

*Driving Innovation in Crisis Management for European Resilience*

## D43.21 – Airborne Sensor Processing Experimentation Report (Initial Inventory of SP4 tools)

Dissemination level: Public

Grant agreement number: 607798  
Start date of the project: 2014-05-01 Due date of deliverable: M10  
Duration: 54 months Actual submission date: 2015-02-28  
Lead Beneficiary: DLR

**Keywords:**

Tools, SP4 Initial Inventory of Tools, Experimentation, Airborne Sensor Processing

**Dissemination level:**

PU   
PP   
RE   
CO

**Release History**

Version	Date	Description	Release by
V0.1	16 January 2015	Draft	Julia Zillies, Gunnar Schwoch, Carsten Dalaff (DLR)
V0.2	22 January 2015	Final Draft	Julia Zillies, Gunnar Schwoch (DLR), José Luis (GMV)
V0.3	15 February 2015	Revision	FRQ, WWU
V1	27 February 2015	Released for Submission	Julia Zillies, Gunnar Schwoch, Konstanze Lechner (DLR)

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## List of Acronyms

Abbreviation / acronym	Description
ACRIMAS	Aftermath Crisis Management System-of-systems Demonstration (FP7 project)
COP	Common Operational Picture
DOW	Description of Work
EmerT	Emergency Mobility of Rescue Forces and Regular Traffic
GCS	Ground Control Station
RPV	Remotely Piloted Vehicle
SoS	System of Systems
SP4	DRIVER Subproject 4 "Strengthened Responders"
SUMO	Simulation of urban mobility
TRL	Technical Readiness Level
WP	Work Package
ZKI	Center for Satellite Based Crisis Information

## Executive Summary

The overall goal of WP 43 is to improve the capabilities of the responders' community in terms of situations assessment, prediction and early warning on different levels of command (operative, tactical, and strategic) in various dimensions of CM (equipment, society, health, security, transport) within and across member states. Existing (legacy) systems, procedures and prototypes within other research projects have been analysed according to their possible contributions in fulfilling the overall goal of WP 43. This work is supported by the outcomes of several other WPs. For example, the findings in the WP 22 were that several technical tools exist that use data and information from different sources to conduct various analyses. The extracted information is presented and visualized in several ways to provide the required information on, e.g., crisis dynamics, or demand and assessment needs.

Airborne collected data can be an important source for such tools, as the provided imagery data contains not only the most up-to-date information on areas with limited access, but is also an efficient way to assess, e.g., the area extent of the disaster.

In this context, the sub task 43.2 "Airborne Sensor Assessment" addresses the need for improved airborne sensing capabilities. The desired outcome of the task is to ensure that it is possible to conduct a situation assessment, prediction and early warning within and across member states based on airborne sensors in order to facilitate data-downlink and information processing (geo-referencing, generation of map-overlays, analysis, interface to higher level systems e.g. COP).

Several tools, namely EmerT, U-Fly, ZKI-Portal, SUMO, and ESS, have been presented to a selected group within the Driver SP4 *Initial Inventory of Tools* held in Aix-en-Provence in November 2015. The objective was to evaluate the usability of the tools in the context of the Driver project with members of the driver project and tool providers. This report gives a summary of the conducted evaluation method and the outcomes of the evaluation related to Task 43.2 *Airborne Sensor Processing*. The general procedures, outcomes and conclusions drawn from the Initial Inventory of Tools are summarized in document *D41.1.1 Initial Inventory of Tools SP4 Level Experimentation Report*.

# 1 Introduction

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## 1.1 Scope

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The purpose of this document is to report on the experiment related activities lead by SP4 and more specifically by Task 43.2 Airborne Sensor Processing during the first period (before MS1). During the *Initial Inventory of Tools* conducted in November 2015, a specific session has taken place to present all tools that are related to Task 43.2. Selected tool features have been evaluated by a group consisting of project partners and end-users. The purpose of this methodology was not only the validation and presentation of tool related features, but also to develop ideas and concepts that enable interworking of different tools.

## 1.2 Document overview

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This document contains the following chapters:

- A first chapter gives a short introduction into the scope of the document.
- Chapter 2 refers to the outcomes of the initial experimentation activities on SP4 level.
- Chapter 3 introduces Task 43.2 and explains the methodology used for the *Initial Inventory of Tools*. Afterwards, all tools that have been presented during the Task 43.2 related session are presented. The chapter concludes with the description of the results from the *Initial Inventory of Tools*.
- Chapter 4 contains conclusions that have been drawn from the evaluation results and further discussions that took place during the *Initial Inventory of Tools*.

## 1.3 Reference Documents and Standards

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This report refers to the following documents:

D41.1.1 Initial Inventory of Tools - SP4 level report

Tool descriptions: see DRIVER Space

→ SP4 → \_SP4 Tools very short descriptions:

<https://driver.atosresearch.eu/index.jsp?uid=fb8f9121-45cd-47cc-927d-ce7f37be2881>

→ SP4 → SP4 1st Initial Inventory of Tools (Aix) → Tool Descriptions

<https://driver.atosresearch.eu/index.jsp?uid=0f36372a-56d1-4c1c-82f4-e58d26e47da7>

## 2 SP4 Initial Inventory of tools

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A representative set of tools available in SP4 were presented and evaluated during the 1st SP4 experimentation week (also referred to as *Initial Inventory of Tools*) in Aix-en-Provence (at POLE Risque) from Nov. 24th – 28th, 2014.

A summary of this week and general conclusions are factored out and summarized into a common document D41.1.1 *Initial Inventory of Tools SP4 Level Experimentation Report*. That general chapter belongs to all deliverables D4x.y1 describing further on the particular results per task.

## 3 Task experiment report

### 3.1 Introduction

The task "Airborne sensor processing" first of all requires the collection of airborne imagery data. This demands the deployment of different technical means and, in preparation for the final demonstration, the conduction of several simulations and flight experiments.



Figure 1: DLR Research Aircraft, D-CODE<sup>1</sup>

The features of these tools are difficult to map directly to crisis management related features. Therefore, not each tool involved in the task presentation was subject to a following evaluation. This applies to DLR's research aircraft D-CODE (Dornier 228) and DLR's 3K camera system.

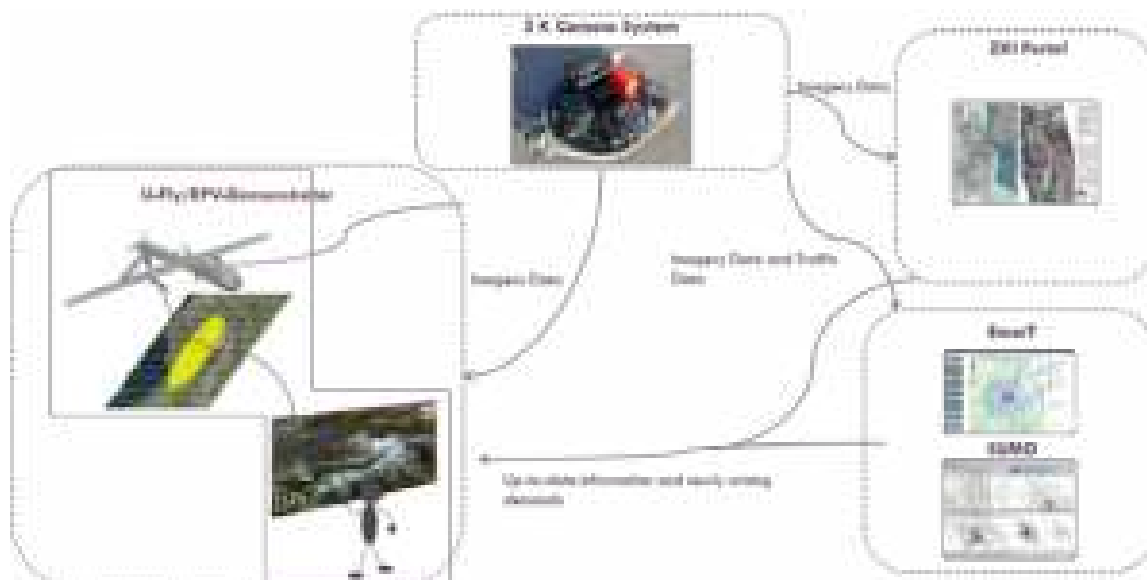


Figure 2: DLR System Architecture

During the session, the simulation of a reconnaissance mission based on data of a past campaign was shown. The output in terms of flight paths and collected imagery data was made visible to the audience through DLR's ground control station (GCS) U-Fly.

<sup>1</sup> The DRIVER logo has been added to the plane by image editing



The remaining tools presented in the session deal with information processing, analysis and visualisation, as well as traffic simulation. The demonstrated tools provide a large range of features, which are related to other tasks, but since these systems will work together during future DRIVER experiments, it was decided to present the whole system of DLR tools in the session of Task 43.2. Various analysis capabilities include the use of aerial data. The demonstration during the initial inventory of tools has illustrated in which way airborne collected data can be utilised to support disaster management. The existing interworking capabilities will be the foundation to allow a seamless integration into the DRIVER System of Systems (SoS).

### 3.1.1 Task description

According to the Description of Work (DOW), this task is described as follows:

*This task addresses the need for improved airborne sensing capabilities and involves:*

- *Assessment based on airborne sensors (Optionally Piloted Aircraft –OPA-)*
- *Flight planning/operation, data-downlink and information processing (geo-referencing, generation of map-overlays, analysis, interface to higher level systems e.g. COP)*

*Planned Experiments:*

- *Usage of mobile sensors (SAT, OPA and robots) within a flood scenario*

DLR as the task leader provides all tools located in this task itself. The DOW describes the role of DLR as follows:

*DLR will provide airborne sensor suites for real time information gathering and Optionally Piloted Aircrafts mission planning and furthermore a tool for analysing the traffic situation including decision support.*

As part of Phase II of the EU's Aftermath Crisis Management SoS Demonstration Programme, DRIVER is built on the needs and findings of the previous projects ACRIMAS and CRISYS. Tasks within DRIVER are mostly related to validated topics with identified need for improvement. The project ACRIMAS has given a comprehensive analysis of critical areas and topics within the current CM "system-of-systems". Identified gaps and needs have been summarized within the ACRIMAS "Gap Analysis". According to this analysis, the discussions about the use of space and aerial means in support of disaster management have been controversial. While certain stakeholders have mentioned such assets as a priority need, others have argued strongly against this. However, several needs regarding situation assessment and sense-making as well as information gathering, logistics, and infrastructure have been validated and will be supported by airborne and satellite imagery data.

The DRIVER initial inventory of tools has shown several technical tools that use data and information from different sources to conduct various analyses. The extracted information is presented and visualized in several ways to provide the required information on, e.g., crisis dynamics or demand and needs assessment. Airborne collected data can be an important source for such tools, as the provided imagery data contains not only the most up-to-date information on areas with limited access, but is also an efficient way to assess, e.g., the area extent of the disaster. The ACRIMAS "Gap Analysis" has claimed, that tools which support visualization of information, modelling and simulation, support topics like "Understanding specific crisis dynamics", or "Demand and needs assessment". The demonstrated Task 43.2 related tools provide such functionalities with focus on crisis mapping and risk assessment as well as analysis and simulation of the traffic situation for decision support. In this way, the presented tools can contribute to relevant ACRIMAS topics.

### 3.1.2 Evaluation sheet structure

Task 43.2 is of a rather technical nature. Since it involves aircraft operation, it is subject to several constraints. Therefore, the task internal feature description against the background of disaster management is of limited extend, but the output will be supportive to many other SP4 tasks.

The task related features are summarized in the following table:

Table 1 : Evaluation Sheet Structure

Task	Feature	Sub-feature	Tool specific implementation
T43.2 Airborne sensor processing	Assessment based on airborne sensors		
	Flight planning/ operation	Large radius of action	
		Sensor-adaptive Flight Planning	

## 3.2 Tools involved

Table 2 : Tool Description

Tool	Provider	Session	Evaluators
U-Fly/RPV-Demonstrator +3K Camera System	DLR	T43.2	MSB, THW, WWU, Pole and Marseille Fire Department
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. U-Fly 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 be used as RPV-demonstrator in DRIVER experiments. Equipped with the 3K Camera System, the RPV will gather and provide aerial images of a disaster area in real time.			
ZKI	DLR	T43.2	MSB, THW, WWU, Pole and Marseille Fire Department
The Center for Satellite Based Crisis Information (ZKI) presents a service at DLR. It provides a 24/7 service for the rapid provision, processing and analysis of satellite and airborne imagery during natural and environmental disasters, for humanitarian relief activities and civil security issues worldwide. The resulting satellite and airborne based information products are provided to relief organisations and public authorities and are mainly freely available on the ZKI website. According to the requirements of the user, the information products are delivered in the form of maps, GIS-ready geodata or dossiers which are then used to support disaster management operations, humanitarian relief activities or civil security issues. The ZKI is ISO 9001 certified.			

Tool	Provider	Session	Evaluators
SUMO Simulation of urban mobility	DLR	T43.2	MSB, THW, WWU, Pole and Marseille Fire Department
<p>SUMO is a microscopic and open source road traffic simulation. In SUMO it is possible to simulate vehicles, pedestrians, traffic lights and multimodal mobility. In principle, SUMO requires a road network that includes road-side infrastructure, such as traffic lights, and a traffic demand for performing a simulation. Given both, the simulation SUMO moves the vehicles from the start position of their route to their end position. SUMO is a development of the Institute of Transportation Systems at the German Aerospace Center. The first concepts were developed in the year 2000 and the first public release was done in the year 2002.</p>			
EmerT - Emergency Mobility of Rescue Forces and Regular Traffic	DLR	T43.2	MSB, THW, WWU, Pole and Marseille Fire Department
<p>The EmerT- Portal is a web-portal developed within the Delphi and VABENE projects of the German Aerospace Center (DLR). With EmerT it is possible to visualize the current traffic situation using different traffic sources (aerial images, inductive loops, Floating-Car-Data etc.). The traffic data can be used as basis to simulate and predict traffic and for supporting the decision process for traffic management actions in case of an incident or planning a big event.</p>			
ESS	GMV	T43.2	AIT 1, TNO, AIT 2
<p>The Emergency Support System (ESS) is a suite of real-time data-centric technologies which 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&amp;C).</p>			

### 3.3 Inventory results

#### 3.3.1 Tools feature coverage overview

The tool feature coverage was compiled from the evaluation sheets and is visualised in the following table.

Table 3 : Tool Feature Coverage

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				
		Tool Supplier	DLR	DLR	DLR	DLR	GMV
		Tool name	EmerT	U-Fly	ZKI-Portal	SUMO	ESS
Task	Feature	Sub-feature					
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Fully	Fully	Fully		Fully
	Flight planning/ operation	Large radius of action		Partly			
		Sensor-adaptive flight planning		Fully			

### 3.3.2 U-Fly

#### 3.3.2.1 Explicit feedback tables

Table 4 : U-Fly Evaluation

Feature	Sub-feature	U-Fly (DLR)	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	Pole, Marseille Fire Department	THW
Assessment based on airborne sensors		Aerial images are acquired from RPAS (remotely piloted aircraft system). The automatic real-time processing includes orthorectification into map coordinates, mosaicing, automatic traffic data extraction and downlink of data to the control station.	3	6,5	3				
Flight Planning/Operation	Large radius of action	RPAS+3K tool can cover wide areas for regional and national disasters.	3				Limited by the range of the data link. If downlink fails it will be downlinked later which is good		
	Sensor-adaptive Flight Planning	Areas of interest can be defined by the end users. Re-planning of the flight path based on already collected sensor data	3	5					In terms of radius; The bigger the better

General remarks to the tool		WWU	MSB	Pole, Marseille Fire Department	THW
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.		<ul style="list-style-type: none"> <li>- Interesting in order to get an overview</li> <li>- Monitoring of units by a plane is less interesting (pumps do not move frequently)</li> <li>- Could be interesting in order to see which streets are affected -&gt; which route should a team take</li> </ul>
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.		<ul style="list-style-type: none"> <li>- Big issue: cost vs. benefit</li> </ul>
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.		

### 3.3.2.2 Statement of the tool provider

As DLR's Research Ground Control Station (GCS) "U-Fly" and the connected Remotely Piloted Vehicle (RPV) demonstrator come from a different research field for most of the evaluators, it was difficult for the evaluators to assess all features comprehensively. However, the evaluation was well done and valuable to tool providers and task lead.

The estimated Technical Readiness Level (TRL) varies from 5 to 8, while DLR would set the TRL level between 4 and 5, as this technology is currently only deployed in DLR's experimental environment. All evaluators express their good overall impression of the tool with emphasis on the usability of collected imagery data within the DRIVER SoS. Beside the two main advantages of using unmanned systems, the ability to operate up to 30 hours and the ability to

operate in inhospitable environments, the tool provider has attempted to outline the benefit of using advanced mission and path planning capabilities for aerial reconnaissance missions. Even though the path planning capabilities have been mentioned as rather mature features in the evaluation, the advantages of using unmanned systems in crisis management should be demonstrated in further experiments from the tool provider’s perspective. This will outline and strengthen the role of remotely piloted aircraft systems within the crisis management community.

During evaluation, the limited range of the datalink that connects the aircraft with the ground station is considered as a critical point. The current datalink range is dependent on the flight level and reaches theoretically up to 200 km. Future datalink connections will make use of satellite technology to overcome such limitations. Within the DRIVER context, the used datalink connection is considered as sufficient to demonstrate the relevant features.

It was also mentioned that monitoring of selected units may not be important (e.g., in flooding scenarios). This might apply to certain scenarios, but in the past, 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, has been of great support to the disaster management mission.<sup>23</sup> The relatively high costs of a flight manoeuvre have been considered as a big issue. While the benefit of such an operation certainly has to be considered, many disaster scenarios require airborne imagery data.

### 3.3.3 ZKI

#### 3.3.3.1 Explicit feedback tables

Table 5: ZKI Evaluation

Feature	Sub-feature	ZKI (DLR)	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	Pole, Marseille Fire Department	THW
Assessment based on airborne sensors		Imagery from optical and radar satellite as well as aerial imagery can be used for mapping purposes, products include simple image information maps, or more complex impact and damage assessments	3	8,6	3				

<sup>2</sup> <http://www.australiansecuritymagazine.com.au/2014/04/unmanned-vehicles-enhancing-security-rescue-and-natural-disaster-management-capability-part-ii/>

<sup>3</sup> [http://www.ga-asi.com/news\\_events/index.php?read=1&id=424](http://www.ga-asi.com/news_events/index.php?read=1&id=424)

General remarks to the tool		WWU	MSB	Pole, Marseille Fire Department	THW
Overall impression		ZKI is a very useful and established tool to fulfil the mentioned features.	<p>My limited experience is that maps with processed satellite data are from Copernicus activations.</p> <p>It takes a very long time from satellite image requested and taken until the product is finally delivered.</p> <p>As a user I may want a less "prepared" format such as a vector file instead of a map product if that data may be available quicker than the final product.</p>		
Usability	2,6		Maps and presented product seem very usable		<p>Satellite imagery is a useful tool if:</p> <ul style="list-style-type: none"> <li>a) Satellite is available</li> <li>b) Cost are reasonable</li> <li>c) Time between request and fulfilment is not too large</li> </ul>
Position within the DRIVER System of Systems		Relevant to the most other tools as the provided information have a very high bandwidth and quality	The tool can provide imagery and geodata for emergency management and disaster assessment for the Driver experiments. Information should be integrated into the common operational picture tools.		



### 3.3.3.2 Statement of the tool provider

The evaluation of ZKI reflects the usability and maturity of the service. Most features have been assessed with TLR 8 or 9, which corresponds to the TLR given by DLR, as this service is already operational. Furthermore, most features have been marked as fully usable by the evaluators. The possibility to create different map formats has been positively perceived with an emphasis on the importance of vector formats which ensure reusability by other tool providers. The use of satellite imagery is very much appreciated, but it is also outlined that the acquisition of such images may take a long time. The evaluators point out the importance of the data and maps provided by ZKI, and it was highlighted that the information should be integrated in the common operational picture.

When working with satellite data, time is indeed the limiting factor. The analysis and preparation of maps play minor roles. The time consuming part is the satellite acquisition and satellite delivery to the ZKI. For this reason vector data derived by satellite imagery is not faster than delivering the map product. The time frames can be discussed to decide on a case by case basis which information product would suit. The advantage of airborne imagery like demonstrated in DRIVER is the faster availability of the images.

### 3.3.4 EmerT

#### 3.3.4.1 Explicit feedback tables

Table 6: EmerT Evaluation

Feature	Sub-feature	EmerT DLR	relevance	maturity	potential	Suggested improvements / comments			
						WWU	MSB	Pole, Marseille Fire Department	THW
Assessment based on airborne sensors		Automated traffic detection from images. Demonstration of the further processing of the collected data. Traffic visualization and prognosis. Traffic prediction and situation support	3	7	3				

General Remarks to the tool		WWU	MSB	Pole, Marseille Fire Department	THW
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.		<ul style="list-style-type: none"> <li>- interesting tool primary for planning events</li> <li>- seems difficult to use in an ad hoc crisis, as people will behave in an un-/ less predictable or hard to predict manner</li> <li>- also good for evacuation forecast and evaluation of evacuation strategies</li> </ul>
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 EmerT results.	I think it will be very central in Driver especially if its information content can be shared with other tools. All "other common operational picture" / "situation assessment" type of tools would benefit from integrating data from EmerT.		

### 3.3.4.2 Statement of the tool provider

Most of the evaluators do not have a detailed traffic research background and come from different research fields. Therefore the evaluators focused on the practical applications. All evaluators expressed their good overall impression of the tool and emphasized the tool as very mature and rich in functionality. The usability is voted with 3 (the highest value). The evaluators underlined that the tool is able to provide many information and tools for the planning of big events and other critical events. The tool additionally opens the opportunity to evaluate crisis management strategies, e.g., evacuation scenarios. The output is ranked as 'of high interest' and 'very central in DRIVER'. The evaluators see the sharing of information with other common operational picture and situation assessment tools as a very important constraint for this tool. The integration of the tool output in the DRIVER common operational picture is one of the tool provider's aims.

### 3.3.5 SUMO

#### 3.3.5.1 Explicit feedback tables

Table 7: SUMO Evaluation

General remarks to the tool		WWU	MSB	Pole, Marseille Fire Department	THW
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 output.	Seems very useful to most cases where traffic simulation is needed.		<ul style="list-style-type: none"> <li>- Very useful tool</li> <li>- If you can obtain info on the change in f. ex. the stability/load capacity of bridges, it would be very beneficial.</li> <li>- Ex.: normally a bridge can handle 8t, after 5 hours of flood exposure it can handle 3t.</li> </ul>
Usability	2-3	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.		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.

#### 3.3.5.2 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. The evaluators focused on the practical applications. Nevertheless, the evaluation was well done and valuable for the tool provider and task lead. 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. An additional demand was to check if this tool can be used as a service to other tools that may require traffic simulation. Further comments apply to very specific and detailed first responder tasks which could be supported by the tool.

### 3.3.6 ESS

#### 3.3.6.1 Explicit feedback tables

Table 8: ESS Evaluation

Feature	Sub- featur e	ESS (GMV)	relevance	maturity	potential	Suggested improvements / comments		
						AIT 1	TNO	AIT 2
Assessment based on airborne sensors		Cameras and sensors integrated in UAV and balloons.	2,5	5	2	Integration of airborne cameras seems to work well, nice to have. There is no support for assessment, the tool simply shows the view from airborne camera		Not so clear what the tool can do with airborne sensors.

General remarks to the tool		AIT 1	TNO	AIT 2
Overall impression		<p>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:</p> <ul style="list-style-type: none"> <li>- middleware for gathering and sharing of information from various sources.</li> <li>- mass-informing functionality through several channels. Most interesting appears to be a feature which allows sending of SMSs to everyone in an area even if the network is down.</li> <li>- modelling sub-system which can be used to assess and predict the risk development for certain types of events (e.g. fire)</li> </ul>		<p>Appears to be a very mature tool with a lot of possible use cases in CDM and in the environmental domain.</p>
Usability	2,5-3			<p>Remarks: Is it only for COP during the crises or also in all other phases?</p>
Position within the DRIVER System of Systems		<p>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.</p> <p>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.</p>	<p>Technical promising Non-technical part should be improved, e.g. in relation with SP3 (wr[t?]) communication with citizens)</p> <p>How to deal with N (N &gt; 100) messages in a short period.</p>	<p>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.</p>

### 3.3.6.2 Statement of the tool provider

As the evaluators point out in their conclusions, the main goal of ESS is to present crisis managers with the COP of a crisis to improve their situational awareness. In this sense, ESS represents the perfect way to integrate the information gathered through airborne sensors into the COP. ESS shows the location of the sensors, gives access to their feedback, like pictures or videos, and could be easily adapted to allow the ESS operators to send simple commands to the other tools, all of this through an intuitive GIS interface.

## 4 Conclusion

### 4.1 SP4 Inventory of tools

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Please refer to document D41.1.1 Initial Inventory of Tools SP4 Level Experimentation Report for the more general conclusions drawn from the initial inventory of tools.

### 4.2 Task 43.2 Inventory of tools

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During the initial inventory of tools, the different tools related to Task 43.2 were successfully presented to the audience. The evaluation reflects that each tool was presented in a structured way, which enabled the evaluators and the audience to understand the different functionalities and the contribution to the DRIVER SoS. Most importantly, the initial inventory of tools revealed different opportunities for interworking with other systems. Many partners were interested in accessing the airborne sensor data in order to incorporate them into their tools. The evaluators stressed the need to clarify how the data interoperability can be guaranteed. In future events, this data can be made accessible for other partners via a network drive. The data can be provided in different formats and contains additional meta-information on quality and recording time.

The tool presentations have also opened up opportunities for interworking. For example, data from different sources on disaster extend and destroyed infrastructure could be included in the modelling and simulation process. In accordance to Tasks 43.1, 43.3, and 43.5, it has to be decided which data should be exchanged and how this will be done on a technical level. Especially SUMO has shown several possible connections with other tools. For example, data from different sources on disaster extend and destroyed infrastructure could be included in the modelling and simulation process. Moreover, the output of SUMO in terms of traffic prediction could be used in other tools that deal with logistics.

With respect to the objectives of WP43, the recorded comments of the evaluators during the structured interviews gave very fruitful hints. The evaluators stressed that the capabilities of the responders' community can be improved in terms of situation assessment, prediction and early warning on different levels of command in the various dimensions of CM within and across member states. Furthermore, the evaluators emphasised to focus on the task how the received data from the presented tools have to be processed (aggregation, combination, etc.) to facilitate the different tasks of the assisting parties in CM.

Since the presented tools were considerably diverse, the next section contains a few conclusive remarks of each tool provider.

**U-Fly/3K Camera System:** Using remotely piloted systems in crisis management is a new concept. While these systems have been used in disaster management missions by e.g. US authorities quite often, these novel systems have not been used very often by the European responders. Formally known for their military use, the deployment of such systems is part of a critical societal discussion. However, using these systems in civil applications is becoming more and more popular, as they have certain advantages in terms of mission range, advanced sensor deployment, protection of human

health, and effective flight planning. It is therefore of significant interest to demonstrate the benefits of these systems during the DRIVER experimentation campaigns.

The evaluation has reflected a positive attitude towards the use of remotely piloted systems, but has also shown that the advantages of using such systems need to be further highlighted during the next steps. To enable efficient flight path planning and thereby sensor data collection, as many information as possible are included into the planning process. Successfully collected images are displayed to the RPAS operator to provide the operator with enhanced situational awareness. In addition, advanced optimization strategies support the operator during the planning process. Within the DRIVER context, an important objective is to enable interworking between the different CM tools. To that aim, further information from different resources should be included in the planning process. This could e.g. include geographical areas or landmarks that need to be examined. The next step is to identify authorities, consortium partners and/or end-users that could benefit from such information and that will have permission to request such information and thereby influence the flight path during the upcoming DRIVER experiments.

ZKI: The service of ZKI has been operational for several years and it was possible to present its strength and usability during the presentation. Satellite and airborne based ZKI information can be integrated into the DRIVER system and be provided to the partners using existing web service functionalities. Several ZKI procedures, particularly regarding image analysis, are implemented semi-automatically and, depending on the request, require a high amount of effort. Therefore, only a part of ZKI's product portfolio was demonstrated within the presentation. Information from other sources in the DRIVER SoS can be additionally included in the ZKI products, which offers the opportunity to create for example cases novel, individual maps, GIS-ready geodata, or dossiers, tailored to the needs arising in the upcoming experimentation campaigns. Focus of the ZKI service will be on the 3D visualization of satellite and airborne imagery as well as DRIVER relevant information.

As partners were asking for satellite imagery to be included in the next experiments, the ZKI staff will help to provide available archive satellite data for these experiments and demonstrate the benefits and limitations of satellite imagery in examples.

EmerT: Up to now, it is not common that modern approaches of traffic management are adapted to crisis management. Different functionalities of EmerT offer the opportunity to easily provide partners with traffic information using existing web service functionalities. The integration of traffic information, routing optimization and further decision support information to the common operational picture could be realized within the project. By doing so, EmerT is able to provide an additional component to crisis management.

The evaluation has reflected a positive attitude towards the integration of traffic information and management approaches into crisis management, which has to be investigated in detail during the next steps.

SUMO: The traffic simulation tool SUMO has been in use for several years and was able to show its strength and usability. The traffic simulation can be integrated into the DRIVER SoS and can provide additional information to the partners easily. During the evaluation, SUMO has shown its potential to

complement other tools concerning traffic information. For example, SUMO could be used for the evaluation of the different evacuation scenarios.

The evaluation has reflected a positive attitude towards the integration of traffic aspects into crisis management, which has to be investigated in detail during the next steps.

ESS: The tools described in this document provide different types of information coming from airborne sensors and ESS is ready to provide a common interface where all this information is presented to the crisis managers along with any other information that conform the COP. Furthermore, a deeper collaboration with these tools will allow the sending of commands using simple interfaces within ESS, for example an area to be analysed, and so forth.



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Table 9: U-Fly, Evaluator WWU

Date	Evaluator org.	Evaluator name	DLR					
			U-Fly/RPV-Demonstrator	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
T43.1 Damage and Needs Assessment	Gathering data from the field	Machine readable info	Airborne sensor data collection and data-downlink	Yes	3	8		3 (*not being an expert in the area of aerial imagery the estimation of the evaluator is really limited)
	Information preparation	Map view	Map overlays for areas, in which sensor data have successfully been collected	Yes	3	8		3
	Decision support	Information processing for decision making purposes	The displayed sensor data will help the operator to plan/re-plan the mission	Yes	3	8		3
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Aerial images are acquired from RPAS (remotely piloted aircraft system). The automatic real-time processing includes orthoprojection into map coordinates, mosaicing, automatic traffic data extraction and downlink of data to the control station.	Yes	3	8		3
	Flight planning/operation	Large radius of action	RPAS+3K tool can cover wide areas for regional and national disasters.					
		Sensor-adaptive Flight Planning	Areas of interest can be defined by the end users. Re-planning of the flight path based on already collected sensor data					
T43.5 Shared situation awareness	Acquisition	Acquisition (manual / automatic)	Real time information gathering	Yes	3	8		3
	COP Production	Fusion / Aggregation	Single camera frames are aggregated to georeferenced tiles	Yes	3	8		3
		Visualization	Processed pictures (tiles) are displayed in					

		/filtering / Querying of common operational picture	form of map overlays in U-Fly's geographical environment					
	Equipment/ Deployment	Control centers	U-Fly has an advanced HCI, with design focus set on intuitive and efficient human-machine interaction concepts	Yes	3	8		3
T44.1 Capacity Building and Capacity Mapping Tools	Deployment of Resources	Decision Support	Planning and re-planning of the RPV mission (sensor suite deployment)	Yes	3	8		3
		Mapping to different Crisis types and levels	Due to generic map formats U-Fly can be utilized in different crisis scenarios The RPV can be used in inhospitable environments to collect sensor data (cf. Fukushima)					
		Monitoring of current status of deployed resources	Monitoring of RPV position and status Monitoring of the mission status and mission progress					
	Selection of Resources Level	Monitoring of current resource level	The RPV can be assigned to permanently monitor the deployment of certain resources	Yes	3	8		3
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Positioning	The RPV can be assigned to permanently track certain resources	Yes	3	8		3
		Information (availability, status, resource level...)	Resource status in terms of movement, or action can be monitored					
	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	Yes	3	8		3
		Decision Support	RPV routing based on the most-up-to-date information					
	Tasks Management	Task Creation	Reconnaissance Tasks	Unclear	-	-	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.	3
		Task Prioritization	Operator has to weight tasks					
		Task Tracking, Reporting, Monitoring	Task progress can be monitored by the RPV					
	Information Sharing	Manually	Optionally information sharing through traditional communication channels	Yes	3	8		3
		Automatically	Sharing through image displaying					

<b>Name</b>		U-Fly	<b>General remarks to the tool</b>
<b>Description</b>		Research Ground Control Station	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.
<b>Main functionalities</b>		Mission Planning and Operation Sensor Data Visualization Mission status and mission progress monitoring	
<b>Provider</b>		DLR	
<b>Origin</b>	Internal		
<b>DRIVER Task</b>		T43.2 Airborne Sensor Processing	Usability (1=none ... 3=fully): 3 remarks: Although coming from another domain the usability seems to be very high thanks to the well-structured presentation
<b>CM Phasis</b>	Preparedness & Planning		
	Response	yes	
	Recovery	yes	
	all phases (Generic)	no	Position within the DRIVER System of Systems (potential integration with..., complementary to...) The integration seems to be very high, although it should be done partly automated and partly manually.
<b>Target Body</b>			
	Public health	no	
	Civil security	yes	
	Law enforcement	no	DLR Prototype
	Fire brigade	yes	
	All bodies (generic)	no	
<b>Licensing</b>	Commercial		
	Free	yes in DRIVER's context	yes in DRIVER's context
	Open-source	no	

Table 10: U-Fly, Evaluator MSB

Date	Evaluator org.	Evaluator name	DLR	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
			U-Fly/RPV-Demonstrator	Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
Task	Feature	Sub-feature						
T43.1 Damage and Needs Assessment	Gathering data from the field	Machine readable info	Airborne sensor data collection and data-downlink	Yes	2	5		
	Information preparation	Map view	Map overlays for areas, in which sensor data have successfully been collected	Yes	3	5		
	Decision support	Information processing for decision making purposes	The displayed sensor data will help the operator to plan/re-plan the mission				Not really decision support for the responders.	
T43.2	Assessment		Aerial images are acquired from RPAS	Yes	3	5		

Airborne sensor processing	based on airborne sensors		(remotely piloted aircraft system). The automatic real-time processing includes orthorectification into map coordinates, mosaicing, automatic traffic data extraction and downlink of data to the control station.					
	Flight planning/operation	Large radius of action	RPAS+3K tool can cover wide areas for regional and national disasters.	Partly	3		Limited by the range of the data link. If downlink fails it will be downlinked later which is good	
		Sensor-adaptive Flight Planning	Areas of interest can be defined by the end users. Re-planning of the flight path based on already collected sensor data	Yes	3	5		
T43.5 Shared situation awareness	Acquisition	Acquisition (manual / automatic)	Real time information gathering	Yes	3	5		
	COP Production	Fusion / Aggregation	Single camera frames are aggregated to georeferenced tiles	Yes	3	5		
		Visualization /filtering / Querying of common operational picture	Processed pictures (tiles) are displayed in form of map overlays in U-Fly's geographical environment	Yes	3	5		
	Equipment/Deployment	Control centers	U-Fly has an advanced HCI, with design focus set on intuitive and efficient human-machine interaction concepts	Yes	2	5		
T44.1 Capacity Building and Capacity Mapping Tools	Deployment of Resources	Decision Support	Planning and re-planning of the RPV mission (sensor suite deployment)	Yes	3	5		
		Mapping to different Crisis types and levels	Due to generic map formats U-Fly can be utilized in different crisis scenarios The RPV can be used in inhospitable environments to collect sensor data (cf. Fukushima)	Yes	3	5		
		Monitoring of current status of deployed resources	Monitoring of RPV position and status Monitoring of the mission status and mission progress	---	---	---	I didn't catch that during presentation	
	Selection of Resources Level	Monitoring of current resource level	The RPV can be assigned to permanently monitor the deployment of certain resources	Yes	3	5		
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Positioning	The RPV can be assigned to permanently track certain resources	Yes	3	5		
		Information (availability, status, resource level...)	Resource status in terms of movement, or action can be monitored				I didn't catch that during presentation	
	Assignment of	Monitoring	U-Fly enables the deployment of multiple	Yes	3	5	Monitoring flood progress is very	

	Resources to Tasks		RPAS at the same time Optimal RPV task assignment Point of interests, areas of interest can be added manually by the operator				important!	
		Decision Support	RPV routing based on the most-up-to-date information					
	Tasks Management	Task Creation	Reconnaissance Tasks				?	
		Task Prioritization	Operator has to weight tasks				?	
		Task Tracking, Reporting, Monitoring	Task progress can be monitored by the RPV				?	
	Information Sharing	Manually	Optionally information sharing through traditional communication channels	Yes	3	5		
		Automatically	Sharing through image displaying	Yes	3	5		

<b>Name</b>		U-Fly	<b>General remarks to the tool</b>		
<b>Description</b>		Research Ground Control Station	<b>Overall impression:</b>  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.		
<b>Main functionalities</b>		Mission Planning and Operation Sensor Data Visualization Mission status and mission progress monitoring			
<b>Provider</b>		DLR			
<b>Origin</b>	Internal				
<b>DRIVER Task</b>		T43.2 Airborne Sensor Processing			
<b>CM Phasis</b>	Preparedness & Planning		<b>Usability (1=none ... 3=fully):</b> remarks:  3. The tool for flight planning seemed user friendly but to us, the usability for the end user of the images is more relevant perhaps.		
	Response	yes			
	Recovery	yes			
	all phases (Generic)	no			
<b>Target Body</b>			<b>Position within the DRIVER System of Systems (potential integration with..., complementary to...)</b>  The plane may not be able to fly during the actual experiment.		
	Public health	no			
	Civil security	yes			
	Law enforcement	no			
	Fire brigade	yes			
	All bodies (generic)	no			
<b>Licensing</b>	Commercial	DLR Prototype			
	Free	yes in DRIVER's context			
	Open-source	no			

Table 11: ZKI, Evaluator WWU

Date	Evaluator org.	Evaluator name	ZKI	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
27.11.2014	WWU			Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
Task	Feature	Sub-feature						
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info	ZKI tool is tailored to the integration of georeferenced data from satellites and aerial imagery, vector data and is principally open for field data which need to be delivered by end users or by other portals	Yes		9		3 (*not being an expert in the area of aerial imagery the estimation of the evaluator is really limited)
		Machine readable info	Map products as image files, GeoPDF or OGC web services and ESRI REST Services	Yes				3
		Statistics and trend analysis	- Quantification of exposed and affected population / infrastructure assets in case of emergency situations, - Trend analysis in a sense of monitoring and quantifying changes in the spatial extent of different features (e.g. water extent).	Yes		9		3
	Assessment of risks	Risk catalogue	Risk can be addressed via the mapping of exposed or/and affected critical infrastructure, exposed assets & people	Partly	3	-	Not sure about how risks are identified, but this might be only a matter further explanations (time frame of presentations).	3
	Information preparation	Map view	Usually, a current or archived satellite or aerial image is used as map backdrop. Different thematic layers in vector format are used as map overlay: e.g., infrastructure, damage information, hazard information. Tables, map labels and map frame information (legend, interpretation texts...) complement the map view.	Yes		9		3
		List view	Lists or tables can be part of map products or information dossiers	Yes				
		Report generation	Technical and information dossiers which are delivered as PDF	Yes				
T43.2 Airborne sensor	Assessment based on airborne sensors		Imagery from optical and radar satellite as well as aerial imagery can be used for mapping purposes, products include simple	Yes		9		3

processing			image information maps, or more complex impact and damage assessments					
T43.3 Crisis dynamics & early warning	Translation of info into actionable info for EM users	Monitoring information	Terms, items, symbols and layout used in map products are adjusted to users' needs and standardized facilitating map interpretation /usage	Yes		9		3
	Dissemination	Dissemination (manual automatic)/	Users will be announced via RSS or email whenever new information is made available on the Web-portal	Yes		9		3

<b>Name</b>		ZKI	<b>General remarks to the tool</b>					
<b>Description</b>		24/7 service to provide satellite and airborne crisis mapping products and thematic monitoring.	Overall impression: ZKI is a very useful and established tool to fulfil the mentioned features.					
<b>Main functionalities</b>		Remote Sensing data ingestion, processing, analysis and information extraction. ISO standardized workflow for mapping, map production, delivery, display and archiving.						
<b>Provider</b>		DLR						
<b>Origin</b>	Internal	Internal						
<b>DRIVER Task</b>			Usability (1=none ... 3=fully): 3 remarks:					
<b>CM Phasis</b>	Preparedness & Planning	yes						
	Response	yes						
	Recovery	yes						
	all phases (Generic)	yes						
<b>Target Body</b>			Position within the DRIVER System of Systems (potential integration with..., complementary to...) relevant to the most other tools as the provided information have a very high bandwidth and quality.					
	Public health	yes						
	Civil security	yes						
	Law enforcement	yes						
	Fire brigade	yes						
	All bodies (generic)	yes						
<b>Licensing</b>	Commercial	commercial software products are used within the service (e.g., ESRI products)						
	Free							
	Open-source							
<b>Maturity</b>	Technology Readiness Level	9, full operational service (ww.zki.dlr.de)						

Table 12: ZKI, Evaluator MSB

Date	Evaluator org.	Evaluator name	ZKI	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info	ZKI tool is tailored to the integration of georeferenced data from satellites and aerial imagery, vector data and is principally open for field data which need to be delivered by end users or by other portals	Yes	2	9		
		Machine readable info	Map products as image files, GeoPDF or OGC web services and ESRI REST Services	Yes	3	9	Support of vector formats are much appreciated to enable reuse of the information for crisis managers in their own tools.	
		Statistics and trend analysis	- Quantification of exposed and affected population / infrastructure assets in case of emergency situations, - Trend analysis in a sense of monitoring and quantifying changes in the spatial extent of different features (e.g. water extent).	Yes	3	9		
	Assessment of risks	Risk catalogue	Risk can be addressed via the mapping of exposed or/and affected critical infrastructure, exposed assets & people	---	---	---		
	Information preparation	Map view	Usually, a current or archived satellite or aerial image is used as map backdrop. Different thematic layers in vector format are used as map overlay: e.g., infrastructure, damage information, hazard information. Tables, map labels and map frame information (legend, interpretation texts...) complement the map view.	Yes	3	9		
		List view	Lists or tables can be part of map products or information dossiers	---	---	---		
		Report generation	Technical and information dossiers which are delivered as PDF	Yes	2	9		
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Imagery from optical and radar satellite as well as aerial imagery can be used for mapping purposes, products include simple image information maps, or more complex impact and damage assessments	Yes	3	9		
T43.3 Crisis dynamics & early	Translation of info into actionable info for EM	Monitoring information	Terms, items, symbols and layout used in map products are adjusted to users' needs and standardized facilitating map interpretation /usage	Yes				



warning	users						
	Dissemination	Dissemination (manual automatic)/	Users will be announced via RSS or email whenever new information is made available on the Web-portal				

Name		ZKI	General remarks to the tool
Description		24/7 service to provide satellite and airborne crisis mapping products and thematic monitoring.	<p>Overall impression: My limited experience is that maps with processed satellite data are from Copernicus activations. It takes a very long time from satellite image requested and taken until the product is finally delivered. As a user I may want a less "prepared" format such as a vector file instead of a map product if that data may be available quicker than the final product.</p>
Main functionalities		Remote Sensing data ingestion, processing, analysis and information extraction. ISO standardized workflow for mapping, map production, delivery, display and archiving.	
Provider		DLR	
Origin	Internal	Internal	
DRIVER Task			
CM Phasis	Preparedness & Planning	yes	<p>Usability (1=none ... 3=fully): remarks: 3 - Maps and presented product seem very usable</p>
	Response	yes	
	Recovery	yes	
	all phases (Generic)	yes	
Target Body			<p>Position within the DRIVER System of Systems (potential integration with..., complementary to...)</p> <p>The tool can provide imagery and geodata for emergency management and disaster assessment for the Driver experiments. Information should be integrated into the common operational picture tools.</p>
	Public health	yes	
	Civil security	yes	
	Law enforcement	yes	
	Fire brigade	yes	
	All bodies (generic)	yes	
Licensing	Commercial	commercial software products are used within the service (e.g., ESRI products)	
	Free		
	Open-source		
Maturity	Technology Readiness Level	9, full operational service (ww.zki.dlr.de)	

Table 13: EmerT, Evaluator WWU

Date	Evaluator org.	Evaluator name	DLR	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info	- Up-to-date aerial image maps are a valuable information source for situation assessment (3K Sensor) - Up-to-date mobile traffic data information (floating <i>emergency</i> car data, indirect traffic detection of mobile devices (DYNAMIC), portable traffic-cams) - traffic data information (floating car data, induction loop, stationary Bluetooth detection, traffic cams, Munich, Cologne, Brunswick) - Traffic-data fusion and prediction	Yes	3	6 (although TRL seems higher, evaluator follows the tool provider estimation)		3
		Machine readable info	- data as image files, KML, OGC web services and REST Services					
	Situation analysis	Alerting	- Aerial images and traffic data to support the analysis of situation	Yes	3	6 (s.a.)		3
		Statistics and trend analysis						
	Assessment of risks	Risk catalogue		Yes	3	6 (s.a.)		3
		Simulation tools	Simulated view of current traffic situation showing possible traffic bottlenecks is generated from DLR SUMO tool					
	Information preparation	Map view	road network from NAVTEQ is used, rendered maps as map backdrop, different thematic layers are used as map overlay.	Yes	3	6 (s.a.)		3
		List view						
		Report generation						
	Decision support	Information processing for decision making purposes	Isochrone-map can be used, further more we have a risk routing which includes likelihoods of risks for possible routes	Yes	3	6 (s.a.)		3
Automatic decision modelling								
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Automated traffic detection from images. Demonstration of the further processing of the collected data. Traffic visualization and prognosis. Traffic prediction and situation support	Yes	3	6 (s.a.)		3
	Flight planning/operation							
T43.3	Translation of	Monitoring	- Aerial images and traffic data provides information as input for other	Yes	3	6 (s.a.)		3

Crisis dynamics & early warning	info into actionable info for EM users	information	tools. Aerial images (orthoprojected and mosaiced) give general overview about the disaster situation. - merged traffic situation und prediction give also an overview, shows bottlenecks, and are input for maintain supplies					
		Modelling, simulation and scientific advice	- Output of the 3K camera system can be used as input for other modelling, simulation and scientific advice tools. - Simulation based prediction of the traffic situation incorporating demand and infrastructure predictions [see DLR SUMO Tool]					
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Positioning	floating emergency car data and the indirect traffic detection of mobile devices (DYNAMIC) allows to monitoring the action force as well as the movement of civilian population in the affected area.	Yes	3	6 (s.a.)		3
		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	Yes	3	6 (s.a.)		3
		Decision Support	Isochrone-map can be used, further more we have a risk routing which includes likelihoods of risks for possible routes					
T44.4 Bottlenecks & Cascading Effects	Definition of Scenarios	Modelling	[see DLR SUMO]					
		Simulation	[see DLR SUMO]					
	Bottlenecks Analysis	Characterization	Journey/Trip time analyses for blue light driving operations	Yes	3	6 (s.a.)		
		Decision Support	[see DLR SUMO]					
Cascade Effects Analysis	Characterization	[see DLR SUMO]						
	Decision Support	[see DLR SUMO]						

<b>Name</b>	EmerT - Emergency Mobility of Rescue Forces and Regular Traffic	<b>General remarks to the tool</b>
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		
Usability (1=none ... 3=fully): 3 remarks:		
Position within the DRIVER System of Systems (potential integration with..., complementary to...) The output is of high interest for all logistics related tasks, many other tools can benefit from EmerT results		

Table 14: EmerT, Evaluator MSB

Date	Evaluator org.	Evaluator name	DLR					
			EmerT - Emergency Mobility of Rescue Forces and Regular Traffic	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info	- Up-to-date aerial image maps are a valuable information source for situation assessment (3K Sensor) - Up-to-date mobile traffic data information (floating <i>emergency</i> car data, indirect traffic detection of mobile devices (DYNAMIC), portable traffic-cams) - traffic data information (floating car data, induction loop, stationary Bluetooth detection, traffic cams, Munich, Cologne, Brunswick) - Traffic-data fusion and prediction	Y	3	7		
		Machine readable info	- data as image files, KML, OGC web services and REST Services	?	3	7		
	Situation analysis	Alerting	- Aerial images and traffic data to support the analysis of situation	Y	3	7		
	Assessment of risks	Simulation tools	Simulated view of current traffic situation showing possible traffic bottlenecks is generated from DLR SUMO tool	Y	3	7		
	Information preparation	Map view	road network from NAVTEQ is used, rendered maps as map backdrop, different thematic layers are used as map overlay.	Y	3			
	Decision support	Information processing for decision making purposes	Isochrone-map can be used, further more we have a risk routing which includes likelihoods of risks for possible routes	Y	3	7	Very relevant with a dynamic isochrone map	
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Automated traffic detection from images. Demonstration of the further processing of the collected data. Traffic visualization and prognosis. Traffic prediction and situation support	Y	3	7		
T43.3 Crisis dynamics & early warning	Translation of info into actionable info for EM users	Monitoring information	- Aerial images and traffic data provides information as input for other tools. Aerial images (orthoprojected and mosaiked) give general overview about the disaster situation. - merged traffic situation und prediction give also an overview, shows bottlenecks, and are					It would be very useful to be able to use information from EmerT in other situation assessment tools, rescue services own operational tools.

			input for maintain supplies					
		Modelling, simulation and scientific advice	- Output of the 3K camera system can be used as input for other modelling, simulation and scientific advice tools. - Simulation based prediction of the traffic situation incorporating demand and infrastructure predictions [see DLR SUMO Tool]	Y	3	7		
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Positioning	floating emergency car data and the indirect traffic detection of mobile devices (DYNAMIC) allows to monitoring 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		I can't recall seeing this at the demo but in any case this is a very interesting feature to exploit in Driver	
		Decision Support	Isochrone-map can be used, further more we have a risk routing which includes likelihoods of risks for possible routes	Y	3	7		It would be very useful to be able to use information from EmerT in other situation assessment tools, rescue services own operational tools.
T44.4 Bottlenecks & Cascading Effects	Definition of Scenarios	Modelling	[see DLR SUMO]					
		Simulation	[see DLR SUMO]					
	Bottlenecks Analysis	Characterization	Journey/Trip time analyses for blue light driving operations					
		Decision Support	[see DLR SUMO]					
	Cascade Effects Analysis	Characterization	[see DLR SUMO]					
		Decision Support	[see DLR SUMO]					

<b>Name</b>	EmerT - Emergency Mobility of Rescue Forces and Regular Traffic	<b>General remarks to the tool</b>
Overall impression: This tool seems very mature and rich in functionality.		
Usability (1=none ... 3=fully): 3 remarks:		
Position within the DRIVER System of Systems (potential integration with..., complementary to...)		
I think it will be very central in Driver especially if its information content can be shared with other tools. All "other common operational picture" / "situation assessment" type of tools would benefit from integrating data from EmerT.		

Table 15: SUMO, Evaluator WWU

Date	Evaluator org.	Evaluator name	DLR	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
			SUMO - Simulation of urban traffic					
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info						
		Machine readable info						
	Situation analysis	Alerting						
		Statistics and trend analysis						
	Assessment of risks	Risk catalogue			Yes	3	7	
Simulation tools		Generating simulated view of current traffic situation showing possible traffic bottlenecks						
Automatic decision modelling								
T43.3 Crisis dynamics & early warning	Translation of info into actionable info for EM users	Monitoring information		Yes	3	7		
		Modelling, simulation and scientific advice	Simulation based prediction of the traffic situation incorporating demand and infrastructure predictions					
T44.1 Capacity Building and Capacity Mapping Tools	Deployment of Resources	Decision Support						
		Mapping to different Crisis types and levels						
		Monitoring of current status of deployed resources						
	Contingency Plans Definition	Mapping to different Type of Crisis						
		Mapping to different crisis levels						
	Selection of Resources Level	Monitoring of current resource level						
		Decision Support						
Risk Assessment	Risk catalogue			Yes	3	7		3
	Simulation tools	Simulating road network capacities						
	Supply Forecast							
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Positioning		Yes	3	7		3
		Information (availability, status, resource level...)	Feeding current travel times into reachability analysis (see EmerT)					
T44.4	Definition of	Modelling	Importing street networks and	Y	3	7		3

Bottlenecks & Cascading Effects	Scenarios		demand data to model street traffic					
		Simulation	simulating traffic jams as well as rerouting effects and changes in demand					
	Bottlenecks Analysis	Characterization	showing effects of jammed streets	Y	3	7		3
		Decision Support	scenario modelling (what happens if I block road X instead of Y)					
	Cascade Effects Analysis	Characterization	incorporating movement of special vehicles	Partly	3	7	If understood correct the consideration of special vehicles like heavy weight transports is proceeded in EmerT, but not sure here	3
		Decision Support	routing advice (see EmerT)					

<b>Name</b>	SUMO Simulation of Urban Mobility	<b>General remarks to the tool</b>
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,		
Usability (1=none ... 3=fully): 2-3 remarks: 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 (potential integration with..., complementary to...) 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).		

Table 16: SUMO, Evaluator MSB

Date	Evaluator org.	Evaluator name	DLR	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
			SUMO - Simulation of urban traffic					
T43.1 Damage and Needs Assessment	Assessment of risks	Simulation tools	Generating simulated view of current traffic situation showing possible traffic bottlenecks	Yes	3	7		
T43.3 Crisis dynamics & early warning	Translation of info into actionable info for EM users	Modelling, simulation and scientific advice	Simulation based prediction of the traffic situation incorporating demand and infrastructure predictions	Yes	3	7		
T44.1 Capacity Building and Capacity Mapping Tools	Risk Assessment	Simulation tools	Simulating road network capacities	Yes	3	7		
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Information (availability, status, resource level...)	Feeding current travel times into reachability analysis (see EmerT)	Yes	3	7		
T44.4 Bottlenecks & Cascading Effects	Definition of Scenarios	Modelling	Importing street networks and demand data to model street traffic	Yes	3	7		
		Simulation	simulating traffic jams as well as rerouting effects and changes in demand	Yes	3	7		
	Bottlenecks Analysis	Characterization	showing effects of jammed streets	Yes	3	7		
		Decision Support	scenario modelling (what happens if I block road X instead of Y)	Yes	3	7		
	Cascade Effects Analysis	Characterization	incorporating movement of special vehicles	Yes	1	7	I cant see relevance to cascading effects.	
		Decision Support	routing advice (see EmerT)	---	---			

Name	SUMO Simulation of Urban Mobility	General remarks to the tool
Overall impression: Seems very useful to most cases where traffic simulation is needed.		
Usability (1=none ... 3=fully): 3 remarks:		
Position within the DRIVER System of Systems (potential integration with..., complementary to...)		
Useful as a service to other tools that need to complement with traffic simulation.		



Table 17: ESS, Evaluator AIT 1

Date	Evaluator org.	Evaluator name	GMV Sistemas					
25.11.2014	AIT		ESS	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info	Text and pictures entered by responders via Android application	Yes	3		In my opinion having a middleware service which is capable of integrating different sources of observations and sharing the raw data and fused results with other tools would help us to avoid duplication of efforts in DRIVER. Maybe this application could be used as one?	3
		Machine readable info	Integration of sensors via Data Fusion and Mediation System (DFMS)					
	Assessment of risks	Simulation tools	Gas spread, flood and fire simulation.	yes	3		The simulation part of the tool (GUI) appears quite interesting to me. The question is: how much work (if any) is required to make these simulations work in a new area?	3
	Information preparation	Map view	Selectable overlays on base map; Dynamic import of geo-referenced data layers	yes	2		My impression of the GMV map view is that it's a good tool for technical users which need to figure out which sensors are out there before trying to use them in own tools.  That's OK if the tool is used as a middleware, but i have doubts concerning ist usability for end users.	2
List view		Filtered lists of items (visible in the map pane or all)						
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Cameras and sensors integrated in UAV and balloons.	yes	2		Integration of airborne cameras seems to work well, nice to have. There is no support for assessment, the tool simply shows the view from airborne camera	2
T43.3 Crisis dynamics & early warning	Translation of info into actionable info for EM users	Monitoring information	Traffic information from road network sensors (ITIS)					
	Distribution of warnings (public and to operators of critical infrastructure and	preparation of warnings	Alerting tool for SMS broadcasting through regular phone network (ALCATEL) and network hijacking (IMSI Catcher)	yes	3		The tool allows mass-sending the SMS and voice messages - even in the situation where network is not available	2
		authorisation of warnings	ESS alerts are considered authorized by the broadcasting systems.					
		distribution of	Alerting tool for SMS broadcasting					

	enterprises)	warnings	through regular phone network (ALCATEL) and network hijacking (IMSI Catcher)					
T43.4 Interaction with citizens	Usage of social media	gathering of situational awareness info	Situational awareness information can be gathered via twitter and facebook	yes	2		The tool can also send messages to twitter, or facebook and also present the responses. Not quite sure what is the advantage of doing so compared to simply using twitter/facebook application.	2
	Usage of social media	pushing warnings via social media	Publishing of information to ESS social media accounts (Twitter, Facebook)					
	Usage of crowd tasking	Info collection (citizen as a sensor) Supporting relief actions (citizen as a volunteer)	Public can comment on information published by ESS Requests for collaboration can be sent via social media and SMS (Messaging campaigns)	partial	2		Most usable for sending mass requests and messages - even in the situation where mobile network is down. Does not target specific groups or individuals. That's OK and very useful, but only partially addresses the "citizen as a sensor/volunteer" requirements.	2
T43.5 Shared situation awareness	COP Production	Visualization /filtering / Querying of common operational picture	COP can be setup in the ESS interface, stored and shared with other EM				not demonstrated?	
	Dissemination	Dissemination (manual automatic)/	COP can be shared with other ESS users				not demonstrated?	
	Equipment/ Deployment	Control centers	ESS is a portable and deployable emergency response system including a portable C3I, resilient communication system and on-field deployable sensors					not demonstrated?
Field devices		Multiple field devices were used in the project, including: UAV, UGV, Balloons, and ruggedized On-Board Units that can connect to a host of sensors and vehicles						
T44.1 Capacity Building and Capacity Mapping Tools	Deployment of Resources	Decision Support	List of available resources				not demonstrated?	
		Monitoring of current status of deployed resources	All resources equipped with an OBU are monitored in real time and the status and location of responders with the Android application are displayed on the map.					
	Risk Assessment	Simulation tools	Gas spread, flood and fire simulation.	yes	3		very useful if it can be used "anywhere" without much work. Even more so if we could use this as a service and thus incorporate the functionality in other tools.	3
T44.2 Tasking and	Resource Monitoring	Positioning	All resources equipped with an OBU are monitored in real time.				not demonstrated?	

Capacity Monitoring		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.	yes	3			3
T45.2 Collaborative tools (GMV)	Collaborative ECM management	Security / Rights management	Possibility to invite and manage the security rights of new users				not demonstrated?	

<b>Name</b>		ESS	<b>General remarks to the tool</b>	
<b>Description</b>		The Emergency Support System (ESS) is a suite of real-time data-centric technologies which 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-theater command and control centers (C&C).	Overall impression: 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:	
<b>Main functionalities</b>		Integrate data from various sources into a common information management and communication platform Develop portable and mobile smart communication elements for supporting the management and coordination of emergency operations Integrate ad hoc networking technology of intelligent sensors for addressing emergency and crisis management requirements	<ul style="list-style-type: none"> <li>- middleware for gathering and sharing of information from various sources.</li> <li>- mass-informing functionality through several channels. Most interesting appears to be a feature which allows sending of SMSs to everyone in an area even if the network is down.</li> <li>- modelling sub-system which can be used to assess and predict the risk development for certain types of events (e.g. fire)</li> </ul>	
<b>Provider</b>		GMV SAU		
<b>Origin</b>	Internal	FP7 project		
<b>DRIVER Task</b>		T43.4, T43.5, T44.1, T44.2, T44.4, T45.2		
<b>CM Phasis</b>	Preparedness & Planning	no	Usability (1=none ... 3=fully): 3 remarks:	
	Response	yes		
	Recovery	no		
	all phases (Generic)		Position within the DRIVER System of Systems (potential integration with..., complementary to...) 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.	
<b>Target Body</b>	Public health			
	Civil security			
	Law enforcement			
	Fire brigade			
	All bodies (generic)	yes		
<b>Licensing</b>	Commercial	no		
	Free	no		
	Open-source	no		
<b>Maturity</b>	Technology Readiness Level	7		

Table 18: ESS, Evaluator AIT 2

Date	Evaluator org.	Evaluator name	GMV Sistemas	Feature available	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? Taking trends into consideration	
Task	Feature	Sub-feature		Yes / No / Partly	0=none 3=fully	1=basic 9=proven	free text	0=not at all ... 3=fully + free text	
25.11.2014	AIT		ESS						
T43.1 Damage and Needs Assessment	Gathering data from the field	Human readable info	Text and pictures entered by responders via Android application	Yes	3	6-7	How are observations verified?	3	
		Machine readable info	Integration of sensors via Data Fusion and Mediation System (DFMS)						
	Assessment of risks	Simulation tools	Gas spread, flood and fire simulation.	yes	3	6-7	How are the events modelled?	3	
	Information preparation	Map view	Selectable overlays on base map; Dynamic import of geo-referenced data layers	yes	3	6-7	Useful for COP	2	
		List view	Filtered lists of items (visible in the map pane or all)						
T43.2 Airborne sensor processing	Assessment based on airborne sensors		Cameras and sensors integrated in UAV and balloons.	yes	2-3	N/A	Not so clear what the tool can do with airborne sensors.	2-3	
T43.3 Crisis dynamics & early warning	Translation of info into actionable info for EM users	Monitoring information	Traffic information from road network sensors (ITIS)						
	Distribution of warnings (public and to operators of critical infrastructure and enterprises)	preparation of warnings	Alerting tool for SMS broadcasting through regular phone network (ALCATEL) and network hijacking (IMSI Catcher)	yes	3	N/A	The tool allows to send mass SMS and voice messages. Unclear if they can be distributed to specific groups only.	2	
		authorisation of warnings	ESS alerts are considered authorized by the broadcasting systems.						
distribution of warnings	Alerting tool for SMS broadcasting through regular phone network (ALCATEL) and network hijacking (IMSI Catcher)								
T43.4 Interaction with citizens	Usage of social media	gathering of situational awareness info	Situational awareness information can be gathered via twitter and facebook	yes	3	N/A	Sends messages also to twitter and facebook	2	
	Usage of social media	pushing warnings via social media	Publishing of information to ESS social media accounts (Twitter, Facebook)						
	Usage of crowd tasking	Info collection (citizen as a sensor)	Public can comment on information published by ESS		partial	2	N/A		2
		Supporting relief actions (citizen as a volunteer)	Requests for collaboration can be sent via social media and SMS (Messaging campaigns)						

T43.5 Shared situation awareness	COP Production	Visualization /filtering / Querying of common operational picture	COP can be setup in the ESS interface, stored and shared with other EM	yes	3			3
	Dissemination	Dissemination (manual automatic)/	COP can be shared with other ESS users					
	Equipment/ Deployment	Control centers	ESS is a portable and deployable emergency response system including a portable C3I, resilient communication system and on-field deployable sensors					
Field devices		Multiple field devices were used in the project, including: UAV, UGV, Balloons, and ruggedized On-Board Units that can connect to a host of sensors and vehicles						
T44.1 Capacity Building and Capacity Mapping Tools	Deployment of Resources	Decision Support	List of available resources					
		Monitoring of current status of deployed resources	All resources equipped with an OBU are monitored in real time and the status and location of responders with the Android application are displayed on the map.					
	Risk Assessment	Simulation tools	Gas spread, flood and fire simulation.	yes	3			3
T44.2 Tasking and Capacity Monitoring	Resource Monitoring	Positioning	All resources equipped with an OBU are monitored in real time.					
		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.	yes	3			3
T45.2 Collaborative tools (GMV)	Collaborative ECM management	Security / Rights management	Possibility to invite and manage the security rights of new users					

<b>Name</b>		ESS	<b>General remarks to the tool</b>
<b>Description</b>		The Emergency Support System (ESS) is a suite of real-time data-centric technologies which 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-theater command and control centers (C&C).	Overall impression: Appears to be a very mature tool with a lot of possible use cases in CDM and in the environmental domain.
<b>Main functionalities</b>		Integrate data from various sources into a common information management and communication platform Develop portable and mobile smart communication elements for supporting the management and coordination of emergency operations Integrate ad hoc networking technology of intelligent sensors for addressing emergency and crisis management requirements	
<b>Provider</b>		GMV SAU	
<b>Origin</b>	Internal	FP7 project	
<b>DRIVER Task</b>		T43.4, T43.5, T44.1, T44.2, T44.4, T45.2	

<b>CM Phasis</b>	Preparedness & Planning	no	Usability (1=none ... 3=fully): 3 remarks: Is it only for COP during the crises or also in all other phases?
	Response	yes	
	Recovery	no	
	all phases (Generic)		
<b>Target Body</b>	Public health		Position within the DRIVER System of Systems (potential integration with..., complementary to...) 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 crowdtasking.
	Civil security		
	Law enforcement		
	Fire brigade		
<b>Licensing</b>	All bodies (generic)	yes	
	Commercial	no	
	Free	no	
	Open-source	no	
<b>Maturity</b>	Technology Readiness Level	7	

*Advice: 27 Nov*

DRIVER DPC 22 (round of experiments and evaluation)

Task	Objective req.	Technical items	DSF	Feature Feasibility	Feature Priority	Feature Difficulty	Suggested improvements / additional considerations (positive/negative)	Value captured in the future? (long/short term considerations)
74.1 Damage and Health Assessment	Exchanging data from the host	Relative location info	Airborne sensor data collection and data transfer					
		Information preparation	Map overlay for cross, in which sensor data have successfully been collected	Y	3			
		Decision support	Information processing for decision-making (DSF/DSI)	The displayed sensor data are? being the user able to identify the mission	Y	3		
74.2 Efficient sensor scheduling	Assessment based on airborne sensor		Partial images are processed from (BMA) currently ground-based systems. The systems real-time processing includes an image fusion that may include, tracking and detection of data in the sensor system					
		Flight planning operation	Large volume of sensor	BMA-30 can work with areas for regional and national datasets	Y	3		
		Sensor selection / flight planning	Area of interest can be defined for the end user. An ordering of the flight path based on priority selected sensor data	Y	3			
74.3 Global situation awareness	Adaptation	Information (manual / automatic)	Real time information gathering					
		DSF Production	Filter / Aggregation	Input sensor frames are aggregated to compressed data				
		Visualization / filtering / filtering of sensor (as sensor) paths	Processed sensor (DSF) are displayed in form of map centered on the flight geographical environment					
	Assessment / Department	Control Centers	AI is an advanced VCI with design focus on an interface and efficient human-machine interaction strategy	Y	3	6	2 sensors needed. Feasibility of VCI, etc. integration.	
74.4 Capacity Building and Support	Deployment of resources	Decision support	Planning and re-planning of the BMA sensor sensor data deployment					

DRIVER DPA 22 (List of experiments - test evaluations)

				D-PM/MPV Demonstration			Suggested improvements (positive/negative)		Future potential of the subject? (adding items into current plan)
Task/Activity	Resource	Task/Activity	Description	Task Success	Resource Utilization	Task Success	Task Success		
Mapping/Task		Mapping to different (test) tasks and levels	Due to generic test formats (D-PM) can be utilized in different test scenarios. The MPV can be used in collaborative environments to collect sensor data (if allowed)	/					
		Monitoring of system status of testbed elements	Monitoring of MPV position and status. Monitoring of the mission status and mission progress.						
	Allocation of Resources (test)	Monitoring of current resource level	The MPV can be assigned to automatically monitor the deployment of certain resources.						
Task/Tasking and Capacity Monitoring	Resource Monitoring	Monitoring	The MPV can be designed to automatically track certain resources.	/	3				
		Information (availability, status, resource level, ...)	Resource status in terms of availability, or when you're monitored.						
	Assignment of Resources to Tasks	Monitoring	D-PM enables the distribution of multiple MPVs at the same time. Monitor MPV task assignment. Point of interest, areas of interest can be added manually by the operator. MPV routing based on the most up-to-date information.						
		Resource Support							
		Task Management							
	Task Management	Task Creation	Administrative Tasks						
		Task Prioritization	Operator has to assign tasks.						
		Task Tracking, Reporting, Monitoring	Task progress can be monitored by the test.						
	Information Storage	Manually	Necessary information stored through traditional communication channels.						
		Automatically	Storing through image stitching.						



DRIVER M4 (2) round of experiments - final evaluation

			U-Fly M4 - Demonstration	Platform Availability	System Reliability	System Security	Suggested Improvements / Additional Requirements (optional/optional)	Future potential of the system/ Using U-Fly M4 demonstration
Name			U-Fly	Several systems in the past				
Description			Research, Control, Control Station Mission Planning and Operation Sensor Data Visualization Mission Status and Mission progress monitoring					
Main Responsibilities			Control	Availability Issues - U-Fly reliable				
Origin			Internal					
DRIVER Task			U-Fly Airborne Sensor Processing	Mission within the DRIVER system of hardware substituted / integrated with / complementary to ...				
DR Process	Preparation & Planning							
	Resources		yes					
	Access		yes					
	All process Generated		no					
Target Body								
	Public Health		no					
	Oil Spills		yes					
	Law Enforcement		no					
	Fire Search		yes					
	All bodies Generated		no					
Learning	Command		U-Fly Platform					
	Plan		yes in DRIVER's context					
	Control Station		no					

Figure 3: U-Fly, Evaluator Pole, Marseille Fire Department



TABLE 214 (continued) (continued)

Task	Deliverable	Performance Goals	DoD	Major Milestones	Phase 1	Phase 2	Phase 3	Support/Implementation/Additional Information/Comments/Notes	Other Information/Details/Notes/Comments
Task	Deliverable	Performance Goals	DoD	Major Milestones	Phase 1	Phase 2	Phase 3	Support/Implementation/Additional Information/Comments/Notes	Other Information/Details/Notes/Comments
143.1 Sensor and Data Assessment	Gathering data from the test	Deliverable: Data files	Acquire sensor data collection and distribution	yes	3				
	Information presentation	Map view	Map coverage for areas in which sensor data was successfully collected		2			Map view of flight	Map view of flight
	Sensor layout	Information processing for decision-making systems	For deployed sensor data will have the sensor to provide data for mission						
143.2 Airborne sensor processing	Assessment based on airborne sensors		Aerial images are received from (M4) secondary payload (small sensor). The automatic real-time processing includes image registration, link map correlation, georegistration and download of data to the ground station.						
	Flight planning/operation	Large volume of data	M4-PC test can cover wide areas for regional and national detection		3			Volume of data to be processed	
		Sensor location flight planning	Area of interest can be defined by the end user. An planning of the flight path based on already collected sensor data		3				
143.3 Ground station assessment	Acquisition	Acquisition (manual / automatic)	Real time information gathering		3				
	GEF Production	Process / Aggregation	Single sensor frames are aggregated in georegistered M4		3				
		Visualization / Filtering / Querying of common information	Processed products (M4) are displayed in form of map overlay in C4I's geospatial environment						
	Support/Integration	Control system	On the test an advanced GUI, with simple base set an intuitive and efficient human-machine interaction concept						
143.4 Capabilities Building and Capacity	Deployment of resources	Control system	Planning and re-planning of the M4 mission sensor with replacement						

TABLE 24. (continued) Experiment - test evaluation

			Is the task demonstrated?	Human available	Human resources	Human efforts	Supporting measurements / qualitative considerations (perceived)	Future potential of the feature? / Any needs for consideration
Testing Item		Mapping to different flight types and levels	It is proven that forward UTM can be achieved efficient since available. The RPI can be used in appropriate scenarios to collect sensor data of task area.		3			
		Monitoring of current status of assigned aircraft	Monitoring of RPI position and status. Monitoring of the mission status and sensor status.					
	Selection of Resource Level	Monitoring of current resource level	The RPI can be assigned to permanently monitor the capabilities of various resources.		1-2		Handwritten notes: "Handwritten notes: 'The RPI can be assigned to permanently monitor the capabilities of various resources.'"	
Task Management	Resource Monitoring	Monitoring	The RPI can be assigned to permanently monitor various resources.					
		Information Availability (Data, Resource Level)	Resource status in terms of movement, or action (or to be taken).					
	Assignment of Resources to Tasks	Monitoring	U-UTM enables the assignment of multiple RPIs at the same time against RPI task assignment. Point of interests, areas of interest can be added manually by the operator.					
		Decision Support	RPI routing based on the need up to date information.					
		Task Management	Task Creation	Recommenced Task				
	Information Sharing	Task Prioritization	Operator has to weight tasks.					
		Task Tracking, Reporting, Monitoring	Task progress can be monitored by the RPI monitoring.					
	Information Sharing	Manuals	Operator information sharing through graphical command set through		3		Handwritten notes: "Handwritten notes: 'Operator information sharing through graphical command set through'"	
		Automatically	Sharing through image streaming					

(2008-2011) in view of experiments - no evaluation

U-Fly/APP Demonstration			Feature available	Feature emerging	Feature maturing	Supported environment/ platform / implementation (software/hardware)	Value added to my target? (adding benefit/ cost/ complexity)
Name	U-Fly		General Mission				
Architecture	Access to Global Control Station Mission Planning and Control Sensor Data Evaluation Mission Status and Mission Progress Monitoring		<p>Interesting in order to get an overview                      processing of years by a plane is (20) approx                      Groups (25 not more frequently)                      - could be interesting in order to see what happens                      - by 15000 units is budget</p> <p>Further value to Global Station of sensor data/mission with... (something is...)</p>				
Key Capabilities	Mission Status and Mission Progress Monitoring						
Product	U-Fly						
Orbit	Mission						
DRIVER Team	U-Fly/APP Sensor Processing						
U-M Team	Processing & Planning						
	Request	yes					
	Mission	yes					
	U-Mission (General)	no					
Target Role							
	U-Mission	no					
	U-Mission	no					
	U-Mission	no					
	U-Mission	no					
	U-Mission (General)	no					
Learning	U-Fly/APP						
	U-Fly	yes in DRIVEN's order					
	U-Mission	no					

Figure 4: U-Fly, Evaluator A. THW

(Continued from previous page)

Item	Requirement	Functional Group	Description	Y/N	3	8	Other	Comments
10.1 Data Processing Requirements	Processing of raw data	Raw data	Raw data is defined as the output of the sensor after the raw data has been collected and stored on the sensor. It is not processed in any way and is not yet ready for use by the user.	Y				
		Processed data	Processed data is defined as data that has been processed by the sensor and is ready for use by the user.	Y	3			
		Metadata	Metadata is defined as data that describes the data. It includes information such as the date and time of collection, the location of the sensor, and the type of sensor.	Y	7			
		Quality control	Quality control is defined as the process of ensuring that the data is accurate and reliable. This includes checking for errors and anomalies in the data.	Y				
		Storage	Storage is defined as the process of storing the data for future use. This includes ensuring that the data is stored in a secure and accessible format.	Y	3			
10.2 Data Processing Performance	Processing of raw data	Raw data	Raw data is defined as the output of the sensor after the raw data has been collected and stored on the sensor. It is not processed in any way and is not yet ready for use by the user.	Y				
		Processed data	Processed data is defined as data that has been processed by the sensor and is ready for use by the user.	Y	3	8		
10.3 Data Processing Integration	Integration of data	Integration of data	Integration of data is defined as the process of combining data from different sources into a single, unified view. This includes ensuring that the data is accurate and reliable.	Y				
		Integration of metadata	Integration of metadata is defined as the process of combining metadata from different sources into a single, unified view. This includes ensuring that the metadata is accurate and reliable.	Y				

TABLE 5: ZKI, EVALUATOR POLE, MARSEILLE FIRE DEPARTMENT

			Phase 1 Analysis	Phase 2 Synthesis	Phase 3 Evaluation	Phase 4 Reporting
Item	Y/N					
Objective	Y	Identify the main issues and determine the required resources and human resources				
Key Deliverables	Y	Final Report and System Architecture, Design and Technical Solution. An implementation strategy for the system.				
Phase	Y/N					
Start	Phase	Phase				
End	Phase	Phase				
Phase 1	Phase 1 & 2	Y/N				
Phase 2	Phase 2	Y/N				
Phase 3	Phase 3	Y/N				
Phase 4	Phase 4	Y/N				
Phase 5	Phase 5	Y/N				
Phase 6	Phase 6	Y/N				
Phase 7	Phase 7	Y/N				
Phase 8	Phase 8	Y/N				
Phase 9	Phase 9	Y/N				
Phase 10	Phase 10	Y/N				
Phase 11	Phase 11	Y/N				
Phase 12	Phase 12	Y/N				
Phase 13	Phase 13	Y/N				
Phase 14	Phase 14	Y/N				
Phase 15	Phase 15	Y/N				
Phase 16	Phase 16	Y/N				
Phase 17	Phase 17	Y/N				
Phase 18	Phase 18	Y/N				
Phase 19	Phase 19	Y/N				
Phase 20	Phase 20	Y/N				
Phase 21	Phase 21	Y/N				
Phase 22	Phase 22	Y/N				
Phase 23	Phase 23	Y/N				
Phase 24	Phase 24	Y/N				
Phase 25	Phase 25	Y/N				
Phase 26	Phase 26	Y/N				
Phase 27	Phase 27	Y/N				
Phase 28	Phase 28	Y/N				
Phase 29	Phase 29	Y/N				
Phase 30	Phase 30	Y/N				
Phase 31	Phase 31	Y/N				
Phase 32	Phase 32	Y/N				
Phase 33	Phase 33	Y/N				
Phase 34	Phase 34	Y/N				
Phase 35	Phase 35	Y/N				
Phase 36	Phase 36	Y/N				
Phase 37	Phase 37	Y/N				
Phase 38	Phase 38	Y/N				
Phase 39	Phase 39	Y/N				
Phase 40	Phase 40	Y/N				
Phase 41	Phase 41	Y/N				
Phase 42	Phase 42	Y/N				
Phase 43	Phase 43	Y/N				
Phase 44	Phase 44	Y/N				
Phase 45	Phase 45	Y/N				
Phase 46	Phase 46	Y/N				
Phase 47	Phase 47	Y/N				
Phase 48	Phase 48	Y/N				
Phase 49	Phase 49	Y/N				
Phase 50	Phase 50	Y/N				
Phase 51	Phase 51	Y/N				
Phase 52	Phase 52	Y/N				
Phase 53	Phase 53	Y/N				
Phase 54	Phase 54	Y/N				
Phase 55	Phase 55	Y/N				
Phase 56	Phase 56	Y/N				
Phase 57	Phase 57	Y/N				
Phase 58	Phase 58	Y/N				
Phase 59	Phase 59	Y/N				
Phase 60	Phase 60	Y/N				
Phase 61	Phase 61	Y/N				
Phase 62	Phase 62	Y/N				
Phase 63	Phase 63	Y/N				
Phase 64	Phase 64	Y/N				
Phase 65	Phase 65	Y/N				
Phase 66	Phase 66	Y/N				
Phase 67	Phase 67	Y/N				
Phase 68	Phase 68	Y/N				
Phase 69	Phase 69	Y/N				
Phase 70	Phase 70	Y/N				
Phase 71	Phase 71	Y/N				
Phase 72	Phase 72	Y/N				
Phase 73	Phase 73	Y/N				
Phase 74	Phase 74	Y/N				
Phase 75	Phase 75	Y/N				
Phase 76	Phase 76	Y/N				
Phase 77	Phase 77	Y/N				
Phase 78	Phase 78	Y/N				
Phase 79	Phase 79	Y/N				
Phase 80	Phase 80	Y/N				
Phase 81	Phase 81	Y/N				
Phase 82	Phase 82	Y/N				
Phase 83	Phase 83	Y/N				
Phase 84	Phase 84	Y/N				
Phase 85	Phase 85	Y/N				
Phase 86	Phase 86	Y/N				
Phase 87	Phase 87	Y/N				
Phase 88	Phase 88	Y/N				
Phase 89	Phase 89	Y/N				
Phase 90	Phase 90	Y/N				
Phase 91	Phase 91	Y/N				
Phase 92	Phase 92	Y/N				
Phase 93	Phase 93	Y/N				
Phase 94	Phase 94	Y/N				
Phase 95	Phase 95	Y/N				
Phase 96	Phase 96	Y/N				
Phase 97	Phase 97	Y/N				
Phase 98	Phase 98	Y/N				
Phase 99	Phase 99	Y/N				
Phase 100	Phase 100	Y/N				

Figure 5: ZKI, Evaluator Pole, Marseille Fire Department

7

TABLE 211 (continued) of Identifiable Task Activities

Task ID	Task Name	Task Category	Task Description	Task Status	Task Priority	Task Complexity	Task Duration	Task Effort	Task Resources
211.1	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.2	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.3	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.4	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.5	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.6	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.7	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.8	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.9	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.10	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.11	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.12	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.13	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.14	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.15	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.16	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.17	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.18	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.19	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						
211.20	Identify sensor processing tasks	Task Category	Identify sensor processing tasks that are required for the mission and are not currently being performed by the system.						





Date	Task no.	Task name	SR	Task priority	Task status	Task owner	Reporting instrument / additional considerations (optional)	Task priority of the delivery (being mostly into consideration)	
Task	Feature	Sub-feature		Y/N / 1/0	Done / In-Progress	Lead	Not yet	Not at all / 1/0	
22.04	P4.1.1.1	Highway...	SMART - Emergency Analysis of Vehicle Events and Roadside Traffic						
T4.1 Storage and Road Assessment	Gathering data from the road	Human incidents into	<ul style="list-style-type: none"> <li>Assemble aerial image maps are a valuable information source for situation assessment (SR - based)</li> <li>Assemble mobile traffic data information (during emergency - car data, accident traffic, detection of mobile devices (PHONES), portable traffic cams)</li> <li>traffic data information (floating car data, induction loop, portable flowmeters)</li> <li>detectors, traffic cams, mobile, image, flowmeters)</li> <li>Traffic data fusion and prediction</li> </ul>						
		Machine readable only	- Data as image files, (M4, IIC) with servers and API access						
		Visualisation	starting	- Aerial images and traffic data to support the analysis of situation	Y	3	8		
		Assessment of risks	Simulation tools	Simulated view of current traffic situation, road network from live/old data	Y	3			
		Information preparation	Map view	combined map to map facilities, different feature layers are used at road level					
	Decision support	information processing for decision-making process	contour maps can be used, further more we have a risk routing which includes thresholds of M4 for possible routes						
T4.2	Advanced sensor processing		Advanced traffic detection from images. Classification of the further processing of the collected data. Traffic visualization and prognosis. Traffic prediction and situation support	Y	3	8			
T4.3	Cross domain & early warning	Monitoring information	<ul style="list-style-type: none"> <li>Aerial images and traffic data provide information as input for other tools. Aerial images (enhanced) and investigated the general overview about the disaster situation</li> <li>merged traffic situation and prediction give data on accidents, closed bottlenecks, and are input for decision support</li> </ul>	Y	3				

			EmerT - Emergency Mobility of Rescued Assets and Regulate Traffic	Features available	System resources	Human resources	Subjected to requirements / Additional considerations (positive/negative)	Other potential of the resource / Tasking issues (non-compatibility)
		Modeling, simulation and scientific advice	<ul style="list-style-type: none"> <li>Output of the AI sensor system can be used as input for other modeling, simulation and scientific advice tools.</li> <li>Stochastic based prediction of the traffic situation (incorporating demand and infrastructure prediction) (see OLR 5044) tool</li> </ul>					
Task 1: Tasking and Capacity Monitoring	Resource Monitoring	Monitoring	<ul style="list-style-type: none"> <li>Tracking emergency car data and the predicted traffic detection of mobile devices.</li> <li>EMER-T allows to monitor the system behavior with the assessment of vehicle availability in the affected area.</li> </ul>					
		Information Availability, status, resource level	Information are provided at high level of SOC with services and MDT services.					
	Assignment of Resources to Tools	<ul style="list-style-type: none"> <li>Monitoring</li> <li>Resource Support</li> </ul>	<ul style="list-style-type: none"> <li>Information are provided at high level of SOC with services and MDT services.</li> <li>Software tools can be used, further could be have a tool using which includes likelihood of this to possible state.</li> </ul>					
Task 4: Performance & Capacity Effects	Definition of Resource	Modeling	(see OLR 5044)					
		Simulation	(see OLR 5044)					
	Resource Analysis	Characterization	Accuracy for time intervals for blue light driving operations					
		System Support	(see OLR 5044)					
Capacity Effects Analysis	Characterization	(see OLR 5044)						
	Resource Support	(see OLR 5044)						

Figure 7: EmerT, Evaluator Pole, Marseille Fire Department

Sheet - Emergency Mobility of Rescue Forces and Regular Traffic			Timeline available	Timeline resources	Timeline risks to	Suggested improvements / additional considerations (optional)	Other potential of the solution (being tested or planned)
<b>Name</b>			<b>Emergency Mobility of Rescue Forces and Regular Traffic</b>				
<b>Description</b>			Data stream of traffic data acquisition from multiple sensors, fusion and quality assessment				
<b>Main functionalities</b>			Provision of a coordinated operational picture of the traffic system for mission control				
<b>Principle</b>			Mission support tools for rescue forces towards flightline operations and the general mobility of airframes in case of disaster or major events				
<b>Origin</b>			Internal				
<b>DRIVER Task</b>			T2.1, T2.2, T2.3, T2.4, T2.5				
<b>SDM Phases</b>			Preparation & Training: yes Response: yes (response is for focus) Recovery: yes All phases (General): yes				
<b>Target Users</b>			Flight deck: no ATIS/ATIS: yes Air traffic control: yes Fire brigade: yes All border agencies: yes				
<b>Operating</b>			Commercial: no Free: no Experimental: no, traffic simulation (ATIS) is under GDS testing				
<b>Availability</b>			Availability ( ) none ... (4/4) ...				
<b>Integration</b>			Function within the DRIVER System of Systems (interfaced integration with ... complementary (S.I.))				

Item	Available via	Author/ Name	NA	System Availability	System Complexity	System Flexibility	Suggested Experiments / Additional Considerations (positioning)	System potential of the proposed System based on the combination	
Task	Inputs	Sub-Inputs		Yes/No / Partial	Complex / Simple	Flexible / Rigid	See text	Good as an - 1940s System	
TBL1 Image and Scene Assessment	Gathering data from the base	Former available info	<p>Up to date aerial image maps are a valuable information source for situation assessment. (NA) (Low)</p> <p>Air-to-air visible traffic data information (floating emergency car data, indirect traffic extension of mobile devices (DPMSS), portable cellphones)</p> <p>Traffic data information: floating car data, induction loop, stationary Bluetooth detection, traffic cam, Marine's College, Houston</p> <p>Traffic data format and position</p>						
		Other available info	<p>State or local files, PDF, JPEG web-services and GIS services</p>						
		Situation analysis	Alerting	<p>Aerial images and traffic data to assess the status of situation</p>					
		Assessment of TBL1 Information preparation	<p>Structured tools</p> <p>Map view</p>	<p>Structured view of current TBL1 situation and network from NATED system</p> <p>rendered maps on map building, different scenario layers are used on this meeting</p>					
TBL2 Autonomous sensor processing	Assessment based on different sensors	Information processing for decision making purpose	<p>Automated traffic detection from images. Demonstration of the further processing of the collected data, traffic evaluation and prognosis, Traffic position and situation support</p>						
TBL3 Other Sensors & Early warning	Transmission of data over cellular/wireless links for the base	Monitoring information	<p>Aerial images and traffic data provides information as input for other tools. Aerial images (orthorectified and mosaiced) give general overview about the disaster situation</p> <p>image/traffic situation and prediction give also an overview, show landmarks, and are used for mission support</p>						

			SWP1 - Emergency Mobility of Normal Forces and Regular Traffic	Priority rankings	Phase reference	Phase status	Suggested improvements / additional considerations (qualitative/quantitative)	Value potential of the project? (high/medium/low/consideration)
		Modeling, simulation and scientific advice	<ul style="list-style-type: none"> <li>Content of the 2d camera system can be used at least for other modeling, simulation and scientific advice tools</li> <li>Simulation based prediction of the traffic situation (interoperating demand and infrastructure prediction) (see I&amp;A SWP1) Test</li> </ul>					
V&A Testing and Capacity Monitoring	Resource Monitoring	Planning	Tracking emergency air traffic and the incident traffic detection of incident detection (IF/STADTC) allows to monitor the entire force as well as the movement of incident resolution in the affected area.					
		Information availability, status, resource level, ...	Information are provided in map layer or DDC with access and B2C services. Information are provided in map layer or DDC with access and B2C services.					
		Assignment of Resources to Tasks	Resource Support	Resource may can be used. Further more we have a risk matrix which includes breakdown of risk for possible order.		3		
V&A Activities & Capacity Effect	Definition of Scenario	Modeling	see I&A SWP1					
		Simulation	see I&A SWP1					
	Resource Analysis	Information	Resource/Time analysis for other type during operations		3			
		Resource Support	see I&A SWP1					
Capacity Effects Analysis	Information	see I&A SWP1						
	Resource Support	see I&A SWP1						

EmerT - Emergency Mobility of Marine Ferries and Regular Traffic			Project analysis	Project analysis	Project analysis	Approved requirements / optional requirements / other / other	Other potential in the future? (bring back into consideration)
<b>Name</b>		EmerT - Emergency Mobility of Marine Ferries and Regular Traffic	<b>General remarks to the user</b>				
<b>Description</b>		Task: collection of traffic data acquisition from multiple sources, fusion and quality assessment Priority of a coordinated operational picture of the traffic system for decision control Decision support tools for manual for air traffic control operators and the general mobility of installations in case of disasters or major events	General remarks: - wanting tool primarily for planning events. Difficult to use in a real hot crisis, all people will behave in a unpredictable / non-predictable manner. - also good for evaluation.				
<b>Main functionalities</b>		1. 2D / 3D visual and prediction tool decision support for regular operations					
<b>Procedure</b>		EMER T					
<b>Origin</b>	internal	EMER T					
<b>DRIVER Task</b>		4.1, 4.2, 4.3, 4.4, 4.5, 4.6					
<b>CDM Phases</b>	<b>Preparation &amp; Planning</b>	yes	<b>Availability (on-site / off-site)</b>				
	Preparation	yes (on-site & off-site)					
	Planning	yes					
	on-site (General)	yes					
<b>Target Study</b>							
	Study health	yes					
	Study security	yes					
	Study effectiveness	yes					
	Study safety	yes					
	Study usability (General)	yes					
<b>Learning</b>		yes					
	yes	yes					
	yes (on-site)	yes, highly sensitive (EMER T) & under PDU format					

Figure 8: EmerT, Evaluator THW

Topic	Subtopic	Subtopic name	DRP	Feature enabled	Feature released	Feature testing	Required equipment / additional instrumentation (optional)	Have elements of the feature? (Add to work item spreadsheet)
Item	Category	Subcategory		Yes / No / In dev	Done / In dev	Not done		Partial or fully tested
	<i>Threat</i>	<i>Threat</i>	DRP - Simulation of urban traffic					
141.1 Damage and Heat Assessment	Assessment of risk	Risk category Simulation work	Increasing simulated size of current traffic Simulation showing possible traffic bottlenecks	Y				
141.2 Urban dynamics & early warning	Evolution of urban dynamics into the future	Modeling urban dynamics Modeling, simulation and possible advice	Simulation based prediction of the traffic situation including demand and infrastructure prediction	Y				
141.3 Capacity building and Capacity Mapping Tools	Risk Assessment	Risk category Simulation work	Increasing road network capacities	Y				
141.4 Timing and Capacity Monitoring	Resource Monitoring	Monitoring Information (dynamic data, resource level...)	Including current road times, lane availability, analysis (see item 1)	Y	3			
141.5 Networks & Control Elements	Simulation of scenarios	Modeling	Simulating street networks and general data on urban street traffic	Y	3			
		Simulation	Simulating traffic jams as well as resulting effects and changes in demand	Y	3			
	Networks analysis	Characterization	Studying effects of general vehicle	Y	3			
		Resource Support	Resource modeling (what happens if I break road X instead of Y)	Y	3			
Capacity Effects Analysis	Characterization	Resource modeling (what happens if I break road X instead of Y)	Resource modeling (what happens if I break road X instead of Y)	Y	3			
		Resource Support	Resource modeling (what happens if I break road X instead of Y)	Y	3			

SUMO - Simulation of urban traffic			Features available	Features delivered	Priority security	Suggested improvements / Additional considerations (positive/negative)	Other comments of the reviewer / Other needs/requirements
Name	SUMO - Simulation of Urban MObility		General comments to the tool				
Description	Microscopic Traffic Flow Simulation						
Main functionalities	Routing, Traffic simulation, Traffic demand modeling, Traffic forecast		General comments:				
Provider	SUMO						
Origin	SUMO						
DRIVER Type	V2X, V2V, V2I, V2X, V2V, V2I						
UM Phases	Coordination & Planning	Coordinated Planning					
	Routing	Yes					
	Security	Yes					
	All phases (General)	Yes					
Target Body	Public health	Yes					
	Old security	Yes					
	Law enforcement	Yes					
	Fire brigade	Yes					
	All bodies (general)	Yes					
Learning	General	Yes					
	Yes	Yes					
	Sumo source	Sumo					

Figure 9: SUMO, Evaluator Pole, Marseille Fire Department



Task	Subtask	Task Name	Task Description	Priority	Phase	Current Status	Dependencies	Notes
<p><b>27 MAY 17</b> <b>TRW</b> <b>DR. PETER H. KACZMAREK</b> <b>2000 - Operational urban traffic</b></p>								
<p><b>Task 1: Storage and Needs Assessment</b></p>								
1.1	Assessment of data	Task 1.1.1: Data storage	Developing conceptual view of current traffic situation showing possible traffic bottlenecks		U			
1.2	Transmission of data into external info for EM work	Task 1.2.1: Modeling, simulation and network analysis	Simulation based prediction of the traffic situation incorporating demand and infrastructure analysis		U			
1.3	Capacity Planning and Capacity Mapping Tools	Task 1.3.1: Network Assessment	Task 1.3.1.1: Modeling, simulation and network analysis		U			
1.4	Routing and Capacity Monitoring	Task 1.4.1: Resource Monitoring	Task 1.4.1.1: Modeling, simulation and network analysis		U			
1.5	Performance & Capacity Metrics	Task 1.5.1: Modeling	Modeling current network and demand data to model current traffic		U			
		Task 1.5.2: Simulation	Simulating traffic jams as well as simulating effects over changes in demand		U			
		Task 1.5.3: Performance Analysis	Measuring effects of current traffic		U			
		Task 1.5.4: Capacity Support	Capacity modeling (what happens if I block road I instead of T)		U		not just THD but just the police	
1.6	Capacity Effect Analysis	Task 1.6.1: Characterization	Identifying bottlenecks of current network		U			
		Task 1.6.2: Capacity Support	Routing advice (see 1.5.4)		U			very important for THD

SUMO - simulator of urban traffic			Formal methods	System oriented	Product oriented	Suggested improvements (optional) commentary (optional/required)	Other potential of the product during report and completion
Name	SUMO simulator of urban traffic		General remarks by the evaluator				
Description	Microscopic Traffic flow simulation		Overall impression				
Main functionalities	Routing, Traffic incidents, Traffic demand modeling, Traffic control		Very elegant tool.				
Provider	SUITS		- if you can obtain info on the change in				
Origin	internal		3 on the stability/load capacity of bridges, or what				
Project Team	TALL SYSTEMS LIMITED		be very beneficial.				
Use Phase	Requirements & Planning	Prepared/Planning	Stability (time, cost)				
	Analysis	yes	Remarks: (ex: normally a bridge can handle 8t.				
	Planning	yes	after 5 hours of good exposure it can				
	All phases (Overall)	yes	handle 3t.				
Target Users			Function within the SUMO system of systems (optional integration with... complementary...)				
	Police forces	yes	- if you can get info on the status of gas stations				
	Cost account	yes	(do they still have gas, do the pumps function,				
	Law enforcement	yes	are they flooded etc...) that would help.				
	Fire brigade	yes					
	Oil tanker operators	yes					
Learning	Commercial	no					
	Free	yes					
	Open source	SUITS					

Figure 10: SUMO, Evaluator THW

Item	Deliverable	Production status	SWM included	Feature available	Feature planned	Feature priority	Suggested improvements / additional considerations (positive/negative)	Value potential of the feature / being part of the consideration
Task	Feature	Sub-feature		Yes / No / Partly	On hold / No	High / Medium / Low	See text	Overall status - High / Medium / Low
143.1 Design and Mock Assessment	Gathering data from the field	Human readable info	User and personas entered by researchers via Android application	Y	3	5		1
		Machine readable info	Integration of sensors via data buses and Mediation System (MSM)	Y	3	5		
		Assessment of raw information preservation	Simulation tests Map view Dynamic report of geo-referenced data logs	?	3		Not shown	
		Geo view	Filtered view of items located in the map pane (if any)	?	3			
143.2 Airborne sensor processing	Assessment based on software sensors		Camera and sensors integration in UAV and software	Y	3	5		1
143.3 Data Access & early warning	Simulation of data into actionable info for the user	Monitoring alternatives	Traffic information from road network sensors (ITS)	?	2			
	Distribution of warnings (public use to operators of critical infrastructure and enterprises)	Preparation of warnings	Alerting user for SMS broadcasting through regular phone network (GSM/GPRS) and network blocking (SMS Gateway)	Y	3	5.6	New technical part (how to communicate warnings is not shown)	
Distribution of warnings		Alerting user for SMS broadcasting through regular phone network (GSM/GPRS) and network blocking (SMS Gateway)	Y	3	5.6			
143.4 Interaction with citizens	Usage of social media	Gathering of operational awareness info	Operational awareness information can be gathered via Twitter and Facebook	Y	3	4	Verification of incoming information is not clear/developed	1
	Usage of social media	Pushing warnings via social media	Pushing of information to EMS social media accounts (Twitter, Facebook)	Y	3	5		
	Usage of crowd sensing	Info collection (citizens as a sensor)	Public can broadcast an information published by EMS	Y	3	5		
143.5 Shared situation awareness	CDP Prediction	Visualization/Filtering / Clustering of common operational actions	CDP can be added to the EMS interface, shared and shared with other EM	?	3	5?	Not shown	1

			OS	Feature usability	Feature relevance	Feature usability	Suggested improvements / additional considerations (positive/negative)	Feature potential of the feature? Testing needs re-consideration
	Dissemination	Dissemination (visual enhancements)	COF can be shared with other OS users	Y	3			
	Equipment/ Deployment	Control centers	OS is a portable and deployable emergency response system including a portable OS, in-flight communication system and on-board deployable sensors	Y	3			
		Field devices	Multiple field devices were used in the project, including UAVs, UAS, balloons, and ruggedized On-board Units that can connect to either of sensors and vehicles					
OS4.1 Capacity Building and Capacity Mapping Tools	Deployment of Resources	On-User Support	List of available resources					
		Monitoring of current status of deployed resources	All resources equipped with an OSU are monitored in real time and the status and location of responders with the deployed resources are displayed on the map.	Y				(2)
	Risk Assessment	Simulation tools	Can simulate, flood and fire simulation.	Y	3	6.3	Adv. W. The resource (OSU/OS) /	
OS4.1 Testing and Capacity Monitoring	Resource Monitoring	Feasibility	All resources equipped with an OSU are monitored in real time.	?				
		Information (availability, status, resource level...)	The status of resources including battery level is monitored in real time.	?				
	Information Sharing	Manuals	Other layers can be shared with other OS users. The application integrates a real-time chat and a persistent multi-media message system.	Y	3	6.7		1
OS4.1 Collaborative tools (CMT)	Collaborative CDM management	Security / Rights management	Ability to invite and manage the security rights of new users	?				

		333	Feature outline	Feature relevance	Feature maturity	Suggested improvements / additional considerations (positive/negative)	Future potential of the feature? (Why/How/Who/Under what)
Name		ESS	Special remarks to the text				
Description		The Emergency Support System (ESS) is a suite of real-time data-centric technologies which 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, social, firefighters) and out of phase command and control centers (C4I).	<p>Overall impression</p> <p>Technical processing                      Not-looked part should be                      improved for relation with IIS                      (with communication with                      citizens)</p> <p>How to deal with N (Noise)                      the longer is a short period.</p> <p>7</p> <p>Feasibility (1 score - 5 only)                      2 1/2</p> <p>Position within the DRIVER System of Systems (potential integration with ... complementary to ...)</p>				
Main functionalities		Integrate data from various sensors into a common information management and communication platform. Enable portable and mobile critical communication elements for supporting the management and coordination of emergency operations. Integrate all the networking technology of emergency services for addressing emergency and crisis management requirements.					
Provider		OMV (NL)					
Origin		ESS (paper)					
DRIVER Task		T404, T405, T407, T408, T409, T410					
S/M Check		Possibilities & Planning: no Recovery: no Recovery: no at phases (status):					
Target Body		Public health Civil security Law enforcement Fire brigade All bodies (general): no					
Language		Commercial: no Free: no Open source: no					

Figure 11: ESS, Evaluator TNO