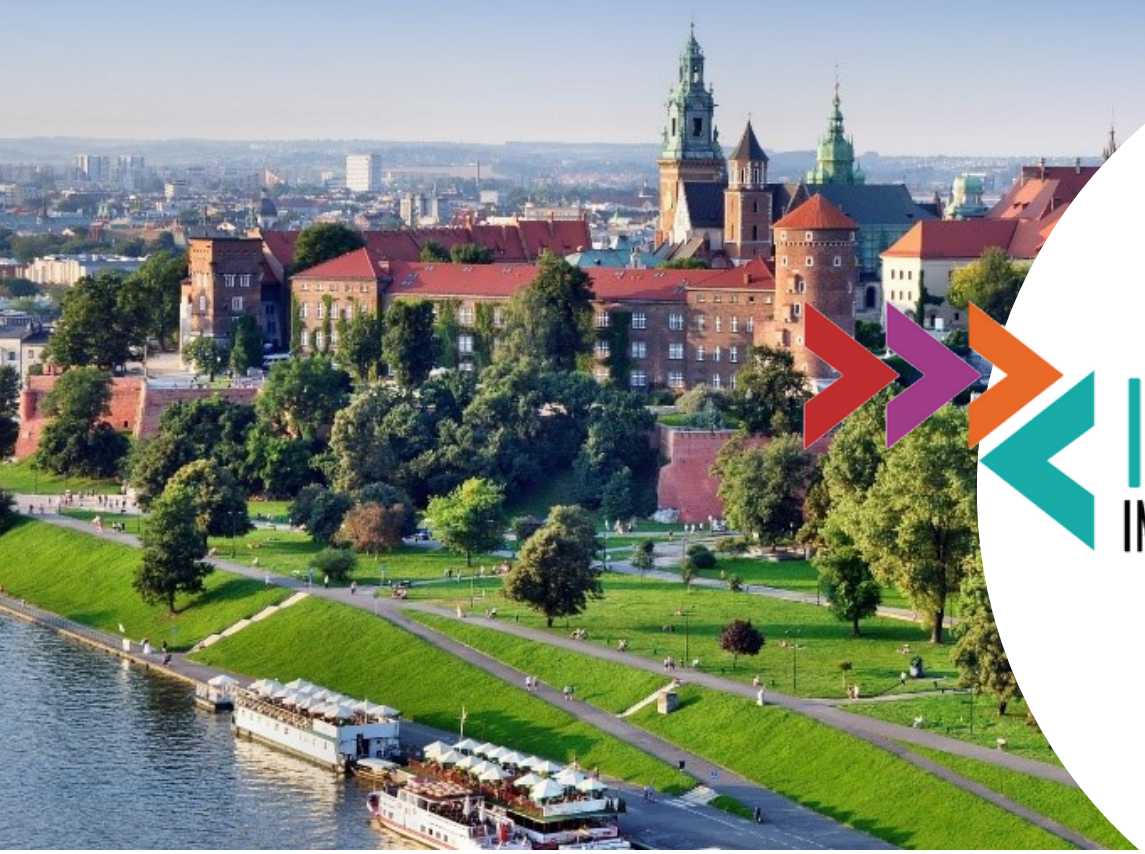
Post-conference paper



INNOVATION
IN DISASTER PREVENTION

9-11 May 2023
Cracow

Learn more

>>> Current challenges, the Sendai framework and synergies with the EU Civil Protection Mechanism

>>> Solutions, especially recent developments in the field of geospatial data management and other innovative technologies

>>> Opportunities within innovations, e.g., in building resilient societies and improving risk communication,

>>> Available funding mechanisms, including the EEA/Norway Grants, which can be used to strengthen cooperation in disaster prevention and preparedness in the years ahead.

Participants in place and online from 30 countries

36 speakers and panellists representing international organisations (UNDRR, OECD, CBSS, ESA), European Union (DG ECHO, EUSPA), governments (incl. Poland, Portugal and USA), academia (PAN, UW), private sector and local authorities (cities of Cracow and Wroclaw (PL) and Stavanger (NO))

Iceland Liechtenstein Norway grants | Norway grants | dsb | RCB | CIK | CBK

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Justification – Background

No one can deny that "the times are changing". This does not only apply to the global, regional and local challenges we now are facing, but also to the ways in which we can reduce the risk of and respond to today's and tomorrow's disasters. During the three days of the conference, we were exploring challenges, solutions, and opportunities regarding the use of innovative solutions in disaster prevention and preparedness.

Day 1 set the scene by focusing on current **challenges** and included presentations about the Sendai Framework and synergies with the EU Civil Protection Mechanism. The second day of the conference highlighted recent developments in the field of geospatial data management and other innovative **solutions** in disaster prevention, including examples from various countries. On the day 3, we wrapped things up by discussing the **opportunities** that lie within these innovations, e.g., in building resilient societies and improving risk communication.

The conference has been made possible through support from the EEA/Norway Grants, as a Polish-Norwegian bilateral initiative under the Disaster Prevention and Preparedness programme. The programme guidelines underline that sharing knowledge and experience is crucial to reducing disaster risk and strengthening resilience. The conference thus also addressed how the EEA/Norway Grants could be used to strengthen cooperation in disaster prevention and preparedness in the years ahead.

Participants of the conference included politicians, public administrators and planners at the national and local level, crisis responders, researchers, NGOs and other international organisations. By panel discussions, breakout groups, interactive sessions, a local excursion and social dinner, we made possible for all participants to benefit from the conference as an arena for the exchange of knowledge, experience and good practices across professional and national boundaries.

Scope

In recent years, exposure to disasters has increased significantly due to climate change, rapid and unplanned urbanisation, demographic pressure, construction and more intensive land-use in hazard prone areas, biodiversity loss and eco-system degradation. Impacts vary across regions, but all countries are vulnerable to disasters.

To address these alarming trends, risk prevention and management policies as well as concrete and continuous safety and security measures are essential to ensure resilient societies, sustainable development and economic growth. There is a concern regarding the elevated risk of climate-related extreme weather events (such as high energy storms, wind gusts, heavy precipitation, flash floods and extreme temperatures), and slow onset climate events (such as sea level rise, permafrost thaw, land degradation and glacial retreat), which may in turn cascade into natural hazard triggered technological accidents (Natech), including industrial facilities holding hazardous substances.

In Europe there are still areas of vulnerability when it comes to disaster prevention. The wide-ranging consequences of the Covid-19 pandemic and of climate change, are examples that illustrate the need for systematic and cross sector collaboration on prevention. We have to take into account the impact of new trends on possible risks and vulnerability in society. Such trends include climate change, globalization, digitalization, health issues, urbanization, loss of supply of critical services and goods, changing security policies, etc. Many severe events can be prevented through regulatory measures, knowledge development and sharing, as well as physical measures.

The works under EC DGECHO highlight the need for cooperation and joint efforts on this topic. This initiative will be supplementary to EU policies on Civil Protection, with a strong focus on disaster prevention.

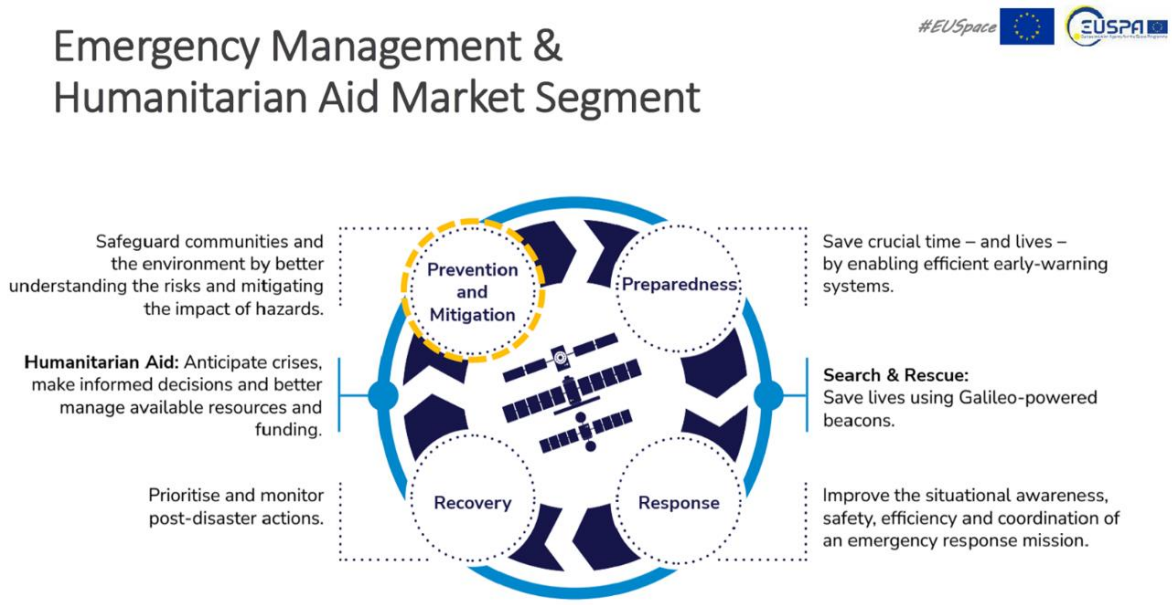

Figure 1 from presentation "The EU Space Programme enabling innovation in disaster prevention" by Vasilis Kalogirou, PhD (EUSPA)

The conference was in accordance with topics and priorities in the Sendai Framework for Disaster Risk Reduction, 2015-2030, namely:

i) Understanding disaster risk,
ii) Strengthening disaster risk governance,
iii) Investing in disaster risk reduction for resilience and,
iv) Enhancing disaster preparedness for effective response and to "build back better" in recovery, rehabilitation and reconstruction.

Sharing of knowledge and experience is crucial to reduce disaster risk and strengthen resilience. Under the EEA-/Norway Grants it is a goal that the donor and beneficiary countries should cooperate to develop prevention competence and capacity, ensuring that robust systems are in place when incidents occur.

Innovation in Disaster Prevention

The global population is more and more often exposed to risks of disasters – both natural and man-made. Especially climate change is causing increased natural hazards, resulting in death and displacement of people, destruction of environment and property, and longer-term economic impact. According to the European Civil Protection and Humanitarian Aid Operations (ECHO) in the EU, from 1980 to 2020, natural hazards affected nearly 50 million people and have cost Member States an average of €12 billion per year.

Therefore, there is a growing need for safer, more resilient, and capable response infrastructure, taking full benefit of existing technological capabilities and innovative solutions in order to carry out the crisis operations more cohesively. Disaster management and control are crucial to mitigate the effects of all kinds of crisis events and they require more and more cross-sectoral and cross-border coordination and cooperation. Fires and floods know no boundaries and no administrative regulations and limits. Efficient crisis management involves information and communication with several different players (at national level among different «blue light services» and local first responders, and at international level among different states, EU or international agencies and organizations) to have a high-fidelity awareness of the situation to implement adequate and effective measures and minimize the negative impacts. All new IT solutions and communication technologies play a key role here, facilitating the necessary information exchange.

In the last 20 years more than 120 000 people worldwide died due to floods. However, the death toll decreased significantly in the last decade. This fact can be linked to the improved disaster management that is being supported by new technological solutions, including – but not limited to – better environmental monitoring and weather forecasting thanks to satellite Earth observation and resulting ability to issue more precise and timely warnings and making sure that they are properly acted upon. Satellite remote sensing provides decision-makers and civil protection authorities objective and timely information that can be used for early warning systems and for monitoring the extent of a disaster. For the EU key role is played by Copernicus system, especially the Emergency Management Service (CEMS), which comprehends a rapid mapping service and the Risk and Recovery Mapping, both accessible by authorised national authorities. Having access to previously difficult (and expensive) to obtain EO data is very important, but it becomes a true „game changer" for risk management and disaster prevention only when combined with innovative technologies like machine learning, cloud computing and artificial intelligence – enabling integration of different available data sources (EO, in-situ, drones, public administration databases, GIS, social media etc.) to analyse long-term trends, assess risks and vulnerabilities, map and monitor the current situation and predict its possible evolution and prepare as accurate as possible risk and crisis management plans.

Another important element of efficient disaster prevention open for innovative solutions is an alert system providing life-saving information to the public through multiple communication pathways relying on several integrated technologies. And when a disaster does occur, apart from constant monitoring of the situation using all available means (in particular Unmanned Aerial Systems and EO) it is crucial to ensure safe and effective communication to emergency services involved and always be aware of their precise location provided by GNSS technologies.

As briefly described above, innovative technologies play a significantly growing role in improving disaster prevention and thus reducing negative consequences of different crisis events. However, simply having access to a new tool or a technological solution is not enough – one has to learn how to properly use it to take full advantage of the capabilities it offers and eliminate any possible disadvantages. It is very important to properly assess the potential impact of a change brought by a new solution on the socio-technical setup of a crisis management organisation. Investments in new

innovative solutions (including geoinformation products), which are not properly adapted to the needs of a given user, his mode of operation, rules and procedures not only generate significant costs, but may also have a negative impact on the operational efficiency of crisis management services. One might argue that there is no place for experimentation in crisis management, while there is plenty of space for innovation. Therefore, it is crucial to develop and share best practices, guidelines and procedures related to operational implementation of innovative solutions in crisis management sector. Several "success stories" are described in the GIS report prepared for the conference, but it is equally important to share and discuss all lessons learnt – both positive and negative. Knowledge of difficulties and barriers encountered by the others in implementing innovative solutions will help to avoid similar problems in the future, while the awareness of benefits they brought and continue to bring to your peers will encourage you to also try it for yourself.

The Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030

The Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 sets out main targets and priorities in disaster risk reduction for next seven years. It notes that global access to disaster data and applicable risk knowledge, including multi-hazard early warning systems, remains inadequate as the increased economic costs of disasters are not matched with financing for disaster risk reduction. The quantifying risk-informed preventive financing also remains a challenge.

New and emerging technologies present opportunities for overcoming data gaps. The scarcity of quality, interoperable or accessible data remains a roadblock to effective disaster risk reduction. Even when data is available and tools do exist, the lack of capacity to interpret data and develop risk information impedes risk-informed decision-making and policy uptake.

That is why Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 recommends (among others) to:

- improve the standard of official risk data and broaden the application of risk assessments,
- prioritize circulation and interoperability of data and risk information across domains and data systems, within and among government agencies, and to and from non-State actors, with advances in computing power, data availability and use of artificial intelligence,
- develop data-sharing platforms and related data-sharing agreements, in respect of transboundary risks and cross-border comparability,
- further implement and improve disaster loss databases and disaster risk mapping at the national level,
- create governance arrangements that support integrated understanding and management of risks across all sectors, scales, and domains,
- continue mobilization of resources by Member States, including technology and capacity to implement and extend the reach of multi-hazard early warning systems, developing guiding strategies and governance arrangements across all four phases of multi-hazard early warning systems implementation: risk knowledge, monitoring and forecasting, dissemination and communication and preparedness and response capability,
- place by Member States and stakeholders' principles of resilience at the heart of developing infrastructure systems, both in upgrading existing systems and integrating risk assessments and data into future projects.

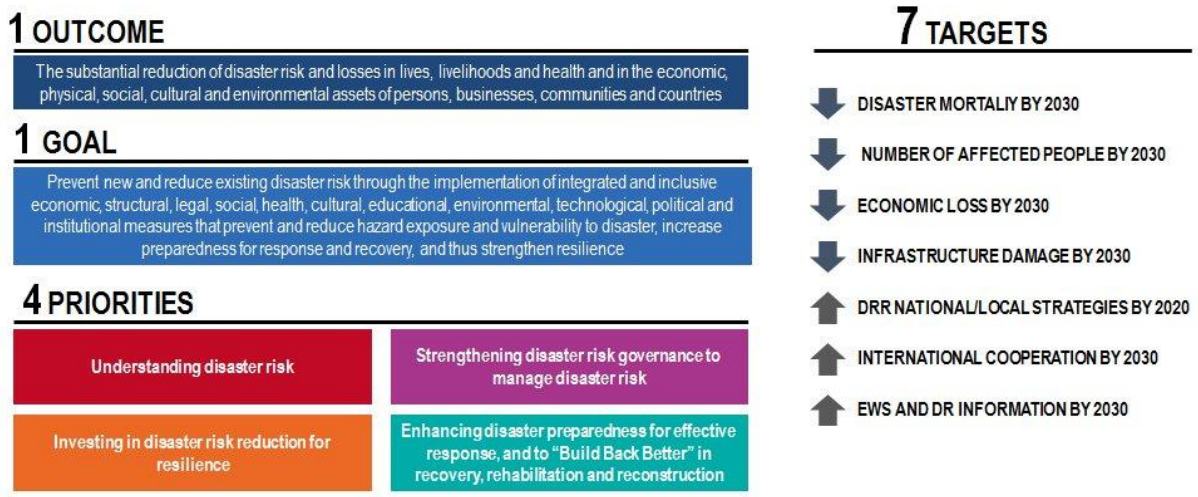

Figure 2 Sendai Framework for DRR, 2015-2030, UNDRR

Political declaration

The outcome of the Midterm Review was the Political Declaration of the High-Level Meeting on the Midterm Review of the Sendai Framework for Disaster Risk Reduction 2015–2030 adopted by UN General Assembly. The goal of the declaration was to reaffirm commitment to the full implementation of the Sendai Framework and boost progress in achieving its goals.

All the documents related to Midterm Review and High-Level Meeting may be found at the dedicated webpage https://sendaiframework-mtr.undrr.org/.

EFDRR Roadmap 2021-2030 For a disaster-resilient European and Central Asian Region in 2030

The EFDRR Roadmap 2021-2030 acknowledges the need for global, regional, national and local collaborations and partnerships as well as comparable learning that supports the implementation of the Sendai Framework by:

- Supporting regional, national, and local disaster risk reduction strategies and actions by identifying shared gaps and challenges to and opportunities for enhancing disaster resilience in the region,
- Highlighting effective arrangements for national and local sharing of good practices, pathways, and opportunities for more risk-informed, gender-responsive, age-sensitive and inclusive policies, strategies, programmes and approaches,
- Promoting and supporting systems for regional collaboration and shared learning.

The EFDRR Roadmap 2021-2030 notes that future climate and disaster risks are no longer predictable from just historical risks and assumptions. Countries are committed to but struggle with the approaches to understand and build resilience set out by the Sendai Framework, the Paris Agreement and the Sustainable Development Goals (SDGs). Identifying, understanding and assessing – as well as communicating in a manner that is accessible to a wide range of audiences – emerging and future disaster and climate-driven risks is challenging.

Building resilient systems requires integrating a wide range of realities, vulnerabilities, and capacities: future climate-driven scenarios, changes in environmental conditions and levels of biodiversity, demographic shifts, gender, age and disability issues, human rights concerns, the intersectional nature of risk, socioeconomic variables, and rapid digitalization and technological advances. The region's disaster risks are becoming increasingly complex and interconnected; a variety of multi-hazard, rapid and slow - onset hazardous events is increasing the risk of cascading and cumulative disasters, threatening development gains and critical systems. The understanding among stakeholders of existing, emerging and future systemic risks remains fragmented, as does the robust use of statistical data or scientific expertise. Moreover, systems supporting policies and strategies often function in isolation.

However, the Road Map sees opportunities for the future such as scenario simulations, evidence-based scientific data and new technologies, including Earth observation, which provide transformative tools for decision makers, scientists and stakeholders to better understand, communicate and monitor disaster and climate risks, enabling them to plan coherent resilient systems.

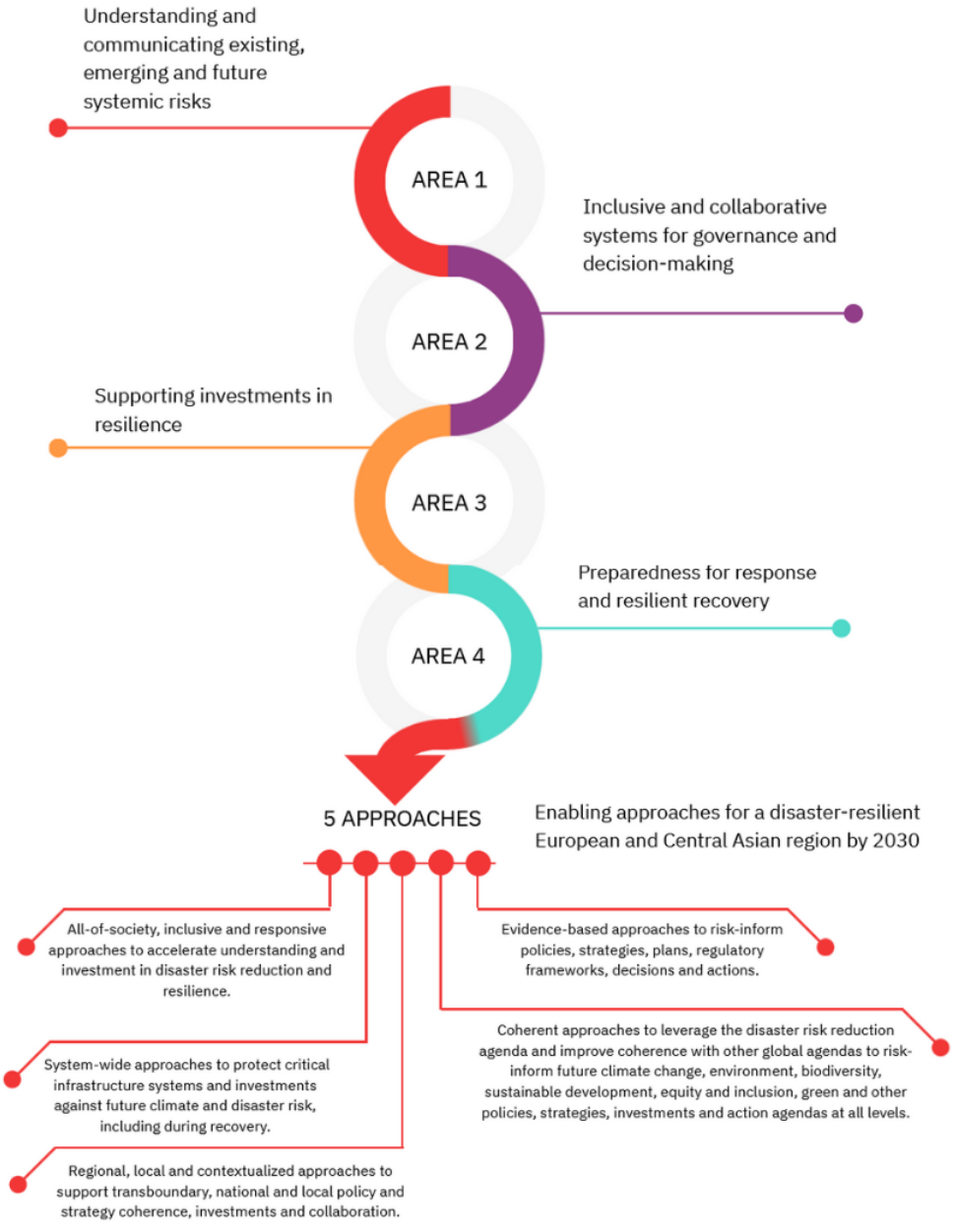

Figure 3 EFDRR Roadmap 2021-2030 for a disaster-resilient European and Central Asian region by 2030

Objectives

The overall objective for the conference fits into guiding principles of EFDRR Roadmap 2021-2030 and findings of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 which is among others to *Improve disaster resilience.*

Goals of the Conference

- Improve disaster resilience.
- Increase knowledge on UNDRR Sendai Framework
- Promote cross-border learning, enhanced mutual knowledge and understanding
- Boost regional cooperation within Sendai Framework for DRR
- Promote new technologies within disaster prevention and preparedness
- Promote EEA-/Norway Grants as a tool for preparedness and resilience building

Executive Summary

The conference Innovation in Disaster Risk Reduction took place in days 9-11th May 2023 in Cracow. It gathered crisis management specialists, responders, scientists, local authorities and private sector representatives from Norway, Poland and 30 other countries at place and on-line. During three days 36 panellists representing international organisations (UNDRR, OECD, CBSS ESA), European Union (DG ECHO, EUSPA), academia (PAN, UW) and governments (incl. Poland, Portugal and USA) and local authorities (cities of Cracow and Wroclaw (PL) and Stavanger (NO)).

Figure 4 Conference family photo 9 May 2023

The conference was divided into three main topics, focused on challenges, solutions and opportunities regarding the use of innovative solutions in disaster prevention and preparedness.

Challenges

Figure 5 from presentation "Innovation in Disaster Prevention: Some reflections on opportunities" by Nestor Nestor Alfonzo Santamaria, OECD

Discussion regarding the challenges have looked on issues like understanding of the nature of hazards, crisis communication and knowledge of general public and building general awareness. Important part of debate were climate change impact, which may trigger no risks or make them manifest in new unknown ways, as well as emerging and new risks.

Challenges focused also lack or limited use of innovative technologies, that are available like satellite imaginary, drone observation, GIS, AI and Big Data. The concern was focused also on absence of comprehensive disaster data, that restrict situation awareness in crisis management system and accurate use of existing technology.

Solutions

Solutions focussed primarily on innovative technology as opportunity. During this part were pointed key innovative technologies such as GIS, Artificial Intelligence and Big Data satellite technology including imagery and navigation systems (PNT), possible ways of use of drones and monitoring systems. Significant issue was use of cell broadcast as early warning system technology.

Also as solutions was discussed modelling, simulation of spreading the threats and crisis situations and importance of open source data standards to enable them for re-use.

In this part were pointed out possible sources of funding, in particular EEA and Norway Grants and EU funds, as well as programs for mutual learning and monitoring (Peer Reviews EU & UNDRR).

Opportunities

Identified opportunities included primary cooperation and coordination on different levels starting from international - global (UNDRR), through regional and transboundary/cross-border cooperation together with regional organisations (EU, OECD, CBSS, V4) and dimensions including cross-sectoral, public-private cooperation. This should be composed not only from privet enterprises such as critical infrastructure operators or insurance companies, but also science entities, NGOs.

Important is also building resilience at the local level. There usage of innovative technology could also bring positives results, as well as local cooperation and international cooperation between local authorities.

Opportunities lies also in exchange of information. Lessons learned, exchange of best practises is a way of disaster risk redaction. Tools for such work are information exchange platform like those under UNDRR (global and regional platforms) OECD High-Level Risk Forum, CBSS or EU Knowledge Network. In this context implementation of international frameworks, programs, recommendations and guidelines cannot be omitted.

Challenges

Disaster prevention faces multiple variety of challenges as disasters themselves are becoming more and more pending problem. Through the last 20 years we have been observing increasing number of disaster events. If the trend remains stable the global number of disasters may increase by 40% from about 400 in 2015 to 560 in 2030.

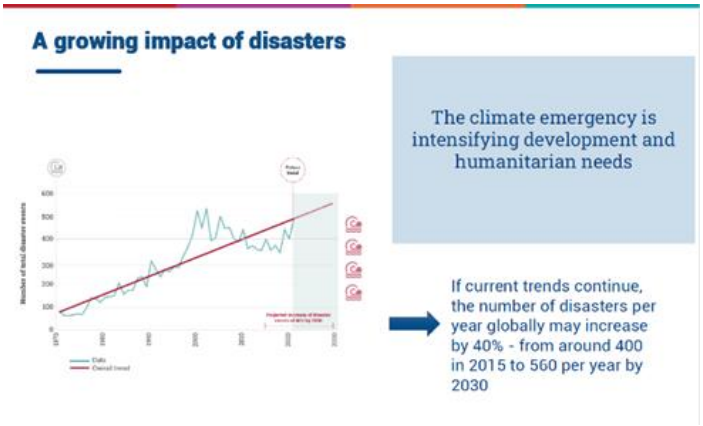

Figure 6 from presentation "Innovation in Disaster Prevention - a global perspective" by Andrew Mackay Bower, UNDRR

Also their impact is becoming more and more visible. 2022 was the fifth warmest year on record. Several regions of the globe saw record-breaking temperatures. In Europe, summer was the warmest on record, at 1.4°C above average, and 0.3–0.4°C above the previous warmest summer, in 2021. Most of western Europe saw heatwave conditions and temperatures in the United Kingdom reached above 40°C for the first time. The average sea surface temperature across Europe's seas was the warmest on record. Lower-than-average precipitation and higher-than-average temperatures, with exceptional heatwaves, led to widespread and prolonged drought. The impact of climate change influence also the nature of known disasters.

Increasing number and scale of disasters put in front of crisis management and civil protection authorities growing challenge how to prevent catastrophes or limit their effects. As resources are always limited it is difficult or even impossible to be prepared for every hazard known nowadays, and even harder is to prepare for those which will emerge in the future.

The knowledge how to prioritise actions would give a significant advantage for the authorities. Unfortunately, in order to obtain this knowledge it is required to have a comprehensive set of data about past events followed by the risk analysis. Although the Sendai Framework for DRR was adopted in 2015, the part of disaster data are still not collected or identified and reported. Data gaps that we are facing all around the world have several dimensions, starting from the lack of data at all, going through the fragmentation of data among several sectors, ending with situation where data is not disaggregated (into smaller data units like number of affected people divided into categories like age, sex, disability etc.) and not comparable. Lack of accurate data leads to difficulties and inaccuracy in risk analysis leads.

Another important issue is risk analysis. Differences in techniques and often lack of capacities both in experienced staff as well as in computing powers lead to wide gaps in knowledge about nature of disasters, their scale and likelihood. No proper data and risk analysis leave us with lack of proper planning, risk anticipating and in the end no evidence-based decision-making, which constructs ground for disaster prevention and no accurate prioritising for which hazard we should build preparedness in the first place.

The challenge is also cooperation among different disaster prevention actors. It is growing, but still is not sufficient. Sectors and states often remain as separate islands, not communicating with each other, as well as the administration and science sector. Lack of sufficient cross-sectoral and cross-border cooperation leads to another type of gaps in risk management and resilience. In the aftermath it is much harder to introduce cross border learning , what in turn has a negative influence also on the possibility of introduction of new solutions in disaster prevention.

Quite often the disaster prevention actors – national or local – are not aware of technologies already in place which could contribute to better prevention and resilience. It may be a difficult task to bring this information to them, as well as convince the decision-makers to grant sufficient funding for these purposes.

One of the awaiting challenges is how to reach people with accurate and timely information about the risk of disastrous event. It is becoming more and more pending as we observe increasing number of disaster events. In many countries special mobile applications were introduced. But for proper functioning of this system the will of a person to download and use such application is required. Other existing early warning systems are using SMS technology, which might be not fast enough (the time required to pass the information from the warning authority to the final user requires about 2-3 hours).

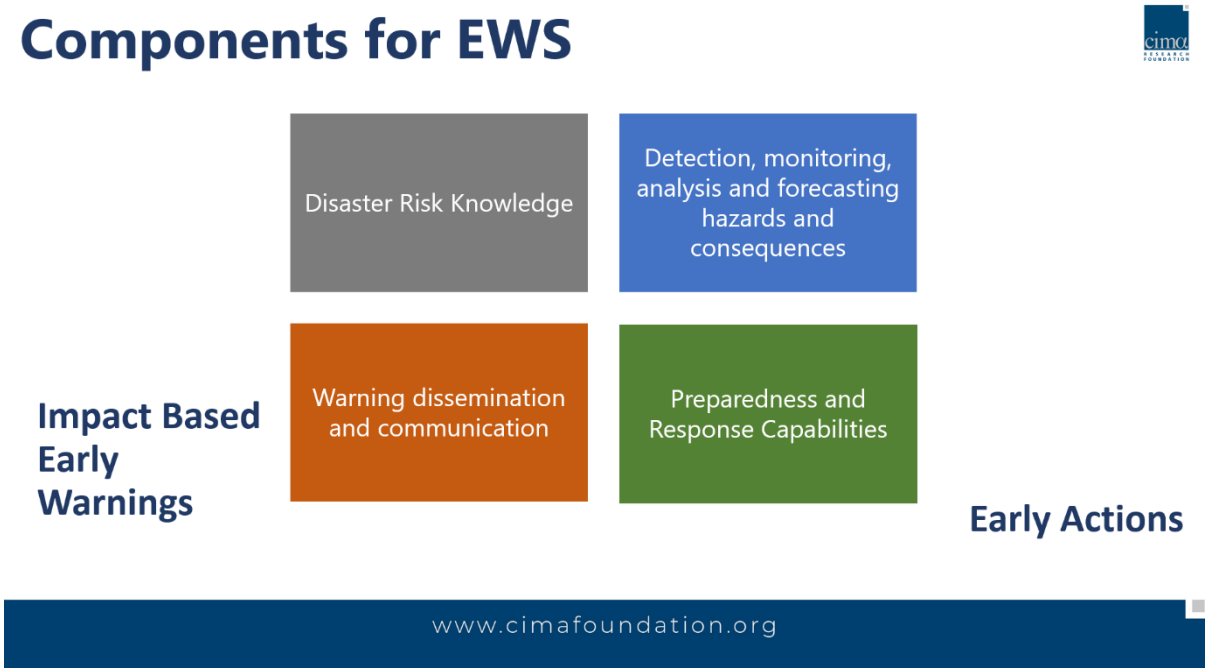

Figure 7 from presentation "Early Warnings and conflicts" by Marco Massabo, CIMA

This context is followed by the question how to ensure the proper reaction. The average confidence level of population toward crisis management authorities ranges from medium too high for all risks. Forest fires and heatwaves account for the highest levels of public trust, closely followed by threats that have garnered political attention, such as disinformation and hybrid threats. The effects of scarcity of raw materials and the release of hazardous materials during armed conflicts enjoy the lowest trust rate.

The proper education and awareness building are ones of the main challenges for disaster prevention.

Opportunities

At the conference opportunities for local level, science-private sector administration cooperation and building a resilient society were discussed.

The local communities play an important role in building resilience and how they can take advantage of already existing opportunities to enhance their preparedness for disasters and other crises. Cities play a crucial role in climate change adaptation as they are on the front lines of its impacts. As urban centres are densely populated and host critical infrastructure, they are particularly vulnerable to the effects of climate change such as rising sea levels, extreme weather events, and heatwaves, in addition to threats and severe technological accidents.

However, cities also present significant opportunities for innovative solutions and proactive measures to enhance their resilience and adapt to a changing climate.

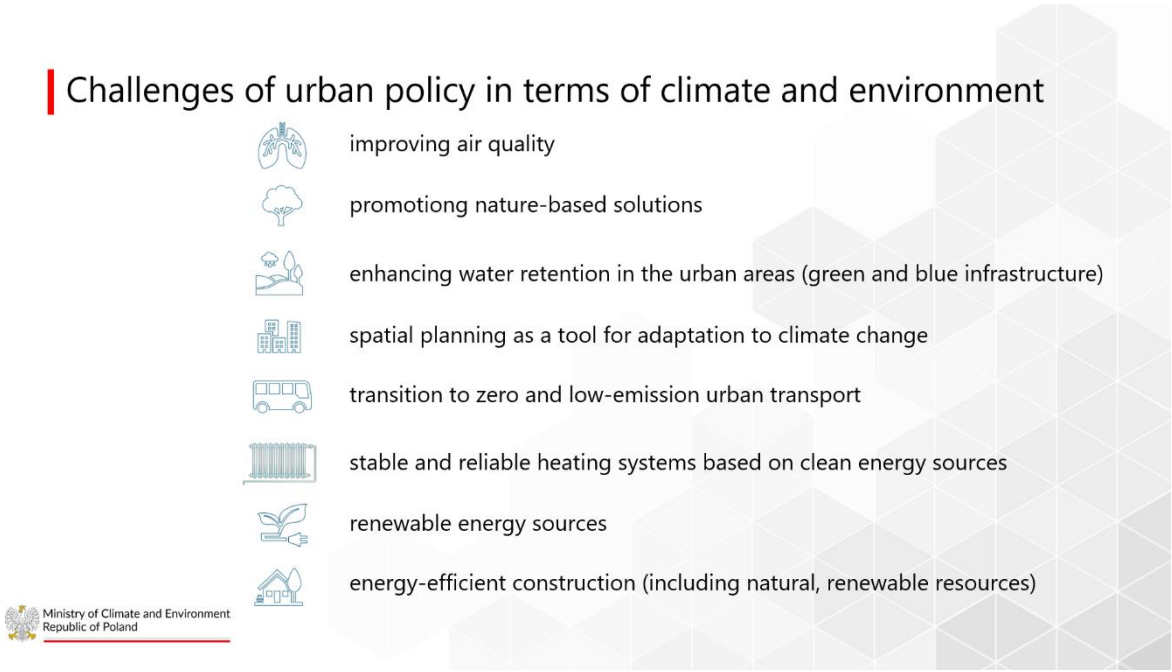

Figure 8 from presentation "Adaptation to climate change" by Ilona Ligocka, Ministry of Climate and Environment, Poland

It is important to investigate and share examples on how local communities and cities can collaborate with each other and with national governments (and worldwide) to build resilience and adapt to climate change. The balance between short-term and long-term goals when planning for climate change adaptation at the local level is a task to be aware of. In this context it is important to investigate what role use of new and innovative technologies can play in helping cities to build resilience and adapt to climate change and man-made/technological accidents. An important issue is how cities can measure the effectiveness of their strategies and make adjustments over time.

Building resilience has become increasingly important with a growing number of hazards such as floods, migrations, technological accidents, disruption on critical infrastructure and war. It is crucial to create societies that can withstand these challenges.

The importance of public-private cooperation in disaster risk reduction is a necessity in the work of disaster prevention and preparedness. The private sector can provide valuable resources and expertise in areas such as risk assessment, technology, and logistics, while the public sector can offer regulatory frameworks and coordination mechanisms to ensure effective implementation. Such

collaborations have the potential to accelerate progress towards achieving the global goals on disaster risk reduction and sustainable development. In addition, the importance of cooperation with scientists in developing evidence-based strategies for disaster risk reduction must not be forgotten. By engaging with experts across various disciplines, we can better understand the complex and interconnected nature of disaster risks and find innovative solutions to mitigate them. Furthermore, the conference emphasized the value of partnerships and collaboration between the public and private sectors, as well as with civil society and local communities. Building resilience requires a collective effort, and by working together, we can create more effective and sustainable solutions.

At the conference several opportunities were presented and discussed. One important advice was to make the most of risk and vulnerability assessment and revising it in light of the changing risk landscape and geopolitical shifts. In order to succeed it could be valuable to showcase how a municipality is using new technologies for understanding hazards and perils to the population. The recommendations and conclusions from the presenters and discussions during the conference can be summarized in the following way:

- The key point is to try to get everyone on-board – infrastructure operators, policy makers, science and academia.
- We should play to each other's strengths (for example use academia to crunch the data).
- Use all opportunities to recognise good work being done, encourage participation in focus groups and promote active engagement of all relevant stakeholders.
- It is crucial to share good practices and learn from your own and others' experiences (learn from self and others).
- We already know better what to train on (based on lessons identified).
- Conducting tests and piloting activities in a safe space is extremely important, as well as creating test beds and sandboxes.
- Organizing demonstrations and practical exercises is the best way to learn.
- We should use work that has been done on the development of toolkits and guidance (from organisations like the OECD, European Commission Joint Research Centre).
- Try to apply tools that are open source and ready to use whenever possible (like the Norwegian Bank of Knowledge or UNDRR risk information exchange). Promote standards for using open data (like the OECD Open data principles).
- You can get much better information by integrating multiple data sources and exploiting new technologies, as well as by sharing and consolidating data from previous events and from model runs.
- Artificial intelligence can be used to advance understanding of risks and identify new threats, as well as developing applications for various stages of disaster risk management.
- Using models may enable you to move from reactive management of challenges to proactive approach. We should try to provide free data for research and academia whenever possible..
- Encourage participation in supporting mechanisms (ESA, EUSPA).
- Use grants and funding available (for example EEA / Norway Grants, EU programmes, ESA funding).
- For addressing the changing nature of hazards: use the opportunity to raise awareness of existing methodologies (like the one applied by INFORM Climate change).
- For standardising the way we measure progress in our field: use the opportunity to raise awareness of existing work on the monitoring of the implementation of the Sendai Framework (like the work of the Open-ended Intergovernmental Expert Working Group on Indicators and Terminology (OIEWG))
- Leverage the lessons from overseas development assistance and from deployments of the EU Civil Protection Mechanism to help inform about climate change adaptation measures (such as dealing with vector borne diseases in Europe).

The issue of how to shift from infrastructure protection to resilience and sustainability still remains a challenge.

Figure 9 from presentation "Innovation in Disaster Prevention: OECD perspective on key challenges" by Nestor Alfonzo Santamaria, OECD.

Solutions

Whereas it is relatively easy to identify the most common and even the most pressing challenges related to disaster risk reduction that we are facing now and will be confronted with in the future, the lines between solutions and opportunities are much more blurred. For instance, are new innovative technologies like big data and artificial intelligence a solution or an opportunity? They can be both, depending on the perspective and previous experience of the end user. From the discussions during the conference four main categories of solutions have been identified: technological, methodological, organisational, and communication.

There is no doubt that new technologies, both hardware and software, play a key role in our collective ability to predict and therefore reduce the risk of disasters. Satellite images of the Earth gathered throughout decades now enable us not only to monitor the current situation in any part of the world, but also compare the data and analyse long-term trends. Satellite navigation and PNT applications allow for precise localisation of available resources or endangered elements. Big data and artificial intelligence make it much easier than before to analyse the situation in a dynamic way, as well as provide reliable models and simulations of spreading of potential threats and evolution of crisis events. GIS solutions enable the relevant stakeholders to see the situation in a clear and understandable way, thus giving them the chance to make better informed decisions. They can easily visualize/simulate the impact of a dam breaking and the resulting flood or probable speed and direction of a forest fire in current meteorological conditions. Drones and other monitoring systems provide ongoing monitoring of a crisis situation and cell phones, internet connectivity and – if necessary – satellite communication allow for quick and smooth information flow.

However, no matter how trivial it may sound, technologies are not enough – you have to know how to use them and how to best fit them into your operational procedures, internal structures and decision-making processes. Tools are only as good as people who use them. Staff of crisis management sector at all levels needs to be properly informed about new possibilities offered by innovative technological solutions and trained in dealing with them. They have to also be made aware of potential

problems and legal issues that may arise, such as for instance the matter of privacy and GDPR violation risks when using data from drones or other monitoring systems.

Third important aspect is related to organizational and procedural aspects. Various stakeholders, equipped with appropriate technologies and having qualified personnel have to coordinate their activities in disaster risk reduction, taking into due account the multi-dimensional and cross-sectoral nature of current challenges. It is useful to organize meetings of representatives of all levels – local, regional and national – to exchange information on shared needs and requirements and the best ways to meet them. Also regular contacts and working relations with academia, R&D institutions and private sector may be really beneficial. At international level EU and UNDRR Peer Reviews have proven to be very useful form of cooperation, similarly to active participation in Union Civil Protection Mechanism.

Last but not least, we have to remember about effective communication as a pre-requisite to successful disaster risk management. It has three dimensions that need to be properly addressed. Technical one means that different systems and tools used by various services should be able to "talk to each other" and not work in isolation. They should be able to share the relevant data, for instance by being adapted to use open source solutions and/or standardized data formats when necessary (like the OECD Open data principles or EU Directive on open data and the re-use of public sector information), while keeping the necessary security requirements. Institutional dimension means that all relevant organizations and services know how to cooperate with each other and have appropriate rules and procedures in place. Simply put, a representative of municipal crisis management authority has to know whom to contact in case of a risk of flood, fire or chemical spill, what resources are needed, what is already there ready to be deployed and what additional support from higher levels might be necessary.

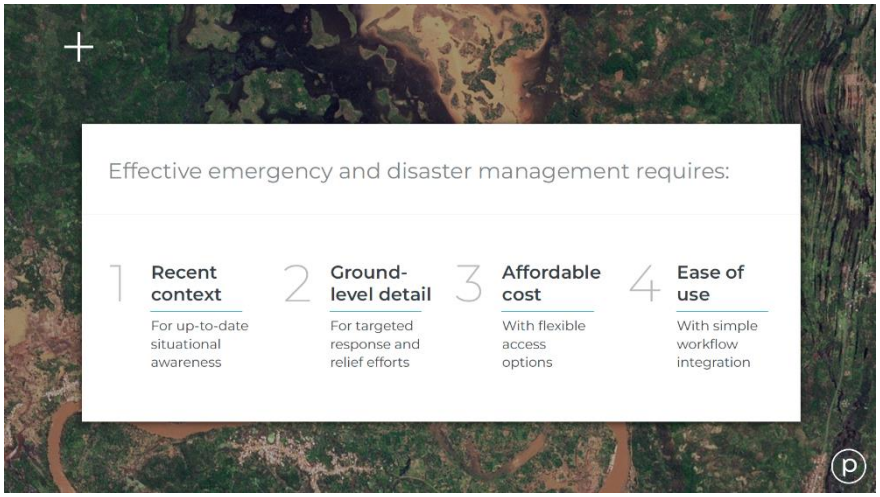

Figure 10 presentation "Innovative Risk Management Solution" by Monika Jankiewicz, PLANET

Finally, the social aspect – how to communicate with the high-level decision makers on the one hand and the general public on the other about possible risks and necessary mitigation measures. It is useful (and funny) to watch a fragment of "Don't look up" movie to see what to avoid when presenting information to the political authorities. Equally important is communication with the general public, which has to know what are the most common risks that may be encountered and what to do if they materialize. This solution is implemented to a different degree in various countries and sometimes the issue still – like the case of flash floods in Germany in July 2021 proved – remains a challenge.

Geoinformation for crisis management – guidelines and examples

Geoinformation means information that describes the location and characteristics of phenomena, natural or human made, related to the Earth's surface. It is used in almost all aspects of social and economic activities, however it can bring particular benefits in all phases of crisis management cycle, especially in disaster mitigation and preparedness. Geoinformation enables identification of threats and hazards in the spatial dimension, modelling of their extent and possible evolution, predicting their impacts and elaborating different crisis event scenarios. Therefore GIS was chosen by the project partners as a subject of a separate report, complementing the more general overall approach towards opportunities and solutions by focusing on one specific technological domain that can be used to successfully tackle different common challenges.

For the end-users, geoinformation may bring enormous benefits, but like all advanced technological solutions it requires investments both in terms of necessary equipment and personnel competences. They need to have the necessary facilities, hardware, or software to access and subsequently process the available data sources, extract the data that could be useful for them and to apply it to their specific situation and information requirements. Fortunately, nowadays there is an ever-growing number of available ready-made solutions and geoinformation services, as well as organizations offering expert support and even available funding. For the crisis management sector in Europe undoubtedly the most important such mechanism is Copernicus Emergency Management Service. It provides all actors involved in the crisis management, rescue and humanitarian aid with mapping products and analyses based on geo-spatial information derived from satellite remote sensing and completed by available in situ or open data sources. This action helps increase the effectiveness of rescue operations and crisis management activities, leading to improved safety of the population and preventing material losses before, during and after disasters and other crisis events by providing information, e.g. on the type and scale of the threat, the extent of the flooded area, the spread of a fire and helps in disaster risk reduction as well as in planning and monitoring the progress of reconstruction. In this way, CEMS contributes significantly to achieving the priorities of the Sendai Framework for Disaster Risk Reduction. Apart from Copernicus services, the end-users may have easy access to other ready-made solutions like the EU Disaster Risk Management Knowledge Centre Risk Data Hub or EO Toolkit for Sustainable Cities and Human Settlements, briefly described in the report. They may also ask for expert and financial support from the European Space Agency (ESA) and/or European Union Agency for the Space Programme (EUSPA), benefit from the Technical Advisory Support of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) and – last but not least – share their knowledge and experience through EURISY.

The report contains 12 different use cases, describing practical examples of successful implementation of GIS-based solutions to help solve challenges faced by public administration at national and/or regional levels. Each story explains in more detail a particular problem/crisis management issue identified by the end-user and indicates how GIS contributed to overcome or at least mitigate them. Some authors also share their "lessons learnt" experiences, give advice as to what main obstacles they encountered and how best to avoid them and present their vision for possible further development of the GIS solutions they decided to implement.

The use cases are as follows:

1. GIS in support of government administration in crisis management activities in Poland
2. Integration of UAV mapping within Norwegian 110 centres (112 centres)
3. Czech Republic: Fighting Climate Change
4. Portugal: Accelerating Disaster Response
5. Area-based Risk Assessment for Donetsk Oblast – Mariupolskyi Raion
6. Tackling Stubble Burning: Towards a Safer and Healthier Environment in Serbia
7. Reducing flood risk through GIS: the results of the Danube Floodplain Project
8. Evaluate natural hazard risk with FEMA's National Risk Index
9. Satellite-based monitoring of water resources – an Odra River case
10. Actionable Natural Catastrophes Intelligence to transform Government Response, Recovery & Resilience
11. Rock the Alps – monitoring rockfall risk and protection forest mapping
12. The Alpine Drought Observatory

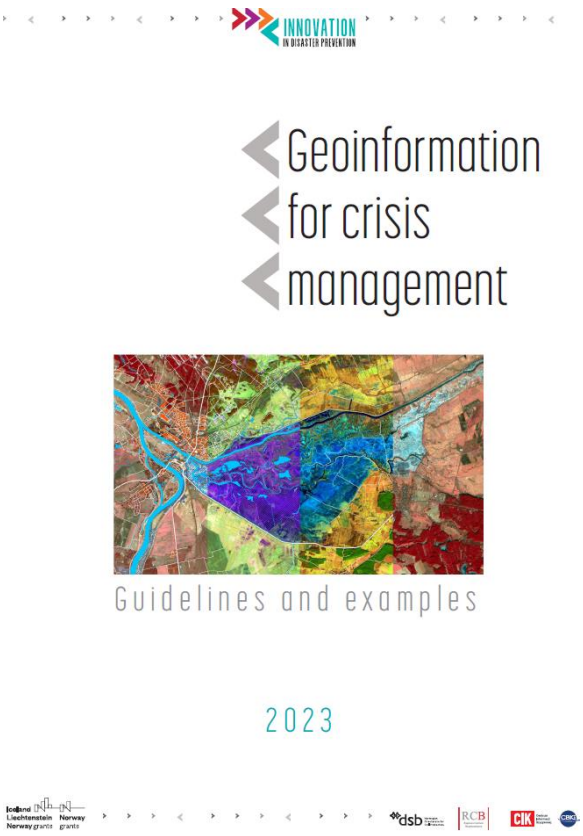

Figure 11 The frontpage of the Geoinformation for crisis management – guidelines and examples

Local Case study from Norway: The City of Stavanger

Main challenges related to disaster risk prevention in a local community

Prevention is always difficult to achieve in a good way. This applies to prevention in general, whether it is health, crime, the environment or societal safety. Prevention should be the primary strategy, but from experience the City of Stavanger and other municipalities in Norway this is still a challenge. In addition, it is difficult to get enough attention to something that may never happen, or which there is a vague relationship to. It could also be that experts in the municipality fail to formulate

Figure 12 Risk and vulnerability analysis for the City of Stavanger. Elements that have been consid-ered (Infrastructure, different risk scenarios, etc.)

the risks and challenges well enough for decision-makers. There might be a general, almost psychological resistance, to thinking about everything that CAN go wrong.

On the other hand, there is a large number of tasks a municipality has to and needs to solve, and there is a continuous struggle for resources. This is the core; it is all about resources. The legislation is somewhat vague about what to actually do, beyond analysing risks, developing plans and then practicing these. It is not clear how measures are to be followed up and prioritised.

Technological solutions already applied in the City of Stavanger and plans to apply them in the near future

The City of Stavanger uses a lot of technical solutions today and the city is only at the beginning of a development towards adopting more of these. Stavanger uses technical solutions both to work more efficiently, prepare better analyses and plans, be able to make connections to other systems and, last but not least, see and discover things they otherwise would not have seen.

However, technical solutions must not become a substitute for having good manual procedures. Technical solutions provide opportunities but will always be associated with vulnerability. To be able to go retro, back to the manual, must always be strived for.

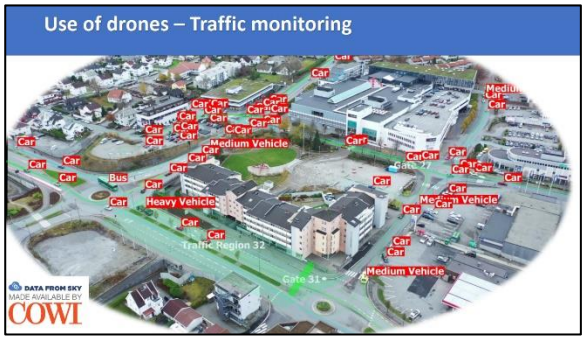

Figure 13 Drones used in an evacuation exercise on a cruise ship, and for traffic monitoring

Technical solutions, such as sensors, gives the city the opportunity to detect early on that something is going on, before it becomes a problem or a crisis. For Stavanger, the use of sensor technology is therefore important. The use of GIS is extensive, in most fields. Gathering information, presenting it in a map, is a very good way to visualize a risk picture - and again, it enables you to see things you would not see without it. Technical solutions allow the city to run more demanding analyses quickly and accurately.

Main "lessons learnt" from the experiences in Stavanger. Main obstacles the city encountered when introducing a new solution.

It takes time, it requires resources, and it requires a willingness to actually want to develop the field of public safety. You need to find other professional environments that provide support and attention. Without these, it becomes very difficult. In Stavanger there has been very good support in the GIS environment, there are professionals with very good expertise and with a broad network externally. It has been useful to have contacts with national authorities, other large cities and colleagues in other countries. Especially Sweden, UK and the Netherlands have been the countries Stavanger has learned a lot from and this has given them inspiration. Participation in EU projects has also been useful. The contact and cooperation with universities has been fruitful. The scientific view on these topics is important for the development.

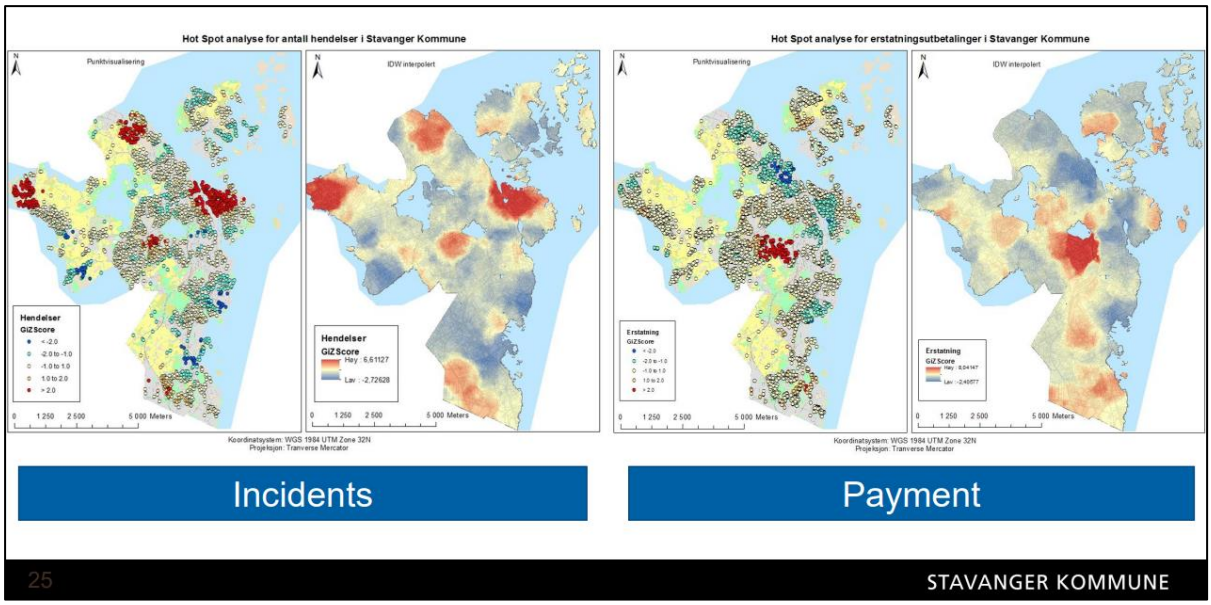

Figure 14 The figure shows Hot Spot analysis for the number of incidents at the left side and compen-sation payments at the right side.

Advice to local authorities

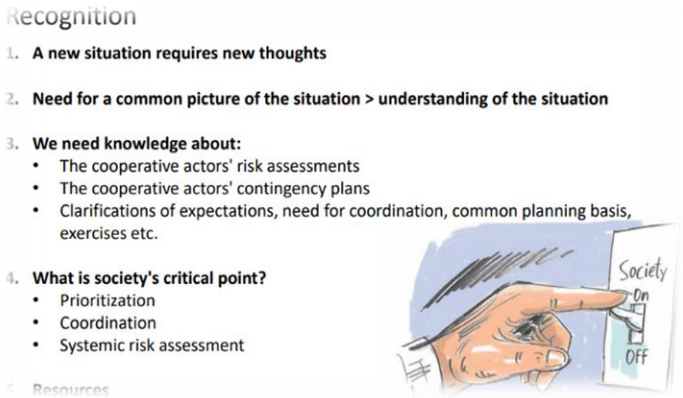

Figure 15 The recognition of new and emerging risks and threats

When Stavanger started working on climate adaptation, from an emergency perspective, they designed a spiral staircase. For each step, they set a task. At the top of the stairs, they should have something that worked. One of the steps was communication. This was their somewhat simple project plan. Stavanger has followed this setup and seen that they are now climbing up and up. They are not at the top, but at least they have moved. It takes time and it requires resources. It is important to look for synergies, find someone to work with, be clear in the communication, build stone by stone and be prepared for the fact that it will take years. In addition, new and emerging risks and threats must be considered, which make this a continuous ongoing work at the local level, as well as at national level.
The clear message is *Don't give up*!

About the EEA and Norway Grants

The EEA and Norway Grants are Iceland, Liechtenstein and Norway's contribution to reducing economic and social disparities in Europe and to strengthening bilateral relations with 15 beneficiary countries in Northern, Central and Southern Europe.

The main intention and goal for the current period is the EEA-countries' contribution to *Work together for a green, competitive and inclusive Europe.*

The three donor countries cooperate closely with the EU through the Agreement on the European Economic Area (EEA). The donors have provided €3.3 billion through consecutive grant schemes between 1994 and 2014. For the period 2014-2021, the EEA and Norway Grants amount to €2.8 billion. The priorities for this period are:

- Innovation, Research, Education and Competitiveness
- Social Inclusion, Youth Employment and Poverty Reduction
- Environment, Energy, Climate Change and Low Carbon Economy
- Culture, Civil Society, Good Governance and Fundamental Rights
- Justice and Home Affairs

Eligibility for the Grants mirror the criteria set for the EU Cohesion Fund aimed at member countries where the Gross National Income (GNI) per inhabitant is less than 90% of the EU average.

The EEA and Norway Grants scheme consists of two financial mechanisms. The EEA Grants are jointly financed by Iceland, Liechtenstein and Norway, whose contributions are based on their GDP. Norway Grants are financed solely by Norway.

Figure 16 Support by country 2014-2021. Source www.eeagrants.org

Programme area n°23 Disaster Prevention and Preparedness

The overall objective of the programme area Disaster Prevention and Preparedness is *Improved disaster resilience.*

The areas of support are set up to be the following topics:

- Risk and vulnerability competence and capacity
- Prevention and reduction of existing and new risks and vulnerability
- Disaster and crisis risk resilience at all levels and in all sectors of society

Disasters and climate risks have a major impact on the economy as well as on the security and well-being of citizens. In recent years, exposure to disasters has increased significantly due to climate change, rapid and unplanned urbanisation, demographic pressure, construction and more intensive land-use in hazard prone areas, biodiversity loss and eco-system degradation.

Figure 17 This Blue Book describes the priority sectors and all programme areas for the current period 2014-2021.
Source: http://www.eeagrants.org

Impacts vary across regions depending on the geographic exposure to risk as well as level of socioeconomic development. While fatalities tend to be higher in developing countries and economic losses higher in developed economies, all countries are vulnerable to disasters.

Human development activities may carry significant inherent risks, caused or inflicted either by technical factors, human errors or malevolent actions – or a combination of these. Recent examples of this are the Fukushima nuclear accident in 2011 and the Deepwater Horizon oil disaster in 2010.

To address these alarming trends, risk prevention and management policies as well as concrete and sustainable safety and security measures are essential to ensure sustainable development and economic growth. Prevention and risk management make strong economic sense in terms of avoiding losses. Investments in disaster risk management also brings extended economic benefits and can act as a means of promoting jobs and help to ensure structural sustainability of public and private finances.

Centre for Research on the Epidemiology of Disasters (CRED) The programme area will further the implementation of relevant international obligations, recommendations and standards given by intergovernmental organisations such as the EU, the European Maritime Safety Agency (EMSA), International Atomic Energy Agency (IAEA), the United Nations Office for Disaster Risk Reduction (UNISDR) and other UN organisations.

The revised EU Civil Protection legislation aims at a better (joint) response to natural and man-made disasters. A swift, pre-planned and effective response will increase the security of EU citizens and disaster victims. The activities shall contribute to realising the Europe 2020 strategy, the EU civil protection legislation and the UN post-2015 framework for disaster risk reduction with a focus on prevention.

The suggested measures for the programme area Disaster Prevention and Preparedness for the period 2014-2021 are:

- Mainstreaming of disaster risk management to support resilient investments
- Development and update of national acts and regulations based on relevant international commitments and recommendations
- Development of national, regional and local risk assessment systems, including procedures and methods
- Cross-border learning and cooperation on development and implementation of risk management policies and practices
- Cross-border learning cooperation on disaster impacts

- Guidance for disaster and crisis prevention based on best practices on cross-cutting themes
- Capacity-building through technical support for critical infrastructure
- Strengthening of chemical, biological, radiological and nuclear (CBRN) safety and security
- Strengthening of oil spill prevention management > Ensuring data availability, accessibility, sharing and comparability, aimed at establishing European standards and protocols for recording disaster losses

For the existing period of the Grants there still might be funds available for bilateral initiatives funded by the National Bilateral Funds in the beneficiary countries. The finalization of bilateral initiatives funded by this mechanism cannot be later than 10 April 2025. The decision on the applications for this fund is conducted by the National Committee for the Bilateral Funds. Members this Committee are from the National Focal Point to the EEA-Norway Grants and the Embassies from the donor countries.

These Funds could for example be used to elaborate bilateral initiatives in the field of innovative solutions regarding disaster prevention and preparedness, which in the next period of the Grants could be background/a basis for a predefined project financed by the EEA Norway Grants.

Sharing of knowledge and experience is crucial to reduce disaster risk and strengthened resilience. The conference in Krakow underlined that innovative technologies play a significantly growing role in improving disaster prevention and thus reducing negative consequences of different crisis. Having access to new tools or technical solutions is not always sufficient. In the field of disaster prevention and preparedness it is crucial to develop and share best practice, guidelines, procedures related to the operational implementation of innovative solutions. The donor and beneficiary countries should cooperate to develop prevention competence and capacity, ensuring that robust systems are in place when incidents occur.

The grants have been instrumental in supporting projects related to disaster risk reduction and climate change adaptation, particularly in countries where these issues are a major challenge. The funding has been used to support a wide range of activities, including capacity building, research, infrastructure development, and awareness-raising. They provide a valuable source of funding for projects that are often difficult to finance through other means and encourage cooperation between donor and beneficiary countries in the pursuit of common goals.

EEA and Norway Grants – FAQs

What?

Iceland, Liechtenstein and Norway are providing €2.8 billion in funding to 15 EU and EEA member states in Central and Southern Europe and the Baltics for the period 2014-2021.

Why?

The EEA and Norway Grants have their basis in the EEA Agreement. Under this agreement, Iceland, Liechtenstein and Norway are part of the EU internal market. The agreement sets out a common goal of working together to reduce social and economic disparities in Europe. For this purpose, the donors have established the EEA and Norway Grants.

Where?

The beneficiary countries are Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.

Which areas?

Through the EEA and Norway Grants, Iceland, Liechtenstein and Norway aim at contributing to, among other things, growth and jobs, tackle climate change and energy dependency, and reduce poverty and social exclusion.

Who?

Beneficiaries are local, regional, and national authorities, educational and research institutions, students, teachers and researchers, non-governmental organizations, small- and medium-sized enterprises and social partners.

More information: http://www.eeagrants.org

Other funding opportunities – EU programmes

Apart from various opportunities to obtain funding for initiatives related to disaster risk reduction from EEA/Norway Grans described above, it is also worth to mention EU programmes which offer multiple options as well, making it possible to find financial schemes best suited to different stakeholders' purposes and interests. From DRR perspective there are 3 main EU funding sources: Horizon Europe, Interreg and EU Civil Protection Mechanism.

Horizon Europe

Horizon Europe is the EU's key funding programme for research and innovation with a budget of €95.5 billion for 2021-27 financial perspective. The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges, such as climate change or the UN's Sustainable Development Goals. It supports creating and better dispersing of excellent knowledge and technologies in order to boost the EU's competitiveness and growth.

The programme is divided into 3 pillars: Excellent Science, Global Challenges and European Industrial Competitiveness and Innovative Europe. Among them the issues related to disaster risk prevention are covered mostly by the second one, with a budget of more than 53 billion euro. They are grouped in so-called Cluster 3 Civil security for society, responding to the challenges arising from persistent security threats, including cybercrime, as well as natural and man-made disasters and focused on building disaster-resilient societies (including against CBRN incidents, climate-related risks and extreme events; geological disasters, such as earthquakes, volcanic eruptions and tsunamis; pandemics), protection and security (including border management, maritime security, crime and terrorism) and cybersecurity. Some elements related to the development of useful technological solutions, applications and data sources for DRR are also found in Cluster 4 Digital, Industry and Space (for instance artificial intelligence, advanced computing and Big Data, Earth observation) and Cluster 6 Food, Bioeconomy, Natural Resources, Agriculture and Environment (issues like environmental observation, protecting biodiversity, ensuring plant and forest health).

Apart from these more or less «traditional» research areas (present also in the previous EU R&D programmes) in Horizon Europe a new approach was introduced – so called «missions». For entities wanting to improve their disaster risk reduction capacities the key one is „The Mission on Adaptation to Climate Change". It is focused on supporting EU regions, cities and local authorities in their efforts to build resilience against the impacts of climate change. by helping the regions to better understand the climate risks they are and will be confronted with in the future, develop their pathways to be better prepared and cope with the changing climate and – last but not least – test and deploy on the ground innovative solutions needed to build resilience. Regional and local authorities from EU Member States and countries associated to the Horizon Europe may join the Mission by signing the Mission Charter, in which they declare their willingness to cooperate, mobilise resources and develop activities in their respective region and communities to reach their adaptation goals. Other entities, such as research institutions or businesses may participate in the relevant activities as Friends of the Mission (after endorsing the Mission Charter).

Interreg

Interreg Europe is an interregional cooperation programme, co-funded by the European Union, established in 2002. It aims to reduce disparities in the levels of development, growth and quality of life in

and across Europe's regions, by helping local, regional and national governments to develop and deliver better policy through exchange of good practices, sharing solutions to regional development issues and policy learning. The budget for the years 2021-27 is 379 MEUR and beneficiary states are the EU27, Norway and Switzerland. Public authorities of all levels, education and research institutions, business support organisations and environmental organisations (both public and NGOs) can apply for funding for projects related to research & innovation capacities development, climate change adaptation, improved water management, protection of nature & biodiversity, integrated urban and non-urban development – to name but a few topics relevant to disaster risk reduction measures.

UCPM

In October 2001, the European Commission established the Union Civil Protection Mechanism (UCPM). The Mechanism aims to strengthen cooperation between the EU countries and 9 participating states (Albania, Bosnia and Herzegovina, Iceland, Montenegro, North Macedonia, Norway, Serbia, Türkiye and Ukraine) on civil protection to improve prevention, preparedness, and response to disasters.

When an emergency overwhelms the response capabilities of a country in Europe and beyond, it can request assistance through the Mechanism. The Commission plays a key role in coordinating the disaster response worldwide, contributing to at least 75% of the transport and/or operational costs of deployments.

The Mechanism also helps coordinate disaster preparedness and prevention activities of national authorities and contributes to the exchange of best practices.

In May 2021 the EU adopted a newly revised legislation on civil protection, which aims to strengthen the EU Civil Protection Mechanism and put in place a reinforced and more ambitious crisis management system within the EU. It also aims to support, coordinate or supplement the actions of EU Member States in the prevention of, preparedness for, and response to disasters.

As a result of this decision the UCPM budget for 2021-27 was significantly increased – it now amounts to €3.3 billion. This encompasses the Multiannual Financial Framework allocation of €1.263 billion and the additional Next Generation EU allocation of €2.056 billion as a temporary reinforcement addressing the recovery needs of the EU and its Member States as a consequence of the COVID-19 crisis.

Every year the European Commission's Civil Protection and Humanitarian Aid Operations department (ECHO) publishes a number of calls for proposals concerning a range of relief and civil protection efforts, for which relevant institutions from eligible countries may apply.

Recommendations & conclusions

The conference *Innovation in Disaster Risk Reduction* was organised thanks to financing from Bilateral Fund of Norwegian Financial Mechanism 2014-2021 and European Economic Area Financial Mechanism within "Home Affairs" Programme operated by Ministry of the Interior and Administration of Republic of Poland.

The project partners for this Polish-Norwegian bilateral initiative are convinced that the takeaways from this conference are important to follow up and investigate further for countries, as well as authorities at regional and local levels. During the conference it was demonstrated that innovative technologies offer a wide range of solutions for disaster prevention. Risk assessment, understanding of risks and cross-sectoral (especially public–private) and cross-boundary cooperation are crucial for efficient disaster risk reduction.

Some conclusions and recommendations from the project's participants and organizers of the conference:

- There is a need of educating Public Authorities at all levels and across various sectors in using existing technological solutions and sharing information and best practises for mutual learning.
- It is useful to have contacts at national level with other cities/communities, as well as with cities abroad.
- Developing data-sharing platforms at local, regional and global levels will benefit all stakeholders.
- There are still some funds left for new bilateral initiatives in a current period of the EEA-/Norway Grants.
- Ideas from this conference should be followed up during the new period of EEA/Norwegian Grants.
- UCPM Knowledge Network and recommendations of OECD, SFDRR should be used to the broadest extent possible.

During the conference, we also heard about the importance of public-private cooperation in disaster risk reduction. The private sector can provide valuable resources and expertise in areas such as risk assessment, technology, and logistics, while the public sector can offer regulatory frameworks and coordination mechanisms to ensure effective implementation. Such collaborations have the potential to accelerate progress towards achieving the global goals on disaster risk reduction and sustainable development. In addition, the importance of cooperation with scientists in developing evidence-based strategies for disaster risk reduction is crucial.

Another key takeaway from the conference was the value of local-level approaches to building resilience. Local communities play a critical role in disaster preparedness and response. By involving and empowering local communities and civil society, more effective and sustainable solutions to address disaster risks can be developed and built. Cooperation is a crucial factor in building resilience. Through sharing knowledge, resources, and best practices, different actors and stakeholders can learn from each other and work together to address common challenges.

Finally, the conference emphasized the importance of aligning countries efforts with global goals such as the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals.

By working towards these shared goals, we can ensure that efforts are coordinated and effective in building more resilient and sustainable societies.

In conclusion, this conference provided a valuable platform for fruitful discussions and exchange of ideas. By implementing solutions at the local level, promoting regional cooperation, and working towards global goals, we can take steps to build societies that are more resilient and sustainable in the face of growing threats from natural disasters and other hazards.

It is worth emphasizing that the EEA/Norway Grants contribute to reducing economic and social disparities in Europe and strengthening bilateral relations with beneficiary countries in Europe. The funding is available for a wide range of areas, including disaster prevention and preparedness, climate change mitigation and adaptation, environmental protection, sustainable energy, and human and social development. One of the unique features of the EEA/Norway Grants is that they require close cooperation between the donor and beneficiary countries. This includes a requirement for co-financing of projects by the beneficiary countries, as well as close cooperation between the donor and beneficiary countries in the selection and implementation of projects. The funding has been used to support a wide range of activities, including capacity building, research, infrastructure development, and awareness-raising. Overall, the EEA/Norway Grants can provide a valuable source of funding for projects that are often difficult to finance through other means, and the project partners of this conference encourage cooperation between donor and beneficiary countries in the pursuit of common goals.

About the project partners and organizers

RCB – The Government Centre for Security

The Government Centre for Security is a state budget unit subordinate to the Prime Minister. It was activated on 2 August 2008 and was established under the Act of 26 April 2007 on crisis management. The idea of the establishment of the institution was the construction of an effective and comprehensive system of crisis management thanks to which it shall be possible to prevent crises and in the event of their occurrence, through professional actions, to minimize their effects. In the polish administration system this is a new solution, because there was constructed a supraministerial structure whose objective is to optimise and uniform the perception of threats by particular ministries and ipso facto to increase the degree of capability of coping with difficult situations by competent services and bodies of public administration. The Centre provides service of the Cabinet, the Prime Minister, the Government Team for Crisis Management and the minister in charge of the interior with relation to crisis management and functions as the national center of crisis management.

The Government Centre for Security is in charge of developing optimal solutions occurring in crisis situations and also of coordinating the flow of information about threats. Within this scope, the Government Centre for Security carries out its tasks by drawing up a catalogue of risk, monitoring threats, activating crisis management procedures at the national level, conducting planning and programme activities in the field of crisis management and critical infrastructure protection, supervising cohesion of crisis responding procedures, organising and carrying out trainings and exercises in crisis management, cooperating at the international level, in particular with the NATO and the EU within crisis management. Most importantly, it is also a National Sendai Focal Point for Disaster Risk Redaction and coordinator of the implementation the Sendai Framework in Poland.

DSB – The Norwegian Directorate for Civil Protection

DSB's overall task is maintaining a complete overview of various risks and vulnerabilities. The directorate's responsibilities cover local, regional and national preparedness and emergency planning, fire safety, electrical safety, handling and transport of hazardous substances, as well as product and consumer safety.

Nødnett – the Norwegian Emergency Public Safety Network is a separate radio network, built specifically for rescue and emergency users. This network is owned and managed by DSB.

Furthermore, the Norwegian Civil Defence, the DSB College, the Norwegian Fire Academy and the Civil Defence Academy belong to DSB's portfolio. As do the Norwegian Support Team (NST), an internationally focused emergency capacity.

The head office of DSB is located in Tønsberg, 100 km south of Norway's capital, Oslo. Currently, DSB's staff consists of about 700 employees, divided between the head office and a wide range of locations and functions throughout all of Norway.

CIK CBK – Crisis Information Centre in Space Research Centre of Polish Academy of Science

CBK PAN is the leading institution for UAV, satellite and geoinformatic support for civil protection authorities in Poland. The Crisis Information Centre (CIK), provides operational support for crisis management structures and conducts R&D activities based on its insight into user needs in this field, specializing in optimisation of information flow between technology providers and security end-users. CIK is an interdisciplinary team consisting of geographic information system, Earth observation and UAV data analysis experts and well-qualified crisis management specialists.

The main mission of CIK is to increase effectiveness and efficiency in safety and crisis management domain by:

- Optimising the use of existing technological capabilities in geospatial information, especially satellite-and aerial-based remote sensing
- Developing new information products and integrating external data sources in order to support situational awareness during crisis events and planning activities (hazard and risk analysis in the planning and preparation phase, damage analysis in reconstruction phase)
- Testing usability of new, pre-operational technical solutions during exercises and demonstrations
- Providing advisory services, education and trainings, table-top exercises, simulations etc.

The conference Innovation in Disaster Risk Reduction was organised thanks to financing from Bilateral Fund of Norwegian Financial Mechanism 2014-2021 and European Economic Area Financial Mechanism within "Home Affairs" Programme operated by Minister of the Interior and Administration of Republic of Poland.

Authors: T. Tandberg (DSB), E. Michałkiewicz, G. Małachowski (RCB), A. Kobierzycka (CIK CBK)

ANNEX no 1 - Programme of the conference

Time	Day 1 (Tuesday 9th May 2023) – Challenges	Time	Day 2 (Wednesday 10th May 2023) – Solutions	Time	Day 3 (Thursday 11th May 2023) – Opportunities
09:00	Registration	08:30	Presentations by Norway: • Norwegian Water Resources and Energy Directorate, Mr. Lars Løkedal Slåke • Tiepoint AS, Mr. Nicholas Newhouse Poland: • Presentation of GIS Report, Ms. Anna Kobierzycka	08:30	Opportunities for local level: • Ministry of Climate and Environment, Ms. Ilona Ligocka • City of Stavanger, Mr. Torstein Nielsen • City of Wroclaw, Mr. Jakub Mazur • University of Agriculture in Krakow, Mr. Jacek Florek • Global Water Partnership, Mr. Konstantin Ivanov • City of Belfast, Mr. Richard McLernon
10:00	Welcome Representatives of Norway & Poland, • Director of the Government Centre for Security in Poland, Mr. Col. Konrad Korpowski, • Honorary Consul of the Kingdom of Norway in Krakow, Mr. Marian Mikołajski • DSB, Mr. Dag Olav Høgvold	9:45	Solution providers: • Government Centre for Security, Ms. Beata Janowczyk • EUSPA, Mr. Vasilis Kalogirou • Iceye, Mr. Jeffrey Apeldoorn • Planet Labs, Ms. Monika Jankiewicz		
10:30	Opening remarks: • DG ECHO, Mr. Artur Malantowicz • UNDRR, Mr. Andrew Mackay Bower • OECD, Mr. Nestor Alfonzo Santamaria • DG Network of European Crisis Management Centres, Mr. Bart Raeymaekers • CBSS, Ms. Vineta Polatside	10:45	Coffee Break	10:15	Coffee Break
		11:15	• UNDRR, Mr. Andrew Mackay Bower • Government Centre for Security, Ms. Beata Janowczyk, Ms. Wiktoria Królikowska-Murray	10:30	Science-private sector administration cooperation: • OECD, Mr. Nestor Alfonzo Santamaria • ESA, Mr. Christopher Leigh Topping • Poland Main School of Fire Services, Mr. Paweł Gromek • ICM UW, Mr. Franciszek Rakowski • Inclus, Mr. Mikaeli Langinvainio
11:45	Coffee break	11:45	Break-out groups 1. Climate change adaptation 2. Energy transition 3. Early Warning Systems	11:45	Building resilient society: • DRR focal point for North Macedonia, Ms. Elena Zarkovska • Poland Main School of Fire Services, Mr. Mariusz Feltynowski • British Department for Levelling Up, Housing and Communities, Mr. Mathew Gaskin • HUMLOG Institute in Hanken School of Economics, Mr. Wojciech Piotrowicz
12:00	Continue panel discussion	13:00	Lunch	13:00	Conference conclusions and Closing
13:00	Lunch	14:00	Presentation of the results/group discussion	13:15	Lunch
14:00	EEA/ Norway Grants: Successful projects Next period of EEA Q&A • Polish Ministry of Interior and Administration, Ms. Magdalena Zdrojewska • DSB, Ms. Torill Tandberg	14:30	Examples from different countries how prominent risks have been mitigated: • FEMA, Mr. Howard Stronach • CIMA, Mr. Marco Massabo • ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management, Ms. Monique Kuglitsch • State Water Holding "Polish Waters", Mr. Michał Piórecki		
15:00	Presentation of conference background - Survey - Q&A	16:00	Intro to excursion / Coffee		
15:35	Coffee Break	16:30	Excursion Field trip - Wieliczka Salt Mine		
15:50	InIntegrated Risk Assessment • British Department for Levelling Up, Housing and Communities, Mr. Josh Watson • IMPACT in Geneva, Ms. Nataliia Makaruk • Portuguese National Authority for Emergencies and Civil Protection, Ms. Sandra Serrano				
17:10	Conclusions - Warmup for day 2 Narrowing the focus	19:00	Dinner - Wieliczka Salt Mine		
17:20	End Day 1				
18:00	Standing reception				

ANNEX no 2 - Links

Links to the presentations and links to the video streaming at the RCB YouTube Channel can be found on the conference web page: https://www.dsb.no/menyartikler/english/internasjonalt/innovation-in-disaster-prevention/

ANNEX no 3 - BIOs of the presenters

Mr Jeffrey Apeldoorn is the Head of Government Solutions for Europe at ICEYE and is responsible for ICEYE's engagements across ESA, the European Commission, the PAN European organizations and European Governments, including the UK Government. Before joining ICEYE, Jeffrey held various leadership roles in space companies in Europe and the USA, working with ESA and NASA. Notably he worked for over 10 years for the OHB Group in Europe, concluding as Vice President Corporate Affairs where he worked on the group's corporate strategy development amongst others. In the USA, Jeffrey was President & Founder of Arrow Space Consulting, supporting both US and European companies. Following this, he was Vice President Future Missions & Technology at Astrobotic Technology and part of the Leadership Team of the company. In this role Jeffrey led the R&D side of the company incl. the R&D's Business Development, sales, budgets, contracts and hiring activities.
Upon his return to Europe, he started as Director of Space Business and Strategy at Cobham in Paris where he was responsible for transforming the company from a component manufacturer to an integrated subsystem and assembly solution provider. Finally, Jeffrey is a long-time visiting lecturer on the topic of "Space Debris" at the yearly Space Studies Program of the International Space University.

Mr Andrew Mackay Bower is Programme Manager Country Support at United Nations Office for Disaster Risk Reduction Regional Office for Europe and Central Asia (UNDRR)
From 2011 to 2013 he was Researcher and Academic Assistant in Department of EU International Relations and Diplomacy Studies in College Of Europe. In the years 2010-2013 Andrew Bower was a Visiting Research Fellow at King's College London. He gained 5 years experience in policy development on disaster risk management, civil protection and humanitarian aid, in particular at EU and global political level, as Policy Officer in European Commission. From 2018 he was working in UNDRR on the disaster risk reduction, risk management and climate adaptation in Europe and Central Asia, as per the commitments made by UN Member countries through the Sendai Framework 2015-2030. His particular affection is strong political communication and meaningful action for the public good.

Mr Mariusz Feltynowski received Ing degree of Fire safety in the Main School of Fire Service in Warsaw (1999), master of Finance at the Academy of Finance in Warsaw (2001). In the 2001-2002 he won scholarship from Robert Bosch Foundation and get 9 months experience from Germany Federal Situation Centre, Academy of Crisis Management and Federal Agency for Technical Relief. He holds doctorate of Science in Defence Studies (Social Sciences) at the Academy of Defense in Warsaw (2016). He participated in 6 international rescue mission, twice was acting chair (2014 and 2020) of INSARAG regional Group for Africa/Europe/Middle East. He has dozen of practical international experience from international humanitarian missions and complex field exercises, including disaster risk reduction, crisis management, homeland security and UAV. General Feltynowski is currently rector and associate professor at the Main School of Fire Service, Warsaw, Poland, expert of INSARAG, UNDAC and Union Civil Protection Mechanism.

Mr Maj. Pawel Gromek, DSc Eng. holds an M.S. in Fire Safety Engineering (Engineering Studies) from the Main School of Fire Service in Warsaw, Poland, a PhD in Security Studies (Social Sciences) from the National Defense Academy in Warsaw, Poland, and a Doctorate of Science in Security Studies (Social Sciences) from the War Art Academy in Warsaw, Poland. Mr. Gromek completed post-graduate studies in occupational safety and health at the Warsaw University of Technology, Warsaw, Poland, and post-graduate studies in pedagogics for teachers at Warsaw University of Life Sciences, Warsaw, Poland.
Major Gromek is currently an associate professor at the Main School of Fire Service, Warsaw, Poland, a senior officer of the State Fire Service of the Republic of Poland, and an expert in European Research Executive Agency and the Government Centre for Security (Poland). He has researched and published in several areas of security including disaster risk reduction, crisis management, homeland security and infrastructure resilience.

Mr Dag Olav Høgvold is the head of section for International Relations at the Norwegian Directorate for Civil Protection, DSB and responsible DSB's follow up of the program Area Disaster Prevention and Preparedness under the EEA-Norway Grants. He has been working at DSB since 2008. Høgvold has been working on natural disaster prevention and preparedness and lead the section for DSB's follow up of the County Governors tasks related to civil protection in three years. Høgvold was the president of the European Forum for Disaster Risk Reduction in 2013.
Before he started his carrier at DSB he worked with international relations and collaboration at the University of Oslo. He has a master's degree in Sociology from the University of Oslo.

Mr Konstantin Ivanov is the Regional Coordinator of Global Water Partnership Central and Eastern Europe, a global action network focused on the sustainable management of water resources with over 3,000 partner organisations in 179 countries, including 11 in the CEE region, focused on transboundary cooperation, SDGs, climate/drought and youth issues among others. Mr Ivanov has extensive experience in nature conservation, including climate change adaptation projects and freshwater restoration, as well as advocacy, fundraising and campaigning work for NGOs like WWF in Central and Eastern Europe. In his earlier career as a journalist, he has worked for a variety of media outlets, last with the BBC World Service. Mr Ivanov holds a Master's Degree from the University of Sofia.

Mr Mathew Gaskin is a Strategy Team Leader at Department for Levelling Up, Housing and Communities since 2021. For two years He dealt with emergency management, resilience policy and response management in the Ministry of Housing, Communities and Local Government. In 2018 Mathew was an EU Exit Policy Officer in Department for Business, Energy and Industrial Strategy. In the period from 2012 to 2016 He got experience in project menagement being responsible for commissioning and managing a portfolio of community investment services in London and the South East of England in the Circle Housing Company.

Ms Beata Janowczyk is an experienced Advisor at the Government Centre for Security, and acting Head of the Risk Assessment and Emergency Planning Division. With expertise in national security, risk assessment and management, civil-military cooperation, building resilience, and civil protection, she has contributed to critical initiatives related to crisis management and disaster risk reduction.
Her role involves developing strategic national documents, such as the Report on Threats to National Security, the National Crisis Management Plan, and the National Strategy for Disaster Risk Reduction. As the National Focal Point of Poland for the Sendai Framework for Disaster Risk Reduction, she collaborates with international partners, including the United Nations Office for Disaster Risk Reduction.
She cooperates with the European Commission, where she contributes her expertise to enhance EU disaster resilience, risk management and early warning systems. Additionally, she represents Poland as the national delegate for the OECD High-Level Risk Reduction Forum and serves as a member of the DG Network of European Crisis Management Centres.

She has also led technology projects, including the GISBN National Security geo-information system. Her 13-year tenure at the Government Centre for Security has seen her involvement in high-profile projects aimed at enhancing crisis management capabilities.
In previous roles at the Ministry of the Environment and the National Water Management Authority, she gained experience in flood protection, including managing catastrophic floods in Poland in 2010.

Ms Monika Jankiewicz is a Sales Manager at Planet Labs Company, with was founded by a team of ex-NASA scientists and is driven by a mission to image the entire Earth every day, and make Earth's changes visible, accessible and actionable. She works also at Civil Government Department in Poland. Monika gained experience working as: Business Development Manager and Head of Sales Cee in leads.io, Chief Digital Officer and Business Development Manager in lokalnyrolnik.pl and Key Account Manager and Sales Team Leader in Advertising Department at Allegro Group. She studies at Poznań University of Life Science, She has a Master's degree in Environmental Science from the University of Warsaw and she attended to Harvard Business School Online.

Mr Vasilis Kalogirou is a Space Downstream Research & Innovation Officer at the EUSPA - EU Agency for the Space Programme. He leads the Emergency Management and Humanitarian Aid segment actions, defines and implements actions to boost technology development for the downstream of the EU Space Programme covering integrated areas of EGNSS, Copernicus and GovSatCom. From 2013 to 2020 he worked at SatCen Company as Copernicus Project Manager and Officer. He has extensive experience in Remote Sensing, which he gained among others, at ESA (from 2008 to 2013).

Ms Anna Kobierzycka has graduated the Institute of International Relations at the University of Warsaw. She specializes in space policy, international cooperation in space activities and relations between the European Union and the European Space Agency. She participated in Poland's accession negotiations to the ESA and represented Poland in the work of this organization. Co-author and editor of the "Polish Space Strategy" adopted by the government in January 2017. In CIK CBK PAN she is focused on supporting the implementation of new technologies and innovative solutions in public administration via national and international projects.

Dr. Monique (Stewart) Kuglitsch is the Innovation Manager at Fraunhofer HHI and Chair of the ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management. She also serves as an Expert in the Working Group on AI Capacity Building for the ITU/UNESCO Broadband Commission for Sustainable Development. She previously managed operations for the ITU/WHO Focus Group on AI for Health. In her past role at the American Meteorological Society, M. Kuglitsch was the Lead Technical Editor for several journals (including the Journal of Hydrometeorology and Journal of Physical Oceanography) and the Senior International Outreach/Communications Specialist. As a researcher, M. Kuglitsch has investigated past climate change, extreme weather events, and regional climate model projections. M. Kuglitsch has experience in fluvial and limnological field work, geochemical laboratory methods, applied mathematics and statistics, greenhouse gas emissions, and climate risk/impacts research. Her research has been published in high-ranking peer-reviewed scientific journals and books, cited in a past IPCC report, presented at various conferences (with recent Keynotes at the European Meteorological Society Annual Meeting, Copernicus Emergency Management Service Assembly, European Geoscience Union General Assembly, and AI for Good Summit), and featured in the press (with interviews in The Washington Post, the Tagespiegel, Women in Tech, and Forbes).

Mr Mikaeli Langinvainio from Inclus, Finland has over 20 years of experience in business, crisis management and peace negotiations in over 20 countries on three continents. Over his career he has designed and facilitated dozens of peace mediation, risk management and policy development processes of national importance in the world's most challenging environments. Mikaeli co-founded Inclus, which provides software for collaborative risk management. Mikaeli's prior experience includes

working at CMI - Martti Ahtisaari Centre - as Senior Manager leading the Methods and Tools Unit, where he continues to act as a consultant. He has worked at the Finnish Defence Administration as a strategic analysis team leader, routinely providing analysis to the top leadership of Finland. He has also acted as the National Coordinator of Civilian Crisis Management Training and Research at the Finnish Ministry of Interior taking part in establishing Crisis Management Centre and representing Finland at the European Union. He has also acted as a researcher at the University of Turku and served as a Peacekeeper with honorary mention of meritorious service.

Ms Ilona Ligocka is a Counselor in the Ministry of Climate and Environment, involved in adaptation to climate change, mostly in the cities. She coordinates a project aimed at strengthening coordination in climate change adaptation policy between local, regional and national authorities in Poland. She is a member of working groups of the European Commission dealing with climate resilience and adaptation to climate change.

Ms Natalia Makaruk from IMPACT in GENEVA holds the master's degree in Geography of Environmental Risks and Human Security from UNU-EHS and Bonn University. Has 5 years of experience in disaster risk research and analysis. Since 2021 She is working with IMPACT Initiatives as Climate and Disasters Assessmnet Officer, first with the Ukrainian mission and now at HQ in Geneva. The area of her expertise falls into the research projects like area-based assessments, and particularly area-based risk assessments, research tools development, stakeholders' engagement and advocating for disaster risk assessments in humanitarian settings.

Mr Artur Malantowicz, Ph.D., Leader of the Union Civil Protection Knowledge Network Coordination Team, Directorate General for European Civil Protection and Humanitarian Aid Operations (ECHO), European Commission. Artur is a geographer and political scientist with professional experience gained at the crossroads of academia and crisis management sector, in the context of both humanitarian and civil protection operations. He currently leads a team coordinating the development of the Union Civil Protection Knowledge Network, an initiative with an ambition to provide the Union Civil Protection Mechanism and its community with the knowledge and expertise to effectively prevent, prepare for and respond to current and emerging risks and challenges in disaster risk management.

Mr Marco Massabo is a Programme Director at **CIMA** Research Foundation which the main task is focusing on study, technological development and higher education in the fields of hazard mitigation, civil protection and ecosystem protection. Marco deals with Capacity Development in Disaster Risk Reduction and Civil Protection. He has been a researcher at CIMA for 16 years.

Mr Nicholas Caprino Newhouse - Chief technology officer at Tiepoint AS in Norway. He has been working in the professional drone industry for 4 years. Delivers drone services to customers amongst others; NOFO, Enova, Equinor, the Norwegian state, the Norwegian Police, Fire Departments and the Norwegian state. He is Drone instructor for first responders (both flight training and post processing), accident reconstruction and Special ops drone pilot and workflow specialist. Nicholas has specialised knowledge within 2D/3D mapping.

Mr Torstein Nielsen is Chief Emergency Management in the City of Stavanger, Norway. He works with both prevention and management of crisis and disasters. He gained Education and background from Norwegian Armed Forces and Universities of Bergen and Stavanger (political science and societal safety).

Dr Wojciech Piotrowicz (PhD Brunel, UK, MA Gdańsk, PL) is Associate Professor in Supply Chain Management and Social Responsibility, and former Director of the Humanitarian Logistics and Supply Chain Research Institute (HUMLOG Institute), at Hanken School of Economics, Helsinki. His current

research is related to risks, especially in supply chain management, as well as humanitarian logistics, disaster preparedness, and security. Wojciech has considerable experience as member of large international research projects within both the public and private sectors. Wojciech leads research focused on humanitarian logistics in conflict areas, especially Ukraine and Syria (Cash and/or Carry Academy of Finland project), as well as work package of the CORE (sCience & human factOr for Resilient society) EU project, focused on supply chain disruption.

Mr Michał Piórecki – Head of the Operational Center for Flood Protection State Water Holding Polish Waters Regional Water Management Board in Krakow. He has over 20 years of professional experience, mainly related to hydraulic modeling and flood risk analysis.
Currently, he is responsible for managing and coordinating flood actions in the area administered by the Regional Water Management Board in Krakow.

Ms Vineta Polatside is a Senior Adviser for Safe and Secure Region Priority at the Council of the Baltic Sea States. She coordinates activities of a Civil Protection Network that consists of civil protection senior experts and Directors General from 10 CBSS Member States. The focus of the work is on building a common societal security culture in the Baltic Sea Region, shared attitudes towards societal security threats and an understanding of prevention, preparedness, and response to disasters and crisis. Polatside has been working in fields related to safety and security in different capacities for 20 years, it also included issues of migration, integration and combating human trafficking.

Ms Katarzyna Szymczak-Pomianowska, Director of Sustainable Development Department Municipality of Wroclaw, since 2018 in charge of sustainable development and implementation of new measures and standards to improve air quality and adapt the city to climate change. Previously responsible for participatory budget and social dialog and as the project manager for infrastructural investments such as the National Forum of Music or the Musical Theatre Capitol, both co-financed by European Union, both city showcases.

Mr Bart Raeymaekers is Director General of the Belgian National Crisis Centre (NCCN) since 2017. In the main part his experience comes from working in the government administration industry, including Office of the Deputy Prime Minister and the Minister of Security and the Interior, Cabinet for Police and Crisis Management, Cabinet of the Deputy Prime Minister and Minister of Security and Home Affairs. He has skills in Crisis Management, Coaching, Government, Law Enforcement and Emergency Management. He is business specialist with professional experience in cross government and all agency coordination and approach. In 2012 Bart gained Director's certificate, Phd training Chief of police in the School for Officers – Integrated Police.

Mr Franciszek Rakowski (PhD) since 2020 He is a Project Leader in ICM University of Warsaw responsible for Epidemiological Model. Since 2022 He is member of Polish Prime Minister Covid-19 Advisory Board.

Mr Jakub Ryzenko is the Head of Crisis Information Centre, Space Research Centre pas. He is a space policy and crisis management expert. He is actively involved in several research and development activities and he advises the Polish government and the Polish parliament on space policy matters. In 2004–2008 he was the Head of the Polish Space Office. In 2011–2013 he was involved in the accession of Poland to the European Space Agency. Since then he has regularly acted as a space policy advisor for different governmental institutions and the Polish parliament. Currently he is actively involved in definition of the Polish national space programme. In the safety and security domain, he focuses on effective use of space-related solutions for international security, civil protection and humanitarian operations. Since 2013 he heads the Crisis Information Centre at Space Research Centre pas, which develops space-related innovative solutions as well as provides operational support

for crisis management institutions in Poland. He has coordinated or overseen over 40 operational activations of satellite and UAVs information support for crisis situations.

Mr Néstor Alfonzo Santamaría is an expert on risk governance and disaster risk reduction/management currently on loan to the Organisation for Economic Co-operation and Development (OECD), serving as a senior advisor on risk governance in the Public Governance Directorate. Before his current position, he worked on resilience policy and disaster management at the UK Cabinet Office, as well as in various UK ministries, the government of the City of London and the United Nations Development Programme (UNDP). Nestor has also advised the European Union, various UN agencies, the World Bank and the Inter-American Development Bank on disaster management issues. Néstor regularly speaks at international events (such as thematic events of the Group of 20 and the Group of 7) and is also a visiting lecturer at several universities worldwide (including University College London, Kings College London, Coventry University, London School of Economics, Universidad Central de Venezuela, Tsinghua University Beijing, Universidad Nacional Autónoma de Mexico, Universidad de Buenos Aires, and Berlin Free University).

Ms Sandra Serrano - Head of Department for risk analysis and emergency planning in the Portuguese National Authority for Emergency and Civil Protection. Her activities are currently mainly focussed on prevention and preparedness, at a strategic level, in the area of civil protection planning and disaster risk reduction. Other fields of action are risk assessment, emergency planning, namely in the coordination and elaboration of the National Civil Protection Emergency Plan, environmental impact assessment, spatial planning, early warning systems and decision support to major emergencies. Sandra Serrano has a degree in Urbanism with a postgraduate degree in emergency management.

Mr Lars Løkeland Slåke - Lars works at the Norwegian Water Resources and Energy Directorate (NVE), as a staff engineer with climate adaptation and communication. He is educated in physical geography and GIS at the Norwegian University of science and technology.

Mr Howard Stronach is a Chief at the Disaster Grants Implementation Branch in the Hazard Mitigation Assistance Division at **FEMA** Headquarters. He has been working for FEMA for 25 years. From 1997 to 2019 He was a strategic leader for a multi-billion dollar national disaster recovery program, providing guidance to disaster operations on funding eligibility and regulatory requirements also he led a team who perform many the tasks including policy and regulation development and catastrophic disaster planning for large-scale infrastructure restoration projects and interagency response and disaster recovery activities. In 1995 Howard completed his master's degree in Military National Resource Strategy And Policy at the National Defense University.

Ms Torill Tandberg works as specialist director at the Norwegian directorate for Civil Protection (DSB) with international relations. She is working on the EEA-/Norway Grants under Program Area Disaster Prevention and Preparedness, representing Norway as Donor Program Partner. Tandberg has a master's degree in Industrial Chemistry from the Norwegian University of Science and Technology (1985). From 2004 – 2016 she was director of DSB's department for Industry, Products and Hazardous Substances. She is the chair of the UNECE Industrial Accident Convention and has been the chair of the OECD working Party for Chemical Accidents from 2015-2018.

Mr Christopher Leigh Topping is a satellite communications engineer with 25 years experience in the telecoms engineering, satellite manufacturing and satellite services industries. These days Christopher is leading Civil Security and Crisis Response Programmes within ESA, building on Telecoms and Earth Observation disciplines to deliver solutions for Europe. This comes at a time where crisis events are escalating and space based tools can provide rapid response capabilities everywhere at any time and to anyone in need.

Ms Elena Zarkovska She has more than 14 years of experience. Over the past decade, she has had a rare and extraordinary opportunity to complement her experience working in different organizations and held challenging job positions. She had the opportunity to run one of the most active representative offices of the Government of the Republic of Macedonia abroad, in a place which, after the end of the financial crisis, was extremely risky for doing business. She gained personal experience when it comes to risk management, financial soundness and sharpened her organization skills by learning from the best in their fields. She was in charge of the accounting, budgeting and cash reconciliation against invoices and bank statements. During the period, She was able to successfully organize few dozens of events, gala dinners for domestic and international guests and investment presentations in front of Fortune 500 companies. Besides obtaining her Bachelor and Master Degrees, She managed to complete a Specialization and a series of certifications and courses offered by the US Universities that additionally elevated her knowledge in accounting, organizational behavior, operations management and computer systems such as MS Excel.
Alongside that, she also completed couple of study abroad visits to the EU institutions and spent considerable amount of time working on harmonization of the domestic laws and regulations with the EU.She gained tremendous experience attending many workshops and professional leadership programs which allowed her not just to expand the network of contacts, observe the policy making process in different areas and voice the young generation`s viewpoints within established circles of specialists, but also help her efforts to promote interaction and cooperation and to enrich for the benefit of all. Her legal degree paired with multiple awards and recognitions for her past achievements in the legal and financial sector and international cooperation with governments and businesses is strong indicator that Elena is willing to work on reforms in the risk management sector.

Ms Magdalena Zdrojewska - Graduate of the Faculty of Law and Administration at the University of Lodz, field of study - Administration, graduate of the XXIII Promotion of the National School of Public Administration, appointed civil servant. Participant of foreign internships, including BlueBook at the European Commission and at the Permanent Mission of the Republic of Poland to the United Nations in New York.
She has been employed at the Ministry of the Interior and Administration since 2014. Initially, she carried out tasks in the personnel and organizational area under Director General. Then she coordinated the settlement and evaluation of the MIA Programme in the framework of the second edition of the Norwegian Funds in Poland in the Department of Border Policy and International Funds. Since February 2018 - as deputy director of the Department of European Funds - responsible, among others, for supervising the development of assumptions and implementation of the "Home Affairs" Programme of the Norwegian Funds in Poland.

Composition and layout: Katarzyna Dąbrowska

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