A Combinatorial STI Solution for a Disaster Management Framework towards Stakeholder Engagement

Dr. Dimitris Simos, Austria/WEOG

Key Researcher & Head of Strategic Research, SBA Research
Associate Professor, Graz University of Technology

PH-US-UNCTAD HARNESING STI FOR DRR WORKSHOP

February 29 - March 1, 2024 Alabang Muntinlupa City
## Prevention and Reduction of Disaster Risk

### Several Scientific Issues need to be addressed:
- Extreme weather events
- Impact of cascading effects by natural hazards
- Multi-hazard risk reduction

### Existing Technology could and need to be further improved:
- Risk assessment
- Simulation tools
- Precise prediction, forecast and early warning systems

### Science, Technology & Innovation (STI) Challenge:
An integrated disaster management system with monitoring, warning and simulation, response and reconstruction is **lacking**
DRR Landscape in Austria

**STI-related Data Points and Tools (AT)**

- **SKKM**: National Crisis and Disaster Protection Management
- **HORA**: Natural Hazard Overview & Risk Assessment Austria
- **CESARE**: Collection, Standardization and Attribution of Robust disaster Event information
- **ÖKS15**: Climate scenarios for Austria
- Natural hazard and climate change check for municipalities

**Policy Information and Stakeholder Integration (AT)**

- **ASDR**: Austrian Strategy for Disaster Risk Reduction
- **Team Austria by Red Cross and Ö3**: mobilization of trained volunteers in emergencies (~ 400,000 people)
- Austrian Strategy for Adaptation to Climate Change
- **EUSDR**: aiming to collectively increase disaster response and implement flood risk management
- **EUSALP Action Group 8**: risk governance of Alpine countries
Science

Sequence Covering Array

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Progress of scenario

Technology

COPERNICUS Emergency Management Service

Disaster Management System

KATWARN Österreich/Austria

Innovation?
A Combinatorial Disaster Management Framework (CODOD)

Placement within the *Disaster Risk Management (DRM)* Cycle

**Source:** FINANCING DISASTER RISK REDUCTION IN HUMANITARIAN AND CRISIS SETTINGS

*UN Office for Disaster Risk Reduction*
Simulation: Comparison of two flood scenarios

Comparison of Combinatorial Flood Scenarios
Simulation: Comparison of two bushfire scenarios

Comparison of Combinatorial Fire Scenarios
Placement of CODOD within the UN *Sendai Framework*

**Sendai Framework for Disaster Risk Reduction 2015 - 2030**

**Priority 1**
Understanding disaster risk

Disaster risk management needs to be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment.

**Priority 2**
Strengthening disaster risk governance to manage disaster risk

Disaster risk governance at the national, regional and global levels is vital to the management of disaster risk reduction in all sectors and ensuring the coherence of national and local frameworks of laws, regulations and public policies that, by defining roles and responsibilities, guide.

**Priority 3**
Investing in disaster risk reduction for resilience

Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These

**Priority 4**
Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction

Experience indicates that disaster preparedness needs to be strengthened for more effective response and ensure capacities are in place for effective recovery. Disasters have also demonstrated that the recovery, rehabilitation and reconstruction needs to be prepared.

- **Systematic generation of diverse disaster scenarios.**
- **Instantiations at the local, national, regional and global level.**
- **Minimized impact on prevention- and preparedness costs.**
- **Simulations and trainings improve response mechanisms.**
Towards an STI Solution for RTOs and Stakeholder Engagement

Data sources
- Post disaster reports
- Real-time environmental data
- Satellite data

(N)GOs Stakeholders

Potential partners: National Disaster Management Centers, UNESCO, UNDRR, UNCTAD etc.
Towards an STI Solution for RTOs and Stakeholder Engagement

Disaster knowledge base & Scenario generation
- Events (occurrences, properties, relationships,...)
- Algorithms

Potential partners: Disaster Competence Groups, GADRI research organizations etc.
Towards an STI Solution for RTOs and Stakeholder Engagement

Simulation & assessment
• Simulation tools
• Impact assessment
• Risk analysis

Potential partners: GADRI research organizations, National Disaster Management Centers, UNESCO, UNDRR, UNCTAD etc.
The mathematical concept of **sequential coverage** can lead to an **integrated disaster management strategy**, encompassing diverse simulations, complex exercises and resilient response plans, implemented across **participating stakeholders**.