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Decision Making Improvement for Disaster Risk Management (DRM) through technological support

DRMKC Risk Data Hub, GRRASP (Geospatial Risk and Resilience Assessment Platform) and RAPID-N (Rapid Natech Risk Analysis and Mapping System) ***3rd DRMKC RDH Workshop, 16th of October 2019***

Antofie, E., Marin Ferrer, M., Luoni, S., Eklund, G.,

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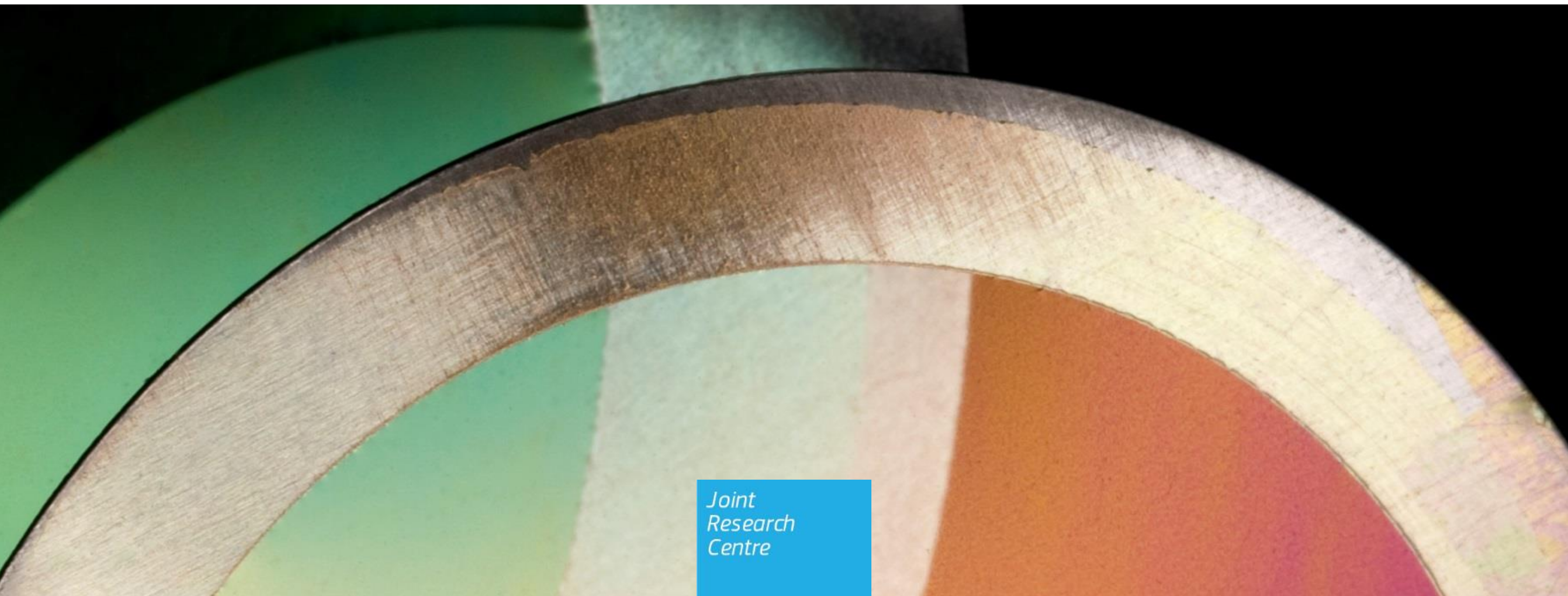

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Abstract

The workshop “Decision Making Improvement for Disaster Risk Management (DRM) through technological support” was held in Bucharest, Romania on 16th of October 2019, part of the 4th DRMKC Annual Seminar. The key objective of the session was to increase the collaboration with national/regional/local authorities and other institutions, aligning the development of the tools to the needs and concerns expressed at local/national level. To accomplish its objective, the workshop brought together technical and scientific experts with end users of the platforms, who have faced the main challenges related to data, knowledge and institutional practices while offering technological support for DRM. Showcases and feedback from national authorities and institutions were presented, as they were experienced when using the platforms presented in the session: the DRMKC Risk Data Hub, GRRASP and RAPID-N. The session was divided in two parts, in the first it was presented the general characteristics and functionalities of the platforms, followed in the second part by showcases of using these platforms in various applications by the local authorities and institutions.

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Agenda

09:00-09:30	*Registration, coffee*
WELCOMING SESSION: *Facilitator: representative (Romanian Department for Emergency Situations)*	
09:30-10:00	• Welcoming • Opening messages
SESSION 1 : Risk Data Hub – GRRASP – RAPID_N, DRM platforms	
10:00-11:00	• Introducing RDH Tiberiu- Eugen Antofie (JRC) • Introducing GRRASP Georgios Giannopoulos (JRC) • Introducing RAPID-N Serkan Girgin (JRC)
11:00-11:30	Coffee break
Session 2: Case studies of technological implementation at national/local level :	
11:30 – 13:00	• Risk Data Hub implementation in Romania Presenter: Francisc Senzaconi (DSU Romania) • Decision making improvement, Genoa's corner in JRC Risk Data Hub *Presenter: Stefania Manca (Genoa municipality)* • Using Risk Data Hub - Austrian experience Presenter: Christian Schubert (CCA, Austria), • Analysis of selected uses of satellite data for disaster risk management in Poland and potentially applicability in the DRMKC Risk Data Hub *Presenter: Jakub Ryzenko (Crisis Information Centre SRC, Poland)* • GRRASP – Milano case-study Presenter: Boris Petrenj (Politecnico Di Milano) • RAPID-N: Seismic Natech risk analysis case-study in Romania Presenter: Serkan Girgin (JRC, Ispra)
13.00-13.15	**Wrap Up and Discussion of further actions**
13.15-13:30	**Closing Remarks**
13:30-14:30	*Lunch & Networking*

Motivation and objectives of the workshop

Complex forms of decision-making need technological support for achieving Disaster Risk Management (DRM) objective of reducing risk. European Commission's Joint Research Centre (JRC) plays an essential role in this domain, by introducing innovative methods, tools and technological solutions for the mitigation of disasters and their impacts. It is essential that the emerging technological developments match the needs of the users. For this reason, JRC's Disaster Risk Management Knowledge Centre (DRMKC) has foreseen the organization of a back-to-back session on the topic of DRM, to booster both technological innovation in this application area and the adoption of emerging methodologies at the national level.

The session is part of the 4th DRMKC Annual Seminar, co-organized with the Romanian Department for Emergency Situations (DSU) and hosted in Bucharest, Romania. On the morning of the 16th of October, we will discuss and assess the usability and applicability of three of JRC's web-platforms related to Risk Management tasks, namely the DRMKC Risk Data Hub, GRRASP (Geospatial Risk and Resilience Assessment Platform), and RAPID-N (Rapid Natech Risk Analysis and Mapping System).

The DRMKC Risk Data Hub aims at becoming a tool for hosting systematically collected, comparable and robust disaster risk damage assessments and loss data (impact assessment). As such, it is meant to serve as an essential element and facilitator for the whole risk assessment and risk management cycle.

GRRASP is a World Wide Web oriented architecture bringing together geospatial technologies and computational tools for the analysis and simulation of critical infrastructures. This includes, notably, the case of complex networked systems, taking into consideration cross-sectoral and cross-border interdependencies. It can be used for assessing impacts at local, regional, national, and international levels.

RAPID-N is a risk analysis system for technological accidents triggered by natural hazards (Natechs), which combines on-site natural hazard severity analysis, physical and functional damage assessment for industrial units, accident scenario development, and hazardous consequence modelling in a single tool. The system features an innovative data analysis framework, which allows automated data estimation, scalable analysis (i.e. local, regional, national) and case-specific dynamic modelling, which can be easily extended by users without need of technical knowledge.

A key objective of the session is to increase the collaboration with national/regional/local authorities and other institutions, aligning the development of the tools to the needs and concerns expressed at each level. To accomplish its objective, the workshop brings together technical and scientific experts with end users of the platforms, who have faced the main challenges related to data, knowledge and institutional practices while offering technological support for DRM. Showcases and feedback from national authorities and institutions will also be presented, as experienced throughout their interaction with the DRMKC Risk Data Hub, GRRASP and RAPID-N.

The session was divided in two parts, in the first it was presented the general characteristics and functionalities of the platforms, followed in the second part by showcases of using these platforms in various applications by the local authorities and institutions. A brief overview of the presentation is available in the following.

1 First SESSION: Risk Data Hub – GRRASP – RAPID_N, DRM platforms

This session proposed to discuss and assess the usability and applicability of three of JRC's web-platforms related to Risk Management tasks, namely the DRMKC Risk Data Hub, GRRASP (Geospatial Risk and Resilience Assessment Platform), and RAPID-N (Rapid Natech Risk Analysis and Mapping System).

1.1 DRMKC Risk Data Hub

Presenter: Antofie Tiberiu-Eugen (European Commission, Joint Research Centre, Ispra, Italy)

The DRMKC has been working since its launch in September 2015 in the challenging task of developing collective knowledge based on the establishment of solid partnerships involving scientists, policymakers and operational authorities. The DRMKC Risk Data Hub has been developed to provide a concrete platform where these different communities could share and profit from this possibility of working together.

The need to have a multi-hazard platform to link science and policy, past and future, local and global dimensions was identified after having reviewed the National Risk Assessments prepared by the Union of Civil Protection Mechanism's (UCPM) participant countries and then submitted to the Commission. There was an evident gap between the knowledge developed by the scientific community and the one reaching this important deliverable due under the UCPM.

The latest version of the RDH architecture comes also as a natural conclusion of a series of reports developed in collaboration with DG ECHO and national experts regarding the need of collecting, recording and sharing Damage and Loss Data.

The Knowledge Centres launched by the Commission have as primary mission to work in the Science-Policy interface trying to bridge this existing gap between the scientific output and the evidence required for well-informed policies. The DRMKC Risk Data Hub is a concrete answer to this need but the only way to succeed on this objective is to be able to engage with the two ends of the bridge - scientists and policy-makers – to co-design and co-develop this common bridge.

An essential element to really succeed is to strengthen the partnership and collaboration with local authorities and institutions, in order to establish a collaborative development that matches the needs and realities expressed at local level.

The present version of the Risk Data Hub covers the pre-event phase of prevention and mitigation and the post-event phase of recovery from the disaster risk management (DRM) cycle.

In the prevention and mitigation phase, we focus on anticipation of disaster events in order to reduce, or avoid, the potential losses. In the recovery phase, we focus on gathering lessons learned and loss and damage data.

The pre-event phase is based on European-wide, multi-hazard and across scale assessments of exposure, vulnerability, impacts and risk. Vulnerability (working progress) and exposure are measured, quantified and mapped, as they are the main drivers of risk and the only risk components that can be managed – on short time range - in order to reduce the impacts.

Multi-hazard risk assessment capabilities are embedded in the Risk Data Hub in the form of a template. Uploaded data from various sources and geographical scales are converted in assessments of risk. This proposes an alignment of methodological approaches and data used, and becomes an useful instrument for National Risk Assessments.

The RDH considers the post-event phase of DRM and offers the access to the available historical loss and damage data. Best addressed at national and subnational level, the Risk Data Hub approach on loss and damage data includes the characteristics of a decision support system that integrates spatial data (e.g. event extent, event location) along with statistical records and analysis. The template like application, allows for the pots-event data to have various outputs that matches the needs and realities expressed at local, national level. Therefore the statistical records are structured according to Sendai Targets for DRR and also evaluated in order to indicate disasters that leads to requesting financial support, as the EU Solidarity Funds.

With a reduced access to national records, for the Risk Data Hub we identified various sources of information: online media (e.g. Europe Media Monitor), online encyclopedia (Wikipedia), existing multi-hazards databases (e.g. Munich Re, Swiss Re, EM-DAT, GLC), EU services (e.g. EMS Copernicus, ERCC) , JRC services (EFFIS, EDO), EU financed projects (e.g. Share) or academic research.

1.2 Rapid Natech Risk Analysis and Mapping System: RAPID-N

Presenter: Serkan Girgin (European Commission, Joint Research Centre, Ispra, Italy)

Industrial facilities are vulnerable to the impacts of natural hazards. These impacts can result in physical and/or functional damage at structural and non-structural components, including process units, storage tanks, pipelines, and other infrastructure. Damaged components may directly or indirectly cause the release of hazardous materials and subsequently trigger accidents with adverse consequences such as fires, explosions, and toxic dispersions. These so-called Natech accidents are a recurring but often overlooked feature in many natural disasters which impact industrial areas. The Fukushima nuclear accident in the wake of the Tōhoku earthquake and tsunami in Japan in 2011 or oil spills, chemical releases, and wide-spread shutdown of production and refining activities in the Eastern United States in 2017 due to Hurricane Harvey are some recent examples. Industrial growth, climate change, and the increasing vulnerability of society and infrastructure that is becoming more and more interconnected increases the risk of such events in the future.

Risk analysis is a prerequisite for understanding Natech accident risks and for determining which prevention and mitigation measures should be implemented to reduce the risk and mitigate the consequences. It also allows the prioritization of the required safety measures in an efficient and cost affective way. Unfortunately, recent studies showed that there is a lack of methodologies and tools for Natech risk analysis and mapping which has so far hampered the appropriate inclusion of this type of risk into industrial risk assessment. Following calls by governments to close this gap, the European Commission's Joint Research Centre developed a risk analysis framework called RAPID-N for rapid Natech risk analysis and mapping, which is publicly available at https://rapidn.jrc.ec.europa.eu.

RAPID-N is a unique system that allows the rapid analysis of Natech risks at a specific industrial unit, at an industrial facility (multiple units), or at multiple facilities regionally in a scalable manner. It is unique in that it covers all functionalities required for Natech risk analysis including on-site natural-hazard severity assessment, estimation of the type and extent of damage at industrial units, development of accident scenarios, analysis of hazardous consequences, and visualisation of the results in one tool. Models required for the analysis are built dynamically for each case by considering available data. Missing input data is automatically estimated by utilizing scientific methods available in the framework, which can be customized or extended easily by the end users. The output of the analysis is a risk summary report that features all input parameters supplied by the user and calculated by RAPID-N for the analysis, and an interactive risk map showing the specific impact areas for all potential Natech scenarios. Since the user can choose the impact criteria, RAPID-N can determine the likelihood and severity of human impacts as well as of damage to neighbouring structures (e.g. power plants, ports, etc.) alike. This helps to understand the risks of cascading effects that might hamper a speedy recovery after a natural hazard event.

RAPID-N was designed to address different natural hazards and industrial equipment types, but its primary focus is earthquakes and storage tanks. Prototype versions are available for floods and pipeline systems. The system can be used to quickly identify Natech risk hotspots and determine the associated risks both at the design and operation phases. It also supports land-use and emergency planning, and facilitates decision making and priority setting based on near real-time damage assessment immediately after the occurrence of a natural disaster. This is fundamental for informing emergency response actions and for early warning of the population about potential hazardous consequences.

The presentation explained the overall concept, scope and risk-analysis approach of RAPID-N. Features of the system were presented, including the innovative data analysis and estimation framework with open-model approach. A complete risk analysis process has been demonstrated by using a live case-study from Romania.

1.3 Introducing GRRASP

Presenter: Georgios Giannopoulos (European Commission, Joint Research Centre, Ispra, Italy)

European Commission's Joint Research Centre (JRC) develops the Geospatial Risk and Resilience Assessment Platform (GRRASP, https://ec.europa.eu/jrc/en/grrasp), a web-oriented architecture bringing together geospatial technologies and computational tools for the analysis of critical infrastructures. The key objective is to support risk and resilience assessment by operators and competent authorities at a local, regional, national and international scale. In doing so, relevant scientific methodologies are drawn from the research community and their application is promoted and facilitated.

The technical infrastructure of GRRASP involves the interaction of

— a supporting content management system, allowing the integration with a number of third-party modules to foster interoperability;

— different kinds of map services, sourced both from the embedded map server and external providers accessible through the internet;

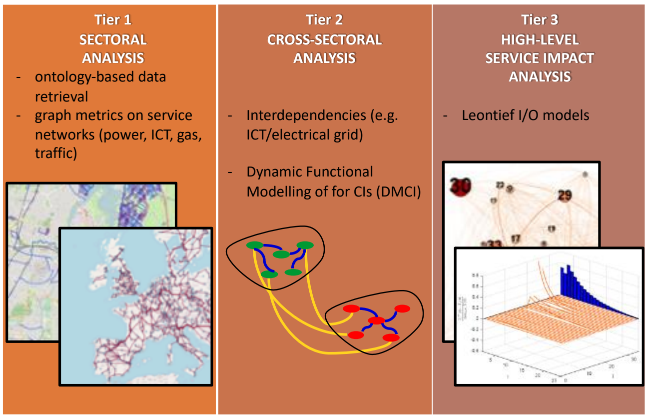
— various analysis modules tailored to critical infrastructure analysis;

— a set of data visualization tools.

Modularity and expandability characterize the platform, which can be enriched with additional mapping, analysis and visualization capabilities. Users access the available resources and work within assigned personal workspaces, yet information sharing can be enabled based on per-user and per-role criteria. These features lay the ground for future developments in the areas of collaborative assessment and federated simulation.

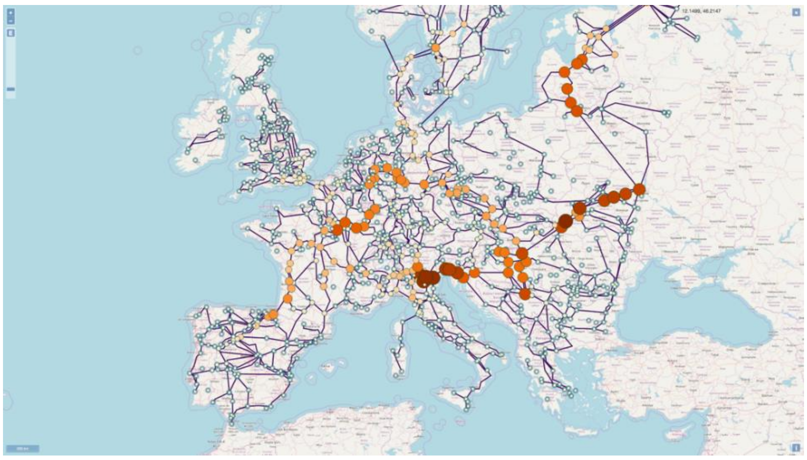
The current development status of GRRASP reflects the need, stressed by the critical infrastructure community, for a diversified set of analysis engines. In particular, the analysis modules implemented so far can be classified as illustrated in Figure 1.

Figure 1. Tiered approach to critical infrastructure analysis implemented in GRRASP, with examples of implemented modules.



As an example, in Figure 2 we report an output obtained by performing network analysis over an illustrative network. In this case, the system is helping to determine high-centrality nodes and node clusters, reporting the associated scores on map. Available are also multiple alternative network metrics, whose relevance may depend on the application at hand.

Figure 2. Example of output from the network analysis module.



Besides, the same network analysis tool may play a broader role within the ecosystem of modules included in GRRASP. For instance, its output may feed relevant information into modules selected from other tiers. The analysis pipelines resulting from similar toolchains can serve to assess the system under study from various angles.

GRRASP can be deployed into separate servers and exploited by competent authorities to facilitate and coordinate the analysis of risk and resilience in critical infrastructures. In addition, it can represent a tool to foster the development and testing process of new models, as well as training activities related to critical infrastructure protection.

2 Second SESSION: Case studies of technological implementation at national/local level

This session held presentations made by local authorities/institutions on the applicability and usability of the platforms developed for DRM.

2.1 Decision-Making for DRM of CI systems supported by Dynamic Functional Modelling (DMCI) & GRRASP

Presenter: Boris Petrenj (Politecnico di Milano)

A Critical Infrastructure (CI) is an array of assets and systems that, if disrupted, would threaten national security, economy, public health and safety, and way of life (EC, 2008). Contemporary societies are increasingly dependent on availability, reliability, correctness, safety and security of CI. For improving resilience at the system level, it is important to understand and assess CIs vulnerabilities and interdependencies. The development of the DMCI (Dynamic Functional Modelling of vulnerability and interdependency of Critical Infrastructure systems) model started in 2012 (Trucco, Cagno, and De Ambroggi, 2012) with the objective to develop knowledge about how disruptive events or disturbances acting on CIs could spread to the whole network because of different types of interdependencies and affect businesses, end users and the entire society. The DMCI is a discrete event simulator that analyzes the behavior of modelled CI as a result of a threat impact to one or more of the infrastructure nodes. By describing CI from a functional point of view, it is possible to observe their behavior by means of the services they provide. The formalism of the DMCI model is characterized by:

- vulnerable nodes (susceptible to threats which can affect the node functionality);
- threats that cause missed service demand (MSD) in vulnerable nodes;
- interdependencies between different nodes;
- propagation of inoperability (disruption of node service due to cascading effects) and demand variations throughout the nodes of the same infrastructure and between interdependent CI.

The proposed methodological approach was previously applied to analyze the wider EXPO 2015 area in Milan (Italy), where 211 transport nodes under high service demand and electrical energy vulnerable nodes were mapped. The evolution of the DMCI model (DMCIe) happened within the Interreg project SICt (Security of cross-border Critical Infrastructures, 2018-2021). The project aims at strengthening the joint resilience capacities between Italy (Lombardy Region) and Switzerland (Canton Ticino) linked to events that may disrupt the continuity of critical transport infrastructures service with cross-border relevance. There are 424 nodes currently mapped covering transportation system nodes between Milan and Zurich. The DMCIe is integrated with the Geospatial Risk and Resilience Assessment Platform (GRRASP) web environment, and is continuously enhanced thanks to a collaboration between Politecnico di Milano and the Joint Research Centre (Directorate E - Space, Security and Migration, Technology Innovation in Security Unit).

The presentation will include approaches and types of analyses supported by the DMCIe-GRRASP with examples taken from past and current applications of the platform by the CIR unit in Lombardy Region Government. The simulation activities go through three broad phases:

- Vital Node Analysis (VNA) – focuses on identifying nodes with the property to influence and degrade the service capacity of the infrastructure system as a whole (critical nodes) and nodes that are susceptible to being disrupted by disturbances of other nodes in the system (sensitive nodes). This analysis is conducted through a simulation campaign in which each experiment assumed the total loss of functional integrity of one of the mapped nodes. The main results of the VNA carried out in the SICt project will be presented.
- Vulnerability analysis – the next step integrates the risk exposure of individual infrastructure nodes and the node vulnerability to such events. By adding the probabilities for specific hazards and threats, we come up with the integrated risk analysis. Static and dynamic parameters are specified to define the vulnerability (disruption-recovery) profiles of each node. For the needs of the SICt project, the vulnerability data will be collected from the Infrastructure Operators through the GRRASP interface. The integrated risk analysis done for the wider EXPO 2015 area in Milan will be shown.

— Critical Scenarios Analysis (Impact Analysis) – the selected scenarios of interest are simulated to assess their potential impact. The analysis supports the evaluation of possible protection and resilience strategies by varying simulation parameters. The example of the support for strategic decision making will be shown on a heavy snowfall event in Milan, which impacted a number of CI nodes simultaneously.

For each type of analysis, the main insights obtained from the simulations and the conclusions will be presented. Possible future improvements and developments are considered.

2.2 Decision making improvement, Romania's corner in JRC Risk Data Hub

Presenter: Francisc Senzaconi (Department of Emergency Situations, Romania)

The objective of the presentation were the following:

— Presentation of the main stages of the national risk assessment process in Romania;

— Presentation of the main components of the Methodology for National Risk Assessment;

— Presentation of the main results of the Sectoral Risk Assessments and of a comparison framework (risk matrix) for different types of risks - the national adaptation strategies to climate change were taken into consideration in this process;

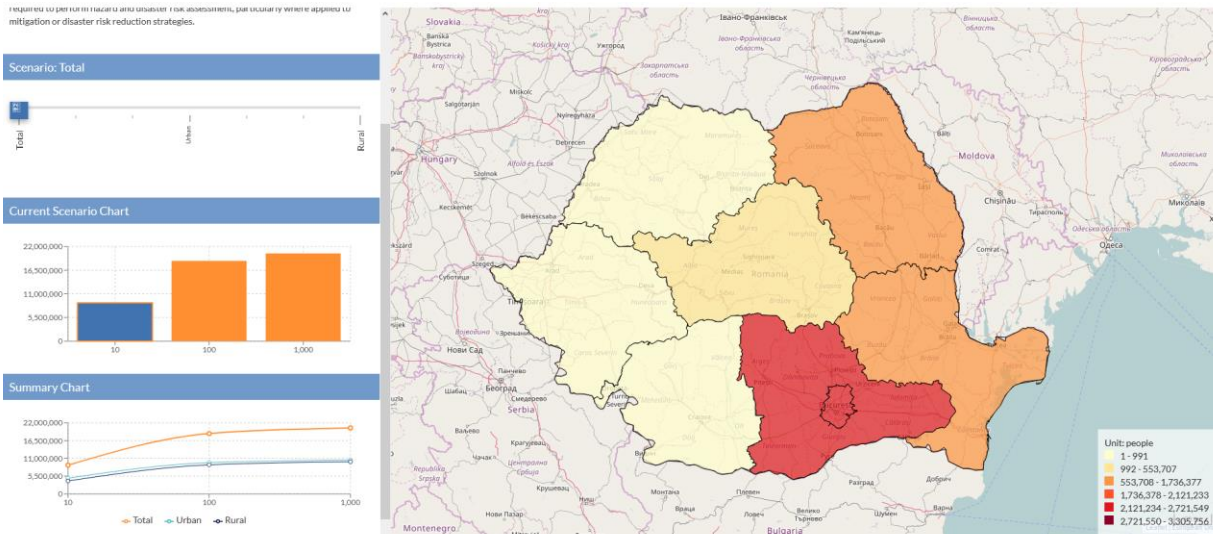
— Identification of the most important needs of the administrative system in order to improve the capability level of Romanian institutions involved in risk management related activities;

— Identification of the communalities between the Ro-Risk platform developed at local level and the DRMKC Risk Data Hub. The communalities and differences were discussed following the:

  - Loss and damage data. Recording and uploading on the Risk Data Hub. Analysis and scope of the L&D data used at national level: Sendai reporting, Solidarity Funds and NRA applications with local data.

  - Assessments of potential impacts and individual risk components. Methodological aspects and uploading on Risk Data Hub of risk data. Implementation of Exposure module at national level with local data (Figure 3).

Figure 3. Implementation of local data on the DRMKC RDH platform (case study: Population exposed to earthquakes in Romania)



The results presented are the outcome of an initial practical implementation of the RDH platform at local level started at the beginning of September 2019. The lessons learned from this initial phase of the collaboration has served to further develop the platform following the needs of local authorities.

Some advantages of using the Risk Data Hub, identified by the national authorities are presented below:

- The possibility of producing the NRA as a report automatically generated by the platform taking advantage of the template structure offered by the RDH. Even if not entirely achievable with the present level of development of the platform, this possibility was instantly identified and suggested by the national authorities. Moreover, a shift in the methodological approach will be possible, passing from the present deterministic to the probabilistic National Risk Assessment approach (supported by the RDH platform).
- Disaster Loss and Damage data, at the present stored at the level of various institutions can be uploaded and used on a shared platform. Different from the local Ro-Risk platform, this action will also automatically have as outcome aggregation of the data following the Sendai Targets that the country has to report yearly. Moreover, the uploaded events will be used in the "Event detailed analysis" module in association with various sources and modelled data given the opportunity to offer the magnitude of the event's impact. This is an information needed at national level for the Solidarity Fund Request. Moreover the possibility of directly accessing satellite products (EFFIS burned area, COPERNICUS impact areas etc.) through the platform was highly appreciated.

The difficulties mentioned are strictly related with the further technological developments that need to be addressed in order to allow the hosting of local data:

- The usability of the platform, also for non-specialist users, has to become an important objective in the future development of the platform. Further efforts need to be directed towards the uploading of the risk data. Users of the platform were being identified as local institutions and ministries, research centers and universities, owners of risk data directly involved in the risk related activities (NRA and SENDAI reporting contact points), which are potential users with various background.
- Applicability of the platform needs to be revised also towards the recording of loss and damage data. The need of an interface for recording of these data has been found essential.

2.3 Analysis of selected uses of satellite data for disaster risk management in Poland and potentially applicability in the DRMKC Risk Data Hub

Presenter: Jakub Ryzenko (Crisis Information Centre SRC, Poland)

The presentation reported the outcome of a short study conducted as an activation of the DRMKC Support Service on request of the Government Centre for Security in Poland. The study team defined and conducted initial assessment of usefulness of several satellite-based products for risk management. They can be developed on the basis of the monitoring products that are currently under development in the Polish space sector.

Data from EU Copernicus Programme enable continuous detection of surface water and provision of maps presenting areas affected by floods. In addition to use of such information to support operational activities during floods, this data can be collected over a long period of time and used to map areas that are flooded regularly. With several limitations it is possible to measure frequency of flooding events and length of time that specific area remain flooded. Availability of such information may offer a valuable support for risk assessment processes in Poland.

Satellite data combined with in-situ measurements enable monitoring of fire hazard (as well as monitoring of ongoing fires). Use of national meteorological data may represent an opportunity to further increase precision of already available monitoring information. This data can also be collected over a long period of time and used to generate analytical products for assessment of long-term fire hazards. The usefulness of such information for risk assessment activities in Poland requires practical validation.

The Government Centre for Security confirmed its interest in assessment of how flood and fire risk products may be used in the context of risk assessment and preparation of risk management plans. The use for reporting related to Sendai Framework is also of high interest.

Availability of such information may offer a valuable support for risk assessment processes in Poland. Below it's listed the data and products derived from satellite images and indicated as useful at national level:

Water extent

I. Current surface water cover

- A11 – Water cover map presenting the most recent information
- A12 – Water cover map presenting the most recent information about change of water extent

II. The amount of time with water cover

- A21 – Map of aggregated time of water occurrence
- A22 – Map of aggregated time of water occurrence for different types of land use
- A23 – Map of aggregated time of water occurrence for different types of crops in agricultural areas

III. The frequency of inundation

- A24 – Frequency of inundation map

IV. The maximum observed extent of water

- A31 – Map of maximum observed extent of water
- A32 – Map of maximum observed extent of water for different types of land use
- A33 – Map of maximum observed extent of water for different types of crops
- A34 – Map of maximum extent of water ever observed

V. Intensity of rescue operations and evacuations

- A41 – Map of intensity of rescue operations
- A42 – Map of intensity of evacuations

VI. Areas of long-term water retention

- A51 – Identification of areas of long-term water retention

VII. The assessment of land use/land cover in buffer areas around flood embankments

- A61 – Assessment of potential for removing flood embankments

Spread Of Fires

I. Map of weather conditions favourable for fire spread

- B11 – Map of weather conditions favourable for fire spread

II. Frequency of different classes of weather conditions favourable for fire spread

- B22 – Map of frequency of a specific class of weather conditions favourable for fire spread for different types of land use
- B23 – Map of number of days reaching specific class of weather conditions favourable for fire spread
- B24 – Map of number of days reaching specific class of weather conditions favourable for fire spread for different types of land use
- B25 – Map of number of days reaching specific class of hazard for protected areas

III. Intensity of rescue operations

- B31 – Map of intensity of rescue operations

IV. Assessment of risk for economic production in areas of high hazard of fire spread

- B41 – Map of risk for economic production in areas of high hazard of fire spread

OTHER TOPICS

I. Monitoring of agricultural droughts

- C11 – Map of current intensity of drought
- C12 – Map of drought influence for individual crops

II. Identification of correlation between road accidents location and related meteorological conditions

- C21 – Map of road accidents and incidents for specific meteorological conditions
- C22 – Map of active weather-dependent "black points"

The ongoing discussion consider possible pilot activities focused on provision of such products for selected regional authorities in Poland and conducting risk assessment activities (jointly with the Government Centre for Security and the Crisis Information Centre). Use of Risk Data Hub country corner functionalities for product provision and during analysis may represent a significant improvement of the process.

2.4 Using Risk Data Hub - Austrian showcases

Presenter: Chris Schubert (Climate Change Centre Austria - Data Centre)

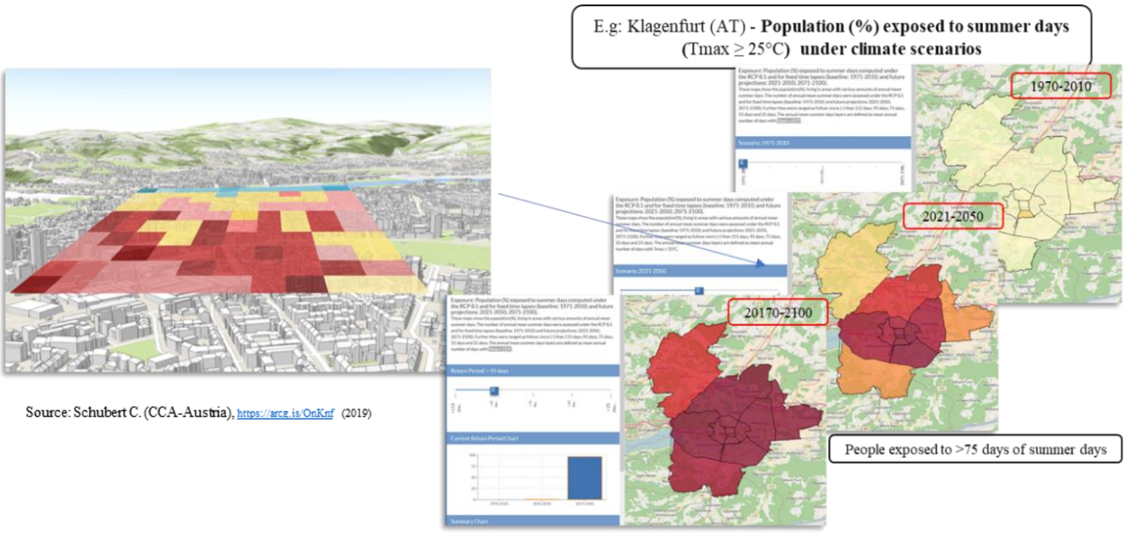
Disaster risk reduction strategies and actions plans on local and national level are in place because hazards and their impacts significantly endanger our society with growing wealth and increasing critical infrastructures. Aiming at a resilient economy and society it is crucial to identify respective hazards and to establish suitable prevention as well action and management plans. Any robust hazard estimation, based on observations, implicit information on events and its impacts are fundamentals on such actions. Although there is a variety of hazard data are available in Austria, a concise harmonized analysis and comparable reports are still very difficult.

Austria was actively involved within the DRMKC Support Service Initiative for testing and evaluating the Risk Data Hub to tackle the semantic gap on robust data with the scope to make information cross border comparable. Due to this activity, the RDH software environment will be part to set up an Austrian data base for collection, standardization and attribution of robust disaster event information. The given presentation is focusing to share experiences on developed data show cases. One example is based on a current research activity, the H2020 project CLARITY, http://clarity-h2020.eu, where ZAMG is involved to calculate climate scenarios for urban areas as base for climate adaptation. High resolution Data layers, like Austrian Climate Scenarios, the urban models with land use, population data will be visible as well information about identified hot spot areas with a high degree of vulnerability. A second show case that has just been started includes analysis of available INSPIRE data services regarding disaster risk information especially for national Sendai reporting. Public authorities and institutions are obliged to deliver data according the European directive by end of 2021. This study should identify synergies with the offered RDH Factsheets for reporting, but also to adapt the given INSPIRE data models, regarding Sendai indicators.

The presentation reflected the needs expressed at country level – Austria- in regards with the disaster risk data, management and use. Main issue is that the governance landscape and the data accessibility at local level bring limitations that are further transmitted on decision systems. For these aspects Risk Data Hub was used as possible answer trying to offer solutions for specific needs like Sendai reporting (confronting matters regarding Loss and damage data collection and definition, semantics and compliances with INSPIRE directive) and also climate change information use and implementation on a decision platform.

To reach conclusions 3 show cases were discussed and confronted against the RDH technical characteristics. In the case of Sendai reporting local data was uploaded on the platform and the analysis potential of the platform was assessed. Nevertheless, regarding the implementation of the climate change information the report described technical developments needed to be confronted even if practical test were not completed due to lack of data and time availability. Being an import issue and in order to complete the activity started with the present Support Service a continuation of the collaboration has been proposed and followed. This collaboration had a 2-fold development. First, a study case was identified with the purpose of using climate change data for an assessment of climate change impacts at city level – Klagenfurt (AUT) (Figure 4).

Figure 4. Combined climate data and local exposure data (case study – Klagenfurt)



The second is hosting of the outcome of Clarity project on Risk Data Hub. This activity came as a result of networking provided by CCA Austria, partners in the project. Both activities are focused on climate change impact on cities and the expected outcome of these activities would be first developing the platform for climate change information and second hosting projects outcomes (one of the RDH objectives).

2.5 Decision making improvement, Genoa's corner in JRC Risk Data Hub

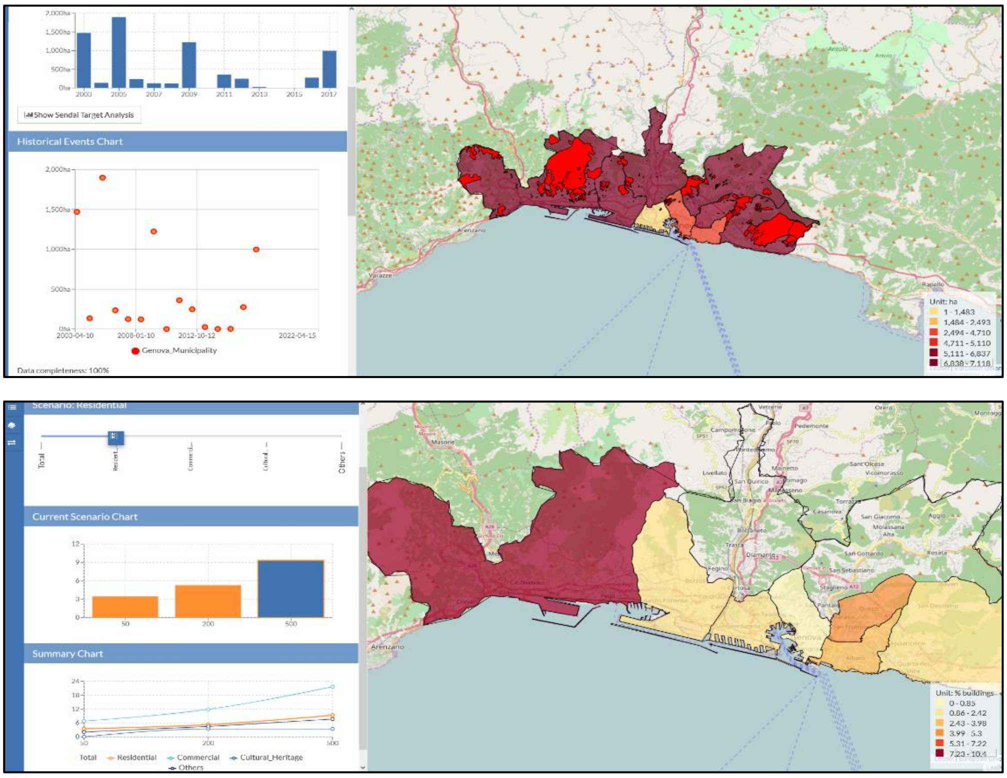
Presenter: Stefania Manca (Genoa municipality)

The Municipality of Genova is located in the norther-western part of Italy it's composed of a narrow coastal zone of almost 40 km long with hills and steep mountains in the backcountry. The fascinating landscape and landmark that characterize the local territory represent a severe constraint that conditions the town assessment. As well as many other medium-sized European cities, its territory is affected by different natural and anthropogenic phenomena that expose the territory and the population to serious risks. In particular, the urban environment of the city is extremely vulnerable to storms, violent rainfall, flash-floods, heat waves, wildfires, coastal erosion and other extreme weather events (storms surge, winds) that occur with increasing intensity and frequency. After the most recent flooding (2010, 2011, 2014), the City gained an increased awareness of its urban pattern fragility and the urgent need of adaptive measures to address this and any other threat related to the climate change effects. It applied to several EU project and initiatives with different roles, and from 2017 coordinated the Climate Adaptation Partnership of the Urban Agenda for the EU to empower city capacity building. In 2018, the municipality boosted the process to approve a holistic resilience strategy of the city that aim also to maximize the power of the relationship, partnership and stakeholder engagement to address the related effect of all shock and stress occurrences. DRMKC Risk Data Hub would help us to localize climate scenarios useful to realize our comprehensive risk assessment, as a key facilitator to empower both the decision making process and the evaluation of possible policy solutions.

The main objectives of the collaboration was to obtain a dynamic risk assessment process using local data. The main datasets identified were part of the Genoa Geoportal:

— resolution map (71 urban units - 3610 census sections);
— damages and losses data on recent past events;
— critical infrastructures (mapping, characterization towards risk assessment);
— building characterization;
— demographic distribution and characterization;
— environmental risk assessment;
— economic pricing;
— cultural heritage;
— climate change future impacts scenarios (peseta iii);
— indirect losses assessment methodology (social – community);
— high resolution and probabilistic hazard layers.

Figure 5. Implementation of local data from Genoa Municipality on the Risk Data Hub platform (Forest fire and flash flood disaster risk data)



Most of the datasets identified and the proposed analysis can satisfy the conditions needed to achieve the collaboration's objective. Nevertheless, up to date flash flooding and forest fire were among the first data to be addressed so far.

Due to the short period of collaboration, the huge amount of data needed, processed and the further elaboration and cluster aggregation of some dataset requested, the state of workflow show a local Preliminary Dynamic Risk Assessment Baseline that is already a great achievement at local scale.

To obtain a complete Dynamic Risk Assessment, it is necessary to take into consideration a further period of collaboration among the partners.

This suggestion to extend the co-working timeframe would give enough time to the WGs staff to complete in a self-sustainable way the elaboration of the dataset related to the influence that the socio-economic current data, as far as the capacity current data has at local scale, and to reach the direct and indirect economic loss data from the owners (agreements under definitions).

3 Conclusions

The technological support intended in the session is referring to web platforms that provides a set of tools and methods used to assess the potential impact of hazards on structures, social-economic dimensions and capacities at national and subnational levels. Showcases and feedbacks from local institutions were presented in order to improve their effectiveness and the integration of DRM concerns from local level into their development.

3.1 General considerations

If considered at the level of activity that helps discover needs at local level for the Disaster Risk management, the satellite images for DRM as presented by - the Government Centre for Security in Poland- is a topic that the RDH needs to address. Even if well covered at technological level - of hosting satellite-derived products on the platform- at the level of implementation and applicability of the satellite images for DRM, the collaboration provided valuable information. A comprehensive theoretical coverage for a wide variety of products for DRM derived from satellite data was proposed. The collaboration also offers insights about the usability of these products/data that once converted in information can address needs expressed at local level: Solidarity Funds, Sendai Reporting, NRA and National crisis management plans. These applications are already addressed in the RDH platform and the presentation confirmed the usability of the RDH platform to answer this need at national level.

The CCA Austria, in regards with the disaster risk data access, management and use, presented more results in the workshop. Three showcases were discussed and confronted against the RDH technical characteristics. Besides the Sendai reporting, the implementation of the climate change information addressed technical developments needed to be confronted on the RDH platform. This activity was highlighted in the presentation through usage of climate change data for an assessment of climate change impacts at city level – Klagenfurt (AUT) and through hosting projects outcomes (Clarity project).

The collaboration with DSU Romania and Municipality of Genoa had a common characteristic. The large amount of data made available by local authorities and the time and resources needed to the reach the scope of the collaborations. The technological development of the platform tends to follow the complexity of the work (in this case disaster risk assessment with all its complex components and analysis). The usability of the platform, also for non-specialist users, has to become another focus in the future development of the platform. Therefore, in order to have a complete assessment of the usability of the platform further efforts and a continuation of the collaboration period are foreseen. The collaboration continuity has also been foreseen on a series of obvious motivations that are listed below:

- Identifying incentives (e.g. loss and damage assessments processing with the benefit of learning from hundreds of similar events that have happened in the past) to enable the appropriate collaboration;
- Improving the institutional linkages to better connect local and the JRC platforms in areas of common interest (identification, implementation and evaluation of prevention and preparedness);
- Exchanging experiences on the collection and structuring of data, information and knowledge;
- Identifying priority areas and improve the links to support collaboration (e.g. integration of response policies, plans and action)

3.2 The feedback received can be grouped as follow:

3.2.1 Technical feedbacks:

There is a need of connectivity between the JRC's DRM platforms.

An interface user friendly for uploading the records on loss and damage data on the RDH platform is needed. In addition, the connectivity between the RDH and Sendai Reporting platform was requested.

The usability of the platform, also for non-specialist users, has to become another focus in the future development of the platform. Further efforts needs to be directed towards the uploading of the risk data. Users of the platform were being identified as local institutions and ministries, research centers and universities, owners of risk data directly involved in the risk related activities (NRA and SENDAI reporting contact points), which are users with various background.

The possibility of producing the NRA as a report automatically generated by the platform taking advantage of the template structure offered by the RDH. Even if not entirely achievable with the present level of development of the platform, this possibility was instantly identified and suggested by the national authorities. Moreover, a shift in the methodological approach will be possible, passing from the present deterministic to the probabilistic National Risk Assessment approach (supported by the RDH platform).

3.2.2 Data:

Most of the datasets identified and the proposed analysis hosted on the platforms satisfy the conditions needed to achieve the main objective at local level. Nevertheless, the issue of data availability and governance was raised. Even from local/national level, data ownership is obviously divided among institutions and departments of various institutions. Likewise, the involvement in collaborative activities - such as the one presented in the session - and accessibility to disaster risk data depends largely on the involvement in previous projects with national and regional scope of the local institution.

Disaster Loss and Damage data, at the present stored at the level of various institutions can be uploaded (following a predefined file structure) and used on a shared platform. Different from the local platforms, this action will also automatically have as outcome aggregation of the data following the Sendai Targets that the country has to report yearly. Moreover the possibility of directly accessing satellite products (EFFIS burned area, COPERNICUS impact areas etc.) through the platform was highly appreciated.

3.2.3 Strategic feedback:

The process of data analysis in support of DRM is time consuming, mostly because of identifying the suitable data for the scope of the collaborations. Consequently, in order to have sustainable activity and results a constant and continuous collaboration period is needed, as suggested in meeting.

3.3 Follow-up actions

The workshop become also the basis for a series of follow-up actions involving the participants, strengthening the partnerships and collaborations for common goals. Follow-up actions identified:

Cooperation between the DRMKC RDH and CESARE (CollEction, Standardization and Attribution of Robust disaster Event information - project financed by the Austrian Federal Ministry of Interior and Federal Ministry for Sustainable Development) regarding the development of a software and architecture environment based on/ using the existing code of RDH. The implementation should result in an Austrian Risk Data Base and platform.

Sharing a common goal with LODE project (https://www.lodeproject.polimi.it/) financed by DG ECHO, and intended for the sustainability of these activities it is foreseen an important collaboration: RDH-CESARE-LODE. The outcome of this collaboration is foreseen to bring technological development for RDH in agreement to local needs.

Cooperation on using RAPID-N and GRASSP for risk assessment on industrial infrastructure and critical infrastructures respectively for the municipalities of Genoa and Linz. The outcome of this collaboration will be hosted on dedicated space on RDH.

List of abbreviations and definitions

CCA-Austria	Climate Change Centre Austria
CESARE	CollEction, Standardization and Attribution of Robust disaster Event information
DG ECHO	Directorate-General for European Civil Protection and Humanitarian Aid Operations
DRM	Disaster Risk Management
DRMKC	Disaster Risk Management Knowledge Centre
RAPID-N	Rapid Natech Risk Analysis and Mapping System
GRASSP	Geospatial Risk and Resilience Assessment Platform
RDH	Risk Data Hub
LODE	Loss Data Enhancement project
SDGs	Sustainable Development Goals
WCDR	World Conference on Disaster Reduction

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