



## Deliverable D6.2

# Report 1 of Workshops in Application Case Studies

Revision	Organization	Date
Written by	University of Twente	20-03-2023
Checked and approved by	UB, NRC, UNIVIE, ITU	30-03-2023
Validated and released by	University of Twente	31-03-2023

## Information Table

Deliverable Number	D6.2
Deliverable Title	Report 1 of Workshops Application Case Studies
Version	V3
Status	Final
Responsible Partner	University of Twente
Contributors	Funda Atun, Ruxandra Mocanu, Iliana Armas, Silvia Cocuccioni, Lotte Savelberg, Elske van Zeeuw de-Dalfsen, Philipp Marr, Seda Kundak, Caglar Goksu, Till Wenzel, Dinand Alkema, Pauline Kruiver
Contractual Date of Delivery	31-03-2023
Actual Date of Delivery	31-03-2023
Dissemination Level	PU – Public

### Abstract

This deliverable F6.2 is the first report of the stakeholder workshops that have been organized in the period from January to April 2023 in the four application case studies of the EU Horizon Europe PARATUS project (<https://www.paratus-project.eu/>): Istanbul (Turkey), Sint Maarten (Caribbean), Brenner (Austria) and Bucharest (Romania). Due to the earthquakes that occurred in Turkey and Syria in February 2023, the workshop planning in Istanbul and Bucharest was changed. Nevertheless, stakeholder workshops have now been organized in all four application case studies in the project. As co-development is a very important component of the PARATUS project, the stakeholder involvement in the process was crucial, for the hazard identification, brainstorming on impact chains, for historical disaster events, analysis of possible changes expected in the area, and an evaluation of the needs and expectations of the stakeholders. This report provides an overview of the workshops and presents the main finding. The workshops are the first in a series where co-development of the PARATUS platform will depend on.

## Document History

Version	Date	Author	Description
V1	08-03-2023	Funda Atun (UT)	Made the skeleton of the deliverable
V1	10-03-2023	Seda Kundak (ITU)	Extended the part on the workshop in Turkey
V1	13-03-2023	Lotte Savelberg (NRC), Dinand Alkema (UT), Elske van Zeeuw de-Dalfsen (KNMI), Pauline Kruiver (KNMI)	Extended the part on the workshop in the Caribbean
V1	15-03-2023	Philipp Marr and Till Wenzel (UNIVIE)	Provided input for the case study in the Alps
V1	17-03-2023	Silvia Cocuccioni (EURAC)	Provided input for the section on impact-chain
V1	23-03-2023	Ruxandra Mocanu and Iuliana Armas (BU)	Provided feedback for the workshop in Romania
V2	25-03-2023	Funda Atun (UT)	Integrated and harmonized all contributions from the various parts
V2	28-03-2023	Bettina Koelle (RCCC)	Review of the document
V3	30-03-2023	Funda Atun (UT)	Final version made
V3	31-03-2023	Cees van Westen (UT)	Submitted the deliverable

### Disclosure Statement:

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The deliverable 6.2 has been submitted to the European Commission on 31/03/2023 and is waiting for approval by the Research Executive Agency. Therefore, this current version may not represent the final version of the deliverable.

### About PARATUS:

The PARATUS project aims to increase the preparedness of first and second responders in the face of multi-hazard events and to reduce the risks related impacts on various sectors resulting from complex disasters. The outcome is to develop an open-source cloud-based Online Service Platform that offers support in reducing dynamic risk scenarios and systemic vulnerability caused by multi-hazard disasters. To achieve these objectives, the project will perform in-depth assessments of complex interactions between hazards and their resulting impacts on various sectors, analyse the current risk situation and study how alternative future scenarios could change multi-hazard impact chains. Based on these analysis, scenarios of multi-hazard

impacts will be co-designed and developed with stakeholders in four case study areas (including the Caribbean, Romania, Istanbul, and Alpine regions).

## List of Acronyms

Acronym	Definition
AIT	Asian Institute of Technology
ASFINAG	Autobahn and Schnellstraßen-Finanz-Aktiengesellschaft
BCP	Brenner Corridor Platform
BFW	Federal Research and Training Centre for Forests, Natural Hazards and Landscape
DSU	Department for Emergency Situations
ENGAGE	ENGAGE is a EU-funded project, started in July 2020, whose mission is to provide novel knowledge, impactful solutions and emergency response guidelines for exploiting Europe's societal resilience
EURAC	EURAC Research
GBA	Geological Survey
GDES	Gender, Diversity, Ethics and Security
GDPR	General Data Protection Regulation
IGSU	Romanian General Inspectorate for Emergency Situations
IMM	Istanbul Metropolitan Municipality
ITU	Istanbul Technical University
KNMI	Royal Netherlands Meteorological Institute
M	Month
MDLAP	Operative Centre for Emergency Situations
NLRC	Netherlands Red Cross Caribbean
ÖBB	Austrian Railway
PARATUS	Increasing Preparedness and Resilience of European Communities by Co-Developing Services Using Dynamic Systemic Risk Assessment
RAN	Resilience Advisory Network
RCCC	Red Cross Red Crescent Climate Centre
REA	European Research Executive Agency
UB	Universitatea din Bucuresti
UNIVIE	Universitat Wien
UT	University of Twente
WLV	Torrent and Avalanche Control

WP	Work Package
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## Executive Summary

WP6 demonstrates the work process of the application case studies and project coordination. WP6 includes 15 deliverables. The work package sets out the activities and actions that need to take place, and information on implementation specifically in four application case study areas individually and horizontally. Additionally, WP6 includes information on project management that is structured so that technical issues are managed separately from finance and administration.

This deliverable F6.2 is the first report of the stakeholder workshops that have been organized in the period from January to April 2023 in the four application case studies of the EU Horizon Europe PARATUS project (<https://www.paratus-project.eu/>): Istanbul (Turkey), Sint Maarten (Caribbena), Brenner (Austria) and Bucharest (Romania). Due to the earthquakes that occurred in Turkey and Syria in February 2023, the workshop planning in Istanbul and Bucharest was changed. Nevertheless, stakeholder workshops have now been organized in all four application case studies in the project. As co-development is a very important component of the PARATUS project, the stakeholder involvement in the process was crucial, for the hazard identification, brainstorming on impact chains, for historical disaster events, analysis of possible changes expected in the area, and an evaluation of the needs and expectations of the stakeholders. This report provides an overview of the workshops and presents the main finding. The workshops are the first in a series where co-development of the PARATUS platform will depend on.

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## 1 Introduction to WP6 and D6.2

WP6 includes activities about the application case study coordination, project coordination, reporting and communicating and quality assurance. WP6 sets out the activities and actions that need to take place, and information on implementation specifically in four application case study areas individually and horizontally. Additionally, WP6 includes information on project management that is structured so that technical issues are managed separately from finance and administration. In total WP6 includes 15 deliverables (Table 1).

The objectives of D6.2 are:

- To report the result of the first six months of the activities conducted in the application case study areas
- To share the methods conducted in the application case study areas and the lessons learnt
- To share the follow up planning

*Table 1: PARATUS Deliverables D6.1 – D6.15*

#	Name	Due date (month)	Description
D6.1	Strategy and case study protocols	6	Strategy, case study protocols, including template for follow up, overall coordination
D6.2	Report 1 of workshops in application case study area	6	Reports on workshops in application case study areas
D6.3	Report 2 of workshops in application case study area	18	Reports on workshops in application case study areas
D6.4	Report 3 of workshops in application case study area	24	Reports on workshops in application case study areas
D6.5	Report 4 of workshops in the application case study area	38	Reports on workshops in application case study areas
D6.6	Project management plan	3 (submitted)	Project management plan
D6.7	Initial project risk management plan	6	Initial project risk management plan
D6.8	Updated project risk management plan	18	Updated project risk management plan
D6.9	Final project risk management plan	36	Final project risk management plan
D6.10	Initial data management plan	6	Initial data management plan including data security aspects
D6.11	Updated data management plan 1	18	Initial data management plan 1 including data security aspects
D6.12	Updated data management plan 2	36	Initial data management plan 2 including data security aspects,
D6.13	Final data management	48	Final data management plan including data security aspects
D6.14	Draft gender, diversity, and ethics (GDE) plan	12	Lead Beneficiary: UT
D6.15	Final gender, diversity and ethics (GDE) plan	36	Lead Beneficiary: UT

## 2 Background information

In PARATUS project we have four application case study areas that are selected to implement the methods developed in PARATUS, together with the local or regional communities and authorities. The case study areas are selected considering combinations of the following aspects:

- Natural and anthropogenic hazard interactions.: extreme weather events and associated events, geophysical hazards, slow-onset trends, anthropogenic threats.
- Assets and vulnerabilities in different sectors: social aspects, human health, cultural heritage, environment and biodiversity, public financial management and key economic sectors.
- The scale of analysis: international, cross-border to local applications. Three of them are located in the periphery of the EU, which generally does not receive equal attention with respect to international research efforts but have high levels of vulnerabilities and significant proportions of disadvantaged groups.

We plan various activities in the four application case study areas. These activities are:

- Kick-off meeting including needs and requirements workshop with internal stakeholders and project partners (M01)
- Case study workshops with external stakeholders – separately within each application site (M02-M04)
- Mid-term meeting with stakeholders and project partners – (M16)
- Case study progress and evaluation meetings – separately within each application site (M20-24)
- Mid-term meeting with stakeholders and project partners – (M34)
- Case study evaluation meetings – separately within each application site (M32-M38)
- Final project meeting with stakeholders and project partners (M48). The last meeting will be linked with an international conference.

As the overall aim of the PARATUS project is to co-develop an open and online platform together with stakeholders for stakeholders, stakeholder engagement is the key to the success of the project. The PARATUS project, therefore, aims to engage with representatives from a wide range of sectors related to Disaster Risk Management to gather insights, knowledge, and expertise, and to ensure that the project results are relevant and of high quality. In PARATUS we will build a network of stakeholders.

The Impact Chain Approach was adopted as a guiding tool to gather structured information from the stakeholders during the Application Case Studies Workshops.

### 2.1 Impact Chain Approach<sup>1</sup>

Impact chains are conceptual models of climate (and disaster) risks that have been developed to streamline the analysis of climate-related impacts and provide a structured framework for the comprehensive

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<sup>1</sup> For more information, please visit deliverable 1.1 (M10) and deliverable 1.2 (M20).

assessment of related risks following the comprehensive risk management framework (UNDRR 2022). Impact chains are a powerful methodology to elicit, conceptualize, represent, and share a body of knowledge about climate risks within a given geographical and temporal scope. They describe in an intuitive, graphical, and logical description the complex chain of cascaded impacts induced by possibly compounded climate-related events and trends (see Figures 1 and 2). Such description includes other relevant risk-related factors, e.g., exposed systems and vulnerabilities. Within the resulting conceptualization of hazard and impact cascades, adaptation measures of different types can be identified, such as early warning systems, ecosystem-based adaptation, capacity building, and technical as well as socio-economic measures.

Impact Chains can be developed through a participatory approach (e.g., working with subject-matter experts), or by desktop-analysis of empirical evidence and scientific literature. Impact chains can be used to understand risks from a conceptual perspective and can provide a consistent framework for a semi-quantitative assessment, e.g., with composite indicators or a structured qualitative assessment (e.g., Schneiderbauer et al. 2020; Estoque et al. 2022).

They are widely used in climate risk assessment at national and regional scale (Fritzsche et al. 2015; Zebisch et al. 2017; 2021; 2022) and recently also included into an ISO standard (ISO/IEC 2020). Within PARATUS they are adopted in the four Application Case Studies to analyse future events and in Learning Case Studies to analyse specific past events. The Application case study workshops described in this Deliverable focus on the participatory approach which was used to build the preliminary draft Impact Chains. The desktop-analysis to further refine the Impact Chains will follow; this will include better defining and describing the different elements and connections which constitute the Impact Chains, through the collection and analysis of quantitative and qualitative data.

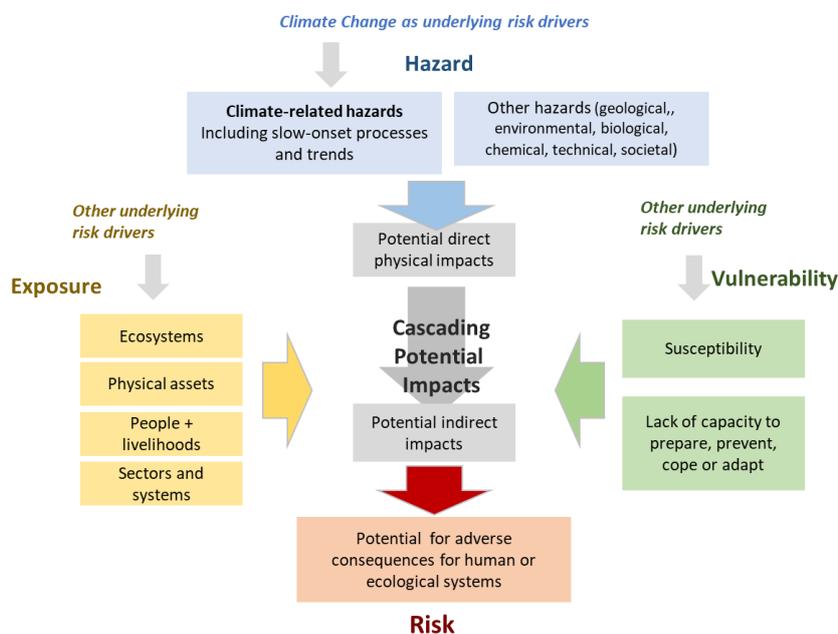


Figure 1: General structure of an impact chain of conceptualisation of cascading and compounding hazards and impacts and their adverse consequences for various human and ecological systems.

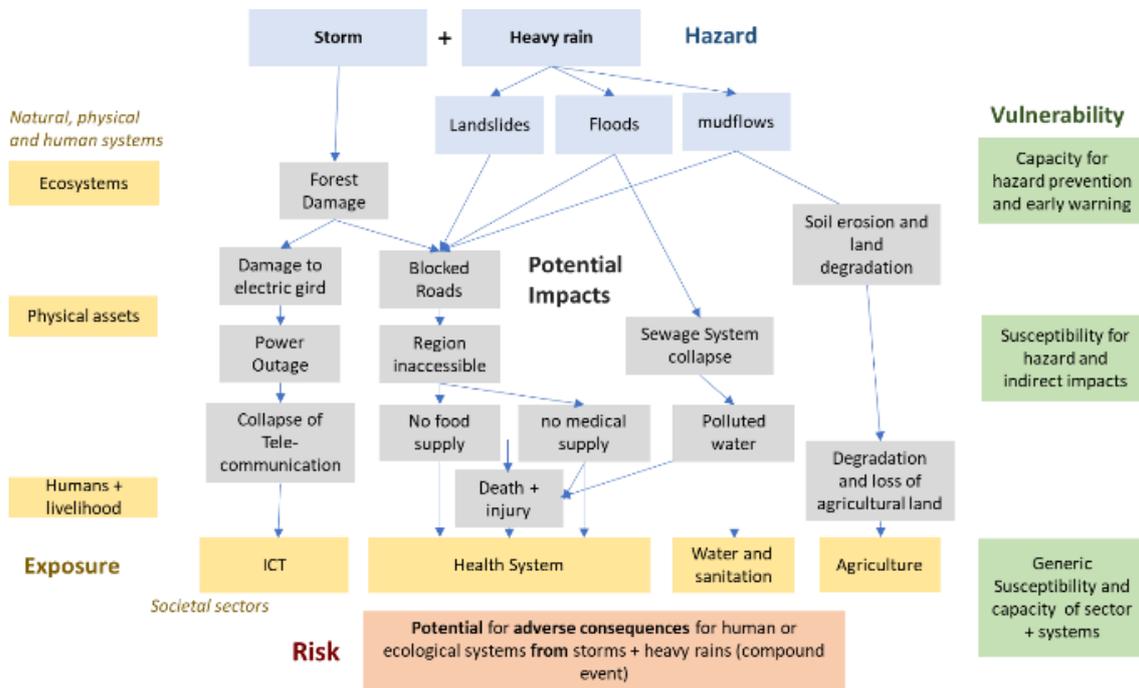


Figure 2: An example of conceptualisation of cascading and compounding hazards and impacts and their adverse consequences for various human and ecological systems.

## 2.2 Selection of Stakeholders<sup>2</sup>

The PARATUS project engages with stakeholders at different levels, depending on their characteristics, interests, and relevance to the project. Stakeholders will be informed, consulted, involved, collaborated with, or empowered, according to their level of interest and influence. The project uses the five engagement levels defined by the International Association of Public Participation (IAP<sup>2</sup>) to ensure a balanced representation of all stakeholder groups. The goal is to empower stakeholders through the development process and the knowledge gained, so that they can decide whether to adopt or boost the final developments and endorse the uptake of the project results. We implement a stakeholder analysis process to identify which stakeholder groups shall be involved within the activities of the project. In parallel, together with the interested stakeholders we are building a PARATUS Stakeholder Hub in an online and offline environment to facilitate active engagement with other crisis management professionals (including first and second responders) and relevant stakeholder groups. This allows us to create synergies with the Societal Resilience Cluster, an informal, voluntary, and free subset of the Community for European Research and Innovation for Security (CERIS) and in particular the Disaster Resilient Societies (DRS) community made-up of EU projects working on different aspects of Societal Resilience. With the start of the project, the relevant stakeholders have been defined for each of the four application case studies, covering the Caribbean islands, Alps, Romania, and Istanbul Metropolitan. During the kick off meeting and the first external stakeholder workshop, their needs and requirements are analysed, and priority groups are established. The goal of this project is to effectively communicate the value proposition of PARATUS to various stakeholder groups through clear, tailored messages. The communication style will be adapted to the specific type of stakeholder, with a focus on delivering relevant and meaningful content. The key messages for each stakeholder group will be formulated and refined over the course of the project.

<sup>2</sup> For more information, please visit Deliverable 5.1 (M3) and Deliverable 5.2 (M24)

### 3 Reports on Application case studies

This section includes the reports of the activities during the six months of the project in four application case study areas: Caribbean, Istanbul, Alps and Bucharest.

#### 3.1 Caribbean

Climate change has already turned into crises in island states. That is why one of the PARATUS case studies focuses on Caribbean islands that are part of Europe (especially the Netherlands islands of Bonaire, St. Eustatius and Saba), but additionally, considers the Caribbean in a wider context by including cross-border issues. The main hazards are tropical storms (with their associated hazards such as extreme wind and rainfall, leading to windfall, storm surge, flash floods, debris flows and landslides), earthquakes, tsunamis, volcanic eruptions (and associated hazards, such as ash cloud dispersal), pyroclastic flows, lava flows and lahars). The Caribbean case study focuses on the development of a multi-hazard early warning dashboard (KNMI is the lead partner) which will link to exposure and vulnerability modelling. The dashboard will derive an impact-based forecast that can be directed at humanitarian response planning by the Netherlands Red Cross (as key stakeholder) and its Caribbean branches. Another sector that will be considered is the telecommunication sector, since it may be impacted by tropical storms, resulting in an impact on emergency response, and on economic sectors such as tourism. During previous hazardous events in the area this enhanced the impacts tremendously.

##### 3.1.1 Kick-off meeting

In December 2002, the PARATUS partners involved with the Caribbean case study came together for the first time. Partners included in the kick-off meeting were KNMI as case study leader, NLRC as the main stakeholder, UNU-EHS, University of Twente EEMCS department, and ITC. We looked into the seven main variables in the Caribbean, being the presence of natural hazards, technical hazards, migration challenges, access to stakeholders, the governmental strength, Red Cross branch stability, the access to meteorological and vulnerability data, and the presence of cross border issues. Based on these variables, we decided to initially focus this case study on St Maarten and St Vincent. The case study in St Maarten has a focus on meteorological hazards, the case study in St Vincent will focus on volcanic hazards.

During the kick-off meeting, we started planning the organization of the first stakeholder workshop on St Maarten, and we planned to include stakeholders from Saba and Statia as well. Due to a lack of access to stakeholders on the French side of St Maarten, we only focused on the Dutch side for now.

Additionally, a workshop will be organized in St Vincent in June 2023, to understand impact chains from volcanic hazards and zoom in to the higher-level stakeholders, whereas the workshop in St Maarten focused more on the practitioners involved with DRM.

### 3.1.2 Application case study workshop with external stakeholders



The first application case study workshop took place in Simpson Bay, Sint Maarten on the 1<sup>st</sup> and 2<sup>nd</sup> of March 2023. The workshop was jointly organized by 510 and initiative of the NLRC, the NLRC delegation in the Caribbean, KNMI and ITC. The stakeholder selection was led by the NLRC in the Caribbean. Their contacts were vital to get in on contact with important players in the region who work in a broad sense on (natural) hazards. During the selection process, in communication

with WP5, the following groups were identified: decision makers & public bodies, practitioners, critical infrastructure, transportation, civil protection, insurance companies, society & citizens, related projects and research. In total 25 stakeholders were present during the workshop. A list of the stakeholders can be found in Annex 2.

The workshop aimed to build up a relation with and between the different stakeholders, to get to know the project as well as methodological approaches and most importantly, listen to the needs, requirements of the stakeholders and how they want to contribute to PARATUS. Additionally, the goal was to provide a mutual understanding of partners and stakeholders with regard to the development of a multi hazard risk platform and to create a mutual understanding of impact chains. A means to achieve the goals was using the historic events of the Hurricane Irma and Covid-19 as examples of hazards and impacts.

During the workshop, past disasters were discussed, and the origin and impacts of these disasters were considered. Furthermore, first exemplary impact chains were created, which visually represent the consequences and effects of a hazard event. This workshop represented the first step in co-developing tools for better decision-making and reducing the amount of people affected by disasters and systemic risks. The workshop was structured into 2 days. The agenda is included in Annex 1.

The workshop design was centred around five discussion topics, in line with what was suggested by the Impact Chain guidelines provided by EURAC and RCCC before the workshop: 1) past hazardous events, 2) relations between impacts, 3) the priorities of the stakeholders, 4) how stakeholders expect future hazardous events to look like and 5) how they prefer to collaborate with PARATUS. These so-called focus groups were designed as participative sessions to elicitate interaction between the stakeholders and to structure the discussion around predefined questions.

The participants that were present in the room divided themselves in three groups, loosely based on three perspectives: government, responders and telecommunication. A fourth group, moderated by KNMI, joined the discussions online. During each focus group session, participants were free to choose the group they wanted to participate in by joining one of the three tables in the room. Remarkably, participants did not always choose the perspective that they “belonged” to base on their job responsibilities. Especially the

telecommunication group received a lot of attention from the stakeholders. This was due to the failure of these critical instruments/networks during previous hazard events.

The challenge of the workshop was to find a balance between giving freedom to the stakeholders to discuss the topics as they saw fit (and let the discussions develop naturally) and to ensure that the required information was collected without steering the participants into 'desired' directions. This was done by first giving a general overview of the aims of PARATUS and next giving all participants the opportunity to reflect on their role during past events (hurricane Irma, the COVID pandemic, earlier events, ...). Finally the ideas behind the impact chains were explained. This resulted in a workshop mix of presentations, focus group discussions, feedback sessions and informal discussions.

### 3.1.2.2 Methods in the workshop

During the workshop all focus groups were designed around the needs of the stakeholders. A user-centred design approach was the basis of the success. The focus groups were divided through three perspectives, being one group that focused on the governmental aspects, one that focused on the response, and one on the telecommunication. The fourth, online, group was a mix of perspectives. The composition of the online group varied during the workshop with participants joining and leaving online depending on their availability. Although the group composition was not constant, it was useful for the stakeholders who could not be present in person at Sint Maarten to share their ideas and opinions.

The primary concern of the participatory stakeholder workshop is the engagement of participants and the collection of their ideas. Participation is regarded as essential for the Caribbean Application Case Study for the natural hazards and impacts, and especially for the co-development of the platform.. Each table was equipped with basic topographic maps from Saba, Statia, and St Maarten, to better visualize hotspot areas as well as guiding questions. Per focus groups, A0 sheets with the leading questions were provided to guide the discussion and the outcomes. The aim of these exercises was to assess and map potential occurrence of different types of natural hazards. This in turn might help the PARATUS team to consider single hazardous events as well as their interactions. Furthermore, buzz groups, informal one on one discussions, were implemented in the workshop. Plenary discussions with different parts of activity were also part of the interaction with the stakeholders. With this variety of methods, we anticipated to keep the workshop environment lively. The interaction with the Alps Application Case Study workshop proved to be a good opportunity in showing PARATUS as wider than just the respective Application Case Study. And interestingly, even during the rather short period of interaction between the two Case Studies striking similarities came up, such as the way isolated communities are self-reliant after hazards and their dependencies on communication mechanisms.

### 3.1.2.3 Agenda

The agenda was developed beforehand with the other Application Case Studies in order to have comparable approaches and results at the end of the workshop. To meet the specific needs of the local stakeholders in the Caribbean Application Case Study, the PARATUS partners slightly adjusted the agenda. This meant that special focus was put on the communication perspective, and how the project would answer the needs of the local community. The agenda was communicated to the stakeholders before the meeting. Most of the

stakeholders were present at the venue on St Maarten. Some stakeholders and PARATUS partner KNMI joined the kick-off online. The online focus groups were moderated by KNMI.

### **Day 1:**

The first external stakeholder day started with an overview of the PARATUS project and its partners. Then the participants were given the opportunity to present their experience and knowledge related to hazards. Next, participants were split up into three groups with one moderator on each table (see above) and the online discussion platform was opened for the online participants. The first focus group in the morning dealt with past events, whereas the second focus group in the afternoon discussed the relation between different impacts. In addition, first exemplary impact chains have been set up. Following each participatory section, the outcomes were summarized by the moderators or one of the stakeholders and shared with the entire group. Additionally, the chance was given for stakeholders and partners to contribute with ideas, concerns as well as wishes. To conclude, especially the knowledge of the stakeholders about past events and present hazards helped to understand the needs of the local stakeholders.

### **Day 2:**

In the morning the Alps workshop connected online via MS Teams to the stakeholder workshop of the Caribbean Application Case Study which was held on the same day but in a different time zone. Participants from both workshops prepared short questions which were answered by the participants of the other workshop and further discussed. This showed very interesting perspectives related to being an isolated community and to telecommunication.

After the short joint session, the idea for a co-developed multi-risk platform was presented and discussed in detail. Building on this knowledge future scenarios were identified with the stakeholders in the focus groups of the second day. Additionally, the next steps and future plans were formulated, and it was stressed that this project thrives due to co-development and collaboration. Interests of the stakeholders were collected as well as their wishes and needs. The following steps were also discussed and included individual talks, meetings and/or interviews with certain key stakeholders, e.g., to gather information and data concerning the learning case studies and past events to develop impact chains. Updates regarding the project and further developments will be communicated to the participants. The entire program is shown in Annex 1.

## **3.1.3 Focus Group Reports**

### **Focus groups Part I: Past events (01.03.2023,11:00-12:15)**

The main questions during this session were:

- Which are the main natural hazards the area is prone to?
- What are the impacts of these hazards?
- What are the main events you experienced in your career and what was your role?
- How did past events affect different sectors?
- Where did the past events occur?

During the discussion of the past events, hurricanes Louise and Irma were addressed, but also the COVID response. Important insights are the effectiveness of drawing on the maps of the islands to indicate which

impacts occurred and the location of the impacts. For the island of St Maarten, which has a Dutch part and a French part, it became apparent how this division not only presented a language barrier during the response, but also results in a mismatch between local organizations and international relief organizations working on either side of the border.



Figure 3: During the focus group discussion in Caribbean Island

#### Focus groups Part II: Understanding the impact relations (01.03.2023, 13:30 -15:00)

The main questions focused on were:

- What are the main impacts based on the criteria in Impact Chain diagram?
- What are the risks related to these events?
- Which exposed systems are directly affected by the events?
- What are the indirect impacts of the event?
- What elements make the system and actors even more vulnerable?

During the discussion of the impact relations, it was very useful to use the method of impact chains to understand the cascading events related to a hazard. An important additional impact that was discussed is the effect on the mental health of (first) responders and how this affects their decision making.

#### Focus group Part III: What do you need? (01.03.2023, 15.30 - 16.30)

The main questions discussed during this focus group were:

- For your decision making – on which components of the mapping we have been doing do you need more information?
- Which tools would you need for this decision making?
- Which kind of data / information do you need for it?
- How can the platform be interactive?
- How does a user-friendly platform look like?
- In which phase of disaster management do you want to use the platform?

- What information do you need in which phase?

During the discussion of what is needed for better decision making, the requirements of accurate information during a disaster was discussed elaborately. Additionally, impact chains were acknowledged as a useful tool to pinpoint mitigation measures for cascading impacts before a hazard occurs.

#### **Focus groups Part IV: Scenarios and future challenges (02.03.2023,10:00-11:00)**

Inspirational questions for this focus group were chosen from this list:

- Which (additional) hazards do you expect to be a main challenge in the future?
- Which are the impacts you can think of regarding future challenges?
- Which tools would you need to tackle future challenges?
- For which hazards are you well prepared and which not?
- What trends do you expect in the future?
- Which underlying risk factors are potentially increasing risks?
  - Population growth
  - Economic instability
- How can adaptation decrease the risks?

During the discussion on future scenarios, stakeholders' focus of discussion was about the level of preparedness for hurricanes – which is generally considered sufficient. However, improvements are possible and necessary in the collaboration between the islands and in the preparedness for other hazards such as earthquakes or tsunamis.

#### **Focus groups Part V: Stakeholders' interests and needs (02.03.2023,11:30-12:30)**

During the last focus group, the guiding questions were:

- Which of the desired tools from focus group part I and II can be used for the PARATUS platform?
- In which ways do you want to be involved in PARATUS?
- How can PARATUS involve you / your organization in the project?
- What makes a cross-border cooperation efficient?

In the discussion of the next steps, we clearly identified the need to actively report back to the stakeholders. They not only expressed their willingness to collaborate, but also to be kept up to date. Additionally, we identified other stakeholders that should be involved in the next steps.

The results, notes and pictures from the focus groups are included in Annex 3. There was a lot of positive energy in the room. There were lively discussions in the focus groups with a lot of interaction between the participants. It was also interesting to observe the discussion between the participants from the different islands (St. Maarten, Saba and Statia) on how things were done slightly different and how they recognised each other's mutual dependencies.

### 3.1.4 Preliminary Impact Chains

As part of the workshop draft impact chains were developed during the 2<sup>nd</sup> focus group. One example from the communication focus group is shown in Figure 4. The draft impact chains from the other focus groups are included in appendix 6.1.3.

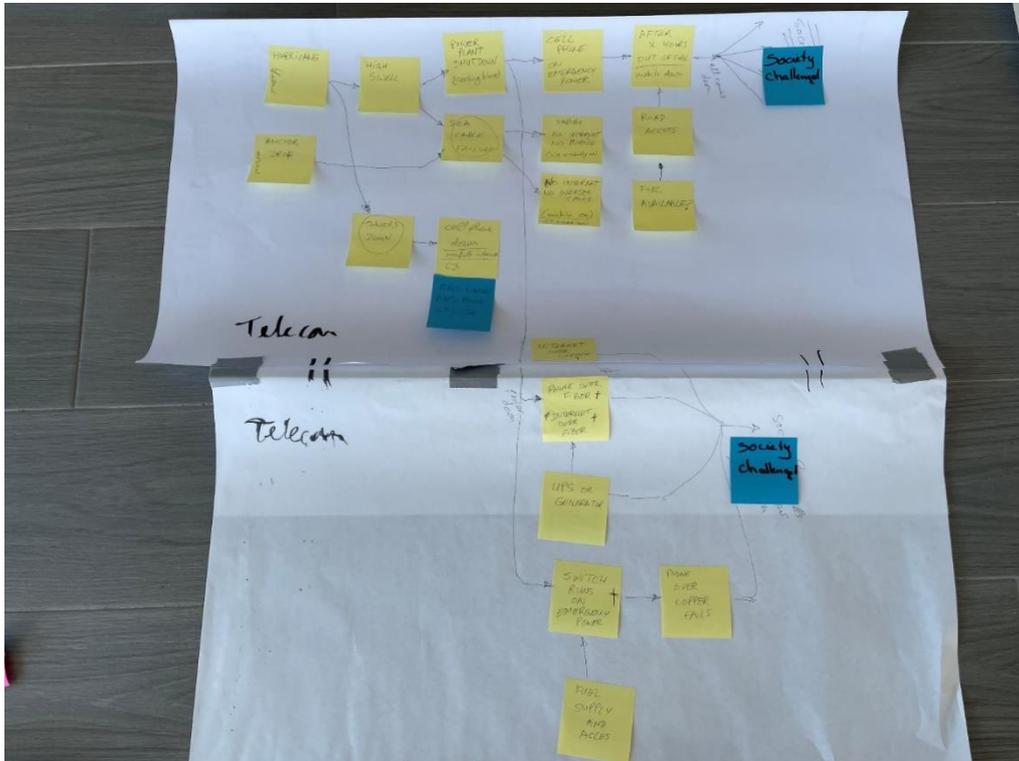


Figure 4: Impact chain communications Caribbean drawn during the Workshop.

The stakeholder meeting enabled the identification of certain key risks through natural and systemic hazards in the Caribbean region. Heavy rains, epidemics and strong winds are already contributing to a challenging risk today. The community is aware of the increasing risk connected to earthquakes, tsunamis or volcanic eruptions.

Based on the discussions from the focus groups, the preliminary impact chain for communication was further detailed after the workshop. The impact chain was built from a communications perspective since this is a specific challenge for the Caribbean. The resulting Impact Chain in Figure 5 is still a draft. The next steps consist in better defining and quantifying the Impact Chain elements and connections and in validating it with the local stakeholders. The effects in the Impact Chain for the communications system will be further mapped together with the stakeholders considering the following sectors:

- Disaster information system
- First responders' system
- Health sector
- Logistics sector

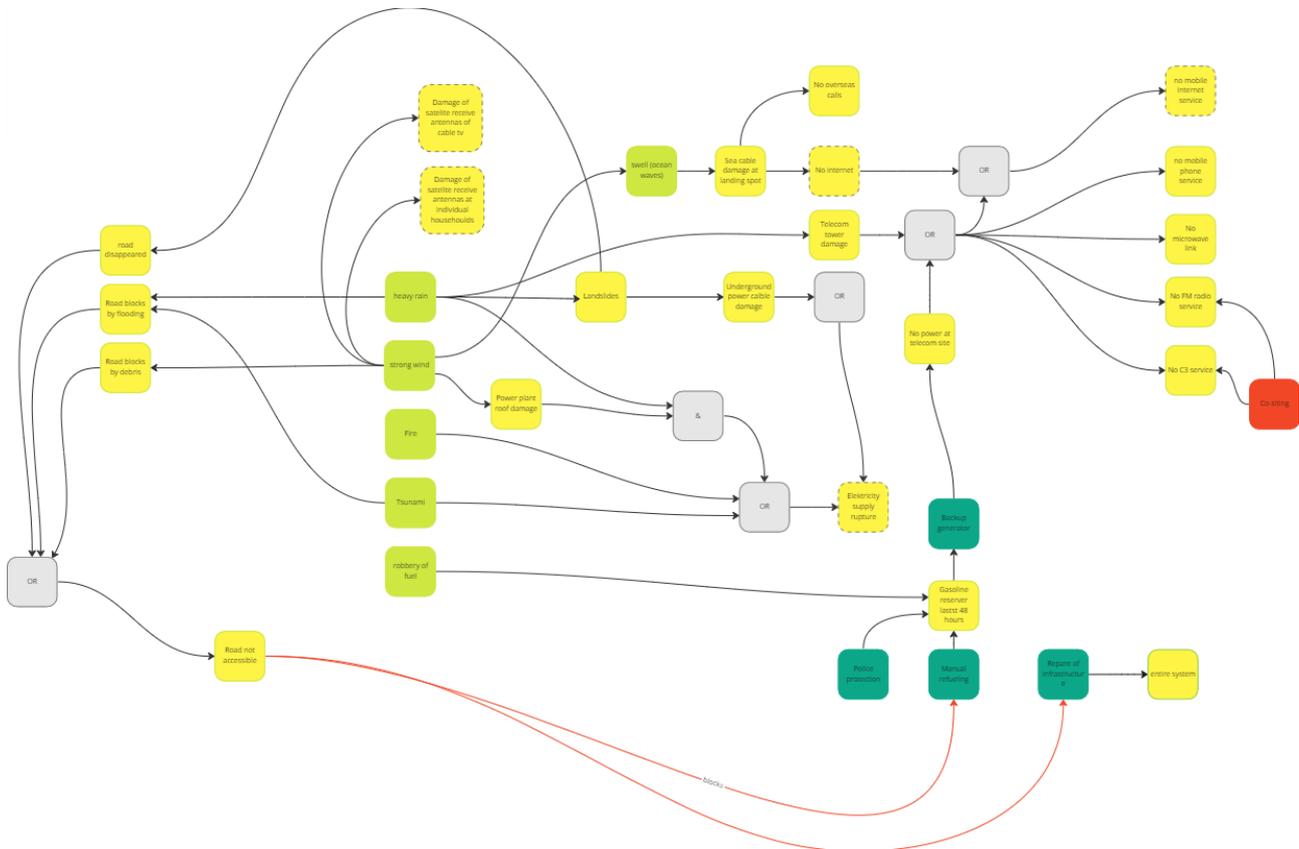


Figure 5: More detailed (draft) Impact Chain for communication in the Caribbean (zoom in to read the text). The figure mainly serves to show that based on the first post-it draft a more detailed draft was developed.

### 3.1.5 Follow up planning

The first stakeholder workshop marks the beginning of the co-developing phase in the PARATUS project for the Caribbean Application Case Study, including the knowledge of stakeholders and practitioners. From the perspective of the organizers, the workshop was a success, as the input and the motivation from the stakeholders was great. It is essential to enable participants of the workshop to be part in the next steps of the project as well as to inform them about updates and progress.

The lessons-learnt from the first workshop will be considered when organising next workshops. The main lessons-learnt were:

- Stakeholders are generally interested when local knowledge is included.
- An internal meeting with individual partners before the external stakeholder workshop was very important for building the relation.
- Online-connection with the stakeholder workshop in the Alps case study was successful and opened perspectives: some results were in line with the on-site results, but there were also additional insights.
- Mapping the impact chains provided a lot of valuable insights for the participants. Quote from a stakeholder: *“This gives me tools to understand the subsequent impacts of a flood and heavy*

*rainfall and makes it possible to develop mitigation measures in between to stop the cascading effects.”*

- Cross-border issues and dependencies between the islands are important. Feedback from stakeholders: “Great to be working together with Saba – Statia – St Maarten”
- We specifically asked the stakeholders present to identify which stakeholders were missing. They indicated that it is important to include planners and engineers that work in the government and insurance parties. This recommendation will be taken into account during the organisation of the next workshop.

The next steps are the following:

Data identification and revision:

- Which data is available?
- Which data can be used for PARATUS purpose?
- Which data gaps/voids need to be filled?

Stakeholder engagement:

- Impact chains will be further developed and discussed with the stakeholders
- Individual interviews with participants, on specific questions regarding their field of expertise will be carried out.
- Stakeholders missing in the first workshop were identified and will be contacted individually.
- There was a high willingness from stakeholders to collaborate and become better prepared. We need to keep that willingness going.
- There already was a follow-up with stakeholders
- We will involve the stakeholders in the Caribbean in PARATUS Stakeholder Hub.

Stakeholders workshop in Saint Vincent:

- A second workshop will be organized in St Vincent in June 2023. This workshop will be set up with higher level stakeholders and focusses on the impacts of volcanic hazards.

### 3.1.6 Conclusion

The stakeholder kick-off meeting of the Caribbean Application Case Study from the 1<sup>st</sup> to 2<sup>nd</sup> of March took place in Simpson Bay, Sint Maarten. The different approaches to engage with the stakeholders and the workshop venue created a nice atmosphere for fruitful discussions where new ideas were explored, and new perspectives could be taken. The aim to build up trust and a relation with the stakeholders was fulfilled. This initial workshop marks the starting point of developing impact chains and collecting data and to interact closely with selected stakeholders e.g., with interviews and field visits.

## 3.2 Brenner corridor, Alps, Austria

Global environmental changes are widely visible, this is especially true for mountainous areas. Temperatures in the Alps have warmed almost twice as fast compared to the global average. These changes have impacts on known and unknown natural and anthropogenic hazards; cascading as well as compounding events can influence the susceptibility of different anthropogenic structures, such as critical infrastructure and e.g., potentially threaten cross-border transportation which constitutes the main focus of this Application Case Study.

The Alpine Application Case Study will focus on the impact of the interruption of cross-border transportation by different hazards in a mountainous environment, such as extreme wind, floods, rockfall, mudflow, landslides and snow avalanches within the Brenner Corridor reaching from Kufstein (Austria) to Bolzano (Italy). The Brenner Corridor marks one of the key transit routes connecting southern and northern Europe. Each year more than 10 million cars and 2 million trucks pass the corridor. It needs to be stressed that the Corridor comprises not only the Brenner highway itself but also municipal roads and railway tracks.

### 3.2.1 Kick-off meeting

The partner kick-off meeting on December 14<sup>th</sup> 2022 enabled the identification of goals, the distribution of workload and the planning for the first stakeholder workshop planned for March 2023. Participants included UNIVIE, ASFINAG, EURAC, ITC, BFW and Synalp, with further partners connected online.

Some partners met for the first time and each organisation gave a brief overview of responsibilities and capacities. After defining the tasks and time framework for the deliverable, the core of the partner kick-off meeting consisted of an open discussion concerning expectations, interests and motivation for the participation in PARATUS and the upcoming stakeholder workshop.

Hazards that should be focused on in the alpine application case study were; road and transport challenges, such as road blockages, but also heat waves and snow avalanches. Furthermore, it was highlighted that certain hazards are present but are underestimated, e.g., earth quakes. However, it was decided to focus on the multi hazard risk aspect instead of low probability hazards.

First ideas on how to organize and structure the stakeholder workshop were gathered. The focus was on who to invite, which topics should be discussed and what role the stakeholders should take. Especially the indirect stakeholders, also from the German motorway and insurances were thought to be possible additions to the directly involved stakeholders. Open questions remained on how to deal with open and public data, as well as how to best collect this data.

Action points identified include; the definition of the exact study site extend, finding solutions to involve stakeholders e.g., the Austrian rail way company (ÖBB) and the Italian Autostrada, as well as the launch of an alarm and management website.

### 3.2.2 Workshop with external stakeholders

The external stakeholder workshop from the 2<sup>nd</sup> to the 3<sup>rd</sup> of March took place in Pfons, Matri am Brenner, Austria. The workshop was jointly organized by the ENGAGE working group of the Institute of Geography and Regional Research of the University of Vienna, together the partners ASFINAG, EURAC, BFW and Synalp. The

workshop aimed to build up a relation with and between the different stakeholders, to get to know the project partners and their expertise, the PARATUS project itself as well as methodological approaches. Most importantly, the focus was to listen to the needs, requirements of the stakeholders and how they want to be involved, how they can contribute and what they expect from PARATUS. Additionally, the goal was to develop a mutual understanding of partners and stakeholders regarding the development of a multi hazard risk platform.

During the workshop, past natural disasters were discussed, and the origin and impacts of these disasters were considered in the first session. Furthermore, the first exemplary impact chains were created, which visually represent the consequences and effects of a past hazard event. Besides the past events, future events were discussed in the second session and how hazards and impacts could be modified, and which challenges were identified by the stakeholders. These topics were discussed in 3 focus groups in each session.

Afterwards, there was the possibility to visit the affected area of the case study, along the Brenner highway A13, during an excursion and to get a better insight into possible occurring hazards. This workshop represented the first step in co-developing tools for better decision-making and minimizing the number of people affected by disasters and systemic risks. The workshop was structured into 2 days, see the agenda in Annex 4. The language of the meeting was German, but English translation was provided by simultaneous translation.

### **3.2.2.1 Stakeholder Selection**

The stakeholder selection was led by ASFiNAG. Their contacts were vital to get in contact with important players in the region who work in a broad sense on (natural) hazards. During the selection process, in communication with WP5, the following groups were identified: decision makers & public bodies, practitioners, critical infrastructure, transportation, civil protection, insurance companies, society & citizens, related projects and research. A list of the stakeholders can be found in the Annex 6. In total, 28 stakeholders joined the workshop, from which most of them were affiliated to organizations in the context of infrastructure.

### **3.2.2.2 Methods**

The primary concern of the participatory stakeholder workshop is the engagement of participants and their ideas. This is seen as an input for the Alps Application Case Study regarding natural hazards, impacts and especially for the co-development of platform. The methods applied was comprised discussions in small focus groups on different tables with moderating staff. Each table was equipped with basic topographic maps from the Brenner Corridor to better visualize hotspot areas as well as guiding questions. The aim of this exercise was to assess and map potential occurrences of different types of natural hazards. This in turn might help the PARATUS team to consider single hazardous events as well as their interactions. Furthermore, buzz groups, random one on one discussions, were implemented in the workshop. Plenary discussions with different parts of activity were also part of the interaction with the stakeholders. With the variety of methods, we anticipated to keep the workshop environment lively. The interaction with the Caribbean Application Case Study workshop was performed as we wanted to show that PARATUS is more and has wider implications

than just the respective Application Case Studies. And interestingly, even during the rather short period of interaction between the two very different application case studies synergies and similarities were identified.

### 3.2.2.3 Agenda

In general, the structural idea of the workshop was to mix input from the PARATUS partners and stakeholders in different formats (e.g., presentations, focus groups, buzz groups) and to give time to discuss and reflect. The first part of the workshop focused on past events whereas in the latter part the focus was on scenarios and future challenges. The agenda was developed beforehand with the other Application Case Studies in order to have comparable approaches and results at the end of the workshop. To meet the specific needs of the local stakeholders in the Alps Application Case Study, the PARATUS partners adjusted the agenda slightly. The agenda was communicated to the stakeholders before the meeting.

#### Day 1:

The first external stakeholder day gave an overview of the PARATUS partners and the project, pointed out key stakeholders working in the area of interest and gave them the opportunity to present their experience and knowledge. Later, participants were split up into four focus groups with two moderators at each table. Following the first introductory session, the first participatory session started. Participants split into focus groups which discussed, based on guiding questions, about past events, whereas the second focus group session in the afternoon worked on future challenges and scenarios. During both sessions, the first exemplary impact chains have been set up. The idea was that the stakeholders created impact chains from their experience in the first session without being introduced to the impact chains concept in the beginning. After lunch, the concept was introduced and they applied it in a more structured way in the second session, which focused on future challenges and scenarios.

Following each participatory section, the outcomes were summarized by the moderators and shared with the entire group. Additionally, the chance was given to stakeholders and partners for the contribution of their ideas, concerns and wishes. In the afternoon the Alps workshop connected online via MS Teams for the stakeholder workshop of the Caribbean Application Case Study which was held at the same time. Participants from both workshops prepared short questions which were answered by the participants of the other workshop and further discussed took place. Here, we wanted to share with the stakeholders the wider impacts of PARATUS, showing that the topics and experiences from the Caribbean Application Case Study are both similar but also very different. To conclude, especially the knowledge of the stakeholders about past events and present hazards helped to develop specific plans and ideas for the next meeting day as well as for the future paths for this project.

#### Day 2:

Continuing, the idea for a co-developed multi risk platform was presented and discussed in detail. Future plans were formulated, and it was emphasized that this project thrives due to co-development and collaboration. Interests of the stakeholders were collected as well as their wishes and needs. The following steps were also discussed and included individual talks, meetings and/or interviews with certain key stakeholders, e.g., to gather information and data concerning the learning case studies and past events to develop impact chains. Updates regarding the project and further developments will be communicated to

the participants. The workshop concluded with the option of joining an excursion around the area of interest, along the Brenner Corridor.

### 3.2.3 Focus Group Reports

#### 3.2.3.1 Focus Group session: past events

The first group work was concentrating on past events, known hazards and possible coping strategies. Workshop participants organized themselves, by choosing one of the 4 different groups and discuss the questions (see below). Following, the outcomes of each group was presented to the plenary.

##### Questions: Focus groups Part I: Past events (02.03.2023,11:00-12:15)

- Which are the main natural hazards the area (Tyrol, South Tyrol) is prone to?
- What are the impacts of these hazards along the Brenner highway?
- What are the main events you experienced in your career and what was your role? (Consider the different disaster phases)
- How did past events affect different sectors? (Filling interdependency table)
- Which tool would you have wished to have to better cope with the situation?

In the first focus group session, key hazards, impacts and adaptation strategies were identified. These included next to gravitationally driven processes, meteorological extreme events and e.g., high traffic volume. Additionally, past events located along or in proximity of the Brenner Corridor were listed and discussed including a heavy precipitation event 2019 in a neighbouring valley and forest fires along the railway. Results are shown in Annex 6.

#### 3.2.3.2 Focus Group session: future scenarios

Since some participants already had to leave the workshop 3 groups formed.

##### Questions: Focus groups Part II: Scenarios and future challenges (02.03.2023,14:00-15:15)

- Which natural hazards do you expect to be a main challenge in the future?
- Which are the impacts you can think of regarding future challenges?
- Which tools would you need to tackle future challenges?
- For which hazards are you well prepared and which not?
- How should an online tool look like to help, also considering time scale (e.g., including information on past events)?

Results of the second session listed in Annex 6 show that especially changing forests and unpredictable convective weather events are of concern. Solutions and tools are available on a local level, but in many cases interaction between regions can be improved.

#### 3.2.3.3 Stakeholders' interests and needs:

For a better overview of stakeholder needs, expectations but also motivation, every participant had the chance to give input regarding wishes and possible contributions to PARATUS.

*Table 2: Shows what stakeholders want and can contribute as well as what stakeholders hope to gain through PARATUS project.*

Possible Contributions to PARATUS	Expectations and Wishes
Expertise regarding Climate Change (geosphere)	Cross-link available data
Know-How: prediction, extreme weather	Checklists for practitioners
Data: Hazard-/ Risk-maps, Raw data (Synalp)	Cross-border collaboration in emergency response units regarding (avalanches, fires...)
Climate adapted forests, Biodiversity, <ul style="list-style-type: none"> <li>- Forest inventory data</li> <li>- Input by BFW (Vienna)</li> </ul>	Multi-hazard platform <ul style="list-style-type: none"> <li>- Further development</li> <li>- Economize it (market ready...)</li> </ul>
Tools for process modelling (BFW) <ul style="list-style-type: none"> <li>- FlowPy</li> <li>- Avaframe</li> </ul>	Possibility to connect in a network with certain experts.
Data contribution (Wasser Tirol?)	Practicable benefit for the Brenner region and the corridor. With a focus on seeing new hazards.
Case study data, examples (ÖBB)	Networking with Event database
Specific local / regional knowledge (Transitforum)	A closer scale modelling (smaller grid)
	Don't compromise the topics too much. (mix?)

### 3.2.4 Preliminary Impact Chains

Based on the discussions from the focus groups some preliminary impact chains were developed.

The stakeholders meeting enabled the identification of certain key risks connected to natural and systemic hazards in the Brenner Corridor. Heavy traffic, straining the infrastructure and blocking partially the road system is already a challenging task. The truck load increased over the past decades and also bridges needs renovation.

Natural slow onset processes as the continuous decrease of water availability in the past years, combined with rapid local convective events successively reduces the protection capacity of forests. Forests formerly able to protect a road or settlement from smaller rockfalls or avalanches are now and, in the future, shifting towards becoming a hazard by itself due to deadwood accumulating and barren slopes.

The two example impact chains presented below in Figure (?) and Figure (?) show one past event and future concerns of compounding events.

Impact Chain 1 shows an example of the flood 2019 in the Sellrain Valley, which was mentioned in the stakeholder workshop as an example for a past event.

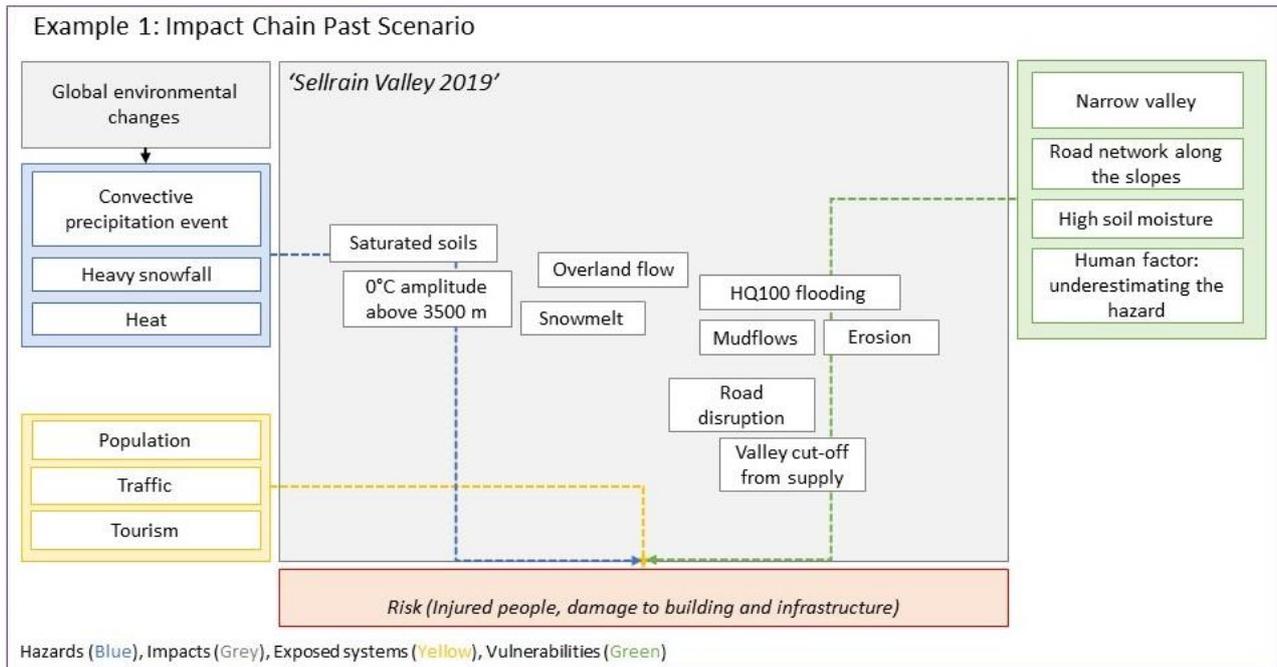


Figure 6: Impact Chain Past Scenario in the Sellrain Valley

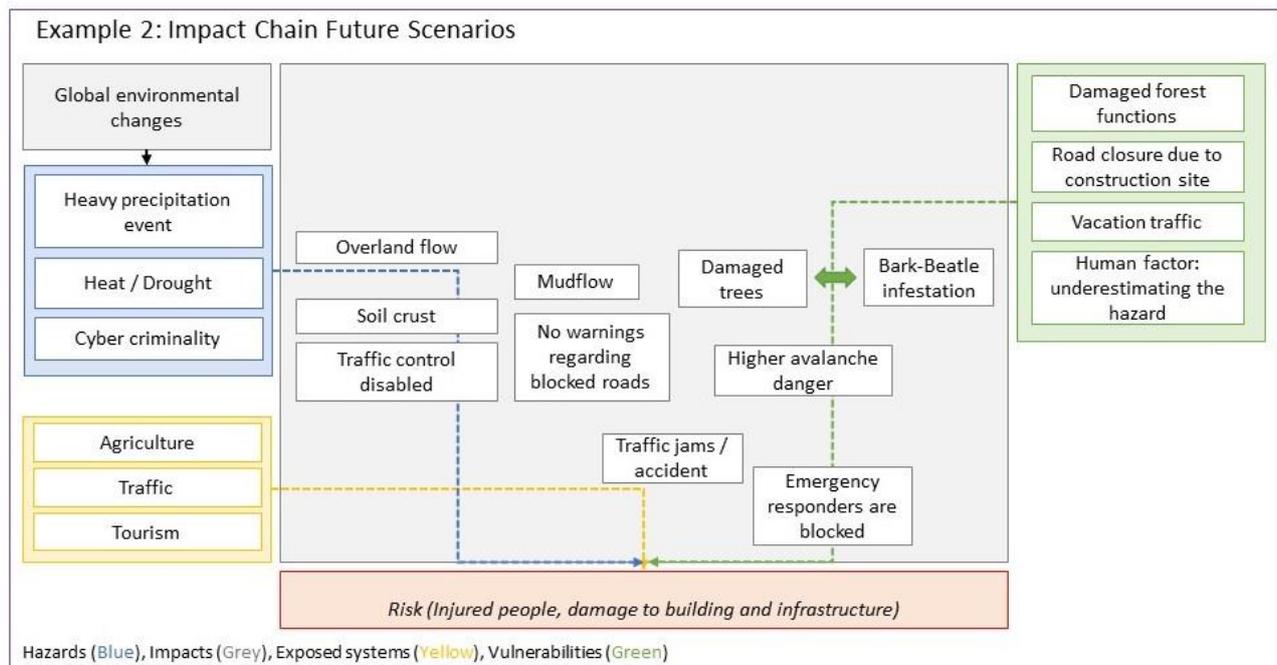


Figure 7: Impact Chain 2 - the complex impacts that might result from compounding hazards.

### 3.2.5 Follow up planning

The first stakeholder workshop marks the beginning of the co-developing phase in the PARATUS project for the Alps Application Case Study, including the knowledge of stakeholders and practitioners. From the perspective of the organizers the workshop was a success, as the input and the motivation from the stakeholders was great. It is essential to enable participants of the workshop to be part in the next steps of the project and keep them updated about the project progress. The 3<sup>rd</sup> workshop day gave an overview of the coming project phases including the announcement of next stakeholder workshop in March 2024.

A limitation of this workshop was the absence of Italian stakeholders which would have been very important as PARATUS particularly wants to explore cross-border transportation issues. In order to overcome this and get in contact with Italian stakeholders, we are organizing a meeting in the beginning of May in Bolzano.

The next steps are the following:

#### Data identification and revision:

- Which data is available?
- Which data can be used for PARATUS purpose?
- Which data void must be filled?

#### Stakeholder engagement:

- Between the 8th -13th of May a 1-day workshop with stakeholders of the Italian Brenner corridor is planned. Here, the first results and developed impact chains of the first workshop shall be presented and complemented.
- Impact chains will be further developed and discussed with the stakeholders
- Individual interviews with participants, on specific questions regarding their field of expertise will be carried out.
- Stakeholders missing in the first workshop were identified and will be contacted individually.

#### Impact:

- People are generally interested when local knowledge is included.
- An internal meeting with partners before the external stakeholder workshop was very important.
- Online-connection with other case study was successful and opened perspectives,

### 3.2.6 Conclusion

The stakeholder kick-off meeting of the Alps Application Case Study from the 2<sup>nd</sup> to 3<sup>rd</sup> of March took place in Pfnos, Matrei am Brenner. The venue was very well selected, located in a rural area, and designed for meetings and meditations. The interaction with the stakeholders went very well. Despite minor language problems the exchange of information went very smooth. The stakeholders provided very valuable feedback and presented different views, which stimulated discussions. New ideas were developed and new perspectives could be taken. The aim to build up trust and a relation with the stakeholders was fulfilled. This initial workshop marks the starting point of developing impact chains and collecting data and to interact closely with selected stakeholders e.g., with interviews and field visits.

## 3.3 Istanbul, Turkey

### 3.3.1 Introduction to the case study

Istanbul is a mega city with its population of over 15 million inhabitants. Istanbul is highly susceptible to earthquakes, as well as associated hazards such as liquefaction, landslides and tsunami. In addition, hydrometeorological hazards (i.e., extreme temperatures, fires, flooding) are also becoming increasingly problematic. Since the 1999 Kocaeli Earthquake, the population of Istanbul has increased from around 8 million to 15 million. This population growth, combined with the speed of urban expansion and the integration of new migrants (both native and foreign, including refugees from countries such as Syria and Afghanistan), has contributed to an escalating level of disaster risk. Furthermore, the income and welfare gap between wealthier and disadvantaged groups is more pronounced in such big agglomerations, making disadvantaged groups even more vulnerable during times of disaster. Despite their importance to the national economy, primate cities like Istanbul can have a far-reaching impact beyond their borders. This means that the impacts of certain shocks will be propagated through diverse channels to other cities. After the 1999 earthquakes, which hit the most industrialized zone of Turkey, some industrial businesses in other parts of the country urged to import some intermediate goods as they could not purchase them from Kocaeli because of the large-scale destruction. The majority of Istanbul's population is internal migrants who still have connections to their city of emigration. After devastating earthquakes, it has been noted that people tend to turn to these cities of emigration temporarily or permanently. This mobility can create some real estate pressure in target cities, mostly through the rental prices. In the case study of Istanbul, we plan to focus on urban dynamics (including demography, social factors, economy, built-up environment, etc.) to reveal systemic vulnerabilities.

### 3.3.2 Kick-off meeting

The aim of the kick-off meeting for the Istanbul Application Case Study was to meet stakeholders from the Istanbul Metropolitan Municipality (IMM), to establish the first contact, to introduce PARATUS and to understand their approach and their needs in risk management. The IMM is a very large local administration with 107 offices under 30 departments and more than 50.000 employees working at the IMM and 39 companies of the IMM. As indicated in Figure 8 (red borderline), in PARATUS, the contact unit of the IMM is the Department of Earthquake Risk Management and Urban Improvement. The other departments have different levels of involvement in risk reduction and disaster management activities and projects conducted by the IMM. Furthermore, the Istanbul Disaster Coordination Center which was established during the 1999 earthquakes under the IMM, consists of representatives of diverse departments and units of the IMM (indicated as green in Figure 8). Therefore, all departments and affiliates were invited to the meeting.

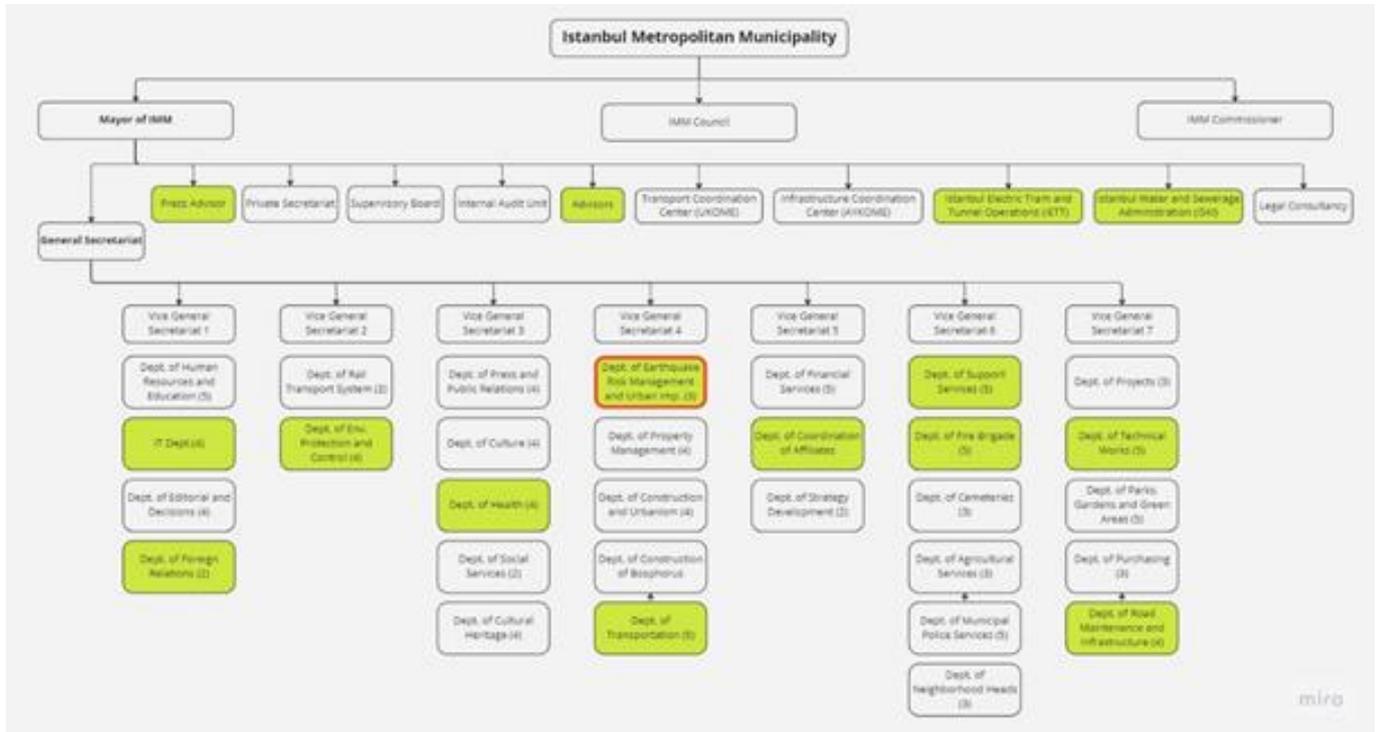


Figure 8: Organization scheme of the Istanbul Metropolitan Municipality

The kick-off meeting was held on December 20th, 2022, at the Istanbul Metropolitan Municipality (IMM) facility of "Dr. Mimar Kadir Topbaş Gösteri ve Sanat Merkezi, Yenikapı". The meeting was attended by directors and affiliates of IMM as well as representatives of LoS stakeholders, with a total of about 40 participants. Prior to the meeting, a 22-page Turkish translated document was prepared and distributed to the attendees in hard copy, outlining the PARATUS project and its aims and focus.

The meeting began with the welcome speech of Özlem TUT, Director of Earthquake Risk Management and Urban Improvement Department, followed by a presentation by Seda KUNDAK, Istanbul Case Study Leader at ITU. Throughout the meeting, common speeches and explanations were translated into English for online international participants via the zoom platform. After 40 minutes of introduction, the participants were divided into four tables to work on the given topics. The agenda of the meeting is in Annex 7.

The first question was “**What are the three most important threats Istanbul is facing?**”. The majority of the participants mentioned that earthquake is one of the most important threats (35). Following the earthquake, climate change & flood (19) and population growth & migration (17) are at the second and third rank respectively. Furthermore, participants noted that urban development and uncontrolled expansion of the built-up areas posed threats (see Figure 9).

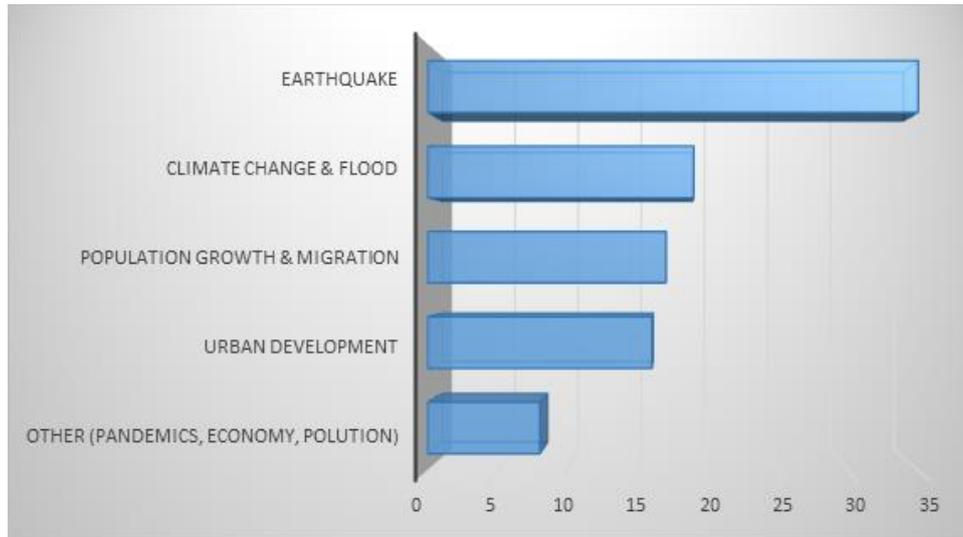


Figure 9: Major threats to Istanbul

The second question was “**What are the three most important difficulties/problems/obstacles that will complicate disaster management?**”. Lack of coordination among institutions and “un-planned” urban development were indicated as the most critical problems. To be clear, lack of coordination refers to overlaps of some duties and gaps in disaster management. Another note is that unplanned urban development refers to legal development processes that ignore city’s carrying capacity, natural environment and earthquake threat. The answer of lack of awareness does not only refer to inhabitants but also includes decision-makers. In the lack of competency, governmental institutional leaders and decision makers are questioned by the means of their background. Financial limitations and rapid population growth were also considered as problems in managing disasters. Other refers to security, logistics and legal tools (see Figure 10).

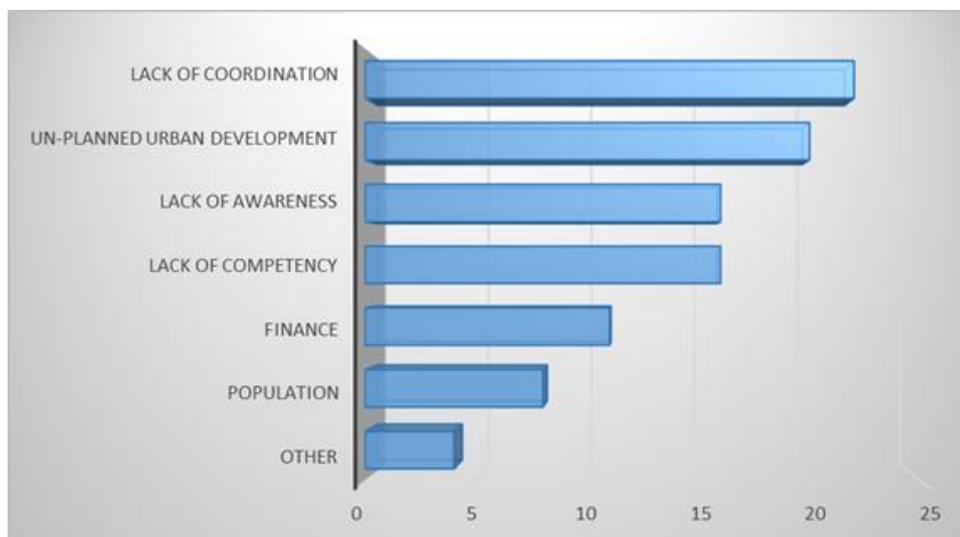


Figure 10: Problems in managing disasters

The third question was “**What are the three most important things to do to overcome these problems?**” which was related to the second one. After the participants expressed their opinions, they were asked to prioritize them by scoring. The most selected choices are given in the Figure 11.



Figure 11: Prioritized options to overcome problems/obstacles

At the end of the kick-off meeting, participants were asked to indicate which external stakeholders would attend the following meetings through the Mentimeter application. A word cloud was simultaneously shared on the wide screen of the meeting hall (Figure 12). According to the size of the letters, AFAD and district municipalities were the most cited ones among the others. In detail, external stakeholders can be grouped in representatives of central governmental institutions, local representatives and NGO’s & universities.

The final question of the kick-off meeting was about the participants’ expectations from PARATUS Project. Once more, participants gave their answers anonymously through the Mentimeter application. A new word cloud was generated according to their answers (Figure 13). According to the size of the letters, collaboration, coordination and road map are the most indicated items by the participants. The second-rank expectations are the increase in institutional capacity and solution proposals.



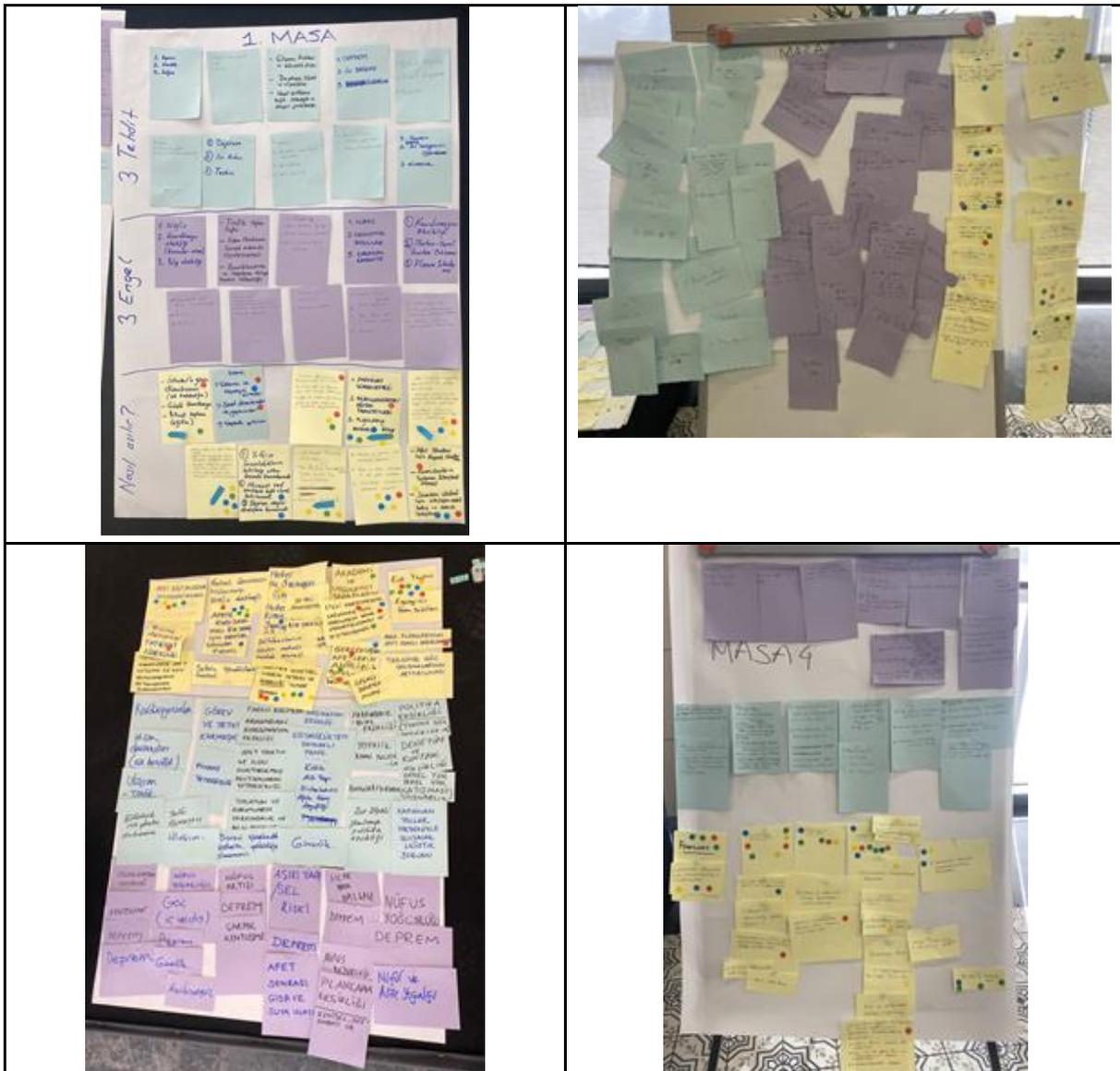


Figure 14: Outcomes of discussions

### 3.3.3 Application case study workshop with external stakeholders

The planned application case study workshop with external stakeholders, scheduled for February 27<sup>th</sup>, 2023, was impacted by the Kahramanmaraş Earthquakes, which occurred on February 6<sup>th</sup>, 2023. The Kahramanmaraş Earthquakes had a devastating impact, affecting 11 provinces in Türkiye and resulting in significant loss of life (50.000+) and substantial economic damage (see Figures 15-18). The full extent of the damage is still being assessed, but initial reports indicate a widespread impact on infrastructure, buildings and the local economy. As a result, both the ITU and IMM teams had to shift their focus and plans. ITU team members were called upon to conduct field surveys and attend meetings with governmental institutions to evaluate and facilitate immediate response and recovery processes. IMM team members were in charge to

provide external assistance to the affected region. Due to these circumstances, the workshop had to be postponed until June 2023.



*Figure 15. Osmaniye: before and after (Maxar Technologies)*



*Figure 16. Hatay: before and after (Anadolu Ajansı)*



*Figure 17. Kahramanmaraş: before and after (Anadolu Ajansı)*



*Figure 18. Gaziantep: before and after (Maxar Technologies)*

### 3.3.4 Follow up planning

The first external stakeholder workshop will be held in June in Istanbul. The agenda of the external stakeholders meeting has been organized to reveal the perspective of professionals, who work on disaster and risk issues, on impact chain of disasters (ANNEX). According to the responses declared by the kick-off meeting participants, external stakeholders have been selected among central governmental organizations, local authorities and NGOs and universities. In the first section of the workshop, participants will be asked to produce an impact chain diagram. The second section will be on the impact chain and systemic risks that Istanbul is facing to. As a special topic, the critical infrastructures will be evaluated in the last section.

### 3.3.5 Conclusion

The participants knew about other risk management projects conducted by other institutions; therefore, they expect collaboration and coordination to achieve tangible results. They are also willing to be part of PARATUS activities to co-develop risk mitigation tools.

### 3.4 Bucharest, Romania

Bucharest is one of the most endangered capitals in the world due to seismic hazard, as revealed by all global and regional hazard studies, such as Giardini et al. (2003, 2013) or Jimenez et al. (2001) and proven by the reality of the XX<sup>th</sup> century. From this point of view, it can also be considered the most endangered capital in the European Union.

Although located more than 130 km epicentral distance away from the Vrancea Seismic Source, significant peak ground acceleration (PGA) values, greater than 0.2 g, can occur in Bucharest. The Vrancea intermediate-depth seismic source is located at the contact of the East European Plate, the Intra-Alpine and the Moesian Subplates, 130-150 km epicentral distance away from the city. Its seismic activity is responsible for damaging acceleration values in Bucharest, according to Giardini et al. (2013).

A recent seismic microzonation study (Marmureanu et al. 2010) shows that for the maximum predicted Vrancea earthquake (with Mw 7.8, at 150 km depth), PGA values ranging from 0.22 g up to 0.3 g could be recorded at surface. However, the study highlights that along the Dambovita River the PGA values can be expected to be smaller; but we consider that the geological datasets for the city area do not provide the clear picture of what zonal differences could be. This is because there are few boreholes with depths > 100 m available for explaining the propagation from bedrock to surface in an area with deep sedimentary layers, and few strong motion recordings, which are not enough for depicting strong motion patterns. A significant distribution variation from an event to another is also expected, depending on the slight modifications of earthquake parameters - real recordings from the 1986, 1990 or 2004 moderate magnitude earthquakes revealed different patterns in terms of PGA distribution (Pavel et al. 2013).

During the 1940 and 1977 earthquakes (with moment-magnitudes Mw of 7.7, respectively 7.4) that occurred in the Vrancea Intermediate-Depth Source, 1564 people were killed in Bucharest, mostly due to the collapse of medium and high-rise buildings. Most damage was in the city center, where many constructions built without considering the seismic design code (prior to 1940), and with poor construction quality, were and still are located. As the 2011 statistics show, Bucharest hosts more than 31430 buildings belonging to the pre-code era. Experts employed by the Bucharest General Municipality individually evaluated 759 vulnerable buildings (Bucharest General Municipality 2016) and considered 357 of them as being in the seismic risk class I (meaning that they could collapse at any event similar to the control period earthquake). The 1977 earthquake also proved that some newer buildings can also be severely affected, due to design and construction errors.

#### 3.4.1 Kick-off meeting and preliminary qualitative research

The stakeholder kick-off meeting took place on the 4<sup>th</sup> of November 2022 at the Department for Emergency Situations that coordinates the General Inspectorate for Emergency Situations and several other institutions involved in emergency response. During the kick-off meeting the necessity of a different approach was decided. To identify vulnerabilities and needs in the response system, the partners agreed on grassroots, bottom-up approach. A succession of focus groups organized on the hierarchical levels of the intervention chain in Bucharest was approved, based on specific protocols and discussion guides (see Annex 9).

The General Inspectorate for Emergency Situations (IGSU) responded to the request formulated by the Department for Emergency Situations (DSU), concerning the support granted to the University of Bucharest in performing qualitative and quantitative research that involves the participation of the personnel responsible for life saving and damage reduction during disasters.

We applied focus groups with **First responders** (paramedics and firefighters) on the 16<sup>th</sup>, 17<sup>th</sup>, and 18<sup>th</sup> of December 2022, with the **Unit Commanders** on the 19<sup>th</sup> of January, and had interviews with members from the **Leadership level from DSU and IGSU** on the second, third and 7<sup>th</sup> of February. At the Leadership level, we interviewed the Head of the National Operation Centre/the Integrated Operational Planning Unit, the Head Inspector of ISU-BIF (Bucharest-Ilfov region), and the DSU Head of Integrated Operational Planning Service at the headquarter of the General Inspectorate for Emergency Situations. Including the calibration discussion, we had several conversations with 25 first responders (out of 2000) in 3 (out of 6) randomly selected units from Bucharest, with all the 6-unit commanders and representatives of the three operational departments of the DSU response-structure (Figure 19). Discussions lasted between 2 and 3 hours each. At the first and second level, discussions were focused on specific vulnerabilities and needs (Table 3), and at the leader level on impact chains of recent disasters that hit Romania, expectations and wishes to be fulfilled, and tools to be made available by the PARATUS Platform (Table 4). All focus groups and interviews were recorded, and the transcriptions were made available.

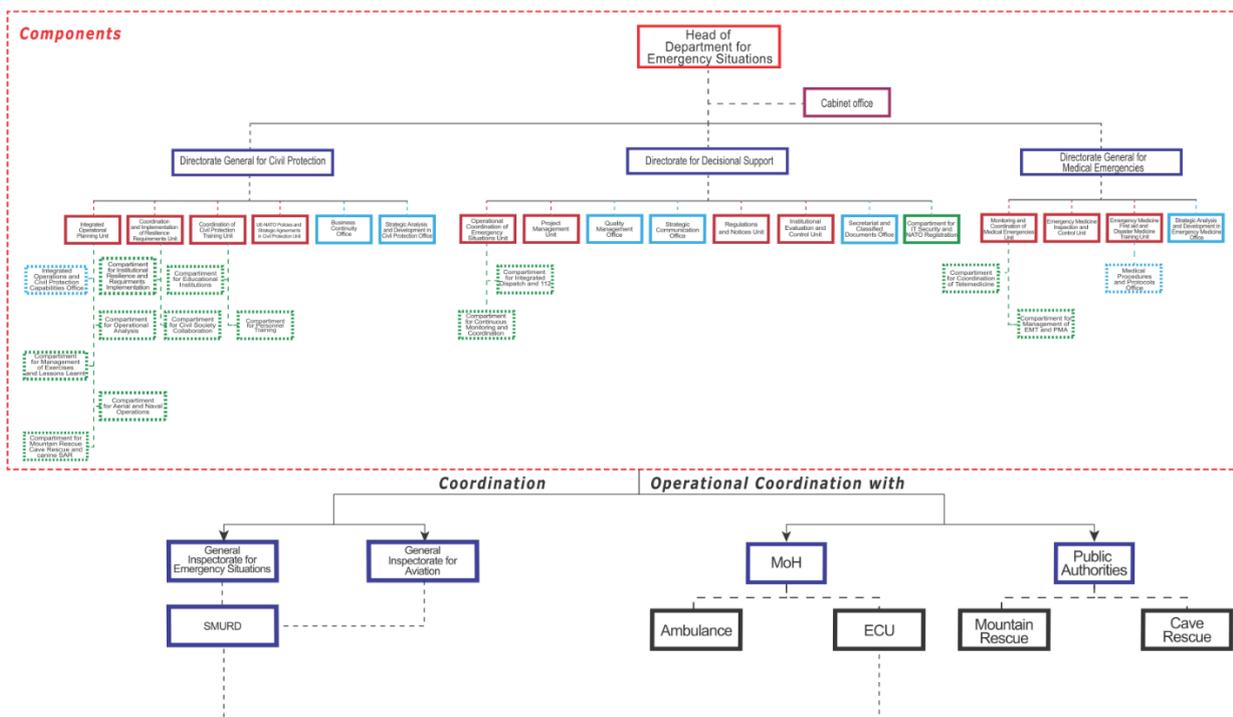


Figure 19. Organizational structure of the Department of Emergency Situations in Romania

Table 3. Vulnerabilities and needs

City infrastructure	Buildings and equipment	Human resources	Human behaviour
Old and vulnerable buildings (lack of retrofitting/consolidation program)	Insufficient firefighting units, not dimensionally calibrated to a very fast-growing city and population	Recruitment policy - criteria, suitable candidates' profiles	Population unprepared / unknowing / not perceiving danger
Authorization of construction for new buildings	Fire units in seismic vulnerable buildings	Mental health (support therapy for rescuers and first aid courses for victims)	Hostile
Chaotic urban development	Intervention equipment (in the pipeline)	Need for/perception of training (negative perception of exercise conditions and general training program)	Passive (bystanders' film with the phone but do not get involved)
Lack of parking spaces - blocking sidewalks with parking lots	More adequate equipment for rescuer protection	Undersized human resources (1 fire engine every 10k people. 66/300 necessary 1500 men per engine x 3 shifts /// 40 Ambulance vehicles x 3 x 3 order 360 IGSU)	Decreasing solidarity
Tall buildings	Insufficient, non-functional communication systems - missing stations, insufficient and untested satellite phones	Work overload	Unrealistic expectations stemming from a lack of clarity about Ambulance / SMURD services
Old and vulnerable buildings (lack of retrofitting/consolidation program)		Insufficient recovery time	Misuse of 112 emergency service
Restricted or even blocked access to the incident area due to: parked cars (not leaving room for emergency vehicles), abusive occupation of public space, turning radius not respected for emergency vehicles on new streets, lack of permits for access roads in new neighbourhoods, traffic direction separation elements, road traffic (even under standard conditions)		Exhaustion through overwork, 24/48 schedule (24/72 initially) which makes it impossible to recover	Increased social assistance needs
Water supply problems: lack of hydrants (sometimes blocked by cars or asphalted), water supply at access point: none, low pressure		Individual insurance policies rejection	Negative media impact

Table 4. Interests and platform need at leadership level

Interests	Needs
Clear, live/continuously updated information from the field during disaster	Data transformed to information required in different situations
Fast transfer of information required to allocate resources	Existing data transferred to maps
Reduction of the response time during intervention	Real time data collection from field
Immediate support from one intervention structure to the other	Assisted decisions
Even if the disaster response system is well-managed, we need to increase the effectiveness of preventive and preparation/training measures provided by other stakeholders	Helping find procedures for no procedure situations
Necessity to maintain communication in disaster situations	Updated maps
Continuously updated database concerning the building stock and population	Decision supporting tools using different possible risk and disaster scenarios
Database of all the locally- and regionally available resources in disaster situations, which can be provided by both ministries and economic stakeholders	Updated in real time or near real time information on access routes in case of disasters
Support in getting accustomed to the intervention area	Integration of dispersed databases
Reduction of communication delays in disaster situations	Support in decreasing response time
Necessity to educate the population in terms of proactive attitudes	Support in raising awareness and in educating the population in order to increase resilience
Necessity to prioritise information in disaster situations	Real time information prioritisation system
Necessity of knowledge on vulnerabilities regarding infrastructure, the building stock, the population, and on the trails and areas fit for evacuation procedures	Configuration of the platform based on information access levels
Necessity to identify hidden, indirect risks	Inclusion of hidden, indirect, hybrid and cascading risks into scenarios and into the decision-making support system
International accreditation of more intervention modules (e.g., CBRN in the process of accreditation)	Inclusion of a unitary, standardised system for the assessment of the situation in the field (in case of disasters)
Necessity of information support in prioritising intervention information	Data and information resources well-structured in the platform, which can generate operational realities to be used in decision-making
Necessity to identify the risks for the physical integrity of rescuers	Increased levels of sensitive information security and data protection
Identification of risks at sector scale	Continuous update of data on the building stock
Identification of the vulnerability specific to each community type	Granting the population access to information which can help raise awareness in terms of danger sources, and generate adaptation strategies

Another important goal of the kick-off meeting and the semi structured interviews conducted with the Department of Emergency Situations leadership level was to identify the most important local stakeholders to be invited in the case study workshop.

The list of invited stakeholders was composed based on the dispositions of the Governmental Decision HG no. 557, which stipulates the ministries and institutions responsible for the management of different risks and interventions.

### 3.4.2 Application case study workshop with external stakeholders

The stakeholder workshop in Bucharest took place at the Sheraton Hotel in the city centre, on the 20<sup>th</sup> of March from 9 am to 5 pm. The language of the meeting was Romanian and simultaneous translation into English was provided. The whole event was recorded and transmitted online via Microsoft Teams.

Stakeholder selection was composed based on the dispositions of the Governmental Decision HG no. 557, which stipulates the ministries and institutions responsible for the management of different risks and interventions. One of the premises in selecting the stakeholders for this first meeting was related to the necessity to ensure a large coverage in disaster situations, and more precisely to protect the population, which includes evacuation, accommodation, water and food provision, and other measures. These measures are implemented in collaboration with the local authorities, which must organise areas where first responders and the population can gather. In this context, the most prominent roles belong to the Ministry of National Defence, the gendarmerie, the police, and other order enforcement personnel who are in charge of evacuation procedures and security in the area impacted by the hazardous event. Also, the Health Ministry and Red Cross may provide medical support. Official invitations were sent to all the institutions involved in disaster response according to the HG no. 557, and we received answers from the Prefecture (Service for Government Strategies and Public Concentration Services), Bucharest City Hall, Police, Gendarmerie, MDLAP (Operative Centre for Emergency Situations), Ministry of National Defence/ National Military Command Centre (Head)/ Directorate General for Emergency Situations (and Operative Centre for Emergency Situations), MapN – Operation Department/Major State of Defence, IGJR, IGSU – Coordination and Implementation of Resilience Requirements Unit, ISU, BIF, IGPR – Road Department, IGPR – Directorate General for Civil Protection, DSU. The Health Ministry and Ministry of Transport did not send any representatives.

The aim of this first stakeholders meeting was to bring together practitioners involved in prevention, response and recovery from major disaster events, to raise awareness regarding the consequences and effects of a major earthquakes striking in Bucharest and find a common language to develop possible impact chains to feed the PARATUS platform.

The meeting agenda was elaborated in cooperation with the DSU partner and with the other Application Case Studies in order to have comparable approaches and results at the end of the workshop. Workshop Agenda is added to the Annex 10. The workshop was designed to fulfil the goals of the PARATUS by adding input from the PARATUS partners and invited stakeholders in different formats (e.g., presentations, focus groups, buzz groups). The morning part of the workshop included presentations on what PARATUS is, the aim of the project, what are impact chains based on past events affecting Bucharest and what role do these disasters have in understanding impact chains, ways to develop them, who participants are and what expectations do they have from this first meeting. Important representatives from DSU exposed the intervention of Romanian rescuers in the disaster in Turkey and Syria, in order to introduce the operational frameworks of

intervention/recovery as potential topics to be addressed during the focus groups discussions in the afternoon meeting (all presentations are uploaded on the platform). In order to understand past impact chains, a large historical database including 39 large earthquakes with magnitudes over 6.5 that affected Bucharest between 1100 and 1900 was analysed (Figure 20). The resulting impact chain based on historical documents and maps is shown in Figure 21. The afternoon meeting focused on scenarios and future challenges.

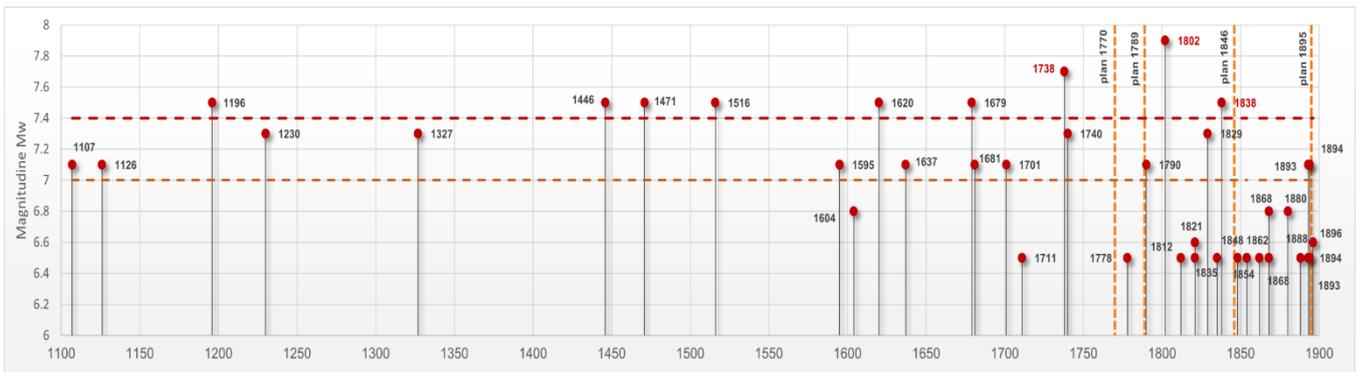


Figure 20. Historical earthquake database used for the historical impact chain

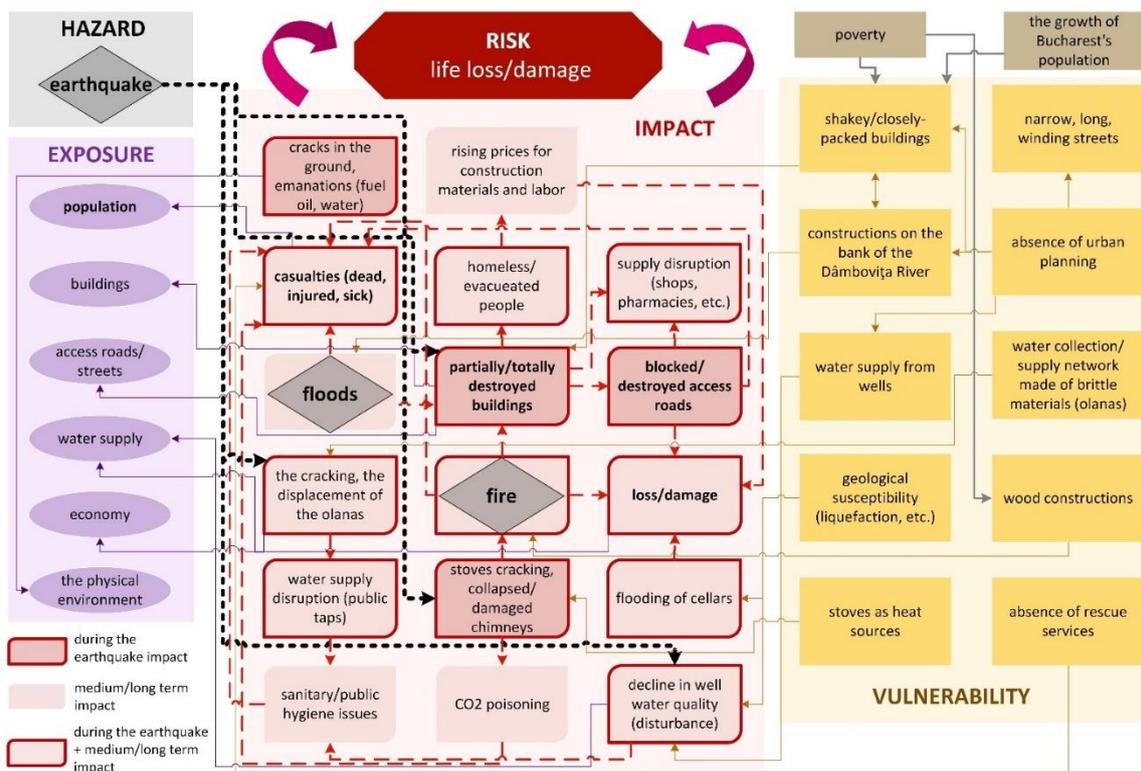


Figure 21. Historical impact chain of earthquakes in Bucharest

### City fieldtrip

A one-hour guided excursion along the centre of Bucharest helped participants understand vulnerabilities and the potential consequences of an earthquake.

A special session of the "Bucharest and earthquakes" guided tour was held, for the participants to the Bucharest workshop, by representatives of the National Institute for Earth Physics with a background of both in seismology and engineering. The focus of the tour was on the seismic vulnerability of the city, providing insights for the city center which is the most problematic area both in terms of buildings safety but also due to other factors such as lack of accessibility, potential outbreak of fires, socio-economic problems etc. Representative places which were affected during the 1940 and 1977 Vrancea earthquakes, such as the location of Scala, Casata, Wilson, Carlton, Simu or Tourist blocks of flats were visited and put into context, with the help of past images. Participants were also very interested in the current situation state as so many vulnerable buildings (with seismic risk class I) are not into retrofitting projects but still generate income and draw people inside, through shops or other businesses.



Figure 22. Photos from the city tour: past and present

### 3.4.3 Focus Group Reports

The second part of the workshop was composed of three focus groups designed with regard to the needs of the stakeholders

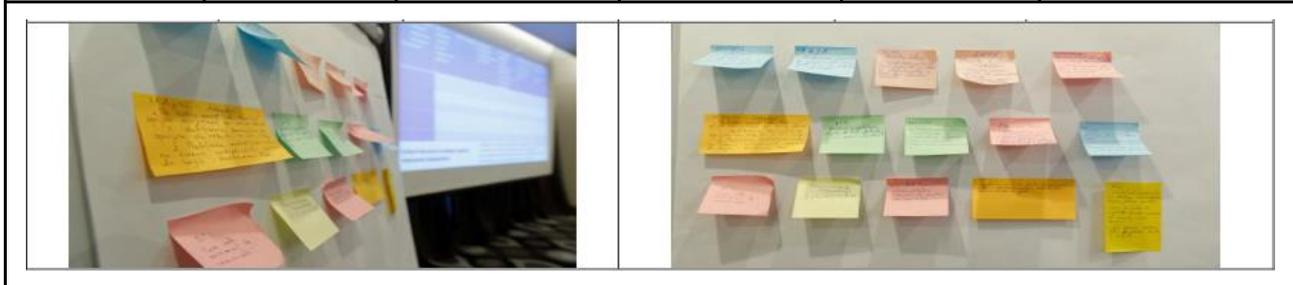
Questions: Focus groups Part I: Past events and impacts (20.03.2023, 12:00 -12:45) was guided using the following questions, the results being summarized in table 5a and b:

- What are the main events you experienced in your career and what was your role? (Consider the different disaster phases)
- Which are the main natural hazards Bucharest being prone to?
- What are the impacts of these hazard?
- How did past events affect different sectors? (Filling interdependency table). Participants were divided into three groups focusing on the following topics: (1) Infrastructure, (2) Communications (3) Type of impact.

Table 5. Summarizing results

Risks for Bucharest on a daily basis	Extreme events for Bucharest	Which exposed systems, sectors, and functions are affected?	Type of impact	Have you already observed trends related to this risk? How do you expect the impacts to change in the future?	Rate the relevance of impacts for Bucharest using the following criteria and indicate the overall estimate (low-medium-high)
Earthquakes	Earthquakes	All / Blockage of routes	Damages (buildings, infrastructure, etc.), isolated areas, uninhabitable buildings, health problems, migration	rise	high
Infrastructure problems	Fires (in hospitals, in inaccessible areas, in the subway)	Buildings / people / infrastructure / economy	Legislative changes, lack of insurance coverage? (Many people don't have)	rise	high
Human behaviour (irresponsible)	Floods (dam failure)	Subway / building stock / people/ economy	M1 subway, insurance coverage?	rise	medium
Increasing population density	Storms	Infrastructure/ communication/ electricity	Supply chain failure (energy), roads blocked by trees	rise	medium
Chaotic urban development	Epidemics	Population / Health system / economy	Health system failure	rise	medium
Parking problems	Car accidents	Population	Health	rise	high
Vulnerable buildings	Power plant crisis	Population / Health system / economy	Failure of supply chain, blackouts, health crisis, migration	rise	medium

Construction developers who did not respect the conditions mandated by the construction authorization (different volumes of construction materials, more storeys than required, storeys extending to the roadway)	CBRN incidents /Explosions	Population / Health system / public institutions / economy		rise	medium
Weak rescue programs	Heavy rains	Infrastructure	Economy	rise	medium
Chaotic traffic and traffic jumps	Heat waves	Population	Health system	rise	high
Lack of evacuation network	Damaged infrastructure	Population / economy	Supply chain	rise	high
Lack of hydrant network in case of fires	Risk of war and refugees' crises	Population / economy / public institutions	Food shortage, failure of supply chains, health problems, social instabilities	rise	high



**Criteria used to estimate the relevance of impacts:** Magnitude of adverse consequences, Likelihood of adverse consequences, Temporal characteristics of the risk, Ability to respond to the risk, Relevance for the study area in terms of responsibility for actions to be taken (who is the risk owner?), Unavoidable losses and damage, Irreversibility, Importance of the system(s) at risk, Interplay with dynamic vulnerabilities and underlying risk drivers



Figure 23. Key outcome of focus group session 1

**Focus groups Part II: Impact chains (20.03.2023, 14:30 -15:30)**

Impact chains were discussed according to guiding questions summarized in table 6.

**Table 6. Questions used to develop the impact chain in case of a major earthquake in Bucharest**

Element at risk	Question
Population and buildings	Which are the <b>direct impacts</b> ?
	How do direct impacts cause <b>indirect impacts</b> ? And impacts beyond population?
	For each impact, think about the <b>elements of vulnerability</b> involved: what specifically makes exposed population vulnerable? (Predisposition to physical, social, economic, institutional vulnerability, susceptibility, lack of capacity to prepare, prevent, respond, cope or adapt).
	What links exist between these impacts and risks and <b>other exposed systems and sectors</b> ?
	Which underlying risk factors (drivers - e.g., existing vulnerabilities or future trends) are potentially increasing risks?
	Which additional hazards, impacts or vulnerability factors may be at play in the <b>future</b> ?
	How could <b>adaptation</b> reduce high vulnerabilities?

### Focus groups Part III: Stakeholders' interests and needs (20.03.2023, 16.15 - 17)

The interests, needs and expectations related to the PARATUS project of the different organisations involved in the workshop are reflected in table 7.

*Table 7. Interests, needs and expectations of stakeholders*

Organizations	Interests and Needs	Expectations from PARATUS platform
Ministry of Defence	Broad-spectrum identification of the risk elements, of their impact of military entities (personnel, military infrastructure, equipment designed for national defence)	The platform should be an instrument that supports decision-making, that allows for the identification of support tasks to be provided by the ministry to the authorities responsible for risk management. Fundamental support in the adaptation of response activities.
Prefecture	High-level collaboration between institutions	Interconnected network of experts
Gendarmerie and Police	Provides support functions, for which a clear, comprehensive picture of the first after-event measures is a pre-requisite. The first 24 h are pivotal, meaning that knowing what has to be done during this narrow time frame will generate an optimal response.	May extend on two levels: 1) a set of preventive/training measures prior to disaster occurrence, with general access for the population, and 2) a set of maximum-security measures and responsibilities designed for the departments involved in response actions. The second one would be very helpful, since disaster situations do not leave room for thinking and call for immediate actions.
ISUBIF	Access to the database with all elements at risk, in order to perform law enforcement in relation to the owners/users of these elements. This would facilitate the check-up of necessary mitigation measures, and the fulfilling of obligations regarding the elaboration of self-defence plans.  Availability of economic stakeholder to provide equipment (e.g., bulldozers, excavators, trucks etc.) and staff in a timely manner for support.	The platform should include these information and databases on the types of useful and available resources in disaster situations. It should help the improvement of collaboration between institutions. The platform should make available the best European practices applied in previous disaster situations, which can be translated into the legal framework and applied in the field.
Ministry of Development	Involvement of the institutions with primary and secondary roles at both central and local level (public local authorities) in future meetings.	Prioritizing the dissemination of the project at institutional level, but also to the population.
Department for Emergency Situations DSU	Identification of risks at micro scales (increasing grain resolution), specific to each community (A group may be vulnerable in terms of location, and another group because of its socio-economic status etc.)	Continuous update of data regarding risk elements.

### 3.4.4 Preliminary Impact Chains

Impact chains were developed using a set of guidelines indicated in table 4.

Each participant was asked to imagine the situation of a major earthquake occurring in Bucharest, and to build direct and indirect impacts chains especially referring to population and building stock. Everyone had a set of guidelines to draft an impact chain related to a main earthquake event (Table 5). According to their expertise, participants noted on different coloured papers the direct and indirect consequences that are expected and presented them to the audience. We compiled all expressed opinions and designed the chart in figure 24.

When it comes to population-related issues, which is the main element that rescuers need to focus on, the most prominent concern was behaviour. The participants expect asocial behaviours that result from panic and can put first responders to danger. The behavioural degradation in time was mentioned as another threat, as well as relationship and communication problems between people in need and rescuers. Vulnerable groups (e.g., patients in hospitals, people in tall buildings, in nursing homes, in new residential ensembles with very narrow streets that preclude the intervention of emergency management vehicles, etc.) are another social concern to have in mind when developing coping strategies. Additionally, the accommodation of the people left without homes and shelter as a result of earthquake-induced building collapse or damage, represents another major issue on the list of problems to be solved by first responders and local authorities.

Regarding the impact chains on the physical environment, the identified vulnerability sources concerned the modifications of the initial building plan, of the initial function of the building, the newly built additional storeys or the artificial reduction of construction materials volume, the design errors, and the plethora of buildings that present deterioration marks but have not been technically surveyed. Tall buildings may collapse over the ones with lower profiles, leading to secondary effects such as the damage of gas pipelines, which can lead to fires and explosions. Therefore, improvements in terms of gas supply cut-off measures are pre-requisite for increasing resilience. Other highlighted issues regarded the danger which stems from lifeline failure, which may be indirectly caused by building collapse; and the blockage of transport ways, with the limitation of first respondents' access to intervention spots and the hindering of evacuation and self-evacuation. Nevertheless, the resistant structure of the buildings will be affected by the earthquake, which is directly linked to long-term economic effects concerning retrofitting costs and efforts. Building damage will generate long-term vulnerabilities, which will be aggravated by the parallel incapacity to technically expertise them in a timely manner. The functionality of a building holds an important role in the impact chain on at least medium term; for instance, a building used for service provision, a building affiliated to the civil protection system, or a hospital. Building damage will impair the functionality of the institution or will affect its functioning at maximum capacity, as every institution "with certain responsibilities holds a fundamental part and a backup part" which maintain it functional in disaster situations.

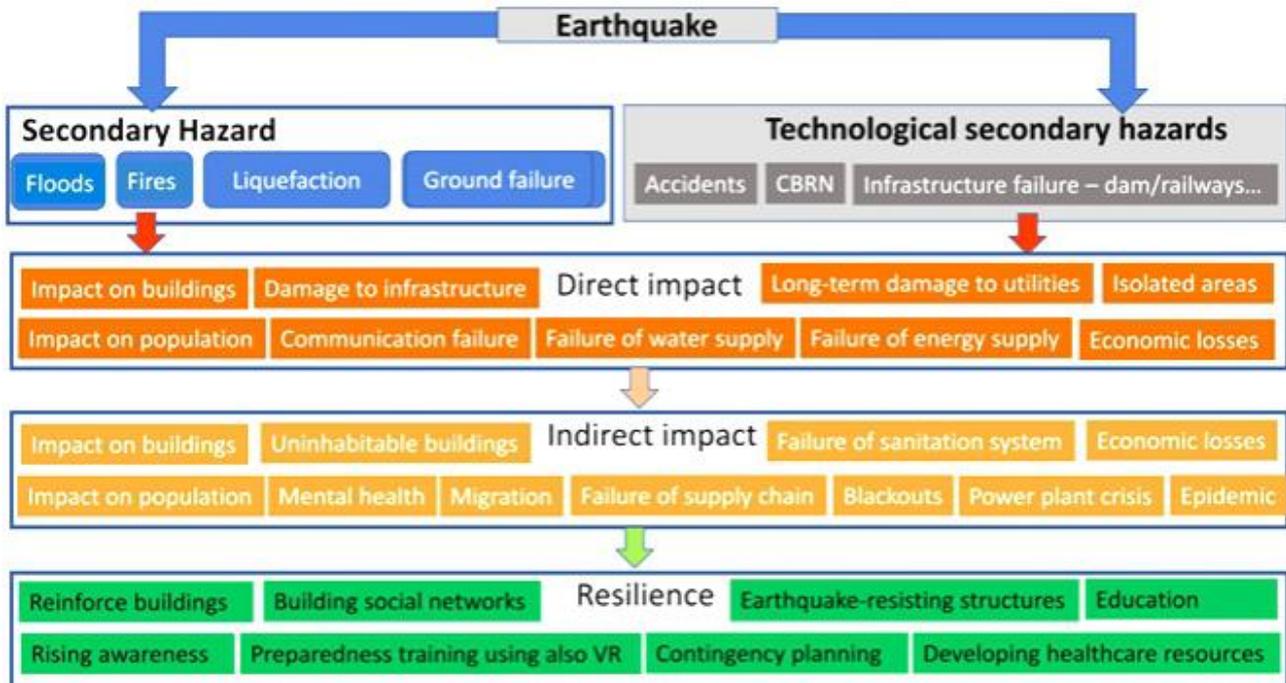


Figure 24. Preliminary impact chain for a major earthquake in Bucharest

### 3.4.5 Follow up planning

The first stakeholders' workshop in Romania marks the beginning of the co-developing phase in the PARATUS project for the Bucharest Application Case Study, including the knowledge of stakeholders and practitioners.

Next steps are:

- feedback to stakeholders with preliminary results from the workshop, including the resulting impact chains.
- Initiate interviews with some of the stakeholders present in the meeting to better understand their role, needs and expectations and further develop the impact chain from their perspective.
- widening the circle of invitations for the next workshop and making direct contacts. We intend to invite in future meetings (by personal contact) the Ministry of Transportation, the Ministry of Health, The Natural Disaster Insurance Pool (PAID), The National Union of Insurance and Reinsurance Companies from Romania, Apa Nova - the drinking water supplier and sewerage service provider of Bucharest, NGO's.
- listing available data for the resulted impact chain, references or experts that could help to describe its different components, based on inventories or existing studies.

Limitations were given by the absence of representants from the Ministry of Health and the Ministry of Transportation, but we intend to overcome these drawbacks by organizing individual interviews with key persons in those institutions on specific questions regarding their expertise.

As a general impact, participants mentioned that working on the impact chain provided many insights and were open to further meetings and discussions between professionals.

### 3.4.6 Conclusion

This initial workshop demonstrated the need for closer collaboration and continuous communication between all actors involved in disasters, to better understand each other's needs and different perspectives.

This first meeting marks the starting point of developing impact chains and collecting data based on close interaction with selected stakeholders.

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## 6. ANNEXES

### ANNEX 1 Agenda of the workshop – Caribbean Case Study



**1 March: Direct and Indirect impacts**

09:00 - 10:00	Introduction to PARATUS
10:00 - 10:30	Remembering past events
10:30 - 12:30	Identifying past events and impacts
12:30 - 13:30	Lunch
13:30 - 15:00	Understanding impact relations
15:00 - 15:30	Coffee
15:30 - 16:30	Identification of priorities
16:30 - 17:00	Day wrap up

**2 March: Scenarios and future challenges**

09:00 - 10:00	Tools to map direct impacts
10:00 - 11:15	Identifying the future
11:30 - 12:30	Partner hub and collaboration
12:30 - 13:30	Lunch
13:30 - 15:00	Next steps and Reflection

**PARTNER WORKSHOP**  
Increasing preparedness and resilience  
St Maarten  
**1-2 MARCH 2023**

 This project has received funding from European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N°101073954.

### ANNEX 2 Stakeholders – Caribbean Case Study

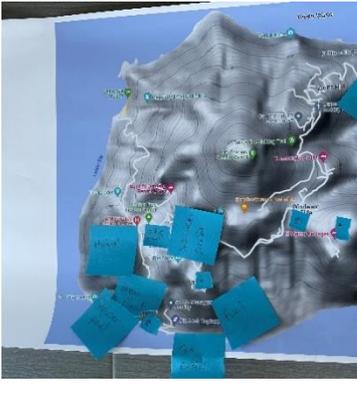
Stakeholder Group	Island
Society and Citizens	Sint Maarten
Practitioners	Sint Maarten
First responders	Statia
Decision makers + public body	Saba
Decision makers + public body	Sint Maarten
Decision makers + public body	Sint Maarten
Practitioners	Sint Maarten
Critical infra	
Decision makers + public body	Statia
Decision makers + public body	Statia
Decision makers + public body	Sint Maarten
Decision makers + public body	Sint Maarten
Decision makers + public body	Sint Maarten
Decision makers + public body	Saba / Statia / SXM
Practitioners	

Practitioners	Sint Maarten
Critical infrastructure	Sint Maarten
Critical infrastructure	Saba
Practitioners	All Islands
UT-ITC	Not applicable
UT-EEMC	Not applicable
Government	Bonaire
Related project	Barbados
Practitioners	Trinidad & Tabago
Related project	Sint Maarten
Related project	Sint Maarten
NLRC	Not applicable

## ANNEX 3 Raw results of focus groups – Caribbean Case Study

### Focus group 1: Identifying past events and impacts

	Government	First Responders	Telecom
<b>What are the most important hazards?</b>	Tropical Storms and Hurricanes Earthquakes Oil Spills Volcano Heavy Rain Plane crash Fire on the dump Pandemic	Wind + Rain -> Hurricane Earthquake Plane Crash Oil Spill Sargassum seaweed Tsunami Fire Global Warming Tornados Cruise Boat accident Sea level rise Poor/no zoning	Hurricane (wind -> affects towers) Coastal waves Anchors (damage to sea cables) Fire in the main server Critical Cable + equipment failure Accidents No back-ups Insufficient funds Incompetence (lack of training) Security Equipment Management
<b>Impacts of these hazards</b>	Landslides Erosion Floods Destruction of property Tsunami Influx of PPI Mass evacuation Loss of lives Mental impact Bio-Hazards DF Plane crash Economic and Social Impact Environmental and Ecological	Floods and landslides Damaged/unusable infrastructure Roofs damaged Debris Displaced persons Food insecurity Lack of medicines Mental health risk Development of children Hunger among the elderly Price hikes	Direct: towers down Equipment failure Diesel spill from telecom site Sea cable damage Lack of communication Lack of sufficient radios
<b>Important events you have experienced in your career</b>	All of the above	Prolonged Rain -> problems Hurricanes Covid – lock down Earthquake Missed plane crash	Car crashed into airco of telecom site -> overheating Security of critical sites (fuel theft) Water damage Circulation of fake news

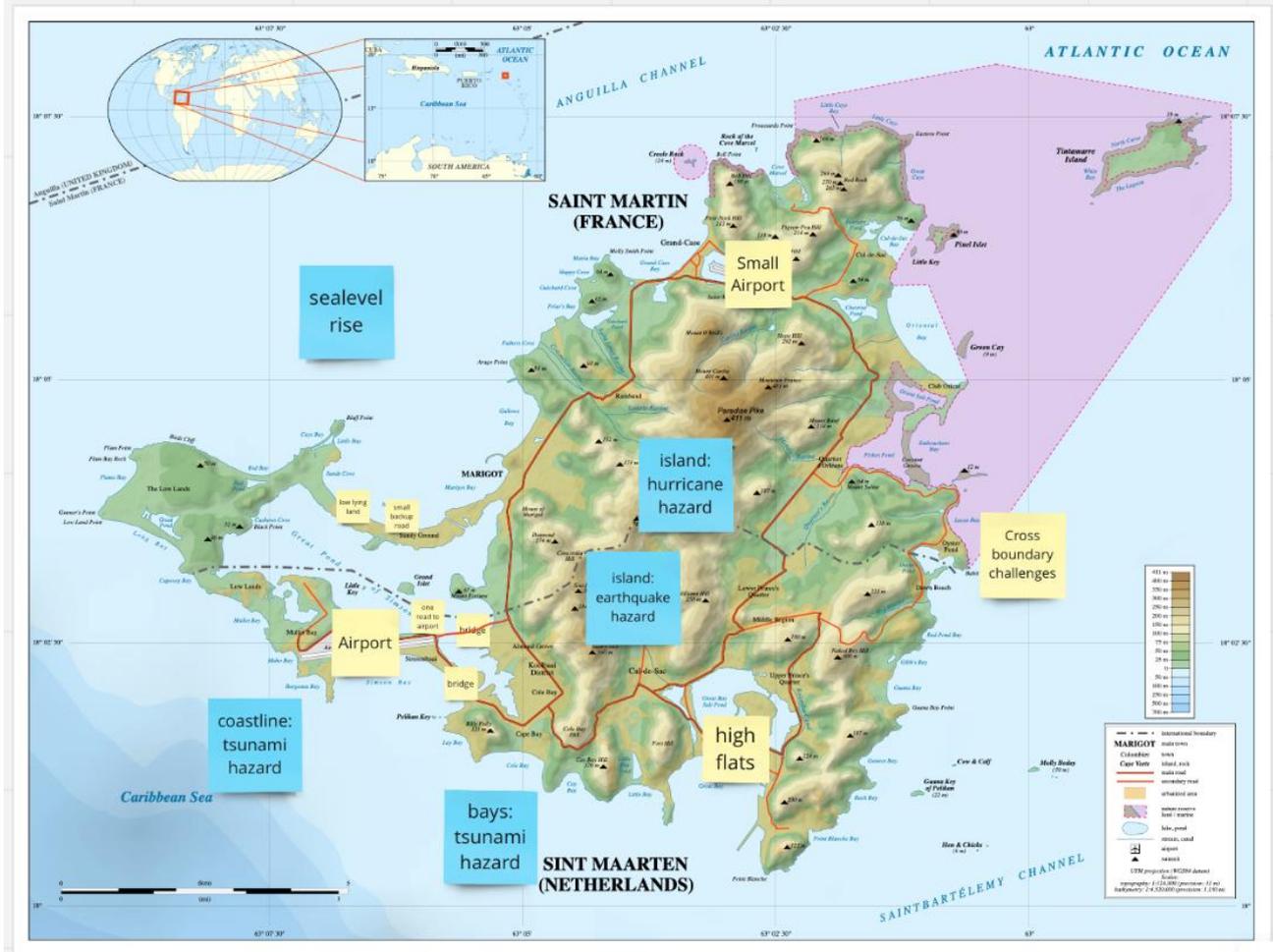
		<p>Mass food project Community Spirit and helping each other Becoming self-sustainable</p>	<p>(in)effective communication Not able to give sitrep on the ground Too much information – no overview Telecom tower crashed through roof of equipment shack -&gt; incoming water -&gt; protective shut-down Lack of (meteo) information Shipping delays of high-priority equipment</p>
<p><b>What different systems and sectors were affected</b></p>	<p>Telecom Emergency Response Gov. Institutions Coast Guard Population Volunteers Min of Defense Police</p>	<p>Pollution / sewage Healthcare Telecom Economy – Tourism Education Safety Water / Electricity / gasoline Retail Family contacts -&gt; isolation Free cross-border movement Influx of products/ goods / relief</p>	<p>Supermarkets Response teams Radio station Schools Families Government Medical exchange with Pat. Aviation Port Security Online education Tourism ATM's e-commerce</p>
<p><b>Where did these events occur</b></p>			
		<p>Zagerscut Cayhill roundabout Dutch Q. (border) P. Blanche, head of town</p>	

Online results:

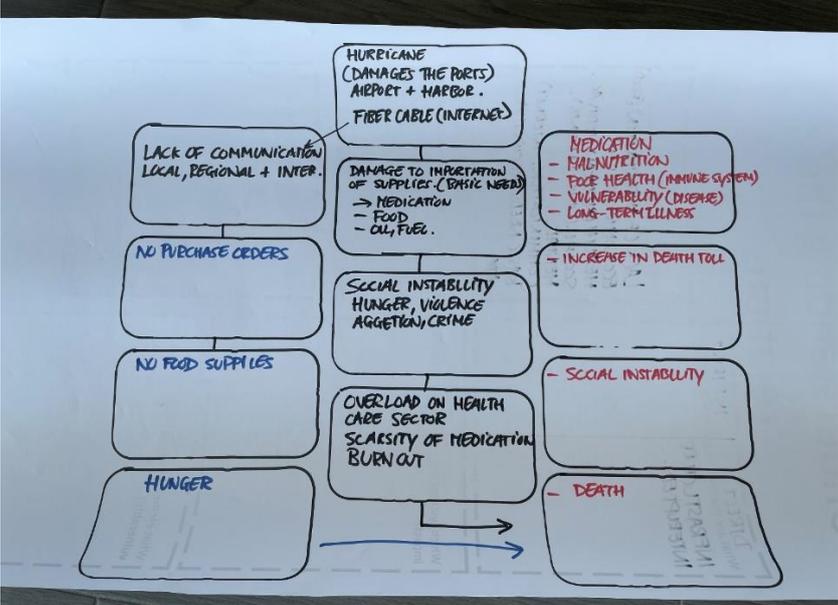


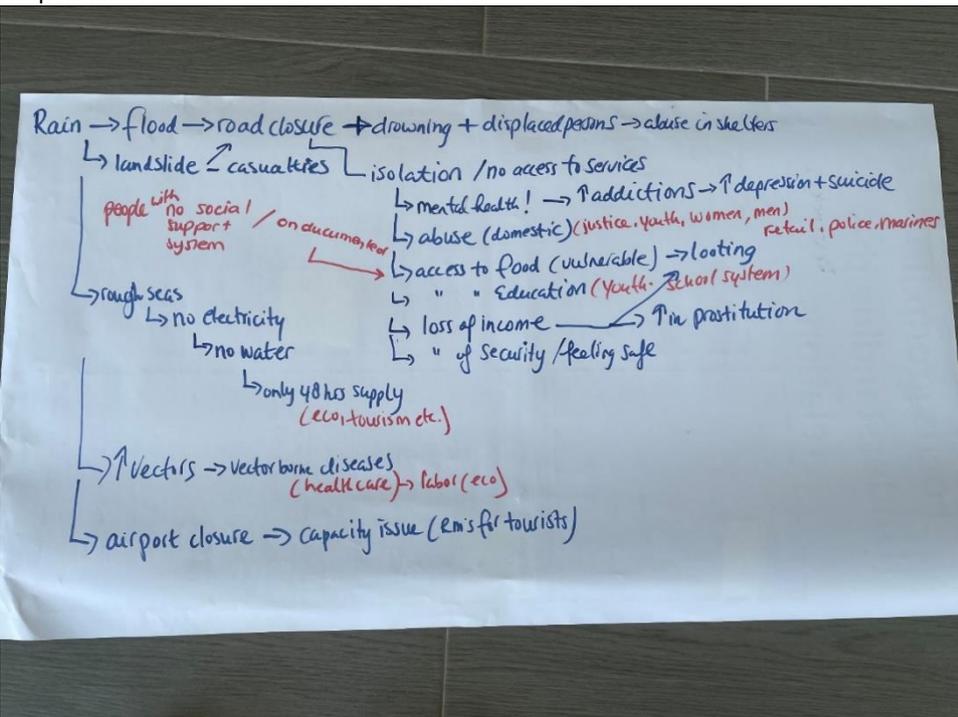


Sint Maarten

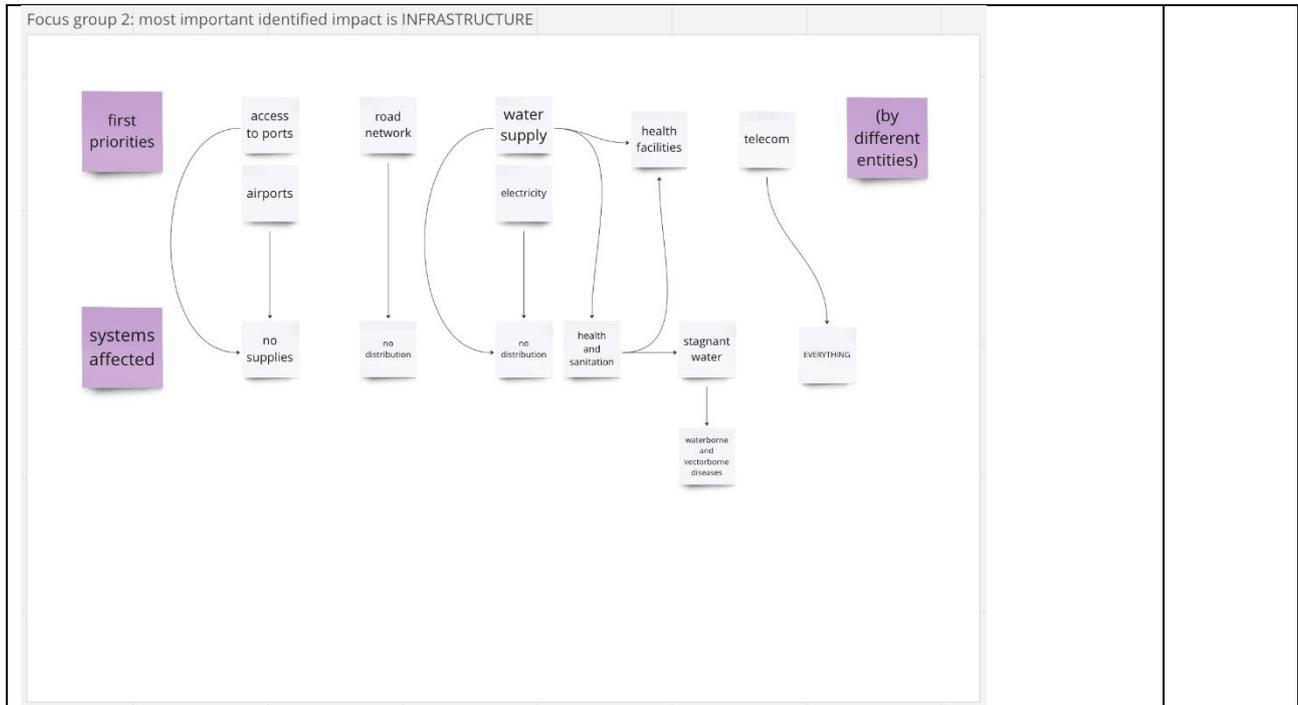


**Focus group 2: Impact chains**

<p>Government:</p> 	<p>Direct Impact:</p> <ul style="list-style-type: none"> <li>- Infrastructure</li> <li>- interruptions</li> </ul> <p>Risks related to impacts:</p> <ul style="list-style-type: none"> <li>- lack of import (food)</li> <li>- economic (tourism)</li> <li>- health (medivac)</li> <li>- social (family + friends)</li> <li>- Mental</li> <li>- Communication (internet)</li> <li>- Basic needs (electricity)</li> </ul>
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<p>Responders</p> 	<p>Rain -&gt; Floods -&gt; Road closure</p>
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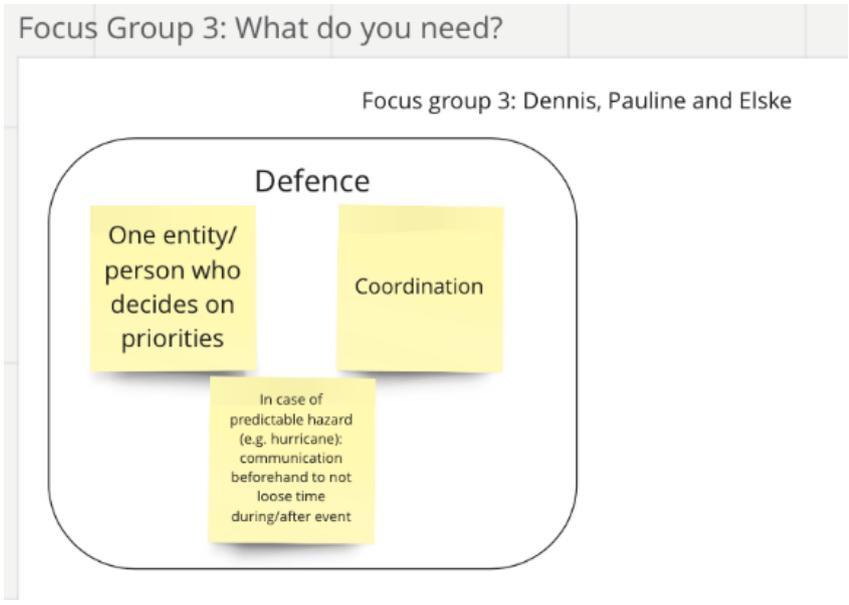


**Focus group 3: What do stakeholders need?**

	Government	Responders	Telecom
<b>For your decision-making, on which components do you need more information</b>	Assessment of necessities <ul style="list-style-type: none"> <li>- Food and water (basic supplies)</li> <li>- Man-power</li> <li>- Medication</li> <li>- Equipment</li> </ul> <ul style="list-style-type: none"> <li>• Based on demands (varies per island)</li> <li>• Information be placed in capable hands (no third party)</li> </ul>	Specific info on impact (historical data) Actual info <ul style="list-style-type: none"> <li>- Dem</li> <li>- Access</li> <li>- Services</li> <li>- Census</li> <li>- Vulnerable people (com. Canals)</li> <li>- Heritage</li> </ul>	All possible scenarios
<b>What tools do you need for this?</b>	Database (app, software) that delivers real-time quantity and quality Flight plans Vessels + transport lines Contact persons Direct link	Plan (business continuity) Input <ul style="list-style-type: none"> <li>- via sensor</li> <li>- user (comm) input with incentive</li> <li>- upload partner data to tool</li> <li>- Generalized impact forms</li> </ul>	Logistics (for things that are not on the island (via St Maarten) Specific for different ESF groups Coherence plan multi-ESF and external (from the model)

<b>What kind of data do you need</b>	Stockpile Regional resources (bi-lateral) National resources (inter) Estimated Time of Arrival (dashboard feature) AAR (after action review) Adaptability	<ul style="list-style-type: none"> <li>- Predictors of impact</li> <li>- Actual info (current state)</li> <li>- Basic data of main topics</li> <li>- During disaster real-time impact chains</li> <li>-</li> </ul>	Model: Expectation of Risk -> Population -> Estimation of -> How many PPE and medicines Modelling of COVID likelihood -> expected future Models of transmission of disease When to scale up, when to scale down When do we have to close schools and businesses Prediction of wind speed and rain Outcome: <ul style="list-style-type: none"> <li>- 80% chance – what to do</li> <li>- 19% - what to do</li> <li>- 1% what to do?</li> </ul>
<b>In which phase of DM do you want to use the platform</b>	From before the disaster occurs; minimum 48 hours	Before <ul style="list-style-type: none"> <li>- Possible impacts</li> <li>- Decision only on news sites</li> </ul> During <ul style="list-style-type: none"> <li>- Decision Making (Direct environment)</li> </ul> After <ul style="list-style-type: none"> <li>- Assessment (joint) (main topics)</li> <li>- Needs list (based on)</li> <li>- Water/food/healthcare/safety shelter</li> <li>- Missing persons / contact tracing</li> </ul>	Prior (prep) Response Evaluation of decisions made
<b>What should a user-friendly platform look like?</b>	Available Accessible Language (mono) Simple + Understood S.M.A.R.T. + I (Intelligence) Inspire – Innovate - Ideas	Off-line work option Low data usage Multi-lingual Multi-device Validation of info Link pro - user	Similar look and feel as social media (Facebook) Data must be hosted locally
<b>Other</b>		Start small, but with important topics	

Online:

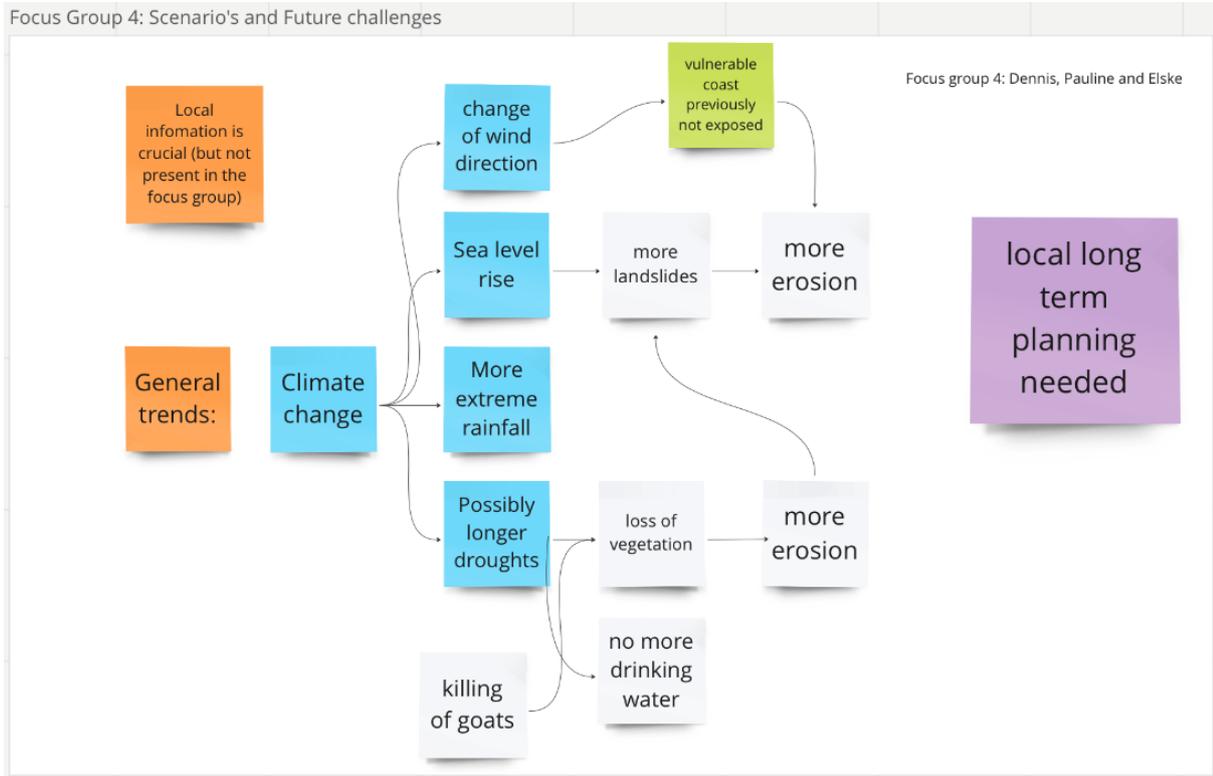


**Focus group 4: Expected future scenarios**

	<b>Government</b>	<b>Responders</b>	<b>Telecom</b>
<b>Which hazard do you think will be the main challenge in the future</b>	Global Warming Solar Flare Terrorism	Stronger and more frequent hurricanes Increase of excessive rainfall More earthquakes + increase risk of tsunamis Rising sea level Increase sargassum weed Pandemic	Hurricanes Earthquakes Fire Tsunami Change of Wind direction -> more erosion Drought -> loss of vegetation Cyber crimes
<b>What future impacts do you foresee</b>	Intensification of natural disasters Hurricanes, drought Sea-level rise Vital infrastructure like telecom, civil, port Erosion, loss of land Drought (absence of water) Environment Food shortage		Sea-cable damage Power plant failure Damage to mobile / Tower damage Severe societal breakdown (mental, communication, lack of medical care and services)
<b>For which impacts are you well-prepared</b>	Hurricane (singular event)	Hurricanes Pandemic (NGO's better prepared + trained / lessons learned) NOT well prepared: - Rainfall (lack of pumps) - Tsunami's - Earthquakes - Rising Sea Level	Hurricanes Pandemic

<b>What trends do you expect in the future</b>	Increased frequency of hurricanes Higher sea level - displacement	Population increase More construction Individualization Increase of migration + reduced national pride Increase of undocumented persons If GHI -> decrease of uninsured persons Misinformation (conspiracy theory, false info, alternative "facts")	Climate Change Increased frequency and intensity of hurricanes Society will be more reliable More advanced technological changes
<b>How can adaptation decrease the risks</b>	Knowledge (database / education) Risk management Food and water storage Infrastructure <ul style="list-style-type: none"> <li>- building code</li> <li>- rain proofing</li> </ul> Enhancing communication Participation	Increase of "stand alone days" abilities (self-sufficiency) Zoning Mapping vulnerable persons / communities Community based relief response Better plans based on real experience	Increase of budget Training drills Prediction models Collaboration with French side + other neighbouring islands
<b>What underlying risk factors are potentially increasing risk</b>	Finance Governance Capacity (manpower/knowledge)	Hospitals not able to remain open if Cat4 or higher comes Increased demand on care systems due to migrants and aging population Instability of government Lack of capacity in government Lack of connection between international organizations and local governments Looking through the "Dutch Lens".	Budget Lack of equipment Outdated equipment Building regulations and enforcement policies Resources More mobile telecom (less wired) Lack of preparation for future hazards

**Online Group**

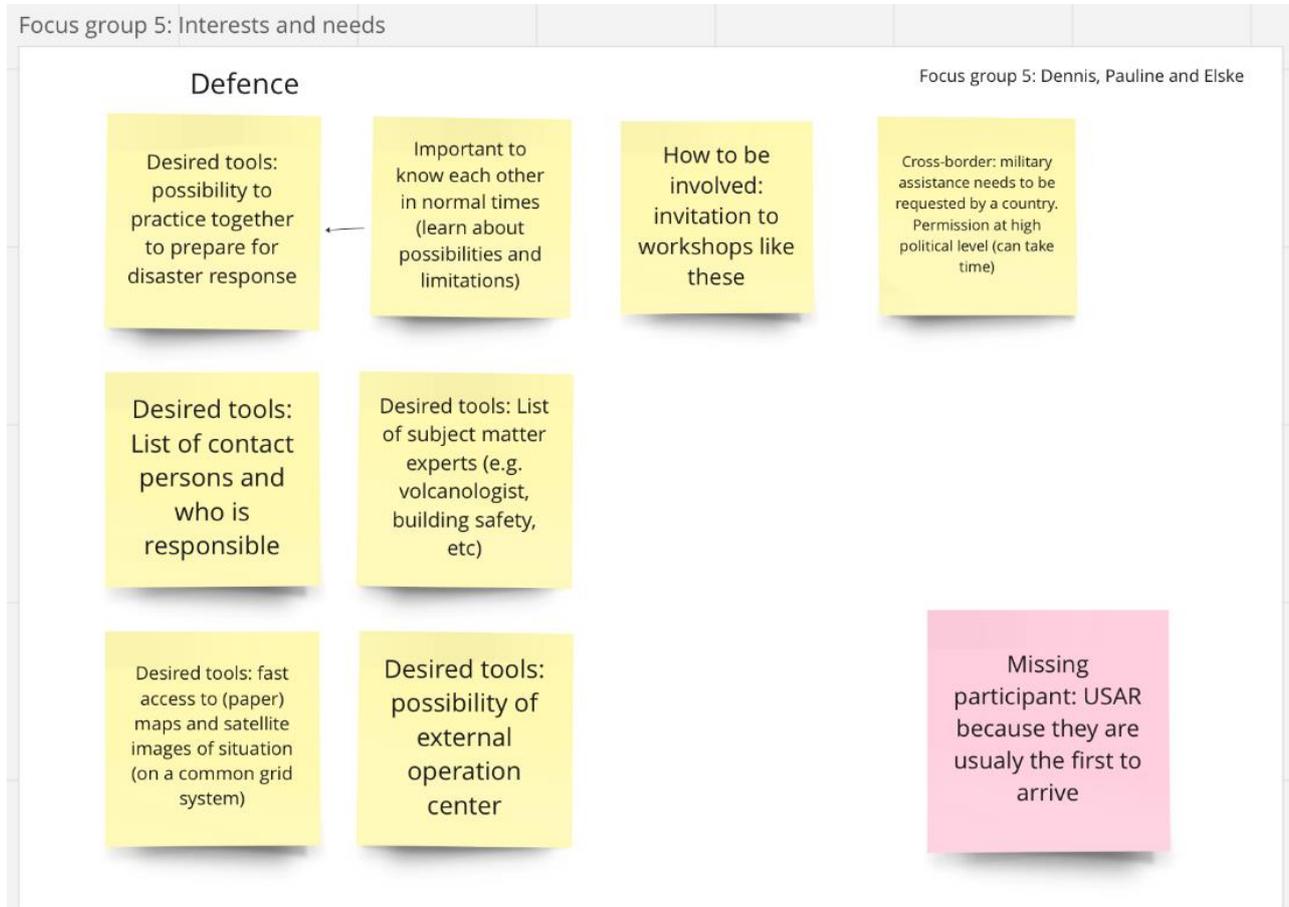


**Focus group 5: Partners' interests and needs**

INTERESTS	Communication on progress of the program – also on the other case studies	Take home message
Commitment	Requires: ESF5 (police), ESF9 (communication), VROMI (ministry)	Better understanding of Telecom
Network	Community / <i>grap</i> to provide feedback and suggestions	Interest in telecommunication
Required Information from islands individual and collective	Involvement in testing	Importance of telecom
Bi-lateral intervention + regional (diversity is our strength)	Phasing (step by step)	Networking between the islands
Thoughts group	Free of charge	Models
Telecommunication	Post-disaster component in the tool	
	Ambassador Group	
	Visualize historical events/data more accessible	
	Risk profile included	
NEEDS		Who to include

<p>Follow-up (PDCA – Plan-Do-Check-Act)</p> <p>Network</p> <p>Information sharing</p> <p>Presentation to Exec. Comm. / Ministry / Island Councils</p> <p>Training (workshop/brainstorming sessions/information processing)</p> <p>ETE/OTO</p> <p>Access to (risk analysis data) database</p> <p>Upkeep (sustainability)</p> <p>Tutorials</p> <p>Dynamic + diverse risk</p> <p>Assessment analysis</p> <p>User friendly (SMART-I)</p> <p>Disaster forensics</p> <p>Open-source platform</p> <ul style="list-style-type: none"> <li>- Hazard, Risk, Vulnerability, exposure, sensitivity</li> </ul> <p>Behaviour of population</p> <p>Resources</p>	<p>Prioritize the topics (food/health)</p> <p>Team channel</p> <p>Standard setting</p> <p>DRM community</p> <p>Heritage mapping as driver to the project</p> <p>Indirect impact for other islands</p> <p>Impact Chains</p> <p>Other islands being <b>her</b></p> <p>Connecting Dutch French islands more</p> <p>French side</p> <p>Missing partners:</p> <ul style="list-style-type: none"> <li>- OceanSX -&gt; drinking water</li> <li>- Insurance companies</li> <li>- CRIFF</li> <li>- Community sessions with the elderly for past events</li> <li>- Planners (government)</li> <li>- Different ESF's</li> <li>- CBES</li> <li>- Church and community leaders</li> <li>- French partners</li> <li>- Comm. Canals sessions</li> </ul>	<p>Met office</p> <p>Disaster NGO's</p> <p>EOC</p> <p>ESF members</p> <p>Citizen reporting to be incorporated</p> <p>More government officials (lively debated)</p> <hr/> <p>What can we contribute:</p> <ul style="list-style-type: none"> <li>- Expertise</li> <li>- Feedback (continuous)</li> <li>- Data</li> <li>- Input on design</li> </ul>
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Online Group



## ANNEX 4 Agenda of the workshop - Case Study Alps

### Agenda, 2<sup>nd</sup> of March 2023

Topic		
Time	Description Title	Who (lead)
09:00 – 09:15	Arrival and registration of the participants	
09:15 – 09:45	Opening by host / Introduction of the partners	UNIVIE, EURAC, ASFINAG, BFW, ITC
09:45 – 10:00	Project Presentation PARATUS	ITC/UT
10:00 – 10:30	Spotlight introduction stakeholders	Red Cross Climate Centre
10:30 – 10:45	Introduction to focus groups	Red Cross Climate Centre
10:45 – 11:00	Introducing past events	BFW Tiroler Landesstraßendirektion Land Tirol Wasserwirtschaft BMK
	The Brenner Corridor Platform	
11:00 – 12:15	Focus groups 'Past events and status quo' Including coffee	Red Cross Climate Centre
12:15 – 12:30	Reports from the focus groups	Red Cross Climate Centre
12:30 – 13:30	Lunch Break	
13:30 – 14:00	Impulse talks: <ul style="list-style-type: none"> <li>• Future local and regional climate changes in Tyrol</li> <li>• Future challenges in spatial planning</li> <li>• Impact chains</li> </ul>	Geosphere Austria  Tyrol State, Department of Spatial Planning  EURAC Others tbc
14:00 – 15:15	Focus groups 'Impact Chains, scenarios and future challenges'	Red Cross Climate Centre
15:15 – 15:45	Reports from the focus groups	Red Cross Climate Centre
15:45 – 16:00	Coffee break	

16:00 – 17:30	Stakeholders' interests and needs expectations, interests, motivation, priorities and expected outcomes	Red Cross Climate Centre
17:30 – 18:00	Open Space for questions and pathways	Red Cross Climate Centre
18:00 – 20:00	Dinner	
20:00 -	Social Evening	

### Agenda, 3<sup>rd</sup> of March 2023

Topic		
Time	Description Title	Who (lead)
07:00 – 09:00	Breakfast	
09:00 – 09:15	Recap of yesterday's achievements and defining desired outcomes	UNIVIE
09:15 – 10:30	Introduction multi-risk platform & Co-developing ideas for PARATUS platform	ITC/UT Red Cross Climate Centre
10:30 – 11:30	Open discussion part: time plan, responsibilities & Open Space for questions	Red Cross Climate Centre
11:30 – 12:00	Coffee break	
12:00 – 15:30	Field trip (incl. lunch package)	ASFiNAG
15:30 – 16:00	Arrival train station / airport	

## ANNEX 5 – Stakeholders in the Alps Workshop

Stakeholder Group	Organisation Name	Specific Domain
<b>1. Practitioners (First &amp; Second Responders from public and private sectors)</b>	Polizei - Landesverkehrsabteilung Tirol	police, first responder
	Austrian Armed Forces (6. Gebirgsbrigade, Pionierbatallion (disaster operations))	disaster operations
	Zivilschutzverband	civil protection
<b>2. International Networks &amp; Organisations</b>	Brenner Corridor Platform (BCP) / BMK Verkehrsplanung	Platform for traffic planning
	DKKV (German Committee on Disaster Risk Reduction)	Disaster risk reduction
<b>3. Policy &amp; Decision makers</b>	Land Tirol Abt. Verkehrs- und Seilbahnrecht	laws on traffic
	Austrian Economic Chamber Tyrol (Wirtschaftskammer Tirol)	economic chamber
	Transitforum Tirol, Arbeiterkammer Tirol	forum for transit Tyrol
	Land Tirol Abt. Raumordnung	Tyrolian chamber for spatial planning
<b>4. Civil Society</b>	Austrian Alpine Club (ÖAV)	Alpine Club

<b>5. Scientific &amp; Research community</b> (including related projects and initiatives of the Security Resilience Cluster)	Geosphere Austria (former ZAMG and GBA)	geological survey and meteorology
	Tyrolean Water Management Department	water management
	Tyrolean Hydrography and Hydrology Department	hydrography and hydrology
	Austrian Service for Torrent and Avalanche Control (WLV) / Regional Office	torrent and avalanches control
<b>6. Actors from Financial &amp; Insurance sectors</b>	Tyrolean Insurance (Tiroler Versicherung)	insurance group
<b>7. Critical infrastructure operators</b>	Austrian Service for Torrent and Avalanche Control (WLV) / Unit Tyrol	torrent and avalanches control
	BMK - BCP SKMM; Staatliches Krisenmanagement	crisis and catastrophe management
	State Forest Directory (Landesforstdirektion), Department Forestry Organisation	forestry organisation and management
	District Forestry Office Steinach	forestry organisation and management
	Road Maintenance Office Matrei am Brenner (Straßenmeisterei)	Road maintenance
	Gruppe Bau & Technik (responsible for main. regional roads - B- & L-Landesstraßen)	Road maintenance
	Austrian Railways (ÖBB)	Railway
	Fachbereich Katastrophenhilfe (LWZ), Amt der Voralberger Landesregierung	emergency response infrastructure provider
<b>8. Technology providers</b>	Regional Warning Centre Tyrol	Warning centre and technologies
	Gruppe Tiroler Zentrum für Krisen- und Katastrophenmanagement - Zugehörige Einheiten deren Teilnahme wird von Elmar abgeklärt: <ul style="list-style-type: none"> <li>o Katastrophenschutz</li> <li>o Landeswarnzentrale</li> <li>o Landesgeologie</li> <li>o Lawinenwarndienst</li> </ul>	crisis and catastrophe management

## ANNEX 6 - Results of focus groups in the Alps Workshop

### Focus Group Work 2: Future Scenarios

#### Group 1



Table: Shows the key outcome of focus group session 1, group 1

Hazards	Impacts	Events and Adaptation Strategies
<p>Landslides Translational sliding (Hangmuren) Straßenwasser Ableitung -&gt; Vorfluter</p> <p>Drought (Slope fires) Storm, Tree uprooting (+ wet snow)</p> <p>Infrastructure is the problem itself when simultaneous events are happening Wildfire problematic Overlapping of summer and winter traffic. (no slow period)</p>	<p>Processes are overlapping and are increasing Corrosion? 12% of the damages at ÖBB are traced back to natural hazards Rockfall over the whole year (Shift from seasonal phenomena to year-round problem) Waste deposit -&gt; Forest fires Red Zones: No coverage through insurance Insurance coverage? Slope mobilisation? Many people do not flood insured (e.g., Kufstein) Loss of value: Building sites are downgraded to grasslands</p>	<p>ÖBB: rail tracks are adjusted regarding average temperature from 18°C to 21°C.</p> <p>Flooding Inn 18/19 (Snowmelt and heavy precipitation) Multiple processes: Kärnten 20/21 Flooding Kufstein and area 2021</p>



Table: Shows the key outcome of focus group session 1, group 2

Hazards	Impacts	Events and Adaptation Strategies
<p>Heavy precipitation Avalanche, flooding, mudflow, gravitational mass movement</p> <p>Temperature Quick ice, drought and heat, heavy snow</p> <p>Wind Föhn, wind thrown trees, trees breaking</p>	<p>Blockage of routes Security of supply Forest Traffic jams Snow clearing Critical infrastructure such as telecommunication No preparation since events are happening in many seasons</p>	<p>1998 Gravitational mass movement Franzonsföse?</p> <p>2005 / 2019 Flooding Kufstein area</p> <p>2012 Protection wall Schönberg</p> <p>2017 Gravitational mass movement Ellbögen</p> <p>2018 Mudflow Brenner bad</p> <p>2018 Matri gravitational mass movement</p> <p>2019 Avalanches, blockage A22 02.02.2019</p> <p>2020 Gravitational Mass movement Pians</p> <p>2020 Forest fire</p> <p>2022 Rockfall Schönberg</p>
Tools		
<p>Additionally, group 2 collected ideas about tools. Early warning systems, adjusting the law regarding resilience, communication intra regionally, Resilience, Prevention. What tools?</p> <ul style="list-style-type: none"> <li>- Everyone has different communication</li> <li>- Good communication between authorities and countries</li> <li>- Often no preparation for resilient communities</li> </ul> <p>Communication over regional</p>		

Group 3

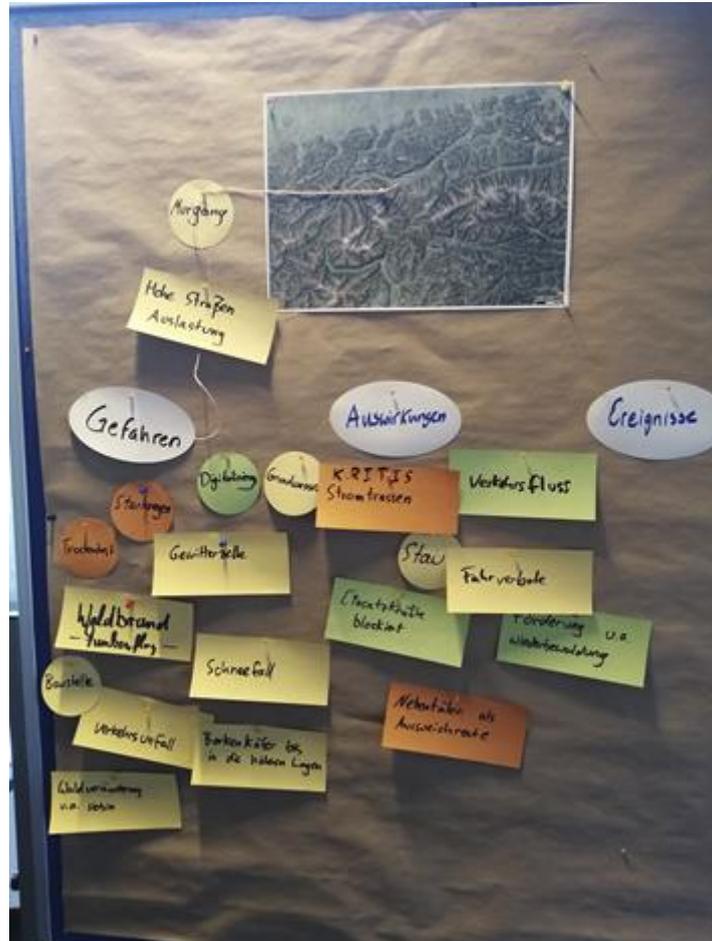


Table:Shows the key outcome of focus group session 1, group 3

Hazards	Impacts	Events and Adaptation Strategies
Extreme precipitation Heavy snowfall Convective events Forest is damaged (forest fires) Forest fire due to rail traffic. Bark Beetle migrating to higher altitudes High traffic Volume Weather Construction sites Traffic accidents Digitalisation	Pollution in the valleys Natural protective forests damaged Slow traffic New routes to other valleys due to accessible internet and (e.g., Google maps) Indirect impact for other valleys Groundwater problematic Critical infrastructure First and second responders are blocked due to high traffic	Partly stopping traffic before arriving at the narrow pasts of Brenner corridor No truck traffic allowed on the weekends Substitutions for Forest owners Early warning systems generally work well
Tools		
Block processing (Blockabfertigung), Promotion and funding of reforestation projects, driving restrictions		

Group 4



Table: Shows the key outcome of focus group session 1, group 4

Hazards	Impacts	Events and Adaptation Strategies
Traffic volume /pollution Precipitation / Snowmelt Construction sites Rockfall Political hazards Cyber criminality (attack on critical infrastructure) Heat Wind, changes	People stuck in traffic jams (need to be supported) Streets too warm (Electric batteries?) Supply problems when roads blocked Heavy snow on trees Loss of biodiversity New civic initiatives are founded	1976 earthquake acidic rain due to polluted air. 2005 Flooding Extreme weather (Flooding) Sellrain. Hahntennjoch?  Need to adjust building strategies.
Tools		
Society needs more self-responsibility / civil protection trainings Traffic system (with lights) Since communication and more focus oriented		

Focus Group Work 2: Future Scenarios

Group 1



Table: Shows the key outcome of focus group session 2, group 1

Hazards	Impacts	Adaptation Strategies / Challenges
Combination of hazards Protection function of the forest endangered Bark Beetle New hazards (e.g., wild fires) Convective heavy precipitation Flood waves due to glacial lakes or dammed lakes	Forest reacts very slow with adaptation. Power plants of the ÖBB Schutzwald – Ausfall Death of pine trees (ÖBB) More forest in higher areas = more competition	Climate Change for regional sorts of forests Bark Beetle What when scenarios are published, is there a need to react? Uncertainty regarding Temperature and Precipitation.
Tools needed?		
Currently too many island solutions on the local level, need for more interaction between regions. Difficulty to consider all data. Homogenous event database Impact chains and real time simulations.		

Group 2



Zukunft

Zunahme Gesteins-  
→ seit 2014/15  
→ Bewegung

Gefahren  
punkt, Starkregen/NS (Schnee) → Variable  
Gewitter/Hagel Disposition  
→ Grund-  
Disposition  
→ Erosion  
Überschneemungen  
Schneementige Wände  
häufige Frost/Tauzyklen

Zukunft

Auswirkungen

Material (Gesteine) - Deponien (3 Mt/jr.)  
Größere Nutzungen → Höhere Anforderungen  
Höhere Präzisionsanforderungen → Nachfragen  
Sicherheitsgedanke - Ausdehnung Restrisiko  
Abnehmende Eigenverantwortung  
Bsp. Hagel: "Verstopfung" Abfluss →  
Winterrisiko: kurz & viel; aber weniger  
Andere Zeiten von Jdr./mrd. Jdr.  
"Zeit in time"

Zukunft

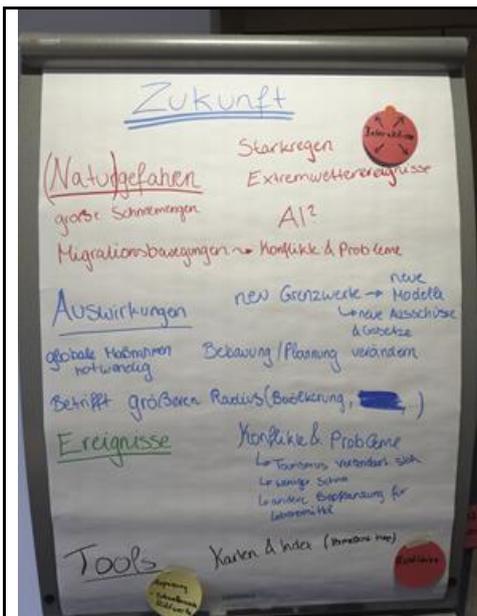
Impact Chains

Schneebruch → Borkenkäfer → "Zentralanfall"  
Wald  
⇒ Steinschlaggefahr → Erosion → Gerinne  
⇒ Schneelawinen  
"kommunizierende Gefäße"  
→ teilweise bekannt / teilw. neu  
→ Energieerzeugung?  
→ Tourismus?  
→ Verkehr?

Table: Shows the key outcome of focus group session 2, group 2

Hazards	Impacts	Adaptation Strategies / Challenges
Increase of: Gravitational mass movements Local heavy rain, snowfall Longer dry periods Flooding Wind (schneisenartig) Frost / thaw circles Changing basic and variable dispositions	More frequent events Questions of responsibility Time changes when avalanches are happening. Disruption of just in time. Sicherheitsglaube, abnahme Eigenverantwortung e.g. Hail, closing the wastewater system	Higher amounts of users Different perception Winter services: more extremes but less snow fall
Tools needed?		

Group 3



*Table: Shows the key outcome of focus group session 2, group 3*

Hazards	Impacts	Adaptation Strategies / Challenges
Snow extremes Heavy precipitation events AI Artificial Intelligence Migration due to climate change	Global Impacts on the local area Changes for society with negative impact on life standard Food security with transport logistic problems? Conflicts due to migration Building activity and planning New laws, new models	New thresholds need to be considered Creeping processes difficult to quantify Mind setting No clear simple solutions
Tools needed? Or already available?		
Traffic regulation with electronic signs exists Quick reparation of problems (on highway) Availability of maps and Indexes (e.g., Permafrost map)		

## ANNEX 7 – AGENDA Kick off Meeting in Istanbul Case Study

Program, 20<sup>th</sup> of December, 2022

Time	Activity	Process
09:45-10:00	Registration	
10:00-10:15	Welcome address	Local stakeholder
10:15-10:30	Introduction to PARATUS	Presentation of PARATUS What is PARATUS? Why is this important? How do we want to work together? Other study sites
10:30-10:40	Content of the workshop	To give a brief information on the steps of the workshop
10:40-11:00	<b>Group Photo &amp; Coffee Break</b>	
11:00	Table Choice	There will be four tables. To avoid grouping and create familiarity, participants pick a folded paper from the bowl on which number of the table is written.
11:00-11:10	Introduction	Introduction of participants: Name, department they are currently working, their involvement on disaster and risk issues.
11:10-12:30	Exploring hazards in Istanbul	What are the three most severe threats that Istanbul is facing to? (green cards)  What are the three relevant difficulties/problems/obstacles that you expect to manage a disaster? (3 yellow cards) What do you need to address these difficulties/problems/obstacles? (3 white cards) Setup smaller groups of about 8-10 participants and provide three color cards and marker pens. Invite participants to write their thought on a card.
12:30-12:45	<b>Coffee Break</b>	
12:45-13:15	Priority issues for exploration	Facilitate a discussion on what has emerged. Encourage participants to agree on which issues are on priority to be addressed. Give each participant 5 stickers and ask them to place the dots on the cards they find should be a priority.
13:15-13:40	Presentation	Spokesperson of each table gives short presentation about discussions and output.
13:40-14:00	Next steps	Which stakeholders should be invited to future workshops/meetings? What are your expectations from PARATUS? (Via the Mentimeter)
14:00-14:10	Closure	Closing and thanks

\* Timeslots in blue indicate simultaneous translation via the Zoom platform

## ANNEX 8 Planned External Stakeholder Workshop, in Istanbul Case Study, in June 2023

Time	Activity	Process
09:45-10:00	Registration	
10:00-10:10	Welcome address	Local stakeholder
10:10-10:20	Introduction to PARATUS	Presentation of PARATUS What is PARATUS? Why is this important? How do we want to work together? Other study sites
10:20-10:30	Output of the kick-off meeting	What did we discuss? What are the outputs?
10:30-11:00	Impact chain and systemic risks	With examples Kocaeli (1999) and Kahramanmaraş (2023) earthquakes
11:00-11:15	<b>Group Photo &amp; Coffee Break</b>	
11:15-12:00	Focus group Part I	Impact chain: If a large scale EQ occurs what kind of impacts you may expect?
12:00-12:30	Presentations	Focus groups' presentations
12:30-13:00	<b>Lunch Break</b>	
13:00-13:30	Learning Case Study	Challenges aftermath of Kahramanmaraş earthquakes
13:30-14:15	Focus group Part 2	Referring to the impact chain tree which you have produced recently, discuss impact chains that Istanbul may face in the case of a large-scale EQ. Maps to be provided to participants: current land use of Istanbul, transportation, population
14:15-14:45	Presentations	Focus groups' presentations
14:45-15:00	<b>Coffee Break</b>	
15:00-15:45	Focus group Part 3	Evaluation of critical infrastructures and critical services via Delphi method
15:45-16:00	Closure	Closing and thanks

\* Timeslots in blue indicate simultaneous translation via the Zoom platform

## ANNEX 9 Bucharest Case Study - Discussion guide - ISU BIF Level 1 and Level 2 focus group

### ISU BIF Level 1

*Intro – 10min*

*Good morning and thank you for agreeing to take part in this discussion after understanding the topic and conditions under which this research will be conducted. We are researchers at the University of Bucharest and in the next 90 minutes we will discuss your job.*

*We are interested to hear your honest opinions on the topics discussed, as they emerge from your experience. All opinions count. There are just three rules of discussion that I ask you to keep in mind. The first is that there are no right or wrong answers. And we don't expect you all to agree, but to give us as diverse an opinion as possible. The second is that we only use our chosen first name or nickname when addressing each other. The third rule is actually a request, to speak in turn. If you don't do this, and it can sometimes happen in the middle of a discussion, I will find it very difficult to pay attention to everything you say, and that's a pity, because valuable things are lost that cannot be retrieved even on transcription.*

1. To begin with, I would like to ask you to go around the table so that everyone can introduce themselves in a few words. Please just tell me your first name or nickname, how long you have been in this structure, what made you choose this job/career, and something about yourself that is not work-related. It can be a hobby or whatever you think defines you best outside of work. I'll start
2. What is the best advice you have ever received in your job?

### Discussion – 70min

3. What are the top 3 terms that come to mind describing your job? I'll give you 2 minutes to think and then please write them down on the paper you have available. *Please tell me what you wrote down and explain in turn the words you wrote down.*
4. What do you consider to be the 3 biggest dangers you see for the city of Bucharest? Please write them down on another paper, and let's discuss them after writing them down.
5. Let's imagine together the following intervention situation... a call has been received *on 112 informing that an explosion has occurred in a block of flats in the Drumul Taberei district. You do not yet have details of the incident; you only know that there are victims, and the situation is in full swing.* What does an ideal intervention situation look like for each of you? What needs to happen for things to go well? What are the factors that help you do your job well? The phases will be addressed in turn:

*Before the incident - capacity + skills > training, coping, equipment, structure*

*During the incident*

- *Announcement + travel > incident info communication (correct address, access info, info about preparedness or infrastructure at the scene) /*

- *Incident response > on-the-spot decisions in critical situations, command chain*

- *Travel back to unit >*

*After the incident, at the unit > debriefing, psychological support, coping strategies).*

*Expectations vs reality*

6. What is the most difficult situation one can encounter in this profession? Also, please write it down first on the paper in front of you. Can you describe what makes it difficult?

7. What are the main factors that you see as hindering you from doing your job?

8. Let's imagine another situation: *you are on a mission in the centre of Bucharest, on Boulevard Magheru, a few hours after a major earthquake with multiple casualties, which occurred during the day.* Please describe the general situation you think you will face there. Direct effects, indirect effects, Impact chain. What do you think will be the most dangerous effects of the earthquake for you? What are the key elements of your response? Do you think you are prepared to handle such a situation?

*Outro – 10min*

9. What is the best advice you would give in your profession for intervention?

10. Do you have anything else to add to the topics discussed?

\* For laddering we will use a flipchart or paper, on which we will write a tree with the branching of the answers. What thoughts/problems they have, then we will take them in turn. "Why?" "Why is this important?" "What does this mean to you" etc.

## **ISU BIF Level 2**

### **Discussion guide - ISU BIF focus group Jan 19, 2023**

*Intro - 10min*

*Good morning and thank you for agreeing to take part in this discussion after understanding the topic and the conditions under which this research will be conducted. We are researchers from the University of Bucharest and in the next 90 minutes we will discuss issues related to your job and emergency situations in the city of Bucharest.*

*We are interested to hear your opinions on the topics discussed, as they emerge from your experience. All opinions count. There are just three rules of discussion that I ask you to keep in mind. The first is that there are no right or wrong answers. And we don't expect you all to agree, but to give us as diverse an opinion as possible. The second is that we only use our chosen first name or nickname when addressing each other. The third rule is actually a request, to speak in turn. If you don't do this, and it can sometimes happen in the middle*

*of a discussion, I will find it very difficult to pay attention to everything you say, so valuable things are lost that cannot be retrieved even on transcription.*

*To begin with, I would like to ask you to go around the table so that everyone can introduce themselves in a few words. Please just tell me your first name or nickname, how long you have been in this structure, what made you choose this job/career, and something about yourself that is not work-related. It can be a hobby or whatever you think defines you best outside of work. I'll start:*

*Discussion - 75 min*

**A. Validation and completion of issues identified at level 1 - 25 minutes**

1. We would like to ask you, to start with, what are, from your point of view, the main problems you are facing, at the level of Bucharest, directly or indirectly, in your activity (related to emergency response). More specifically, it is about what in Bucharest can affect the success of an intervention, whether we are talking about human or material factors, such as infrastructure.
2. As you know, we have already talked to several of the people under your command, and we have gathered a lot of factors from them, some of which you have mentioned, and some of which you have not mentioned. I'd like to ask you to go through them a little and tell us, briefly, whether these things appear the same from your perspective, and whether there's anything you would replace, eliminate, or add.

**Infrastructure**

- Restricted or even blocked access to the incident area due to:
- chaotic urban development
- parked cars (not leaving room for emergency vehicles)
- traffic (even under normal conditions)
- lack of hydrants (sometimes blocked by cars or asphalted)

**Public attitude**

- hostile
- passive (those present film with their phones but do not get involved)
- lack of solidarity
- Unrealistic expectations stemming from lack of clarity on Ambulance / SMURD services

**Quality of resources (human and material)**

- need for/perception of professional training
- intervention equipment / rescuer protection
- mental health (support therapy for rescuers + first aid for victims)

**Resource allocation**

- Significant population growth in the district area
- Increased share of support services
- Social assistance

3. Of all these factors, or categories, which do you think are the most important? *Please help us to rank them in order of importance, from most to least important.*
4. Which of these factors could be most easily addressed and would have the greatest impact on your structure? If you had to choose a maximum of three. *Please write them down on a piece of paper, and then tell us why?*

B. Command-level specific problems (e.g., freezing rain) - **25 minutes**

1. When an intervention requires the allocation of a greater number of resources or a certain competence, you may also intervene and take over the command. You, therefore, have a different perspective on the emergency response from your colleagues we have spoken to so far. Please tell us what factors, from your point of view, ensure the success of such a response at your level of command.

2. Because it is easier to set up our discussion in a concrete situation framework, we have chosen an emergency situation in Bucharest that involved the engagement of a large number of resources in its resolution and tested the response capacity. At the end of January 2019, there was an extreme weather phenomenon - freezing rain, which caused over 3500 events in Bucharest. Were you involved in the response?

Can you tell us what were the biggest challenges you faced during those days? Can we rank them in order of their impact on the intervention? What were the main factors that helped you to solve the situations you intervened in?

C. Case study: earthquake - **25 minutes**

Now we will move on to a situation we need to imagine: *A major earthquake with multiple victims occurs in Bucharest during the day.* Please describe the general situation you think you will face in your position.

What do you think will happen then, on the one hand at the level of the city (direct and indirect effects), and on the other hand at the level of your structure. *Direct effects, indirect effects, Impact chain.*

What do you think will be the most dangerous effects of the earthquake for you? What are the key elements of your intervention? Do you consider that your structure is prepared to manage such a situation? What can be improved in this respect and why?

*Outro - 5 min*

Do you consider that you have anything else to add to the topics discussed?

## ANNEX 10 – Agenda of the workshop - Case Study Bucharest

### Meeting Details

Title Meeting		
Date: 20 March 2023	Meeting time: 09:00 –17:00	Meeting location: Sheraton Hotel, Arizona Hall 5-7 Calea Dorobanți, 010551Bucharest
Meeting called by	UB & DSU	
Work Package	All (especially WP1 and WP2)	
Type of meeting	Stakeholder Meeting, application case study Bucharest, Romania	
Meeting host	UB, DSU	
Prepared by	UB, DSU	

### Agenda

Topic		
Time	Description Title	Who
08:30 – 09:00	Arrival and registration of the participants	
09:00 – 09:15	Opening by host / Introduction of the partners – UB&DSU	BU
09:15 – 09:30	Project Presentation PARATUS	UT
10:00 – 10:15	Spotlight presentations stakeholders (ask for their workshop expectations & contributions)	
10:15 – 10:45	Impact Chains, scenarios, and future challenges	BU
10:45 – 11:00	Introducing past events in Bucharest	UT
11:00 – 12:00	“Bucharest earthquake” guided tour (with specific tasks), Coffee break	BU
12:00 – 12:45	Focus group, Part I: Past events and status quo discussed in the following groups: (1) infrastructure, (2) communications (3) impacts (4) stakeholder network	Facilitation
12:45 – 13:15	Reports from the Focus group part I	
13:15 – 14:00	Lunch Break	
14:00 – 14:30	Turkey earthquake response, challenges & learnings (DSU)	DSU
14:30 – 15:30	Focus group, Part II: Identify impact chains based on the different components identified in focus group part I.	Facilitation
15:30 – 15:45	Coffee break	
15:45 – 16:15	Reports from the Focus group part II	BU
16:15 – 16:45	Stakeholders’ interests and needs concerning expectations, interests, motivation, priorities and expected deliverables	Facilitation
16:45 – 17:00	Conclusions	BU

Please note that the event will be video live-streamed to a limited no of invited persons and photos will be taken for documentation and public relations purposes. With your participation, you agree that the image material can be published within the PARATUS project as well as on Twitter and LinkedIn for the purpose of public relations. This consent can be revoked at any time (with future effect) by sending an email to [iulia\\_armas@geo.unibuc.ro](mailto:iulia_armas@geo.unibuc.ro)