TRIAL GUIDANCE METHODOLOGY HANDBOOK

Version 1.1 – February 2020

ACKNOWLEDGMENTS

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The time from the DRIVER+ kick-off in May 2014 to the release date of the current edition of the handbook in February 2020 was -for many of us- an impressive, instructive and intense journey of learning, experiencing and growing. Writing sessions, design workshops, intense discussions and continuous exchanges have paved the ground to a mature version that we are happy to share, in the hope that it will result into a stimulating reading.

We have come to realise that the journey has just began: we sincerely hope that the readers and future applicants of the TGM will enjoy their experience and understand the handbook as being a living book, which can and should grow with every single trial. We are deeply grateful for having been -literally- on the road with DRIVER+.

TGM Handbook editors

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PREFACE
WHY THIS HANDBOOK?

ABOUT CRISIS MANAGEMENT TRIALLING
WHY TRIALS?

Crisis management (CM) organisations often face difficulties in assessing the potential impact of a change in their sociotechnical setup for several reasons, for instance the lack of adequate methodological know-how to assess innovative solutions. Investments in new, but inappropriate solutions, not only produce significant costs, but also have negative impacts for the operational performance of response organisations. Changes may be brought about by different types of solutions, such as new software or new training or workflow processes, each adopted with the aim to improve certain functions or activities. For example, the use of an app for managing volunteers (compared to legacy systems and procedures) can be assessed in a trial on the basis of key performance indicators.

Assessing the impact of any kind of change is not a trivial task, as it points to both capability development and to the identification of innovation. This is why we need trials. Trials are of interest for people dealing with research and innovation who would like to test some new solutions, for practitioners in the field who have identified a problem in daily operations and are motivated to initiate the process of assessing solutions, for experts working in coordination centres who consider to participate in trial-like activities. Furthermore, in trials solution providers can collect user feedback to improve their solutions.

THE TRIAL GUIDANCE METHODOLOGY
WHY A METHODOLOGY?

A trial has a well-defined objective and needs to be structured It also implies a co-creative approach and an open mind. Workshops and tools are essential, as several iterations (especially for preparation) are usually needed. Trials are evolving processes: they grow “in the making”, like a handcrafted artefact. Time should be devoted to adjust the design. Key decisions must be taken in agreement with different stakeholders that need to be identified.

The success of a trial then clearly depends on its design: a robust design will lead you to find appropriate answers to your needs. This trial guidance methodology provides step-by-step guidelines, a list of roles and responsibilities, tools and methods to perform a trial through a clear, structured and co-creative approach.

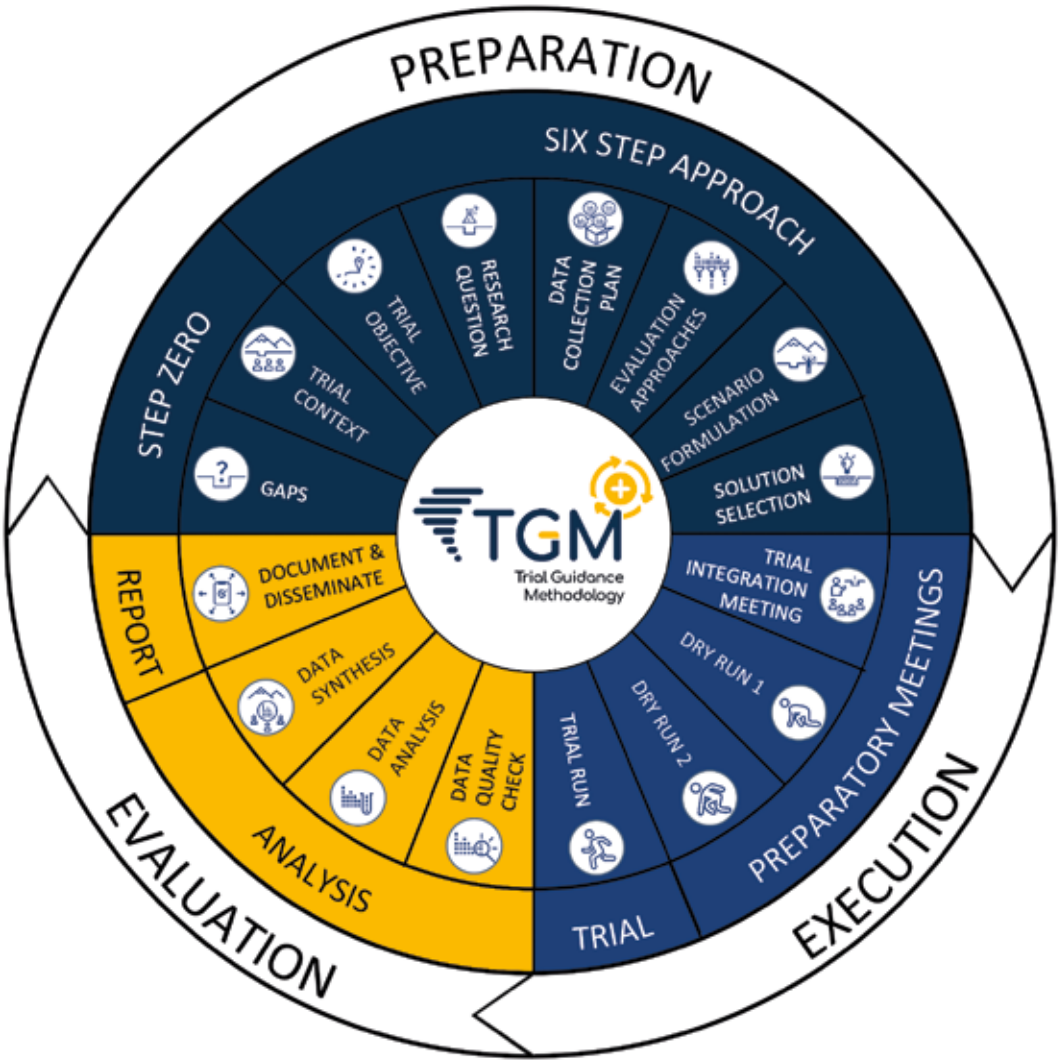
THE HANDBOOK
WHY THIS GUIDE?

A methodology is one thing. A good practical guide under your arm anytime to quickly find any clue of this methodology is another! This handbook shall guide you during the whole journey of the trial experience. You don’t have to memorize it. Instead, having it next to you when working on the trial allows you to find specific answers to your current questions. It can be considered as a “cookbook” helping you step by step to execute a specific recipe by telling you the ingredients you need and how to use them. Enjoy!

WHAT IS IN THIS HANDBOOK?
TABLE OF CONTENTS

A BIRD'S-EYE VIEW ON THE TGM

TGM'S ANATOMY



A BIRD'S-EYE VIEW ON THE TGM
THREE PHASES

The TGM consists of three main phases:

- Preparation
- Execution
- Evaluation

In this handbook, you will find a detailed explanation of the preparatory six step approach and the execution and evaluation phases. Before you start reading, you may want to have an overview of the methodological approach.

The preparation phase consists of two tasks:

TASK 1 is the so-called step zero (S0), the prerequisite for all trials. It involves the identification and the specification of gaps relevant in your context. To highlight the importance of S0, it is depicted separately in the right bar at the descriptions of the steps.

TASK 2 is the design of your trial. The design follows an iterative and non-linear six step approach. Identify the trial objectives first and then formulate one or more research questions. In the trial you should address your questions. The goal is not to elaborate a research paper, but to generate robust results regarding the added value of solutions, which are relevant for your specific context. To do this, you need to put in place an appropriate data collection plan as well as having in mind evaluation approaches and metrics to analyse the data collected during your trial. To conduct the trial, realistic scenarios must be developed and solutions to be trialled selected to allow you to ascertain whether they could be innovative.

Once the trial design has been developed, you are ready for the execution phase, which starts with the trial integration meeting (TIM). The TIM is crucial to align the perspectives of relevant stakeholders involved in the trial before the arrangements are tested at the location where the trial takes place (dry run 1). The full rehearsal of the trial is called dry run 2. After dry run 2, you are ready to run your trial.

After having executed your trial, the data collected can be analysed and disseminated. The main evaluation activities deal with checking and analysing the collected data according to the predetermined evaluation approaches. When the analysis is done, you are ready to synthetise the results providing you evidence on the impact of your solutions of interest and to disseminate the results within and beyond your community.

If you are ready to dig deep into the TGM, turn the page and start your journey.

HOW TO READ
USING THIS HANDBOOK

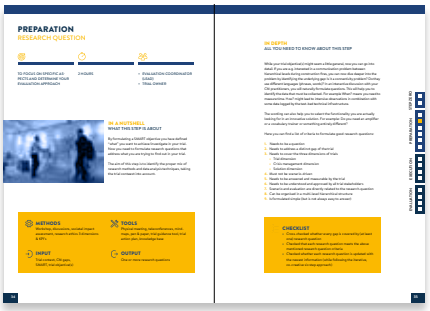
THE AIM OF THIS HANDBOOK IS TO LET YOU PROMPTLY FIND WHAT YOU ARE ACTUALLY LOOKING FOR WHEN CARRYING OUT A TRIAL. HERE ARE A FEW TIPS TO NAVIGATE THIS GUIDE AND USE IT EFFECTIVELY.

THE THREE PHASES
A BIRD'S-EYE VIEW ON THE METHODOLOGY

The TGM is split in three phases that anyone willing to run a trial should follow: **preparation** (designing the trial), **execution** (performing the trial), and **evaluation** (assessing the results). Each of these phases is divided into steps.

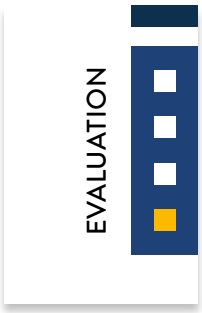
In this Handbook, there is a section for each **phase** and a dedicated page for each **step**:

Section page



Step page

By flipping pages and using the **vertical bar** at the right of the book, you can quickly and easily reach a specific step in a given phase.



"Evaluation" Phase, step 4

At the end of each phase section, you'll see **examples** of how this phase has been implemented in previous trials.

Phase example page

ROLES
THE PEOPLE YOU NEED

Going through all phases of a trial is a team effort. The **Roles** section presents the main human functions needed for a trial. Multiple roles can be covered by more than one person who can deal with several responsibilities.

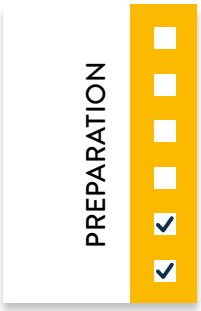
Tip: On the “Steps” and “Methods & Tools” pages, you can find the roles that should be involved in this specific part of the trial.

Roles page

METHODS & TOOLS
THE TOOLS YOU NEED

Tools and **methods** are meant to help you executing the various tasks of a trial. They are described in a dedicated section (one page for each tool or method).

By flipping pages and using the vertical bar at the right of the book, you can quickly and easily see which tools are used in which steps and phases.



Steps where this tool/method is useful

Tool/method page

TRIAL LOCATIONS
THE PLACE YOU NEED

The TGM includes trial locations, which are the place you need to perform your trial. Trial locations are presented in a dedicated section at the end of this handbook. They consist in physical, methodological and technical infrastructure elements to systematically conduct trials and evaluate solutions within an appropriate environment. They are places where trials can be run. Please contact them in case you consider to organise a trial.

Trial locations page

RISK TABLE
HOW TO MITIGATE RISKS?

Before taking a deep dive into the TGM, you would perhaps be interested in reading about some risks which might occur in a trial. Actually, these risks did not come out of the blue: we have some hands-on experience. In the risk table you will find risks categorized per topic, with an explanation and potential mitigation measures. You might come up with better ones but please, take five minutes of your time to have a look at the table.

RISK AREA	EXPLANATION	MITIGATION MEASURE
TECHNOLOGY-ORIENTATION	Once a solution is pre-selected, trial participants tend to develop the trial scenario according to the functionalities of the solutions. By doing so, often practitioners' realities are neglected. In consequence, the gathered data might become irrelevant for the practitioners and the ultimate goal of providing a practitioner-driven evaluation can be missed.	Don't design the trial scenario following the logic of technical solutions. The interest of the CM practitioners is at the centre of a trial. Before taking major decisions, always check that the interest(s) expressed by the main stakeholder (CM practitioner) does not get lost. The key recommendation is to put enough emphasis on drawing the base- and innovation lines and freezing the scenario design as soon as possible.
REALISM OF TRIALS	In DRIVER+ trials there was the tendency to come up with complex scenarios to make sure that all requirements were met (address all gaps and trial all solutions). A negative side effect is the inability to communicate the scenario and the trial objectives, which causes confusion among the CM practitioners, observers and the solution providers. In turn, misunderstandings and confusion amomg trial participants affects badly the analysis of the trial results.	Scenarios should cover all gaps but they should -for and foremost - be as much realistic as possibile. Scenarios must reflect practitioners' realities: this is a minimum requirement. Complex scenarios are not necessarily better ones. Avoid getting lost in details and stick to overall vision and to the requests of the main stakeholder(s) involved in the trial. A good approach to check the degree of complexity and level of realism is to ask the main stakeholders (CM practitioners) for their feedback on the data collection plan in relation to the final scenario.

RISK AREA	EXPLANATION	MITIGATION MEASURE
CO-PARTICIPATION AND COMMUNICATION	It was often observed that a participatory approach was used internally but not externally. Meaning that players, observers or the solution providers missed the full picture. The CM-related participants might get lost as soon as the scenario does not reflect their realities or if the execution of the trial is not explained properly (i.e. what happens when, why and how). On the other side, also the involved solution providers might get confused or even frustrated if the scenario and the way how their solution was integrated into it, was not reflected with and communicated to them.	Have an inclusive approach with all the stakeholders involved in a trial, including those who join "only" the execution phase. Explain how data is collected to the participants. Communicate key results to practitioners so that that they can learn from the experience. A trial does not end at the execution phase! Also, make sure that the solution providers are not afraid of the results. Communicate clearly that a trial is only showing the potential contribution in one particular scenario. The results are not about saying something is good or bad, but how it did contribute to one specific simulated operation.
INVOLVEMENT OF SOLUTION PROVIDERS	The experiences collected in trials, highlighted an active involvement of solution providers during the actual execution. Especially when complex solutions were used for the first time.	Ensure that training is appropriate to minimise an active involvement of solution providers during trials. In case of the use of very complex solutions, solution providers should be allowed to guide practitioners during the execution phase, providing that roles and responsibilities are clarified from the onset.
REFERENCE DATA	Assessing innovative solutions can be done in many different ways. Running a trial according to the TGM is one specific approach, which combines traditional approaches with a new way of investigating the impact of solutions on the CM performance at the center of the assessment. It may happen that TC members are more familiar with traditional approaches which might limit their willingness to spend additional efforts especially on providing reference data needed to measure the impact of new solutions.	The main mitigation measure is to start each trial with a proper presentation of and agreement on the TGM. When it comes to generating reference data it is key to keep in mind the implications it might have on the required efforts. If you have the opportunity to re-play past scenarios for which data is already stored, then use this. In doing so, you will reach a high level of realism and the execution of the trial comes along with less costs. If this is not the case, the best answer to ensure a comparison to the perceived performance in the innovative trial scenario is to execute baseline runs. This will double your efforts during the execution phase, but it is key to carry out appropriate comparisons.

RISK TABLE
HOW TO MITIGATE RISKS?

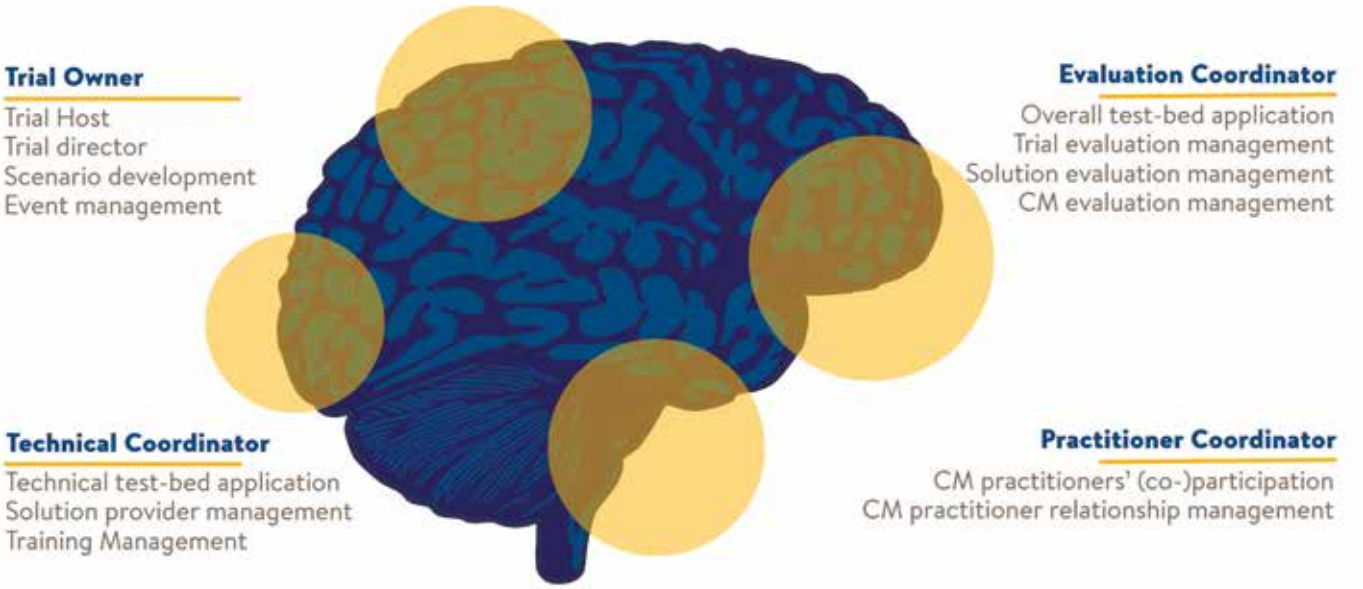
RISK AREA	EXPLANATION	MITIGATION MEASURE
TRIAL, NOT EXERCISE	Due to the nature of the TGM, the innovative solutions are trialled under as much realistic as possible circumstances. This implies that the participating practitioners are requested to respond to the different events as they would do in reality – except the agreed changes given by a realistic implementation of the new solution to the standard operating procedures. By doing so, the actual solution moves to the background, as most of the legacy systems are used intuitively. As an unintended consequence, the actual use of new solutions might decrease as opposed to the use of legacy systems.	Even though, this dilemma between using the solutions and solving the crisis will be always part of trials, there are several measures to avoid the non-utilization of the solutions: (1) it is key to design the scenarios in a way that the use of the solutions is enforced, e.g. by emphasizing the deviations from the standard operating procedures; (2) implement various elements reminding the attendees about the actual goal of trials (e.g. time jumps, recaps between the sessions, or reduction of stress); the more the trial scenario is designed as an exercise, the more the practitioners turn to their standard procedures and refuse the use of the solutions.
RESPONSIBILITY DIFFUSION	The TGM is a highly scalable approach. Trials can be “simple” by investigating one particular solution in a modest scenario but trials can also be used to assess several solutions at the same time in a complex scenario. Depending of the overall setup the size of TCs can vary significantly. While small TCs might cause higher workloads, the risk of big TCs is more complex. Next to a negative effect on decision-making time, a tricky challenge has been identified in the assignment and fulfilling the responsibilities. In case of an unclear, multiple or overlapping distribution of responsibilities among the TCs it might happen that important tasks are not taken up, executed inappropriately or cause serious delays.	To overcome a potential diffusion of responsibilities it is important to (1) not overload the number of TC roles, (2) to clearly define and differentiate the responsibilities as well as (3) to communicate regularly the state of the trial development structured along the roles and the responsibilities. These mitigation measures might be percieved overwhelming in the very beginning of a trial . Remember that assigned responsibility does not mean that no additional support can be requested. It is actually quite the opposite, as the assigned roles will be empowered by a lower decision making complexity and an explicit area of responsibility.

RISK AREA	EXPLANATION	MITIGATION MEASURE
TIMING AND TIME PRESSURE	In collaborative projects in general, every project member has the tendency to get things done fast. Given the nature of dedicated roles and responsibilities the importance of a decision depends on the role each member has. This causes conflicts of interest with the allocation of time to different decisions. In turn, group dynamics might lead to impatience within the trial committee.	Haste makes waste. It is important to be patient within the TC, while being realistic with scheduling and setting deadlines during the trial development. It is also possible to adjust and change your plans, even during the execution phase. Enter each phase with an open mind: it's better to change things when you can, instead rushing into decisions you might regret during the actual trial. Inappropriate decisions can cause serious limitations to reaching the overall goal of a trial.
LANGUAGE	There are many reasons why during the TGM application it is suggested to use English as the trial language (e.g. because of an international trial team or the available early-stage solution). However, CM practitioners are regularly using their native language which is part of their standard operating procedures. Ignoring the practitioners' realities has a serious impact on how the potential added value of innovative solutions is perceived and assessed.	Try to use the native language of the involved practitioners as much as possible. The more familiar the practitioners get with the new solutions, the more relevant the trial results might be. This principle might cause additional efforts, e.g. by providing new language packs of the solutions, but these costs allow for a better assessment of the solutions. In case of dedicated scenarios, which include e.g. cross-border operations, using non-native languages can be appropriate. All other cases call for careful considerations of pros and cons.
EXPECT THE UNEXPECTED	No matter how precise and detailed you are during the preparation phase and in rehearsals: hiccups can always happen during the actual trial. For instance, data exchange between solutions can go wrong with a detrimental impact on the data collection or CM practitioners invited as players might not show up because of a real crisis they have to deal with	Having plans B with regards to organisers and participants: always have more than one person appointed for a specific role/responsibilities. During the trial: have a small group of decision-makers, problem solvers and pre-defined workarounds specifically appointed to tackle problems as soon as they arise.

ROLES AND RESPONSIBILITIES
ACTORS AND STAKEHOLDERS

Regardless of the size of your trial, it is very important to agree on "who is doing what" beforehand. It's easier to say so than to put it into practice though, as there are several aspects to be considered. However, there are some minimum standards, meaning some key roles and responsibilities you don't want to skip to ensure that things go smoothly. Please consider that one person can fulfil one or more responsibilities: based on your time and your resources, you can decide to have a trial owner who is responsible for hosting and directing the trial as well as for following the development of the scenario and managing the event as such. What is important to bear in mind is to nourish the brain power needed for the trial relying on at least on four main roles: trail owner, technical coordinator, evaluation coordinator and practitioner coordinator.

A short explanation is provided in the following pages.



1. TRIAL OWNER

The "owner" of a trial is the CM organisation which is mainly responsible for the trial itself. While, on the one hand, trials are collective efforts, there should be one organisation that takes up the responsibility for planning, executing and evaluating the activities. This important role encompasses the following responsibilities:

A Developing a proper scenario so that the gaps and needs of the main stakeholder are captured in the trial (scenario development);

B Hosting the trial itself using one or more locations and ensuring that the chosen location is apt to the purpose of the trial (trial host);

C Directing the trial. The director has a prominent role in all phases and, as the name suggests, he or she gives the right directions: for instance, the director initiates the trial during the actual execution and is entitled to stop it any time, in case of problems and/or to put in place mitigation actions;

D Managing the trial-event in terms in logistics (e.g. rooms and equipment), safety (e.g. make sure that the people involved in the trial are not in danger), media (e.g. dealing with the media before and after the event) and participants (from active to passive actors: players, observers and guests).

2. TECHNICAL COORDINATOR

The technical coordinator is responsible for a proper technical set-up of the trial scenario, so that an adequate assessment of the selected solutions is ensured. Specifically, the following three responsibilities should be covered by the technical coordinator:

A The first aspect is the application of the technical test-bed infrastructure. The technical coordinator makes sure that the test-bed technical infrastructure is adjusted according to the decisions taken in the preparation phase and to the lessons learned during the rehearsal and that all components work together smoothly with the trialled solutions. During the trial, the technical coordinator oversees all technical aspects (e.g. integration with legacy tools at the trial location, data exchange etc).

B This is why the technical coordinator is also in charge of a proper solution providers management. Solution providers are actively involved in the development of the trial, as they know how to best integrate their solutions in the trial scenarios. Therefore, solution providers need to participate in relevant meetings prior to the execution phase so that they can get a comprehensive overview of the activities. The role of the technical coordinator does not end at the end of the trial execution. In fact, the technical coordinator works closely with the evaluation coordinator to provide insights on the overall test-bed application.

C Another key responsibility is the training management to be provided to the trial participants. The technical coordinator takes decisions with regards to the training needs by deciding how to train the players who actively use the selected solutions during the trial. To do this, solutions providers must be instructed and involved in the overall trial design from the onset.

3. PRACTITIONER COORDINATOR

the TGM revolves around a practitioner-driven approach, which is by-design reflected in every phase and step. The term “practitioners” stands for all relevant CM stakeholders. Starting the selection of potential solutions with the gap assessment in a specific CM practitioner context up to the final assessment of the potentially innovative solutions, it is the practitioner who has the last word about what should be assessed, in which context, how and what the results mean from the practitioners perspective. In order to ensure the practitioner-driven nature of the TGM, a dedicated practitioner coordinator shall serve as a proper guard.

A The first responsibility covers the (co-)participation of CM practitioners in the respective phases and steps of the TGM application. Here it is key to identify relevant stakeholders for each trial context. Ideally, the practitioner coordinator should have a CM background. This would facilitate the identification of the right profiles of CM practitioners needed to develop an as much realistic as possible trial scenario. Moreover, it would facilitate the identification of the main metrics for the CM dimension. Additionally, a clear communication of expectations needs to be ensured, so that all practitioners are aware that their participation is also needed after the trial execution to contribute to the sense making and dissemination of the trial results. The practitioner coordinator should be very sensitive to effectively request a minimum commitment of CM practitioner’s involvement while respecting the tight side restrictions practitioners have with regards to their daily duties. At the same time, this role will be regularly confronted with rather high expectations from the other roles in the TC, so that a proper translation and communication of practitioners’ realities becomes vital.

B The second responsibility targets a well-balanced CM practitioner relationship management. This rather management oriented task goes beyond the content-related (co-)participation of CM practitioners, because it refers to the establishment and maintenance of a pool of practitioners as direct trial participants and (indirectly participating) trial observers. The main functions cover contact management, communication, and reporting tasks.

4. EVALUATION COORDINATOR

Similar to the practitioner coordinator, the evaluation coordinator requires a dedicated role because of the importance of executing trials. The overall goal of trials is a robust assessment of potentially innovative solutions. In turn, the actual evaluation calls for neutrality, independence and an adequate degree of decision-making power. Therefore, it is recommended to confide the following responsibilities to someone, who is not in charge for the activities of the other roles.

A In order to ensure a high evaluation quality, the evaluation coordinator needs to carefully question and verify the overall test-bed application from the very beginning up to the end of a trial. To do so, a close interaction with the practitioner coordinator is important. As a next task, an alignment between the practitioners's inputs and the trial owner decisions is needed and should be secured by the evaluation coordinator. These results need to be communicated continuously to the technical coordinator, who in turn should feedback the alignment checks on a regular basis. In an ideal setup, this might lead to a highly robust assessment of innovative solutions in realistic setups. However, reality implies several limitations like the partial availability of practitioners, an insufficient length of the trial execution or inadequate depiction of real scenarios in virtual simulations. Therefore, trade-offs need to be done and the evaluation coordinator plays a key role in balancing costs and benefits of different setups.

B The next responsibility covers the trial evaluation management. Here, the evaluation coordinator is in charge of translating the agreed objectives and side restrictions of the trial dimension into proper metrics and target values. This task requires a strong collaboration with the trial owner.

C The same applies to the Solution evaluation management. In this area, the evaluation coordinator is tasked to transform the solution specifications, expressed as solution functions or features according to the CM taxonomy, into the solution dimension of the data collection plan. The main collaboration takes place with the technical coordinator, who should align the suggested metrics with the involved solution providers. Their feedback should be properly incorporated, so that the solutions are assessed according to what they are supposed or intended to support. In turn, the evaluation coordinator is in charge of an adequate feedback of the assessment results to the solution providers.

D Probably, themost challenging responsibility refers to the CM evaluation management. Here, the evaluation coordinator relies on a proper input on how the practitioners perceive the effectiveness of CM operations simulated during the trial. Those definitions are key to elicit the "real" impact of a solution on the CM performance. In consequence, the required CM practitioner profiles need to be communicated in advance to the practitioner coordinator in order to have access to this tremendous important basis of a trial. Another important step during the preparation phase is to communicate the scenario-related metrics to the trial owner, in order to ensure an adequate depiction of the actual work practices in the scenario. Last but not least, the technical coordinator needs to be informed about which data is required from the test-bed, so that the relevant data will be collected and stored in a proper quality, format and amount. Finally, during the evaluation phase the main task is to relate the results in the CM dimension to the results in the trial and solution dimensions. Changes in the CM performance have to be explained through a proper sense-making regarding a potential cause-effect relationship.

THE PAN-EUROPEAN TEST-BED

TRIAL LOCATIONS

One of the DRIVER+ objectives is the development of a european test-bed for crisis management capability development. This test-bed consists of physical, methodological and technical infrastructure elements to systematically conduct trials and evaluate solutions within an appropriate environment. In the context of the project, an “appropriate environment” is a testing environment where the trialling of solutions is carried out using a structured, all-encompassing and mutual learning approach.

The DRIVER+ trials have been conducted at four different locations within Europe:

- Szkoła Głowna Służby Pożarniczej (SGSP) - in Warsaw, Poland
- Centre Euro-méditerranéen de Simulation des Risques (CESIR) of VALABRE - in Aix-EnProvence, France
- Veiligheidsregio Haaglanden - Safety Region The Hague County - in The Hague, Netherlands
- Erzberg-Trainingszentrum of the Austrian Red Cross - in Erzberg, Austria

The vision of DRIVER+ is to create, a pan-European arena of virtually connected facilities and crisis labs (so called Centres of Expertise) where users, solution providers, researchers, policy makers and citizens jointly and iteratively can progress on new approaches or solutions to emerging issues. The Centres of Expertise will be the final depositories and service managers of the DRIVER+ outputs. They will act as primary contact points at the national/regional level for all practitioner-driven organisations operating in the field of crisis management and disaster risk reduction (or a specific domain under the latter) interested in using one of more of the DRIVER+ outputs, supporting them in their capability development and innovation management. They will make sure local organisations have easy access to such outputs and will provide guidance and support on how to use them. The Centres of Expertise can be found and approached via a dedicated group on the Crisis Management Innovation Network Europe (CMINE) website: https://www.cmine.eu/topics. This network is intended to not only facilitate innovation in CM, but also to generate a European CM culture and more shared understanding of CM across Europe.

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The Main School of Fire Service (SGSP) is a state services national technical university supervised by the Minister of Interior and Administration with almost 100 years of history. It consists of two faculties: Civil Safety Engineering (incl. topics: crises and risk management, civil protection, civil emergency planning and coordination, internal security, CBRN, CIMIC, rescue and logistic, etc.) and Fire Safety Engineering (incl. topics: fire engineering, fire and rescue operations, command and control, incident commanding, etc.).

Besides being a university, SGSP is also an operational unit of the State Fire Service, which runs its own professional fire station and forms national rescue reserves ready to be deployed country wide by General Director for Civil Protection in the event of a major disaster.

To enable the most effective training, SGSP has not only a very good IT infrastructure, which is focused on didactic and office work, but also a training ground that allows for various scenarios (incl. USAR, water rescue etc.).

ENTENTE POUR DE LA FORÊT MÉDITERRANÉE
VALABRE

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Valabre is a governmental organisation for the protection of the forest and the environment against fires. This organisation coordinates the efforts of the 14 departments most affected by forest fires of the South of France covering 4 regions: Provence Alpes Côte d'Azur, Occitanie, Corsica, and Auvergne-Rhône-Alpes, to fight forest fires.

The fire fighter officer' speciality training school (ECASC) is one department of the VALABRE organisation. Within its various pedagogical means, it uses simulation, notably in its new facility Centre Euro-méditerranéen de Simulation des Risques (CESIR). CESIR is a facility specially focused on virtual simulation environment, with an area of 600 m² fully customisable for any organisation. It contains a conference room with 150 seats and multi-source displays. Several meeting rooms and classrooms are also available.

Simulation capability is deployed in CESIR, enabling the immersion of participants in a virtual scenario. A large number of rooms allows scenarios to be planned with a lot of different actors from field actors to upper hierarchical levels. Such rooms are connected via internet and radio communication.

VEILIGHEIDSREGIO HAAGLANDEN
SAFETY REGION THE HAGUE COUNTY

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The Safety Region The Hague County has the task of ensuring a safe living environment for all those within the region in and around the city of The Hague (405 km²). It is an combined agency consisting of the region's nine municipalities, the police unit The Hague, the regional fire department and the organisation for medical assistance (GHOR). The emergency services, their joint incident room and the nine municipalities are working together 24 hours a day, seven days a week with joint responsibility for safety and care in the SRH.

The facilities of the Safety Region The Hague County are also an XVR Centre of Excellence and therefore the SRH is very experienced in the area of simulation. Here the immersion of the participant in a scenario is supported in the best possible way. Furthermore it supports a strong IT structure for the set-up of all kinds of trials and tests in a table top environment.

ERZBERG-TRAININGSZENTRUM
AUSTRIAN RED CROSS

AUSTRIAN RED CROSS

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The Austrian Red Cross (AT-OeRK) is a non-profit organization based on the Red Cross law in Austria. It is guided by the fundamental principles of the Red Cross Movement and it implements its humanitarian activities with the help of volunteers and employees. Through its activities, AT-OERK aims to help the most vulnerable in society, both at national as well as at international level. In Austria, AT-OERK has a network of around 57.000 volunteers and 8.300 employees, and at the headquarters it employs around 500 staff members. AT-OERK is the Austrian member of the International Red Cross and Red Crescent Movement. AT-OERK is mandated by authorities at all levels (district, regional, national) to be in charge of c&c of emergency medical and psychosocial situation. In the field of civil protection AT-OERK is providing the following services to the public – mandated by law – all over Austria: Emergency Medical Services, Ambulance Services, First-Responder Services, Humanitarian disaster relief, Psychosocial Support, First Aid-Training for the population, Paramedic-Training. Relevant research activities AT-OERK is the biggest provider of emergency medical service (EMS) dispatch in Austria. It is a very active actor in civil protection in Europe (trainings, exercises, missions, committees, exchange of experts, etc.) and has a remarkable record of project-work on international, European (including FP7) and national level both as coordinating as well as participating beneficiary (50+ co-financed projects within the past 5 years).

STEP ZERO

PREREQUISITES OF A TRIAL

When you start a new trial two pieces of information are key: What is your goal and what are the circumstances you work in? The goal gives you the rationale for the project and the circumstances are the boundaries you can act within.

In your trial your goal is: Identifying and evaluating an innovative sociotechnical solution that can bridge a crisis management gap you are experiencing in your daily operations. So the first step here is: identify those CM gaps! This needs to be done in close relation to the practitioners who experience one or more gap. For example: if you only ask the gold level firefighters you will most likely hear about gaps in the area of high level incident management, if you ask the bronze level policemen, you will most likely hear about gaps in patrolling the streets.

As you can already see in the example, every gap depends on a role, its responsibilities and the surroundings. This is the trial context. A bronze level policeman in the Bronx, a quarter of NY, USA will obviously face different gaps than a bronze level policeman in Häger, a farmers' community in Germany. This is not only the case in terms of location but even more in terms of culture, systems, procedures, etc. So even if they had the same gap, let´s say – a lack of situational awareness – they would experience it very differently. A trial context consists of all involved people, who are somehow part of the gap (within your organisation or outside). Furthermore, a trial context consists of equipment and infrastructure. But also the weather conditions can be important. And last but not least the human factor is key.

So please consider the step zero as the foundation of your trial and think of it thoroughly by applying the methods explained on the following pages.

STEP ZERO
GAPS

TO IDENTIFY SPECIFIC CAPABILITY GAPS AND/OR PROBLEMS YOU WANT TO ADDRESS IN YOUR TRIAL

2 DAYS

- PRACTITIONER COORDINATOR (LEAD)
- CM PRACTITIONERS

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

The difference between a current capability and the capability necessary for an adequate performance of different tasks, is a “capability gap”. Before setting up a trial, during the step zero, you have to think about the problems you are currently dealing with and the ideal situation you are aiming at. Identifying your gaps with practitioners will help you to address relevant problems in the trial.

METHODS
Workshops, focus groups, interviews, baseline

TOOLS
DRIVER+ gap list, CM taxonomy, online survey tools, Excel, trial action plan, L3, trial guidance tool, knowledge base, portfolio of solutions

INPUT
DRIVER+ CM gaps

OUTPUT
Context-specific validation of DRIVER+ CM gaps

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

Think about the current capabilities of the CM organisation you are working in. You can consider, for instance, sociotechnical operational aspects (common operational picture tools), or organisational processes (e.g. definition of roles and responsibilities when emergencies occur). Mostly likely, when considering what it is currently in place, you will also focus on what is missing or what can be improved. A structured approach is needed to identify your problems. Your experience is key but it may not be enough. We recommend four main methods to prioritise your gaps:

- Desk research. You can go through internal sources (e.g. reports on exercises to identify needs and lessons learned).
- Focus groups or structured interviews.
- A mixed approach: desk research plus focus groups.
- Workshops.

To organise focus groups you need one or more facilitators who guide the discussion among a group of people (practitioners). The desk research can be a valuable input for a focus group so that relevant aspects with regards to capability gaps emerge.

CHECKLIST

- Gaps selected from 21 DRIVER+ gaps
- Gaps discussed with practitioners
- Additional gaps identified (optional)

STEP ZERO
TRIAL CONTEXT

TO CLARIFY ALL CIRCUMSTANCES SURROUNDING YOUR GAP

3 HOURS + 1 DAY

- PRACTITIONER COORDINATOR (LEAD)
- CM PRACTITIONERS

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

Your gap is embedded in a certain context. It is entwined with a bundle of roles, responsibilities, situations, equipment etc. In order to find a sociotechnical solution that bridges your gap, you need to identify when exactly it occurs. This is done by depicting the trial context.

METHODS
Brainstorming and discussion, visualisation of processes and structures, baseline, societal impact assessment, research ethics

TOOLS
Sticky notes, whiteboard, mind maps, process models, organigrams, trial guidance tool, trial action plan, knowledge base, portfolio of solutions

INPUT
Gaps, practitioner knowledge, Lessons learned documents, accident reeports

OUTPUT
Trial context, baseline

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

This step has two tasks: first you have to identify your trial context and then you have to depict your “as-is-process” by creating a baseline.

Now let’s start with your 1) trial context.

You will find the trial context template in the Trial Guidance Tool. This will help you to identify key aspects of your trial context. Each gap occurs in a specific situation. This situation consits of people, things, circumstances etc. Don’t confuse this with the scenario you will create later on. The scenario will be one point in time where you find your gap - let’s say: a rainy Saturday afternoon in summer. But your gap most likely also occurs on other days, but maybe only in rainy conditions. Therefore you do a brainstorming session with your practitioners - to identify what is a “must-have” to create your gap-scenario and what is a “can-be”.

Now that you know your essentials, we can start 2) creating your baseline.

The baseline is a depiction of the as-is-process that includes all roles, actions and information exchanges (including the means by which they are done). You can use a language called business process modeling notation (BPMN), but feel free to use another method that suits you best.

The trial context template can be found in the trial guidance tool.

CHECKLIST

- Trial context template downloaded
- Trial context template discussed
- Trial context template filled in completely
- First baseline draft depicted
- Your gap might touch on ethical issues (e.g. CBRNe or data privacy related topics). Please indicate this in your trial context.

PREPARATION

THE SIX STEP APPROACH

The second part of the preparation phase is the six step approach. After having thought carefully about the contextualisation of your gap(s) - step zero - you are now ready to start designing your trial.

Again the starting point is being on the same page about your goal with everyone involved: the trial objective. This is a very important step as the trial objective(s) is/are pointing the way ahead. Specific information is provided on the following pages.

Based on this you will also formulate research questions. The aim of formulating a research question is that it increases the incentive to find an answer, right? Furthermore, by stating research question(s) you make it clear to everyone that you are not going to just play around with some nice new “toy” and only “to find out if people like it or not”. Your goal is to assess potentially innovative solutions that may/will be a “game-changer” in your organisation.

Because you aim at a structured assessment that will bring you concrete data to prove whether a new solution will bridge your gap, you need to think about those data. What exactly do you need to measure? Which is the Key Performance Indicator that is your “game changer”? Will improve everything by increasing or decreasing? All this you pin down in a data collection plan. You have to be clear on how to collect those data. It is up to you to decide and to write it down in your evaluation approach. Is it something that can be measured using the test-bed technical infrastructure, can it be observed and captured through a questionnaire?

When you know what to measure and how, you know what specific situations you have to create, in order to trigger the gap. You know all involved roles, their activities and the information exchanged. Based on this information you can create a dedicated trial scenario, that will make sure all needed “gap behaviour” is triggered in a way that enables the application of a new sociotechnical solution and to related measurement.

And finally you know exactly what you need – and can now choose a solution for trialling it that does not only claim to bridge your gap, but is ready to prove how and to what extent it can do this. Now you can make an informed decision at the solution demonstration and selection meeting.

The above mentioned process is an iterative one. Every time your information changes, you might want to update other parts of this cycle. For example, if you have chosen a particular solution, you have to update your data collection plan to the specific characteristics of this solution.

PREPARATION
TRIAL OBJECTIVE

TO DETERMINE THE GOAL(S) OF YOUR TRIAL

3 HOURS

- TRIAL OWNER (LEAD)
- PRACTITIONER COORDINATOR
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

An objective is defined as “something that one”s efforts or actions are intended to obtain or accomplish; purpose; goal; target” So coming from your gaps and the trial context, now you have to clearly define your trial objective(s) in a SMART way (see next page). This is the prerequisite for formulating clear research questions.

METHODS
Brainstorming and discussion

TOOLS
Pen & paper, mindmaps, SMART-definition, trial guidance tool, knowledge base, trial action plan

INPUT
Gaps & trial context

OUTPUT
SMART trial objective(s)

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

Let the preparation phase begin: Your first task is to write down your goals and aspirations - also known as trial objective(s). What do you really want to achieve in your trial?

Start with a brainstorming session for each goal and trial context. What is the core? What is the most important part of it (maybe there is even more than one)?

Now try to formulate this in one sentence that expresses it as an objective. The SMART formulation can help you. SMART stands for Specific, Measurable, Achievable, Reasonable and Time-bound.

First of all you have to be specific about what you want to address. What is your main "problem" within your gap? - write it down.
Second, as we aim for measurable results, it is important to formulate your objectives in a way that allows measuring. So what are you aiming for: Do you need to be faster? More accurate? Write it down.
Third, achievable. Only if you can actually address that gap in a trial, it is worth conducting it. So, write down also what you want to achieve.
Fourth, reasonable. You cannot change the whole world. But you can make a specific change in your everyday crisis management that will make your life better. Reasonable also refers to the resources you can use for your trial.
Finally, your objective must be achievable not only technically or resource-wise, but also it must be realized in a certain amount of time. Time is usually a very scarce resource for both those, who are organizing a trial, and those, who are participating in it. Thus, the time-bound criterion refers to the question how much time you are able and willing to spend, in order to prepare, execute and evaluate the trial. Indicate how much time you want to spend for each step of your trial.

CHECKLIST

- Aim/goal for improvement per gap written down
- Each objective is formulated in a SMART way
- SMART objectives discussed with practitioners
- Objectives are all feasible
- Overall objective of the trial ("slogan") formulated and discussed

PREPARATION
RESEARCH QUESTION

TO FOCUS ON SPECIFIC ASPECTS AND DETERMINE YOUR EVALUATION APPROACH

2 HOURS

- EVALUATION COORDINATOR (LEAD)
- TRIAL OWNER

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

By formulating a SMART objective you have defined "what" you want to achieve/investigate in your trial. Now you need to formulate research questions that address what you are trying to find out in your trial.

The aim of this step is to identify the proper mix of research methods and data analysis techniques, taking the trial conteext into account.

METHODS
Workshop, discussions, societal impact assessment, research ethics 3 dimensions & KPI's

TOOLS
Physical meeting, teleconferences, mind-maps, pen & paper, trial guidance tool, trial action plan, knowledge base

INPUT
Trial context, CM gaps, SMART, trial objective(s)

OUTPUT
One or more research questions

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

While your trial objective(s) might seem a little general, now you can go into detail. If you are e.g. interested in a communication problem between hierarchical levels during construction fires, you can now dive deeper into the problem by identifying the underlying gap: Is it a connectivity problem? Do they use different languages (phrases, words)? In an interactive discussion with your CM practitioners, you will naturally formulate questions. This will help you to identify the data that must be collected. For example When? means you need to measure time. How? might lead to intensive observations in combination with some data logged by the test-bed technical infrastructure.

The wording can also help you to select the functionality you are actually looking for in an innovative solution. For example: Do you need an amplifier or a vocabulary trainer or something entirely different?

Here you can find a list of criteria to formulate a good research question:

1. Needs to be a question
2. Needs to address a distinct gap of the trial
3. Needs to cover the three dimensions of trials
   - Trial dimension
   - Crisis management dimension
   - Solution dimension
4. Must not be scenario-driven
5. Needs to be answered and measurable by the trial
6. Needs to be understood and approved by all trial stakeholders
7. Scenario and evaluation are directly related to the research-question
8. Can be organised in a multi-level hierarchical structure
9. Is formulated simple (but is not always easy to answer)

CHECKLIST

- Cross-checked whether every gap is covered by (at least one) research question
- Checked that each research question meets the above mentioned research question criteria
- Checked whether each research question is updated with the newest information (while following the iterative, co-creative six step approach)

PREPARATION
DATA COLLECTION PLAN

TO COLLECT RELEVANT DATA (= THE DATA YOU NEED) DURING YOUR TRIAL

1 DAY

- EVALUATION COORDINATOR (LEAD)
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOTR
- TRIAL OWNER

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

The data collection plan describes how all the data you need to answer your research question will be collected and measured, by whom and by which means during the trial. This structured plan is key to addressing the research questions.

METHODS
Brainstorming, process modeling, baseline, innovation line, societal impact assessment, research ethics, 3 dimensions & KPI's

TOOLS
Excel, flow diagram, CM taxonomy, trial guidance tool, observer support tool, trial action plan, knowledge base, knowledge base, after-action review tool, observer support tool, extra developer tools

INPUT
Trial objectives, research questions, list of generic KPIs, applied baseline

OUTPUT
A structured data collection plan.

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

The starting point to formulating a good data collection plan is the rationale behind it. Ask yourself why you need a specific set of data and for which purposes. The answers should be easily found in the trial objective(s) and in the research questions ("to answer this research question, I have to collect this set of data"). Please bear in mind that you only have to collect the data you really need ("what is needed to provide an answer?"); but also which you are capable of collecting ("how much time and resources are available?"). To do this, you have to identify appropriate KPIs in all three performance measurement dimensions (trial, CM, solutions). Have a look at the list of generic KPIs and complete it with trial-specific measures.

You then have to think about "who" will collect the data, "when" and "how". You can collect data through the test-bed technical infrastructure and/or through observers during a specific session of the trial and in a given moment of the scenario. You can also collect data through surveys and focus groups. Ultimately, the data collection plan will serve the purpose of a roadmap. To get to your final destination, you have to map carefully all the information you need, bearing in mind the trial objective(s). Map out your plan using an Excel file to represent the directions you have to follow.

The list of generic KPIs is part of the trial guidance tool (see page 96).

CHECKLIST

- Determined what data is to be collected
- Determined measures and metrics (KPIs)
- Determined how data will be collected (e.g. self-report methods: questionnaire, interviews, observations).
- Data collection plan implemented in the observer support tool
- Data collection can concern ethical and legal issues. Consider this, and prepare the relevant documents, such as informed consent sheets and non-disclosure agreements.

PREPARATION
EVALUATION APPROACHES AND METRICS

TO ANALYSE THE DATA IN A PROPER WAY

0.5 DAYS

- EVALUATION COORDINATOR (LEAD)
- TRIAL OWNER

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

The evaluation approach of your trial depends on the data collection plan and deals with “making sense” of the data through different techniques.

METHODS
Brainstorming, quantitative analysis techniques, qualitative analysis techniques, innovation line, societal impact assessment, research ethics

TOOLS
Trial guidance tool, CM taxonomy, lessons learnt library, trial action plan, knowledge base, knowledge base, after-action review tool, observer support tool, admin tool and security, extra developer tools

INPUT
Data collection plan

OUTPUT
List of techniques and tools for evaluation

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

Once you have decided on the type of data you need to answer your research question(s), you have to consider which techniques and tools will be used to analyse the set of data to be collected in your trial. The data collection plan is key here, as it gives you a clear indication of the evaluation approaches you have to consider. What are you planning to collect? Did you decide to collect data using only the test-bed technical infrastructure? Or did you also decide to engage in structured discussions with the participants of your trial to get further insights? The main question to decide on evaluation approaches is how are you going to make sense of the data?

It is not enough to know what data, what to do with it is also important. For example, if you are planning to ask specific questions based on KPIs, you will carry out a survey and you will use a rating scale to measure opinions (quantitative method). If you are looking for more in-depth information that can be better inferred through discussions, your evaluation should take into account more qualitative methods (focus groups) and appropriate techniques to analyse the data collected (qualitative data analysis software).

What is important at this stage is the "sense making". While you still don't have a precise idea of how the data will look like, you should start thinking of advantages and disadvantages of specific techniques and tools.

CHECKLIST

- KPI's & metrics formulated
- Targets per KPI & metric
- Match data with a specific evaluation approach
- Reality check: are the evaluation approaches feasible?
- To analyse and disseminate data or results can include various ethical and/or legal challenges; identify these, e.g. via external consultations, and document how they are followed up

PREPARATION
SCENARIO FORMULATION

TO CREATE EXACTLY THE CIRCUMSTANCES FOR YOUR TRIAL IN WHICH THE GAP OCCURS

1 DAY

- TRIAL OWNER (LEAD),
- PRACTITIONER COORDINATOR
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR
- CM PRACTITIONERS

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

Your trial context gives you lots of opportunities to come up with a specific trial scenario. The scenario is dependent on different things: gaps, available practitioners (number, role within organisation etc.), available facilities & equipment. You need to write a distinct scenario in the same way you would write a script for an exercise - who does what, when, where, with what equipment. In other words: In which special situation do you want to face your gap? Think of this while choosing and selecting solutions.

METHODS
Brainstorming & screenplay writing, baseline, societal impact assessment, research ethics

TOOLS
Trial guidance tool, whiteboard, sticky notes, trial management tool, trial action plan, knowledge base, portfolio of solutions

INPUT
Trial context, gaps, research question, data collection plan

OUTPUT
Scenario script/storyboard

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

You know your gaps and in which trial context they appear. Now you also know when (summer, winter etc.) and where (indoor/outdoor) you want to have your trial. Also, you have an idea of whom you need (bronze, silver, gold level/ personnel from other organisations/ IT staff) and their availability restrictions. All this information has an impact on the formulation of the scenario - you have to pick a specific line of action, based on the prerequisites identified before.

So start writing down all those side-restrictions (look at your trial context template) and brainstorm about the roles and responsibilities you need for conducting your trial.

Then think of the specific situation you need to create in order to trigger your gap. Which roles are involved, which equipment do they use, what are they doing with it? Bounded in space and time in which your gap occurs. Write down what has to happen to trigger this event.

By doing this, you approach your gaps from a different perspective. This is important to when selecting innovative solutions. Only if you know in which situations you face your gap can you identify what kind of solution is needed.

CHECKLIST

- Key events of each gap clearly stated
- Triggering conditions and injects per key event identified and written down
- Roles and actions needed for key events identified
- Key events combined with a conclusive storyline
- Injects prepared to trigger the needed key events
- Your scenario might touch upon sensitive topics (e.g. CBRNe or triage). Look up and consult available ethics guidelines (e.g. for CBRNe security or data protection) and integrate ethical considerations into the scenario from the onset.
- Consider if there are legal implications for the scenario chosen, or whether it can have negative societal impacts.

PREPARATION
SOLUTION SELECTION

TO CHOOSE PROMISING INNOVATIVE SOCIOTECHNICAL SOLUTIONS

3 TO 5 DAYS

- TRIAL OWNER (LEAD)
- PRACTITIONER COORDINATOR
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR
- CM PRACTITIONERS
- SOLUTION PROVIDERS

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

Depending whether the set of potential solutions is known or not, the length of the solution selection process can vary greatly. Once a potential set of solutions is found, the process consists of two tasks. The first task is to execute a practitioner-centered review of the solution itself. Here you can make use of pre-assessment criteria developed by multi-disciplinary CM practitioners. Once the reviews are finished, the whole TC can run the actual selection of the solutions, which includes also further trial-related considerations, like the relation to gaps or the requirements on the technical side.

METHODS
Solution selection process, innovation line, societal impact assessment, research ethics

TOOLS
Website, physical meeting, solutions, trial host infrastructure (espcially wifi), CM taxonomy, trial action plan, trial guidance tool, knowledge base, portfolio of solutions

INPUT
Trial context & gaps

OUTPUT
List of selected solution(s) for the trial

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

You aim to close your gap with a socio-technical solution. This can be a piece of hard- or software, a training course, a new procedure or a mixture of them. It is important that you find something that is actually promising to improve the current situation.

The first task refers is to get a first impression by potential future users. Ask the solution provider to answer the following questions in order to assess the fittingness to your needs:

1. Mission: How does the solution contribute to crisis management?
2. Integration: How is it integrated into the existing crisis management operations?
3. Readiness: How mature is the solution and has it been tested or proved?
4. Motivation: How does the solution address problems of practitioners?
5. References: Which references on solution application exist?

In order to get prepared for the next step, you can optionally ask for the required resources and know-how to use the application, some technical specifications as well as the investment costs needed to deploy the solution. In order not to overload the solution provider the length of the answers should be limited properly (e.g. two pages in total). Once you have collected the answers you should include the potential users, the CM practitioners, to ask them for a feedback, whether the solution sounds promising or not. The results are to be discussed in the TC in order to conclude which solutions appear to be promising to address the gaps. This discussion can be supported by considering the following questions:

1. Can the solution be used to address the initial gap and to provide an answer to the main research question of the trial?
2. Is the solution provider able to provide an appropriate training so that potential end-users can apply the solution in the trial?
3. Does the solution require special technical setup in order to be trialled and is the technical testbed infrastructure able to fulfil them?
4. Is the solution provider willing and able to participate and contribute to the trial-related tasks and meetings?

It is recommended to organise a physical or virtual meeting with the TC and the solution providers, where those questions should be carefully explained and discussed. However, the final decision should be concluded within the TC and communicated shortly after the meeting. In case one solution is not selected, it is important to provide a proper answer so that the solution provider gets a better understanding of the reasoning decision.

CHECKLIST

- Needed solution functionalities for closing the gap identified
- Solution selection process followed
- Solution review issued
- Preselection finalised
- Solution demonstration meeting held
- Solution selection agreed upon within thee trial committee
- Agreed with solution provider on terms of participation in a trial
- Carry out a Societal Impact Assessment (SIA) on the chosen solutions. Identify and follow up on potential legal or ethics issues relating to the use of the solutions (e.g. use of tweets).

EXAMPLE TRIAL 1 – PL
PREPARATION PHASE

THIS EXAMPLE PRESENTS AN EXCERPT OF THE PREPARATION PHASE IN THE FIRST DRIVER+ TRIAL HOSTED IN POLAND. IT DEMONSTRATES THE SIX STEP APPROACH OF THE PREPARATION PHASE STARTING FROM ONE OF THE TRIAL OBJECTIVES AND FOLLOWS ONE GAP, AS WELL AS ONE RESEARCH QUESTION. ACCORDINGLY, THE LATER STEPS OF FORMULATING THE DATA COLLECTION AND EVALUATION PLAN, SCENARIO FORMULATION AND SOLUTION SELECTION WILL ALSO FOCUS ON THIS NARROWED SCOPE FOR ILLUSTRATION PURPOSES.

Objective
The overall objective was to simulate coordinated actions at the local, regional, national and international level with the purpose of counteracting the effects of the disaster effects and to trial selected solutions for their applicability in addressing current crisis management gaps. The sub-objective relevant for this example is to improve the effectiveness of identifying the needs of affected people trapped in buildings in the chemical spill area through:

- Shortening the time to indicate/point on the map the location of the residents in need.
- Improving the accuracy of the identification of the type of needs.

Gap
Among others, one of the identified gaps was the insufficiency in terms of resource management (human resources, hardware, etc.) during multi-stakeholder long-term rescue operations.

Research Question
A research questions was formulated specifically for the gap mentioned above. Gap specific research question: How can cross-border resource management be supported through sociotechnical solutions during multi-stakeholder long-term rescue operations? Accompanying with this research question, an assumption was formulated, which is to be assessed through the data collection and evaluation plan. Such an assumption is not required by the methodology, but it might help in guiding further actions.

Data Collection Plan
The trial was executed as a simulated table top and field experiment, which motivated the use of dedicated observers, who recorded and documented the actions. For the evaluation purposes of this part of the trial, the data below was collected, evaluation questionnaires filled in by the observers and aimed at recording operational decision time slots (from achieving the data collected during the drone flight to the end of counting or measurements).

Evaluation questionnaires on three dimensions (crisis management, trial and solution dimensions) filled in by:

- Practitioners: providing feedback (data) regarding quality of the trial as well as usability, innovation, user friendliness and other aspects of the solution.
- Observers: providing feedback (data) regarding observed organisational difficulties of the trial conduction, external constraints that may influence the trial results.

Besides overall satisfaction and usability scores from questionnaires, further KPIs have been defined to assess the potential improvement in crisis management achieved by applying new solutions.

KPI 1 – Number of identified needs in total indicated by coloured flags.
KPI 2 – Time for decision-making.
KPI 3 – Types of identified needs indicated by the correct identification of coloured flags.
KPI 4 – Location of the needs.

Evaluation

In order to enable the assessment of improvements, multiple sessions have been executed to compare the current mode of operation in the baseline to the innovative solutions in the Innovation Line. This enabled a comparison between these sessions. The combined observations support the assessment of the results in light of the specific trial execution considering difficulties and constraints as well as the three evaluation dimensions crisis management, trial and solution.

Plan Scenario

The scenario of the trial includes a massive release of liquid toxic substances because of a maintenance failure in a reservoir collecting chemical waste.
A valve failure means that the pumps, pumping chemical waste liquid to the reservoir, cannot be switched off. Due to this, there is a rapid inflow of a significant amount of a liquid, mud-like toxic chemical to the retention reservoir. The dikes of the reservoir are weakened after prolonged rainfall during past few days. Due to increased pressure, the dikes break.

Selected Solutions

Drone rapid mapping - The solution enables very fast generation of orthophoto maps based on imagery acquired by a drone (RPAS) available to rescue or crisis management actors. The resulting maps could be viewed and analysed in the dedicated geoportal or any GIS environment already utilised by crisis management institutions. The additional product was a 3D model of the terrain, enabling better and more intuitive understanding of the area of interest.

EXAMPLE TRIAL 2 – FR
PREPARATION PHASE

THE SECOND TRIAL ORGANISED WITHIN THE DRIVER+ PROJECT AIMED TO VALIDATE THE PROJECT'S TRIAL GUIDANCE METHODOLOGY WHILE IMPLEMENTING FIRST LESSONS LEARNED FROM TRIAL POLAND. IT WAS CHARACTERISED BY A DIFFERENT TYPE OF RISK (FOREST FIRE) AND IT ADDRESSED DIFFERENT CRISIS MANAGEMENT GAPS AND UTILISED DIFFERENT SOLUTIONS. THE GENERAL PURPOSE OF TRIAL FRANCE WAS TO IMPROVE COOPERATION AND COORDINATION BETWEEN DIFFERENT ORGANISATIONS.

Trial Context
Trial France focused on a forest fire in southern France. In addition to the fire spread, the threat on a SEVESO plant had to be considered and a MasCal Situation on a nearby camping side had to be taken into account. So the main involved organisations were the fire brigade, the environmental agency and emergency services.

Objective
The mission objective within the trial scenario was the suppression of a forest fire while protecting people, goods, infrastructure and the environment. Further, the trial objectives were to assess the effect of the selected solutions within the scope of the mission and to identify factors affecting the deployment and use of the solutions.

Gap
Among the identified gaps were shortcomings in the ability to exchange crisis-related information across agencies and organisations, and to ensure a common understanding of the information exchanged for all crisis managers involved in the response operations.

Research Question
To address this gap, the following specific research question was formulated: How to improve and maintain, in real time, a shared situational awareness by supporting the exchange of crisis-related information among agencies and organisations? This broad question was then divided into four narrower and more detailed sub-research questions:

- How can relevant information be shared with crisis managers while preventing information overload?
- How can sociotechnical solutions improve the quality of the information exchanged?
- Can sociotechnical solutions improve the understandability of the information exchanged among the different actors involved despite different backgrounds (discipline, culture, language, etc.)?
- Can these solutions save time in exchanging information between different agencies?

Data Collection Plan
In order to answer these detailed questions, a large array of data sources was defined. These included:

- Factual information collected by trial owner during the trial.
- Logs from the test-bed technical infrastructure (including exchange of information involving the innovative solutions and the simulators).
- Logs and other types of data (pictures) from innovative and legacy solutions.
- Observation sheets completed by observers during the trial, after each session.
- Participants' questionnaires completed by all participants immediately after the trial.
- Solution questionnaires completed by the practitioners immediately after the trial.
- Debriefing of the practitioners (managed by the trial owner).
- Debriefing of the observers (managed by the observers' training managers).
- Questionnaires and observation sheets to produce both qualitative (free comment boxes) and quantitative data (using Likert scales).

Evaluation Plan

The performance indicators for evaluation were defined in a two-pronged, complementary approach. A number of relevant KPIs were derived from the international standard ISO 9241-11:

- Effectiveness (can users complete tasks/achieve goals with the product, i.e. do what they want to do?).
- Efficiency (can users finish tasks faster with the help of the product?).
- Satisfaction (does the product meet the users' requirements?).
- Learning (do users need a long learning process to effectively use the solution?).

In addition, based on the DRIVER+ taxonomy, each function of the solutions under test were evaluated for availability, relevance and maturity.

Scenario

The trials overall scenario was a large forest fire in the South East of France with cascading effects on a chemical plant (power outage caused by the spreading fire) and on human settlements (a campsite with tourists was threatened by the fire and people disrespecting security advice and escaping the campsite on foot). The latter element was introduced to consider the CM capability gap on cooperation between fire fighter and emergency medical services, based on recent experiences during forest fires with casualties in Portugal (2017) and Greece (2018).

Selected solutions

Among the solutions selected for the trial was CrisisSuite, which provides a centralised data exchange platform including tasking for all organisations (definition of tasks and task progress management), a common log environment and automated generation of situation reports based on tasking and logs.

EXAMPLE TRIAL 3 – NL
PREPARATION PHASE

THE TRIAL "THE NETHERLANDS" WAS BASED ON THE EXPERIENCES AND LESSONS LEARNED OF THE FIRST TWO DRIVER+ TRIALS AND COULD THEREFORE BE PREPARED MORE EFFICIENTLY. FURTHERMORE, THE TRIAL GUIDANCE METHODOLOGY (TGM) HAD ALREADY MATURED TO SUCH AN EXTENT THAT IT COULD BE USED AS A VERY GOOD BASIS FOR PLANNING.

Objective

The DRIVER+ trial focused on a flash flood scenario simulating a lock breach caused by severe weather conditions. This resulted 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 included power outage, flooded roads and railway infrastructure, affecting the population living in those areas. The aim of this tabletop trial was to improve current Crisis Management capabilities by identifying solutions that address potential shortcomings in the planning of resources for response during large scale and long-term crises, the ability to exchange crisis-related information between agencies and organisations as well as in the planning and management of large scale evacuations of population in urban areas.

Gap

The three identified gaps were:

- Limitations in the planning of resources (qualified personnel and equipment) for response during large scale and long-term crisis,
- Shortcomings in the ability to exchange crisis-related information among agencies and organisations (also related to as interoperability), and
- Shortcomings in planning and managing the side effects of large scale evacuation of population in urban areas.

Research Question

Three research questions, each addressing a gap, were identified in an iterative process between practitioners, solution providers and the trial management team.

- How can simulation tools improve resource planning activities in large scale and long-term disaster operations?
- How can net-centric data exchange improve information sharing between relevant parties and thus improve the shared understanding of the current situation?
- How can simulation tools support the planning and management of a large-scale evacuation under consideration of real-time traffic information?

Data Collection Plan

The data collection plan forms the basis of the 3-dimension evaluation of the solutions in trial activities (including trial, crisis management and solutions) which was carried out using the trial guidance methodology approach. For the trial dimension the set of predefined KPIs used in every trial was used. To evaluate the trial dimension performance a questionnaire was designed for all involved persons in the trial 4 (trial committee & staff, participants, observers and solution providers). Data for the solution dimension was collected two ways, both using the OST:

1. For each solution there was – per scenario block – a questionnaire dedicated to the use of the solution in that particular block of the trial.
2. Checklists were prepared per practitioner group (e.g. action center "Water Board") for the observers to specifically track the use of the solution for particular tasks and assignments. Furthermore, so-called 'walking observers' observed the interaction of solution use between different practitioner groups providing output to each other (e.g. action center "Water Board" sending information to action center "Police").

In addition to the questionnaires the digital communication between action centers and the solutions was monitored and stored. For the crisis management dimension assignments were formulated on the tasks and expected actions from the practitioner groups during the trial. Based on these assignments checklists were formulated for each observer to observe behaviour and e.g. oral conclusions of the practitioners in executing the assignments.

For all three dimensions, short debriefings or first impression reviews were held to collect feedback on any issue relevant in the trial. The observers held a meeting directly after each scenario block; practitioners and technical staff after each day.

Evaluation
According to the TGM the evaluation was divided into the three main topics: trial, solution and crisis management. For each part, a number of relevant KPIs was collected and analysed. A basic scenario without the new solutions was discussed and documented in interviews with practitioners. Afterwards, the innovation scenario was played with the solutions to assess the differences and to see which improvements the solutions could achieve.

Scenario
A north-western storm over the North Sea was expected to hit the Dutch coast in two days. Once it arrived, the high water and bad weather conditions caused a failure of the lock in Scheveningen and endangered dikes. Subsequently, three major regions in The Hague were flooded. A cascading effect of floods was the threat to critical infrastructure. A power failure quickly lead to a shortage of drinking water and the failure of heating systems. Since traffic infrastructure flooded, covered in debris or damaged, the transport system was severely affected or came to a complete standstill. In order to keep the number of casualties as small as possible, a fast and effective evacuation of the population before, during and after the disaster had to be organised. SRH was cooperating with other stakeholders like the water board, power companies and communication providers. The scenario that was played during the trial covered the threat phase before the flooding as well as the impact phase after the flooding and was split in four different blocks: 1) cascading effects (threat phase), 2) evacuation (threat phase), 3) damage assessment (impact phase), 4) damage control (impact phase).

Selected Solutions
25 applications were originally received in response to a call for applications. 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 were:

1) 3Di-DEM edit
3Di is an interactive water simulation model that enables crisis managers to construct a common operational picture of the dynamics of floods and allows a quick calculation of the effects of mitigation measures.

2) SIM-CI
SIM-CI visualizes the flooding event and its cascading effects on critical infrastructures in The Hague by means of a digital twin city. With its simulation, crisis managers can see how water spreads through the area, including buildings and critical infrastructures such as roads and the electricity and telecoms networks.

3) CrisisSuite
CrisisSuite is an online crisis management software application that enables organisations to successfully manage information during a crisis. CrisisSuite supports the net-centric working methods of crisis teams by creating a universal picture of the crisis and share it horizontally and vertically with the other teams in the crisis organisation.

4) Airborne and Terrestrial Situational Awareness
It provides reliable traffic information, prediction and visualization based on various traffic data sources (e.g. satellite/airborne imagery), also providing routing advice taking into account the current traffic and crisis situation (e.g. flooded areas). Additionally, satellite/airborne based 2D and 3D information are provided.

5) HumLogSim
HumLogSim is a performance assessment platform that serves logistic processes in crisis management. The functionality comprises strategic planning support as well as tactical and operational decision support by assessing and comparing the network performance under given situations and realistic crisis management actions.

EXECUTION

GETTING THE TRIAL DONE

You want to find a solution that bridges your gap. And you want valid data to back up your findings. That´s why you have done all the preparation steps. Now you have to execute the trial – and make sure you capture that data!

The first milestone in this phase is the trial integration meeting (TIM). For the first time, practitioners, solution providers and test-bed people will meet at the TIM. The aim of the meeting is to get aligned, hence it is not only technical, it is a real trial integration meeting.

After that, there are two dry runs in which you can test the technical set-up and iterate your scenario in order to refine it. Use your rehearsals also to test your data collection. Actually, this is the most important part. Make sure all data can be collected, through the test-bed technical infrastructure, through solutions, through observations or by asking the players in a structured way. If you don't do this, all the efforts put in the preparation phase will get lost.

The grand finale is the trial itself. Here you have to collect all the data you need in order to be able to decide objectively whether a solution can bridge your gap. Maybe they only partly bridge the gap, maybe not at all or maybe more than just the identified gap will be bridged. In any case you will be able to provide some evidence - do not forget to enjoy and celebrate the event!

EXECUTION
TRIAL INTEGRATION MEETING

TO MAKE SURE EVERYONE IS ON THE SAME PAGE AND ALL NEEDED FUNCTIONALITIES ARE DESCRIBED AND THE DATA COLLECTION DETERMINED

3 DAYS

- EVALUATION COORDINATOR (LEAD)
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOTRIAL
- TRIAL OWNER

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

The trial integration meeting (TIM) aligns the perspectives of the practitioners, solution providers and trial committee. To draft the later trial script, the participants discuss the integration of solutions into the practitioners' operations, the required information exchange as well as the data collection and evaluation criteria to address the trial objectives.

METHODS
Interviews, discussion, process mapping, societal impact assessment, research ethics

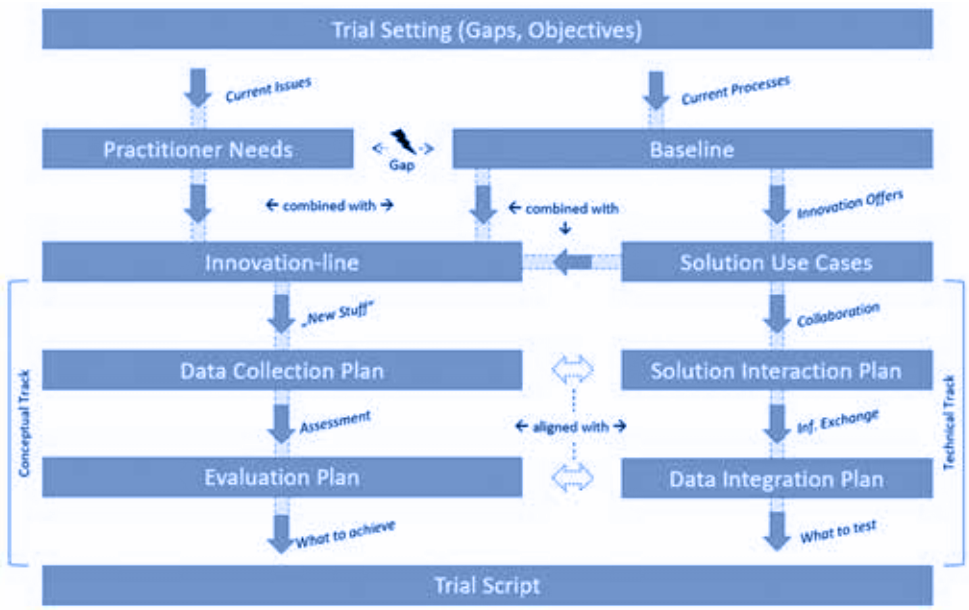
TOOLS
Flow diagram, whiteboard, sticky notes, solutions, test-bed technical infra., trial action plan, common information space, common simulation space, trial management tool, observer support tool

INPUT
Trial context, solution info; baseline & draft innovation line

OUTPUT
Clear definition of practitioner and solution needs, innovation-line, data integration plan, scenario input

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

This will be the first physical meeting with all solution providers, the test-bed technical infrastructure and CM practitioners. So use the time for the following: make sure people understand each others needs - CM practitioners need to understand the solution - solution providers need to understand the CM gaps/processes/needs. Based on the baseline and the solution functionalities, you can define solution use cases. Those will be transferred to the Innovation Line. This is the base on which you can discuss data exchange - both with practitioners and test-bed technical infrastructure (what data & how). Be aware of measurements and your evaluation approach!



CHECKLIST

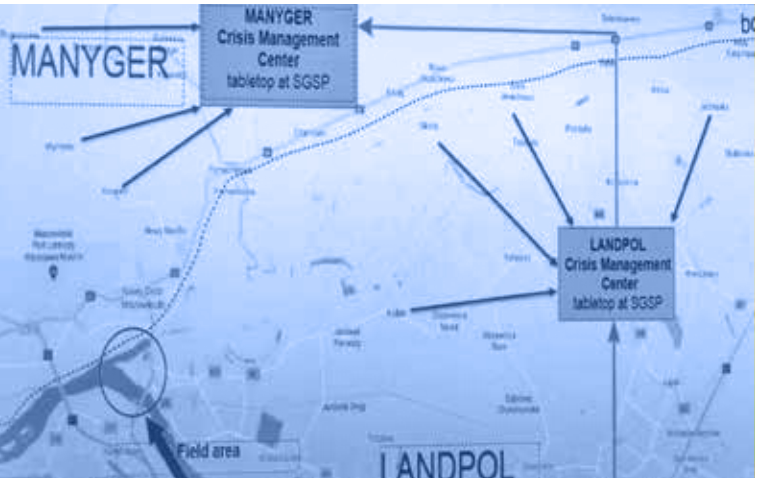
- Initial list of external stakeholders made
- Advanced draft baseline ready
- Draft innovation line prepared
- Draft data integration plan among solution providers and test-bed technical infrastructure personnel created
- Draft solution interaction plan created
- Usecases per solution and key event formulated
- Preliminary data collection plan and evaluation approach checked for feasability
- As this is the first physical working meeting between solution providers and the the trial committee, make sure legal issues relevant for the cooperation (e.g. NDA) are covered. If a SIA was not carried out during the solution selection process, this is a good time to do it.

EXECUTION
DRY RUN 1

TO TEST THE TECHNICAL SET-UP AND YOUR DATA COLLECTION SET-UP AS WELL AS TO TEST THE TRAINING ON SOLUTIONS

3 DAYS

- TECHNICAL COORDINATOTR (LEAD)
- EVALUATION COORDINATOR PRACTITIONER COORDINATOR
- TRIAL OWNER
- SOLUTION PROVIDERS
- CM PRACTITIONERS



IN A NUTSHELL
WHAT THIS STEP IS ABOUT

In this step, the trial design and all test-bed technical infrastructure arrangements are tested at the location(s) where the actual trial will take place. This concerns both technical and non-technical issues. The aim is to test whether or not the results of all six steps have been implemented correctly and are clear for the involved stakeholders and/or users. As this is focused on functionality, you may start with the use cases and then go through the whole scenario.

METHODS
Technical test, roleplay

TOOLS
Solutions, test-bed technical infrastructure, observer support tool, trial action plan, common information space, common simulation space, trial management tool

INPUT
TIM output and detailed scenario

OUTPUT
Proof of concept of data collection and evaluation plan, to-do-list

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

This step contains the final tests and adaption of each trial sub-system and should end with a complete trial dry run.

From a technical perspective: make sure the test-bed technical infrastructure is up and running under the conditions the trial needs: at the location, with all necessary solutions connected. Do a stress-test. Try all needed kinds of input - and some that a creative end user might come up with. (People usually don't stick to the script - especially as they are not able to learn it by heart in the short amount of time).

While the technical crew is setting up, review your injects (the things that have to happen, in order to trigger the gap-behaviour). Test those injects! While doing that, check whether you can really collect the data you need to collect (within the test-bed technical infrastructure, the solutions and with the use of human observers). Based on this test, you can assign the number of observers you need to the rooms and points in time - and write down the instruction for their observation. In the end take enough time to hear from everyone what worked well and where there is room for improvement. Create a to-do-list with clear assignments and start the preparation of dry run 2.

CHECKLIST

- Data collection plan & evaluation approach reviewed in practice
- Scenario and injects reviewed in practice
- Training on solutions tested
- Readiness review of solutions and technical integration conducted
- Local test-bed technical infrastructure adaptation reviewed
- Solutions approved
- Needed roles reviewed in practice
- Make sure legal (e.g. GDPR) and ethical issues (e.g. use of real tweets) concerning the solutions are covered.

EXECUTION
DRY RUN 2

TO MAKE SURE THE DATA YOU NEED CAN ACTUALLY BE COLLECTED BY ALL MEANS NECESSARY

3 DAYS

- TRIAL OWNER (LEAD)
- PRACTITIONER COORDINATOR
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR
- CM PRACTITIONERS
- OTHER TRIAL PARTICIPANTS

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

Dry run 2 is a full test: a general test in preparation for the real trial. In this step the trial design and all test-bed technical infrastructure arrangements are tested at the location(s) where the actual trial will take place. This concerns both technical and non-technical issues. The aim is to test whether (a) adjustments that have been appointed at the end of dry run 1 have been implemented in a proper way, and (b) that the constellation as a whole functions properly. Dry run also the training on solutions with the available CM practitioners!

METHODS
Role play, societal impact assessment, research ethics

TOOLS
Trial action plan, common information space, common simulation space, trial management, after-action review tool, observer support tool, admin tool and security, extra developer tools

INPUT
Trial scenario/script, observer sheets

OUTPUT
Approved script, tested observations, approved technical set-up

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

This is the full dress rehearsal of your trial - only with a limited number of participants. Hence you should aim at as much realism as possible! This means: really have a run through, with all systems up and running, all injects being injected, all observers in their place and every practitioner role acted out by a knowledgeable person (maybe your trial practitioners cannot make it to the dry run; so make sure your replacement does still know enough to make a full dress rehearsal!).

The main goal of this dry run 2 is to ensure that all data can in fact be collected. So you have to create all kinds of data to see whether their collection works or not. Hence your main focus is on the observer support tool, the data collection through solutions and test-bed technical infrastructure and that the participant questionnaires are ready and understandable. If something is not working, analyse if you really need it and can afford the extra effort in getting it up and running.

After dry run 2, no changes should be made! The ultimate goal is to stop coding and changing the scenario. In case something does not workout as planned, identify relevant change requests and - once executed - test them properly before the actual trial. Also, it is also very important to plan ahead for the dissemination and communication activities, catering, safety etc. You also want to print all needed lists, instructions, plans, etc.

CHECKLIST

- Data collection plan & evaluation plan finally reviewed
- Scenario and injects finally reviewed
- Solution and technical integration confirmed
- Local adaptation of test-bed technical infrastructure confirmed
- Solutions approved for the trial
- List of external stakeholders confirmed
- Dissemination and communication activities conducted
- Re-address any legal and ethical issues and investigate if new issues have emerged. As there are observers present, make sure to cover legal and ethical issues of them (e.g. informed consent forms or NDAs). Follow up on potential societal impacts revealed during the solution selection.

EXECUTION
TRIAL RUN

TO ASSESS INNOVATIVE SOCIOTECHNICAL SOLUTIONS BY GATHERING OBJECTIVE DATA

3 DAYS

- TRIAL OWNER (LEAD)
- PRACTITIONER COORDINATOR
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR
- CM PRACTITIONERS
- OTHER TRIAL PARTICIPANTS

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

In this step the trial is executed. During the trial, all kinds of data, as described in the data collection plan, will be collected.

METHODS
data collection using different methods (qualitative and quantitative), societal impact assessment, research ethics

TOOLS
Solutions, test-bed technical infrastructure, observer support tool, trial action plan, common information space, common simulation space, trial management, after-action review tool, admin tool and security, extra developer tools

INPUT
Trial scenario/script

OUTPUT
Raw data - results of your measurement

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

Run your trial! You have prepared and rehearsed everything. Now, it is the time to collect your data in order to assess the solutions that promise to bridge your gap.

First, you have to make sure to do the training on the solutions and give everyone enough time to familiarise with the functionalities themselves as well as the outline of the scenario. Give them time to familiarise with the solution a little and ask questions about it.

Second, make sure all the technical equipment is up and running and most important:, make sure you actually collect your data! This is the reason for all the hard work you have done preparing the trial. So check the test-bed technical infrastructure and solutions. Especially if they have to be restarted for example. If you experience time pressure, it is better to drop a session than to drop the participant questionnaire.

CHECKLIST

- All systems up and running
- Every kind of data collection tested and confirmed
- Solution training conducted
- Trial material printed and distributed
- Observer briefing conducted
- Participants briefed
- Make sure all forms and agreements regarding ethical or legal issues are in place (e.g. informed consent and GDPR issues). If research and development is concerned, make sure everyone has signed a non-disclosure agreement.

EXAMPLE TRIAL 1 – PL
EXECUTION PHASE

THIS EXAMPLE PRESENTS AN OVERVIEW OF THE EXECUTION PHASE IN THE FIRST DRIVER+ TRIAL HOSTED IN POLAND. IT DEMONSTRATES THE DRY RUNS AND THE TRIAL EVENT ITSELF. ACCORDING TO THE EXCERPT FROM THE PREPARATION PHASE, ALSO THE EXECUTION PHASE FOCUSES ON THE SCOPE GIVEN BY THE SELECTED GAP AND SOLUTION FOR THE EXAMPLE.

Dry Run 1
The dry run 1 tests the technical integration of solutions in the test-bed and checks the required functionality for the scenario of the trial. The objective of the dry run 1 therefore was to task solutions on:

- Prediction of the disaster impact development.
- Assessment of needs and resources.
- Sharing & pooling national and international civil protection resources.

Dry Run 2
The dry run 2 is the rehearsal for the trial itself and is used to meet the end users and potential stakeholders. The meeting is also used to train the users on the solutions. dry run 2 has the following objectives:

- Training of end users on solutions.
- Testing the scenario with end users.
- Testing the data collection plan.

Trial Execution
As explained in the preparation phase for this example, the evaluation plan foresees a comparison between two executions of the scenario. The first records the baseline and uses the current mode of operation without making use of the solutions. The second records the Innovation Line and replaces parts of the current procedure with the functionality of the selected solution. In the scenario of the chemical spill, there were still people located in buildings, who needed elementary assistance. Through the national warning system, it was announced that people in flooded objects should hang, behind a window or on the roof of the buildings, appropriate coloured sheets to communicate their needs to the first responders:


Need for urgent evacuation


Need for medical assistance


Need for water and food

This type of communication of the affected populations needs is used in the crisis management system of Poland. The actual locations of the sheets on the training ground can be regarded as the “ground truth” and is illustrated in the images below.

During the session, a drone flight over the affected area was organised to collect data for the analysis. In the baseline, the data from the drone was used as direct input for decision-making. In the Innovation Line, the footage was processed by the drone rapid mapping solution in the form of an orthophoto map and 3D model of the area.

EXAMPLE TRIAL 2 – FR
EXECUTION PHASE

FOLLOWING THE TRIAL GUIDANCE METHODOLOGY, THE EXECUTION PHASE WAS SPLIT INTO TWO SEPARATE DRY RUNS AND THE ACTUAL TRIAL ITSELF.

Dry Run 1
Dry run 1 centered on the technical aspects of the different selected solutions and training for the participants involved. It was also used to further the design the evaluation process and to finalise the scenario in anticipation of dry run 2.

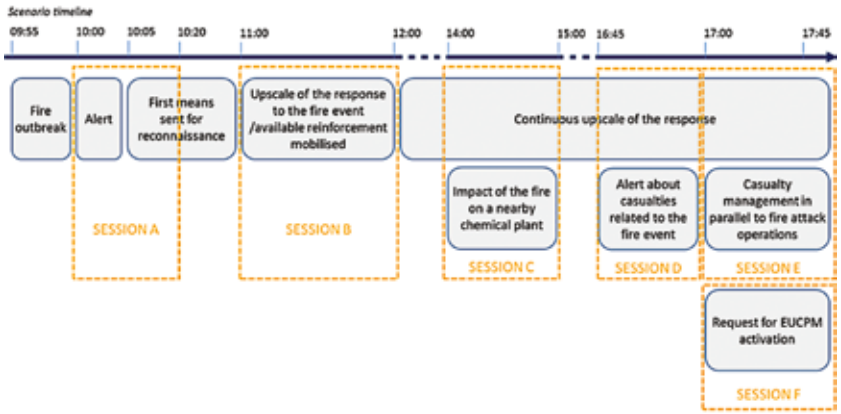
Dry Run 2
The dry run 2 is the rehearsal for the trial itself and was used to meet the end users and potential stakeholders. The meeting was also used to train the users on the solutions.

The dry run 2 had the following objectives:
- Training of end users on solutions.
- Testing the scenario with end users.
- Testing the data collection plan.

Trial Execution
The trial was organised in six subsequent sessions (except E and F, which were run in parallel) as presented in the figure below:

Trial 2 activities were carried in the course of one week:

- Monday was dedicated to the final preparation including deployment of the solutions and adaptation of the platform.
- Tuesday focused on briefing participants and training them on using the solutions, or the responsibilities of an observer.
- Wednesday was dedicated to trial sessions.
- Thursday was dedicated to trial sessions and debriefing.
- Friday was used for internal debriefings and TGM/test-bed infrastructure evaluation by trial committee (TC) members.



EXAMPLE TRIAL 3 – NL
EXECUTION PHASE

AS IN THE OTHER TWO TRIALS, TWO DRY RUNS AND THE ACTUAL TRIAL EXECUTION WERE CARRIED OUT AS DEFINED IN THE PLANNING PHASE.

Technical Integration Meeting (TIM)
The trial committee, representatives of the selected solution providers and practitioners from various disciplines met for the first time at the SRH premises in The Hague. The aim of this meeting was to get to know each other, to validate the scenario / baseline, to get to know the solutions and their possible integration - technically and in terms of content - and to start the development of the innovation line.

Dry Run 1
During dry run 1 all participating solutions were set-up, connected with the test-bed and tested in a technical play-through based on sequence and workflow diagrams. Needs for changes and open issues were identified as well as the solutions training for DR2 and trial was planned. Scenario wise all trial participants were briefed on the script. The feasibility of the play of the scenario in table-top form based on swimming lanes was checked as well as needs for changes identified. At trial management level all participants were trained on T4. A first readiness review on the trial realization was conducted. The planning of DR2 and T4 was set up.

Dry Run 2
Main objectives of dry run 2 were the final checks of the solutions set-up, their test-bed connectivity as well as the trainings of both: the practitioners and the observers. A rehearsal of all trial sessions was conducted in order to validate the scenario script. The interviews for the baseline were held. At trial management level the facility, the whole set-up, the roles as well as responsibilities were finally checked. Last preparations for the trial were identified.

Trial Execution
The trial execution was completed in five days. The first day was a preparation day where the complete setting was set up and tested. On the second day all trainings for the practitioners as well as for the observers were carried out. Days 3 and 4 were the actual execution days of the innovation line. On one day the two blocks of the threat phase were played through, on the other the two blocks of the impact phase. The last day was scheduled for debriefing and evaluation. A total of 145 people took part in the trial, groups into practitioners, observers, solution providers, trial committee members, trial support staff, consortium members and visiting guests.

EVALUATION

LEARNING FROM THE TRIAL

The TGM evaluation phase is dedicated to help you finding the results you were looking for. Did the overall performance of the operation change after introducing the new solution? What does the change mean for your organisation? What could be the reasons for the impact you observed? How could you use the results to support and improve your crisis management organizations?

The main objective is to analyse all the data and observations you have gathered during the trial. In order to do so, you first check and clean up what you have received. The next step is dedicated to processing the results so that you identify the occurred change due to the introduction of the solution(s). The sense making takes place during synthesizing the results of the trial, CM and solution dimensions.

The actual analysis is done once you have tried to make sense of all the different sources and observations. However, it is also important to document and update the knowledge bases. We start with updating the Lessons Learnt Library (L3) which even gives you some further insights into your findings. Then, the DRIVER+ Pan-European Test bed also needs to be updated so that other CM practitioners can learn from your experiences. The CMINE (crisis management innovation network europe) finds them in a structured form in the knowledge base, which you used during the preparation phase, remember? Besides, the portfolio of solutions (PoS) is able to grow thanks to your results of the specific solutions you just trialled. And obviously, not only the internal partners of CMINE, but also your external partners are looking forward to having a look at your trial report.

EVALUATION
DATA QUALITY CHECK

TO MAKE SURE YOUR EVALUATION IS BASED ON HIGH-QUALITY DATA

1 DAY

- EVALUATION COORDINATOR (LEAD)
- TECHNICAL COORDINATOR

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

During your trial you gathered a lot of different kinds of data with various means (observer, test-bed technical infrastructure, questionnaires etc.). This was done according to your data collection plan. Now plans are always just ideal imaginations of how the reality should work. There are cases in which plans work out as expected, but it is common that deviations occur. These deviations are exactly what we need to identify during the data quality check.

METHODS
Structuring & organising, societal impact assessment, research ethics

TOOLS
After action review tool, observer support tool, solutions, Excel, admin tool and security, extra developer tools

INPUT
Raw data

OUTPUT
“Clean” data set

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

First, gather all the data you collected in one place and in the same format. Maybe you want to have it all in one Excel file, maybe you prefer another tool. But make sure you have everything in one place and format it! Do the first check: Is there data missing or broken? If so, is this data critical? If so, think of ways to regain it (repair or maybe ask a participant to have a phone call and fill in a dedicated questionnaire).Even if it is not critical, make sure to indicate where data is missing in your evaluation!

Second, structure your data. Have a look at your data collection plan. Is there a structure to use? Maybe according to role, solution, research question (maybe the 3 dimensions: solution, trial and CM). Now it is easier to see through. Do the second check: Is there data missing or broken? Third, have a closer look at the data quality. Look for patterns. Look for things that don't fit those patterns. Check why they don't fit. Are there strong deviations? If so, try to find more data related to the aspect (maybe in the test-bed technical infrastructure?). If there is no way to improve the data, indicate in the evaluation that the conclusions on this can only be limited. Fourth, create a data set for your analysis. Exclude irrelevant or poor quality data, but indicate that you have done that!

CHECKLIST

- Data completeness checked
- Data quality checked
- Data verified
- Data structured in a preliminary way

EVALUATION
DATA ANALYSIS

TO AGGREGATE AND VISUALIZE YOUR DATA SET IN ORDER TO PREPARE THE SYNTHESIS

3-5 DAYS

- EVALUATION COORDINATOR (LEAD)
- PRACTITIONER COORDINATOR

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

Here you will structure, visualise and identify patterns. Furthermore you will put your data in a first relation to your KPIs. First: Structure - start with the sessions of your trial, the three dimensions and outcomes for the solutions. Second: aggregate and visualise data; create relevant graphs or pie charts. Third: patterns - what is standing out? Don´t hesitate to draw first conclusions and dig deeper to see if your assumptions turns into facts or into unexpected phenomena.

METHODS
Data aggregation, visualisation, comparative analysis, if appropriate further specific qualitative and quantitative data analysis techniques, societal impact assessment, research ethics

TOOLS
Excel, after-action review tool, observer support tool, admin tool and security, extra developer tools

INPUT
“Clean” data set + data collection plan

OUTPUT
Valid information and conclusions

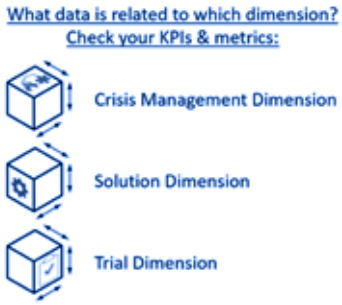
IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

Analysis. It may sound like you need a white coat and a chemistry lab, but this is not necessarily the case. All you need is your high quality data and your brain power.

Here you want your data separated in the three dimensions: trial, solution and CM. Look at your data collection plan and especially at the KPIs and metrics you defined before.

What kind of data did you collect that can be related to those KPIs and metrics. How can you match them? If you e.g. wanted to know something about time (did this solution speed up the process), then gather all data you collected about time in the steps you are interested it.

Are there any patterns? Visualise them! Which dimension do they address? Data analysis is mostly about finding relations! By creating appropriate charts you can already draw some preliminary conclusions and the deep dive knowledge gathering in the next step will be a breeze.



CHECKLIST

- Data of each session structured according to the three dimensions
- Data related to KPIs and metrics
- Data visualised
- Preliminary pattern identification done
- Make sure to process and store the data according to the predefined agreements (e.g. anonymisation etc.) as well as to the GDPR requirements.

EVALUATION
DATA SYNTHESIS

TO DRAW VALID CONCLUSIONS AND ASSESS THE SOLUTIONS WITHIN THEIR SPECIFIC CONTEXTS

1 TO 2 DAYS

- EVALUATION COORDINATOR (LEAD)
- TRIAL OWNER

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

The data you gathered and already analysed now needs to be put into the right context. This is the point in time where you need your three-dimensional approach and see how your gap has been addressed and what more needs to be done to answer your research questions.

METHODS
Sense-making, discussion, physical meeting, societal impact assessment, research ethics

TOOLS
Excel

INPUT
Analysed data

OUTPUT
Valid conclusions concerning your gaps, objectives etc.

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

There you are now, having a lot of high-quality, visualised data and some preliminary conclusions. At this point you want the wisdom of the crowd - your practitioners. Gather them once more and discuss your findings. Present them first without your own conclusions. Let's see what their conclusions are.

Ask them:

- What stands out? What results are remarkable?
- Did you expect these results? Why or why not?
- What are possible explanations for these results? Put them in relation to each of your three dimensions! Maybe one solution's functionality could not be used, because there was a shortage of fish at the trial location. (Means: There can be trial dimension related reasons explaining a CM dimension-related finding, of which you initially thought it would be within the solution dimension.)
- What can you conclude based on these results? (Think here about your initial gaps and trial objectives. Have you bridged your gap? At least partly?)
- Are the results transferable to other teams/ contexts? Why or why not?
- What advice would you provide about the solution? Did it address your gaps as expected? Why or why not?

CHECKLIST

- Checked whether KPI/metric threshholds have been met
- Identified patterns and remarkable data
- Put those into context (checked the relation of every dimension towards this)
- Compared conclusions to gaps
- Formulated whether gap has been closed or not
- Review on solutions formulated and discussed with solution provider
- Take ethical and legal issues into account (e.g. anonymisation etc.)

EVALUATION
DISSEMINATE RESULTS

TO MAKE SURE THE GAINED KNOWLEDGE IS SUSTAINED

2 DAYS

- TRIAL OWNER (LEAD)
- PRACTITIONER COORDINATOR

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

At the end of the trial you want to create something sustainable. Therefore spread the word: Let people know what you learnt. About your gaps and how to bridge them but also about trials. Furthermore: Write down what lessons you learnt with regards to trials etc. - for conducting trials, for crisis management, for your organisation etc.

METHODS
Meeting, social media, website, newspaper article, conferences, societal impact assessment, research ethics

TOOLS
Lessons learnt framework, portfolio of solutions, trial guidance Tool (knowledge base), lesson learnt library

INPUT
Answers

OUTPUT
Tweets, newspaper article, website content, journal paper, updated lessons learnt library etc.

IN DEPTH
ALL YOU NEED TO KNOW ABOUT THIS STEP

Do some good and talk about it! A lot of people were involved in preparing and conducting the trial. The evaluation on the other hand was most likely done only by a few people. So now go ahead and let all the others know what you found out. What was it that they contributed to? Did it help that they spent their time working on it?

You could organise a meeting to talk about the results with your practitioners and discuss a way forward - in the end you still have your gap but now maybe also a solution. Include the outside world. crisis management is a local, a European and also global task. So share your knowledge and inspire others (who might also have that same or a similar gap). Here you can update the lessons learnt library, the DRIVER+ knowledge base and also the portfolio of solutions.

Your solution providers are very important. Let them know what you think of their "products"- they will be very thankful for any bit of information that helps them to go forward in their development! And don't forget about researchers. Sitting in an ivory tower is not nice, so help them in see the real world!

CHECKLIST

- Lessons Learnt Library filled in
- Knowledge base updated
- Portfolio of Solutions updated
- Internal documentation done
- Internal dissemination done
- External documentation done
- External dissemination done
- Consider legal restrictions or limitations with regards to the solutions when you communicate results. Always interpret and consider the evaluation results in the trial context.

EXAMPLE TRIAL 1 – PL
EVALUATION PHASE

THIS EXAMPLE DEMONSTRATES THE RESULTS, WHICH WERE OBTAINED, BASED ON THE PREVIOUSLY SHOWN EXCERPT FROM THE PREPARATION AND EXECUTION PHASE OF THE FIRST DRIVER+ TRIAL IN POLAND. ACCORDINGLY, ONLY EVALUATION VALUES FOR THE SELECTED GAP AND THE SOLUTION IN THE TRIAL ARE PRESENTED.

Neither the team working in the baseline nor the one in the innovation line pointed all the locations and colours of the coloured sheets completely correctly on the map. In addition, the teams in the innovation line placed some of them in wrong locations. The results are presented in the tables blow. The results show the rate of identified sheets in relation to the real number of the sheets on site ("ground truth").

Without solution	Rate of pointed sheetings to real number ("ground truth")		
	Correctly	Incorrectly	Missed
Red	100 %	0 %	0 %
Blue	83 %	0 %	17 %
White	58 %	0 %	42 %
Total	**77 %**	**0 %**	**23 %**

Time needed on average: 39 minutes

With solution	Rate of pointed sheetings to real number ("ground truth")		
	Correctly	Incorrectly	Missed
Red	91 %	9 %	9 %
Blue	53 %	0 %	47 %
White	60 %	29 %	40 %
Total	**66 %**	**14 %**	**34 %**

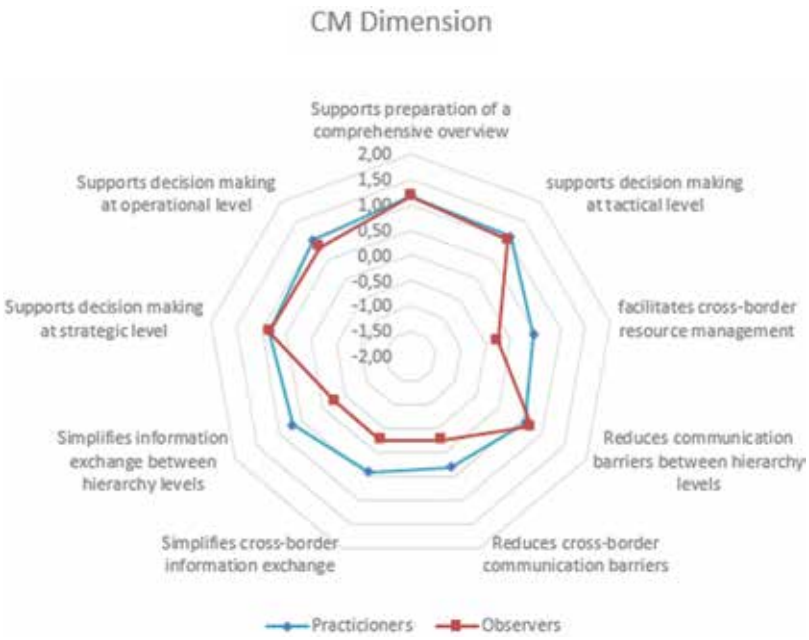
Time needed on average: 30 minutes

The values show that overall the precision of identifying the coloured sheets in the field was lower in the Innovation Line using the solution. In addition, additional incorrect sightings were recorded, which was not the case in the baseline.

In order to compare the times to prepare the decision after receiving the data, it is necessary to add the time for collecting the data. The drone flight is used in both baseline and innovation line and takes 13 minutes. The processing time needed to create the orthophoto map and 3D model in the innovation line using the solution was 82 min. Concluding, one can see that also the time needed to draw a decision did not achieve better values than the baseline.

To answer the research question, the following statements have been concluded as a summary from the results presented above:

- Managing the resources of units from different countries requires a detailed identification of needs and tasks to be carried out. The innovation line can support this assessment by providing information in the form of a 3D model and orthophoto map of an area of limited accessibility. Identification of the needs of the population may enable the needs of the affected population to provide adequate assistance to be better assessed. The solution can partly support cross-border resource management during multi-stakeholder long-term rescue operations by providing 3D maps of the affected area. The biggest constraint in this case is the time to provide outputs, especially in case of low data transfer at the area.
- The drone rapid mapping solution provides data, which might be shown in COP tools as well, providing latest imaginary of affected area in form of orthophoto map.

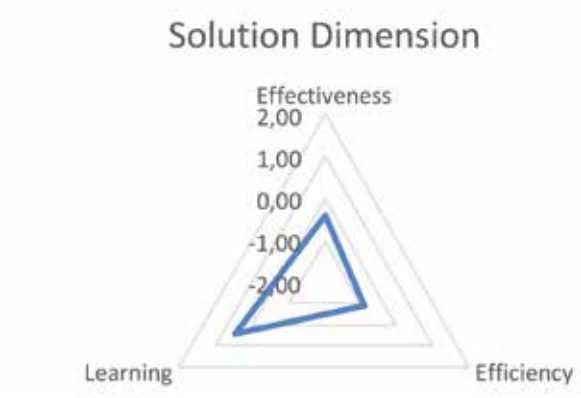

CM Dimension
Supports preparation of a comprehensive overview
supports decision making at tactical level
facilitates cross-border resource management
Reduces communication barriers between hierarchy levels
Reduces cross-border communication barriers
Simplifies cross-border information exchange
Simplifies information exchange between hierarchy levels
Supports decision making at strategic level
Supports decision making at operational level
2,00
1,50
1,00
0,50
0,00
-0,50
-1,00
-1,50
-2,00
Practicioners
Observers


driver

EXAMPLE TRIAL 2 – FR
EVALUATION PHASE

THIS EXAMPLE DEMONSTRATES AN EXCERPT OF THE RESULTS OBTAINED DURING TRIAL FRANCE. IN LINE WITH THE PREVIOUSLY PRESENTED EXAMPLES OF THIS TRIAL, HERE ONLY SOME INSIGHTS INTO THE PREVIOUSLY PRESENTED GAP ETC. WILL BE GIVEN.

The major outcomes related to the trial dimension confirmed that the participants' number, background and commitment supported the trial adequately. The scenario and the simulated environment were deemed realistic enough for the practitioners' immersion. However it became clear that in the area of learning and training there is still room for improvement. This result of the trial dimension has been taken into account by analysing the other dimensions.



The key results regarding the Solutions dimension were that the innovative solution provided the expected functions and was mostly considered straightforward to use. However, the feedback offered by the practitioners showed that the perceived benefit varied considerably for different types of crisis and deployment conditions. Here the ISO 9241-11 – standard on usability was used.

The main outcomes in the crisis management dimension were that the trialled solutions contributed in saving time on specific processes (in particular at the alert step), improving the accuracy of some of the information

exchanged (particularly locations) and as a consequence in reducing the requests for information coming from misunderstandings, which in turn contributed to saving time.

The assessed solution above was easy to use and proved very suitable for control rooms (strategic or non-first responders´ organisations). The solution was evaluated by nine practitioners taking part in the trial. Although the usability was rated as high by the practitioners, not all of them reported major benefits. The radar diagrams based on the averages from participant questionnaires show average values for most dimensions, but the actual ratings varied widely between different roles within the trial. E.g., doubling radio messages with logbook entries diminished the benefit for more operational roles, while others benefitted from extensive use of the logging capabilities and automated situation reports to replace dozens of emails. This of course has to be seen in the context of the French doctrine, which is used to radio. Putting the evaluation in the socio-cultural context of the participating organisations is key to drawing valid conclusions.

STEP ZERO

PREPARATION

EXECUTION

EVALUATION

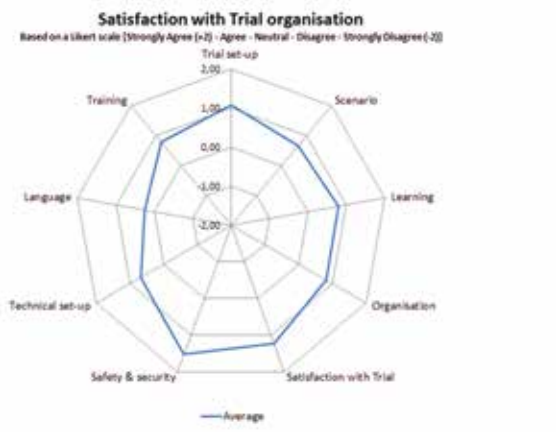
EXAMPLE TRIAL 3 – NL
EVALUATION PHASE

THE TRIAL EVALUATION CONTAINED THREE DIMENSIONS: TRIAL, SOLUTION AND CRISIS MANAGEMENT. ACCORDING TO THE IDENTIFIED GAPS AND RESEARCH QUESTIONS, DIFFERENT KEY PERFORMANCE INDICATORS (KPI) WERE DEFINED AND EVALUATION DATA COLLECTED.

The **Crisis Management** dimension was evaluated for each of the four blocks of the threat and impact phase separately comparing the baseline and the innovation line. None of the selected solutions closed gap 1 (on resource planning) as initially intended. Solutions 3Di, SIMCI and ATSA-ZKI, although very useful in dealing with a (potential) flooding, do not close gap 2 (on information sharing) as initially intended. Solution CrisisSuite however was a perfect choice for gap 2. The experiences in the trial even led to initiatives to formally connect both solutions: the legacy system LCMS which is currently used at SRH and CrisisSuite. Solution HumLog was suited for gap 3, however, only in the threat phase. In all four blocks, the practitioners were more focussed on performing the tasks the were given and 'forgot' to use the solutions for these tasks. A recommendation would therefore be to use a directive approach in formulating the assignment and specify the requested outputs (how, when and where) for the participants so that they are "forced" to use the solutions.

In the first part of the solution dimension generic indicators were derived from the international standard ISO 924-11 (1), where usability is "composed of effectiveness, efficiency and satisfaction". The figure presents the average rates of the solutions features assessed by the practitioners during trial 4. The features included in the questionnaire fulfilled by the practitioners was based on ISO standard. Individual evaluations of each solution were also created taking into account specific KPIs. The graph on the right shows the average ratings of the individual solutions in different colors. SIMCi scored best of all solutions in all categories and received, for example, the value 1.5 (-2: poor to +2: very good).

One part of the trial dimension questionnaire addressed the perception with trial organization. Looking at the average of all answers, the respondents rather agreed that they were satisfied with the organisation. The graph on the right shows the satisfaction with the trial organization. The scale ranges from -2: bad to +2: very good. For example, the scenario was given an average score of about 0.6 and the trial set-up a score of over 1.0.




KREUZ
SANHIST

METHODS & TOOLS

TGM SUPPORT TOOLBOX

In the last chapter of the handbook you will find two pages for each tool or method which was referred to in the step descriptions. Please note that it is not a comprehensive description of tools and methods, but rather this chapter revolves around those used the most within DRIVER+ test-bed. While most participants might be familiar with a tool like Microsoft Excel or the brainstorming method, the understanding and generation of a baseline or the application of the DRIVER+ observer support tool are not that intuitive. We acknowledge that e.g. explanations on how to carry out proper brainstorming might be important, but publicly accessible knowledge bases on the Internet already provide good insights. Hence, we recommend searching online and select the results based on your needs. On the other hand, the understanding and generation of a baseline or the application of the DRIVER+ observer support tool are not that intuitive and we decided to give priority to non-intuitive tools and methods. In many cases you might also find interesting information through the DRIVER+ knowledge base which you can access through the trial guidance tool. The third chapter is basically there to introduce you briefly into broader methodological and technological DRIVER+ infrastructure environment.

The order of the described tools and methods reflects the order of the evolution of a trial:

1. In the beginning five major methods are described. It starts with approaches to design base- and innovation lines, mainly relevant for the preparation phase. In addition, three overarching methods are described, related to societal impact assessments, taking into account research ethics as well as the overall performance measurement paradigm in DRIVER+ trials.
2. They are followed by six major tools, which support the trial participants from the first step up to the evaluation of the trial: the trial guidance tool, the knowledge base, the trial action plan, and the portfolio of solutions. The last tool is a method at the same time: the lessons learnt library supports the trial participants in drawing broader conclusions from the observations during the trial execution.
3. Finally, the test-bed technical infrastructure tools are described, which are mainly relevant for the execution.

METHOD: BASELINE
DRAWING TRIAL-RELATED PRACTITIONER REALITIES

ENABLING A DEEPER MORE THOROUGH ANALYSIS AND COMMUNICATION BETWEEN STAKEHOLDERS

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The idea of a baseline is to depict your as-is process. This means you “paint a picture” that shows all roles, activities and information exchanged in your gap situation. This can then be used for communication purposes: by using a picture you can explain the crisis management process to a solution provider in a fast and easy way. This will help you with the whole integration of any kind of solution into your gap process, as well as the technical integration.

So what needs to be done? First you need to gather your crisis management practitioners - the ones who know the gap and its context best. In doing so, you have already chosen some of the roles that you envision with play a role in the trial. Now go through each gap and the concerned trial context. Brainstorm with your practitioners about the process that surrounds your gap - in which circumstances does who encounters the gap? Try to be as comprehensive as possible by listing roles, equipment and everything (you can get inspired by the trial context template).

After you have listed all this, try to depict it in a kind of flowchart to show how all of these things and persons are connected.

Create a “who is doing what, when, with what equipment, where and under which circumstances” - picture. In the following page you will find some ideas on how to do this.

This picture / flowchart is your baseline. It is a model of your gap-process. In the best case scenario it also includes the kind of information exchanged and means by which they are exchanged. Visualisation is a great tool in order to really identify the key “gap points”. It is a tool that empowers people to talk about specific aspects. By doing this you will be able to understand the gap best and therefore to find an innovative sociotechnical solution that can bridge it. This is the most important step as it allows you to select the most suitable solutions for your trial - not based on the fact that they claim to be the best for you, but based on the fact that you are really clear about your needs.

As mentioned, you start with meeting your practitioner participants and start talking about the identified gaps and the written down trial context.

Then initiate a brainstorming session for each gap. Use sticky notes and a whiteboard.

- Mark a timeline on your whiteboard. This represents the start and end of your gap process.
- Now add along this timeline each task/ action that is part of this special gap process.
- In a next step add all equipment needed in these tasks/ actions.
- Then also add all the roles.

Now you might want to re-arrange your sticky notes. Dedicate one lane for each role. Again work along your timeline.

- Put each task/ action with the attached equipment to the role that fulfills this task/ action.
- Think of the fact that the tasks influence each other and add further tasks/ actions that you identify are necessary in oder to create one whole, consistent course of action.
- In the next step think of the communication processes between the roles. What kind of information is given? When? To whom? By the use of which means (radio, landline, etc.). Write the kind of information and the means used on a sticky note and connect the roles by using your marker.

Congratulations! You have a complete depiction of your baseline. As this is an analogous version, we recommend to first: take pictures, and second: create a digital version. Within DRIVER+ we used the BPMN, the Business Process Model and Notation, to depict the baseline. You find an introduction to it online: www.bpmn.org. But feel free to use other tools.

LINK
This is not a physical tool but a process

METHOD: INNOVATION LINE
DRAWING FUTURE PRACTITIONER REALITIES

IDENTIFYING EXACTLY WHERE CHANGES OCCUR IN THE CM PROCESS; IDENTIFY KPIS

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The idea of the Innovation Line is to integrate the innovative sociotechnical solutions exactly there in the baseline where it can address the gap - at that point where it will lead to changes. Hence the baseline is the document to take into account here.

Again you start with a discussion with your practitioner participants. They need to understand the functionalities of the solutions. Then they can discuss where they would like to use which functionality in the gap-identification process in order to bridge the gap. Here the visualisation is a great tool to enable dedicated discussions with the solution providers, if you wish to do so (maybe during the TIM).

You have to make sure that the solution providers really understand your gap and the specific part of it, in which their solution is involved. Also you have to make sure that your practitioner participants really understand the functionality of the solutions. Only if this information is clear to everyone is a good and fruitful discussion possible. After all this is clear, use again sticky notes and marker as well as the depiction of your baseline in order to create your Innovation Line.

A few hints on how to create an Innovation Line are provided below:

- Print your baseline or use a projector to have it on a whiteboard for everyone to see.
- Go through the whole baseline with your practitioners - task by task and action by action. If one can be replaced by a new functionality at this point, you can write down what new task/ action will be done now.
- Again think of information exchange and equipment needed for the task. Use the marker to create new connections between tasks/ actions that are before or after the newly created one.
- Maybe you also need to create a new role now (e.g. a Social Media Manager).

In this way you will automatically create the Innovation Line. We again recommend taking pictures and then creating a virtual version.

Be aware of the fact that this way of working creates a lot of new information that might not be ideally integrated by sticky notes on the baseline. So make sure no information and re-arrangement of the baseline gets lost!

LINK
This is not a physical tool but a process.

METHOD: SOCIETAL IMPACT ASSESSMENT
SOCIETAL CONSEQUENCES OF CM INNOVATIONS

ASSESSING THE SOCIETAL IMPACT OF EACH SOLUTION

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR
- SOLUTION PROVIDERS

ABOUT
WHAT THIS TOOL IS FOR

The need for innovative solutions to deal with crisis situations stems from the fact that crisis management as such is taking place in complex and dynamic societies. This complexity is caused by several factors, such as increased digitalisation and the growing movement of people across borders and countries. The emergence of new solutions to tackle new and complex challenges also means that the solutions we come up with can have consequences that are more complex than before. These consequences – or, in other words, the impact – can be positive and desired (such as increased efficiency), but there might also be impacts that are negative or unintended. When talking about societal impact in this context, we mean something different than how well the solutions work. A new solution to a challenge can be very efficient in producing the desired effects, but at the same time have tremendous negative impacts on the society of which it is part. For example, the aim of a SIA is not to assess whether a crowd-tasking solution would make response activities more time-efficient, but how a crowd-tasking solution can be deployed to foster a culture of trust in society so that communities feel safe when they are in a crisis situation.

The objective of doing a SIA is to ensure that the implementation of CM solutions maximises its benefits and minimises its burdens, especially those burdens borne by people. Burdens and benefits may not be directly measurable or quantifiable and are often hard to consider exactly for this reason. Nonetheless, they are important, and by identifying potential societal impacts in advance, in particular two advantages are evident:

- Better decisions can be made about which solutions should be employed, and how they should be employed.
- Mitigating actions can be implemented to minimise the harm and maximise the benefits from a specific solution.

In the larger societal context, by achieving these advantages, other benefits include positive impacts such as accountability and acceptability:

- Accountability means that CM participants are in various ways responsible for what they do and should be able to give a satisfactory justification for it.
- Acceptability of solutions, since crisis managers depend on the society accepting the CM solutions, especially if the solutions are participatory in the sense that they require interactions with the public.

Acceptability also relates to issues of sustainability, since solutions that are developed and implemented with the broader society in mind have a larger chance of avoiding controversy and being adopted, in addition to making the implementation more efficient and effective.

A SIA can be carried out in many different contexts, and for many different purposes, which makes it difficult to give a universal definition of what it entails. The starting point for the SIA Framework developed in the DRIVER+ project is that an assessment of what a certain solution does to a society, means thinking about how it impacts the people in it. While some categories of impact are easier to identify and mitigate than others, there is no easy checklist to identify potential societal issues. For example, privacy-related impacts might be easier to recognise due to high public attention of the topic and to the emergence of European-wide legislation. On the other hand, the impact of certain solutions on societal values addresses impacts that exceed calculability, not least because most of these impacts are long-term and often unintended.

While SIA can be challenging to do in everyday CM operations due to a lack of time and efforts, the TGM facilitates SIA as a natural step in preparing a trial. In order to understand the concept of SIA better, let's use the example of trial Poland. This trial dealt with the following research question: How can cross-border resource management be supported through sociotechnical solutions during multi-stakeholder longterm rescue operations? In other words, which technologies and/or methodologies can provide an added value for rescue operations? When we evaluate a given solution, be it a new technology or a new methodology, we always need to step back and wonder if, together with the added value it may bring, there are also new problems that it generates. When setting up a trial, issues related to the societal impact of our activities occupy a central role. This is because we recognise that there is a mutual relationship between technical objects, the natural environment and social practice. The technologies do not operate in a vacuum; rather, they exist in a social context that is impacted by them in different ways.

METHOD: SOCIETAL IMPACT ASSESSMENT
SOCIETAL CONSEQUENCES OF CM INNOVATIONS

Using trial Poland as illustration, relevant steps to take for assessing societal impacts are:

1. IDENTIFY STAKEHOLDER GROUPS/ COMMUNITIES:
The first step would be to identify the stakeholders and the community that could potentially be impacted by the implementation of the solution. Here, relevant questions to ask would start with "how could solution X with all its functionalities have an impact on the stakeholder groups or communities included in this context?" For example, who are the stakeholder groups or communities that could potentially be affected by Drone Rapid Mapping? General society, practitioners, law enforcement agencies? The assessment should be made with these in mind.

2. COLLECT BACKGROUND INFORMATION:
If relevant, collect reference information covering key social issues of the impacted communities such as community history, culture and key events that have shaped the development of the community. Are there known vulnerabilities in the community? Specific social challenges? Who are the major industrial actors? In the example of trial Poland, relevant questions could be: Are there reasons to believe that the community where the Drone Rapid Mapping will be carried out could find it problematic? Have there been controversies regarding the use of drones in this area / region / country?

3. GET AN OVERVIEW OF LEGISLATION AND POLICIES:
Provide an overview of relevant national/ EU legislation and policies that complement the mitigation measures (Step 5) that are directly related to the trial. For trial Poland, the maps generated by the drone can be viewed and analysed in the dedicated geoportal or any GIS environment already utilised by CM institutions. Yet the images that those maps were based upon may raise issues of privacy for individual people and their property; therefore, relevant legal or regulatory considerations would be for example data protection law or local airspace regulation for the use of drones. This step is important for making an assessment, and depending of the trial setup, it could even be relevant to contemplate whether CM activities might challenge other human rights (for example when dealing with vulnerable populations). The added value for CM generated by the maps cannot automatically overrule individual rights of other people.

4. IDENTIFY AND PREDICT IMPACTS:
This is the main part of the SIA, where a structured assessment, based on the information acquired in the previous steps takes place. The full aim is to identify potential direct social impacts and try to predict their significance, duration and extent. The SIA criteria listed in the framework should be used to structure this thinking, but the idea is not to say something about each and every criteria. In some cases the impacts may be rather obvious, and isolated maybe to issues of privacy and data protection, in which case only that one criteria might be relevant; yet, in other cases the societal issues might be more complex. In trial Poland, for example, we used both simulated tabletop and field exercises, which required the use of dedicated observers, who recorded and documented the actions. For evaluating this part of the trial, different data was collected, such as questionnaires filled in by the observers and practitioners. As an example of potential societal impact, the personal data emanating from these questionnaires could have implications for the ones involved, in the sense that if the identification of a firefighter or a practitioner is revealed, this can compromise the depth of their answers.

A second issue relates to the departing assumption of trial Poland, i.e. that 3D models and 2D orthophoto maps of the endangered area is a solution that will positively influence the time and accuracy of the needs assessment, which will better support long-term rescue operations. With this departing assumption, it was natural that the selected solution was drone rapid mapping, which enables fast generation of orthophoto maps, based on imagery acquired by a drone. It is important to realise, though, that a different departing assumption could have led to the choice of a different solution. A prior assumption towards a specific outcome impacts the sociotechnical choices that we make.

5. DESCRIBE MITIGATING MEASURES AND FOLLOW UP:
In order to reduce the risk of negative unintended impacts, and/or to increase the possibility for positive impact, a list of measures should be made. The list should be based on the impacts identified in the previous step and could include actions such as providing extra follow ups for volunteers, establishing rapport with local community leaders, engaging with the communities, and sharing more information about the activity/solution/trial. A plan should be made to describe how the mitigating measures will be followed up. For trial Poland for example, the anonymity of the participants in the trial was an issue; i.e. that the anonymity of an observer should be preserved to ensure independence. Therefore, specific measures regarding both informed consent and anonymity had to be put in place, so that this data collection could take place. A mitigating measure relevant for the issue of departing assumptions would include thorough deliberation regarding the scenario selection, and carefully defined research questions.

LINK
This is not a physical tool but a process.

METHOD: RESEARCH ETHICS
AND GDPR REQUIREMENTS

FOLLOW ETHICAL PRINCIPLES AND NORMS FOR RESEARCH ETHICS, AND ADHERE TO GDPR REQUIREMENTS

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR
- SOLUTION PROVIDERS

ABOUT
WHAT THIS TOOL IS FOR

Relevant across all the three performance measurement dimensions of a trial are issues relating to research ethics. Research ethics rules and norms are part of the TGM and have to be considered when setting up a trial. Whenever human beings are involved in the activities, data protection rules and requirements have to be followed in order to protect their privacy, and to regulate their participation. These obligations are most notably defined in the general data protection regulation (GDPR) of the EU. The GDPR is structured around a handful of privacy principles, briefly described below. Based on these principles, this guide lists key requirements and recommendations, linked to each of the three phases of a trial: preparation, execution and evaluation. With the new regulation, a company can be fined 2% for not having their records in order (GDPR article 28), not notifying the supervising authority and data subject about a breach or not conducting impact assessment. For carrying out a trial, the changes that came with this new regulation mainly refer to citizens' rights. In GDPR, the rights of the data subject are detailed in chapter III. While the new rules for businesses are also relevant in the trial context, the implementation and enforcement of GDPR lie with the individual company/business/organisation taking part in the trial. In sum, this ethical guideline in (as part of the trial guidance methodology) will not be aimed at assisting businesses in adapting to the GDPR, but it will first and foremost take into account the rights of the data subjects that are potentially participating in the trial activities.

The following guidelines reflect the most anticipated issues and concepts for organising a trial, but they are not fully exhaustive. The reason for this is that to identify precisely what ethical issues might be relevant for a trial, more information about the setup, such as the scenario and the extent of involvement of external participants such as volunteers, is needed. However, the guidelines give a good indication of what the most important issues could be, and how to solve them.

FIRST, AN OVERVIEW OF SOME OF THE KEY GDPR PRINCIPLES:

Lawfulness, fairness and transparency: The GDPR clearly states that processing of data shall be lawful only if and to the extent that at least one of several conditions applies [GDPR article 6]. These conditions are e.g. the data subject has given consent to the processing of his or her personal data for one or more specific purposes. The conditions for consent have been strengthened and consent must be provided in an intelligible and easy accessible form, using plain language.

Collection, processing and purpose limitations: The GDPR states that personal data can only be obtained for "specified, explicit and legitimate purposes" [GDPR article 5, clause 1(b)]. GDPR also states that data subjects should be able to "consent only to certain areas of research or parts of research projects to the extent allowed by the intended purpose." Article 17 supplies each data subject with the right to have his/her personal data erased when s/he withdraws consent or objects to the processing, as well as when the data are no longer needed for the purpose for which they were first collected. Under GDPR it is not necessary to submit notifications / registrations to each local DPA of data processing activities. Instead, there are internal record keeping requirements and a DPO appointment is mandatory in certain cases.

Accuracy: The GDPR states that data must be "accurate and where necessary kept up to date" [GDPR article 5, clause 1(d)].

Data minimisation & Privacy by Design: The GDPR states that data collected on a subject should be "adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed" [GDPR article 5, clause 1(c)]. Privacy by design, a new legal requirement under GDPR, calls for the inclusion of data protection from the onset of the designing of systems, rather than an addition. Article 23 calls for controllers to hold and process only the data absolutely necessary for the completion of its duties (data minimisation), as well as limiting the access to personal data to those needing to act out the processing.

Storage limitations/integrity and confidentiality: The GDPR states that personal data should be "kept in a form which permits identification of data subjects for no longer than necessary" [GDPR article 5, clause 1(e)]. The GDPR also states that those processing data should do that "in a manner [ensuring] appropriate security of the personal data including protection against unlawful processing or accidental loss, destruction or damage" [GDPR article 5, clause 1(f)]. Also known as Data Erasure, the right to be forgotten entitles the data subject to have the data controller erase his/her personal data, cease further dissemination of the data, and potentially have third parties halt processing of the data. The conditions for erasure, as outlined in article 17, include the data no longer being relevant to the original purposes for processing, or a data subject withdrawing consent.

GDPR requirements & recommendations for the preparation phase
Decide if a Data Protection Impact Assessment (DPIA) is needed [see GDPR Section 3, Article 35]. A DPIA shall in particular be required in the following cases:

- a systematic and extensive evaluation of personal aspects relating to natural persons which is based on automated processing, including profiling, and on which decisions are based that produce legal effects concerning the natural person or similarly significantly affect the natural person;
- processing on a large scale of special categories of data referred to in Article 9(1), or of personal data relating to criminal convictions and offences referred to in Article 10; or →

METHOD: RESEARCH ETHICS
AND GDPR REQUIREMENTS

- a systematic monitoring of a publicly accessible area on a large scale.
- Ensure that data is collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes [GDPR article 5, clause 1(b)].
- Inform the data subject (the person which personal data is collected from) about the data controller's identity and contact information, what kind of data will be collected and processed, how the result of their contribution will be used, and make sure that the data actually collected matches this description. Provide information about the purpose of the research, who will receive access to the data and how long the material will be stored. This information should be given in an informed consent sheet, which the data subject has to sign prior to data collection.
- Make the conduct of observation or recording very clear. Give anyone potentially affected by it the possibility to refuse from being observed or recorded.
- Always inform all participants and potential bystanders thoroughly and well ahead of the conducted research. In the event that bystanders could be affected by the activity, by e.g. being exposed to a trial scenario with a field component, as much information as possible should be given to them in advance. This can e.g. be done by putting up information posters in the vicinity of the trial area. This would be considered good practice, even though the bystanders are not "data subjects". However, this is dependent on the situation. If there is video surveillance or tracking of bystanders by the solution providers, then they may become data subjects.

GDPR requirements & recommendations for the preparation phase continued

- If needed, consult local data protection authorities to make sure that rules and regulations ensuring data protection rights are followed. Registration with national authorities must be made where required. With GDPR, there is no longer a requirement to notify DPA about data processing. However, other responsibilities apply, which may affect the rights of the participants, such as the duty to carry out data protection impact assessment and conduct prior consultations (descriptions of when this is relevant can be found in article 35 and 36 of GDPR).
- The data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her (GDPR article 22). If such processing is necessary in DRIVER+ (e.g. for the "potentially automated" performance measurement and logging using technical infrastructure in SP92), the decision must be based on the data subject's explicit consent [GDPR article 22, clause 2(c)].
- Plan for practising data minimization, i.e. avoid collecting unnecessary data.
- Plan for and ensure that personal data collected is stored in a secure way, e.g. by using the ISO/IEC 27000 family of standards or the kind of guidance provided by theNational Cyber Security Center.
- Anonymize and encrypt personal data as a general rule.
- Use technology for data recording only if necessary. Provide justification.

GDPR requirements & recommendations for the execution phase

- In case servers are hacked, or if personal data is otherwise obtained by someone without permission to access it, breach notifications are now mandatory in all member states. This is true for cases where a data breach is likely to "result in a risk for the rights and freedoms of individuals". This must be done within
- 72 hours of first having become aware of the breach.
- Ensure that personal data collected is stored in a secure way, e.g. by using the ISO/IEC 27000 family of standards or the kind of guidance provided by National Cyber Security Center in the UK.
- Use technology for data recording only if necessary. Provide justification.
- Practice data minimisation, i.e. avoid collecting unnecessary data. Collected data, which is no longer required, should be deleted. In case of a data breach,

this will lessen the amount of affected individuals.
- Refrain from processing data that is not up-to-date.
- Anonymise and encrypt personal data as a
- general rule.
- Be aware that under GDPR any person located in the European Union (anyone residing in the EU, not just EU citizens) can request their personal information be removed from a corporate database, or know the reason why it can't.
- The data subject does have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her (GDPR article 22). If such processing is necessary for the execution of a trial (e.g. for the "potentially automated" performance measurement and logging using the test-bed technical infrastructure), the decision must be based on the data subject's explicit consent [GDPR article 22, clause 2(c)].
- Ensure that data is collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes [GDPR article 5, clause 1(b)].

GDPR requirements & recommendations for the evaluation phase

- In case the servers are hacked, or if personal data is otherwise obtained by someone without permission to access it, breach notifications are now mandatory in all member states. This is true for cases where a data breach is likely to "result in a risk for the rights and freedoms of individuals". This must be done within 72 hours of first having become aware of the breach.
- Do not re-use data without written agreement. An updated signed informed consent from should be obtained from the data subject when a controller intends to process data for a further purpose.
- Refrain from processing data that is not up-to-date.
- Collected data which is no longer required should be deleted. In case of a data breach, this will lessen the amount of affected individuals.
- Anonymise and encrypt personal data as a general rule. Personal data should be "kept in a form which permits identification of data subjects for no longer than necessary" [GDPR article 5, clause 1(e)].
- Those processing/analysing personal data should do that "in a manner [ensuring] appropriate security of the personal data including protection against unlawful processing or accidental loss, destruction or damage"[GDPR article 5, clause 1(f)].
- Be aware that under the GDPR any person located in the European Union (anyone residing in the EU, not just EU citizens) can request their personal information be removed from a corporate database, or know the reason why it can't.
- If personal data is contained in the description of trial results which is stored in the PoS, this should be justified.
- In addition to ensuring that personal data is collected for specified, explicit and legitimate purposes, make sure that the data is not further processed in a manner that is incompatible with those purposes [GDPR article 5, clause 1(b)].

LINK

This is not a physical tool but a process.

METHOD: 3 DIMENSIONS & KPI'S
MEASURING CRISIS MANAGEMENT INNOVATIONS

ENABLING A REALISTIC ASSESSMENT OF INNOVATIVE SOCIOTECHNICAL SOLUTIONS WHILE TAKING INTO ACCOUNT DIFFERENT INFLUENCES ON THE DATA COLLECTED

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

DRIVER+ trials aim to assess innovative sociotechnical solutions in an as realistic as possible environment in order to bridge a crisis management gap. This leads to the fact that there are three different dimensions that need to be taken into account: The crisis management dimension, The trial dimension and the solution dimension.

The most important one is the CM dimension, because this is the part were we are looking for new solutions that have an impact on our gaps. Here the baseline (and innovation line) can be most helpful, as they depict the CM process with all its involved roles, tasks, processes etc.

The next dimension is the trial dimension, which relates to the trial organisation. Everything that has to do with the trial run in very "hands-on" manner is part of this dimension. This can be the wifi connection, the number of participants, any technical issue ...

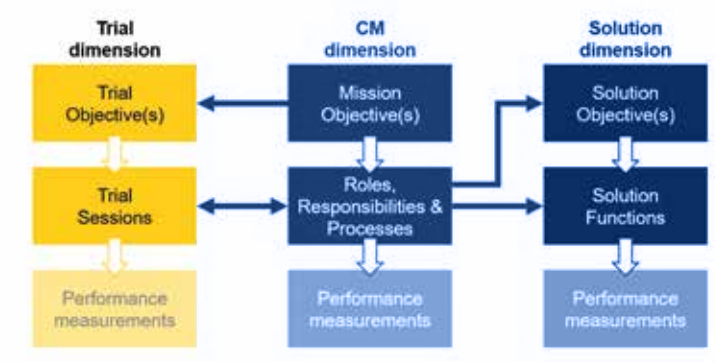
The last one is the solution dimension. This one tackles all functionalities as well as the usability etc. of each sociotechnical innovation. Each dimension can be analysed alone and also in relation to the others. As the aim is to assess a solution in relation to a CM gap, it is very important to see how this was (maybe even negatively) influenced by the trial or solution dimension. For example: It could be that a solution is very well capable of addressing the CM gap, however during the trial a breakdown of the system can occure due to a technical problem within the trial location (trial dimension). In this case the participants cannot see the whole potential of the solution. This is very important to consider during the analysis and evaluation and to ask how these disruptions influenced the overall setup and data collection.

The main challenge here is to set up your trial in a way that actually enables you to measure each dimension on its own so that you can identify the points where they influence each other. This allows to interpret every piece of data in its rightful context. Within DRIVER+ the ISO 9241-11 was identified as being very helpful with the assessment of the solution dimension. This standard includes artifacts like usability, novelty, etc. So far this

kind of data has been collected via dedicated questionnaires filled in by the end user of the solutions within the trial. Here the likert-scale was used and the participants could add their personal opinion as free text.

The use of questionnaires was also chosen for the trial dimension. Again the likert-scale and open text were applied. The persons to fill in this questionnaire were not only the end users of the solutions, but everyone who participated in the trial (staff, observers, etc.). Furthermore the external cooperation team sent a questionnaire to the external participants and solution providers to gather specific data about the trial organisation (which is part of the trial dimension as well).

Most demanding is the set-up for the CM dimension. Here a mixed method approach is recommended: Data collection through the test-bed technical infrastructure as well as the solution (data logs) and observer sheets (observer support tool), were used in DRIVER+ so far. Be aware that you should collect data from the legacy tools as well as from the new innovations - as you aim for a comparative study (this is only necessary if you do not already have valid data from past incidents or simulations). Note as well that a human observer can only see and note down a certain amount of information in a certain amount of time. Having them log timestamps is not recommended. They should be selected according to their specific knowledge and then used to observe specific CM relevant artifacts.



LINK

The template of the generic KPIs can be found in the trial Guidance Tool.

TOOL: TRIAL GUIDANCE TOOL
A WEB-BASED TGM SUPPORT TOOL

TRIAL GUIDANCE TOOL OFFERS SUPPORT IN IMPLEMENTATION OF THE TRIAL GUIDANCE METHODOLOGY

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The TGT is a web-based software tool developed to support trial owners and high-level crisis managers in the implementation of the TGM through the trial phases.

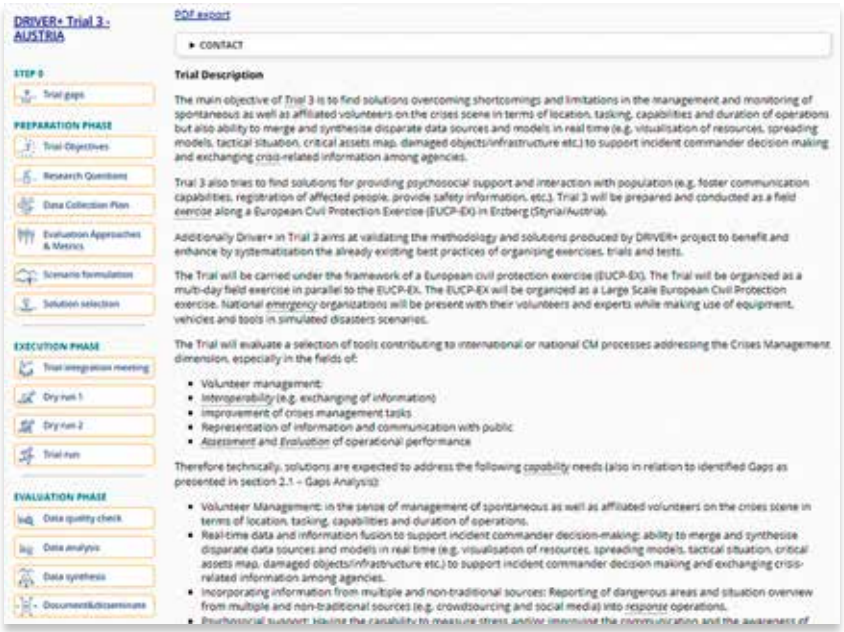
It is derived directly from the TGM and it assures that the practitionerís needs together with trial objectives, are met by following the six steps defined in the preparation phase. The TGT allows also the validation of each steps' outcome, ensuring that they are followed as intended. Given the fact that TGM by its nature is a complex subject, effective and successful implementation requires systematic guidance that the tool provides. The TGT is also a knowledge database containing the results of the DRIVER+ systematic literature research (SLR) as well as lessons learned from the previous trials used for future reference. The tool evolves and improves during the course of the project, and it aims to become the ultimate support tool in all trial phases for future generations of crisis managers.

The TGT aims to simplify the identification of operational (real life) crisis management problems by offering a list of pre-defined gaps stored in the database that can be reused, or it gives support for defining new ones. Each gap is related to CM functions which are also a part of solution descriptions, stored in the Portfolio of Solutions, allowing integration between the tools.

The TGT gives examples of trial objectives and helps the users in defining them. The tool offers examples of "do's" and "don'ts" gained from experience in the past, and it helps with formulating structured and pragmatic data collection plans for evaluating trial results by providing ad hoc templates. It also allows users to formulate trial scenarios and stores them in the tool for future reference.

The search and matching function based on CM functions taxonomy, is designed to help identifying potential solutions from previously identified gaps to be adjusted in a trial. In addition, the tool introduces test cases which can be defined and shared across trials, to help CM practitioners in fulfilling trial objectives and answering research questions. Trial owners, together with their teams, can use the tool simultaneously to improve their collaboration.

The TGT also stores lessons learned from each trial, which can be accessed to foster common understanding of crisis management across Europe. A pdf export function is one of the core functionalities that the tool provides, which allows data to be extracted from the TGT directly to the trial action plan. Integrated help will accompany the user on each step and will provide support and examples for what needs to be done. In the long term, the TGT aims to allow systematic and guided procedures to assess potentially innovating solutions.



LINK
https://pos.driver-project.eu/gt/trial

TOOL: KNOWLEDGE BASE
GET INSPIRED AND LEARN FROM OTHERS

GIVING YOU INSPIRATION,
EXAMPLES AND GUIDANCE
DURING THE PREPARATION PHASE

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The DRIVER+ knowledge base, in its current version, contains the results of a systematic literature review (SLR) of trial-like events in the crisis management domain from the past decade.

The SLR approach is a means to reduce the bias of study selection, data extraction and presentation as well as to ensure high quality, because it is reproducible due to the systematic and well documented procedure. The knowledge of the relevant identified sources was collected in codebooks. These codebooks contain ten different categories, that were filled based on the analysis of the literature: objective, research question, planning & deviation, research method, metrics & KPIs, data collection plan, data analysis, ethical procedures, results, methodological lessons learnt. By re-arranging the knowledge in this systematic way, a database was created that can be searched by using a keyword-search. The aim is to support anyone that is interested in conducting a trial by showing the state-of-the-art within those categories, that are relevant within the preparation phase.
As each of the journal articles have been given an ID, they could be fed into a database that is searchable by keyword search in two ways:

Step 1:
Horizontal search - search for every codebook that has information on serious games in the metrics & KPI in the same way as explained before for the research method. Results will be in the same attribute - in this example now the metrics & KPI attribute (highlighted with yellow boxes). These results could be depicted, for example, in a list giving the ID and the info about metrics.

Step 2:
Vertical search - look again at the whole codebook for one ID, the whole tuple. The idea is to enable the possibility to discover more relevant information as depicted here for a specific ID, and maybe even motivate the user to go deeper and read the whole paper and its underlying research.

So please go to the TGT and try it out! You will see that it will inspire you!

STEP ZERO ☑ ☑

PREPARATION ☑ ☑ ☑ ☑ ☑ ☑

EXECUTION ☐ ☐ ☐ ☐

EVALUATION ☐ ☐ ☐ ☑

LINK

https://pos.driver-project.eu/gt/knowledge

TOOL: TRIAL ACTION PLAN
TAP

COMPREHENSIVE CO-WORKING TEMPLATE & CHECKLIST TO PLAN AND PREPARE A TRIAL. RECORDS EFFORTS, CIRCULATES DECISIONS AND AIDS ASSESSING PROGRESS

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The first version of the trial action plan (TAP) was created during the DRIVER+ project to serve the role of the main trial planning and preparing document. It covers all areas related to the trial organisation and will be used to record the efforts, circulate decisions and assess the progress. Its secondary role is to function as an internal progress reporting document.
The TAP fundamental role is to facilitate collaborative planning and to support combined execution. It should be considered as a support tool facilitating the trial management. It is designed to be used as a living document (document being continually edited and updated by many authorised people). It means that the document is continuously up to date in line with new decisions and actions being realised in the course of the preparation work of the trial committee and other involved stakeholders. This approach allows all important arrangements, conclusions and effects of work to be collected, thus constituting the TAP as a repository (also a coordination and information sharing tool) available to all stakeholders.

The document is provided in a form of a self-descriptive template with completion guidelines that also links the user with DRIVER+ methodological documents. Moreover, it supports the application of DRIVER+ methodology. It accommodates and cites all the decisions of trial committee concerning the methodological aspects of the trial preparation. This includes among other things: description of gaps selected for the trial, general and specific research questions the trial will respond to, the solution selection process and its results, initially identified key performance indicators for evaluation of selected solutions, data collection, evaluation approaches and metrics and general scenario formulation.

The TAP includes several filling aids, facilitating the process of its completion:

- The completion guide (precisely explaining the logical systematisation of progressing with the trial preparation and execution and suggests the correct order of advancements);
- Other instructions, checklists and revision guide.

It is supported by a training module created as a supplement to TGM module.

- Collaborative, systematised workspace that can host decisions and actions - document oriented on task: preparing and executing the trial.
- Completes all the information gathered throughout the preparation and execution phase by all trial stakeholders in a concise form. Serves as a main planning document. Output: aggregation of data in one collaborative worksheet, linked with all trial related documents, that is easy to use.

LINK

This is part of the TGT.

You can find the TGT here: https://pos.driver-project.eu/gt/trial

TOOL: CRISIS MGMT INNOVATION NETWORK
CMINE

A COMMUNITY OF PRACTICE TO FOSTER INNOVATION IN CRISIS MANAGEMENT AND DISASTER RISK REDUCTION

- POLICYMAKERS
- PRACTITIONERS
- NGOS/CSOS
- PEOPLE FROM INDUSTRY
- SCIENCE
- TRAINING AND EDUCATION
- STANDARDISATION REPRESENTATIVES
- TRIAL OWNER

ABOUT
WHAT THIS TOOL IS FOR

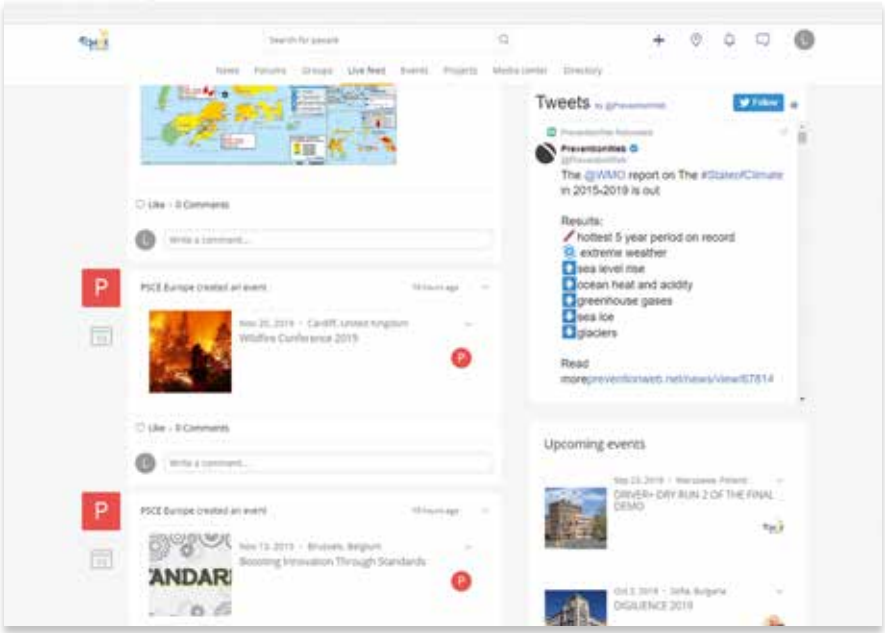
The Crisis Management Innovation Network Europe (CMINE) is a community of practice whose objective is to foster innovation and enhance a shared understanding in the fields of crisis management and Disaster Risk Reduction in Europe.

CMINE is creating an umbrella network of stakeholders active in crisis management by linking existing projects, networks and initiatives. By doing so, CMINE reduces fragmentation in the crisis management domain, prompts the generation of ideas and assists in the identification of innovative solutions to improve European resilience.

CMINE provides to its members an online and offline environment to actively engage with other crisis manage ment professionals. It helps them to reflect on current and future challenges while facilitating the uptake of research and innovation by practitioner organisations. Different task groups have been set up to explore approaches to address issues in specific crisis management areas, namely floods, wildfires and volunteer management. The CMINE platform has been designed as a flexible tool, easy to update and inform through collaboration. Its aim is to become a sustainable pan-European platform in support to all professionals involved in crisis management.

CMINE's guiding principles and ambitions are to:

- Foster multi-stakeholder and cross-sectoral interaction – Join a diverse group of stakeholders active in crisis management, share knowledge, ideas and work together to solve current and future challenges
- Engage members through a content-driven approach – Benefit from a structured, moderated and open space to generate ideas and foster innovation through interaction
- Become a hub for crisis management innovation in Europe – Discover key information such as results of research projects and cutting-edge crisis management solutions and stay up to date on crisis management news and events
- Provide visibility and networking opportunities to the crisis management community – Showcase your results (e.g. EU-funded research projects) to increase visibility, while expanding your networks through our expert database



LINK
https://www.CMINE.eu

TOOL: PORTFOLIO OF SOLUTIONS
POS

THE MAIN PURPOSE OF THE PORTFOLIO OF SOLUTIONS IS TO STORE AND PROVIDE ALL RELEVANT INFORMATION ABOUT INNOVATIVE SOLUTIONS IN CRISIS MANAGEMENT

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The portfolio of solutions is a web-based online platform that aims to document all relevant information regarding the solutions in the crisis management across Europe in such a way that different stakeholders can easily access this information. It also aims to standardise the language through the use of shared vocabulary of pre-defined taxonomies, so that for example, CM professionals, solution owners, CM practitioners and trial owners can work on the same level, and use the same terms, making the collaboration much easier. The trial guidance methodology describes a six step approach - an iterative process for trial preparation, where the last step includes selection of trial relevant solutions. The main role of the PoS in this step is to allow trial owners, and CM practitioners to select solutions that are going to be used and evaluated in the trial and that are related to the defined trial gaps, which are linked to CM functions. In other words, the PoS aims to help in the solution selection process, by offering the information on which CM functions are addressed by the solutions, so that they can be matched with the defined gaps.

Another important function of the PoS, is to propose a marketplace where providers can advertise their innovative solutions in the field of crisis management, and improve the chance of them being selected for a trial, or being used by CM practitioners. It also allows description of potential use cases, to give more insights on the actual use of the solutions.

The search functionality of the PoS enables an easy search through a large number of solutions, maintaining the high level of relevancy, by applying the correct filters that narrow the search results. A goal for the future is to make the PoS project independent, so that information about potential solutions for ongoing real-life crisis management problems is always available when needed.

The portfolio of solutions provides the possibility of describing a solution in a standardised way. The solution owner is able to state in which innovation stage the solution is currently in, what readiness level it has, which crisis cycle management phase is targeting, and which crisis size it covers. It also gives the opportunity to provide information on which standards are supported by the solution, and to upload and store all documentation regarding the solution, such as manuals, installation/ configuration guides etc. Solution providers can also describe use cases in which CM functions are addressed. Other than that, PoS allows references to be added to both internal DRIVER+ trials and external experiments, to give additional information on how the solution performed in real-life situations.

For the trial owners and CM practitioners, the PoS's search function allows easy discovery of relevant solutions by filtering all information provided by the solution owner and by clearly stating which CM functions are being addressed. The solution overview page of the PoS is based on search API which implements deep search algorithms that allow searching through all components of the described solution for relevant terms, delivering fast, user-specified search and also gives the possibility to filter the solutions by CM functions, allowing easy matching with trial gaps. The PoS also implements a PDF export function to allows easy information extraction for further usage. This functionality can be combined with the filtering function that the tool offers to generate PDFs containing user-specified information, that being a description of a single solution, or for example, description of all solutions that address the same CM functions. Integrated help functionality is designed to help both solution owners in describing their solution in the best possible way and to help trial owners in selecting relevant solutions to be benchmarked in a trial.

The future goal of the PoS is to propose a marketplace where the next generations of CM practitioners will be able to find information related to solutions to fill the existing gaps in crisis management, and also to discover new innovative solutions provided by solution owners for arising problems.

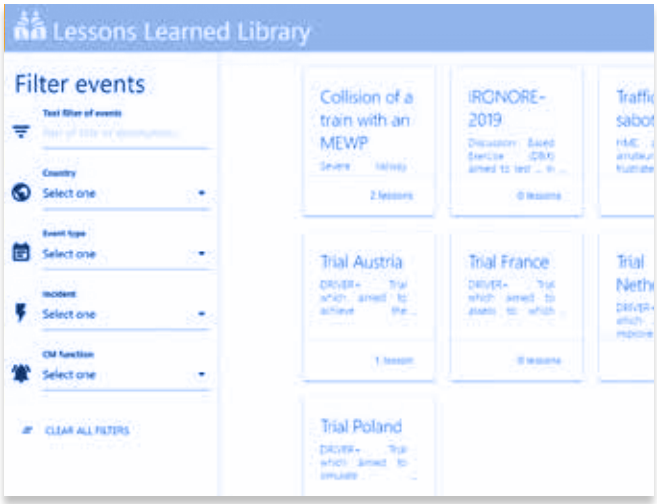
LINK
https://pos.driver-project.eu/PoS/solutions

TOOL: LESSON LEARNT LIBRARY

L3

COLLECTING AND SHARING LESSONS LEARNED FROM CRISIS MANAGEMENT EVENTS

- TRIAL OWNER
- EVALUATION COORDINATOR



ABOUT
WHAT THIS TOOL IS FOR

The objective of the Lessons Learned Library (L3) is to support organisations in sharing, editing, and consulting lessons within the domain of crisis management (CM) and disaster risk reduction (DRR). L3 is especially intended to share lessons across organisations, across sectors, and across countries with the final goal to improve CM and DRR in Europe by learning from each other's experiences.

Lessons may be collected from various types of events: routine, every day operations, crisis situations, training and exercises, experiments and tests, but also from risk management studies or preventive activities. L3 offers a structured approach to develop and improve doctrines, organisations, training, equipment, leadership, personnel and facilities to achieve more effective, efficient and safe operations.

A lesson provides answers to questions such as: What was the situation? What was the impact? What went well in emergency management and is worthwhile to implement? But also: What went wrong, and which improvements are needed? To this purpose, any user can create new events and share their lessons with other emergency management communities in Europe.

Since lessons are of varying nature, a filtering mechanism allows users to quickly find relevant information about an event that took place (e.g. a Trial in the DRIVER+ project), about certain types of incidents (e.g. forest fires or bomb attacks), or about specific crisis management functions (e.g. evacuation or situation assessment).

The main functionalities of the L3 are (a) to add and edit crisis events and associated lessons from these events, and (b) to find and consult specific events or lessons. Because the aim of the L3 is to share lessons across the CM community worldwide, the user interface is in English, and lessons are expected to be in English too (although this is not enforced).

Since lessons need a context, all lessons belong to an event. Each event can contain one or more lessons, and each lesson is linked to one or more crisis management functions.

An **event** is described by:
A summary, including some general data such as type of event (e.g. an incident or an exercise), and its date and place. More detailed information on the incident scenario and CM operations, such as the initial incident and cascading effects, the (potential) impact, a map of the situation, involved organisations, and an overview of critical CM functions that had to be executed. Lessons that have been learned from the event.

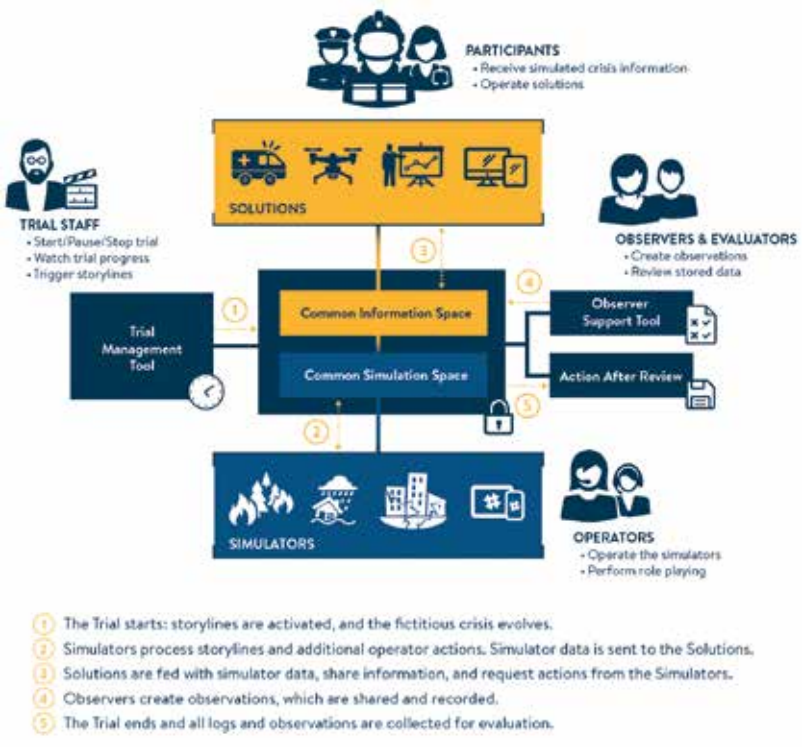
A **lesson** consists of:
The applicable CM functions during the event, including a description of the perceived positive or negative experiences and their effectiveness.
Solutions to improve the CM function based on experiences during the event, including a description of the expected performance improvement and an indication of the expected impact reduction.

These lessons are typically captured during the **evaluation phase** of an event when all required information is available.

LINK
https://l3crisis.eu

TEST-BED TECHNICAL INFRASTRUCTURE
A PRACTITIONER'S OVERVIEW

In a trial, one or more innovative solutions are used by the participants and assessed in the context of a simulated crisis. For a useful assessment, the test-bed offers several tools for support and a common information space to share messages between solutions, and with legacy systems. Additionally, multiple simulators can be connected to create a realistic, yet fictive incident environment. A high-level overview is provided in the figure below. Besides using it for trials, the same technical infrastructure and tooling can also be used in day-to-day CM practice for training, exercises and assessments of personnel and organisation in a realistic, yet fictitious controlled context.



All components are available on https://github.com/DRIVER-EU as open source software (MIT license), but can also be obtained from the docker hub. This means the components can be easily downloaded, installed, used and adapted free of charge.

To facilitate the execution of trials, the infrastructure has the following functionalities and interfaces available to the trial staff (i.e. trial owner, evaluation coordinator, technical coordinator, observers and assisting technicians) to prepare and execute the trial:

- The technical infrastructure allows for connecting solutions and legacy systems alike, such that they can share messages with each other inside the **common information space (CIS)**. For instance, a drone can provide imagery or the location of victims and share them via the CIS with a common operational picture application.
- The technical infrastructure also allows to simulators to be connected together, such that they can simulate an incident and feed the simulated incident to the solutions and legacy systems. This is done by using the **common simulation space (CSS)** and the CIS-CSS gateways. For example, a flooding simulator can share the simulated flooding in the CIS, so the traffic simulator will not route traffic in that area. Via the CIS-CSS gateway, the simulated flood map is provided to the common operational picture application, so they will not dispatch ambulances to that area. The CIS and CSS are both using the open source publish-subscribe streaming platform, Apache
- In the **trial management tool (TMT)**, several scenarios can be created to assess specific aspects of the trialled solutions. Scenarios consists of multiple storylines and so-called injects, i.e. messages that can either trigger an action in a simulator, a solution, or in a role-player. During execution of the trial, the trial staff uses the TMT to keep track on activation of these storylines and injects.
- In the **observer support tool (OST)**, observer checklists and questionnaires can be created and used by observers and participants during the execution of a trial. Furthermore, the TMT can trigger new checklists and questionnaires. All answers are subsequently shared with the after-action-review tool
- The **after-action-review tool (AAR)** logs all checklists and questionnaires as well as all messages flowing though the CIS and CSS. This data is stored and made available for evaluation.
- The open source nature of the components and the developer documentation provided with it, make it easy for software developers to deploy these components, connect solutions and simulators to the infrastructure and create a fictive crisis scenario and observation templates. For administrators, the infrastructure also offers an admin tool to configure the infrastructure, turn on security, and an extra set of developer tools for the implementation and testing of the trial specific set-up of the technical infrastructure.

On the following pages, these components are described in more detail.

LINK
https://github.com/DRIVER-EU

TOOL: COMMON INFORMATION SPACE
CIS

FACILITATE DATA EXCHANGE BETWEEN SOLUTIONS AND TO EXCHANGE DATA BETWEEN SOLUTIONS AND SIMULATORS

- TECHNICAL COORDINATOR
- SOLUTION PROVIDERS

ABOUT
WHAT THIS TOOL IS FOR

The Common Information Space (CIS) is used to facilitate data exchange between solutions (i.e. software tools) in a transparent and reliable way, in order to enhance the collaboration within and the effectiveness of crisis management while using these solutions. Currently used IT systems (i.e. legacy systems also present in the baseline) can also be connected to the CIS, such that these can feed data into solutions (e.g. a first dispatch report) or vice versa, and such that they can be fed with simulator input (e.g. simulated ambulance positions).

Connecting to the CIS is done by using current emergency management data exchange standards, like Common Alerting Protocol (CAP) messages, or Emergency Data Exchange Language (EDXL) messages. This facilitates exchange of understandable information between different organizations, even if they use different data formats (syntactical interoperability) and different languages and/or taxonomies (semantic interoperability). Main benefit is that the systems connected to the CIS do not have to adapt to the data formats of other systems, yet can still exchange information with them. If a solution or legacy system is not yet using such data exchange standards, their data inputs or outputs first need to be transformed into common standard formats.

To link up the solutions and legacy systems with simulators, the CIS can be connected to the Common Simulation Space (CSS) via so called CIS-CSS Gateways. Data from the simulators is translated into data that can be understood by the solutions connected to the CIS and requests from the solutions can be relayed back to the simulators. Because they translate specific message types, there may be multiple gateways. These gateways have to be developed trial specific, converting common standard data formats used in the CIS to common simulation data formats used in the CSS. The CIS and CIS-CSS Gateways do not need to have their own visual user-interfaces, since they only convert messages. Please find more information on the simulators and how they can feed the CIS in the detailed explanation of the CSS.

Configuration of the CIS and monitoring of its functioning is done via the admin tool, which does provide a vi-

sual user-interface to the trial staff. One major aspect of the developed CIS concept is data protection and security, which is considered necessary in order to create trust among the integrated organisations and their systems. This will be achieved by a trusted registration process for all organisations and an encapsulation of all messages exchanged via the CIS. The admin tool and the security is explained in more detail in their own section.

Technical details

The CIS consists of multiple Kafka topics, enabling data communication channels amongst the connected solutions and systems. Every data exchange type (and thus message type, for instance CAP or EDXL) should have its dedicated Kafka topic, such that data exchange between solutions, legacy systems and to/from simulators can be easily managed. Connecting solutions and systems to the CIS is done by using one of the offered adapters, which are available in the programming languages Java, C#, JavaScript/TypeScript/Node.js, Python and as REST end-point. These adapters and the technical tools to implement and test the trial-specific technical set-up are explained in the section about Developer Extras.

LINK
https://github.com/DRIVER-EU/test-bed

TOOL: COMMON SIMULATION SPACE
CSS AND SIMULATORS

FACILITATE DATA EXCHANGE BETWEEN SIMULATORS AND TO FEED SOLUTIONS, THEREBY CREATING A FICTIVE INCIDENT (CRISIS)

- TRIAL OWNER
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR
- SOLUTION PROVIDERS

ABOUT
WHAT THIS TOOL IS FOR

The trial participants and the solutions and legacy systems connected to the common information space (CIS) typically require information from a fictitious crisis (e.g. number of resources present at a certain dispatch location, or the detailed information of victims at the incident scene).

The sommon simulation space (CSS) is the component within the test-bed technical infrastructure that provides a framework for simulators to jointly generate and maintain a simulation world needed for the solutions (and legacy systems) and the participants to get a sufficiently realistic impression of the fictitious crisis for them to manage.

Dependent on the trial scenario, simulators are to be selected, based on:

- Whether solutions or legacy systems need data from the simulated crisis, which they cannot get from other solutions or legacy systems (e.g. solution fed with a simulated flood status).
- Whether participants need extra information about the simulated crisis (e.g. eye-level view of the crisis, simulated by a virtual reality application or by staging this by physical items on a live-exercise terrain).
- Whether information in the scenario needs to be pre-calculated / pre-simulated for realism (e.g. a realistic wildfire progression).

The common simulation space allows multiple simulators to focus on their part of maintaining the current state of the simulated world (i.e. the simulated truth of the incident and the world around it, for instance a flooding simulator keeping track of the progression of a flood through a region and a resource simulator keeping track of the positions of multiple ambulances). In order to communicate state changes with other simulators inside the CSS, self-created communication messages are allowed inside this space. This is different from the messages being sent over the CIS, because the CIS is more aligned with current emergency management data exchange standards.

To direct the simulated world towards a desired scenario relevant for the trial, the CSS is connected to the trial management tool, which can send out messages to

change the simulated world i.e. injects directly processed by simulators. For example, to initiate the dike breach, let a container explode, or drive 10 ambulances to the incident scene, etc..

Simulators all have their own data model of how they represent the simulated world. The CSS allows these simulators to agree on a communication form that the simulators understand to create and maintain a jointly simulated world.

Next to the CSS, there also is the common information space (CIS), that is used to connect all the solutions and legacy systems to each other. The CSS is not connected directly to the CIS, but via CIS-CSS gateways. This ensures that the two spaces of simulated truth inside the CSS and perceived/communicated truth inside the CIS are kept separate, and allows the gateways to control which information from the CSS flows to the CIS. For example, if you don't have any sensors or observers near the flood (as simulated in the CSS), the common operational picture should not be able to see the flood map. Only after sending a drone to inspect the area, this information can become available via the drone. The drone itself, however, does receive an accurate picture of the flood in order for it to compute and communicate the current flood map.

In this way, a shared perceived truth is offered to the solutions, to be used in further emergency management decision making. However, due to an incorrect observation, miscommunication or a failing sensor/solution, the perceived truth can be different from the simulated truth. Filters to create a different perceived truth can be implemented in the CSS-CIS Gateways, restricting participants from getting the correct information out of a simulator. So whereas trial/exercise staff can see all information of in the simulators, participants may only be able to see part of that information or may deliberately receive incorrect information.

Technical details
The CSS has the same technical set-up as the CIS (i.e. via one or more Kafka topics), and simulators can be connected to it using the same adapters as available for connecting solutions and legacy systems to the CIS. Security can be added to the CSS like it can be added to the CIS. The Admin tool is used to configure the CSS and monitor it during trial run.

LINK
https://github.com/DRIVER-EU/test-bed

TOOL: TRIAL MANAGEMENT TOOL
TMT

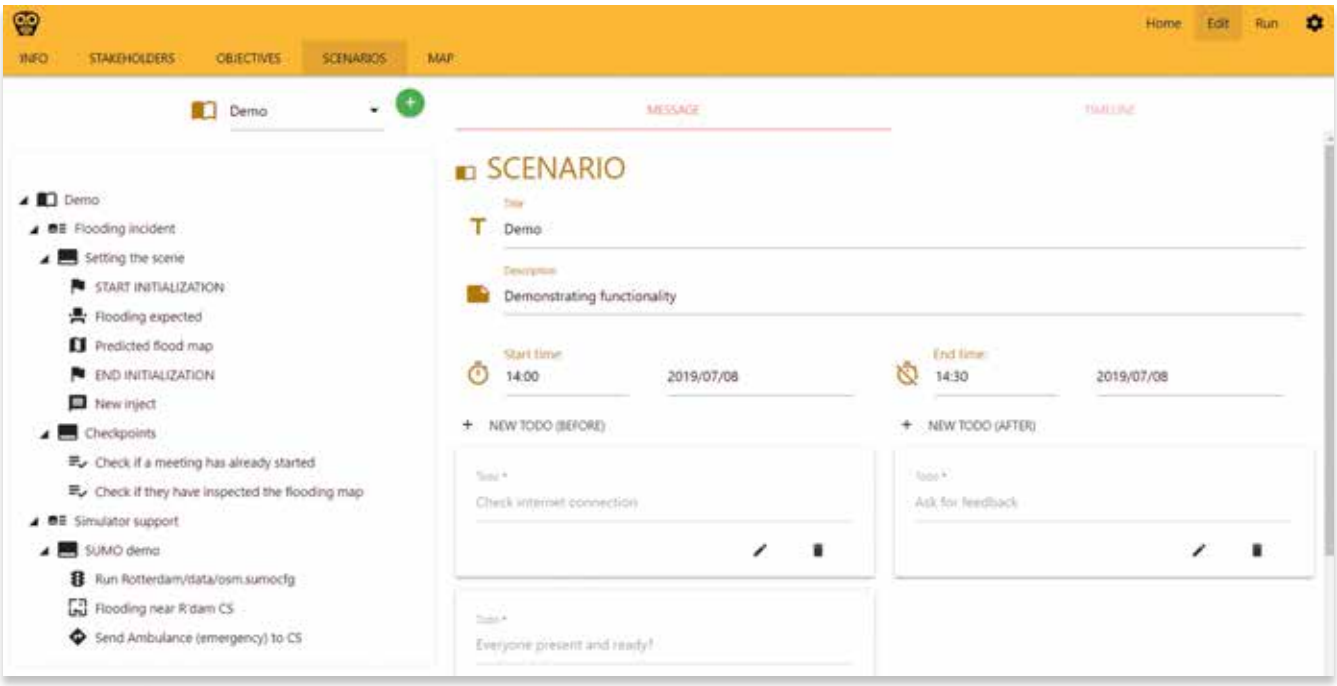
A WEB APPLICATION TO CREATE ONE OR MORE SCENARIO'S AND CONTROL IT DURING EXECUTION

- TRIAL OWNER
- EVALUATION COORDINATOR
- TECHNICAL COORDINATOR

IN A NUTSHELL
WHAT THIS STEP IS ABOUT

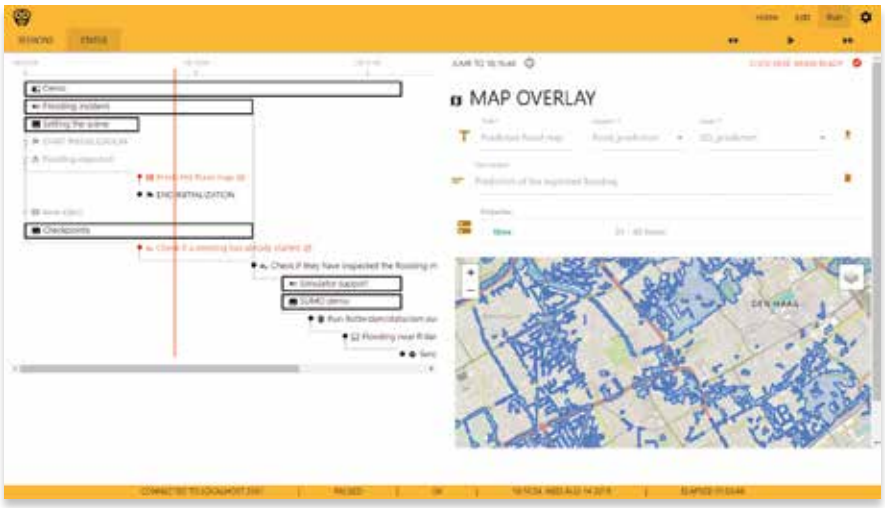
In order to assess solutions during a trial, one or more scenarios are created in the TMT by CM experts and trial staff. Each scenario controls the simulation time (start, stop, pause), and specifies what is happening during the trial, so the solutions can be properly evaluated, and the trial objectives are met. In a scenario, multiple storylines can be created, each containing one or more injects, i.e. messages to simulators, solutions and role-players.

During the trial execution, those messages influence the scenario. For example, the TMT can send a message to a traffic simulator to create an incident at a certain location, or it could send a common alerting protocol message to a command & control application. Additionally, the TMT can send messages to role-players, so they can make a call or play a non-participating command centre. The trial staff can also send messages earlier or later, or resend them, offering a great level of control over the trial.



Creating a scenario in the TMT can be compared by creating a new project. However, instead of managing a project by creating subprojects, work packages and tasks, a trial scenario (=> project) consists of storylines (=> subprojects), acts (=> work packages) and injects (=> tasks, like a simple message). And whereas in a project, you assign resources, in the TMT you assign simulators, role players and observers (=> resources).

A scenario is created while preparing the trial and is executed during the trial. And like a project manager, controlling the sequence of the tasks during the lifetime of a project, the trial staff is also able to control the sequence of inject/messages during the lifetime of a scenario. For example, a scenario may specify that initially water levels rise, next a dyke breaks and a flooding starts. In parallel, a traffic accident causes an ammonia cloud to threaten a part of the city. Its output is a time sequence of messages, for example to instruct a simulator to start a flooding, a role player to call 112 or an observer to watch out for a particular use of a solution.



LINK
https://github.com/DRIVER-EU/scenario-manager

TOOL: AFTER-ACTION REVIEW TOOL
AAR

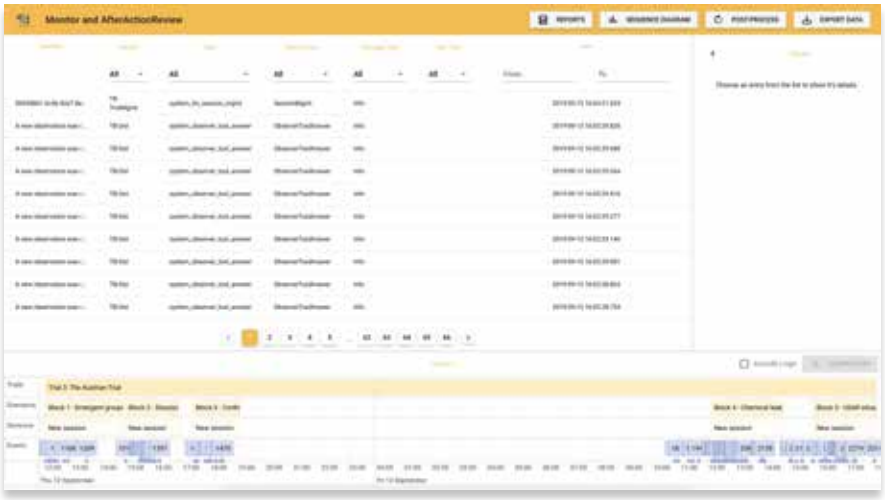
COLLECT, STORE DATA LOGS AND OBSERVATIONS AND MAKE THEM AVAILABLE FOR EVALUATION

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR

ABOUT
WHAT THIS TOOL IS FOR

The AAR tool logs all messages exchanged between the solutions, legacy systems and simulators connected test-bed technical infrastructure and by components within the infrastructure (e.g. observations inputted via the observer support tool), with the purpose to enable a later analysis of the data exchanged during the trial. Apart from being used for a post-analysis, it is also used during a trial execution to monitor the amount and kind of data exchange, in order to check whether all data exchanges are correctly functioning, to check whether the correct data is exchanged at the correct moment during scenario execution and to check whether observations are being stored.

The detailed logging of all formats, sources and destinations, all marked with time-stamps, allows the technical staff to sort, filter and inspect the messages. The output of the message logging can be viewed on a list, on a timeline or as a sequence diagram. This enables several options for a visual analysis about which components have exchanged which data with each other.



LINK
https://github.com/DRIVER-EU/after-action-review

TOOL: OBSERVER SUPPORT TOOL
OST

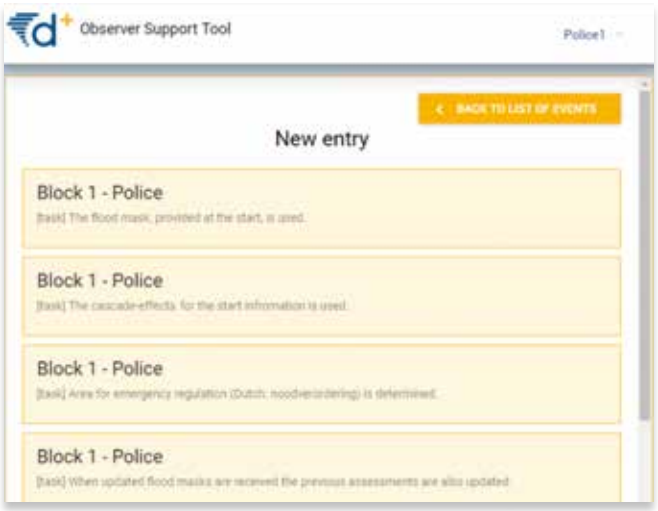
SUPPORT A STRUCTURED COLLECTION OF DATA DURING THE TRIAL/EXERCISE VIA CHECKLISTS AND QUESTIONNAIRES FOR OBSERVERS AND OTHER PARTICIPANTS

- TRIAL OWNER
- EVALUATION COORDINATOR
- PRACTITIONER COORDINATOR
- TECHNICAL COORDINATOR
- OBSERVERS AND PRACTITIONERS

ABOUT
WHAT THIS STEP IS ABOUT

The observer support tool records all observations from the observers digitally, so they can be analysed during and after the trial. To collect feedback, the OST also provides the ability for participants and trial staff to fill in questionnaires, directly after (a part/episode of) the trial is executed.

The OST consists of a web application for the observers that is typically run from a tablet. The same application can also be accessed in a browser on a desktop computer, a laptop or a mobile device, for instance for participants to fill in the questionnaires and for the evaluation coordinator to prepare the trial specific observation templates (i.e. checklists) and questionnaires. Furthermore, a server is running to manage all checklists and questionnaires and record all answers. This server is connected to the trial-management-tool, such that the correct checklists/questionnaires are available at the applicable moments during execution of the trial. All collected observation and questionnaire data is thereafter shared with the after-action-review tool, such that it is centrally stored for evaluation.



The functionalities of the observer support tool within each phase are:

Preparation phase:
- Definition of trial episodes (i.e. parts of trial in which different phenomena are expected).
- Definition of roles in the trial (e.g. observer in room A, participant type B).
- Definition of the observation templates (i.e. checklists and questionnaires) which are composed of one or more questions.
- Assignment of observation templates to roles and to trial stages.

Execution phase:

- Definition of the data collection Session during testing, dry runs or the trial, by creating user accounts and inviting the users.
- Assignment of users to roles.
- Supervision of the data collection process.
- Changing the trial episode, manually or via the trial-management tool.
- Sending currently applicable observation templates and messages to roles (i.e. users).
- Showing how many answers to observation templates are inputted by users and showing these answers.

Evaluation phase:

- Exporting the answers inputted in observation templates to CSV format.
- Sharing these answers with the after-action-review tool.
- Reviewing these answers.

In order to configure the OST, the evaluation coordinator (and colleagues) have to provide the **following inputs:**

- List of trial episodes.
- List of roles in the trial which will be using the OST (e.g. observer A, B, C and participant 1,2,3).
- Set of observation templates (i.e. observer checklists and participant questionnaires).
- Information in which trial episode particular observation templates should be displayed.
- Assignment of observation templates to roles.
- User accounts (e.g. user John Doe = role observer A).
- Short description of trial.

LINK
https://github.com/DRIVER-EU/ost

TOOL: ADMIN TOOL AND SECURITY
ADMIN TOOL AND SECURITY

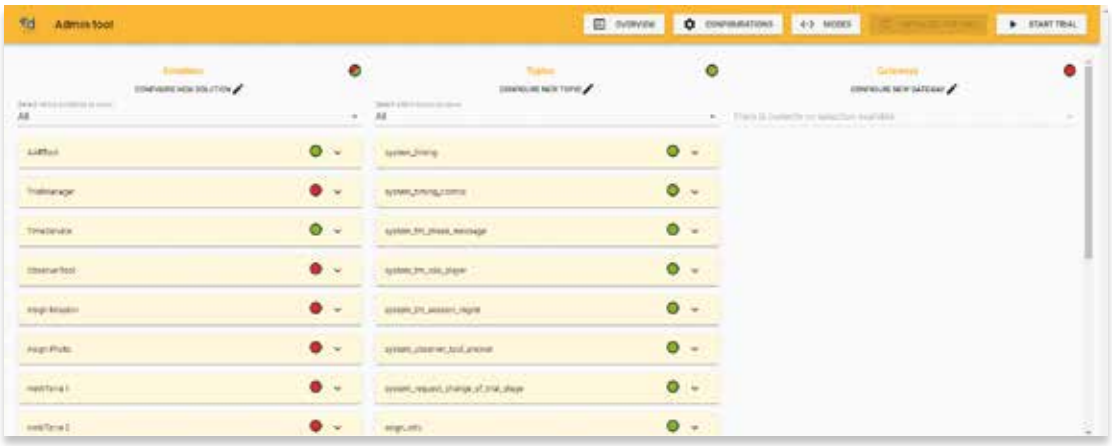
CONFIGURE THE DATA EXCHANGE IN THE CIS AND CSS, TO SET-UP SECURITY ON THESE AND TO MONITOR TECHNICAL READINESS DURING TRIAL EXECUTION

- TRIAL OWNER
- TECHNICAL COORDINATOR
- SOLUTION PROVIDERS

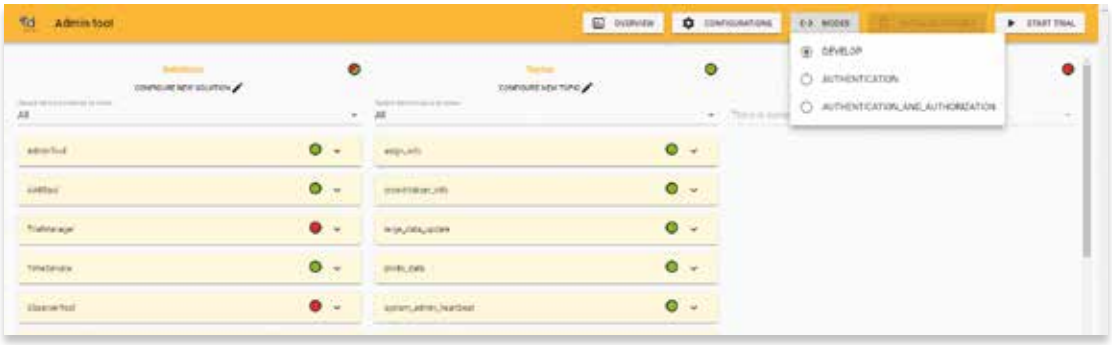
ABOUT
WHAT THIS TOOL IS FOR

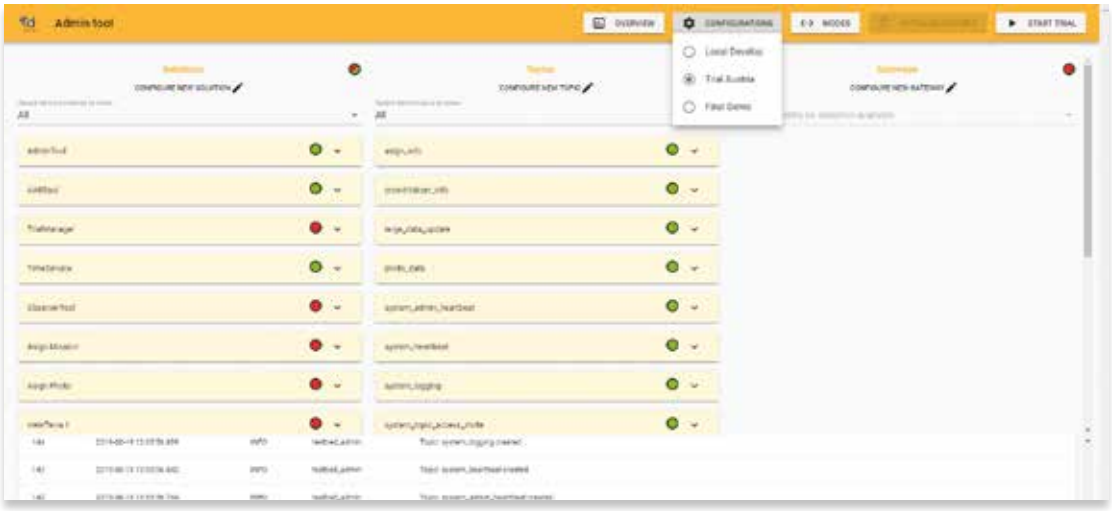
The admin tool is necessary to configure the Kafka layers of the CIS and CSS and the CIS-CSS gateways and to configure all adapters used by solutions, legacy system, simulators, trial management tool, observer support tool and after action review tool to connect to the CIS or CSS. When performing tests and during execution of a trial, the admin tool provides an interface to monitor whether all components are well connected, to specify the types of messages being used and to collect all errors and warnings. When all lights are green in the admin tool's user-interface, all components are well connected.

Additionally, via the admin tool, you can secure the infrastructure, by creating certificates. These certificates will assure that only the certified solutions, systems, simulators and components can access only the for them applicable Kafka layers within the CIS and CSS. Adding of security certificates is especially important in case an online technical infrastructure is used, for example when assessing web-based solution, or when the IT-network of the hosting platform is vulnerable to external parties listening in to the trial.



The Admin tool provides pre-defined configuration defining a set of solutions, layers and gateways that can be selected. It also offers the possibility to enable/disable security for the testbed so that only authorized solutions can connect.





LINK
https://github.com/DRIVER-EU/admin-tool

TOOL: EXTRA DEVELOPER TOOLS

MESSAGE INJECTOR, REPLAY, DATA SERVICES, DOCKER

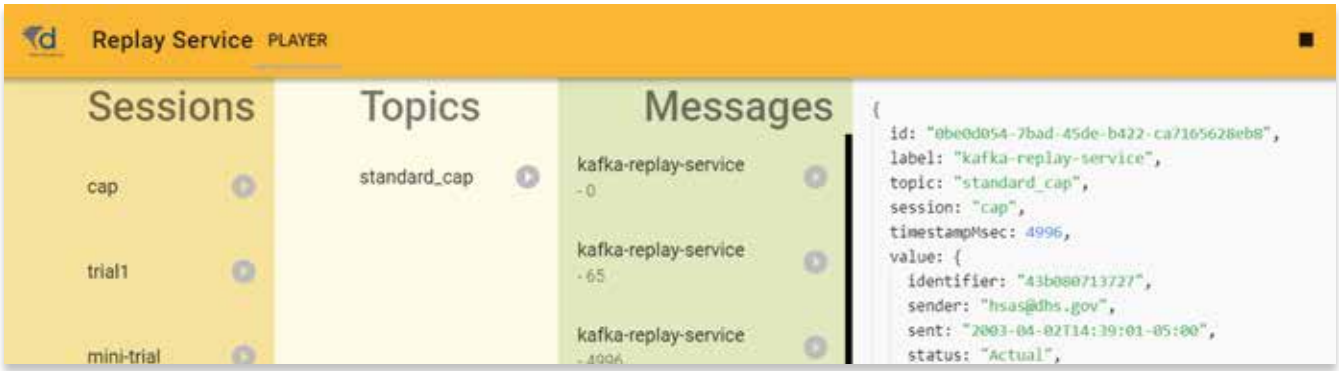
SUPPORT TECHNICIANS IN IMPLEMENTING THE TEST-BED TECHNICAL INFRASTRUCTURE AND CONNECTING SOLUTIONS AND SIMULATORS

- TECHNICAL COORDINATOR
- SOLUTION PROVIDERS

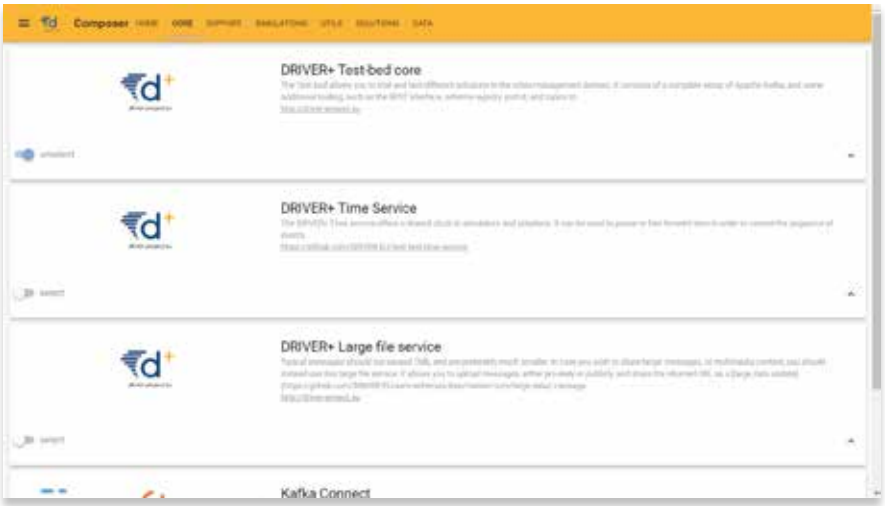
ABOUT
WHAT THIS TOOL IS FOR

For technicians involved in deploying the infrastructure and configuring it for a specific trial, the following extra components and functionalities are available:

- CIS and CSS adapters are available as open source software in the programming languages Java, C#, JavaScript/TypeScript/Node.js, Python and as REST end-points. The enhance the regular Kafka connectors with trial-specific functionality, such as heartbeats, direct access to simulation time and message encoding. With these easy to adjust and implement adapters, software developers can quickly link up solutions, legacy systems and simulators to the CIS or CSS. These adapters come with standardized AVRO schemes for data exchange, which means the data exchange does not have to be designed and developed from scratch, but every trial can refer to what has already been developed before and can build upon this for its own use.
- The replay service enables sending out a chronological stack of messages (e.g. testing out a simulator feeding a solution). In addition, the Kafka topics UI is useful for inspecting the messages that were sent. Recorded messages can be downloaded in this UI and replayed.



- The infrastructure can be further enriched using several data services, such as the large file service for sharing large datasets between solutions, a WMS service for converting GeoJSON map overlays to the more common WMS format, a Twitter-gateway to convert messages to tweets, or a mail-gateway to convert messages to emails back-and-forth. A geofencing service is also available, that can trigger messages when a person or simulated entity enters or leaves an area.
- The test-bed technical infrastructure runs on the virtualisation platform Docker, which allows an IT technician to simply select the infrastructure components needed and quickly build one installer for the whole trial specific infrastructure. Several complete examples can be found here, or, alternatively, one can use the online composer. This infrastructure can then be easily deployed at your own organisation or inside an online cloud service (i.e. the whole infrastructure runs in the cloud and all connected components link to it via internet).



LINKS

https://github.com/DRIVER-EU/large-file-service
https://github.com/DRIVER-EU/test-bed-wms-service
https://github.com/DRIVER-EU/twitter-gateway
https://docker.com

SPACE FOR NOTES

SPACE FOR NOTES

SPACE FOR NOTES

WHO ARE WE?

The DRIVER+ consortium brings together dedicated multi-national practitioners, relief agencies, policy makers, technology suppliers and researchers. Altogether, they represent 14 countries. Since DRIVER+ is following an inclusive approach, more EU Member States and organisations will be invited to join and more individuals will be invited to join the Community of Practice in Crisis Management in the near future.

IMPRINT

Driving Innovation in Crisis Management for European Resilience

If you want to quote the Handbook, please use the following citation style:

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