driver+

Driving Innovation in Crisis Management
for European Resilience

TRIAL - THE NETHERLANDS
SEVERE FLOODING SCENARIO IN THE HAGUE

The Netherlands, May 2019

Research Operational needs Lessons learned
Shared Understanding
Trials Guidance Methodology
Knowledge base
Reference implementation Tools Pragmatic
European Test-bed
Crisis Virtually connected facilities
Unpredictability
Management
Challenges Innovative solutions
Cooperation Experience
Innovation Disasters Crisis Labs
Analysis Trial-driven development
Portfolio of Solutions
Practitioners

The scale and pace of crises pose enormous challenges for the Crisis Management (CM) sector, with new threats emerging all the time. An already complex field must also strive to integrate new technologies and methods, cope with a rapidly changing infrastructure, understand evolving risks, be effective across cultural, administrative and national boundaries and engage with populations to enhance their resilience. Innovation is therefore critical but will only be successful if it is relevant and accessible to practitioners and operators. Many crises involve interfacing diverse CM systems and solutions. Major crises can also frequently involve more than one country or region, which may have differing CM infrastructures and cultures. It is also highly likely that this will necessitate interfacing different systems and combining different solutions. CM innovation must therefore be capable of meeting these multifaceted challenges and delivering solutions that are modular, flexible and adaptable.

These solutions must be tested and validated in realistic environments; they must be evaluated to assess their true benefits and for their overall suitability, before being adopted by end-users. Failure to meet these needs could result in less than perfect solutions being introduced or in the increased costs of CM capability development, due to the imperfect management of ever more complex crises.

In May 2014, dedicated practitioners' organisations, research institutes, industries and SMEs teamed up to support the European Union to tackle this issue. Until April 2020 the broad aim of the DRIVER+ project, funded under the European Union's 7th Framework Programme, will be to improve the way capability development and innovation management are addressed, by assessing and delivering solutions that can be used, and combined, to address different types of large-scale crises.

DRIVER+ CORE OBJECTIVES

A pan-European Test-bed

To develop a pan-European Test-bed for Crisis Management capability development enabling practitioners to create a space in which stakeholders can collaborate in testing and evaluating tools, processes or organisational solutions.

A Portfolio of Solutions

To set up a Portfolio of Solutions in the form of a database-driven website documenting several Crisis Management solutions, open to any external organisations willing to share data and experiences of solutions.

A shared understanding

To foster a shared understanding in Crisis Management across Europe, through the enhancement of the cooperation framework.

WHAT IS IN THIS BOOKLET?
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TRIAL GUIDANCE METHODOLOGY
GUIDELINES TO SUPPORT PRACTITIONERS

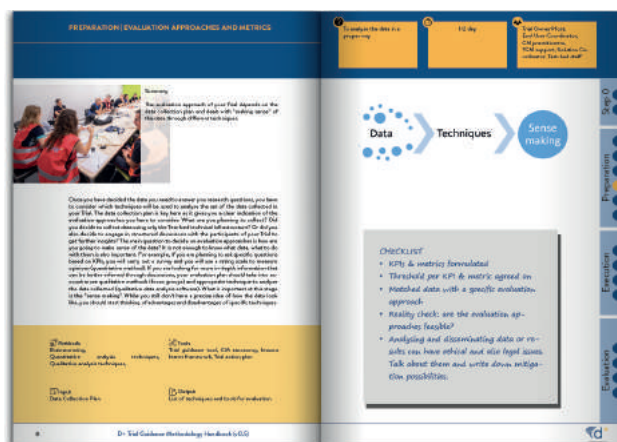## WHY A TRIAL GUIDANCE METHODOLOGY ?
ADDRESSING CURRENT CRISIS MANAGEMENT CAPABILITY GAPS

The Trial Guidance Methodology is designed for Crisis Management practitioners as it facilitates the investigation of innovative solutions. The TGM provides step-by-step guidelines on how to assess them in non-operational contexts (such as a Trial) through a structured approach. Trials are collective efforts. They imply a co-creative approach and an open mind in order to stimulate innovation and true capability development within the Crisis Management (CM) domain.

The methodology consists of three phases: preparation, execution and evaluation. The preparation phase results in a Trial design with multiple elements that are captured in the Trial Action Plan whose main outcome – the design of the Trial methodology – is meant to be applied and executed in the second phase. It is up to the Trial committee to ensure that all the decisions taken in the first phase can be carried out. Each Trial includes three elements: the tailoring of the Test-bed in accordance with the Trial design, the finalisation and simulation of the identified scenario within the Test-bed, and the ability to run an assessment of the three DRIVER+ performance measurement dimensions (CM, Trial, solutions). The execution phase terminates with the running of the actual Trial through the simulation of the pre-defined scenario, the deployment of potential innovative solutions and the collection of relevant data. In addition to the data collected during the Trial, additional feedback from external stakeholders (participating actively as Trial actors or passively as observers) is gathered after the main event. During the third phase, the gathered data is processed in order to assess and analyse the real impact of the innovative solutions. This information is not only very useful for the CM practitioners but is also valuable for the solution providers concerned with improving their solutions further.

To that end, DRIVER+ has developed and issued a Trial Guidance Methodology Handbook providing an overview of what Crisis Managers would need to do in order to depict a specific operation and integrate new socio-technical solutions in their ways of working.

The TGM offers not only a guidance on what to do by whom and when, but also introduces appropriate tools and methods to conduct those tasks. The Handbook should also be of interest to CM experts working in coordination centres, especially those considering participating in Trial-like activities (e.g. in the execution phase) to understand the potential added value of the DRIVER+ Test-bed.

Download the Handbook today at:
driver-project.eu/trial-guidance-methodology
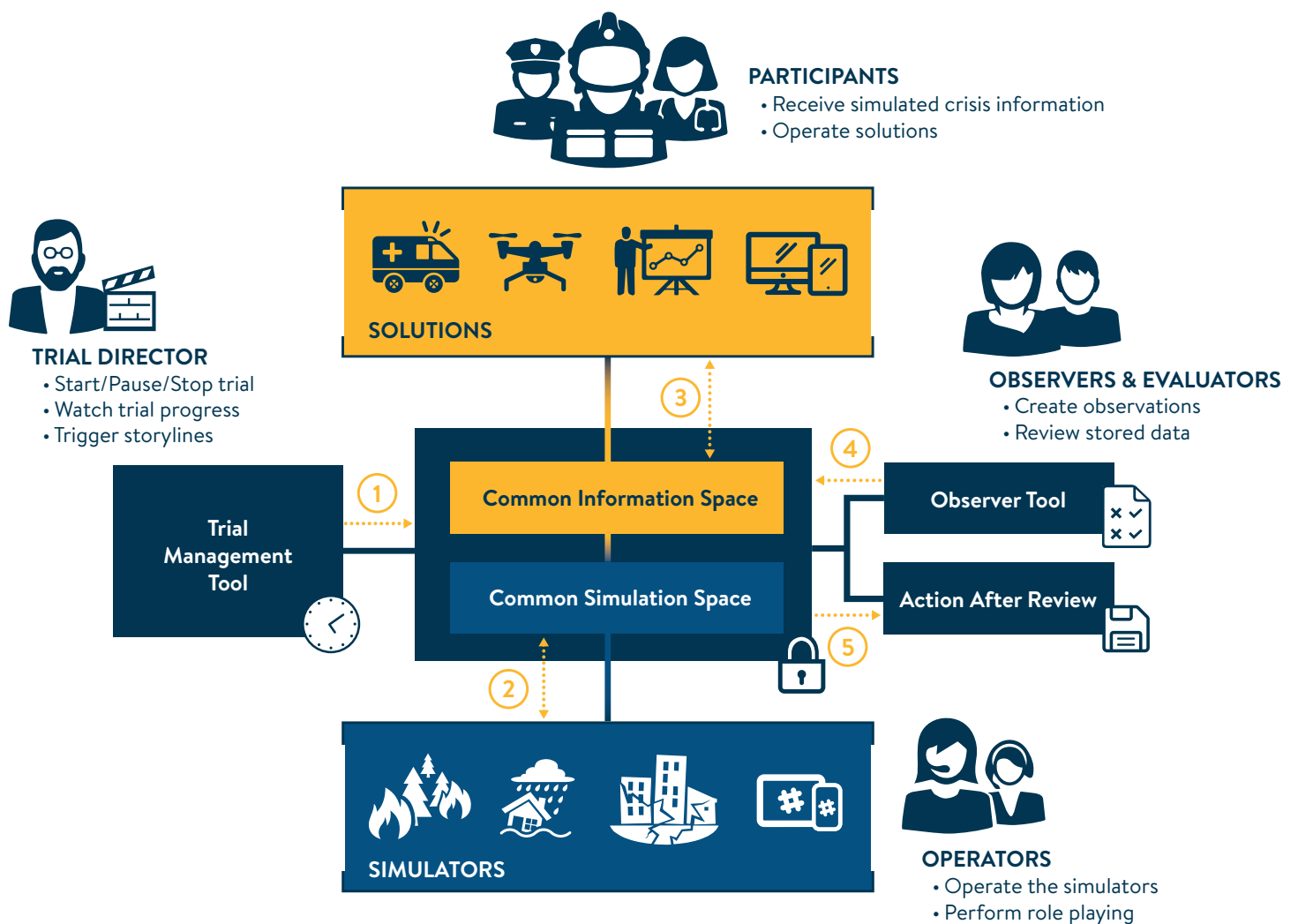
TEST-BED TECHNICAL INFRASTRUCTURE
A SPACE FOR TRIALLING

WHY A TEST-BED?
TO FACILITATE PREPARING, EXECUTING AND EVALUATING A TRIAL

The Test-bed provides you with software components to:
• Connect Solutions for data and information exchange
• Connect Simulators to create a fictitious, but realistic, crisis
• Create and control the scenario's storylines
• Record and collect observations and logs

PARTICIPANTS
• Receive simulated crisis information
• Operate solutions

SOLUTIONS

TRIAL DIRECTOR
• Start/Pause/Stop trial
• Watch trial progress
• Trigger storylines

OBSERVERS & EVALUATORS
• Create observations
• Review stored data

Trial Management Tool

Common Information Space

Observer Tool

Common Simulation Space

Action After Review

SIMULATORS

OPERATORS
• Operate the simulators
• Perform role playing

① The Trial starts: storylines are activated, and the fictitious crisis evolves.

② Simulators process storylines and additional operator actions. Simulator data is sent to the Solutions.

③ Solutions are fed with simulator data, share information, and request actions from the Simulators.

④ Observers create observations, which are shared and recorded in the Test-bed.

⑤ The Trial ends and all logs and observations are collected for evaluation.

SOLUTIONS

The solutions are assessed during the Trial. They can be connected to the Test-bed via CIS adapters such that they can send and receive data from other solutions and simulators.

Common Information Space (CIS)

Set of KAFKA topics to exchange data between solutions, to receive data from and send commands to simulators.

SIMULATORS

Provide a fictitious crisis during the Trial for participants and solutions, so solutions can be evaluated effectively in a realistic setting and such that participants feel immersed in the simulated crisis. They offer data and visualisations, such as 3D virtual reality views, flooding plots, fire progressions, panicking crowds and jammed traffic, simulated (social) media messages or a regional/national set of available resources.

Common Simulation Space (CSS)

Set of KAFKA topics to exchange information between simulators, so they are synchronised and can act as one. Simulators send, via a gateway to the Common Information Space, data to solutions and receive instructions to be executed.

Trial Management Tool

Acts as composer and conductor, offering the Trial staff control over the Trial. During preparation, the staff can create storylines and acts, which represent possible evolutions of the simulated crisis. During the Trial itself, the staff can start and pause the Trial, its storylines and acts, thereby influencing the direction of the Trial and the challenges that the participants face.

Observer Support Tool

Runs on tablets and in browsers, to create observations quickly that are targeted at specific moments in time during the Trial.
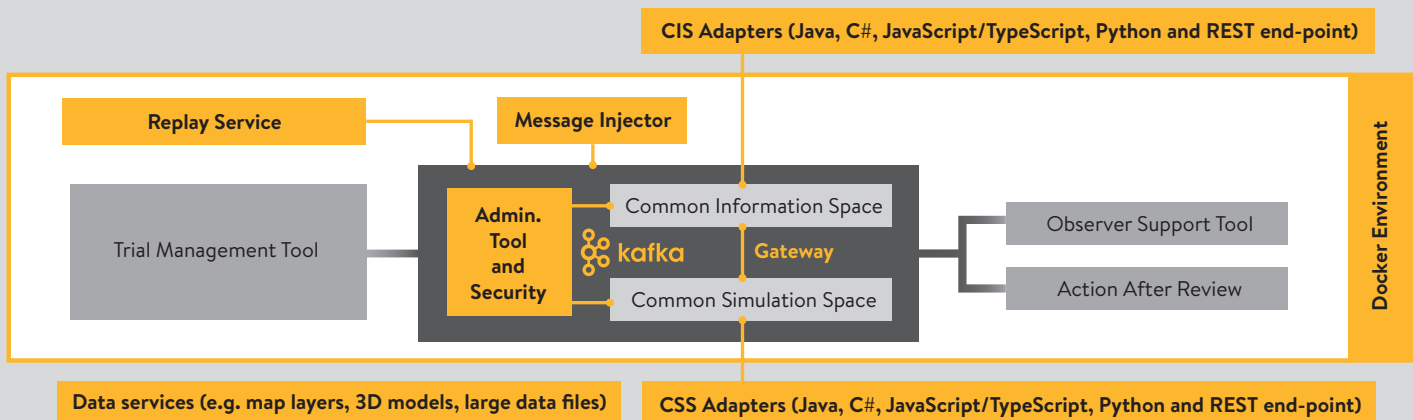
After Action Review

Facilitates a detailed, data-based evaluation after the Trial. Stores all messages and observations exchanged during the Trial execution, as well as screenshots from running applications, so it can be reviewed together.

TEST-BED TECHNICAL INFRASTRUCTURE
FOR SOFTWARE DEVELOPERS AND SYSTEM ADMINISTRATORS

To deploy, configure and run the Test-bed anytime and anywhere, and to simplify connecting Solutions and Simulators, these extra components are available to software developers and system administrators.

CIS Adapters (Java, C#, JavaScript/TypeScript, Python and REST end-point)

Replay Service

Message Injector

Docker Environment

Trial Management Tool

Admin. Tool and Security

kafka

Common Information Space

Gateway

Common Simulation Space

Observer Support Tool

Action After Review

Data services (e.g. map layers, 3D models, large data files)

CSS Adapters (Java, C#, JavaScript/TypeScript, Python and REST end-point)

Docker environment

Part of the DRIVER+ website on which you can select the Test-bed components to be installed. It creates one installer containing the Docker images of all the selected components, such that these can be easily installed in one go.

Replay Service

Developer component to send out a set of pre-recorded messages across one or more KAFKA topics. Can also be used to demonstrate solutions in a realistic context.

Administrator Tool and Security

Developer component to set-up and manage the KAFKA topics and security needed in the CIS and CSS for a specific Trial.

Message Injector

Developer component to quickly send out a message on one KAFKA topic.

Gateway

Translates messages from CSS to CIS and vice versa. CIS message are standardised for use in emergency services communications. CSS messages are optimised for massive throughput and quick handling by simulators.

Data Services

A set of complementary services to support the Trial, e.g. for storing large data sets, a height model, data from a flooding simulator, a set of fictitious resources, points of interest, map layers, et cetera.

PORTFOLIO OF SOLUTIONS
SHARING INFORMATION ABOUT INNOVATION

WHAT ARE WE LOOKING FOR?
CRISIS MANAGEMENT SOLUTIONS

A solution is a building block that contributes to a Crisis Management function. Solutions can be technologies, tools, methods, concepts, or recommendations that regard potential technical, organisational, procedural, legal, policy, societal, or ethical improvements to the European Crisis Management legacy. It may be a new piece of software or training approach, a new item of equipment or a new way of collaborating. In the context of the DRIVER+ Portfolio of Solutions, a solution is presented as a coherent set of tools and methods to use them, which can be used "as is" in the trials and which addresses specific needs of the stakeholders by providing matching functionality.

WHY A PORTFOLIO OF SOLUTIONS?
### THE RATIONALE

The scale and pace of crises pose enormous challenges for the Crisis Management sector, with new threats emerging all the time. An already complex field must also strive to integrate new technologies and methods, cope with a rapidly changing infrastructure, understand evolving risks, be effective across cultural, administrative and national boundaries and engage with populations to enhance their resilience. Innovation will be successful if it is relevant and accessible to practitioners and operators. Major crises can also frequently involve more than one country or region, which may have differing Crisis Management infrastructures and cultures. It is also highly likely that this will necessitate interfacing different systems and combining different solutions. Crisis Management innovation must therefore be capable of meeting these multifaceted challenges and delivering solutions that are modular, flexible and adaptable.

Practitioners can be reassured that solutions used in the four DRIVER+ Trials, that are listed in the portfolio of solutions, have been assessed in a realistic and challenging environment. These solutions must be tested, validated and evaluated to assess their true benefits and for their overall suitability, before being adopted by end-users.

HOW IS THE PORTFOLIO OF SOLUTIONS ORGANISED?
A DATABASE-DRIVEN WEBSITE TO DOCUMENT CRISIS MANAGEMENT SOLUTIONS

The Portfolio of Solutions (PoS) is a database driven website aiming to document all the available Crisis Management Solutions, independently from their use in DRIVER+.
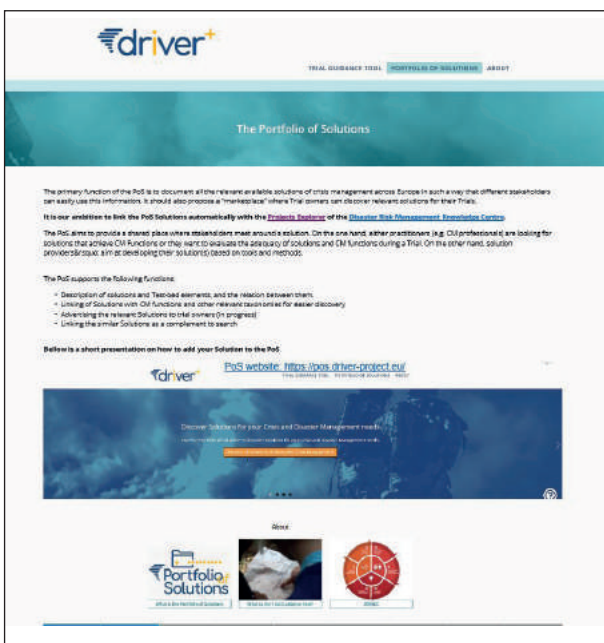

Specifically for the solutions that are used in DRIVER+ trials, the web site will contain much of the information that is being gathered while applying the Trial Guidance Methodology. It includes information on the experiences with a solution (i.e. results and outcomes of Trials), but also the needs it addresses, the type of practitioner organisations that have used it, the regulatory conditions that apply, the societal impact considerations, a glossary, and the design of the trials. It will be extended with third-party solutions when required by the Trials, allowing for the introduction of solutions already used by practitioners or relevant to the Crisis Management field. Ultimately, the Portfolio of Solutions will be opened up for external organisations to share data and experiences

on their solutions, which should in turn ease the successful implementation and usage of solutions by other practitioners.

In the DRIVER+ context, a PoS has distinctive meanings:
It includes a set of building blocks (DRIVER+ Solutions) that can be used in trials and beyond. These solutions are adapted to the DRIVER+ Test-bed and the Trials. This includes the integration of the tools in the Test-bed, the integration testing, resolving of the technical issues and the documentation of the solutions in a trial-independent manner.

The results of the assessment of the solutions and outcomes of the Trials will be stored and made accessible via the PoS database, downloadable in PDF format.
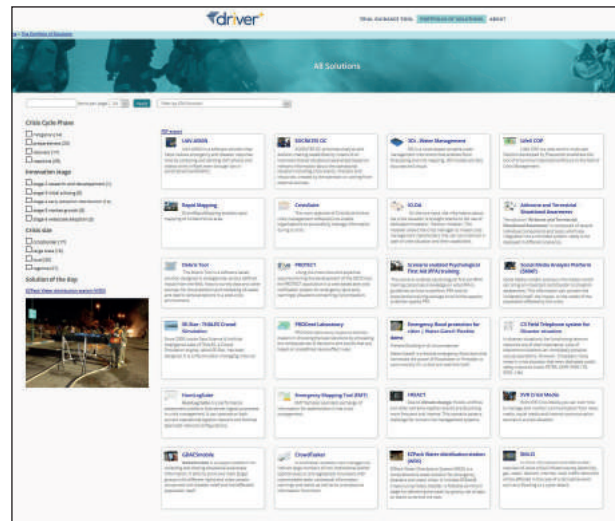
Discover the Portfolio of Solutions today at:
pos.driver-project.eu

TRIALS
TOWARDS INNOVATIVE SOLUTIONS

WHY ORGANISE TRIALS?
ASSESSING AND EVALUATING SOLUTIONS IN REALISTIC ENVIRONMENTS

The DRIVER+ approach takes as a starting point the fact that there is a strong innovation momentum present in the Crisis Management community. At the same time, there is inertia to change, which can prevent this momentum from resulting in sustainable improvement. This points to the need for a better evidence base for Crisis Management capability investment decisions.

Innovation is critical but will only be successful if it is relevant and accessible to practitioners and operators. Many crises involve interfacing diverse Crisis Management systems and solutions. Major crises can also frequently involve more than one country or region, which may have differing Crisis Management infrastructures and cultures. It is also highly likely that this will necessitate interfacing different systems and combining different solutions.

Crisis Management innovation must therefore be capable of meeting these multifaceted challenges and delivering solutions that are modular, flexible and adaptable.

These solutions must be tested and validated in realistic environments; they must be evaluated to assess their true benefits and for their overall suitability, before being adopted by end-users.

A series of four Trials and a Final Demonstration will be conducted. The aim is to investigate innovative solutions under simulated crisis conditions, by gradually adapting them to operational constraints, as well as creating acceptance among users through their active involvement and by providing evidence to decision makers that they are cost-effective.

IDENTIFYING THE GAPS TO BE BRIDGED
ASSESSING AND IMPROVING

DRIVER+ seeks to improve the way capability development and innovation management are tackled, by testing and evaluating solutions that address the operational needs of practitioners dealing with Crisis Management (CM). Therefore, it is of utmost importance for the project to start by understanding the main problems CM practitioners are currently facing, and to build upcoming DRIVER+ activities on this basis to ensure that the project results correspond to the practitioners needs.

In January 2018, DRIVER+ drew up a list of 21 gaps organised in five CM functional domains: decision support; information sharing and coordination; engaging the population; resource planning and logistics, casualty management. Starting first by identifying and describing the CM capability gaps faced by the end-users involved in the project, this initial set of gaps was then challenged and enriched through an in-depth analysis of the available literature in this field and during an assessment and validation workshop involving the wider CM community.

The four Trials to be conducted during the project duration will therefore focus on these capability gaps, i.e. "the difference between a current capability and the capability considered necessary for the adequate performance of one or more disaster management tasks", as identified by the CM practitioners.

HOW DO WE PICK THE SOLUTIONS TO BE TESTED?
DRIVER+ CALLS FOR APPLICATION

For each of the Trials, a Call for Applications is launched to identify innovative solutions that address the identified gaps and which will help the emergency services manage major crisis more effectively and more efficiently. Both internal and external applicants interested in submitting an application are invited to answer the same set of questions, which subsequently ensures a fair and equitable comparison. On the basis of these answers, the solutions to be tested are selected.

Mission	How does the solution contribute to crisis management?
Integration	How is it integrated into the existing crisis management operations?
Readiness	How mature is the solution and has it been tested or proved?
Motivation	How does the solution address the problems of practitioners?
References	Which references on the provider's experience and solution application exist?
Resources	Which resources are needed to operate the solution?
Know-How	What expertise is needed to operate the solution?
Platform	On which platforms (e.g. technical/organisational) is the solution available?
Technique	On which technique (or technology if applicable) is the solution based?
Investment	Which investments are necessary to deploy the solution?

Trials selection criteria

TRIAL - THE NETHERLANDS
THE HAGUE – 22 – 23 MAY 2019

IN A NUTSHELL
WHAT? WHY?

The DRIVER+ Trial focuses on a flash flood scenario simulating a lock breach caused by severe weather conditions. This will result in the flooding of a large part of The Hague city centre, damaging infrastructure and threatening a large portion of the city's inhabitants. Cascading effects will include power outage, flooded roads and railway infrastructure, affecting the population living in those areas.

The aim of this tabletop Trial is to improve current Crisis Management capabilities by identifying solutions that address potential shortcomings in the **planning of resources** (qualified personnel and equipment) for response during large scale and long-term crises, the ability to **exchange crisis-related information** between agencies and organisations (also referred to as interoperability) as well as in the **planning and management of large scale evacuations of population in urban areas**, including the side effects of such evacuations.

Throughout the DRIVER+ Trial, a number of innovative socio-technical solutions, recognising the interaction between people and technology, will be evaluated to assess to what extent they can improve the response for practitioners and the other Crisis Management experts involved.

ORGANISATION
WHO? WHERE?

DRIVER+ Trial – The Netherlands is being organised by the German Aerospace Center (DLR) and Safety Region Haaglanden (SRH). It will be conducted as a tabletop Trial at the premises of SRH in The Hague from Wednesday 22nd May 2019 to Thursday 23rd May 2019.

Gap1: Limitations in the planning of resources (qualified personnel and equipment) for response during large scale and long-term crisis.

Gap2: Shortcomings in the ability to exchange crisis-related information among agencies and organisations (also related to as interoperability).

Gap3: Shortcomings in planning and managing the side effects of large scale evacuation of population in urban areas.

List of selected and validated gaps

TRIAL SCENARIO
SEVERE FLOODING IN THE HAGUE

A north-western storm over the North Sea of force 10 on the Beaufort wind scale (about 90-100 km/h) is expected to hit the Dutch coast in two days. Once it arrives, the high water and bad weather conditions cause a failure of the lock in Scheveningen and endanger dikes. Subsequently, large parts of The Hague are flooded including the city centre.
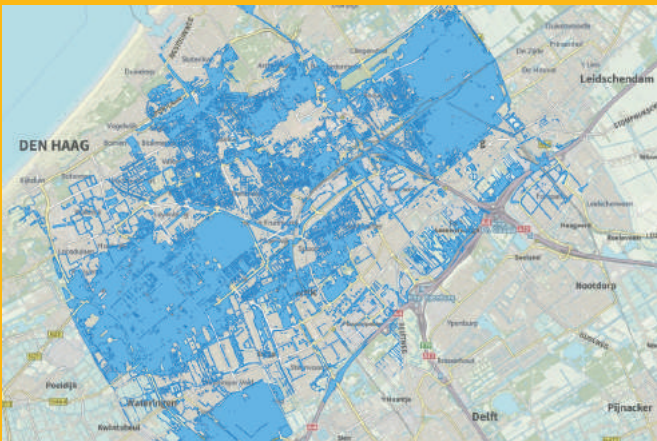
Water depths of up to 1.5 meters expose the population to the risk of drowning.
A cascading effect of floods is the threat to critical infrastructure. A power failure quickly leads to a failure of landlines and the Internet.
Since the traffic infrastructure is flooded, covered in debris or damaged, the transport system is severely affected or comes to a complete standstill. In order to keep the number of casualties to a minimum, a fast and effective evacuation of the population before, during and after the disaster has to be organised.

A crisis of this scale cannot be managed by the Safety Region Haaglanden and its regional crisis partners alone, and therefore requires the deployment of additional emergency services to deal with the increasing number of exposed people and to manage all cascading effects. The scenario will require the commitment of stakeholders (end-users and decision makers) from every crisis management level (local, regional, national and international level) such as representatives of the national police, regional fire and medical services, crisis management experts, representatives of water sectors, representatives of non-governmental and international organisations. Actions will be taken by these stakeholders based on realistic data such as crisis management plans, rescue procedures and good practices of participants.
The challenge for the Regional Operation Team is to use the information that is provided effectively, either by legacy systems or using the new solutions.

25 applications were originally received in response to a Call for Applications (13 external and 12 internal solutions) and eleven solutions were pre-selected (five external and six internal solutions) after the double blind-review, meta-review process and a final teleconference on 29/08/2018. The review results, the comments from the practitioners as well as the suitability of the solution in the Trial context informed then a pre-selection. After a meticulous selection process, face-to-face meetings, Trial rehearsals, five innovative Crisis Management solutions were chosen, based on their ability to solve a series of gaps identified by practitioners earlier in the project. These solutions will be deployed during Trial – The Netherlands by practitioners playing their own roles in their respective Action Centres. They will then evaluate the added value of the solutions together with Crisis Management experts who will be observing the Trial sessions. It is expected that the solutions will facilitate the management of crises in similar types of incidents and the sharing of information between and across organisations. Solutions should also improve situation assessment capabilities and support decision-making.

3DI
NELEN AND SCHUURMANS

ABOUT THE SOLUTION
IN A NUTSHELL

3Di is a cloud-based versatile water management instrument that enables flood forecasting and risk mapping. 3Di models are fast, accurate and visual. 3Di results present flooding locations, water depths, arrival times and damages in high detail. Moreover, flood mitigation measures can be modelled for their effectiveness. Experts and decision-makers can interact with the model to simulate dike breaches, rain events and storm surges. The fact that users can create different scenario's in combination with mitigation measures makes it the go-to instrument for hydrology experts, crisis managers and policy makers working for water authorities and cities around the world.


3Di Water Management
Hydrodynamic Simulation Software

What does 3Di provide?
The solution offers a complete package to model, simulate and analyse floods. The use-cases are: Flood risk assessments on a detail of 0.5m2; Flood early warning based on real-time measurements; Testing effectiveness of flood mitigation measures; Cost-benefit analysis supporting flood resilient strategies.
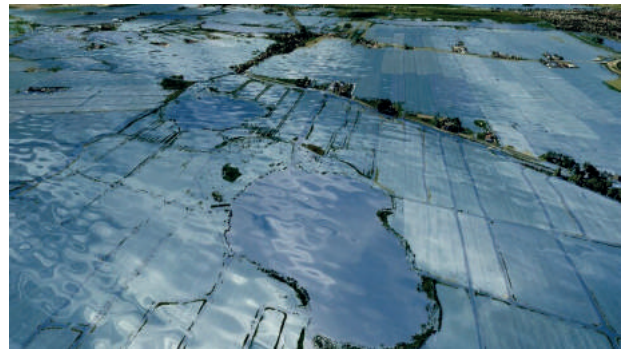
In practice, 3Di provides cloud-based, interactive modelling on touch table, iPad and PC as well as an online documentation and training with fast computation times and a user-friendly interface which is ready-to-use. Request a demo on 3diwatermanagement.com

ABOUT THE PROVIDER
WHO ARE THEY?

Nelen & Schuurmans is a water management consultancy & IT company. Founded in 1998 the company has grown to be a multidisciplinary team of over 70 highly educated water management and programming experts. Nelen & Schuurmans operates in the private as well as public sectors across the globe.

Nelen & Schuurmans

GAPS ADDRESSED
WHAT DOES THE SOLUTION BRIDGE?

· Lack of knowledge in the area of potential flood hazard/chemical spill sites (preparedness phase), limitations on forecasting of flood location and depth (response phase) and water travel time identification.

· Lack of knowledge on routes available for normal and emergency vehicles at specified times after start of flood event (not addressed directly, only after postprocessing).

CRISIS MANAGEMENT FUNCTIONS
WHAT IT DOES

· Mitigation of effects through identification of vulnerabilities: The model can predict the extent and depth of the flooding/chemical spill, and thus with some postprocessing also the vulnerable roads (i.e. inaccessible to normal and/or calamity traffic), also across borders, and thereby sites with high priority for evacuation.

· Raise awareness and anticipate to support decision makers with protection and response measures: 3Di combines 'current operational status' with consequence analysis to build a real-time geospatial framework in support of effective and timely decision-making.

· Communication between stakeholders for shared situational awareness: 3Di provides an intuitive and interactive framework which shows the extent of the flooding/chemical spill, including water depths and arrival times, which can assist in clear communication between stakeholders.

· Support C3 decision making: The solution supports communication among stakeholders because of the interactive and intuitive model that helps visualise extent of hazard and provides support in decision making for evacuation sites and routes.

PLANNED ACTIVITIES
DURING THE TRIAL

· Using a realistic, ready-to-use and tailor-made 3Di-model

· Calculating different flood scenarios

· Providing training for use of 3Di-model and results

· Integrating with DRIVER+ Test bed

· Adapting 3Di-model with latest information

· Assisting with the setup of flood scenarios

TECHNOLOGY READINESS LEVEL
SOLUTION TECHNOLOGY MATURITY

· TRL 9 – Water management domain

ULTIMATE GOAL
SOLUTION MAIN OBJECTIVE

The goal of 3Di in this Trial is to inform Crisis Managers about the forecasted flood situation to simulate possible consequences and allow adequate responses.

AIRBORNE & TERRESTRIAL SITUATIONAL AWARENESS
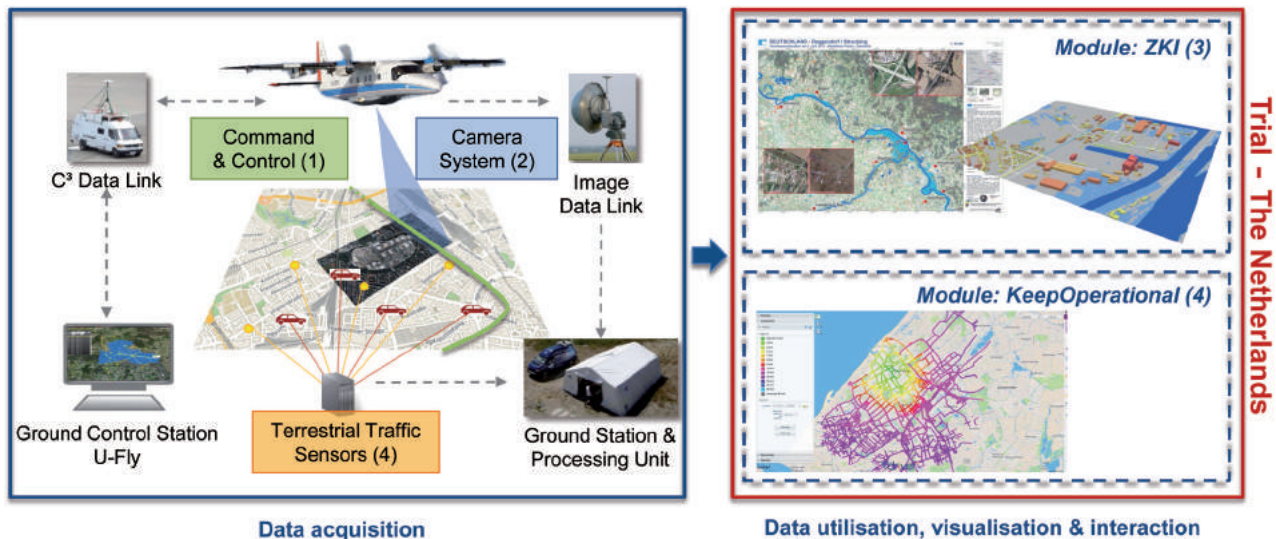## GERMAN AEROSPACE CENTER (DLR)

ABOUT THE SOLUTION
IN A NUTSHELL

Real-time aerial imaging could significantly support situational awareness during major and area wide disasters. DLR's solution "Airborne and Terrestrial Situational Awareness" comprises four modules to provide such a real-time aerial imaging and analysis system. Module 1 is the Ground Control Station U-Fly operating the research aircraft D-CODE as a remotely piloted vehicle (RPV). Module 2 is DLR's 3K aerial camera system. Module 3 is the Center for Satellite based Crisis Information (ZKI) which analyses the acquired aerial imagery and generates crisis information, such as situational awareness maps. Module 4 is called KeepOperational and provides traffic analysis and route planning capabilities taking into account aerial imagery and/or ground data. The solution can be applied as a complete system or by using the individual modules as stand-alone versions.

Within Trial - The Netherlands, module 3 (ZKI) and module 4 (KeepOperational) have been selected to demonstrate their capabilities. Instead of using real-time aerial imagery, simulated flood information as well as existing imagery and additional geoinformation, accessible as open data, will be used for the Trial.

Data acquisition

Data utilisation, visualisation & interaction

ABOUT THE PROVIDER
WHO ARE THEY?

The German Aerospace Center is the national aeronautics and space research centre of the Federal Republic of Germany. Its extensive research and development work in aeronautics, space, energy, transport, digitalisation and security is integrated into national and international cooperative ventures. In addition to its own research, as Germany's space agency, it has been tasked by the federal government with the planning and implementation of the German space programme. The German Aerospace Center is also the umbrella organisation for one of Germany's largest project management agencies.

GAPS ADDRESSED
WHAT DOES THE SOLUTION BRIDGE?

· **Shortcomings in the ability to exchange crisis-related information among agencies and organisations**: The module "ZKI" provides satellite or airborne based crisis information in form of standardised web services and digital PDF maps that can be easily integrated and shared in legacy systems and other solutions.

· **Planning of resources (qualified personnel and equipment) for response during large-scale and long-term crisis**: The module "KeepOperational" provides analysis and monitoring of the traffic situation and efficient routes for rescue teams, taking crisis-related information into account provided e.g. by the "ZKI" module. As a result, resources can be planned and coordinated according to the available infrastructure.

· **Planning and managing large-scale evacuation of population in urban areas**: The "timely reachability" function of the "KeepOperational" routing module assists in evacuation planning considering infrastructure constraints.

CRISIS MANAGEMENT FUNCTIONS
WHAT IT DOES

Module ZKI:
· Determine the nature of the crisis
· Conduct damage and need assessment
· Leverage shared situational awareness

Module KeepOperational:
· Conduct monitoring and anticipation
· Leverage shared situational awareness

PLANNED ACTIVITIES
DURING THE TRIAL

In this Trial, each Action Centre will be supported by information obtained from remote sensing

data on the disaster extent and potentially affected buildings and infrastructure. ZKI provides a flood mask as if it had been derived from aerial imagery of the actual flood situation and which is disseminated via standardised OGC visualisation and data web services. Hence this type of information can be integrated in various COP systems and other solutions. Further, ZKI provides digital, interactive 2D and 3D map products that show the extent of flooding and its impact on infrastructure in areas of interest.
KeepOperational will be used by the Action Centre Police to generate traffic circulation plans, as well as for analysing the accessibility of the affected crisis area. The flood information collected from the ZKI and the flood prediction provided by the solution "3DI" will be combined. The Action Centre Police will also able to add their own information (for example traffic jams, reported by units in the field) to the KeepOperational tool.

TECHNOLOGY READINESS LEVEL
SOLUTION MATURITY

· TRL 9 - Actual system proven through successful mission operations (ZKI)

· TRL 7 - System prototype demonstration in an operational environment (KeepOperational)

ULTIMATE GOAL
SOLUTION MAIN OBJECTIVE

· ZKI aims to provide an overview of the area affected by a crisis and to build situational awareness through value-added information products.

· The goal of KeepOperational is to combine traffic information from terrestrial traffic sensors with different types of information obtained from airborne reconnaissance or other sources to provide routing tools on the common operational picture.

CRISISSUITE
MERLIN SOFTWARE B.V.

ABOUT THE SOLUTION
IN A NUTSHELL

CrisisSuite is an online software application enabling organisations to successfully manage information during a crisis. All crisis information is securely stored in the cloud and is available anytime, anywhere. This solution supports the netcentric working method (an information management approach) of crisis teams by creating an universal picture of the crisis by sharing it horizontally and vertically with all the other teams in the crisis organisation. It also assists in maintaining an effective crisis meeting structure and it decreases the administrative workload for the people managing the crisis.
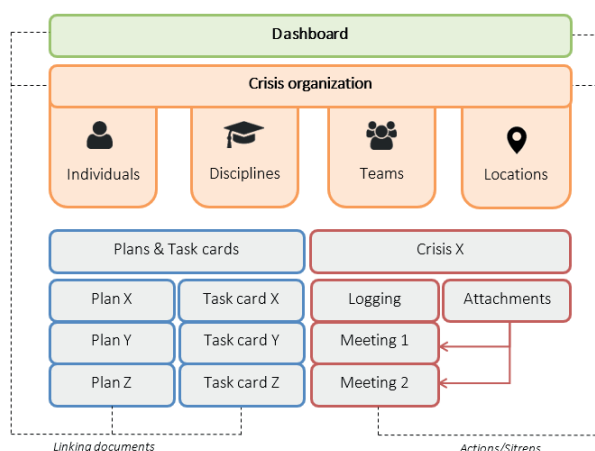

Each member of a crisis organisation gets access to CrisisSuite and has their own personalised dashboard with the crisis plans that are relevant to them, an overview of the current crisis and a list with all their unfinished actions for the current crisis.

The actions are immediately forwarded to the appropriate teams or individuals; and they, in turn, can indicate that the actions are being carried out or completed. At the same time, a reply can be sent as well. The crisis team can follow the proceedings of the actions in a simple overview.

Based on the log, the crisis team may compile situation reports (SitReps) and share them with individuals, teams or with the entire organisation.

ABOUT THE PROVIDER
WHO ARE THEY?

Merlin Software B.V. develops practical software tools in the field of Crisis Management. These tools help an organisation to prepare for, respond to and learn from a crisis situation. Because crisis information is sensitive by nature, Merlin has spent the required efforts to obtain the ISO 27001 certificate for information security.

Merlin is affiliated with Parcival, specialist in Crisis Management and education, training and exercise.

GAPS ADDRESSED
WHAT DOES THE SOLUTION BRIDGE?

· Adequate COP environment
· Exchanging crisis-related information between agencies and organisations

CRISIS MANAGEMENT FUNCTIONS
WHAT IT DOES

· **Support C3 decision making** – By storing all relevant information in a logbook, the decision makers in the organisation can look up what they need to know in order to make the right decision.

· **Communicate operational information across chain of command** – Actions can automatically be sent down the chain of command to the people responsible for executing them. In a similar fashion, people in the field can send pictures of the situation on the ground to higher up in the chain of command.

· **Disseminate COP and assessments** – Either by selecting entries from a logbook or by filling out a sitrep manually, any team can disseminate their part of the COP with the relevant stakeholders.

· **Develop and sustain COP** – Information from various sources can be sent into CrisisSuite to build a common geographical and textual overview.

PLANNED ACTIVITIES
DURING THE TRIAL

CrisisSuite will be deployed in three instances; one instance for Stedin – a power supply company, one for HTM – a public transport company, and one for a number of international organisations. These three instances are used to receive and share information with the information inside the Regional Operational Team (ROT), which uses the Dutch national crisis management system (LCMS).

Through this connection, the external stakeholders know what is going on in the ROT, and can make their decisions based on 'validated' information. Inside CrisisSuite the organisations will log their decision-making processes. And eventually, they can send a sitrep to the ROT, so they can see (inside LCMS) what questions their stakeholders might have.

TECHNOLOGY READINESS LEVEL
SOLUTION MATURITY

· TRL 9 – Actual system proven in operational environment

ULTIMATE GOAL
SOLUTION MAIN OBJECTIVE

· The aim of this solution is to successfully manage information during a crisis. This implies that all involved organisations have access to the right information at the right time, in order to make the right decisions.

HUMLOG SIM
UNIVERSITY OF MÜNSTER

ABOUT THE SOLUTION
IN A NUTSHELL

HumLogSIM is designed to assess the performance of logistic processes in Crisis Management. It can operate on both current operational logistics network and fictional (planned) network configurations. In the Trial, this solution will address the issue represented by the evacuation of the affected population from the City of The Hague.
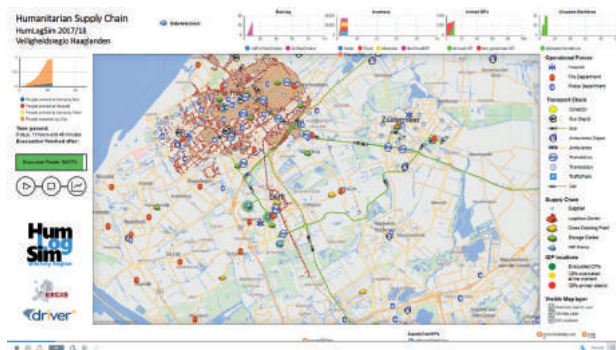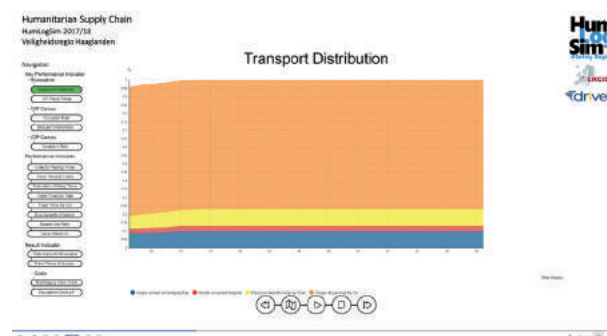

HumLogSIM is an adaptable simulation environment for discrete event-based and agent-based simulations which can feature crisis management activities conducted within and by humanitarian organisations on the way to a defined objective, whilst assessing the overall performance.

It allows for strategic planning as well as tactical and operational decision support by assessing and comparing the network performance under given circumstances and realistic crisis management actions. The main target groups for this solution are higher-level crisis managers, coordinating field operations, and responder networks in their strategic network design and configuration. The name "HumLog" refers to humanitarian logistics, i.e. the planning, implementation and controlling of efficient, cost-effective flow and storage of goods, materials and equipment, from their point of origin to their point of consumption or use. This is designed to meet the beneficiaries' requirements with the given resource capacities.

ABOUT THE PROVIDER
WHO ARE THEY?

The Competence Center for Crisis Management (C³M) at the University of Münster was created at the end of the year 2013. It integrates the research efforts of the European Research Center for Information Systems (ERCIS) network in the domain of crisis management and humanitarian logistics. It is primarily concerned with identifying relevant challenges and gaps in current practices of humanitarian organisations and finding adequate solutions in the area of information systems and supply chain management research.

WWU
MÜNSTER

GAPS ADDRESSED
WHAT DOES THE SOLUTION BRIDGE?

· Limitations in the planning of resources (qualified personnel and equipment) for response during large scale and long-term crisis: The solution assesses the performance of the responder network against available resources, showing if the resources are sufficient to achieve the objectives while highlighting potential bottlenecks. It can therefore inform about the adaptation needed for the resources to meet the user's needs.

· Shortcomings in planning and managing the side effects of large-scale evacuation of population in urban areas: The evacuation of the affected population requires a large-scale collaboration of different responder organisations and the provision of resources, for example transport infrastructure, food and medical supplies. HumLogSIM looks into this collaboration and raises awareness about the the resource demands over time.

CRISIS MANAGEMENT FUNCTIONS
WHAT IT DOES

· **Provide decision support**: Different evacuation strategies can be defined based on the affected population to be evacuated, the available infrastructure to transport the people, the provision and operation of evacuation sites and other factors. The strategies can then be compared against a number of parameters, like total evacuation time, transport time per person, costs and bottlenecks.

· **Review and adjust the response plan**: Based on the foreseen threat, it has to be decided if, when and how the population is to be evacuated. Through simulation, the appropriateness of the response evacuation plan can be reviewed then approved or amended.

· **Identify and analyse bottlenecks**: The simulation results for the evacuation can point towards bottlenecks in the evacuation strategy, e.g. availability of resources like buses or ambulances, or the capacity of evacuation sites.

· **Assess current capabilities**: The current situation of the responder network offers a baseline for evacuation strategies. It is therefore possible to assess the current capabilities in terms of evacuating the affected population.

PLANNED ACTIVITIES
DURING THE TRIAL

HumLogSIM will be used by a newly established team led by military practitioners with expertise in organising evacuations. Working closely with the local action centres and the police forces, they'll be tasked with defining and assessing different evacuation strategies based on information gathered during the Trial.

TECHNOLOGY READINESS LEVEL
SOLUTION MATURITY

· TRL 6 - Technology demonstrated in relevant environment

## ULTIMATE GOAL
SOLUTION MAIN OBJECTIVE

The main objective is to assist higher-level crisis managers in the design of crisis management networks. HumLogSIM therefore assesses and compares logistic processes in different crisis management network configurations. In the Trial, it will be adopted to assess the performance of The Hague city's evacuation strategies in response to a severe flooding event.

SIM SAFE
SIM-CI

ABOUT THE SOLUTION
IN A NUTSHELL

SIM-CI has developed a software platform with supporting tooling and services to assess and visualise the impact of multiple trends and disruptive events on societies and their critical infrastructures. The various simulation methods run in parallel, benefitting from results at any stage of the simulation process. This implies the creation of a digital twin copy of densely populated (urban) areas or for example industrial areas containing multiple critical, vital and potentially hazardous infrastructures to inform through 3D visualisation civil services about a given crisis situation, enabling them to make more accurate and informed decisions.
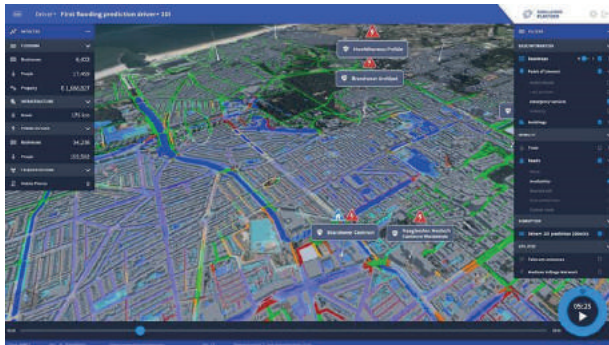
From data collection to exploring the unforeseen:
1. Simulation: based on open, commercial and customer proprietary data.
2. Disruption: include disturbances such as flooding, terrorist and cyber-attacks.
3. Cascading effects: direct effects and resulting cascading effects.
4. Impact: relevant indicators and visualisation in 2D, 3D, AR, VR or summarised in a report.
5. Vulnerability analysis: identify vulnerabilities, based on total impact of the disruption.
6. Mitigation: evaluate mitigations to protect, restore, train, evade or strengthen your infrastructures.
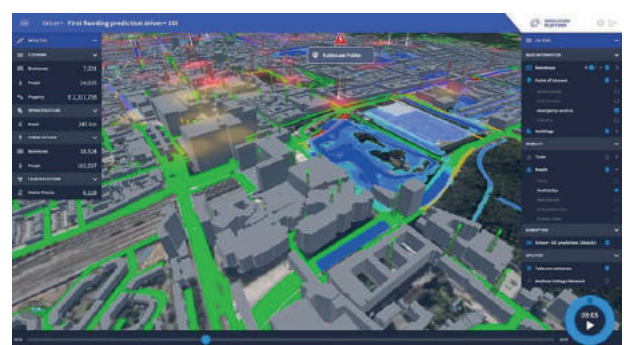
ABOUT THE PROVIDER
WHO ARE THEY?

SIM-CI is concerned with urban infrastructure planning, design, execution and maintenance in an effective, predictive and cost-efficient way, and in which incidents and disaster scenarios can be simulated on both macro- as well as microscopic levels. Explored in safe digital environments and in which seamless coordination between civil services is facilitated to maximise urban resilience: Creating a safe, flexible, transparent and efficient society. SIM-CI was established in 2017 as a 100% daughter company of Alliander New Business BV with the mission to help create this better world.

SIM·CI

GAPS ADDRESSED
WHAT DOES THE SOLUTION BRIDGE?

In the design, build, finance, maintenance and operation cycle of its critical infrastructures, City (crisis) management teams, design and construction companies as well as finance and risk stakeholders, can greatly benefit from software tools that combine data visualisation with simulation and forecasting algorithms to project potential future developments in urban development and crisis management scenarios. We deliver a software tool that runs these simulations and scenarios, calculated with any data available, and visualise the results in realistic representations of current events, all simultaneously and all integrated.

In a preparation or training setting these scenarios can be used to assess various counter moves and mitigation strategies in a safe and cost-efficient manner, while results and learnings may be stored for later reference or application in the field. Moreover, our simulation platform can also be used to explore various design, construction or financial portfolio management strategies. Addressing risks at all levels and on all typical time horizons.

CRISIS MANAGEMENT FUNCTIONS
WHAT IT DOES

SIM-CI's digital twins cities can be used to investigate, train for and evaluate typical crisis framework scenarios, all revolving around various "what if scenarios": (e.g. What if a category 5 hurricane hits city centres? What if we re-develop this district by unlocking its access routes and redistributing commuters underground? What if my physical investments are hit by the long-term effects of climate change?)

Crisis Management involves disruptions (e.g. depletion of resources, mismanagement of waste streams, hurricane, flooding, heatwave, earthquake, tsunami, etc.) and a City under stress.

SIM-CI applications:

· **Crisis Management mitigations**: evacuation planning, emergency supplies, prioritisation.

· **Crisis response mitigations**: damage assessments, infrastructure restoration scenarios.

· **Crisis prevention mitigations**: vulnerability analysis, what if scenarios, bottleneck analysis.

PLANNED ACTIVITIES
DURING THE TRIAL

· Creation of a digital twin of The Hague area: map, buildings, roads, public transportation system, electricity, telecommunications, points of interest, visualisation

· Integration of 3Di flooding scenarios (see p.16)

· Calculation & visualisation of cascading effects: flooding > roads ; flooding > electricity > telecommunications ; flooding > buildings ; etc.

· Access to the simulation and its data by all relevant stakeholders and action centres: Fire brigade, Ambulance services, Police, Public transportation, Grid Operator, Municipality, Regional Operational Team.

TECHNOLOGY READINESS LEVEL
SOLUTION MATURITY

· TRL 7 - System prototype demonstration in an operational environment

ULTIMATE GOAL
SOLUTION MAIN OBJECTIVE

Our ultimate goal is to provide digital twin solutions that respond to external and internal impulses almost identically to their real-life counterparts, only differing in the fact that our simulations are safe, efficient and integrate all relevant stakeholders.

FUTURE
WHAT WILL HAPPEN AFTER THIS TRIAL?

This Trial is the third in a series of Trials and various events in the DRIVER+ project. One more Trial will be organised in Austria to operationalise and test Crisis Management solutions. Trial - Austria and future events will all incorporate the lessons learnt and outcomes of Trial - The Netherlands.

Trial - Austria

Trial - Austria will be held from 9th – 15th September 2019 in Eisenerz (Styria, Austria) and is being organised by the Austrian Red Cross (ARC). It will be conducted as a multi-day tabletop exercise under the framework of, and in parallel to, the Large Scale European Civil Protection IRONORE2019 exercise in Eisenerz, Austria. The Trial will evaluate a selection of tools contributing to international or national Crisis Management processes, especially in the fields of volunteer management; standardisation for representation of information; flexibility and ability to interoperate; and improvement of the vertical workflow (up and down) of information. The scenario of the Trial is a heavy earthquake causing severe damage in the local region of Eisenerz. Local and national emergency response organisations will be deployed on site; international assistance and a large number of volunteers are also required. Read more at www.driver-project.eu/trial-austria.

The 4th edition of the Innovation for Crisis Management (I4CM) event. Register now!

The next edition of the I4CM will be held from 12-13 June 2019 at the Kosmopol Centre in Copenhagen, Denmark. It will be hosted by the Danish Red Cross. This event will contribute towards building a shared understanding in Crisis Management across Europe. The fourth edition will focus on volunteer management in a crisis situation, with special attention being paid to issues around organised volunteers, spontaneous volunteers and psychosocial support to volunteers. Furthermore, this edition will give the participants an opportunity to learn about the latest development regarding the organisation of the fourth Trial to be organised in Styria (Austria) in September 2019, whose focus is also on Volunteer Management. The two-day event will comprise various interactive sessions such as keynote speakers, plenary discussions, interviews, dedicated

workshops and hands-on training sessions and roundtable discussions. Furthermore, a marketplace will be central to the event, allowing practitioners to discover innovative Crisis Management solutions. Take a look at the programme and register at: www.driver-project.eu/events/4th-i4cm

CMINE: Crisis Management Innovation Network Europe

The CMINE was launched in December 2018 and is intended to become an active and structured Community of Practice in the field of Crisis Management. It will be closely aligned with the Community of Users (CoU) initiative run by DG HOME and will complement other already existing communities, such as the Civil Protection Forum. The CMINE is designed to become an overarching Crisis Management network both at the EU level and beyond, creating a community of various types of stakeholders (including practitioners, policy makers, industry representatives, academia, civil society, and private bodies) that are involved in Crisis Management – providing a platform to link them together. The CMINE will facilitate exchanges between these stakeholders, in which challenges in the Crisis Management domain can be addressed, best practices can be exchanged, and solutions can be shared. The CMINE is an in-person and online community and will include face-to-face meetings

as well as online discussions. The current CMINE platform is structured in various spotlight sections - Capability Gaps, Innovative Solutions, Terminology, Trials and Demonstrations and Standardisation. Furthermore, chaired thematic areas have been set up to discuss how to tackle current and future challenges and to develop approaches designed to resolve pressing issues of practitioners involved in crisis management. The working groups are currently focussed on the following three thematic areas:

1. Flooding
2. Volunteer Management
3. Wildfires

The CMINE will closely follow the outcomes of all Trials. By now the community has already succeeded in attracting over 150 subscribed members. Would you like to join this interactive network?
www.driver-project.eu/cmine

Crisis Management
Innovation Network Europe

Policy Research Dialogue Roundtables (PRDR)

The DRIVER+ project will organise three Policy-Research Roundtables (PRDR). The PRDR events specifically aim to foster dialogue on how a pan-European approach to capability development and innovation management in the field of Disaster Risk Reduction and Crisis Management can be supported through a common trial and validation framework that ensures comparability and improves the uptake

of results stemming from EU funded Research projects. In this attempt, these events will bring together EC DGs (in particular DG HOME, DG ECHO/ERCC, DG RTD and DG CLIMA), the JRC/DRMKC, international organisations (UNISDR), national civil protection authorities from the Member States and selected Research & Innovation projects and/or initiatives. The first Policy Research Dialogue Roundtable was held back-to-back with DG HOME's CoU Governance meetings on 28th February 2019 in Brussels. The second roundtable will be organised on 17th October 2019 in Brussels also together with the CoU Governance meeting. The last PRDR will be held in conjunction with the DRIVER+ Final Conference. Find out more about the PRDR events at: www.driver-project.eu/events/prdr.

Final Demonstration

The Final Demonstration will take place from 25 – 29 November 2019 in Ispra, Italy and Warsaw, Poland. The Final Demonstration will showcase the DRIVER+ achievements to a large audience involved in Crisis Management, comprising industrials, researchers, Crisis Management professionals, policy makers, civil organisations and the press. The ambition is to build a sustainable event outliving the project. The Final Demonstration will present the potential of a more integrated high-level Crisis Management system in Europe, especially in cross-border contexts in term of improved situation assessment, coordination, resource pooling & sharing, and cross border cooperation. The event will also serve as a demonstration of the potential of a Common Operational Picture approach at European level. To achieve this, it will include solutions enhancing joint COP production and usage for improved interoperability between agencies.

LET US HEAR YOUR VOICE
CONTRIBUTE TO INNOVATION IN CRISIS MANAGEMENT

Are you a Crisis Management practitioner or solution provider? Are you a policy-maker impacted by Crisis Management issues? Are you involved in a related project or initiative? Your participation in the DRIVER+ activities is important to us and will help us to align with and to follow-up on relevant policies, challenges, gaps and community needs faced within the wide spectrum of thematic areas dealing with Crisis Management. To ensure that our activities are conducted taking into account your expertise and the technological state-of-the-art, we warmly invite you to take part in DRIVER+.

January 2018
Gaps & Needs assessment workshop

February 2018
Trials Workshop 0 (Poland)

September 2018
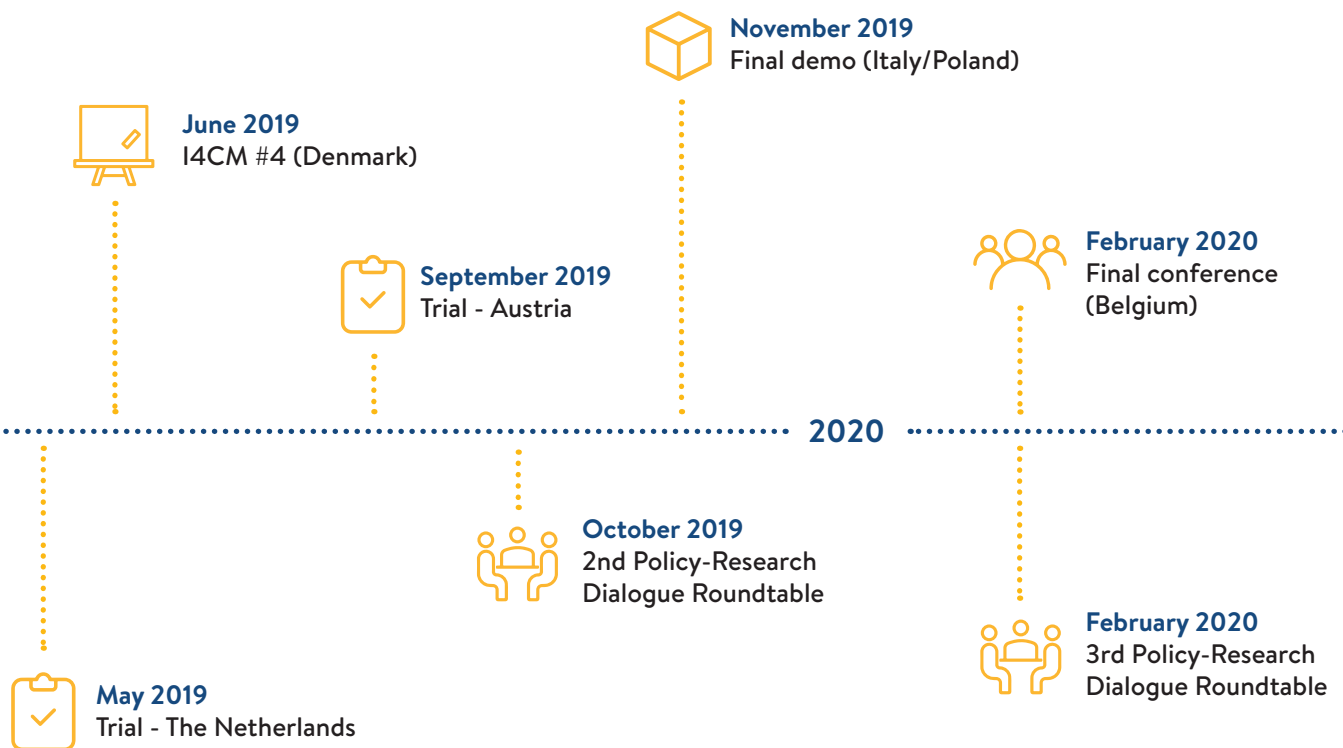I4CM #3 + Standardisation needs identification workshop (Poland)

2018

2019

October 2018
Trial #2 (France)

May 2018
Trial #1 (Poland)

February 2019
1st Policy-Research Dialogue Roundtable

November 2019
Final demo (Italy/Poland)

June 2019
I4CM #4 (Denmark)

February 2020
Final conference
(Belgium)

September 2019
Trial - Austria

2020

October 2019
2nd Policy-Research
Dialogue Roundtable

February 2020
3rd Policy-Research
Dialogue Roundtable

May 2019
Trial - The Netherlands

CONTACT US NOW!
DRIVER-PROJECT.EU

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Interested in collaborating with us? - cooperation@projectdriver.eu
Communication and media contact - communication@projectdriver.eu

Research
Operational needs
Lessons learned
Shared Understanding
Trials
Guidance Methodology
Knowledge base
Reference implementation Tools Pragmatic
European Test-bed
Crisis Virtually connected facilities
Unpredictability
Management
Challenges Innovative solutions
Cooperation Experience
Innovation Disasters
Crisis Labs
Analysis Trial-driven development
Portfolio of Solutions
Practitioners

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