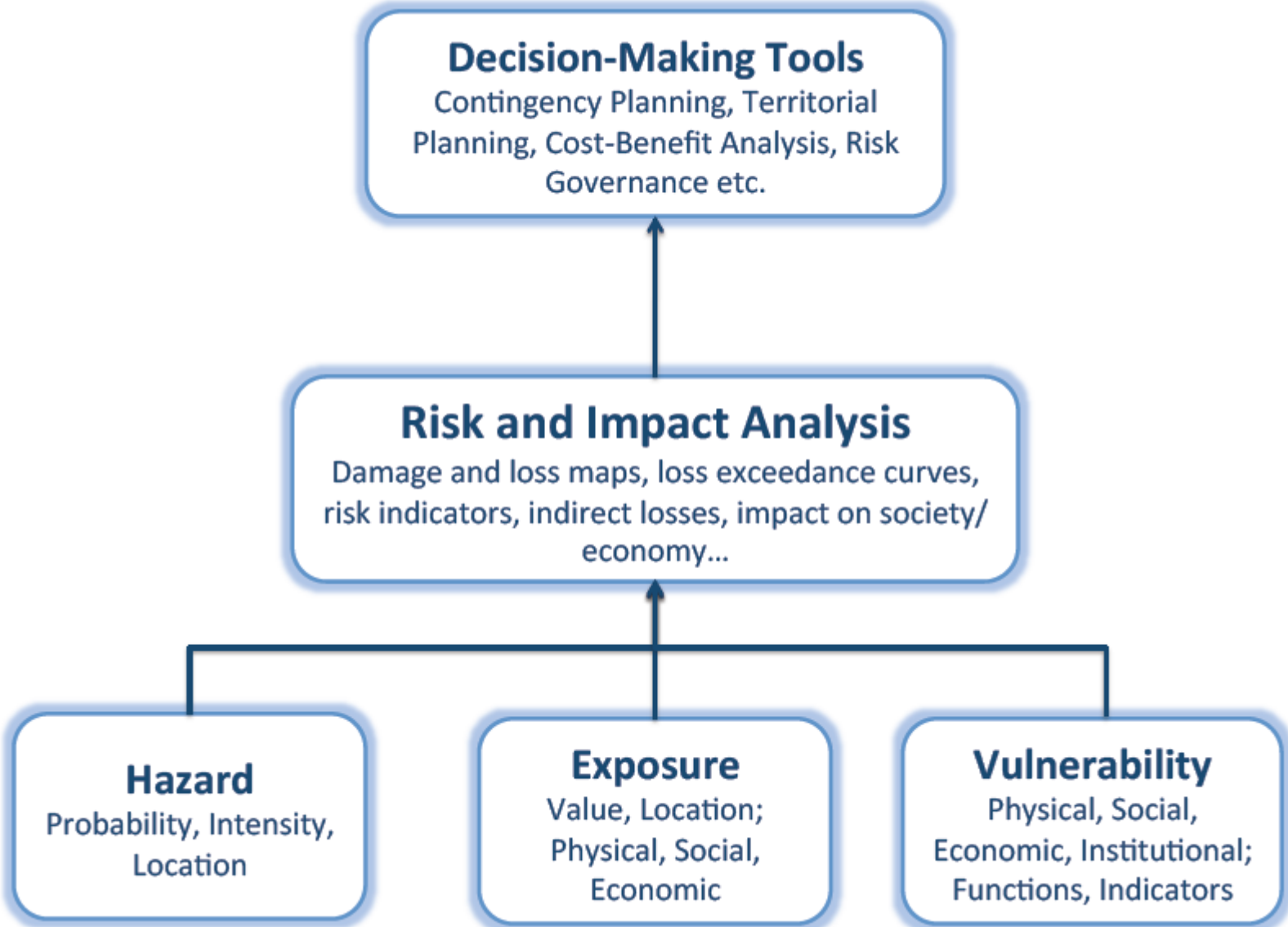


Social Vulnerability and Resilience

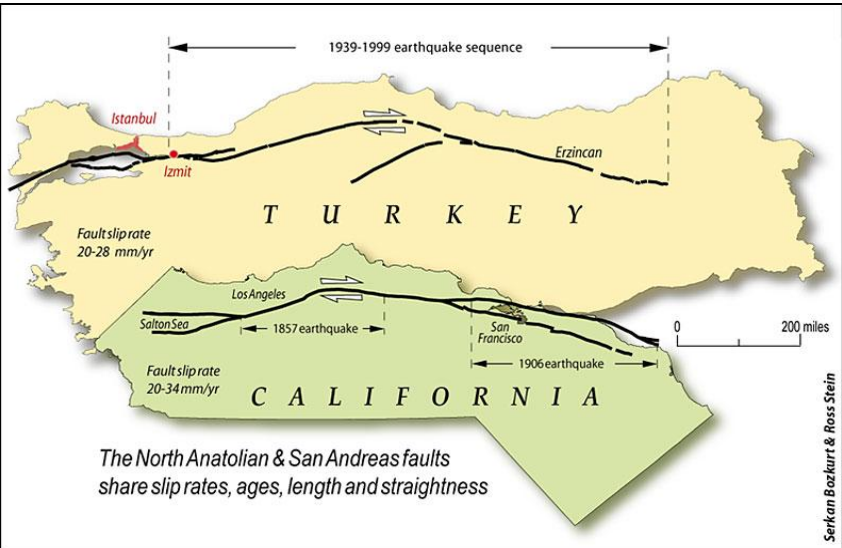
Scope of Work

Christopher G. Burton (GEM Secretariat)

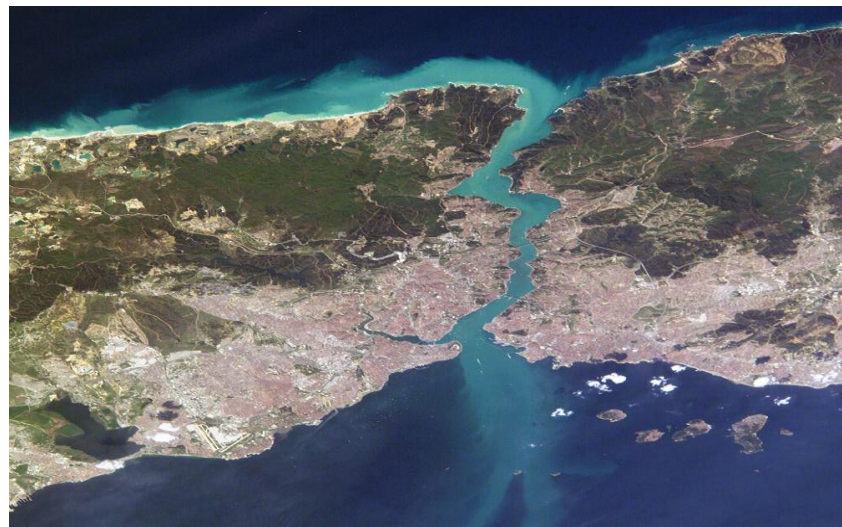
Revised GEM Framework



Same Event Type Different Impacts



earthquake.usgs.gov



eol.jsc.nasa.gov



Societal factors intersect with natural systems and the built environment to redistribute risk before an event and after an event in the distribution of losses.



earthquake.usgs.gov

Driving Questions:

Impact and Consequences

- What is the magnitude and scale of consequences of earthquake losses beyond physical damage modeled in GEM?
- Where are the risk hotspots? What are the relative differences within a country or between countries?
- What is the variability in the underlying factors that contribute to earthquake risk and losses worldwide?
- What are the global interdependencies, systemic risk?

Decision Making

- Where should we prioritize allocation of limited resources?
- Where should we invest in risk mitigation, hedging and insurance?
- How do we engage stakeholders in the risk integration and reduction process?

The development and implementation of methods, metrics, and tools for the integrated evaluation of earthquake risk worldwide

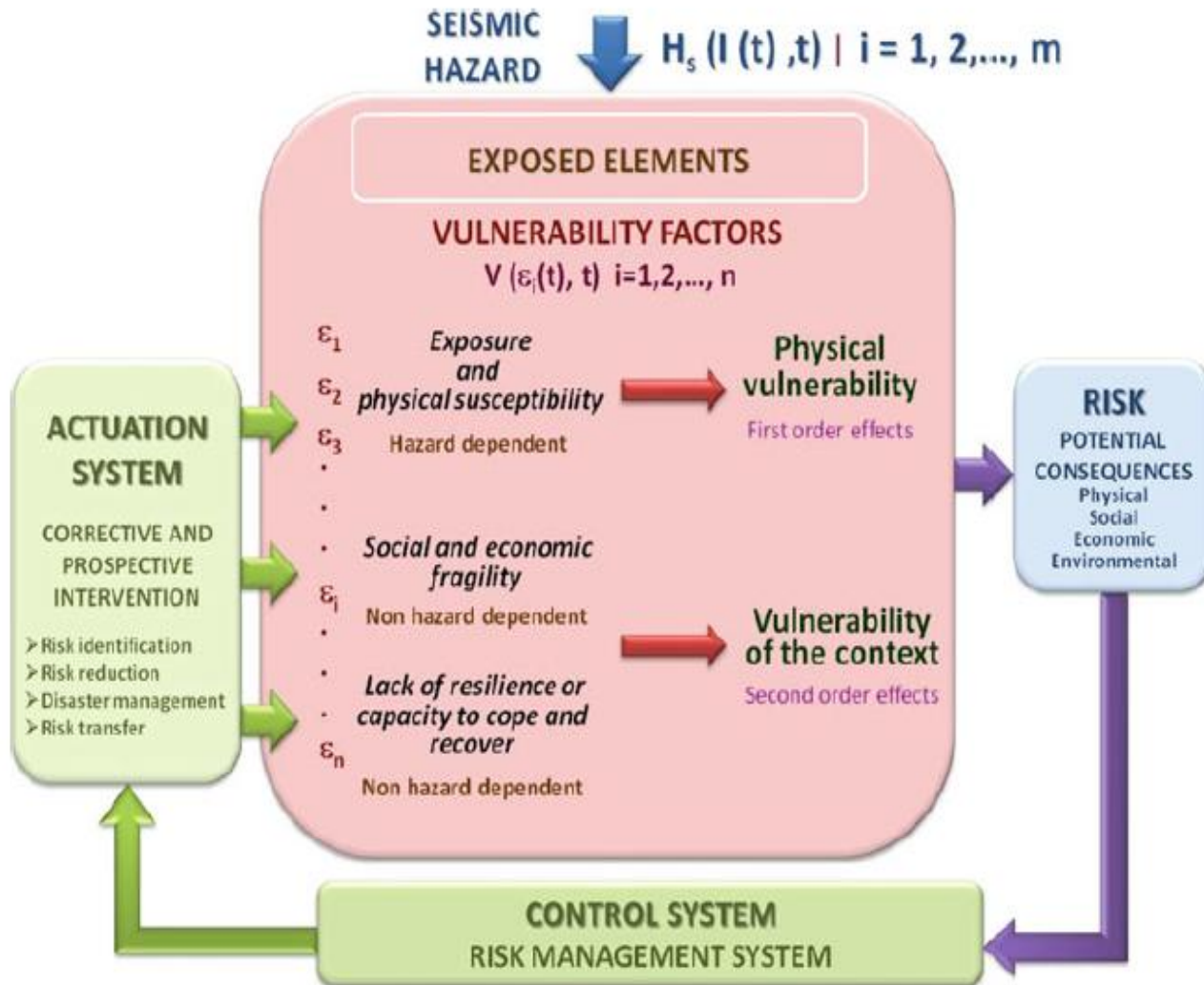
- Development of indices
 - Social vulnerability index and database
 - **Disaster resilience index and database**
 - Indirect loss index and database
- Interactive tool development
 - Indicator toolkit
 - **Integrated risk toolkit**
- Social vulnerability knowledge and meta-database integration portal

Multiple Benefits of an Integrated Approach

- Allows for a direct comparison of risk and consequences
 - inherent social conditions, awareness, perceptions
- Allows assessing systemic risk, locally, regionally, and globally
 - Local context, regional, global trade, supply chain and Infrastructure, global interdependencies
- Risk factors can be assessed independently
 - Increases awareness of the range of components upon which earthquake disaster risk depends
- Benchmarking and focused risk monitoring
 - Monitoring development of main risk factors over time

- Social Vulnerability
 - Social Vulnerability Index (SoVI), ISDR/GAR (2009, 2011), Urban Seismic Risk (CIMNE), Prevalent Vulnerability Index (PVI)
- Disaster Resilience
 - Social, Economic, Institutional, Infrastructure, Community capital
- Economic Vulnerability (Indirect Loss)
 - Capital dependency, labor dependency, supply chain dependency, infrastructure dependency, production loss, loss of public services, tourism receipt losses, regional and global interdependencies
 - Disaster Deficit Index (DDI)

Urban Seismic Risk from a Holistic Perspective



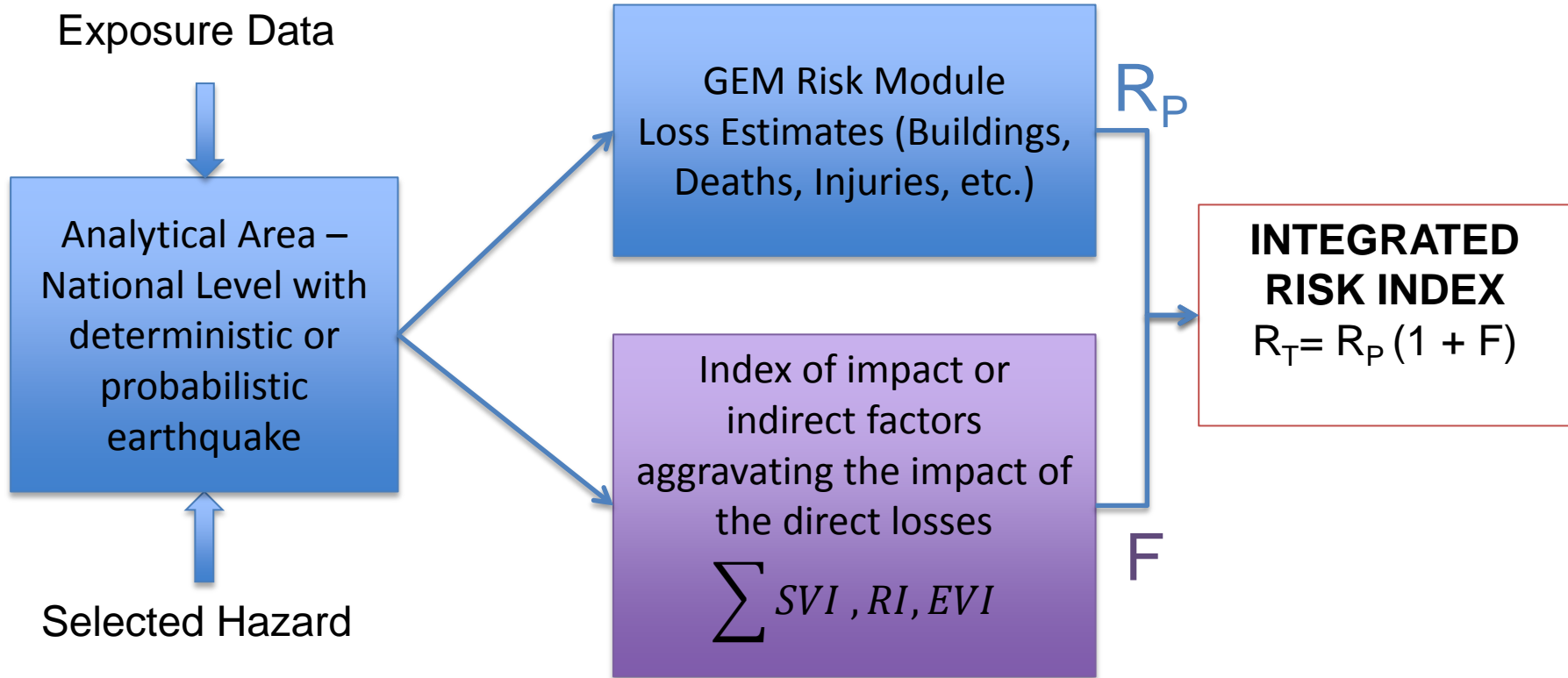
Moncho's Equation:

$$R_T = R_F (1 + F)$$

F : Depends on the weighted sum of a set of aggravating factors related to economic fragility and lack of resilience

$$\sum_{i=1}^m w_{FSi} F_{FSi} + \sum_{j=1}^m w_{FRj} F_{FRj}$$

Integrated Risk Toolkit



Indicator Toolbox

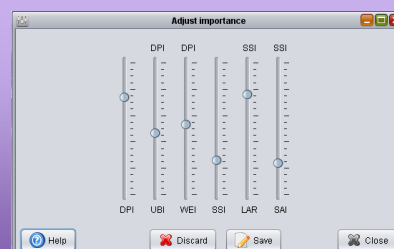
Modify input

Input data

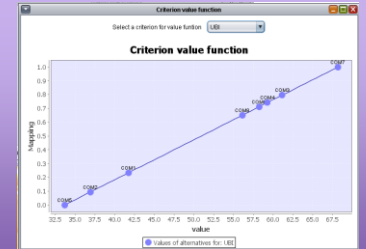
Alternatives	DPI	SSI	UBI	WEI	Age	Housing Type	Housing Tenure	LAR	SAI	Income	Hshld Structure	Education
COM1	41.75	18.32	77.547	77.735	7.21	7484.0	29.209	0.486				
COM2	36.93	29.07	66.119	82.63	12.46	6138.0	24.012	0.614				
COM3	61.11	29.73	77.547	85.532	10.19	4836.0	25.286	0.677				
COM4	59.26	18.35	83.218	77.231	7.89	7832.0	31.427	0.899				
COM5	33.71	18.32	77.863	63.158	7.21	6955.0	24.923	0.468				
COM6	59.21	29.37	75.308	77.814	12.31	5719.0	25.984	0.893				
COM7	68.15	22.04	81.475	79.967	9.7	6395.0	31.854	0.894				
COM8	56.1	20.8	84.303	78.189	8.13	7775.0	33.972	0.645				
Criteria L...	1.02	0.98	0.56	1.44	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0

Help Discard Save Close

Socio Economic Indicator Databases (LEVEL 1, 2, 3)



Visual Weight Definition



User Defined Settings

Indicator Toolbox and Database

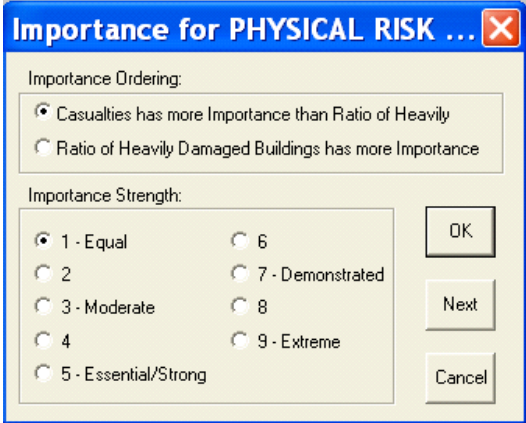
Open source indicator tool box and database

Software tool guides user through:

- Methodological approach for structuring composite indicators and obtaining *integrated risk rankings*
- Assigning importance weights to indicators
- Interactively changing weights and evaluating effect on rankings (Dynamic Sensitivity Analysis)
- Various output and interactive visualization tools

Database includes all variables used in constructing composite indices

Dynamic sensitivity and uncertainty analysis



Importance for PHYSICAL RISK ...

Importance Ordering:

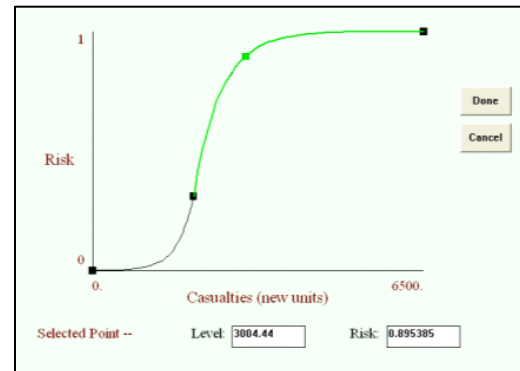
- Casualties has more Importance than Ratio of Heavily Damaged Buildings
- Ratio of Heavily Damaged Buildings has more Importance

Importance Strength:

- 1 - Equal
- 2
- 3 - Moderate
- 4
- 5 - Essential/Strong
- 6
- 7 - Demonstrated
- 8
- 9 - Extreme

OK Next Cancel

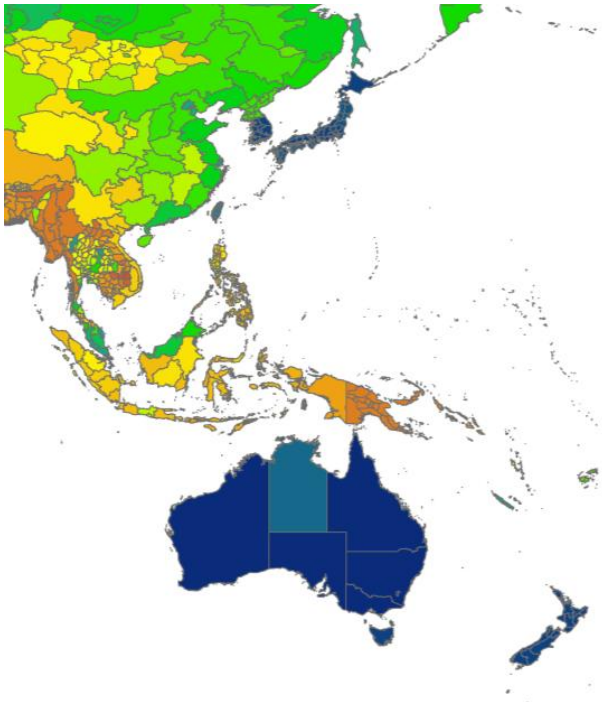
Interactive visualization tools and functions



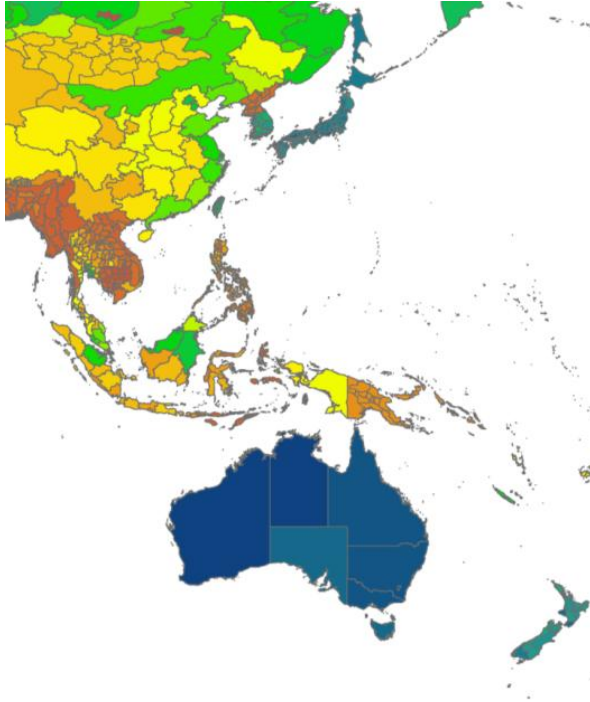
Extending GEM Social Vulnerability Indicators Initiative Beyond First Year

- Downscale to sub-country and sub-regional levels of analysis where possible
- Database development for Japan and Philippines (Municipalities and Barangays)
- **Reality Check:** Validation of indicator structure in developing country and developed country; data-rich vs. data-scarce context
- Also informed by existing case studies (e.g. CIMNE: Barcelona, Bogota)

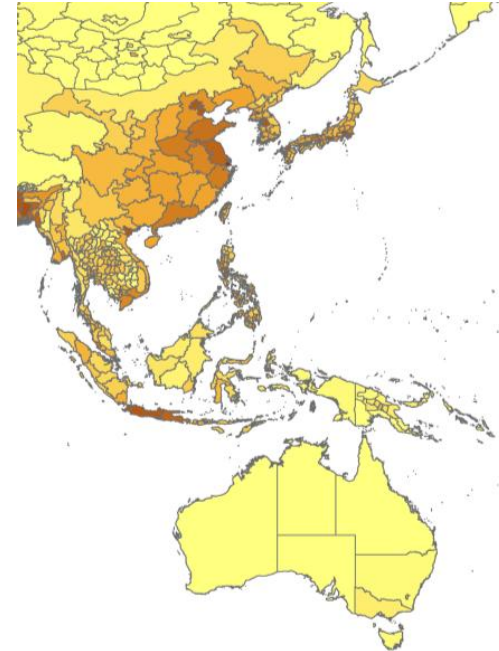
HDI



GDP Nominal (international \$/Capita)



Population Density



Vulnerability and Resilience Groups towards a Network

- Hazards and Vulnerability Research Institute (University of South Carolina)
- **Community & Regional Resilience Institute (Oak Ridge National Laboratory)**
- Centre Internacional de Mètodes Numèrics en Enginyeria (Technical University of Catalonia) (CIMNE)
- **Universidad Nacional de Colombia, Manizales, Colombia**
- UN/ISDR (Global Assessment Report Initiative)
- **IRDR (Integrated Research on Disaster Risk)**
- WRN (Willis Research Network), Willis
- **Center for Disaster Management and Risk Reduction Technology (Karlsruhe Institute of Technology)**



Objective:

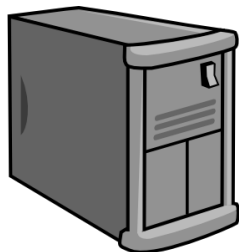
- Development of a portal and information system with meta-database focusing on population-based natural hazards vulnerability assessment.
- To build on GEM's capacities to develop a common platform of information pertaining to social vulnerability assessment.

Rationale:

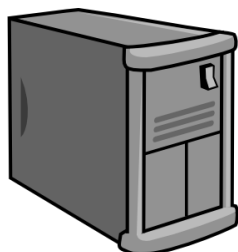
- Access to relevant data on vulnerability supports DRR.
- Data is difficult to collect globally.
- Support of bottom-up vulnerability assessments.
- Complements OpenQuake framework

GEM Social Vulnerability and Resilience Data Discovery and Sharing Program

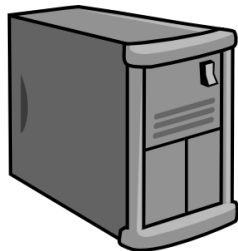
Source Data



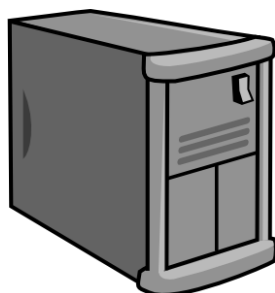
Partner Initiatives



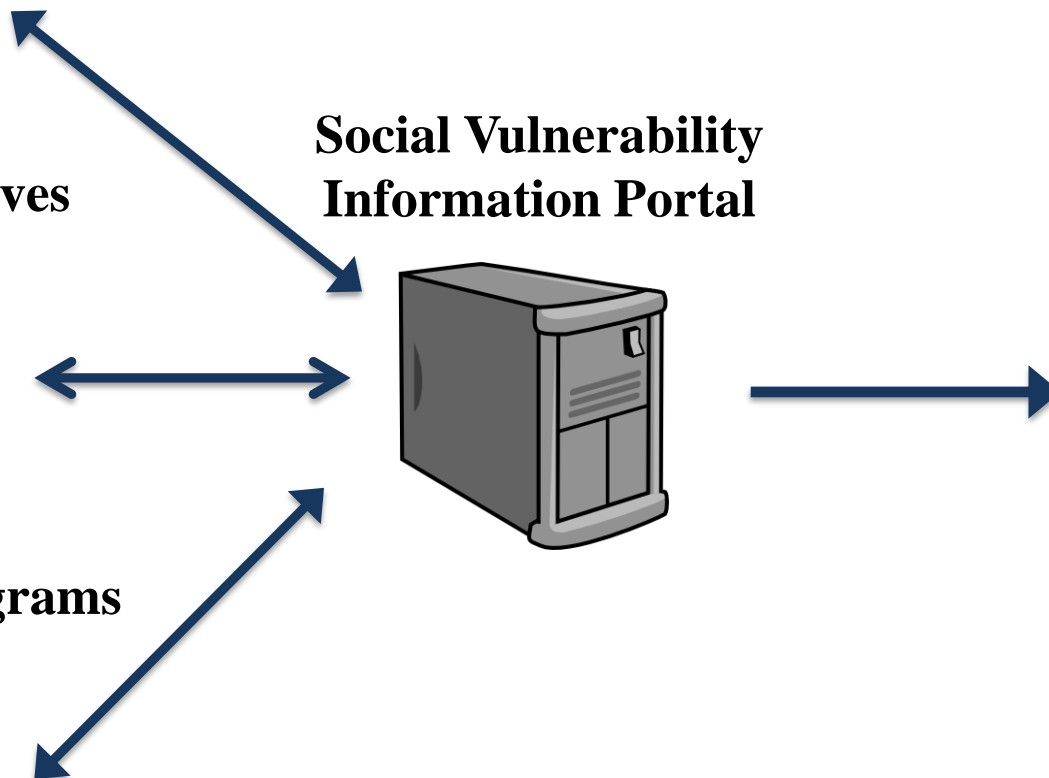
Additional Programs



**Social Vulnerability
Information Portal**



Client



Database Design

PreventionWeb
Serving the information needs of the disaster reduction community

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Search GO
 PreventionWeb All DRR Sites

HYOGO FRAMEWORK | COUNTRIES & REGIONS | THEMES & ISSUES | HAZARDS | PROFESSIONAL RESOURCES

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Subscriptions: RSS Email

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- Philippines
- Gambia

Select a country GO

Original cartography: UNEP/DEWA/GRID-Europe
The boundaries and names shown and the designations used on this map do not imply official endorsement or approval by the United Nations Secretariat of the World Meteorological Organization.

Global Network of Civil Society Organisations for Disaster Reduction

The Global Network for Disaster Reduction is a major international network of non-governmental and not-for-profit organisations committed to working together to improve the lives of people affected by disasters world-wide.

Home | Who are we | What we do | Get involved | News & Events | Contact | Resources | Members

Resources

On this page you can find useful resources in the form of downloads and weblinks.

GNDR Reports

- View from the Frontline 2011 - Summary Report (en)
- View from the Frontline 2011 - Summary Report (fr)
- View from the Frontline 2011 - Summary Report (es)
- View from the Frontline 2011 - Full Report (en)
- Views from the Frontline 2009 - Summary Report
- Views from the Frontline 2009 - Full Report

Papers

- CBDRR Workshop - Washington September 2011
- Build Back Better
- Saskatoon Award Submission - February 2011

GFDRR Global Facility for Disaster Reduction and Recovery
Reducing Vulnerability to Natural Hazards

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March 2012: Understanding the importance of geospatial data to improve information-based decision making for disaster risk reduction, Saint Lucia launched its first national ... [Read More](#)

GFDRR AT A GLANCE

Resources: Pledges Vs. Committed
 Pledges Received: US \$324 million
 Committed by GFDRR: US \$153 million
 How is Every Dollar Spent?

STAY IN THE LOOP

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POPULAR LINKS

- About GFDRR
- DRM at the World Bank
- GFDRR Annual Report 2011
- World Bank / GFDRR Newsletters
- Annual Meeting 2011
- Partnership Strategy
- GFDRR Brochure
- List of Priority Countries

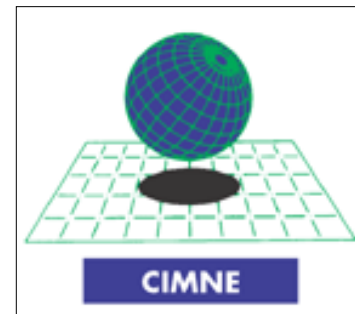
Potential GEM Contribution


- International Strategy for Disaster Reduction (ISDR) (United Nations)
- Integrated Research on Disaster Risk (IRDR) (ICSU)
- Global Facility for Disaster Reduction and Recovery (GFDRR) (World Bank)
- Global Network for Disaster Reduction (GNDR)
- Others (UNEP, UNESCO, ????)



Potential Contributors

- Hazards and Vulnerability Research Institute (HVRI) (South Carolina)
- Center for Disaster Management and Risk Reduction Technology (CEDIM) (Karlsruhe)
- Willis Research Network (WRN) (London)
- International Center for Numerical Methods in Engineering (CIMNE) (Barcelona)
- Others ?????





Christopher G. Burton
Social Vulnerability and Disaster Resilience
GEM Foundation
Phone: +39-0382-5169898
Web: www.globalquakemodel.org