*Driv*ing Innovation in Crisis Management for *E*uropean *R*esilience

D44.21 - Tasking and capacity monitoring experimentation report

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List of Acronyms

Abbreviation / acronym	Description
ACRIMAS	Aftermath CRIsis MAnagement System-of-systems demonstration
C2	Command and Control
CIS	Common Information Space
CM	Crisis Management
COP	Common Operational Picture
DOW	Description Of Work
DRIVER	DRIVing innovation in crisis management for European Resilience
ERC	Emergency Response Centre
GDACS	Global Disaster Alert and Coordination System
SoS	System of Systems
TRL	Technology Readiness Level

Project Description

DRIVER evaluates solutions in three key areas: civil society resilience, responder coordination as well as training and learning.

These solutions are evaluated using the DRIVER test-bed. Besides cost-effectiveness, DRIVER also considers societal impact and related regulatory frameworks and procedures. Evaluation results will be summarised in a roadmap for innovation in crisis management and societal resilience.

Finally, looking forward beyond the lifetime of the project, the benefits of DRIVER will materialize in enhanced crisis management practices, efficiency and through the DRIVER-promoted connection of existing networks.

DRIVER Step #1: Evaluation Framework

- Developing test-bed infrastructure and methodology to test and evaluate novel solutions, during the project and beyond. It provides guidelines on how to plan and perform experiments, as well as a framework for evaluation.
- Analysing regulatory frameworks and procedures relevant for the implementation of DRIVER-tested solutions including standardisation.
- Developing methodology for fostering societal values and avoiding negative side-effects to society as a whole from crisis management and societal resilience solutions.

DRIVER Step #2: Compiling and evaluating solutions

- Strengthening crisis communication and facilitating community engagement and self-organisation.
- Evaluating solutions for professional responders with a focus on improving the coordination of the response effort.
- Benefiting professionals across borders by sharing learning solutions, lessons learned and competencies.

DRIVER Step #3: Large scale experiments and demonstration

- Execution of large-scale experiments to integrate and evaluate crisis management solutions.
- Demonstrating improvements in enhanced crisis management practices and resilience through the DRIVER experiments.

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Executive Summary

The global executive summary of the experiments performed during the 1st experimentation week (in Aix-en-Provence from Nov.24th – 28th, 2014) is described in the document D41.1.1 – Initial Inventory of Tools SP4 level experimentation report ([1]).

DRIVER experimentation process consists of a sequence of experiments that are hosted by the platform owners, being the Initial Inventory of tools the first step for it. In the Initial Inventory of tools, the different solutions that could be candidates for being part of later experiments were presented and demonstrated in order to evaluate their initial status.

The present document is focused on task T44.2 – *Tasking and capacity monitoring*, **which aims at improving the efficient and effective assignment of resources during crisis response through monitoring of actions undertaken by responders and allocation of resources. Thus, it includes the evaluation results (and later analysis) about those solutions presented during the Initial Inventory of tools that included features associated to T44.2. The main results can be summarized as follows:**

- **Although most of the solutions have been considered as usable and relevant for CM, it seems that many of them do not fit very well for the tasking and resource management as described in T44.2, but are only related to its features in an indirect way.**
- **The solutions that seem to better fit for T44.2 are the IDIRA COP, Large Event and Socrates TSK tool. Taking into account that**, according to the evaluators' feedback, **Socrates TSK (as a generic task management tool) seems to stand out in some T44.2 essential features (considering mainly its maturity level), it might be used as the reference tool for T44.2.**
- **Information sharing issues should be solved, as the different systems are in principle expected to use different communication mechanisms. Web services are considered a good candidate for the basic infrastructure for tool interoperability.**
- **According to the high number of tools that have been in some way considered related to task T44.2, and taking into account that most of them are more focused on other work packages and tasks, it can be presumed that next rounds of experiments should allow to define more complete and complex experiments covering several Crisis Management phases and different aspects of it.**
- **Subsequent SP4 experiments cannot be linked to a single task of the DOW but should be connected to several of them. It was suggested to divide the SP4 experimentation into a set of well-defined experiments each of them mapped to several SP4 tasks, instead of having a different experiment per task.**

As a final note, it must be taken into account that processes, workflow and the specific methodologies followed by the end-users in the Crisis Management domain should be analysed in order to arrive to a more or less common methodology that could better guide the efforts put on the interoperability of the tools to be integrated into the DRIVER SoS.

1 Introduction

1.1 Purpose and scope

The purpose of this document is to report on the experiment related activities led by SP4 and more specifically by task T44.2 – *Tasking and capacity monitoring* **during the first period (before MS1).**

The work associated to task T44.2 started in September 2014 and concludes with the release of this deliverable D44.21 in February 2015. Only a small part of the effort performed during this period corresponds to the preparation of this deliverable, as most of the work has been devoted to plan, design, prepare, execute and evaluate the Initial Inventory of tools, on which the experimentation activities related to T44.2 were centred during this period.

The Initial Inventory of was held from Nov. 24th to Nov. 28th in Aix-en-Provence, with the aim of presenting and demonstrating the available tools and evaluating their initial status. The Initial Inventory of tools has been the first step of the SP4 experimentation process, which is introduced in section 1.2.2.

While all the tools available in SP4 were presented and evaluated during the Initial Inventory of tools week, this deliverable is focused only on those tools related to T44.2 – *Tasking and capacity monitoring*: **it summarizes the evaluation results of those tools including capabilities that support tasking and capacity monitoring activities.**

The general summary and conclusions of this experimentation week are factored out in a common document, D41.1.1 – Initial Inventory of Tools SP4 level experimentation report ([1]), applicable to all deliverables D4x.y1, including the present one.

1.2 General context

1.2.1 T44.2 – Tasking and capacity monitoring

Task T44.2 aims at improving the efficient and effective assignment of resources during crisis response through monitoring of actions undertaken by responders and allocation of resources including permanent monitoring of resource availability and location, pooling and sharing of common resources (including cross-border cooperation), assignment of resources to tasks and their prioritization and task tracking, reporting and monitoring (status, performance and fulfilment).

Task T44.2 takes into consideration the outputs from task T41.2 (State of the Art), reported in the corresponding deliverables [2] and [3] as well as those from tasks T45.1 (Interoperability Standards) and T45.3 (Structured Information Exchange), which are reported in [4] and [5] respectively.

According to the high number of tools that has been in some way considered related to T44.2, and taking into account that most of them are more focused on other work packages and tasks, T44.2 might become the link between tools focused on different aspects of the CM, thus allowing the definition of more complete experiments that covered as many as possible of the phases and tasks associated to it. In order to achieve this, tools usage should be aligned with a methodology that is

currently lacking. While situation awareness may be shared by exchanging messages according to a common semantics (to be provided by one or more of the standards being assessed in T45.1), tasking and resource management as well as other similar C2 (Command and Control) activities require the alignment to a greater extent of end-user procedures and the definition of the corresponding orchestration mechanisms. Thus, processes, workflows and the specific methodologies followed by the end-users in the Crisis Management domain should be analysed in order to arrive to a common approach that could better guide the efforts put on achieving the interoperability of tools. This will be one of the main activities to be developed during the SP4 2nd round of experiments and refined in later on. The work will include interviews and workshops between platform providers and their associated stakeholders and, to the extent possible, the participation of the latter in the execution of the corresponding experiments.

The resulting end-user interaction and collaboration approach, together with the DRIVER's System of Systems that supports it, should clearly define the links between the situational awareness, the identification of needs and the specification of action plans, the execution of these plans by means of resource management, and the feeding back of the loop by monitoring the situation on the ground, updating and sharing the operational picture, re-adjusting the action plans and updating the allocation of resources.

1.2.2 SP4 experimentation process

SP4 DRIVER experimentation process consists basically of the execution of a set of experiments aimed at allowing interaction between end users by enabling interoperability of existing tools. After each experiment, the necessary tool adaptions and lessons learnt, as well as any other required modifications are defined in order to be used as input for the joint experiments.

The general objective is to complement the value of existing legacy systems and procedures defining and implementing a SoS (System of systems) approach exploring synergies and achieving pooling and sharing capabilities. The definition of the architecture of this SoS is the main purpose of WP42. This architecture will be based on a Common Information Space in which the different tools will be integrated forming a collaborative Crisis Management network aimed at enhancing the European Crisis Management capabilities. The DRIVER's SoS architecture will be evaluated and continuously refined successively in the SP4 experimentation process.

As said, the first step of this process has been the Initial Inventory of tools, where the different tools that could be candidates for being part of later experiments have been presented and demonstrated in order to evaluate their initial status (for instance, current TRLs and their applicability to the Crisis Management domain).

The Initial Inventory of tools will be followed by the 2nd Round of Experiments, which is expected from Sep 2015 to May 2016. This second activity will use the outputs and feedback from the Initial Inventory of tools and will again involve the corresponding planning, design, preparation and execution of the corresponding experiments with a deeper involvement of end-users and platform providers. In this round of experiments, clear objectives and research questions will be defined in coordination with the community of stakeholders of the corresponding platform providers.

Finally, there will be a final round of experiments (the Transverse experiments) before starting the Joint Experiments and the Final Demo. This final round of experiments will follow the same philosophy than the 2nd round of experiments, adopting the lessons learnt into a more integrated approach.

1.2.3 SP4 Initial Inventory of tools

The Initial Inventory of tools was aimed at presenting and evaluating the initial status of those tools candidates to be part of later SP4 experiments. As in these experiments tools are expected to be integrated into a Crisis Management SoS (System of Systems), the Initial Inventory was a necessary first step to procure a global overview of tool capabilities and interoperability possibilities and reach preliminary agreements about the approach to follow for subsequent experiments.

As previously said, most of the work related to task T44.2 during the first period (before MS1) has revolved around the Initial Inventory of tools, and can be divided into the activities performed before, during and after the SP4 Initial Inventory of tools week, including the preparation (design + planning) and execution of the corresponding tool demonstrations and the analysis and evaluation of the corresponding results.

Before the SP4 Initial Inventory of tools

The following activities were agreed and performed previous to the experimentation week:

- To collaborate in the preparation of the corresponding tool descriptions, tool features and tool evaluation sheets, which would be used during the experiments execution. For the tool features and evaluation sheets, a series of features mapped to the SP4 WPs and tasks were defined at SP4 level, in order to guide tool demonstrations and help evaluators assess how task-related features were covered by the corresponding tools.
  In the case of T44.2, the features and sub-features shown by Table 1 were identified.

Task	Feature	Sub-feature
T44.2 Tasking and capacity monitoring	Resource monitoring	Positioning
		Information (availability, status, resource level…)
	Assignment of resources to tasks	Monitoring
		Decision support
	Pooling & sharing	Pooling
		Sharing
	Tasks management	Task creation
		Task prioritization
		Task tracking, reporting, monitoring

Task	Feature	Sub-feature
	Information sharing	Manually
		Automatically

Table 1: T44.2 features and sub-features

- To agree and define the partners that were participating on the tool demonstrations and the roles they were performing. Each partner with effort allocated to T44.2 was assigned at least a role to be performed during the initial inventory of tools:
    - *Experiment leader* (by default the task leader): Coordinated the contributions of the participating partners and controlled the experiment execution.
    - *Tool provider*: Responsible of the tool demonstration.
    - *Facilitator*: Provided organizational support and guidance during the preparation (questionnaires) and moderated the execution of the experiments.
    - *Evaluator*: Controlled the alignment of the experiment set-up and execution with the pre-defined goals, observed the experiment from a neutral perspective and evaluated the results of the experiment by filling the corresponding tool evaluation sheets. In the case of T44.2, evaluators were both selected from task partners and end-users present in tool demonstrations.
- Each tool provider to:
    - provide a presentation that include a brief description of the tool they were showing during the *SP4 Initial Inventory of tools* and an overview of the demonstration they were going to perform.
    - assess which features were covered by their tools and fill the tool descriptions and tool features sheets with the required information.
    - check that the tools were conveniently allocated in the agenda for the Initial Inventory of tools and interact with the corresponding T44.2, WP44 and SP4 leaders in order to provide feedback and refine the agenda.
    - assess and inform platform providers about the specific technical requirements for the tool demonstrations.

Previous activities were controlled and supervised by the corresponding task, WP and SP4 leaders.

In addition to those listed above, the following activities were required from each of the corresponding tool providers in order to prepare the demonstrations:

- Develop a demonstration script focused on demonstrating the way in which their tools covered the features they were supposed to support.
- Configure and/or develop the corresponding tool adaptions in order to prepare tool demonstrations and facilitate the evaluation of them. For instance, some efforts devoted to adapt interfaces to the Crisis Management domain were required.
- Prepare presentation slides that support the tool demonstrations.

During SP4 Initial Inventory of tools

The demonstrations were divided into several sessions corresponding to SP4 tasks. During them, people involved in the experiment had to perform their assigned role.

There were also some bilateral demonstrations of tools to other partners and presentations aimed to introduce DRIVER to end users.

In the particular case of task T44.2, eleven tools were presented and evaluated. This evaluation was based on the evaluation sheet templates that were prepared in advance by the tool providers. In this template, tool providers indicated which features and sub-features (from those shown in Table 1) their tools were supposed to cover and how they were doing it. Based on this, the corresponding evaluators filled the tool evaluation sheets with their comments and suggestions and graded the tool features according to their relevance, maturity, potential and usability.

The corresponding evaluation results are compiled and analysed in the present document.

The experimentation week finished with a wrap-up meeting were preliminary conclusions were drafted and ideas for the following rounds of experiments were gathered (feedback on methodology and organisation, ways to group the different tools for future experiments, end users involvement, interests of platform providers, etc.).

After the SP4 Initial Inventory of tools

The main activity regarding T44.2 after the *SP4 Initial Inventory of tools* **was the preparation of the D44.21 report (this document). As said, this report summarizes the corresponding evaluation results and includes an assessment of the gathered feedback. It also includes the main conclusions extracted from the first experimentation week and some considerations about the future work.**

The work performed to prepare this deliverable included:

- **The collection of the evaluation sheets filled by the corresponding evaluators in order to compile all the feedback gathered for each of the eleven tools related to T44.2.**
- **The assessment of the evaluations sheets, extracting the more relevant aspects and providing a statement from the to**ol provider in response to main evaluators' **observations.**
- **Drafting the general conclusions that could be extracted from the first report period regarding T44.2. These conclusions took into consideration not only the feedback from evaluators but also all the lessons learnt from the experimentation week and the preparatory work performed before it.**
- **Writing the D44.21 itself.**

After and during the preparation of the deliverable, some work was also started to take the first actions arising from the conclusions:

- **Analysis of gathered feedback to define a first set of required modifications on the demonstrated tools.**
- **Definition of a new approach to the experiments, not directly linked to different tasks but trying to match the interest of the end-users and platform owners.**

- **Definition of the interfaces between the demonstrated tools and the Common Information Space (CIS), understood as the architectural framework for the integration of tools into the Crisis Management SoS.**

1.3 Document overview

This document is structured as follows:

- **This chapter provided an introduction to the work related to task T44.2 that has been done during the first period (before MS1).**
- **Chapter 2 includes a summary of the evaluation results related to task T44.2 gathered from the Initial Inventory of tools, which was the centre of all T44.2 experimentation-related activities carried out during this first period.**
- **Chapter 3 includes an overall analysis of previous results.**
- **Chapter 4 outlines the main conclusions extracted from the first period of task T44.2.**

2 Results from Initial Inventory of tools

This chapter summarizes the evaluation results gathered from the Initial Inventory of tools regarding task T44.2. Only those tools relevant for task T44.2, i.e., those that according to the tool providers cover the features/sub-features associated to the task (see Table 1), have been considered. A general description of these tools is provided in Table 2.

Tool	Provider	Session	Evaluators
Emer-T	DLR	T43.2	WWU, MSB, THW, POLE
Web based traffic tool for rescue forces. It provides traffic visualization and prognosis, simulation for decision support and traffic situation and prediction plus decision support for logistics operation: • Data platform for traffic data acquisition from multiple sources, fusion and quality assessment. • Provision of a coordinated operational picture of the traffic system for mission control. • Decision support tools for rescue forces towards logistics operations and the general mobility of inhabitants in case of disasters or major events			
SUMO	DLR	T43.2	WWU, MSB, THW, POLE
Microscopic Traffic Flow Simulation. It includes routing, traffic simulation, interaction with ITS and communication models and emission modelling.			
U-Fly	DLR	T43.2	WWU, MSB, THW, POLE
U-FLY is a ground control station (GCS) for Remotely Piloted Aircraft (RPV). The capabilities include mission planning and evaluation for single RPAS or swarm formations. It receives aerial sensor data, processes and evaluates sensor data and dynamically adapts RPAS missions to newly received information. The research aircraft D-CODE, a modified Dornier 228 with digital autopilot and control/payload data link, can be controlled via the GCS and used as RPV-demonstrator in DRIVER experiments. Equipped with the 3K Camera System, the RPV will gather aerial images of a disaster area.			

Tool	Provider	Session	Evaluators
CrisisWall	JRC	T43.3	MSB, POLE, FHG-IAO, EMIZ, DLR, TNO
Gathers live data from various sources of crisis information and stores it. The sources include GDACS, EMM, ECHOFLASH, RELIEFWEB and ERC EMERGENCIES. A web client allows the user to search, filter, group and organise this data into events. This web client is tailored specifically for use on a large wall touch screen. Users can also create events directly, add analysis and populate them with items. Event reports can be generated and shared and data from the CrisisWall can also be viewed through mobile applications. Information sharing includes daily situation reporting and mapping, publish-and-subscribe and event-based situational awareness.			
ESS	GMV Sistemas	T43.4	AIT, MSB, TNO
The Emergency Support System (ESS) is a suite of real-time data-centric technologies that will provide actionable information to crisis managers during abnormal events. This information will enable improved control and management, resulting in real-time synchronization between forces on the ground (police, rescue, firefighters) and out-of-theatre command and control centres (C&C). It integrates data from various sources into a common information management and communication platform, develops portable and mobile smart communication elements for supporting the management and coordination of emergency operations, and integrates ad hoc networking technology of intelligent sensors for addressing emergency and crisis management requirements.			
IDIRA COP	FRQ	T43.5	FHG-IAO, JRC, TNO
The COP provides shared situational awareness with a GIS based user interface. It collects data from various data sources (static and dynamic data) and presents all input data on a map centric user interface. Each dataset is presented in form of a layer, which can be switched on/off by the user. Various options to filter and search for data are included.			

Tool	Provider	Session	Evaluators
Large Event	TCS	T43.5	FHG-IAO, JRC, TNO, THW
Large Event is a system providing collaborative workspaces and situation awareness. It includes a mobile extension enabling staff on the field to share information.			
IO-DA	ARMINES	T44.1	TNO, MSB, GMV
Interoperability of Organizations - Design Assistant. This research tool is dedicated to (i) collect and model (offline, during the preparation phase) capacities of responders (and to store them in knowledge bases), (ii) formalize (offline, during the preparation phase) doctrines and business rules (also in knowledge bases), (iii) characterize crisis situation (online and continuously, during the response phase) and (iv) automatically build and infer collaborative processes (BPMN) relevant for the faced situation, according to the available capacities of responders. Model capabilities of responders / Gather doctrines and rules / Model crisis situation / Deduce collaborative process models (BPMN).			
Socrates TSK	GMV	T44.2	TNO, HKV, DLR, ARMINES
Socrates TSK tool manages the assignment of resources and monitoring of response actions in a GIS (Geographic Information System). It may create, assign and monitors tasks. The system can be deployed at different levels of the command chain or even can allow collaboration between staff on the same operational level.			
Socrates FR	GMV	T44.2	TNO, HKV, DLR, ARMINES
Mobile application to be used by responders on the field. By means of it, responders may be notified about their assigned tasks as well as informing about task status and reporting relevant information about the situation on field.			

Tool	Provider	Session	Evaluators
CrowdTasker	**AIT**	**T44.3**	**GMV, TNO, MSB, FRQ**
Tool for managing mobile volunteers. It provides a graphical crowdsourcing and crowd tasking platform. **This tool allows crisis managers to coordinate the actions of ad-hoc volunteers ("crowd") in crisis situations. Such ad-hoc volunteers can perform relatively simple tasks (surveying, alerting neighbours, confirming reports, filling sacks with sand ...) but they do not have the obligation to participate in the actions beyond the action(s) they explicitly accept to do.** **The crisis manager can design specific workflows/questionnaires with concrete tasks and tell the system to forward such tasks to a subset of ad-hoc volunteers meeting certain criteria. Depending on the hosting organisation, the system may match the users according to their age, sex, physical (dis-) abilities and special skills such as driving or languages. On top of this, the mobile application is aware of the user's position if he/she allows it. So a form of geo-fencing can be used to trigger task requests.**			

Table 2: Tools involved in T44.2

The evaluation results are based on the feedback provided by the tool evaluators in the corresponding evaluations sheets. This feedback has been summarized in the tables included in next sections.

Two tables have been included for each of the tools above: A *features feedback* **table and an** *evaluators conclusions* **table.**

The first one compiles the evaluators' comments and suggestions for each feature and sub**-feature (related to task T44.2) of the tool in question. It also** includes the average of the "grades" given by the evaluators to the tool performance with respect to each feature, **according to its relevance, maturity and potential:**

- *Relevance* **was graded from 0 (none) to 3 (fully).**
- *Maturity* **was graded from 1 (basic) to 9 (proven) and represents the TRL associated to the feature according to the tool evaluators.**
- *Potential* **was graded from 0 (not at all) to 3 (fully).**

Table 5 shows the template of the *features feedback* **table. It has to be noted that T44.2 features and sub-features present in each table will be those from Table 1 that are covered by the corresponding tool according to the tool provider.**

Feature	Sub-feature	Tool *Tool provider*	relevance	maturity	potential	Suggested improvements / comments		
						Evaluator 1	…	Evaluator m
T44.2 feature 1	*T44.2 sub-feature 1.1*	*Description (by the tool provider) of the tool performance regarding sub-feature 1.1*	*0..3*	*1..9*	*0..3*	*Comments and/or suggestions from evaluator 1 about tool performance regarding feature 1 ("-" if none)*	…	*Comments and/or suggestions from evaluator m about tool performance regarding feature 1 ("-" if none)*
	…	…						
	T44.2 sub-feature 1.p	*Description (by the tool provider) of the tool performance regarding sub-feature 1.p*						
…	…	…	…	…	…	…	…	…
T44.2 feature n	*T44.2 sub-feature n.1*	*Description (by the tool provider) of the tool performance regarding sub-feature n.1*	*0..3*	*1..9*	*0..3*	*Comments and/or suggestions from evaluator 1 about tool performance regarding feature n ("-" if none)*	…	*Comments and/or suggestions from evaluator m about tool performance regarding feature n ("-" if none)*
	…	…						
	T44.2 sub-feature n.q	*Description (by the tool provider) of the tool performance regarding sub-feature n.q*						

Table 3: Features feedback table template

The second table (*evaluators conclusions* table) provided for each tool summarizes the evaluators' overall impression about the tool as well as their opinion **about its usability and its potential position within the DRIVER System of Systems. The usability of the tool was also graded by the evaluators from 1 (none) to 3 (fully usable)**. The table includes the average of the "grades" given by the evaluators**.**

Table 4 shows the template used for this *evaluators conclusions* **table.**

	Evaluator 1	…	Evaluator m
Overall impression	*Overall impression of evaluator 1 about the tool ("-" if not provided)*	…	*Overall impression of evaluator m about the tool ("-" if not provided)*
Usability 1..3	*Opinion of evaluator 1 about the tool usability ("-" if not provided)*	…	*Opinion of evaluator m about the tool usability ("-" if not provided)*
Position within the DRIVER System of Systems	*Opinion of evaluator 1 about the potential position of the tool within the DRIVER System of Systems ("-" if not provided)*	…	*Opinion of evaluator m about the potential position of the tool within the DRIVER System of Systems ("-" if not provided)*

Table 4: Evaluators conclusions table template

2.1 Emer-T

2.1.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	Emer-T DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	THW	POLE
Resource Monitoring	Positioning	floating emergency car data and the indirect traffic detection of mobile devices (DYNAMIC) allows to	3	6	3	-	-	-	-

Feature	Sub-feature	Emer-T DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	THW	POLE
		monitioring the action force as well as the movement of civilian population in the affected area.							
	Information (availability, status, resource level…)	Information are provided as map layer or OGC web services and REST Services							
Assignment of resources to tasks	Monitoring	Information are provided as map layer or OGC web services and REST Services	3	7	7	-	This is a very interesting feature to exploit in Driver. It would be very useful to be able to use information from EmerT in other situation assessment tools, rescue services own operational tools.	-	-
	Decision support	Isochrone-map can be used, further more we have a risk routing which includes likelihoods of risks for possible routes							
	Automatically								

Table 5: Emer-T tool - features feedback table

The following table includes the evaluators' **conclusions about the tool (i.e., their overall impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	WWU	MSB	THW	POLE
Overall impression	Very promising, useful and mature tool that could be used for various transportation planning tasks in the logistics domain, the set up time has to be considered.	This tool seems very mature and rich in functionality.	• Interesting tool primarily for planning events. Difficult to use in an ad-hoc crisis, as people will behave in an unpredictable/less predictable manner. • Also good for evacuation.	-
Usability 3	-	-	-	-
Position within the DRIVER System of Systems	The output is of high interest for all logistics related tasks, many other tools can benefit from Emer-T results.	It will be central in Driver especially if its information content can be shared with other tools. "other common operational picture" / "situation assessment" type of tools would benefit from Emer-T.	-	-

Table 6: Emer-T tool - evaluators conclusions table

2.1.2 Statement of the tool provider

Most of the evaluators didn't have a detailed traffic research background and come from different research fields. Therefore **the evaluators focused on the practical applications. All evaluators express their good overall impression of the tool and emphasis the tool as very mature and rich in functionality. The usability is voted with fully (3). The evaluators underline that the tool is able to provide many information and is useful for the planning of big events and other critical events. The tool additionally opens the opportunity to evaluate crisis management strategies, like evacuation scenarios. The output is ranked** as 'high interest' and 'very central in Driver'. As a critical point the set up time has to be considered. Th**e evaluators see the sharing of information with other common operational picture and situation assessment tools as a very important aspect for this tool. The integration of the tool output in the DRIVER common operational picture is one of the tool provid**er's aims. How this will be realised within DRIVER has to be analysed in the next steps.

2.2 SUMO

2.2.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	SUMO DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	THW	POLE
Resource Monitoring	Information (availability, status, resource level…)	Feeding current travel times into reachability analysis (see EmerT)	3	7	3	-	-	-	-

Table 7: SUMO tool - features feedback table

The following table includes the evaluators' conclusions about the tool (i.e., their overall impression and their opinion on **usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	WWU	MSB	THW	POLE
Overall impression	As mentioned also by the audience SUMO seems to have a high maturity level (the estimation of the evaluator is based on the information of the tool provider in the evaluation sheet, i.e. 7, although some features seems higher than this) but especially a very high relevance for many other tools. Both network planning and operational tools can benefit from SUMO outputs,	Seems very useful to most cases where traffic simulation is needed.	Very useful tool. • If you can obtain info on the change in for example the stability/load capacity of bridges, it would be very beneficial. E.g.: normally a bridge can handle 8 t. After 5 hours of flood exposure, it can handle 3 t. • If you can get info on the status of gas stations (do they still have gas, do the pumps function, are they flooded, etc.) that would help.	-
Usability 3	The only limitation to be considered is the required setup time in terms of new data (esp. transportation network).	-	-	-
Position within the DRIVER System of Systems	As mentioned above SUMO can be understood as a tool that can both process data/results from (e.g. EvacuAid) and to other DRIVER tools (e.g. AnyLogic).	Useful as a service to other tools that need to complement with traffic simulation.	-	-

Table 8: SUMO tool - evaluators conclusions table

2.2.2 Statement of the tool provider

Most of the evaluators come from a different research field. So it was not easy for them to assess all features comprehensively. Even though the evaluation was well done and valuable to the tool provider and task lead. In doing so the evaluators focused on the practical applications. All evaluators express their good overall impression of the tool and see the usefulness for most cases where traffic simulation is needed. The required set up time and input data (like transportation network, traffic demand) was considered as a limiting factor for a quick transfer to a different area. Additionally it was stated to prove if this tool could be used as a service to other tools that need to complement with traffic simulation. Further comments apply to very specific and detailed first responder tasks, which could be supported by the tool.

2.3 U-Fly

2.3.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	U-Fly DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	THW	POLE
Resource Monitoring	Positioning	The RPV can be assigned to permanently track certain recourses	3	7	3	-	-	Which resources are meaningful to CM?	-
	Information (availability, status, resource	Recourse status in terms of movement, or action can be monitored							

Feature	Sub-feature	U-Fly DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	THW	POLE
	level…)								
Assignment of resources to tasks	Monitoring	U-Fly enables the deployment of multiple RPAS at the same time Optimal RPV task assignment Point of interests, areas of interest can be added manually by the operator	3	7	3	-	Monitoring flood progress is very important!	-	-
	Decision support	RPV routing based on the most-up-to-date information							
Tasks management	Task creation	Reconnaissance Tasks	3	-	3	Due to background of the evaluator the meaning of "task" seems to be different compared to the aviation terminology, thus an estimation of the feature task management cannot be given.	-	-	-
	Task prioritization	Operator has to weight tasks							
	Task tracking, reporting, monitoring	Task progress can be monitored by the RPV							

Feature	Sub-feature	U-Fly DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	THW	POLE
Information sharing	Manually	Optionally information sharing through traditional communication channels	3	7	3	-	-	As a full – bad level	-
	Automatically	Sharing through image displaying							

Table 9: U-Fly tool - features feedback table

The following table includes the evaluators' **conclusions about the tool (i.e., their overall impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	WWU	MSB	THW	POLE
Overall impression	Highly relevant and mature tool for DRIVER purposes. No concrete TRL is mentioned in the tool details, but only "prototype", however the impression is that some features seem to have even a TRL of 9. Coming from a different field an average of 8 was estimated to the overall tool.	Very valuable to have a "tool" that can be rapidly deployed to provide aerial images and very good that the images can be provided fast.	• Interesting in order to get an overview. • Monitoring of units by a plane is less interesting (pumps do not move frequently). • Could be interesting in order to see which streets are affected (which route should not be taken). • Big issue cost vs. benefit.	-
Usability 3	Although coming from another domain the usability seems to be very high thanks to the well-structured presentation	The tool for flight planning seemed user friendly but to us, the usability for the end user of the images is more relevant perhaps.	-	-

	WWU	MSB	THW	POLE
Position within the DRIVER System of Systems	The integration seems to be very high, although it should be done partly automated and partly manually.	The plane may not be able to fly during the actual experiment.	-	-

Table 10: U-Fly tool - evaluators conclusions table

2.3.2 Statement of the tool provider

Using Remotely Piloted Aircraft Systems (RPAS) in disaster management missions is a modern concept. Even though manned aircraft can also provide aerial imagery data, the deployment of remote systems has several advantages in terms of endurance, human health and efficiency. Therefore, one objective during the presentation was to outline the features that are specific to RPAS deployment. The evaluation results show that the presented features are generally considered as important and that the deployment of RPAS in CM was received positively by the evaluators. The path planning capabilities have been mentioned as rather mature features in the evaluation. From the tool provider's perspective the advantages of using unmanned systems in crisis **management should be demonstrated in further experiments. This will outline and strengthen the role of remotely piloted aircraft systems within the crisis management community.**

Difficulties arose from the use of the word "task" in the evaluation sheet. From the perspective of airborne reconnaissance, the word "task" in the **framework of crisis management has different meanings. A task in crisis management mostly describes an action that is carried out by an actor, or a resource in CM. The progress of selected tasks can be monitored with use of aerial means. On the other hand, airborne sensors and the aircraft itself can also be seen as a resource in CM. An important objective is to deploy this resource as efficient as possible, i.e., to provide imagery data on requested areas as soon as possible with respect to the defined priority. The use of a modern Ground Control Station (GCS) allows to display information on requested areas and successfully gathered data. In addition with optimized flight planning strategies, the operator is able to plan the mission of the aircraft in the most efficient way.**

It was also mentioned that monitoring of selected units may not be important in e.g. flooding scenarios. This might apply to certain scenarios, but in the past, the constant airborne monitoring of fire-fighting operations during large forest fires in the US, or the monitoring of cooling efforts in the nuclear plant of Fukushima, have been of great support to the disaster management missions.[1] [2]

2.4 CrisisWall

2.4.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	CrisisWall JRC	relevance	maturity	Potential	Suggested improvements / comments						
						MSB	POLE	FHG-IAO	EMIZ	DLR1	DLR2	TNO
Tasks management	Task tracking, reporting, monitoring	The timeline of events is available in two different visualizations	3	6	3	-	-	-	-	A timeline view for specific events/ type of events would be useful	timeline view/river view? If so, see above, timeline view seems enough, river view not	-
Information sharing	Manually	Yes	3	6	3	-	-	-	-	Newsfeeds	Absolutely mandatory if it should be used to provide a COP	-
	Automatically	Soon it will provide clients push notifications										

Table 11: CrisisWall tool - features feedback table

[1] http://www.australiansecuritymagazine.com.au/2014/04/unmanned-vehicles-enhancing-security-rescue-and-natural-disaster-management-capability-part-ii/
[2] http://www.ga-asi.com/news_events/index.php?read=1&id=424

The following table includes the evaluators' **conclusions about the tool (i.e., their overall impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	M. Bornström (MSB)	POLE	IAO	EMIZ	DLR1	DLR2	TNO
Overall impression	Very impressive visualisation capabilities of the information in the common operational picture. Good potential, the JRC backing can be important for the success of the tool. We look forward to a demo on site with full internet capacity and large screens.	-	-	-	The tool can contribute to the COP production in various ways. It is usable, but needs some time to be used by untrained user. A tutorial or readme would be useful to understand "Crisis Wall" and to use it in an efficient way. The information view is sometimes slightly unstructured and overwhelming. To view information more dedicated to specific events could be useful. Also, to incorporate in the view information on what is important to a specific user. A more structured display of information, filtered by severity or for example relevance to the user could help to see and understand information and information changes at a glance. Who is the dedicated user? End-user could probably rather be informed by a national mission manager, as the information are not always officially authorized.	Nice use of Google Earth as display tool of newsfeeds. At first sight, it looks more like an informational tool for home uses. More features like forecasting and more diverse mapping/sorting should be useful for use in real crisis management. Highlighting/downgrading of single "news" could be used to build a system that displays the personal likes/needs.	Monitoring at national level.

	M. Bornström (MSB)	POLE	IAO	EMIZ	DLR1	DLR2	TNO
Usability 2	-	-	-	-	-	-	Analysis/translation for own situation.
Position within the DRIVER System of Systems	This is the most obvious choice for a common operational picture tool on the highest level of aggregation in the project.	-	-	-	Towards more shared understanding of CM Potential to integrate much information coming from other tools (COP, SUMO, etc.)	-	Should be extended from ERCC, National Crisis Centres.

Table 12: CrisisWall tool - evaluators conclusions table

2.4.2 Statement of the tool provider

After the good reception of the tool during the inventory experience in Aix, its development continued achieving the following results:

- **The continued development of clients exploiting its API: web client, Android app, Windows Universal app.**
- **In order to improve the interoperability, new data formats and sources have been added. The procedure to add a new source was greatly simplified also thanks to a set of ready-to-use components.**
- **The use of standard icons from UN-OCHA has been enriched by colour coding them accordingly to the relevance of the displayed information.**
- **Part of the additional sources required then a refinement of the access control. The users are now classified based on their clearance to access specific information. This allows using the same system in different contexts, because sensitive information can coexist with publicly available information, not requiring the duplication of the system. Information can easily transit from one context to the other. Uncleared users have no sensibility of the access restrictions.**
- **A special class of users has also been created specifically for unmanned systems: this feature is intended to auto login a client operating, for instance, in a situation room and displaying the information on a big visualization area.**

All these features are presently used in our daily work and are completing the testing phase.

In the near future, CAP and EDXL formats will be handled as well as the integration of other services.

There will be additional client applications for mobile devices developed during the year.

2.5 ESS

2.5.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	ESS GMV Sistemas	relevance	maturity	potential	Suggested improvements / comments			
						AIT1	AIT2	MSB	TNO
Resource Monitoring	Positioning	All resources equipped with an OBU are monitored in real time.	3	6	-	-	not demonstrated?	-	-
	Information (availability, status, resource level…)	The status of resources including battery level is monitored in real time.							
Information sharing	Manually	Map layers can be shared with other ESS users. The application integrates a real time chat and a persistent mail-like message system.	3	6	3	-	-	-	-

Table 13: ESS tool - features feedback table

The following table includes the evaluators' conclusions about the **tool (i.e., their overall impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	AIT1	AIT2	MSB	TNO
Overall impression	Appears to be a very mature tool with a lot of possible use cases in CDM and in the environmental domain.	This tool appears to be well done and my impression is that it's either already at the "operative" level or pretty near to being operative. Main functionalities it offers are in my opinion: • Middleware for gathering and sharing of information from various sources. • Mass-informing functionality through several channels. Most interesting appears to be a feature that allows sending of SMSs to everyone in an area even if the network is down. • modelling sub-system which can be used to assess and predict the risk development for certain types of events (e.g. fire)	Under "interactions with citizens" but seem to hold many other features, not enough time to understand the tool.	Technical promising. Non-technical part should be improved e.g. in relation with SP3 (w.r.t. communication with citizens). How to deal with N (N > 100) messages in a short period.
Usability 3	Is it only for COP during the crises or also in all other phases?	-	-	-

	AIT1	AIT2	MSB	TNO
Position within the DRIVER System of Systems	Could be used as a general crisis management supporting tool in DRIVER or as middleware to combine input from other tools. Depending on the use cases, this could be e.g. social media monitoring or crowd tasking.	See "overall impression". In my opinion, the tool could be used as a part of the complete crisis management support infrastructure and provide one or more of the three main functions listed above. From AIT point of view (CrowdTasker), incorporating a map of danger areas resulting from model runs in local situation shown to volunteers would be nice. Also the possibility to send some tasks to "everyone" - even in situation when the network is down sounds interesting.	-	-

Table 14: ESS tool - evaluators conclusions table

2.5.2 Statement of the tool provider

The ESS system allows tracking and monitoring the status of multiple resources deployed on the field. As long as the information can be imported into the system, the resources and their status can be represented in the map to complete a Common Operational Picture. During the field trials, all resources had an OBU that notified their power level, location and, if the resource was a sensor, the sensor reading, but OBUs are not required as long as the information comes into the system in a compatible format, e.g. some smartphones were used as resources too.

Demonstrating it, however, requires deployed resources, which would then send information to the system. Otherwise, it is no different than simply showing a scripted demonstration.

Any map layer (simulation, hand-drawn annotations, traffic information, etc.) can be stored in the map native format and forwarded to a different user. The receiver user will have the shared layer appear in his layer tree and will be able to show/hide the shared information on demand (and overlay it with a transparency) over his own map. This is very useful for quickly sharing visual information, and providing a clear view of the COP, rather than simply exchanging images and trying to import them afterwards into the system or trying to manage maps in different scales/locations/projections.

2.6 IDIRA COP

2.6.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	IDIRA COP FRQ	relevance	maturity	potential	Suggested improvements / comments		
						FHG-IAO	JRC	TNO
Resource Monitoring	Positioning	Resource location can be set manually or by connected CAD systems (EDXL RM messages) Location of mobile device users are tracked automatically	3	6	1	-	-	-
	Information (availability, status, resource level…)	Resource status can be set manually or by connected CAD systems (EDXL RM messages)						
Assignment of resources to tasks	Monitoring	Tasks are related to Incidents and assigned to Organizational Units / Modules. (No detailed dispatching functions)	3	6	2	-	-	-
Tasks	Task creation	High-level tasks (Module deployment)	3	6	2	-	-	Filtering for national level might

Feature	Sub-feature	IDIRA COP FRQ	relevance	maturity	potential	Suggested improvements / comments		
						FHG-IAO	JRC	TNO
management		defined by tactical commander						be necessary
	Task prioritization	manually						
	Task tracking, reporting, monitoring	Field commanders report task status and add info about task fulfilment						
Information sharing	Manually	Tasks are listed together with the related Incident, or as a Task table (filter/sort)	3	7	1	-	-	If connections work?
	Automatically	All information is shared immediately with all (authorized) users						

Table 15: IDIRA COP tool - features feedback table

The following table includes the evaluators' conclusions about the tool (i.e., their **overall impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	FHG-IAO	JRC	TNO
Overall impression	good tool, which helps to get an solid COP	Operational, heavily dependent on web. Good for large visualization areas. Fits a lot of key points: effective.	O.K. – overall (from technical point of view).
Usability 2	-	Terse layout, but too big: requires HD.	End user involvement and expertise required. Also instructions on how to use it in optimal way (Procedures, etc.). Some extension with major critical infra.
Position within the DRIVER System of Systems	-	Possible back-bone component, good for daily use also.	Useful for COP. I wonder how it works in a real big incident.

Table 16: IDIRA COP tool - evaluators conclusions table

2.6.2 Statement of the tool provider

Dependency on the Web:

Supplementary to the installation in the cloud (access via internet), there is a physical server installation in a mobile rack that can easily be moved to the disaster site and enables working in a local LAN/WLAN. The tablet clients are offline-capable and can be synchronized when connectivity is available.

End-user involvement/Usability:

COP was largely developed and tested within the FP7 project IDIRA, with a close feedback loop with various end-users (Red Cross, Italian and Greek Fire Brigades, civil protection authorities, military …).

The Web client is intended for use in control rooms – HD screen resolution can be assumed. If not, the browser zoom function is a work-around

Further development:

Frequentis is going to further develop the COP in own responsibility. It is separated from other IDIRA components and dependencies from the IDIRA partners will be resolved. COP will be integrated in the DRIVER SoS architecture and so provide interoperability with the other systems of DRIVER.

The features and usability will be continuously improved according to the results of DRIVER experiments and other inputs. Results from other research projects and customer requirements will be included.

2.7 Large Event

2.7.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	Large Event TCS	relevance	maturity	potential	Suggested improvements / comments			
						FHG-IAO	JRC	TNO	THW
Resource Monitoring	Positioning	Location of mobile device users are tracked automatically	3	7	2	-	-	-	Device used by CM or by civilians? Data storage implies legal issues.
	Information (availability, status, resource level…)	Resource status can be set manually							

Feature	Sub-feature	Large Event TCS	relevance	maturity	potential	Suggested improvements / comments			
						FHG-IAO	JRC	TNO	THW
Assignment of resources to tasks	Monitoring	Tasks are available	-	-	-	-	-	-	-
Tasks management	Task creation	High-level tasks (Module deployment) defined by tactical commander	3	7	2	-	-	-	-
	Task prioritization	manually							
	Task tracking, reporting, monitoring	Field commanders report task status and add info about task fulfilment							
Information sharing	Manually	-	3	7	2	-	-	-	-
	Automatically	All information is shared immediately with all (authorized) users							

Table 17: Large Event tool - features feedback table

The following table includes the evaluators' conclusions about the tool (i.e., their overall impression and **their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	FHG-IAO	JRC	TNO	THW
Overall impression	Tool gives a good COP for different stakeholders in case of a disaster.	Much matured from previous demo in Ispra. It is very web dependent.	It can be of help for higher Crisis Management level, but more testing with end-users is definitely required.	Not really a new idea. Similar systems are already being used by UN.
Usability 2	-	-	More integration with end-users is required. Link with what they really need for response and collaboration is weak.	-
Position within the DRIVER System of Systems	-	-	Use for higher level Crisis Management, strategic/tactical levels.	-

Table 18: Large Event tool - evaluators conclusions table

2.7.2 Statement of the tool provider

LARGE EVENT is used by staff of civil safety organizations and not by citizens. It can be interfaced with tools and apps provided to citizens in order to exchange information.

Tasking is currently very simple in LARGE EVENT.

Simplicity is a way to enable various organizations to master the tool and adapt the tool to their procedures.

2.8 IO-DA

2.8.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	IO-DA ARMINES	relevance	maturity	potential	Suggested improvements / comments		
						TNO	MSB	GMV
Resource Monitoring	Information (availability, status, resource level…)	Data gathering (automatically or manually).	3	5	3	-	-	-
Pooling & sharing	Pooling	The use of BPMN language allows to support pooling.	3	4	3	-	-	Not completely understood in the demonstration
	Sharing	The use of BPMN allows to define task sharing.						

Feature	Sub-feature	IO-DA ARMINES	relevance	maturity	potential	Suggested improvements / comments		
						TNO	MSB	GMV
Tasks management	Task creation	The deduction mechanism allow the IO-Suite to select adequate tasks.	2	4	3	-	-	-
	Task prioritization	The deduction mechanism allow the IO-Suite to prioritize selected tasks.						
	Task tracking, reporting, monitoring	The orchestration mechanism allows to monitor the progress of collaborative processes.						
Information sharing	Manually	Interfaces allow human-beings to key data and information.	3	4	3	-	-	Sharing of defined tasks was not completely understood during the demonstration
	Automatically	The Mediation Information system collects and distributes data to the concerned partners.						

Table 19: IO-DA tool - features feedback table

The following table includes the evaluators' conclusions about the tool (i.e., their overall **impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	TNO	MSB	GMV
Overall impression	Human experience outperforms the system in exercises.	Use proven business models. Can merge information and visualize needs assessment.	IO-DA is a very interesting tool very useful for Definition of Contingency Plans, Crisis Characterization and Crisis Dynamics.
Usability 2	Maybe this system can assist in checking plans of human first responders. Suggestion: might be useful in automation of large scale volunteer management.	Not so easy to use, but has potential.	The tool seems to be more oriented to the Preparation Phase than to the Response Phase (although the estimation of the Crisis Dynamics would be very useful during this phase). In any case, I think that it could be combined with other tools to work on TSK44.2. Finally, some modelling knowledge is required by the user what would require some previous work and would probably make the tool easier to use in not so large scale disasters.
Position within the DRIVER System of Systems	-	As a system of sharing information it could be integrated with any system except for simulation tools.	The tool is very relevant for DRIVER and it seems that several tools could interact with it. SOCRATES SUITE could be fed by the information about Contingency Plans, Crisis Characterization and Crisis Dynamics.

Table 20: IO-DA tool - evaluators conclusions table

2.8.2 Statement of the tool provider

As the reviewers have underlined it, some modelling knowledge is required in order to characterize the crisis situation and the resources. IO-DA is still a prototype, so it is not yet perfectly user friendly. The estimated Technical Readiness Level (TRL) of IO-DA's features is mostly equal to 4, which fits **with** ARMINES' estimation. Reviewers have also pointed out the possibility to integrate IO**-DA with other tools, which is relevant in the DRIVER context.**

2.9 Socrates TSK

2.9.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	Socrates TSK GMV	relevance	maturity	potential	Suggested improvements / comments			
						TNO	HKV	DLR	ARMINES
Resource Monitoring	Positioning	Positioning of the resources may be monitored.	3	8	3	-	Should monitor stocks.	-	Very good orchestration of the pre-designed coordination plan. What about interoperability with First Responders software?
	Information (availability, status, resource level…)	Monitors the capabilities provided by the resources.							

Feature	Sub-feature	Socrates TSK GMV	relevance	maturity	potential	Suggested improvements / comments			
						TNO	HKV	DLR	ARMINES
Assignment of resources to tasks	Monitoring	Tasks can be created and resources can be assigned to the tasks.	3	-	-	-	Multiple resources for one task & why can't you do multiple tasks?	-	-
	Decision support	Synchronization Matrix can be used to detect conflicting assignments.							
Pooling & sharing	Sharing	Pooled resources can be used under a specific operation.	2	-	-	-	-	-	-
Tasks management	Task creation	Operations/tasks can be created having a set of associated information.	2	9	2	-	Don't ask too much info.	-	Human only decision, no help.
	Task prioritization	Impact can be assigned to Operations/tasks.							
	Task tracking, reporting, monitoring	Task can be updated and historical information is kept. Task can be closed							

Feature	Sub-feature	Socrates TSK GMV	relevance	maturity	potential	Suggested improvements / comments			
						TNO	HKV	DLR	ARMINES
		when completed							
Information sharing	Manually	Information about resources and tasking can be shared.	2	-	-	-	Chemical dispersion != task	-	-
	Automatically	Information about resources and tasking can be shared.							

Table 21: Socrates TSK tool - features feedback table

The following table includes the evaluators' conclusions about the tool (i.e., their overall impression and their opinion on **usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	TNO	HKV	DLR	ARMINES

Overall impression	Potential suite (together with Socrates OC, FR and CSS).
	• Next step is to involve end-users and asking their needs.
	• Besides think of introducing other parties related to coordination, tasking and resource management outside (fire-brigade/civil protection).
	• It has a complex look & feel now.
		• I wonder how this works for hundreds of tasks and responders:
		  • Sequential tasks.
		  • Conditional tasks.
		• Flexibility to add new responders during the crisis.
			• Quite high number of features.
			• Hard to evaluate all single sub-features.
			• Very complex system/tool.
				This is a very precise and efficient orchestration tool, including geographical and planning vision. It doesn't help to design, affect or adapt coordination.

	TNO	HKV	DLR	ARMINES
Usability 2	Currently low.	Resource management/Stock keeping needs to be added.	First response should judge this point.	Very interesting tool for coordination. 2 comments: • Interoperability with legacy. • Agility seems very "human-dependent"
Position within the DRIVER System of Systems	High relevance. Current TRL w.r.t. Crisis Management: 4 or 5.	To implement contingency plans.	First response should check the asset for DRIVER in detail. Seems quite useful for operational Crisis management.	Orchestration of planning.

Table 22: Socrates TSK tool - evaluators conclusions table

2.9.2 Statement of the tool provider

Currently, the Socrates TSK tool is not specifically adapted for Crisis Management scenarios. Due to this reason, and as pointed out by the evaluators, it would be required to interact with the end-users for defining the specific processes and workflow followed in their field, as well as the methodology and procedures for using the tool in the context of the Crisis Management leading also to an improvement in its friendliness and usability. This will be done in the consecutive experiments as part of the DRIVER experimentation process.

As shown by the high amount of tools that have been in some way associated to features corresponding to T44.2, as a specific task management tool, Socrates TSK offers the possibility of interacting with several tools (or other equipment, such as sensors, that could be directly tasked) more focused on other aspects of the CM, being these tools used by First Responders, volunteers in the field, tactical commanders at the centres of operations and/or analysts. For instance, the tool could be interconnected to coordination and planning tools, from which contingency plans could be loaded in order to help the user in the assignment and management of tasks by means of the Socrates TSK tool.

Two final notes should be also taken into consideration:

- Regarding the complexity pointed out by one of the evaluators, it has to be noted that the Socrates TSK tool was presented in conjunction with other tools developed by GMV, forming the Socrates Suite (which main aim was precisely to emphasize the interoperability possibilities offered by the tools). The Socrates TSK may be anyway used in isolation from the rest of the suite, resulting in a simpler tool with a limited number of features.

- Regarding the tool performance for a high number of tasks and responders, it must be taken into account that the tool has been already tested for the use in its original domain (different from CM) and the results on tool performance and flexibility were considered satisfactory.

2.10 Socrates FR

2.10.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	Socrates FR GMV	relevance	maturity	potential	Suggested improvements / comments			
						TNO	HKV	DLR	ARMINES
Tasks management	Task tracking, reporting, monitoring	First Responders can update or inform about the status of their assigned tasks.	3	-	-	-	-	-	-
Information sharing	Manually	Information about resources and tasking can be shared.	3	-	-	-	-	-	-
	Automatically	Information about resources and tasking can be shared.							

Table 23: Socrates FR tool - features feedback table

The following table includes the evaluators' **conclusions about the tool (i.e., their overall impression and their opinion on usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	TNO	HKV	DLR	ARMINES

Overall impression	Potential suite (together with Socrates OC, TSK and CSS).
	• Next step is to involve end-users and asking their needs.
	• Besides think of introducing other parties related to coordination, tasking and resource management outside (fire-brigade/civil protection).
	• It has a complex look & feel now.
		• I wonder how the suite (i.e. Socrates TSK, OC, FR and CSS) works for hundreds of tasks and responders:
		  • Sequential tasks.
		  • Conditional tasks.
		• Flexibility to add new responders during the crisis.
			• Quite high number of features.
			• Hard to evaluate all single sub-features.
			• Very complex system/tool.
				Together with Socrates TSK, it is a very precise and efficient orchestration tool, including geographical and planning vision. It doesn't help to design, affect or adapt coordination.

Usability 2	Currently low.	-	First response should judge this point.	Very interesting tool for coordination. 2 comments: • Interoperability with legacy. • Agility seems very "human-dependent"
Position within the DRIVER System of Systems	High relevance. Current TRL w.r.t. Crisis Management: 4 or 5.	Could be combined with SPS XVR work.	First response should check the asset for DRIVER in detail. Seems quite useful for operational Crisis management.	Orchestration of planning.

Table 24: Socrates FR tool - evaluators conclusions table

2.10.2 Statement of the tool provider

Currently, the Socrates FR tool is not specifically adapted for Crisis Management scenarios. Due to this reason, and as pointed out by the evaluators, it would be required to interact with the end-users for defining the specific processes and workflow followed in their field, as well as the methodology and procedures for using the tool in the context of the Crisis Management leading also to an improvement in its friendliness and usability. This will be done in the consecutive experiments as part of the DRIVER experimentation process.

Socrates FR tool is aimed at serving as a support tool for the first responders in the field. It basically implements the role of a taskee (the one who is tasked or assigned a concrete mission), and thus, should interact with a tasker (the one who tasks or assigns missions) tool (that might for instance be the Socrates TSK tool, as shown during the 1st inventory of tools in Aix-en-Provence, or other tasker tool supporting similar communications architecture). The tool may be used also for gathering info from the field; i.e. the info that would be provided by the first responders in order to contribute to the situational awareness/assessment (covered in WP43).

A final note (regarding the complexity pointed out by one of the evaluators) should be also taken into consideration. As previously said, the Socrates FR tool was presented in conjunction with other tools developed by GMV, forming the Socrates Suite (which main aim was precisely to emphasize the interoperability possibilities offered by the tools). However, the Socrates FR might be used in isolation from the rest of the suite, resulting in a simpler tool with a limited number of features.

2.11 CrowdTasker

2.11.1 Explicit feedback tables

The following table summarizes the feedback gathered from the evaluators regarding the tool features associated to T44.2:

Feature	Sub-feature	CrowdTasker AIT	relevance	maturity	Potential	Suggested improvements / comments			
						GMV	TNO	MSB	FRQ
Resource Monitoring	Positioning	volunteer positions are known (GPS) and used to decide which tasks they will receive (geo-fencing)	3	7	3	Two levels of availability are required: one before being tasked (to decide the assignment) and other once the volunteer has accepted the task (during execution) to monitor difficulties and the capability of the volunteer to finally accomplish the task.	-	-	Make the field "list of choices" larger + give a "mouse over" explanation. Meaning of the field "list of choices" is not 100% clear.
	Information (availability, status, resource level...)	- User profile information, e.g. sex, age, skills (e.g. "speaks Hungarian", "drivers licence B"...) - Volunteers are free to accept or ignore any of our requests; "availability" is therefore somewhat fuzzy.							
Assignment of resources to tasks	Monitoring	We cannot directly assign the tasks to people. We can *ask* them, if they are ready to do the work, and they are assigned, if	3	7	3	Perfect approach to that. In any case some kind of monitoring during the execution (once they accept) could be	-	-	-

Feature	Sub-feature	CrowdTasker AIT	relevance	maturity	Potential	Suggested improvements / comments			
						GMV	TNO	MSB	FRQ
		they accept. This can be monitored.				useful.			
	Decision support	Assignment is semi-automated; system chooses volunteers based on position and profiles.							
Tasks management	Task creation	by operator	3	6	3	-	Speed of setting up the system in an operational way is unclear for me.	-	Task reporting should be possible by picture upload. Monitoring of tasks: progress could be on a more detailed level (not only when finished)
	Task prioritization	by operator							
	Task tracking, reporting, monitoring	operator/control centre							
Information sharing	Manually	manual dissemination of tasks to volunteers	3	6	3	Sharing of information through a Situation Awareness Tool and/or a Tasking Tool is very relevant.	-	-	Good implementation. High potential.
	Automatically	- automated dissemination of local situation info to volunteers; - Automated task generation envisaged							

Feature	Sub-feature	CrowdTasker AIT	relevance	maturity	Potential	Suggested improvements / comments			
						GMV	TNO	MSB	FRQ
		but not implemented. - Automated dissemination of info to other systems (plugin needed!)							

Table 25: CrowdTasker tool - features feedback table

The following table includes the evaluators' conclusions about the tool (i.e., their overall impression and their opinion on **usability and potential position of the tool within the DRIVER System of Systems). It must be taken into account that these general conclusions are based not only on the tool features associated to T44.2, but also on those features associated to the rest of tasks the tool is mapped to:**

	GMV	TNO	MSB	FRQ
Overall impression	Very useful tool.	Good potential. To have it operational it will take some time and needs improvement, e.g. involve end users for most important tasks for which you would like to make use of them.	The tool seems stable and easy to use both on the server- and client side. Highly relevant tool, there is a very big interest in helping out from the public. Obviously large numbers of users that have the app installed is critical to success. Good idea to partner with Red Cross and other organisations to contribute to spreading the app. The tool is lacking the monitoring side of the concept which is solved in Frequentis' application.	The tool has a high potential to become one of the most important communication channels to volunteers. Assuming that volunteers are ready to provide detailed information about their capabilities, the tool enables to find the requested capabilities exactly when and where they are needed.

	GMV	TNO	MSB	FRQ
Usability 3	Some suggestions for improvement have been included but it is required to be very careful when deciding which ones (and how) to implement as it is essential that the tool is kept simple (especially in the side of the volunteer).	Dynamic practical use is not clear to me yet (lots of handling time required).	the app and the server admin user interface both seem easy to use.	-
Position within the DRIVER System of Systems	This tool could be integrated with the SOCRATES Suite by GMV.	Tool for volunteer management. Not useful for initiatives of spontaneous volunteers.	Potential integration with Frequentis (already existing)	The tool can be positioned in the system of systems in 2 main aspects: • Sensor (citizens as a sensor) to a Common Operational Picture • Actor (to receive tasking information)

Table 26: CrowdTasker tool - evaluators conclusions table

2.11.2 Statement of the tool provider

CrowdTasker is primarily positioned as a tool for managing of the pre-registered volunteers, which are willing to help out the crisis managers, but are not under their direct control. This could be the members of a loose organisation such as the "Team Austria" [3]**, just as well as the institutional volunteers and even professionals, which are retired, on vacations or for any other reason work alone at the moment.**

Reviewers "overall impression" clearl**y indicate that the tool is considered interesting and worth integrating with more mainstream applications such as the COP tools for improved crisis management. However, the tool is still in development and the usability needs to be improved. AIT is looking forward to usability testing by end-users in phase two experiments and intends to improve the tool based on the feedback received.**

Contrary to the impression of one of the evaluators, the tool could be used to manage spontaneous volunteers whose accounts have not been validated yet. Differentiation between various categories of users, in order to minimize the risk of injuries and assure high quality of the results, can be achieved through

[3] http://oe3.orf.at/teamoesterreich/

“trust” levels: the newcomers are always awarded the lowest trust l**evel in the system and are therefore never asked to perform any potentially dangerous or critical tasks.**

3 Analysis of results from Initial Inventory of tools

Although the Initial Inventory of tools was an indispensable first step of the DRIVER SP4 experimentation process, there is a series of shortcomings that arise when analysing the evaluation results summarized in previous section.

In general, there is a shortage of comments and suggestions from evaluators to the features that the tools were supposed to cover (at least in the case of features related to task T44.2, which this deliverable is focused on). This makes it quite complicated to extract precise conclusions about the actual performance of the tools regarding those features, and therefore their ability to support the corresponding tasking and capacity monitoring activities. We attribute this mainly to two reasons:

- A significant number of tools were claimed by the tool providers to cover many of the features associated to the different SP4 work packages and tasks. This issue made it almost impossible to demonstrate in detail all the tool features during the tool presentations, thus making it difficult to the evaluators to properly evaluate tool performance regarding those features.
- The understanding of features and sub-features led to diverse interpretations from the tool providers, which possibly complicated even more the evaluation process.

A more exhaustive classification of tools into SP4 tasks according to their main capabilities together with a precise definition of the features prior to the Initial Inventory of tools would have facilitated the evaluation of tools and thus improved the feedback on potential tool interoperability (both technical and operational) and integration into the System of Systems.

Other point to remark is that, as shown in previous sections, there were different evaluators for the different tools. The heterogeneity in the evaluations makes it very difficult to unify the criteria based only on the evaluation sheets, and may lead to some unfair comparisons. Clearer guidelines and checklists should have been provided.

This said, the Initial Inventory of tools was a very useful activity for achieving a global view about the available tools and their Crisis Management capabilities, extracting some conclusions about how to approach the subsequent SP4 experiments and taking some preliminary decisions about the integration of tools into the corresponding System of Systems.

In the rest of this section we have tried to analyse the evaluation results summarized in previous chapter and assess the potential role of the corresponding tools regarding the tasking and capacity monitoring activities associated to task T44.2.

The first step has been to establish which tools actually support T44.2-related activities as expected. According to the DOW, "*task T44.2 aims at improving the efficient and effective assignment of resources during crisis response through monitoring of actions undertaken by responders and allocation of resources including permanent monitoring of resource availability and location, pooling and sharing of common resources (including cross-border cooperation), assignment of resources to tasks and their prioritization and task tracking, reporting and monitoring (status, performance and fulfilment)*"**.**

It is quite clear from this description that the tools supporting task T44.2 – *Tasking and capacity monitoring* **should provide the characteristic capabilities of a typical C2 system (such as task assignment and management), and support a wide range of missions and actors (in this particular case, CM resources that** can be tasked and monitored). A careful reading of the tool providers' statements about the coverage of T44.2 features (and t**he general description of the tools included in Table 2) suggests that this is clearly not the case of Emer-T and SUMO tools. Instead of directly supporting C2 activities, these tools would be used more as sources of information for computer-aided decision making. In other words, these tools would not be used directly for managing tasks or assigning resources to them but for providing commanders with relevant information that help them to make the corresponding decisions. More or less the same can be in principle applied to U-Fly tool, which is focused on gathering information by using aerial means. It is true that in the case of U-Fly, as stated by the tool provider in response to a comment regarding** the use of the word "task" (see **2.3.2), the airborne sensors and the aircraft itself can be seen as resources which are assigned tasks or missions that may be also** monitored afterwards by using the tool. However, these "tasking" and "monitoring" **features are strictly specialized for the aircraft(s) in question and cannot be considered in any case a general purpose C2 tool.**

CrisisWall and ESS are mainly COP tools focused on the gathering, processing and visualization of information. This is more or less expressed by the tool providers in the corresponding general descriptions of the tools (see Table 2), remarked by the evaluators in their comments and opinion about them (see *features feedback* **and** *evaluators conclusions* **tables in sections 2.4.1 and 2.5.1) and confirmed by the tool providers in their final statements about the evaluation feedback (see sections 2.4.2 and 2.5.2**). Again, these tools' capabilities provide decision makers with relevant information about the operational **situation and, in the case of ESS, the status of resources, but they lack the main functionality expected from a C2 tool supporting T44.2 activities.**

CrowdTasker tool seems to achieve many of the capabilities that are expected from a C2 system, and received in general a positive feedback and good average grades from evaluators. However, it is only focused on volunteers and thus lacks a general approach to tasking and resource management (tasks can be only assigned to volunteers, who are the only resources considered by the tool) as required by task T44.2. Volunteer management is in any case addressed in task T44.3 and thus CrowdTasker should be used and assessed in the experiments corresponding to that task.

Socrates FR tool is a mobile application to be used by responders on the field, so they may be notified about their assigned tasks and report about their progress. However, it lacks the "tasker" (understood as the one who tasks or assigns missions) functionality. In fact, Socrates FR was **not designed to be a complete C2 system but to be used as a part of a suite (the Socrates Suite: Socrates FR + Socrates TSK + Socrates OC + Socrates CSS) that provided the whole C2 functionality.**

Finally, IO-DA tool is described as an assistant aimed at enabling the interoperability between organisations. It automates the process of collection of data and builds and infers collaborative process based on sets of formalized business rules. Although this tool may also participate in the response phase, its most interesting use, as remarked by one of the reviewers, seems to be during the preparation phase. Thus, instead of T44.2, which is focused on the response phase (as described in the DOW), IO-DA should be used and assessed in the context of task T44.1, devoted to capacity building and mapping. As in the case of Emer-T and SUMO tools, IO-DA may participate in later SP4 experiments as a source of information that help commanders to make the appropriate decisions during the response phase.

Thus, there are three tools left that seems to fit better to the concept of tasking and capacity monitoring as described in the DOW: IDIRA COP, Large Event and Socrates TSK. According to the tool providers most of the features and sub-features associated to task T44.2 are covered by their tools (see Table 27) and the descriptions they provided seem to match what is expected from T44.2 according to the description in the DOW.

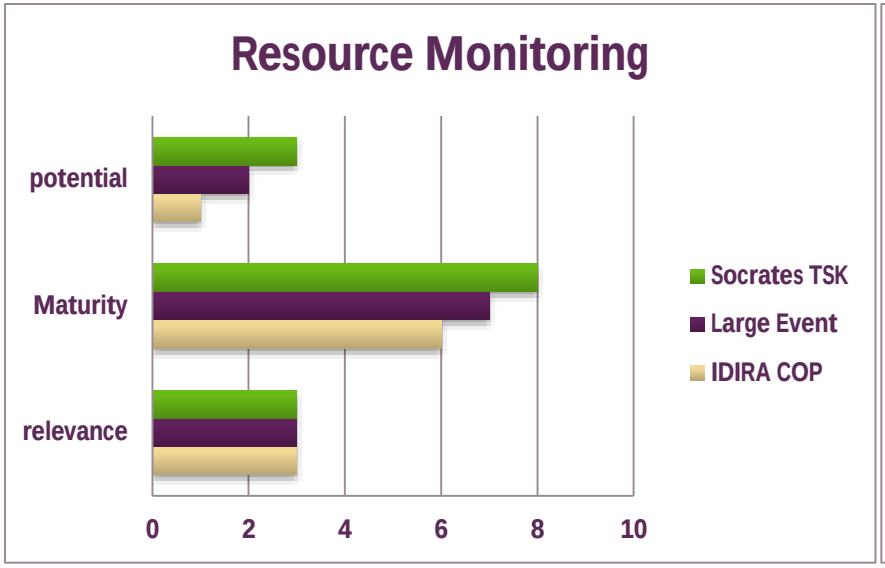
Task	Feature	Sub-feature	Tool		
			IDIRA COP	Large Event	Socrates TSK
T44.2 Tasking and capacity monitoring	Resource monitoring	Positioning	✓	✓	✓
		Information (availability, status, resource level…)	✓	✓	✓
	Assignment of resources to tasks	Monitoring	✓	✓	✓
		Decision support			✓
	Pooling & sharing	Pooling			
		Sharing			✓

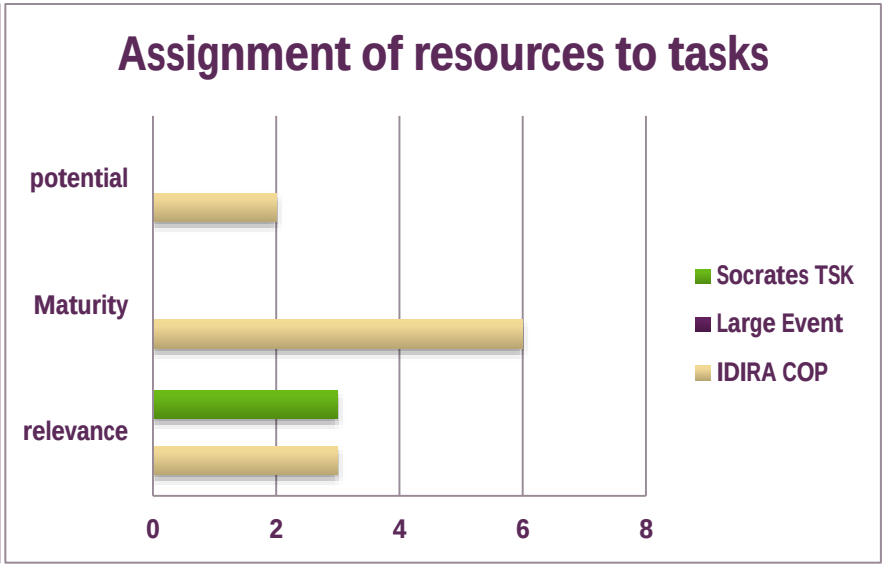
Task	Feature	Sub-feature	Tool		
			IDIRA COP	Large Event	Socrates TSK
	Tasks management	Task creation	✓	✓	✓
		Task prioritization	✓	✓	✓
		Task tracking, reporting, monitoring	✓	✓	✓
	Information sharing	Manually	✓	✓	✓
		Automatically	✓	✓	✓

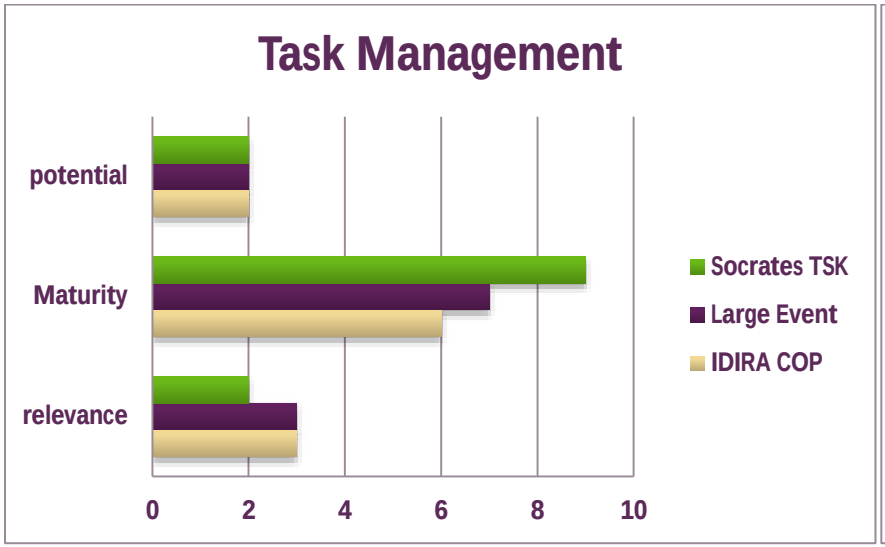
Table 27: IDIRA-COP, Large Event and Socrates TSK: Features coverage according to the tool providers

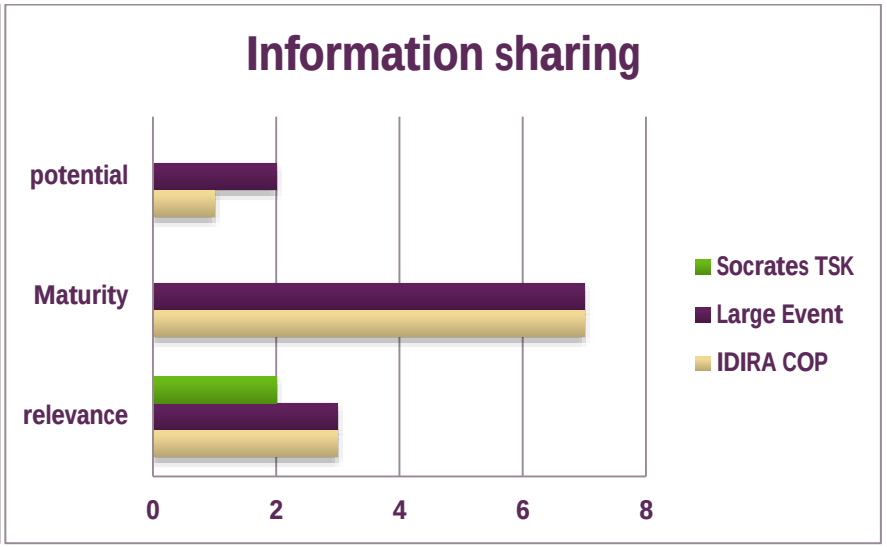
As stated earlier in this section, not much feedback was provided by the evaluators. Socrates TSK was the tool that received more. Although some suggestions for improvement and some reservations (mainly regarding current applicability to Crisis Management, performance for great numbers of tasks and resources and human dependence) were reported by the evaluators, the feedback to Socrates TSK was in general positive.

Evaluators' feedback to IDIRA COP and Large Event was focused on their COP capabili**ties (addressed in WP43), so it is difficult to extract conclusions about their opinion on tool performance regarding T44.2 features. Anyhow, grades were provided by the evaluators to the tool performance regarding those features (following the** *potential*, *maturity* **and** *relevance* **criteria, as described at the beginning of chapter 2). The following graphs summarize these grades regarding the** *Resource monitoring*, *Assignment of resources to tasks*, *Tasks management* **and** *Information sharing* **features, which are covered by all IDIRA COP, Large Event and Socrates TSK tools, according to the tool providers.**


Resource Monitoring
potential
Maturity
relevance
0
2
4
6
8
10
Socrates TSK
Large Event
IDIRA COP


Assignment of resources to tasks
potential
Maturity
relevance
0
2
4
6
8
Socrates TSK
Large Event
IDIRA COP


Task Management
potential
Maturity
relevance
0
2
4
6
8
10
Socrates TSK
Large Event
IDIRA COP


Information sharing
potential
Maturity
relevance
0
2
4
6
8
Socrates TSK
Large Event
IDIRA COP

Previous graph show better grades for IDIRA COP and Large Event tools regarding the *Information sharing* **feature, in which Socrates TSK was not rated. In the case of the** *Assignment of resources to tasks* **IDIRA COP was basically the only one that was given some grade. This feature was probably not sufficiently demonstrated by the Large Event and Socrates TSK tool providers during the tool presentation.**

The three tools were however rated in the case of the *Resource monitoring* **and** *Task management* **features. Due to the importance of these features for task T44.2 (in our opinion, they are the main capabilities required from a C2 tool), tool providers were probably focused on demonstrating tool performance regarding these features during their corresponding presentations. In this case Socrates TSK seems to stand out, mainly according to the** *maturity* **criteria.**

For this reason, although Socrates TSK was originally developed for a different domain and thus must be adapted to the needs of the end-users identified in DRIVER, it might be used as the reference tool for T44.2. The rest of the tools would take a supporting role in future SP4 experiments when it comes to tasking and capacity monitoring activities.

As a summary, Table 28 and Table 29 below show how tools addressed in this deliverable cover features of task T44.2, according to the analysis carried out in this chapter. Note that the following colour code has been used:

- *White* **for features/sub-features not covered by the tool according to the tool provider.**
- *Light green* **for features/sub-features that are covered according to the tool provider but were not properly demonstrated taking into account** evaluators' feedback **and the considerations in the analysis above.**
- *Dark green* **for those features/sub-features fully covered and demonstrated in the Initial Inventory of tools.**
- *Yellow* **for those features/sub-features only partly covered** according to the evaluators' feedback **and the considerations in the analysis above.**

The first table shows the tools presented during sessions corresponding to WP43's tasks; the second one shows the tools presented during WP44's tasks **sessions in the Initial Inventory of tools:**

dark green=FULLY COVERED and DEMONSTRATED; light green=COVERED ACCORDING TOOL PROVIDER BUT NOT DEMONSTRATED, yellow=PARTLY COVERED, white=NOT COVERED		Task session	T43.2: Airborne Sensor Processing			T43.3: Crisis dynamics & early warning	T43.4: Interaction with citizens	T43.5: Shared situation awareness	
		Tool supplier	DLR	DLR	DLR	JRC	GMV Sistemas	FRQ	TCS
		Tool name	Emer-T	SUMO	U-Fly	CrisisWall	ESS	IDIRA COP	Large Event
Task	Feature	Sub-feature							
T44.2 Tasking and capacity monitoring	Resource monitoring	Positioning			Partly		Partly	Fully	Fully
		Information (availability, status, resource level…)					Partly	Fully	Fully
	Assignment of resources to tasks	Monitoring			Partly			Fully	
		Decision support			Partly				
	Pooling & sharing	Pooling							
		Sharing							

dark green=FULLY COVERED and DEMONSTRATED; light green=COVERED ACCORDING TOOL PROVIDER BUT NOT DEMONSTRATED, yellow=PARTLY COVERED, white=NOT COVERED		Task session	T43.2: Airborne Sensor Processing			T43.3: Crisis dynamics & early warning	T43.4: Interaction with citizens	T43.5: Shared situation awareness	
		Tool supplier	DLR	DLR	DLR	JRC	GMV Sistemas	FRQ	TCS
		Tool name	Emer-T	SUMO	U-Fly	CrisisWall	ESS	IDIRA COP	Large Event
Task	Feature	Sub-feature							
	Tasks management	Task creation			Partly			Fully	Partly
		Task prioritization			Partly			Fully	Partly
		Task tracking, reporting, monitoring			Partly	Partly		Fully	Partly
	Information sharing	Manually			Fully	Partly	Fully	Fully	Fully
		Automatically			Fully			Fully	Fully

Table 28: Tools feature coverage (tools presented in T43.x sessions)

dark green=FULLY COVERED and DEMONSTRATED; light green=COVERED ACCORDING TOOL PROVIDER BUT NOT DEMONSTRATED, yellow=PARTLY COVERED, white=NOT COVERED		Task session	T44.1: Capacity building and capacity mapping tools	T44.2: Tasking and capacity monitoring		T44.3: Volunteer management supporting tools
		Tool supplier	ARMINES	GMV	GMV	AIT
		Tool name	IO-DA	Socrates TSK	Socrates FR	CrowdTasker
Task	**Feature**	**Sub-feature**				
T44.2 Tasking and capacity monitoring	Resource monitoring	Positioning		Fully		Fully (only volunteers)
		Information (availability, status, resource level...)	Partly	Fully		Fully (only volunteers)
	Assignment of resources to tasks	Monitoring		Fully		Fully (only volunteers)
		Decision support		Partly		Fully (only volunteers)
	Pooling & sharing	Pooling	Partly			
		Sharing	Partly	Partly		
	Tasks management	Task creation	Partly	Fully		Fully (only volunteers)

dark green=FULLY COVERED and DEMONSTRATED; light green=COVERED ACCORDING TOOL PROVIDER BUT NOT DEMONSTRATED, yellow=PARTLY COVERED, white=NOT COVERED		Task session	T44.1: Capacity building and capacity mapping tools	T44.2: Tasking and capacity monitoring		T44.3: Volunteer management supporting tools
		Tool supplier	ARMINES	GMV	GMV	AIT
		Tool name	IO-DA	Socrates TSK	Socrates FR	CrowdTasker
Task	Feature	Sub-feature				
		Task prioritization	Partly	Fully		Fully (only volunteers)
		Task tracking, reporting, monitoring	Partly	Fully	Fully	Fully (only volunteers)
	Information sharing	Manually	Fully	Fully	Fully	Fully (only volunteers)
		Automatically	Fully	Fully	Fully	Fully (only volunteers)

Table 29: Tools feature coverage (tools presented in T44.x sessions)

4 Conclusion

Although most of the tools have been considered as usable and relevant for CM, it seems that, according to the comments from the evaluators and the general impression from the tool demonstrations, many of these tools do not fit very well for the tasking and resource management as described in task T44.2, but are only related to its features in an indirect way. The tools that seem to fit best for T44.2 are IDIRA COP, Large Event and Socrates TSK, being the latter the one that seems to stand with respect to the main features associated to T44.2 (mainly when considering its maturity level), although it was originally developed for a different domain and thus needs to be adapted to the needs of the end-users identified in DRIVER. This will be done in the consecutive experiments as part of the DRIVER experimentation process.

According to this, Socrates TSK (as a generic task management tool) might be used as the reference tool for T44.2, taking the rest of the tools a supporting role when it comes to the tasking and capacity monitoring activities. Information sharing issues should be solved, as the different systems are in principle expected to use different communication mechanisms. Web services may be for instance a good candidate for the basic infrastructure for tool interoperability, as they are highly widespread. The work developed in WP45, especially in T45.1, will be taken as a reference.

According to the high number of tools that has been considered related to T44.2, many of them more focused on other work packages and tasks, a clear finding is that the experiments cannot be always linked to a single task of the DOW but should be connected to several of them. It was suggested to divide the SP4 experimentation into a set of well-defined experiments each of them mapped to several SP4 tasks, instead of having a different experiment per task. This responds mainly to consistency and efficiency issues.

It was also agreed during the Initial Inventory of tools that part of the work to be developed for the SP4 2nd round of experiments shall be devoted to the definition of a methodology that is currently lacking. It became even clearer that tasking and resource management as well as other similar C2 activities require the alignment to a greater extent of end-user procedures and the definition of the corresponding orchestration mechanisms. For it, it will be necessary to held interviews and workshops between platform providers and their associated stakeholders and, to the extent possible, to have the participation of the latter in the execution of the corresponding experiments. Processes, workflows and the specific methodologies followed by the end-users in the Crisis Management domain should be analysed in order to arrive to a more or less common approach that could better guide the efforts put on achieving the interoperability of the tools to be integrated into the DRIVER SoS.

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