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driver+
Driving Innovation in Crisis Management for European Resilience

THE DRIVER+ PROJECT REPORT

UNLOCKING THE INNOVATION POTENTIAL IN EUROPEAN CRISIS MANAGEMENT

Photo Credit: Laurent Lacombe

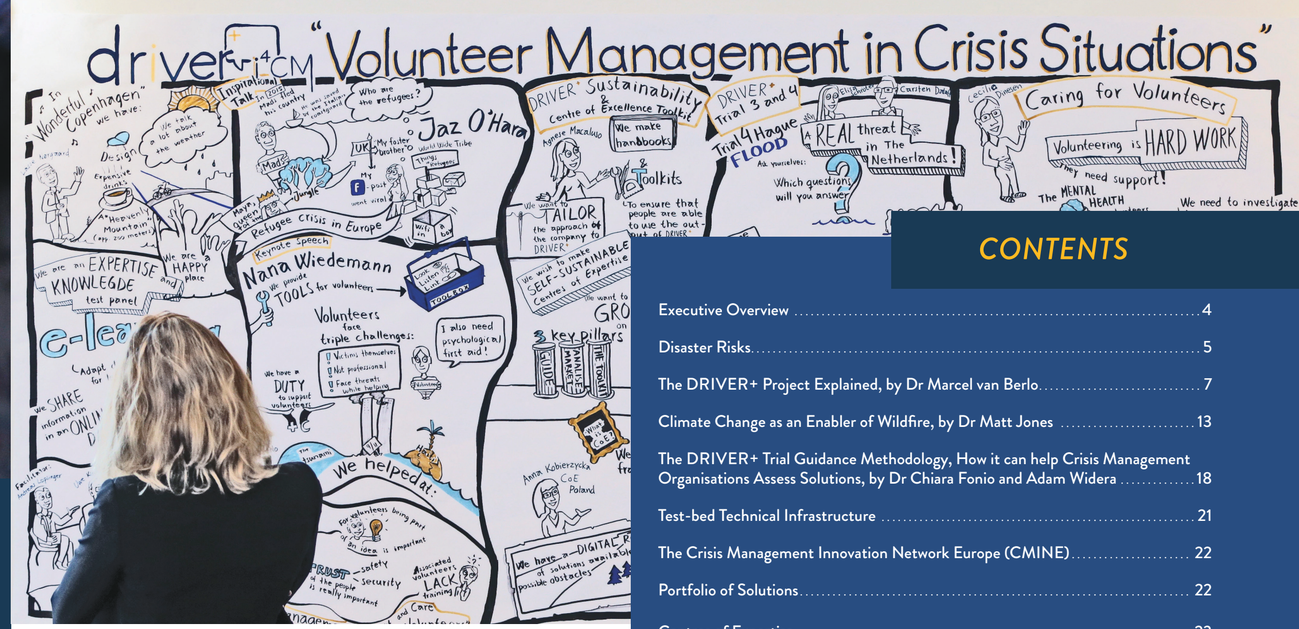
TGM Trial Guidance Methodology
Test-bed Technical Infrastructure
PoS Portfolio of Solutions
CMINE Fostering Innovation in Crisis Management
CoE Centre of Expertise

DRIVER+ is an ambitious pan-European project tasked with supporting the capability development of Crisis Management organisations, promoting and testing new, science-based improvements in Crisis Management (CM).

Dr Marcel van Berlo (TNO)
DRIVER+ Technical Coordinator

KEY ACHIEVEMENTS

- The development of a scientifically based **Trial Guidance Methodology (TGM)** for conducting Trials of Crisis Management solutions and the **Test-bed Technical Infrastructure (TTI)** that underpins it.
- Implementation of large-scale **Trials** using the TGM and TTI conducted in **Poland, France, the Netherlands and Austria**, set up to assess technological and other Crisis Management solutions in realistic scenarios.
- The establishment of an open, cooperative information-sharing community of practice, the **Crisis Management Innovation Network Europe (CMINE)**.
- **The DRIVER+ Portfolio of Solutions** - an online database of state-of-the-art Crisis Management technologies and other solutions.
- The establishment of a network of **DRIVER+ Centres of Expertise** to ensure the sustainability of project outputs.



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EXECUTIVE OVERVIEW

Climate change is exacerbating the intensity of disasters such as wildfire and flooding throughout the world, and conditions look set to continue deteriorating in the future. Other major public safety threats such as earthquakes and industrial accidents also continue to endanger lives, property and natural environments. Governments are increasingly aware of the threats to public safety posed by climate change and citizens understandably expect that the most advanced measures will be put in place to respond effectively when crises occur.

DRIVER+ is an ambitious pan-European project tasked with supporting the capability development of Crisis Management (CM) organisations, promoting and testing new, science-based improvements in Crisis Management. The project's scope includes:

- the promotion and trialling of advanced technologies and other CM solutions in realistic scenarios,
- the development of a scientifically based evaluation methodology (**The Trial Guidance Methodology** supported by the **Test-bed Technical Infrastructure**),
- the development of the **Portfolio of Solutions**,
- the building of a broad, cooperative information-sharing community of practice (**Crisis Management Innovation Network Europe - CMINE**),
- and the establishment of a network of **Centres of Expertise** to sustain the project's outcomes.

At a number of **Trials** staged throughout Europe, specialist Crisis Management teams have trialled a diverse range of different solutions under realistic conditions. A key requirement for Crisis Management solutions is the capability, under the pressure of multiple incidents, communications disruption and multi-national deployments, to be able to create and share a clear, integrated, dynamically updated Common Operational Picture, using resources with maximum effectiveness.

The lessons identified from these Trials, held in Poland, France, the Netherlands and Austria, are helping Crisis Managers identify innovative technologies and approaches for saving lives, protecting communities and caring for volunteers.

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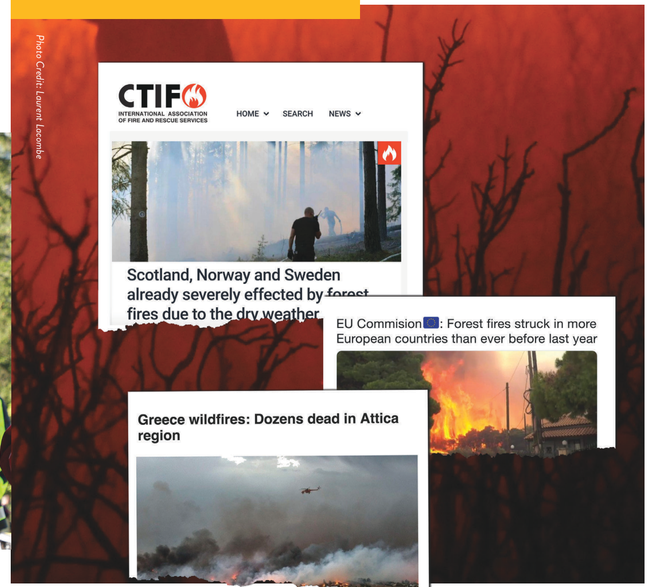
TGM Trial Guidance Methodology · Test-bed Technical Infrastructure · PoS Portfolio of Solutions · CMINE Fostering Innovation in Crisis Management · CoE Centre of Expertise

DISASTER RISKS

WILDFIRE

Photo Credit: Laurent Lacombe



FLOODING

EARTHQUAKE

DISASTER RISKS

PANDEMIC

INDUSTRIAL ACCIDENT

Six months on, chemical spill still haunts Hungary

Six months ago, a deadly red sludge from an alumina plant devastated part of western Hungary. Many villagers have now returned to the region, but risks remain.

On October 4, 2010, an alumina plant at Ajka, Hungary, 160 kilometers (99 miles) outside Budapest unleashed a torrent of toxic red sludge in a wave reaching up to two meters deep.

Since then, residents of the nearby village of Kolontar have been cleaning up homes and gardens that were submerged in the toxic sludge. One million

THE DRIVER+ PROJECT EXPLAINED

- BY DR MARCEL VAN BERLO

An introduction to the objectives and achievements of the DRIVER+ project, explained by Technical Coordinator Dr Marcel van Berlo

The first objective of the DRIVER+ project was to facilitate the capability development of practitioner organisations in the field of disaster risk management. To do this you need to have a very good method for conducting Trials: how do you define your gaps and how do you address these in a proper and sound way?

We have developed a methodology, the Trial Guidance Methodology, for that, to support practitioner organisations, as well as the Test-bed Technical Infrastructure to create realistic environments for testing out new solutions, for bridging these gaps.

So, developing a pan-European Test-bed was one of the main objectives of the DRIVER+ project.

Furthermore, with objective two we developed the Portfolio of Solutions. The main reason for developing this was to help practitioner organisations identify which capability gaps they have, and how they want to bridge them, and how to look for and access the required solutions.

The first objective of the DRIVER+ project was to facilitate the capability development of practitioner organisations in the field of disaster risk management. To do this you need to have a very good method for conducting Trials: ***how do you define your gaps and how do you address these in a proper and sound way?***

THE DRIVER+ PROJECT EXPLAINED

You may not know what solutions are available outside your organisation, let alone what solutions are emerging from research projects. Therefore, we have created the Portfolio of Solutions that can help you identify the available solutions that might be of interest for you.

The great strength of the Portfolio of Solutions is that it not only contains information from the solution providers but it also contains experiences from peers. Users are not having to rely only on what the providers are claiming their solutions can do. Many of the solutions have been tested in Trials.

We have populated the Portfolio of Solutions with solutions that we have tested during our Trials, so actually meeting the requirements of our practitioners in the project. But the Portfolio of Solutions is of course open to any other solution, even though they may not have been tested in the project, but which can provide some information on experiences and results.

The third objective related to creating and facilitating a shared understanding in Crisis Management throughout Europe, and we have done that in various ways. We have our I4CM (Innovation for Crisis Management) events, which are crisis management conferences, interactive workshops and marketplaces. We also have our PRDR's, the Policy Research Dialogue Roundtables, where we are specifically focusing on the connection between policymakers and research.

And we are also inviting many external researchers, practitioners and policymakers to our Trials so that we can share with them, show them what the products are that we are testing and developing and what the results are. We are making them part of that, explicitly asking for their feedback during these events, as observers for instance. That way they get a far better understanding of what we are doing and why we are doing it, and what the benefits are for them applying these products as well.

CMINE (the Crisis Management Innovation Network Europe) offers a platform for shared understanding in Crisis Management, to generate and exchange new ideas.

In addition, we are working on standardisation activities, not so much on developing the standards themselves as that takes quite some time, but we have started a CEN workshop agreement, so we are preparing the ground for a formal standardisation process. The outcomes of a workshop agreement are pretty close to a real standard.

Standards, of course, help with a real understanding of what users and solutions providers are talking about; in the fields of terminology and definitions, in the field of Crisis Management, for the Trial Guidance Methodology, the Test-bed Technical Infrastructure, and information management.

You can see information on this on the CMINE section of the DRIVER+ website where we have a specific taskgroup on standardisation.

CMINE (the Crisis Management Innovation Network Europe) offers a platform for shared understanding in Crisis Management, to generate and exchange new ideas, and to share experiences in many different fields in Crisis Management. For us, of course, it is initially related to the DRIVER+ products, the Trials that we have developed, but it is a virtual platform where everybody can meet and exchange information.

We have about 30 different partners in the consortium coming from practitioner organisations and emergency services, research and technology organisations, universities, industries and small enterprises, and NGO's. These are spread all over Europe, with a large number of participant countries. And I think we are probably quite unique in doing things in this particular pan-European and methodical way.

> We have developed a methodology, the Trial Guidance Methodology, to support practitioner organisations, as well as the Test-bed Technical Infrastructure to create realistic environments for testing out new solutions, for bridging these gaps.

THE DRIVER+ PROJECT EXPLAINED

We are really developing the tools and the methods that can be used by practitioner organisations themselves for their capability development and innovation management. We are working on a common methodology to address capability development in a structured manner, leading to recommendations and follow-up research questions in a very systematic way, leading to recommendations supporting the implementation of new solutions. It facilitates sharing your experiences, so that you can easily share your lessons learned with other organisations, and you know that the results that come out of the Trials are valid.

One of the Eureka moments was when we delivered one of the nearly final versions of the Trial Guidance Methodology, because that was, in the beginning, quite a struggle, to come up with a proper methodology for designing, executing and evaluating Trials.

It is tempting for researchers to write a very extensive, scientifically oriented approach in isolation, but what we did was put practitioners at the heart of the methodology, trying to look through the eyes of practitioner organisations; how they think, what kinds of words and language they use in the real world. And we needed to think how to make this methodology understandable for practitioners, so that they can apply it themselves.

You need many other disciplines as well, innovation management, capability development, a multi-disciplinary approach, but we were putting the practitioners at the centre, and it was

quite a moment when we could say: 'It's working, it's being appreciated'. And we have seen many external organisations looking at the Trial Guidance Methodology for the first time, trying to work with it, they are very enthusiastic.

It went through quite a few iterations. So, while developing the methodology, we were already applying it. During the development and execution, and the evaluation of the Trials, we came up with an initial version of the Trial Guidance Methodology based on experiences during the whole Trial process. We tried out different working forms, different steps, it was a continuous and iterative development of the methodology, both within each Trial but also between all of the Trials. Likewise, the development of the Test-bed Technical Infrastructure also followed this iterative approach.

We did this initially with the DRIVER+ consortium partners, plus we recruited industries and practitioner organisations to have this multi perspective. Later on, in fact quite soon, we also involved other external people not directly involved in the project, making them a part of the development as well, explaining what we were doing, explicitly seeking feedback. They came up with recommendations as well.

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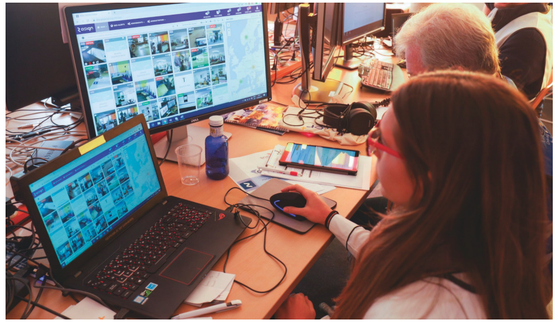
THE DRIVER+ PROJECT EXPLAINED

A good example is the solutions providers. We have not only made use of the solutions from our internal DRIVER+ consortium partners but have brought in external ones as well to fill gaps identified by the practitioners. By having these external participants within the team they became a real part of the team, they were really co-designing the Trials together with us, how their solutions could best be tested and how the methodology could best be applied.

In the Trials the leading developers were some of the main participants, heavily involved in retrieving the feedback and implementing it. What we did was create a really open atmosphere, and I must say that was critical in many aspects of the project, creating a really safe environment for receiving feedback. That is how we communicated between all of the teams working on this.

If something went wrong, for whatever reason, we recognised this and took it into account. We were trying to discover how the Trials worked best, and sometimes these were not easy moments. People put in a lot of effort, they were very dedicated, and the feedback may have been - 'This didn't work' - and sometimes this was not comfortable. But it was always well taken by everybody, always in a very constructive atmosphere, and that really helped in improving the methodology and the Test-bed Technical infrastructure.

We all see the urgency of climate change and in connection with this project it was a very valid choice of focus that was made. Floods and



wildfires are both very relevant for the European context, earthquake to a lesser extent, although in some countries this threat is very relevant. Industrial accidents such as chemical spills are also highly important. Overall, the types of risks we were dealing with in the project are all relevant.

But actually it doesn't matter which kind of crisis or risk you are looking at. We are of the opinion that the approach that we have followed is so robust and structured that it can also be applied to other types of disasters and risks.

So, for a mass gathering event or a riot, which are completely different in terms of actors etc, if you look at identifying the gaps and the questions that you want to answer, how to test solutions, how to select solutions, and how to structure your evaluation, the method and the approach we have developed can also be transferred and applied.

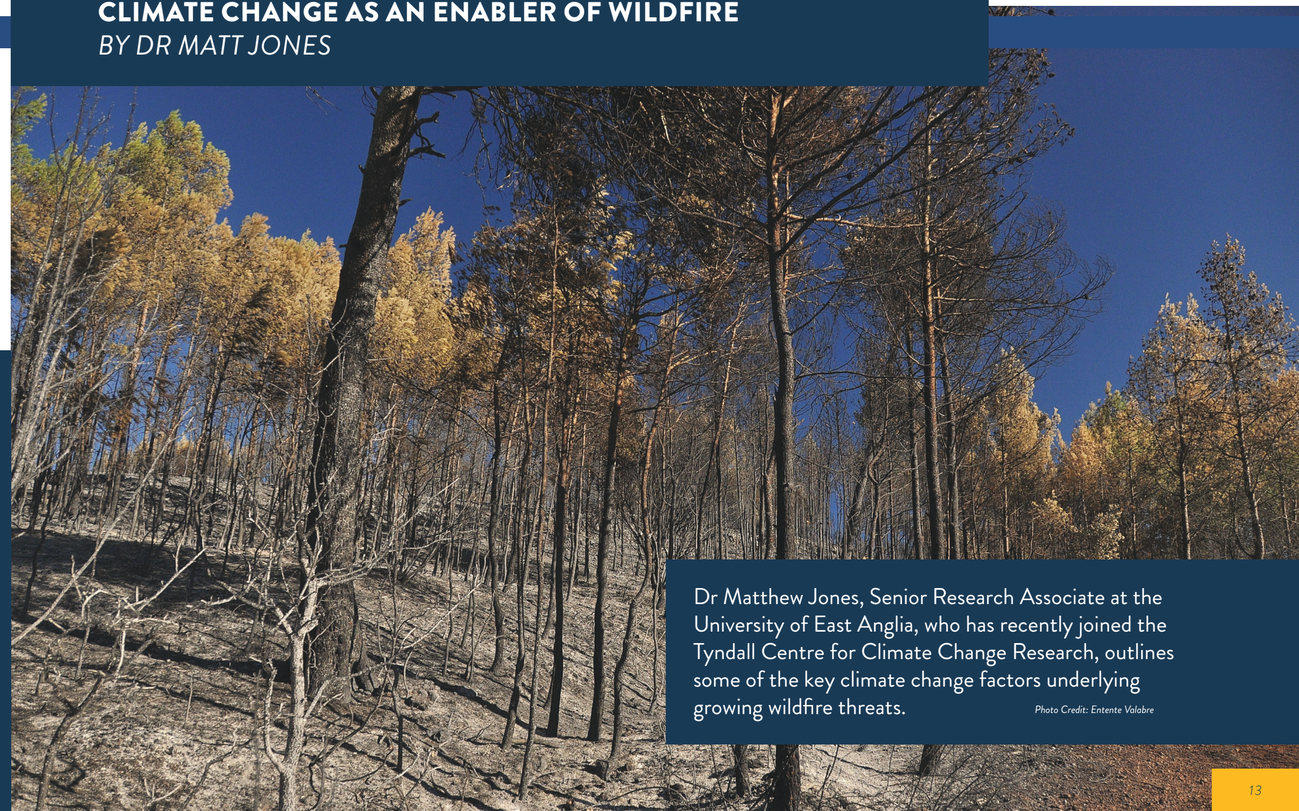
All tools and products that we have developed are open source, openly available for everybody to use and adapt if necessary. We are in the process of establishing Centres of Expertise that will maintain the quality and the application of the main products and outputs coming out of the DRIVER+ project, so that future adopters and users can be supported in a very structured way. What we hope to achieve is that the further development of these products will then be safeguarded as well.

Once the project has ended there will be other experiences from other stakeholders and other users, and that may lead to new modifications or alterations. And we want users and Centres of Expertise to exchange experiences among each other, to align and harmonise approaches and methodologies, although local differences could still be possible.

That is also why we have the CMINE, to offer a platform for exchanging knowledge, lessons learned and experiences, and for facilitating a harmonised approach, for sharing the knowledge.

Dr Marcel van Berlo (TNO)
DRIVER+ Technical Coordinator

CLIMATE CHANGE AS AN ENABLER OF WILDFIRE
BY DR MATT JONES



Dr Matthew Jones, Senior Research Associate at the University of East Anglia, who has recently joined the Tyndall Centre for Climate Change Research, outlines some of the key climate change factors underlying growing wildfire threats.

Photo Credit: Entente Valabre

CLIMATE CHANGE AS AN ENABLER OF WILDFIRE

> Fire weather refers to periods with a high likelihood of fire due to a combination of high temperatures, low humidity, low rainfall and often high winds.

This paper gives a brief overview of the latest science on climate change, its drivers and its consequences for global wildfire risk. Human-driven climate change promotes the conditions on which wildfires depend, enhancing their likelihood and challenging suppression efforts.

Human-induced warming has already emerged as an upwards pressure on fire risk in many regions, including the western US and Canada, southern Europe, Scandinavia, Australia and Amazonia.

CLIMATE CHANGE AND FIRE WEATHER

Fire weather refers to periods with a high likelihood of fire due to a combination of high temperatures, low humidity, low rainfall and often high winds. It is an indicator of the flammability of the landscape. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) published in 2013 identified several climate trends that have the potential to influence fire weather:

(i) Global increases in average temperature;
(ii) Global increases in the frequency, intensity and/or extent of heatwaves (i.e. the breaching of historically extreme temperature thresholds), and;
(iii) Regional increases in the frequency, duration and intensity of drought. Rising global temperatures and more frequent heatwaves and associated droughts increase the frequency and severity of fire weather, and thus the risk of wildfire.

The impact of human-induced climate change on fire weather has already emerged above the range of natural variability. Fire weather seasons have lengthened across ~25% of the Earth's vegetated surface, resulting in a ~20% increase in global mean fire weather season length (Jolly et al., 2015). By 2019, models suggest that the impact of human-induced climate change on fire weather was detectable outside the range of natural variability in 22% of global burnable land area (Abatzoglou et al., 2019).

The influence of climate change became detectable in the 1990s in Amazonia and the Mediterranean, 2000s in Scandinavia, and in the past decade in the Western US and Canada. Regional studies corroborate these global findings by identifying links between climate change and fire weather, including in the following regions with major recent wildfire outbreaks. Fire weather is becoming more frequent and severe in Siberia and Australia and the formal detection of human-induced climate change is expected by the middle of this century.

Fire fighting in Victoria, Australia, 2020. Human-induced warming has already emerged as an upwards pressure on fire risk in many regions, including the western US and Canada, southern Europe, Scandinavia, Australia and Amazonia.

Image courtesy of Department of Environment, Land, Water and Planning, State Government of Victoria, Australia.

THE HUMAN FACTOR

Wildfire occurrence is moderated by a range of factors including land management and ignition sources. This means that fire risk only translates into fire activity if ignitions occur, either naturally (as in the case of lightning strikes) or as a result of human activity (intentional or accidental ignitions). At the global scale, humans have reduced the extent of burned area in recent decades, principally by converting savannahs to agriculture (Andela et al., 2017). Around 60-70% of global burned area occurs in savannahs, so this trend has a large bearing on the global trend.

On the other hand, burned area has increased globally in closed-canopy forests and is associated with rising population, cropland and livestock density. In dense forests, both climate and human activities are upward pressures on fire activity. We care particularly about the trend in forests due to their high fuel loads and their large, but vulnerable, carbon stocks.

Wildfire in France.
Photo Credit: Entente Valabre

CLIMATE CHANGE AS AN ENABLER OF WILDFIRE

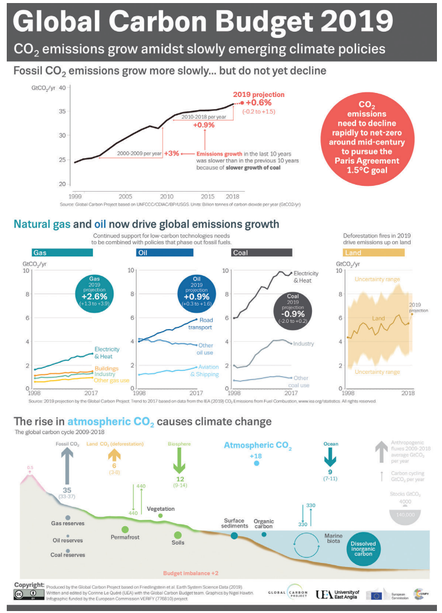
MITIGATING CLIMATE IMPACT ON WILDFIRE RISK

Limiting climate change is key to moderating future growth in wildfire risk. Globally, the area with a detectable impact of anthropogenic climate change on fire weather is twice as large at 3°C than at 2°C (Abatzoglou et al., 2019). For each added degree, the frequency and severity of fire weather grows and increases the risk of wildfire. Limiting climate change to well below 2°C, in line with the Paris Agreement, is key to minimising future growth in fire risk.

To avoid breaching the 1.5°C target set out by the Paris Agreement, CO_2 emissions must fall to net zero by the middle of this century, or possibly even sooner. Recent analysis from the Global Carbon Budget 2019 (Friedlingstein et al., 2019) provides insight into current emissions trends.

Over the past decade, CO_2 emissions from fossil fuel combustion and cement production have risen by 1% per year. This is a slower rate of growth than in the 2000s (3% per year), but nothing like the reduction that is needed to meet the goals of the Paris Agreement goals.

The longer we wait for a decline in CO_2 emissions, the faster those CO_2 emissions must decline. 19 countries have significantly reduced their emissions while maintaining a growing economy, predominantly by implementing policies (Le Quéré et al., 2019). Ambitious pursuit of reductions to CO_2 emissions must occur if global warming is to be limited and the worst of its negative impacts – including on wildfire risk – are to be avoided.



REFERENCES

Abatzoglou, J. T., Williams, A. P. and Barbero, R.: Global Emergence of Anthropogenic Climate Change in Fire Weather Indices, Geophys. Res. Lett., 46(1), 326–336, doi:10.1029/2018GL080959, 2019.

Andela, N., Morton, D. C., Giglio, L., Chen, Y., van der Werf, G. R., Kasibhatla, P. S., DeFries, R. S., Collatz, G. J., Hantson, S., Kloster, S., Bachelet, D., Forrest, M., Lasslop, G., Li, F., Mangeon, S., Melton, J. R., Yue, C. and Randerson, J. T.: A human-driven decline in global burned area, Science (80-.)., 356(6345), 1356–1362, doi:10.1126/science.aal4108, 2017.

Friedlingstein, P., Jones, M. W., O'Sullivan, M., Andrew, R. M., Hauck, J., Peters, G. P., Peters, W., Pongratz, J., Sitch, S., Le Quéré, C., Bakker, D. C. E., Canadell, J. G., Ciais, P., Jackson, R., Anthoni, P., Barbero, L., Bastos, A., Bastrikov, V., Becker, M., Bopp, L., Buitenhuis, E., Chandra, N., Chevallier, F., Chini, L. P., Currie, K. I., Feely, R. A., Gehlen, M., Gilfillan, D., Gkritzalis, T., Goll, D. S., Gruber, N., Gutekunst, S., Harris, I., Haverd, V., Houghton, R. A., Hurtt, G., Ilyina, T., Jain, A. K., Joetzjer, E., Kaplan, J. O., Kato, E., Goldewijk, K. K., Korsbakken, J. I., Landschützer, P., Lauvset, S. K., Lefèvre, N., Lenton, A., Lienert, S., Lombardozzi, D., Marland, G., McGuire, P. C., Melton, J. R., Metzl, N., Munro, D. R., Nabel, J. E. M. S., Nakaoka, S.-I., Neill, C., Omar, A. M., Ono, T., Peregon, A., Pierrot, D., Poulter, B., Rehder, G., Resplandy, L., Robertson, E., Rödenbeck, C., Séférian, R., Schwinger, J., Smith, N., Tans, P. P., Tian, H., Tilbrook, B., Tubiello, F. N., van der Werf, G. R., Wiltshire, A. J. and Zaehle, S.: Global Carbon Budget 2019, Earth Syst. Sci. Data, 2019.

Jolly, W. M., Cochrane, M. A., Freeborn, P. H., Holden, Z. A., Brown, T. J., Williamson, G. J. and Bowman, D. M. J. S.: Climate-induced variations in global wildfire danger from 1979 to 2013, Nat. Commun., 6(May), 1–11, doi:10.1038/ncomms8537, 2015.

Le Quéré, C., Korsbakken, J. I., Wilson, C., Tosun, J., Andrew, R., Andres, R. J., Canadell, J. G., Jordan, A., Peters, G. P. and van Vuuren, D. P.: Drivers of declining CO_2 emissions in 18 developed economies, Nat. Clim. Chang., 9(3), 213–217, doi:10.1038/s41558-019-0419-7, 2019.

DR MATTHEW JONES

TYNDALL CENTRE FOR CLIMATE CHANGE

Matthew Jones is Senior Research Associate at the University of East Anglia. He recently joined the Tyndall Centre for Climate Change Research following a post-doctoral research role at Swansea University. Matt has a broad interest in the global carbon cycle and a particular focus on the roles of landscape fires and fossil fuel combustion in this cycle.

Matt's work has focussed on the legacy effects of fire on the terrestrial carbon cycle. Historical landscape fires influence the modern carbon budget, while present-day fires will continue to influence this budget in the coming decades, centuries and even millennia.

Matt holds a PhD in Physical Geography at the University of Exeter.

THE DRIVER+ TRIAL GUIDANCE METHODOLOGY

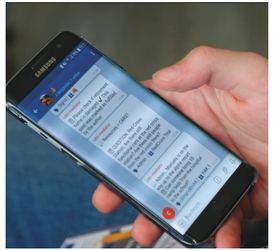
HOW IT CAN HELP CRISIS MANAGEMENT ORGANISATIONS ASSESS SOLUTIONS

BY DR CHIARA FONIO AND ADAM WIDERA

How can Crisis Management (CM) organisations assess potentially innovative solutions? What are the most important aspects that should be measured and why?

The Trial Guidance Methodology (TGM) addresses these questions by providing a practical guide, so that response organisations can follow a structured approach to understanding to what extent socio-technical solutions (such as an app for managing volunteers, a Common Operational Picture (COP) tool or a new training method) can be innovative.

Innovation does not imply an immediate gain: that's why it is important to apply adequate methodological know-how before investing in solutions that may be or may not be needed in specific contexts.



The benefits of having a structured methodological approach clearly emerge in CM Trials which have, at their core, the identification and the assessment of solutions through the involvement of several stakeholders (from first responders to solution providers).

The practitioner-driven nature of the TGM, along with co-creation and the robust assessment, are the guiding principles of the Trial design. CM practitioners are the key decision makers: the need for a Trial, the identification of specific gaps to address, which data should be collected, why and within what scenario, are aspects informed by the knowledge and the experience of the practitioners.

The latter co-create all Trial-like activities with those involved in the process: a certain amount of flexibility and an open-mind are minimum requirements for carrying out a successful Trial.

A robust assessment draws on the evaluation of at least three interlinked dimensions:

- Trial-related aspects (for instance, the Trial setting: the facility set-up, the number of participants etc.);
- solutions-specific functionalities and their user-friendliness;
- and, last but not least, the Crisis Management processes which are impacted by the changes brought about by one or more solutions (such as the effective mobilisation of volunteers).

The Handbook can be downloaded here: **www.driver-project.eu/trial-guidance-methodology/**

A comprehensive evaluation requires a mixed method approach and the interpretation of data in relation to the three dimensions mentioned above.

The TGM consists of three phases and provides, for each phase, step-by-step recommendations to guide practitioners from the preparation until the evaluation of a Trial. Detailed explanations are available in the Handbook.

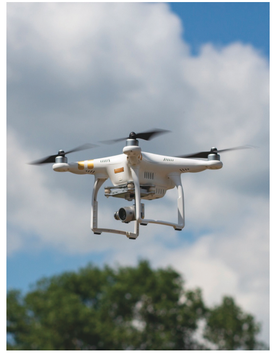
The success of a Trial depends on its design which starts in the preparation phase. It is in this key moment that the gaps are identified, the Trial context is defined and an iterative and non-linear six-step approach must be followed.

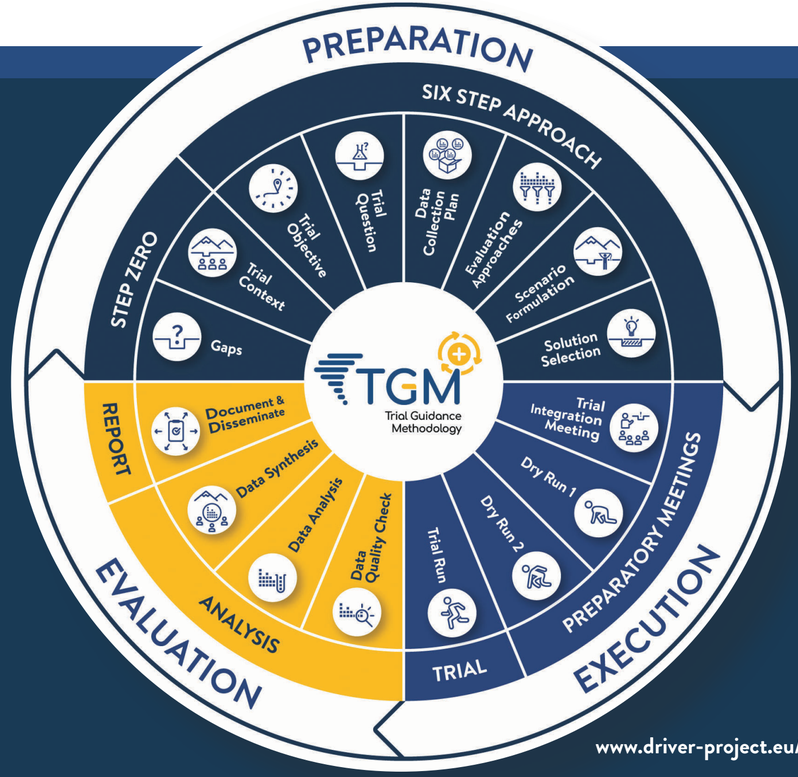
After having agreed upon the objective of a Trial, it is paramount to formulate some questions to generate robust results regarding the added value of solutions. To do this, a structured plan to capture relevant data is needed as well as evaluation approaches and metrics to analyse those data at the end of the Trial. Additionally, realistic scenarios must be developed and solutions to be Trialled must be selected.

The execution as such does not deal only with the actual Trial. Rehearsals and meetings are crucial both to align perspectives among all stakeholders and to check that everything fits within the overall plan decided in the preparation phase.

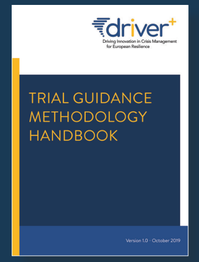
After having executed a Trial, the data collected can be checked and analysed according to the decisions taken in the preparation phase. The dissemination of results to the wider CM community is an integral part of the evaluation phase.

The experience gained in applying the methodology in DRIVER+ Trials, has contributed to refining the guidelines which have been improved after each Trial, according to the feedback received. Tools and checklists are also made available to facilitate future Trial owners.





The Trial Guidance Methodology and TGM Wheel help Crisis Management organisations identify needs and test and assess potential solutions using a structured, methodological approach.
This consists of three key phases (Preparation, Execution, Evaluation) and a number of steps within each phase (more detail is provided in the downloadable TGM Handbook).



www.driver-project.eu/trial-guidance-methodology/

TRIAL GUIDANCE METHODOLOGY (TGM)

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The Trial Guidance Methodology is designed for Crisis Management (CM) practitioners who have identified one or more gaps or have in mind solutions that can address these gaps. Before adopting potentially innovative solutions and investing time and money to determine what solutions are most suitable, Crisis Management organisations may want to assess them in non-operational contexts (such as a Trial) through a structured approach.

For this purpose, the DRIVER+ project has developed a specific methodology called the Trial Guidance Methodology (TGM). The TGM consists of three clear phases (Preparation, Execution, Evaluation) and distinct steps, which are explained in full in the TGM Handbook.

It is not a one-size-fits-all methodology, but it will certainly help an organisation setting up a Trial and wanting to ensure that there is an objective evaluation of the results.

www.driver-project.eu/wp-content/uploads/2019/11/TGM-Handbook_final-min.pdf

CHIARA FONIO

Chiara Fonio holds a PhD in Sociology. She has been involved in many research projects focused on crisis management, crisis and risk communication, surveillance and privacy. Currently, she works as a project officer at the Joint Research Centre (JRC) of the European Commission (Ispra, Italy).

ADAM WIDERA

Adam Widera is the managing director of the Competence Centre for Crisis Management at the European Research Centre for Information Systems (ERCIS) hosted by the University of Muenster, Germany. Adam is working in the area of modelling, simulation and performance measurement in humanitarian logistics, as well as the design and evaluation of information systems for humanitarians.

TEST-BED TECHNICAL INFRASTRUCTURE

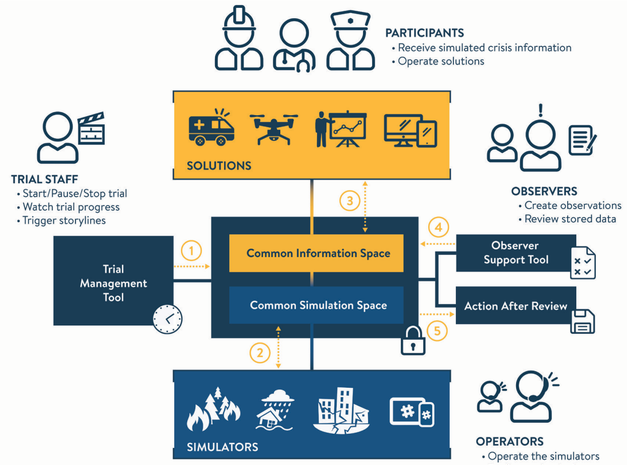
The Test-bed Technical Infrastructure (TTI) is a free-of-charge and open source platform developed to create a rich Trial and training environment. The TTI connects innovative solutions both to each other and to legacy systems, and enables the exchange of information between them.

The Trials are designed by applying the Trial Guidance Methodology, while the Test-bed Technical Infrastructure creates the realistic and controllable Trial environment.

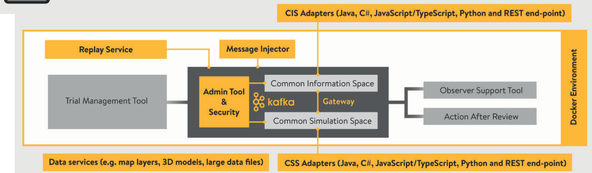
This methodological and technical support helps Crisis Management organisations avoid spending a great deal of money on acquiring and implementing solutions that turn out to have little added value.

To facilitate preparing, executing and evaluating a Trial, the Test-bed Technical Infrastructure offers software components to:

- Connect Solutions for data and information exchange;
- Connect Simulators to create a fictitious, but realistic, crisis;
- Create and control the scenario's storylines;
- Record and collect observations and logs.



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



1. The Trial starts: storylines are activated, and the fictitious crisis evolves.
2. Simulators process storylines and additional operator actions. Simulator data is sent to the Solutions.
3. Participants use the Solutions and enter information. Solutions are fed with simulator data, share information, and request actions from the Simulators.
4. Observers create observations, which are shared and recorded.
5. The Trial ends and all logs and observations are collected for evaluation.

THE CRISIS MANAGEMENT INNOVATION NETWORK EUROPE (CMINE)

The Crisis Management Innovation Network Europe (CMINE) is an open, cooperative and inclusive information network for sharing information, experiences, best practice and lessons learned among CM organisations, researchers, industry and policy makers throughout Europe and beyond, building on the achievements of the DRIVER+ project. CMINE fosters innovation and enhances a shared understanding in the fields of Crisis Management and Disaster Risk Reduction in Europe. CMINE is creating an umbrella network of stakeholders by linking existing projects, networks and initiatives. This will reduce fragmentation, generate new ideas, and help to identify innovative solutions to improve European resilience.

Find out more and join the CMINE at:
www.cmine.eu

Or download the CMINE app from Google Play or the App Store.

PORTFOLIO OF SOLUTIONS

Socio-technological solutions are a key and integral part of all Crisis Management responses, and there are many solutions on offer. But how are CM organisations best able to select and assess which solutions are best for them? The Portfolio of Solutions (PoS) is one option. It is an online, open-source and interactive catalogue, which can be used to match a range of solutions with practitioner needs.

Filters such as the crisis cycle phase, innovation stage, crisis type and size can be used to search all the available solutions within the PoS. The Portfolio of Solutions (PoS) therefore helps practitioners to decide whether a solution may be useful for them and provides support for the implementation and deployment of the listed solutions.

Main PoS/TGT functions are:
- documenting and presenting details on solutions that were tested and evaluated during the DRIVER+ Trials
- allowing for the introduction of third party Crisis Management solutions that are already used by practitioners, as well as those that are actively developed and tested in other research projects
- supporting the development and documentation of the Crisis Management trials as well as sharing user experiences with solutions in trials and trial-like setups
- easing the successful implementation and usage of solutions for other practitioners.

Solutions providers are encouraged to submit their company's solutions to the Portfolio of Solutions. **https://pos.driver-project.eu/en**

CENTRES OF EXPERTISE

Centres of Expertise (CoE) - this is a network of organisations that will offer specialist support and training to users of DRIVER+ results and which will help to ensure the sustainability and further development of DRIVER+ project outputs. A CoE may choose to adopt either the whole suite of DRIVER+ outputs or only some of its components. While applying these outputs, organisations are free to tailor and adapt them to local or national needs, circumstances and capacities. Becoming a Centre of Expertise will strengthen an organisation's pioneering position in the Crisis Management and Disaster Risk Reduction ecosystem, both nationally and internationally.

In Poland the Space Research Centre and the Main School of Fire Service plan to benefit from the extensive knowledge gained through participation in DRIVER+ and signed a joint declaration to become a Centre of Expertise, supporting the sustainability of DRIVER+ project outcomes. Several Centres of Expertise also signed Declarations of Intent during the project's Final Conference.
www.driver-project.eu/centres-of-expertise-coe/

The signing of the joint declaration for the Polish Space Research Centre to become a DRIVER+ Centre of Expertise. Signatories - Professor Iwona Stanisławska, Director of the Polish Space Research Centre, and Dr M.P.W. (Marcel) van Berlo, Technical Coordinator for the DRIVER+ project.

The DRIVER+ approach took as a starting point the fact that there is a strong innovation momentum present in both the technological community and the different user communities in Crisis Management.

This pointed to the need for a better evidence base for Crisis Management capability investment decisions. However, the complexity of CM makes it hard to predict analytically the potential benefits of new solutions and approaches, particularly considering the wide scope of potentially relevant contingencies, and it is even harder doing this in a way that convinces practitioners of the value of investing in these.

In this context, a series of four Trials and a Final Demonstration were carried out by the DRIVER+ project team, using the scientifically based Trial Guidance Methodology (TGM) and the Test-bed Technical Infrastructure (TTI) that were developed during the project.

These multiple-day Trials were held in Poland, France, the Netherlands and Austria, each one using a highly realistic scenario – a highly toxic chemical spill, major wildfires, severe flooding and a serious earthquake. Operational practitioners evaluated a range of innovative technical and other solutions to see if they would help them to manage an incident better or fill an operational gap they had identified.

POLAND

TRIAL

The first DRIVER+ Trial was staged in Warsaw from 22 to 24 May 2018 at the Main School of Fire Services (SGSP) in Poland, which is a state services' national technical university, supervised by the Minister of the Interior and Administration. This Trial was set up to demonstrate the potential interest of a more integrated high-level Crisis Management system in the European Union, in terms of improved situation assessment and awareness, coordination, resource pooling and sharing, and cross-border cooperation. The Trial, which involved both tabletop and field components, served as a demonstration of the potential of a Common Operational Picture (COP) approach at the European level.

To achieve this, solutions designed to enhance joint COP production and to improve interoperability between agencies were assessed by practitioners coming from all over Europe. The Trial also delivered important feedback to the pan-European Test-bed Technical Infrastructure developed by the project.

The event lasted over three days and covered various exercises. The main scenario was a maintenance error causing massive release of a chemical agent from a reservoir containing industrial liquid waste.

www.driver-project.eu/events/trials/trial-1/

23 - 25 OCTOBER 2018, VALABRE

FRANCE

TRIAL

The second Trial organised as part of the DRIVER+ project took place in Aix-en-Provence, France, at the Entente Pour La Foret Méditerranée (Valabre), a public Civil Protection organisation. A large forest fire was simulated with severe cascading effects in a cross-border Mediterranean environment, threatening both wild and urban interfaces.

Practitioners from France and Italy took part in this three day Trial and were able to test and evaluate a number of technical solutions in a realistic scenario.

The aim of this Trial was to assess how to improve cooperation and coordination between different organisations and agencies from different countries using innovative solutions for a large scale and complex multi-event crisis - by enhancing interoperability and coordination in response operations - thereby supporting a common understanding among the actors involved in the crisis.

Time-saving effects have been observed in most of the Crisis Management processes, particularly at the alert stage and locating any victims. The sharing of a common information space (COP) between the firefighters and the emergency medical services supported a better situation assessment, both concerning the crisis dynamics (fire contour visible for the EMS) and the dispatch of resources to the area.

www.driver-project.eu/events/trials/trial-france/

21 - 23 MAY 2019, THE HAGUE

THE NETHERLANDS

TRIAL

The DRIVER+ Netherlands Trial was organised by the German Aerospace Centre (DLR) and the Netherlands Safety Region Haaglanden (SRH). It was conducted as a tabletop Trial at the premises of SRH in The Hague from Tuesday 21 May 2019 to Thursday 23rd May 2019.

The Scenario: A Flood in The Hague
Severe weather causes the Scheveningen lock to fail, flooding The Hague city centre, putting more than 500,000 people at risk. Cascade effects were: (partial) loss of electricity, gas, drinking water, telecoms networks and damage to roads, houses, cars, shops and tram lines.

The scenario required decisions about whether it was necessary to evacuate the inhabitants of the area affected by flooding. Large numbers of emergency workers and rescue equipment were needed to deal with the increasing number of exposed people and to manage the cascading effects. The situation could not be handled by Safety Region Haaglanden and regional crisis partners only, but required the deployment of additional evacuation forces, volunteers and resources from national and potentially international networks.
Crisis Management practitioners of several different disciplines (fire service, police, health service, military/defence, water utility, municipality) were involved in order to work with, and evaluate, a number of innovative technical solutions to assess whether they improved the practitioner response to a severe flooding incident.

The Objectives were to:

- Enhance the capability to plan and coordinate resources for response;
- Improve the ability to exchange crisis-related information;
- Facilitate the planning and management of large-scale evacuations of population.

www.driver-project.eu/events/trials/netherlands-trial/

AUSTRIA

TRIAL

The DRIVER+ Trial in Austria was organised by the Austrian Red Cross (ARC) together with the Austrian Institute of Technology (AIT).
It was conducted as a multi-day field exercise under the framework of (and in parallel with) a Large Scale European Civil Protection exercise in Eisenerz, Austria.

The scenario was a severe earthquake in the local region of Eisenerz, with the central area of Austria struck by an earthquake and subsequent heavy rains, with missing persons, casualties, collapsed buildings, blocked roads, and endangered industries working with hazardous substances.

Inhabitants had left their houses being afraid of aftershocks and possible building collapse. They had to spend the subsequent days outdoors due to the lack of temporary shelter and blocked roads. Similarly, there was disruption of lifelines such as water, food, shelter, transportation and medical care. Electricity and mobile networks were severely damaged.

All local and national emergency response organisations were deployed on site (Austrian Red Cross, fire brigades, police and the army); however, due to the extension of the affected area and overwhelmed national response capacities, the Union Civil Protection Mechanism was activated. A request for international assistance was activated for medical treatment, water purification and search and rescue support.

Large numbers of volunteers and rescue equipment were needed to deal with the increasing number of affected people i.e. search and rescue, shelter, medical care, water food and transportation. Additionally, there was also an urgent need for the management of spontaneous volunteers.

Stakeholders from different Crisis Management levels and from all the agencies participating in the response included:

- Austrian Red Cross
- Austrian Fire Brigades
- Police
- Army
- Decision makers and authorities

Other emergency response organisations from neighbouring countries were expected to participate following the procedures of the Union Civil Protection Mechanism (UCPM). The exercise would also serve as a testing environment for the introduction and establishment of Standard Operating Procedures (SOPs), standards and concepts, of the UCPM within the central European region.

Trial Austria was designed in close synergy with the European Civil Protection Exercise IRONORE2019 which ran from 12 September 2019 to 15 September 2019 in Eisenerz, Austria. The DRIVER+ project was able to test a number of solutions for the management of volunteers.

11 - 13 SEPTEMBER 2019, EISENERZ (STYRIA)

AUSTRIA

TRIAL

POLAND & THE NETHERLANDS

FINAL DEMONSTRATION

The Final Demonstration was the last Trial, concluding the series of DRIVER+ Trials. It also provided an opportunity to showcase the main outcomes of the Project.

The event was tailored to the needs of the main end-user – the Emergency Response Coordination Centre (ERCC) – and was conducted in accordance with the project's methodology. The ERCC, situated in Brussels, was created in 2001, following the European Parliament Decision on Union Civil Protection Mechanism (UCPM). It is the highest Crisis Management coordination body in the European Union.

The primary aim of the UCPM is to strengthen cooperation between Participating States – Member States and others affiliated with the UCPM – in the field of civil protection, in order to respond to disasters as effectively and synergistically as possible. Since 2001, the UCPM has been activated over 300 times

26 - 28 NOVEMBER 2019, WARSAW & THE HAGUE

POLAND & THE NETHERLANDS

FINAL DEMONSTRATION

The solutions used during the Final Demonstration by the various Crisis Management teams were:

Socrates OC from GMV, vieWTerra Evolution from VWORLD, CrisisSuite from Merlin Software, Drone Rapid Mapping from Creotech Instruments (above) and the Field Reporting Tool developed by the European Commission Joint Research Centre.

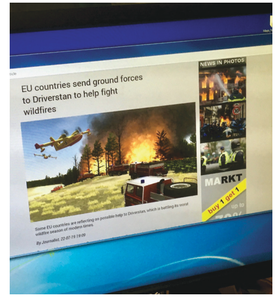
and each year the number of activations is growing. New innovative solutions, improving the effectiveness of the Union Civil Protection Mechanism tasks, are continually being sought.

The ERCC monitors the situation from Brussels and has an expert support group deployed on the ground called the European Union Civil Protection Coordination Team (EUCPT). The main role of the EUCPT is to coordinate activities in the field by liaising between the UCPM Modules and the Local Emergency Management Authority (of the country stricken by a disaster), in order to provide a common understanding of the needs and to ensure a relevant and timely response.

The Final Demonstration addressed the communication aspects between the UCPM components, mainly the ERCC, the EUCPT and the Modules, which are sent to the country in crisis by states affiliated within the scope of the UCPM. The main areas addressed were:

- reporting on the operational activities from the field to the ERCC;
- information exchange among Team Leaders of the Modules, and the EUCPT;
- geo-information support for situation assessment and decision-making for Team Leaders of the Modules and the EUCPT.

The Final Demonstration's overall goal, similar to the other four Trials, was to follow the DRIVER+ methodology and show if, and how, the innovative DRIVER+ solutions can minimise a specific set of identified capability gaps in Crisis Management.
www.driver-project.eu/final-demonstration/



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DRIVER+ RESOURCES

For further information and reports, to join the CMINE or to enquire about becoming a Centre of Expertise please go to:

WWW.DRIVER-PROJECT.EU

Trial Guidance Methodology (TGM)
www.driver-project.eu/trial-guidance-methodology/

Portfolio of Solutions (POS)
https://pos.driver-project.eu/en

Crisis Management Innovation Network Europe (CMINE)
www.cmine.eu

Centres of Expertise (CoE)
www.driver-project.eu/centres-of-expertise-coe/

Test-bed Technical Infrastructure (TTI)
www.driver-project.eu/a-pan-european-test-bed-for-crisis-management-capability-building/

DRIVER+ Trials
www.driver-project.eu/events/trials/

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