent.eu/)
  - PPDR-TC - PPDR-Transformation Center (http://www.ppdr-tc.eu/)
  - BESECURE - Best practice Enhancers for Security in Urban Regions (http://www.besecure-project.eu/)
  - COBACORE – Community-Based Comprehensive Recovery (http://www.cobacore.eu/).
- The consortium is very active in collaborating with end-users. Main drivers for such activities are “survey and interview campaigns” that have enabled to initiated R&D relations with community as well as the preparatory meetings for the showcases. The following groups of end-users were contacted (non-exclusive list):
  - Rescue Department (FI)
  - Crisis centre of the Ministry of Foreign Affairs (FR)
  - Central Directorate of Public Safety / C2 commanders (FR)
  - National Gendarmerie (FR)
  - Fire brigade operational centre (FR, PL, IR)
  - Prefecture Innovation Lab (FR)
  - Voivodship Center of Emergency Information (PL)
  - Public Security Police (PT, IR)
  - Police (FI)
  - Civil Protection Services (PT)
  - Management of digital media (UK)
  - Operators and managers at medical communication centre (NO)
  - Public administration (PL).

In total more than 160 respondents were either met physically or asked for feedback on the “role/need of social media in crisis situations”. In general the feedback was very positive – end-users have underlined the important role of social media in crisis communication. They expressed interest in the products of iSAR+.

Regarding the communication with stakeholders, third parties and other projects some additional highlights are:

- iSAR+ results have been shown and discussed with the Director of Social Innovation at the Qatar Computing Research Institute (QCRI), dr. Patrick Meier.
- representatives of the consortium were present at the following events being able to make linkages with similar projects in the research area (Crisis Management, Social Sensor, Ascent, FI Space, etc.):
    - Vilinus ICT 2013 event (Horizon 2020), 06-08.11.2013
    - EU-funded projects related with social media. The police research seminar, 07.10. 2014
    - Final conference of FP7 project COSMIC, 26.02.2015
    - Social media and crisis management clustering meeting organized by Research European Agency, 27.02.2015
    - FP7 project - BESECURE's final symposium: "New Directions in Urban Security", 05.03.2015
    - EU Project Symposium during ISCRAM 2015 conference, 27.05.2015 (with 19 other social media and crisis related projects in place).

iSAR+ representatives participated to the EENA concentration event in 2014 and in 2015 (i.e. conference with the large participation of end-users ca. 300 professionals). Deveryware representatives attended both conferences and disseminated iSAR+ among end-users.

ITTI has organized two workshops entitled "Interoperability of Radio Dispatcher Systems for First Responders and Utilities" on 28.05.2014 in Warsaw and on 24.06.2014 in Poznań, both in Poland. The workshops were attended by Polish end-users. During the workshops 4 FP7 EU projects from the area of crisis management were presented, i.e. HIT-GATE, PPDR-TC, FREESIC and iSAR+. Moreover, iSAR+ leaflets were distributed among the workshops participants, who were interested in the project.

The summary of dissemination activities is provided in the table below.

Dissemination activities in numbers				
Number of publications	Number of conferences/events		Number of other meetings\dissemination activities	Number of end-users met
	International level	National/local level		
19	26	45	> 20	163 PPDRs* 329 Citizens*

Table 4 - Summary of dissemination activities (as of 09.06.2015)

*Only in the process of users requirements collection

Full lists of publications and dissemination events are presented on the iSAR+ project website (http://isar.i112.eu/).

The following forms of dissemination have been realized during dissemination activities:

- general presentation of the project
- presentation of project results
- publication of scientific paper related to project results
- distribution of the leaflets and project website details
- networking with end-users and authorities
- networking with representatives of other projects.

The preliminary version of the Communication Plan has been developed and reported in the D7.721 deliverable. The D7.721 has been sent to EC for review (on time).

Task 7.3 iSAR+ Workshops Coordination (led by PPSL):

Description of workshops and their results can be found in D7.3.1.

Three workshops followed the Portuguese, French and Finnish showcases. The aim of these workshops was to present and discuss intermediate/final results as well as requirements and expectations with end-users community (PPDR's, citizens). The showcases confirmed the interest for and usefulness of iSAR+ concept for the interaction between PPDRs and citizens during a major crisis, both to benefit from the information coming from citizens, and to allow PPDRs to use the iSAR+ platform as a communication channel with citizens.

PPDRs considered iSAR+ tools easy to use and useful for picking up important information from the social media and communicating with citizens during crisis. However, they would considered it as additional communication channel that would not replace calls to emergency number 112. Resources might also be a challenge for the introduction of that kind of tools in crisis management.

Citizens found IPS integrated technologies, Notico and Twitter interesting to get info about the situation from PPDRs, especially if PPDRs are active in their communication and their messages are clear and distributed fast. They nevertheless pointed out that on Twitter it might be difficult to detect the tweets sent by PPDRs among the flow of other tweets and raised the issue that using social media required some minimum skills on media literacy (use of hashtags…).

In its last iteration, and based on the integrated recommendations, iSAR+ organized a workshop in Boston, United States, looking for expanding the research beyond EU level and aiming at sharing of knowledge with US end-users.

The workshop occurred on May 8th, in the Boston EMS facilities, with the participation of THEO WP leaders, the iSAR+ coordinators and the following end-users' entities:

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

- Boston Fire Department (FD);
- Mccall Ambulance;
- PSNet (Interisle).

The last period of iSAR+ was only dedicated to produce the most important project results: the iSAR+ Guidelines & Roadmap, and the Final Business Plan.

A summary of these Guidelines & Roadmap as well as the Business Plan were presented in the iSAR+ Final Workshop, organized in Lisbon, Portugal, at the Police Sciences and Internal Security's High Institute, the "Academy" of PSP (Portuguese Safety Police) officers.

Task 7.4 Management of the iSAR+ Online Presence (led by ITTI):

ITTI together with TEKEVER as the coordinator (and through SSAG validation) is actively pushing the work towards appropriate visibility of the project within online domain. The work so far encompasses:

- official web site of the project has been erected in the first month of the project and is up to date and running (isar.i112.eu);
- social media pages of the project are up to date and running (Facebook – with 117 likes, Twitter – with 49 followers);
- project newsletter has been released (Q4/2013) and spread to end-users through multiple channels of communication.

Figure 49 - Facebook page (up to date: 30.06.2015): 117 Likes

Figure 50 - Twitter page (up to date: 30.06.2015): 49 Followers

Task 7.5 iSAR+ Sustainable Business Operations (led by THA):

The main role of the T7.5 was to continue and extend the work of T7.1 towards defining and implementing a viable business plan for iSAR+. More precisely, the goal was to identify the most promising and mature results of iSAR+ which would be worth exploiting after the end of the project by the different iSAR+ partners. For each identified exploitable result we tried to define precisely

- the product or service which could be offered;
- the roadmap which needed to be implemented in order to make the result concretely exploitable;
- the related products or services, offered by iSAR+ partners which could usefully complement this offer;
- the target audience and
- the partners in charge of the offer which could be contacted for more details

The identification of the final exploitable results emerged from the comparison between the outputs of the business & marketing plan delivered in D7.711 and the actual and perceived maturity level of iSAR+ outcomes (not only technological components but also the non-purely technological experience acquired and the THEO guidelines).

Based on the initial business & marketing plan we had a global view on the market, the existing offers, the potential clients and their specific needs. It is then actually through the 3 live showcases and the various workshops we hold with end users (after the showcases but also in Boston and Lisbon in May and June 2015) that we managed

- first to have a rather clear idea on the technology readiness level (TRL) of the technological assets developed throughout the project and integrated in the iSAR+ platform and
- second to collect feedback from end users in order to update our knowledge about the “ICT tools for crisis management” market and have an idea of the perceived interest from potential clients about our technological assets but also about the overall know-how we managed to acquire in this field. Indeed in these workshops we are able to express our views about the 4 THEO dimensions and test in this way the

relevance of our guidelines.

iSAR+ produced a business plan presenting the Technological offers as well as a set of services the iSAR+ consortium can provide to end-users (PPDRs).

More information on iSAR+ final business plan can be found in D7.7.1

3.6.2 Problems and deviations from planned work

The work in WP7 was considered very important across the project course. Especially the end-users were treated with special attention and approach. As regards the deviations the following should be named:

- In the first 15 months of the project lots of energy has been put by WP7 (with the support of respective partners) to make good and strong relations with end-users. That is why after issuing of the D7.711 and D7.721 (navigating) deliverables there was less than originally assumed focus on the T7.5 objectives. Thus, the goals "sustain viable commercial business strategy and operations", "develop cost-benefit analysis from the end-users perspective" and "acquire knowledge" have been postponed to the next reporting stage.
- In the second phase of the project the online presence was updated more regularly and provided more up-to-date information to interested end-users – especially as regards the "news" and public "deliverables".
- After each showcase, workshop with end-users aiming at collecting end-users feedback and recommendations for further project phases has been organized. However, more comprehensive results have been collected after French and Finnish showcase. After Portuguese showcase our approach included interviews with the whole group of end-users together, which could result in the fact that public security officers at the lower level of command could not feel free to express their opinion different than their commanders.

Besides ITTI was looking forward to the contact with PSCE members to exchange ideas between iSAR+ and projects from the area of social media and crisis management that PSCE is involved in (i.e. COSMIC). Thanks to the participation in a conference in Germany in Q4/2013 the Finnish partner (ESC) has identified the contact with the partner from COSMIC. The consortium considered common paper however we did not succeed in achieving this.

4 Deliverables and milestone tables

This section provides an overview of the deliverables submitted during the reporting period.

WP	Deliverable	Owner	Nature	Dissem. Level	Submision date		Remarks
					Planned	Actual	
1	D1.1.1 iSAR+ Reports: Concept Prototype Report	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PP	31/08/2013 (8 months)	22/11/2013	Delay caused by PT showcase delay
1	D1.1.2 iSAR+ Reports: Basic Prototype Report	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PP	31/10/2014 (22 months)	18/11/2014	
1	D1.1.3 iSAR+ Reports: Enhanced Prototype Report	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PP	28/02/2015 (26 months)	16/03/2015	
1	D1.1.4 iSAR+ Reports: Final Report	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PU	30/06/2015 (30 months)	30/06/2015	Canceled and replaced by Project Final Report (this document)
1	D1.6.1 iSAR+ Potential Dual-Use Technologies and Associated Mitigation Strategy	HELSE BERGEN HF*HAUKELAND UNIVERSITY HOSPITAL	Report	CO	31/03/2013 (3 months)	01/04/2013	
2	D2.1.1 Case Studies Report	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF	Report	PP	30/04/2013 (4 months)	10/05/2013	

		THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN					
2	D2.2.1 User Requirements Document	ITTI Sp.zo.o.	Report	PP	30/06/2013 (6 months)	16/07/2013	
2	D2.3.1 The iSAR+ Concept Prototype	ITTI Sp.zo.o.	Report	PP	31/07/2013 (7 months)	29/10/2013	Delay caused by PT showcase delay
2	D.2.4.1 Integrated iSAR+ Recommendations (Basic Prototype and Enhanced Prototype)	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	Report	RE	28/02/2015 (26 months)	20/05/2015	Original owner was wrong. Submission date was re-planned
2	D2.5.1 iSAR+ Platform Validation (Basic Prototype and Enhanced Prototype)	ITTI Sp.zo.o.	Report	RE	28/02/2015 (26 months)	20/03/2015	
2	D2.6.1 iSAR+ Concept Prototype User Showcase (plan and results)	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PU	31/08/2013 (8 months)	04/12/2013	Delay caused by PT showcase delay
2	D2.6.2 Approval by French National Data Protection Authority	POLE PILOTE DE SECURITE LOCALE - PPSL	Other	PP	31/08/2014 (20 months)	16/09/2014	
2	D2.6.3 iSAR+ Basic Prototype User Showcase (plan and results)	POLE PILOTE DE SECURITE LOCALE - PPSL	Report	PU	30/09/2014 (21 months)	18/11/2014	Delay caused by FR showcase delay
2	D2.6.4 Approval by Finnish National Data Protection Authority	Pelastusopisto, Emergency Services College	Report	PU	30/11/2014 (23	18/11/2014	

					months)		
2	D2.6.5 iSAR+ Enhanced Prototype User Showcase (plan and results)	ITÄ-SUOMEN YLIOPISTO	Report	PU	28/02/2015 (26 months)	20/03/2015	Submission date was re-planned
2	D2.7.1 iSAR+ Guidelines (Document and online material)	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Prototype	PU	30/06/2015 (30 months)	30/06/2015	
2	D2.7.2 iSAR+ Roadmap (Document	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PU	30/06/2015 (30 months)	30/06/2015	Cancelled and merged into D271
3	D3.1.1 Analysis of European Emergency Plans	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	Report	PP	28/02/2014 (14 months)	26/03/2014	
3	D3.1.2 Organisational Data Collection Tool	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	Other	RE	28/02/2014 (14 months)	26/03/2014	
3	D3.1.3 PPDRs├ Future CONOPS (Basic Prototype and Enhanced Prototype)	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF	Report	RE	31/10/2014 (22 months)	20/05/2015	Original date was wrong

		THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN					
3	D3.2.1 PPDRs View on New Communication Technologies and Social Media in Crises (Survey & Analysis)	ERNST-MORITZ-ARNDT-UNIVERSITÄT GREIFSWALD	Report	RE	31/01/2015 (25 months)	01/08/2014	Original date was wrong
3	D3.3.1 Organisational Recommendations for iSAR+ (Basic and Enhanced Prototype	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	Report	RE	31/03/2015 (27 months)	23/04/2015	Submission date was re-planned
4	D4.2.1 Focused Socio-Cultural Analysis Report (Basic and Enhanced Prototype)	ERNST-MORITZ-ARNDT-UNIVERSITÄT GREIFSWALD	Report	RE	31/01/2015 (25 months)	31/03/2015	Submission date was re-planned
4	D4.3.1 Human Factors Analysis in iSAR+ (Basic and Enhanced Prototype)	THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN	Report	RE	31/03/2015 (27 months)	23/04/2015	
4	D4.4.1 Human Recommendations for iSAR+ (Concept, Basic and Enhanced Prototype)	ERNST-MORITZ-ARNDT-UNIVERSITÄT GREIFSWALD	Report	RE	31/03/2015 (27 months)	31/03/2015	
5	D5.4.1 Ethical and Legal	MINISTERIO DA	Report	RE	31/03/2015	06/04/2015	Submission date

	Recommendations for iSAR+ (Basic and Enhanced Prototype)	ADMINISTRACAO INTERNA			(27 months)		was re-planned
6	D6.1.1 iSAR+ System Requirements and Architecture	ITTI Sp.zo.o.	Report	PP	31/01/2015 (25 months)	06/02/2015	
6	D6.2.1 iSAR+ Portal Software (Basic and Enhanced Prototype versions)	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Prototype	PP	31/01/2015 (25 months)	23/02/2015	Submission date was re-planned
6	D6.3.1 iSAR+ Fusion Centre	THALES COMMUNICATIONS & SECURITY SAS	Prototype	RE	31/01/2015 (25 months)	23/02/2015	
6	D6.4.1iSAR+ Image and Video Analysis	Area7 srl	Prototype	RE	30/06/2014 (18 months)	24/06/2014	
6	D6.5.1 iSAR+ PPDR Services (Visualisation and Decision Support Tools)	THALES COMMUNICATIONS & SECURITY SAS	Prototype	RE	31/01/2015 (25 months)	23/02/2015	Submission date was re-planned
6	D6.6.1 iSAR+ Mobile Services (Basic and Enhanced Prototype versions)	DEVERYWARE	Prototype	PP	31/01/2015 (25 months)	03/03/2015	Submission date was re-planned
6	D6.7.1 Opportunities Stemming out of Social Media Study Report	ITTI Sp.zo.o.	Report	PP	31/01/2015 (25 months)	06/02/2015	Submission date was re-planned
6	D6.8.1 iSAR+ Testing and Evaluation (Basic and Enhanced Prototype versions)	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	PP	28/02/2015 (26 months)	07/04/2015	Submission date was re-planned

6	D6.8.2 ‼ Technological Recommendations for iSAR+ (Basic and Enhanced Prototype versions	TEKEVER - TECNOLOGIAS DE INFORMACAO, S.A.	Report	RE	28/02/2015 (26 months)	10/04/2015	Submission date was re-planned
7	D7.1.1 Business and Marketing Plan	ITTI Sp.zo.o.	Report	RE	31/03/2013 (3 months)	12/04/2013	
7	D7.2.1 Communication Plan	ITTI Sp.zo.o.	Report	PU	31/03/2013 (3 months)	12/04/2013	
7	D7.3.1 iSAR+ Workshops (Organisation and Results	POLE PILOTE DE SECURITE LOCALE - PPSL	Report	PU	30/06/2015 (30 months)	30/06/2015	
7	D7.5.1 iSAR+ Final Business Action Plan	THALES COMMUNICATIONS & SECURITY SAS	Report	PU	30/06/2015 (30 months)	30/06/2015	

5 Project Management (led by TEK)

5.1 Management Tasks and Achievements

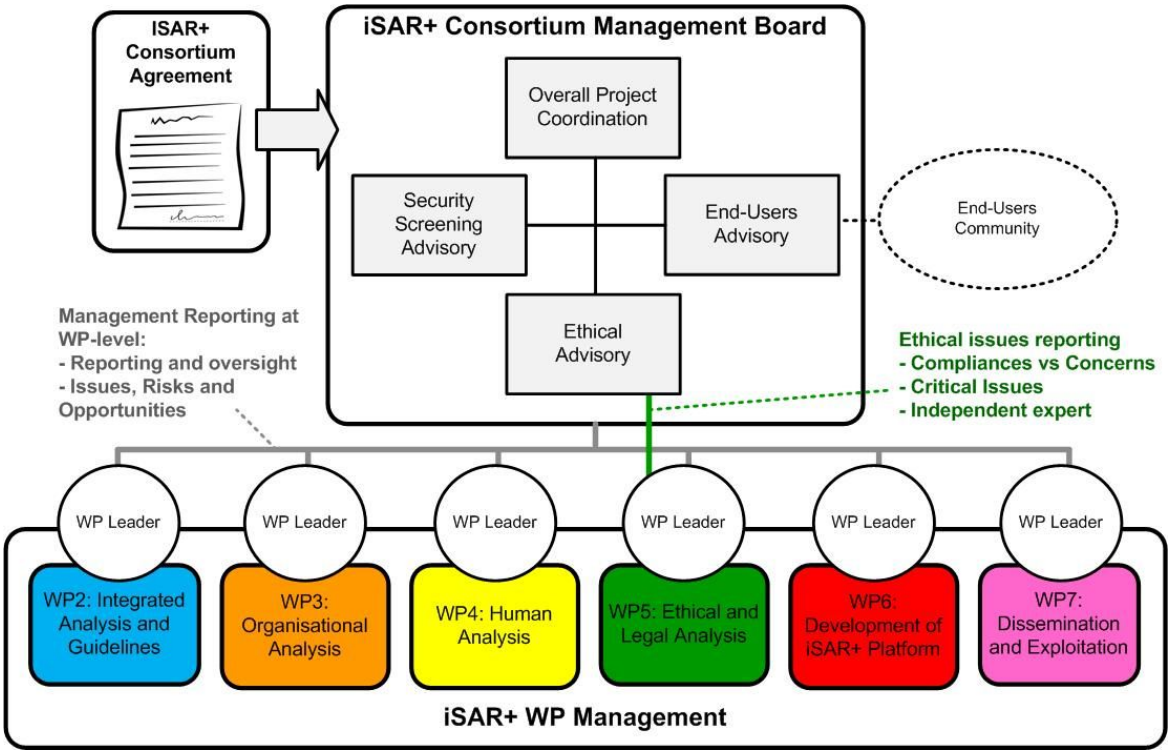


Figure 51 - iSAR+ Management Structure

As depicted, the iSAR+ Project management presents a two-level structure:

- At the top-level, the iSAR+ Consortium Management Board (MB) holds the top decision making and authority over the project, comprising the Overall Project Coordination (responsible for the management and coordination of the iSAR+ consortium and project) and the Project's critical areas, namely, Security Screening; Ethical (and legal framework) and End-users. For each of this areas, there is an Advisory Group composed by elements from iSAR+ partners or independent from the consortium.
- At the WP-level, the iSAR+ WP Management (WPM) comprises the management of the each defined WP and its constituent tasks (each of which having appointed a specific task leader).

This two-level structure ensures that the iSAR+ consortium and the project are properly managed, all critical areas are present at the top-level, and WP status and issues (with likely impact on other WPs) are made visible to the top-level MB so that proper actions can be taken.

5.1.1 Overall Project Coordination

The Overall Project Coordination (OPC) includes the administrative aspects of the iSAR+ Project and provides continuous oversight over the Project activities, progress, risks and accomplishments.

During the iSAR+ project sixteen formal OPC meetings where performed between the project coordinator and the work package leaders. In some occasions other elements were invited to participate on relevant discussions.

In an OPC meeting each work package leader presented the status of the WP corresponding tasks and deliverables, analyze the work package's specific risks, and presents the list of actions and problems. After all the WP discussions, the coordinator proceeded with general announcements and the analysis of project's risks and actions.

In addition to OPC, several other spontaneous meetings took place within each work package, ensuring that the consortium and the project were properly managed.

The normal dynamics of a project like iSAR+ led us to prepare four amendments to the Grant Agreement, and several minor adjustments to initial work plan and deliverables submission dates. The needed flexibility and the perfect relationship with the Project Officers (three during the project life-cycle), allowed a smooth management of our project..

5.1.2 iSAR+ Advisory groups

As a mitigation plan for the identified risk during the proposal preparation, iSAR+ established advisory groups focused on specific critical areas: Security Screening, Ethical/Legal, Scientific/Technological, End-users and Exploitation.

Depending on the subject of each project's deliverable or activity, one or more of these group were called to ensure the compliance with the defined rules within each critical area.

The work performed in the scope of task 1.4 (Ethical Advisory) was naturally merged with the work performed in the scope of task 5.3 (iSAR+ Project's Internal Ethical and Legal Framework Validation), both led by PSP. The same situation occurred with the Other Advisory Tasks (1.2, 1.3, 1.5 and 1.6) as they involve the same people/partners.

Mainly, these advisory groups ware called to review relevant deliverables, to participate in project activities like the Portuguese Showcase and Workshop, and to keep the eyes focused on specific project risks.

5.1.3 Problems and deviations from planned work

The management model defined for iSAR+ showed enabled a very dynamic and flexible tool to guide the project to its success.

Some issues were identified and solve on time, mitigation effects and avoiding any kind of problems.

1. As mentioned above iSAR+ is strongly dependent on the availability and interest of the end-users community, either Citizens or PPDRs, which caused adjustment on our initial plans.

It was the case of the Portuguese and French showcases, and the difficulty to get the desired number of answers to the questionnaires.

2. Replacing one key member of a project is always undesirable. Replacing one key partner is definitely a problem that any coordinator would like to avoid.

   This undesirable situation occurred in iSAR+, as well known by the Project Officer, when CSSC decided to leave the consortium being replaced by PSP. Due to the efficiency of PSP members the impact of such undesirable situation was properly mitigated.

3. Due to CSSC withdrawal it was expected that EAG (directly involved by CSSC) stopped its support as advisor on Ethical aspects, a critical and sensitive area of iSAR+. However the management team was able to find a way to keep this important group supporting us.

4. The timeframe between the proposal preparation and the project execution is always exposed to undesirable changes in points-of-contact, availability of people or entities, strategies, or any other contingencies. For example the US Company in charge of the US workshop organization was closed, and the other POC in US were not available anymore. Dr Derek Ross, from the Trinity College of Dublin, partner of iSAR+, had the kindness of using his contacts to get the iSAR+ project coordinator in contact with Boston Emergency Medical Services. iSAR+ was therefore able to organise this workshop together with Boston end-users which showed very interested in the iSAR+ outcomes and in future cooperation.

5.2 Risk Management

The following table presents the risks identified during the project life-cycle with the impacts and probabilities of occurrence updated. It is based on the table of the Annex I of the GA but has been updated according to the evolution of the project during this period.

Most of these risks were identified during the preparation of the proposal. Therefore their mitigation strategies were created and implemented while defining the project plan, its work breakdown structure and methodology.

These mitigation plans proved to be suitable and sufficient to mitigate the impact of these risks.

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
1	Complex Problem not covered appropriately	Low	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Identify the problem's dimensions and establish parallel WPs, including one dedicated to Integrated Analysis Build a highly qualified Consortium to deal with the problem's complexity.* *Determine four project iterations, with a learn-assess-adapt approach* *Select adequate methodologies to handle the different problem's dimensions.* Additional Notes: Project plan and THEO methodology guaranteed that we tackled the problems properly
2	iSAR+ not meeting end- users needs (PPDR and citizens)	Low	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Promote an active involvement of a wide end-users community, including Consortium partners* *Establish an End-Users Advisory Group (with top-level management presence)* *Define a set of scenarios for iSAR+ with the active participation of end-users* *Establish dedicated WP on the Organisational Analysis (PPDRs)* *Establish dedicated WP on the Human Analysis (citizens)* *Validate the iSAR+ prototypes across several stages of the project (including early stages).*

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
					Conduct User Showcases for advanced validation Additional Notes: The discussions took in the workshops demonstrated that this risk didn't occurred at all. The results were very well accepted by our end-users community.
3	iSAR+ guidelines and platform not built according to the EU ethical and legal framework	Low	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Establish dedicated WP on Ethical and Legal Framework Analysis Create an Ethical (and Legal Framework) Advisory Group* *Define an internal ethical and legal validation on the project's outputs as a project's task to ensure that iSAR+ is ethically compliant with respect to EU fundamental rights legislation* Additional Notes: CSSC and PSP with the EAG ensured that iSAR+ activities kept in accordance with EU ethical and legal framework. Inclusive, iSAR+ had a meeting with Facebook representatives to analyse a possibility to solve a legal obstacle on using Facebook in our platform.
4	Non adoption of iSAR+ guidelines and platform	Medium	Low	No	Risk identified during proposal preparation. *Mitigation Plan:* *Define an iSAR+ Roadmap to ease the adoption of iSAR+* *Establish a dedicated WP on the Dissemination and Exploitation of the project's results*

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
					Implement an ambitious iSAR+ Business and Marketing Plan *Conduct several project's Workshops to promote the project's results while engaging end-users (also beyond Europe).* Additional Notes: The Guidelines & Roadmap were delivered to other EU project coordinators, the end-users community, together with a film produced with the guidelines presentations and the business plan. Some end-users already informed they want to start using them. Therefore we consider this risk on a good way to be solved besides that can be confirmed only in the future.
5	Adoption of iSAR+ guidelines and platform at EU-level only	High	Low	No	Risk identified during proposal preparation. *Mitigation Plan:* *Involvement of US associated partners (SME EBR and a researcher from the University of New Jersey)* *Conduct a project's workshop on the USA.* Additional Notes: The US workshop was a success. The cooperation with, at least, Boston end-users will continue.
6	Complex and large consortium	High	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Implementation of a solid management structure (see Section 2 of proposal) and clear establishment of responsibilities (WP leader, task leader, delivery).* *Monthly meetings covering all critical areas and WPs.*

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
					Well-defined targets per WP and per task (in scope, quality, effort, calendar, and deliveries). Additional Notes: The management methodology was enough to ensure the proper dynamic and flexibility to lead the project to its success.
7	Potential dual-use and misuses of the technology	Low	High	No	Risk identified during proposal preparation. *Mitigation Plan:* *Establish a Security Screening Advisory Group (SSAG), as part of the management board, to screen deliveries that are public or that will be released to the public or non- consortium members. The SSAG may restrict content from becoming public according to identified security issues. Access to sensitive content will be restricted to Consortium members only. All deliveries published outside the Consortium will contain a disclaimer stating that the content has been screen by the SSAG (see section 6 of the proposal - Security Sensitivity Issues).* Additional Notes: Deliverable D1.161 on the mitigation strategy for dual use of iSAR technology was delivered to the commission. No further issue were identified concerning this matter.
8	Expected technical results defined for WP6 too ambitious for the Project's size	High	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Reuse software and services that are part of partners' portfolio and competences and integrate open-source (and social networks) used in past crisis events. Attentively study and identify which project parts ought to be*

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
					implemented (as prototype) and which parts should be addressed via a study. Additional Notes: This risk was merged with RSK9. "Have two iterations in WP6 implementation, thus reducing the complexity of the WP (and consequently its associated risks). The technologies applied in the iSAR+ platform are reused from existing components and products (see previous risk). Have two iterations in WP6 implementation, thus reducing the complexity of the WP (and consequently its associated risks). The technologies applied in the iSAR+ platform were reused from existing components and products. WP6 reached its objectives.
9	Technical goals in WP6 too comprehensive and complex	High	Medium	No	This risk was merged with Risk 8.
10	Delays in the iSAR+ Platform development process	Medium	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Promote the early and quick spotting of delays by establishing iSAR+ planned iterations and understanding that the development process targets a prototype (not a final solution) that shall be appropriate for testing and validation with end-users.* Additional notes: The delays or changes that occurred were not caused by WP6. On the contrary, WP6 decided to star in the first iteration (it supposed to star on ly the the second one) and to expand its tasks to the last iteration, on support of dother workpackages (like WP2 and WP7)

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
11	Citizens unwilling to use the iSAR+ Platform	Medium	Medium	No	Risk identified during proposal preparation. *Mitigation Plan:* *Resort to social networks widely used by citizens, presented as a complementary mechanism to share information during crises that handles private information appropriately and accordingly to the EU legal framework. Develop an appropriate marketing and public awareness campaign (see 3.2.1 - Dissemination of results).* *Develop appropriate guidelines to ensure citizens willingness and capability to use iSAR+.* Additional notes: Due to legal issues iSAR+ was not allowed to use Facebook, which is the most commonly used tool. iSAR+ used mainly twitter to proof the designed concepts. Regarding iSAR+ platform, including related technologies we found no barriers at all on their acceptance by Citizens (and PPDRs). On the contrary they foun it useful and easy to use.
12	iSAR+ Platform's functionality and Human interfaces not adequately implemented.	Medium	Medium	No	Risk identified during the proposal preparation. *Mitigation Plan:* *Focus the first project iteration on understanding end-user needs, defining end-user requirements and developing mockup prototypes subjected to end-users validation, before starting actual implementation of the iSAR+ Platform.* Additional Notes: AS detailed in iSAR+ deliverables, namely those regarding shocases results and workshop, confirm that this risk was properly mitigated.

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
13	Limited Access to PPDR organisations for CONOPS analysis	Low	High	No	Risk identified during the proposal preparation. *Mitigation Plan:* *Encompass several end-user organisations within the iSAR+ Consortium, so as to allow for a multi-organisational and international perspective on the needs and activities of PPDR organisations. Via the end-user group, end-users offer their practical support in the research.* Additional Notes: Some problems occurred in this area as explained in WP3 and WP4 sections of this document. However all these problems were properly solves.
14	Difficulty in achieving consensus between end-users (CONOPS)	Medium	High	No	Risk identified during the proposal preparation. *Mitigation Plan:* *Include a number of end-user organisations in the iSAR+ Consortium and advisory board for the purpose of representation and diversity. It is natural to expect organisational differences to emerge. However, it is the intention of iSAR+, and especially of WP3, to perform an in-depth analysis of not only the similarities and differences between end-users organisations but also to understand the motivation for the differences through a participatory design approach. The end result will not be the ultimate solution for every scenario but will be a flexible and living framework designed to meet the changing and diverse needs of the end-users group in different contexts, while maintaining a common overall approach.* These mitigation plans proved to be suitable and sufficient to mitigate the impact of this risk.
15	M1 may be	High	Medium	Yes	Delays in tasks T16, T21, and T2.2 may propagate to milestone M1. Several

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
	delayed by 1 month				*Mitigation Plan: WP2 specific actions are underway to mitigate this risk. If M1 gets delayed, it may also propagate to M2 and thus have impact on other WP.* *It was decided to delay M1 but without delaying the start of THEO wprk packages, minimizing the impact of this issue.*
16	Dissemination events may not be enough or sufficiently adequate to meet iSAR+ dissemination goals.	Medium	Medium	No	Risk identified during the April OPC meeting. *Mitigation Plan:* *Dissemination of iSAR to the citizens and PPDR communities is critical for its success. Therefore the impact of an inadequate dissemination strategy may compromise such objective.* *All WP Leaders have been requested to include possible dissemination events in their periodic status reports.* Additional Notes: Several dissemination activities were conducted during the project, even more than those planned. We had also the opportunity to prepare a presentation film produced during the French showcase and a film with the summary of the guidelines produced in the final workshop. We consider that these activities were sufficient. However iSAR+ will conitue being disseminated as the consortium will keep alive during the development of other prioject (SOTERIA) and during the implementation of our Business Plan.
17	End users may not be motivated to provide information in the scope of WP-3 and WP-5	Medium	High	Yes	Risk identified during the May OPC meeting following the information provided by the T2.2 task leader. *Mitigation Plan:* *As several surveys and questionnaires are now underway, end-users may not*

Nr	Risk	Probability	Impact	Occurred (Yes/No)	Remarks
	because of questionnaires in task 2.2.				*be available to answer to other (more specialized) questionnaires. Because other WP also rely on the questionnaire/surveys methodology, this may compromise the iSAR+ THEO approach of crisis management analysis. In T2.2 the questionnaires should be used to (mainly) establish an R&D relationship with the end-user community in order to ensure their availability for the studies to be performed in WP3 and WP5* Additional Notes: The plan had to be adapted to wait for the right number of answers to our questionnaires but afterwards that caused no serious impact on the project.
18	Some requirements in the D221 specification are not verifiable	High	Medium	No	Risk identified during the June OPC meeting following the information provided by the Exploitation Advisory board. *Mitigation Plan:* *As several requirements in the user requirements specification are not verifiable, it shall not be possible to determine whether or not the iSAR guidelines and the iSAR platform comply to those requirements. These requirements need to be further identified and reworked in order to become verifiable.* Additional Notes: All iSAR+ requirement were validated through the showcases as deeply detailed in the deliverable D2.5.1

Table 5 – Updated table of iSAR+ risks.