



**Barcelona
Supercomputing
Center**
Centro Nacional de Supercomputación

Dynamic Data-Driven Application System Methods in Economics and Financial Systems Modelling

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EMMA- EMergency situations and disasters modelling, simulation and MAnagement

Overarching Objective:

- provide an effective decision support and management system for emergency situations management and disaster management for natural events (floods, tsunamis, earthquakes, hurricanes, volcano eruptions) for EU and men made disasters.

Aims



- accessing and processing both real-time data from a cloud of sensors and/or from a network of repositories, as well as simulation data coming from a network of supercomputing centers and data providers.
- development and testing of new paradigms and environments which execute simulations/modelling combined with real feed data and visualization and Virtual Reality feedback
- Validate the above on variety of case studies

Detailed Objectives



1. Provide a common platform base on Dynamic Data Driven Application Systems (DDDAS) paradigm unifying the approach for all models for disaster and emergency situations modelling in the project.

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Detailed Objectives (cont.)

2. Designing and developing, novel scalable algorithms, software infrastructures and methods for DDDAS paradigm allowing more efficient:
- real time interaction with real time feeds and historic data (large volumes and both structured and unstructured),
 - visualization and Virtual Reality feedback,
 - real-time analytics and interactive decision support for emergency situations management and disaster management.

Detailed Objectives (cont.)

3. Deal with large volumes of data and data types which are:

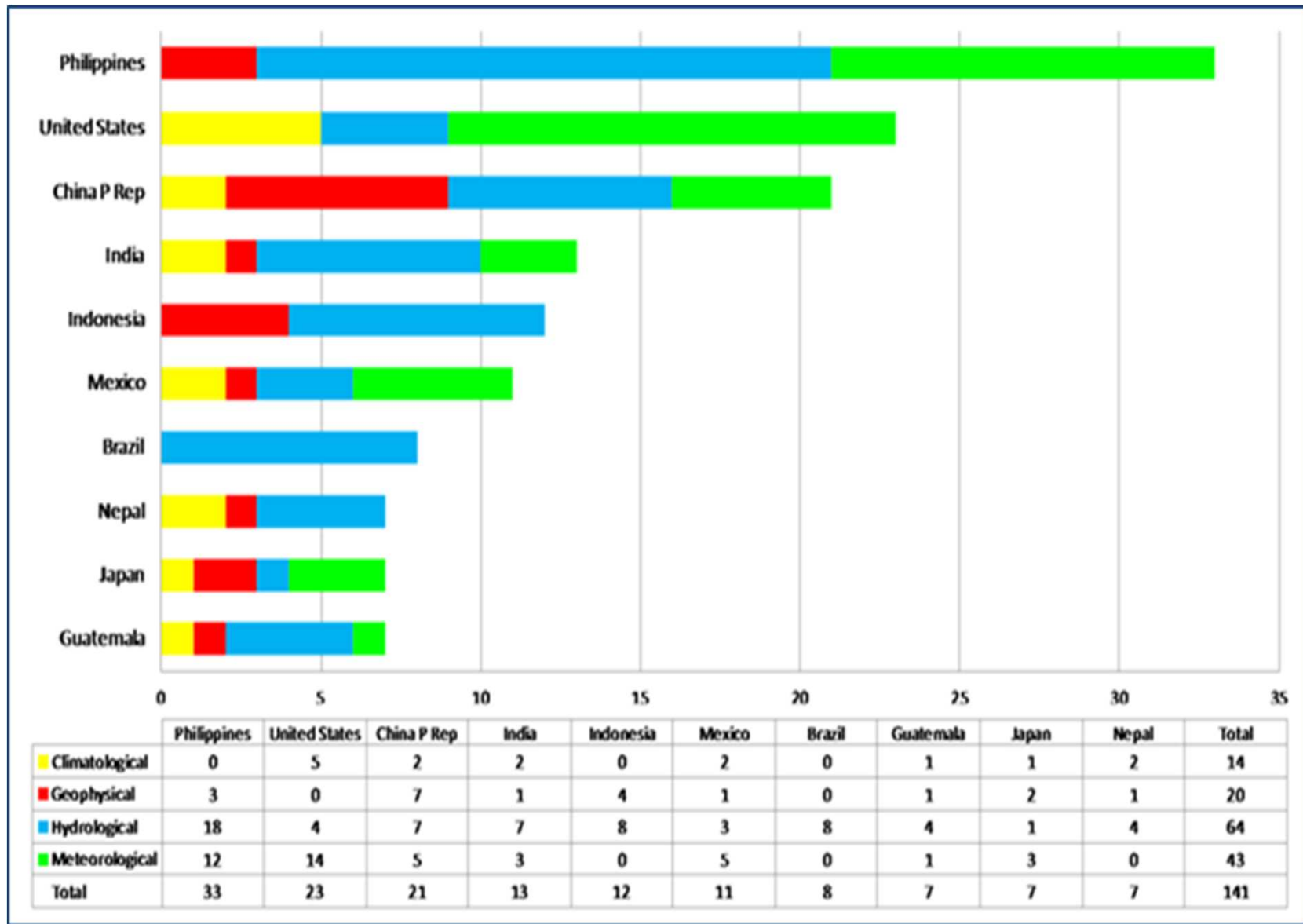
- structured and unstructured,
- both real-time and historic including 3D from finance,
- geospatial,
- social networks,
- transportation, logistics,
- telecommunications, etc

Detailed Objectives (cont.)

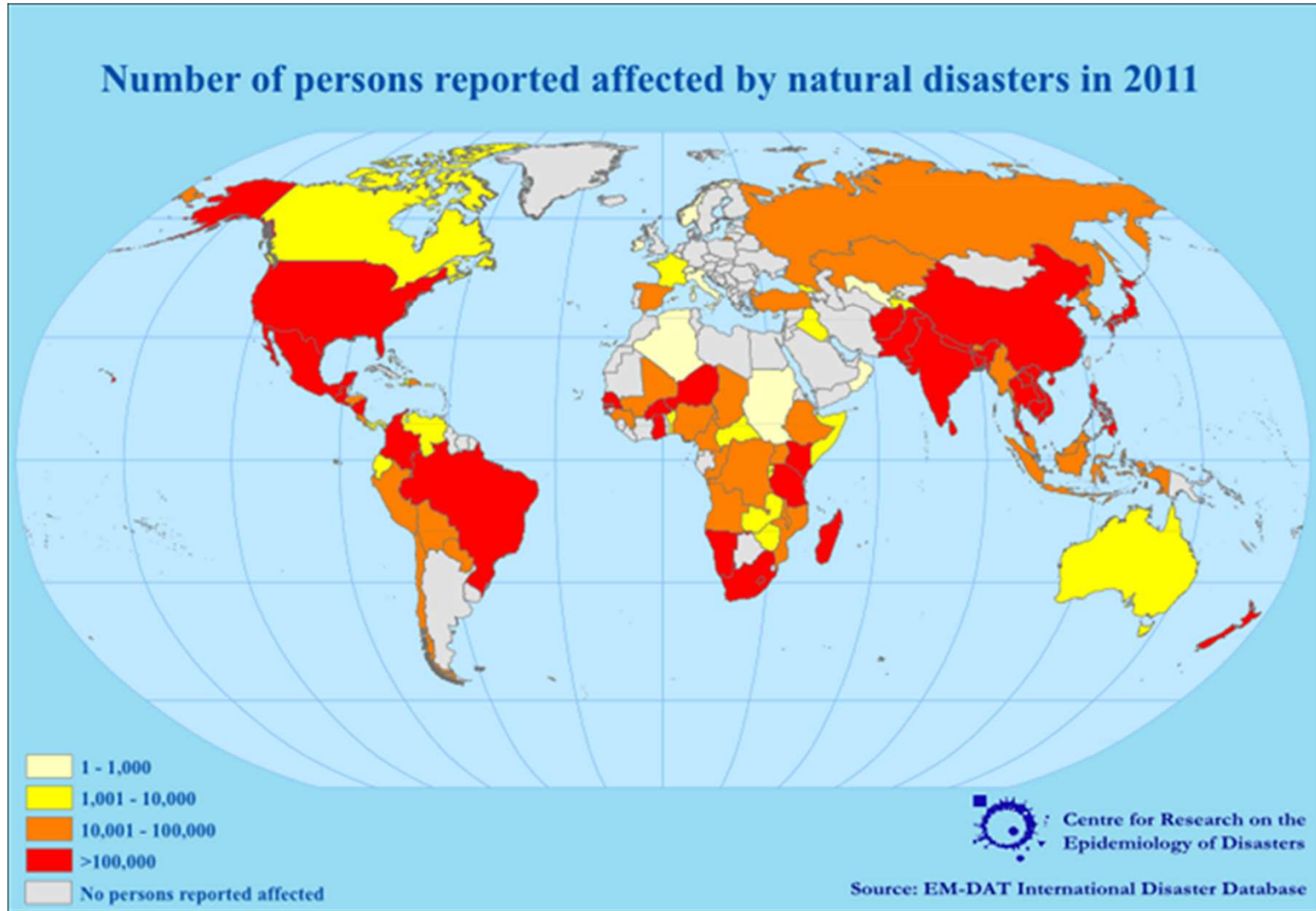
4. Need to work with an extremely large complex data sets and/or streams. Software implementation of the system developed will be tested on a set of case studies drawn from:

- emergency situations
- disaster management for natural events (floods, tsunamis, earthquakes, hurricanes, volcano eruptions)
- men made disasters (finance, etc.)

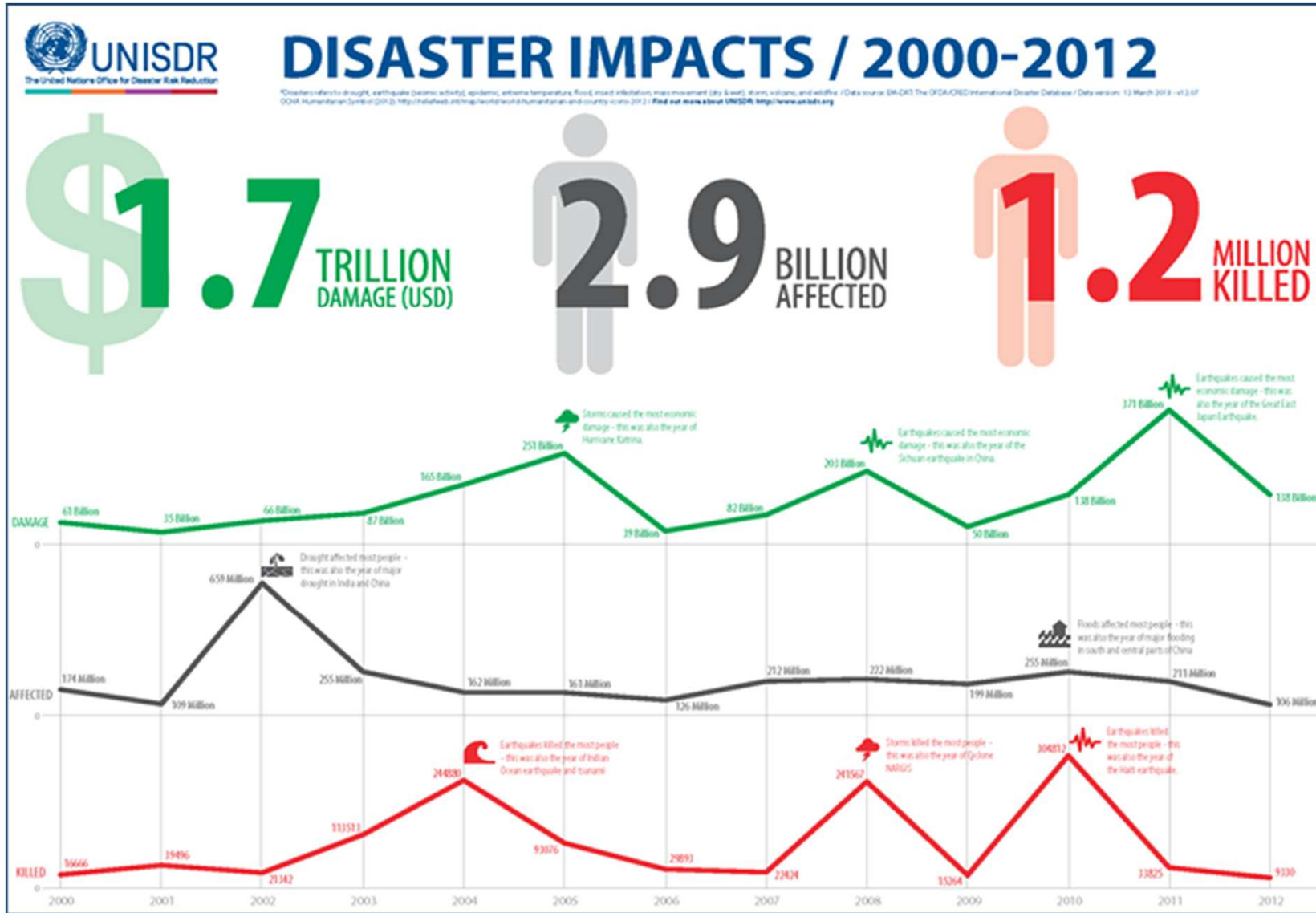
Detailed Objectives



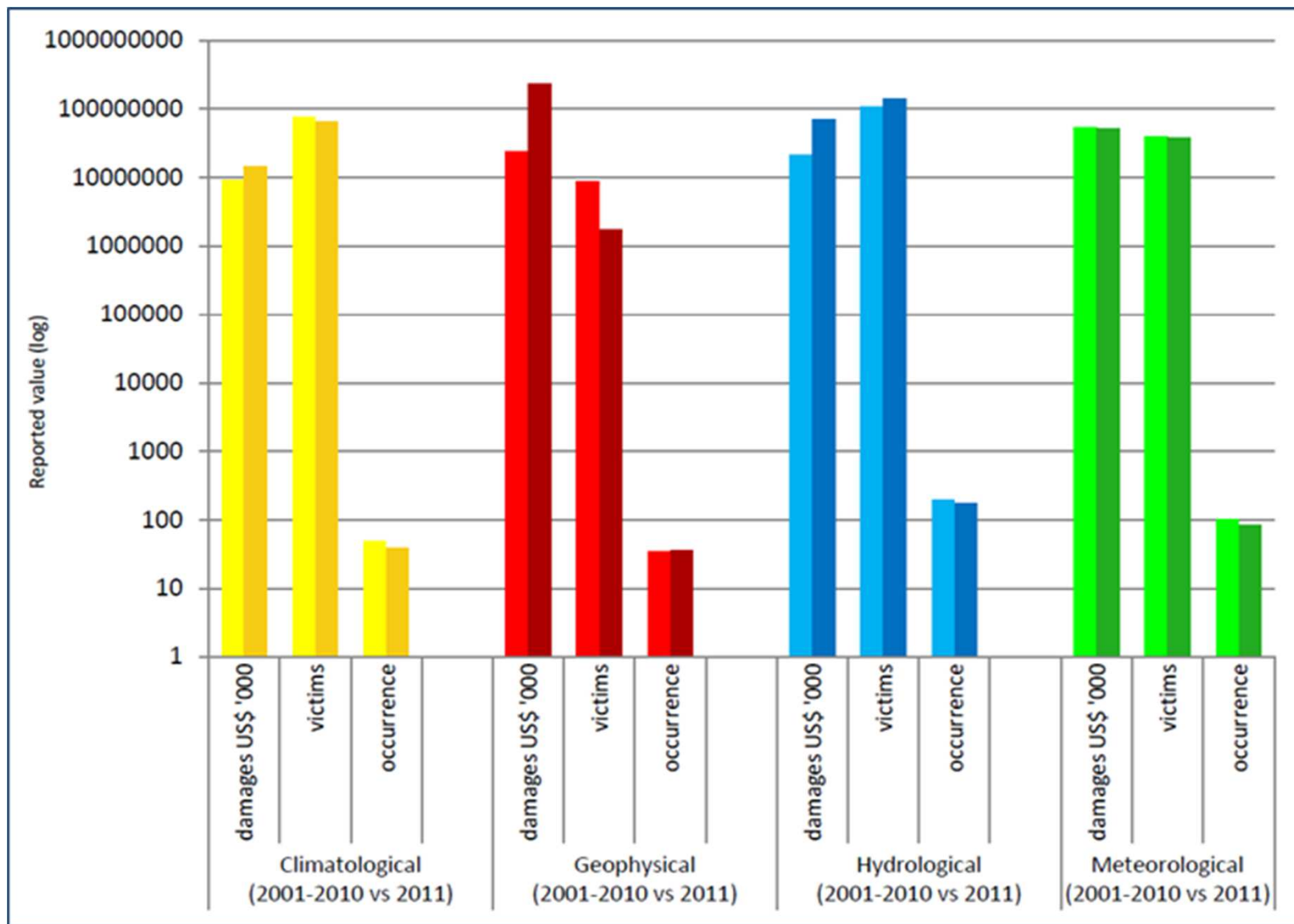
Detailed Objectives



Disaster Impacts



Disaster Impacts by category



Current Case Studies

- Meteorological Phenomena (Hurricanes, Tornados, Typhoons)
- Hydro-Meteorological Phenomena (Floods)
- Seismologic Phenomena (Earthquakes, Volcanos)
- Atmospheric Phenomena (Air Pollution, Climate Change)

Case studies - Financial modeling side:

- Massive data analysis. Noisy data analysis (historic and streaming)
- Variety of advanced economics modelling is urgently needed !
- Banking – sophisticated stress tests!
- Risk Computing and Analysis, Solvency Calculation
- Portfolio Management, derivatives Pricing
- Algorithmic Trading
- Security and Fraud Management
- Customer Satisfaction-Relations (social networking analysis, etc)



Questions?