GLOBAL EARTHQUAKE MODEL

LEASONS LEARNED ABOUT PARTNERSHIPS AT LOCAL, NATIONAL, REGIONAL AND GLOBAL LEVELS

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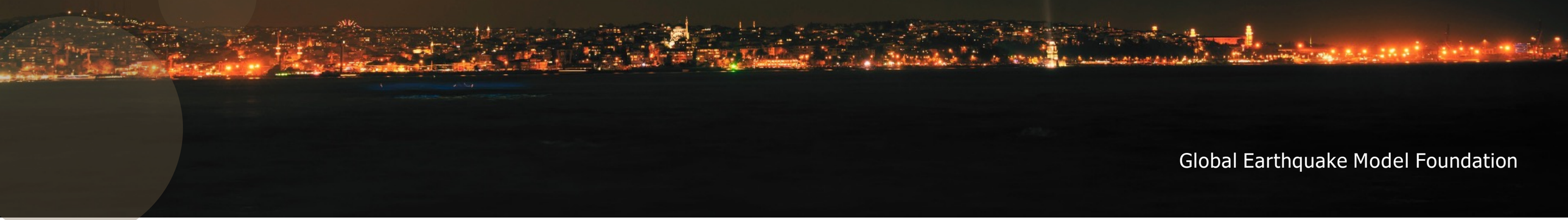
Secretary General
Global Earthquake Model (GEM) Foundation



INTRODUCTION

THE PROBLEM

- Rise of cities in EQ-prone areas
- Lack of data, tools and capability
- Lack of consensus and consistency in assessment methods

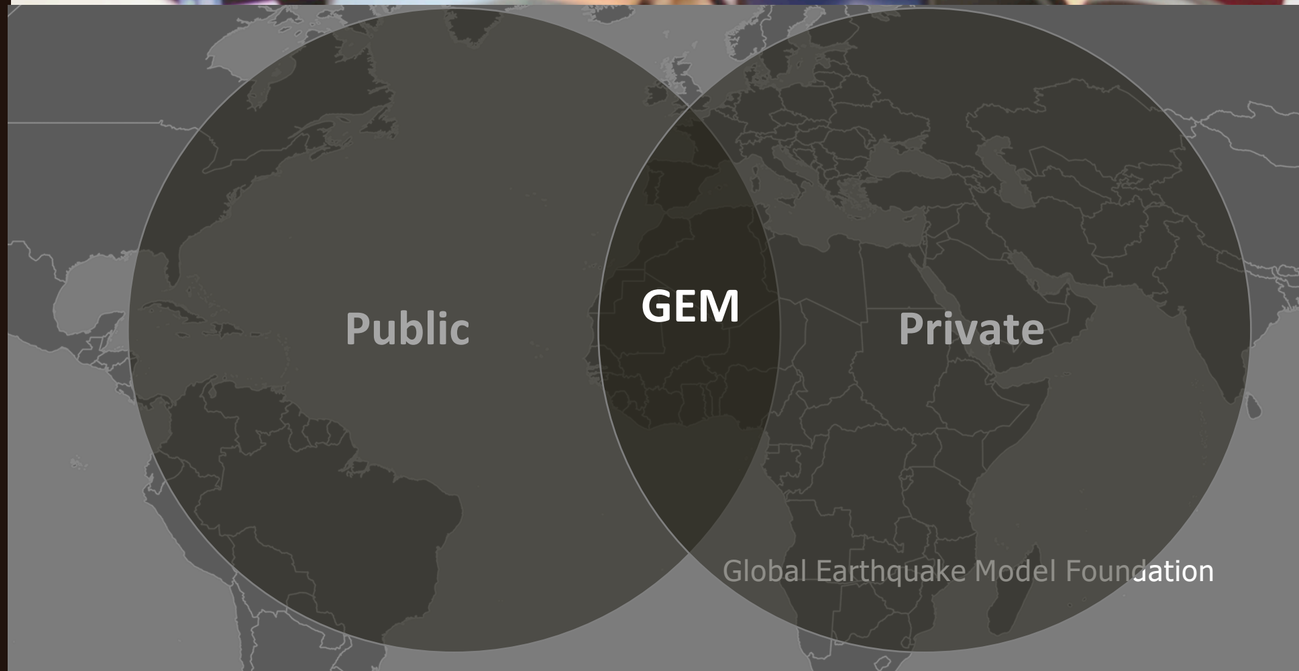
THE SOLUTION

- A global collaboration network
- A cooperative public-private initiative
- Reaching and engaging with stakeholders in all fields

THE FOUNDATION

ABOUT GEM

- Non profit NGO, founded in 2009
- Global, public-private partnership
- Develop software, tools and data for use in earthquake risk assessment worldwide
- Develop trust in the assessment process and ownership of results
- Promote and foster applications to DRR



THE FOUNDATION

OUR VISION

A world that is resilient to earthquakes and other natural hazards.

THE FOUNDATION

ACHIEVEMENTS

WP1
2009-2013

- OpenQuake Engine Development
- Global research programs
- Worldwide partnerships

WP2
2014-2018

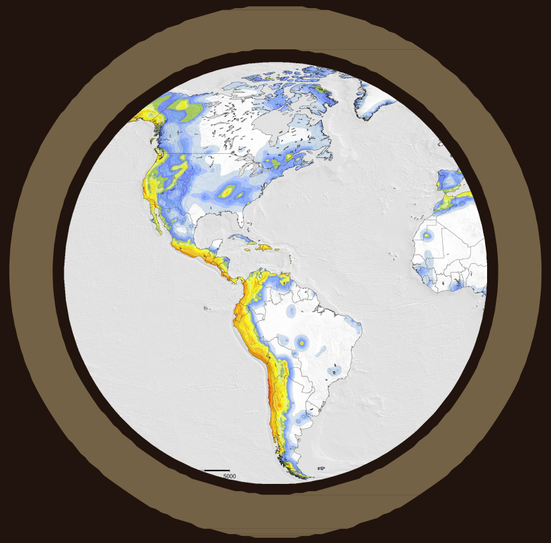
- OpenQuake Platform
- Global Earthquake Hazard Map
- Global Earthquake Risk Map

WP3
2018-present

- Data and models for diverse applications
- Extensions to multi-hazard perils
- Risk assessment applications including to urban scale

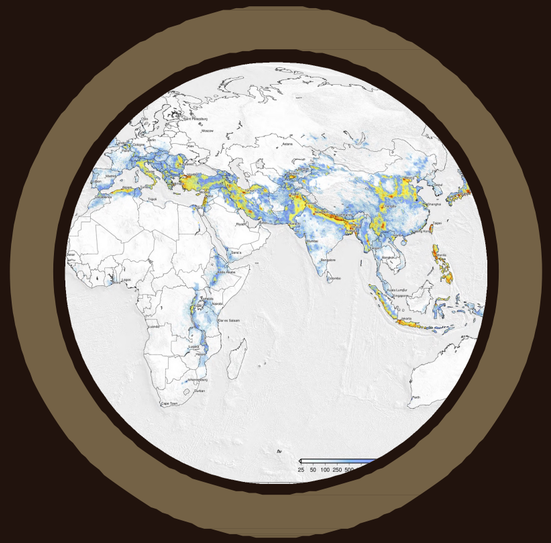
THE GEM FOUNDATION

FLAGSHIP PRODUCTS



Global Hazard Map

the first of its kind since GSHAP was presented in 1999



Global Risk Map

the most comprehensive global assessment of earthquake risk to date.

OpenQuake Engine

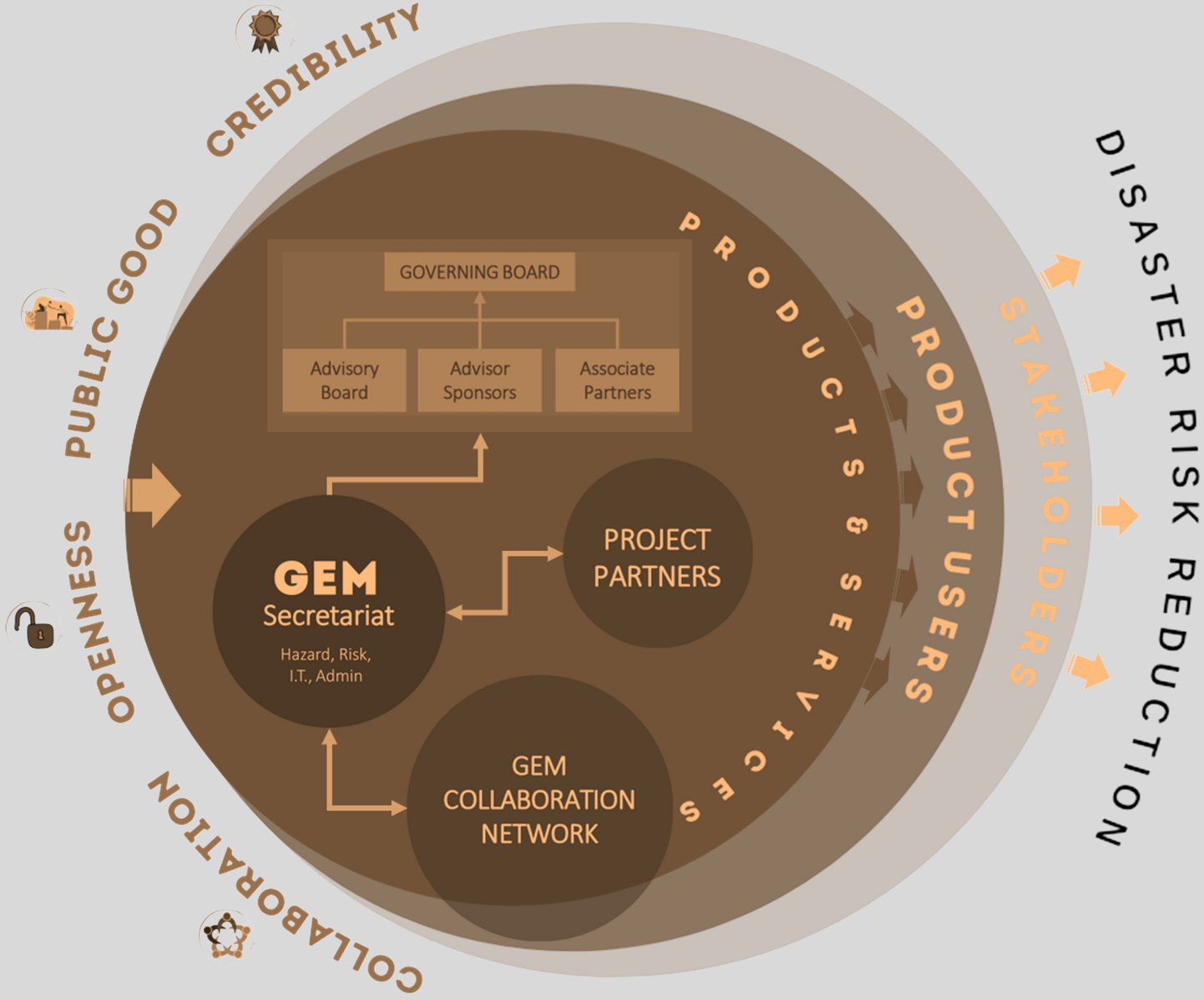
a state-of-the-art, open-source software hazard and risk modelling.

THE FRAMEWORK

COLLABORATION FRAMEWORK

GEM ECOSYSTEM

- Guided by global drivers and GEM principles
- Build relationships with product users and stakeholders



THE FRAMEWORK

SUPPORTERS

COLLABORATORS FROM PUBLIC AND PRIVATE INSTITUTIONS WORLDWIDE

GOVERNING BOARD

Public Governors

Australian Government Geoscience Australia
Natural Resources Canada / Ressources naturelles Canada
PROTEZIONE CIVILE Presidenza del Consiglio dei Ministri Dipartimento della Protezione Civile
NIED 防災科研
NSET Earthquake Safe Communities in Nepal
GNS SCIENCE TE PŪ AO
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra
Swiss Agency for Development and Cooperation SDC
TAIWAN Earthquake Model
NERC SCIENCE OF THE ENVIRONMENT
USAID FROM THE AMERICAN PEOPLE

Private Governors

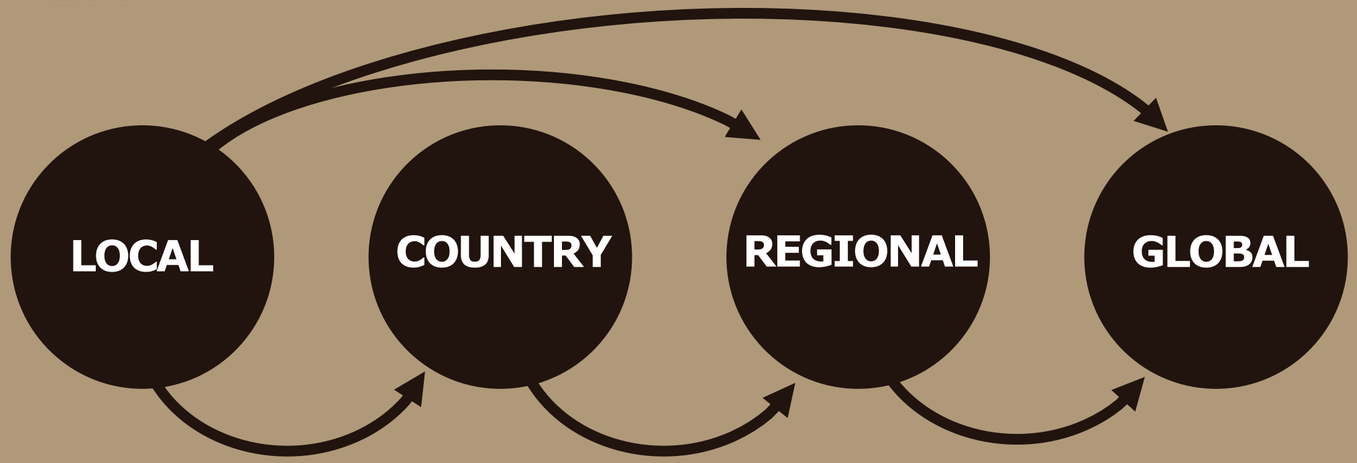
Allianz
AON
EUCENTRE FOR YOUR SAFETY
FM Global
hannover re
MarshMcLennan
Marsh GuyCarpenter Mercer OliverWyman
Munich RE
RMS
Swiss Re
Verisk
Willis Towers Watson

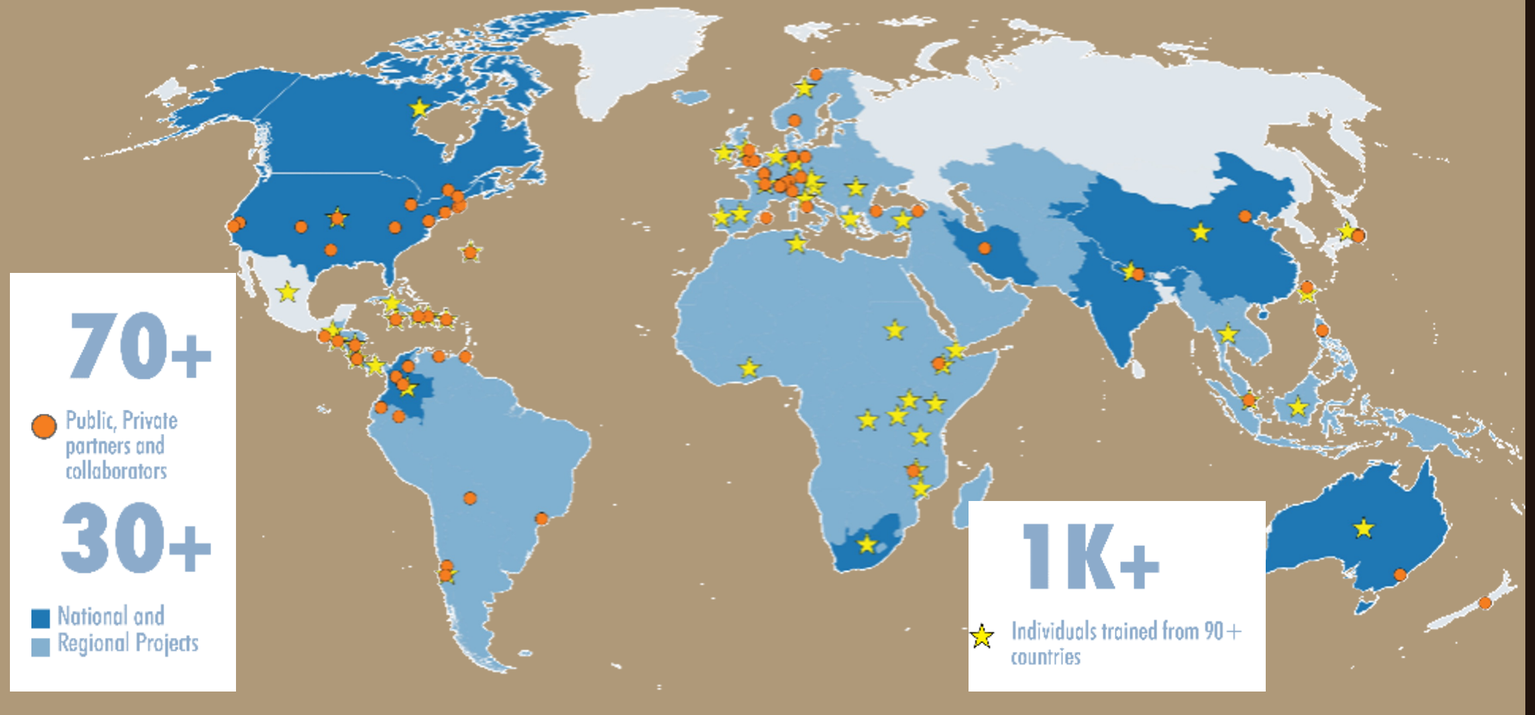
Advisor Sponsors

AXA
CelsiusPro
DESCARTES
GP GLOBAL PARAMETRICS
one concern
PartnerRe
safehub

Associate Partners

ESCAP APIDIM Asian and Pacific Centre for the Development of Disaster Information Management
EERI
Cal OES GOVERNOR'S OFFICE OF EMERGENCY SERVICES
IASPEI International Association of Seismology and Physics of the Earth's Interior
International Association for Earthquake Engineering
IRDR Integrated Research on Disaster Risk
ICSU International Council for Science
OECD BETTER POLICIES FOR BETTER LIVES
UNESCO
The Institution of Structural Engineers
UNDRR UN Office for Disaster Risk Reduction
USGS science for a changing world





THE FRAMEWORK

COLLABORATION FRAMEWORK

GEM ECOSYSTEM

- Built upon collaborations and partnerships
- Multi-level: local, country, regional, global interactions

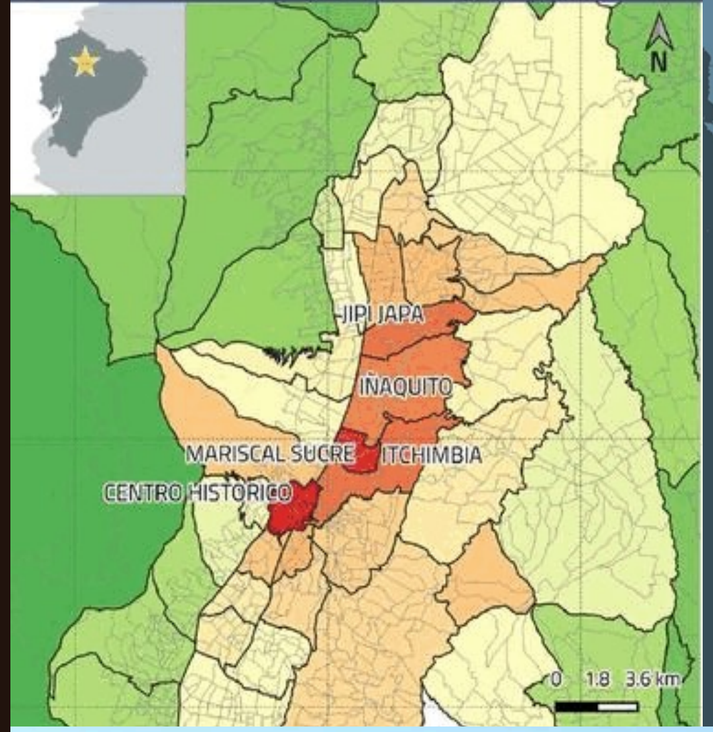
THE FRAMEWORK

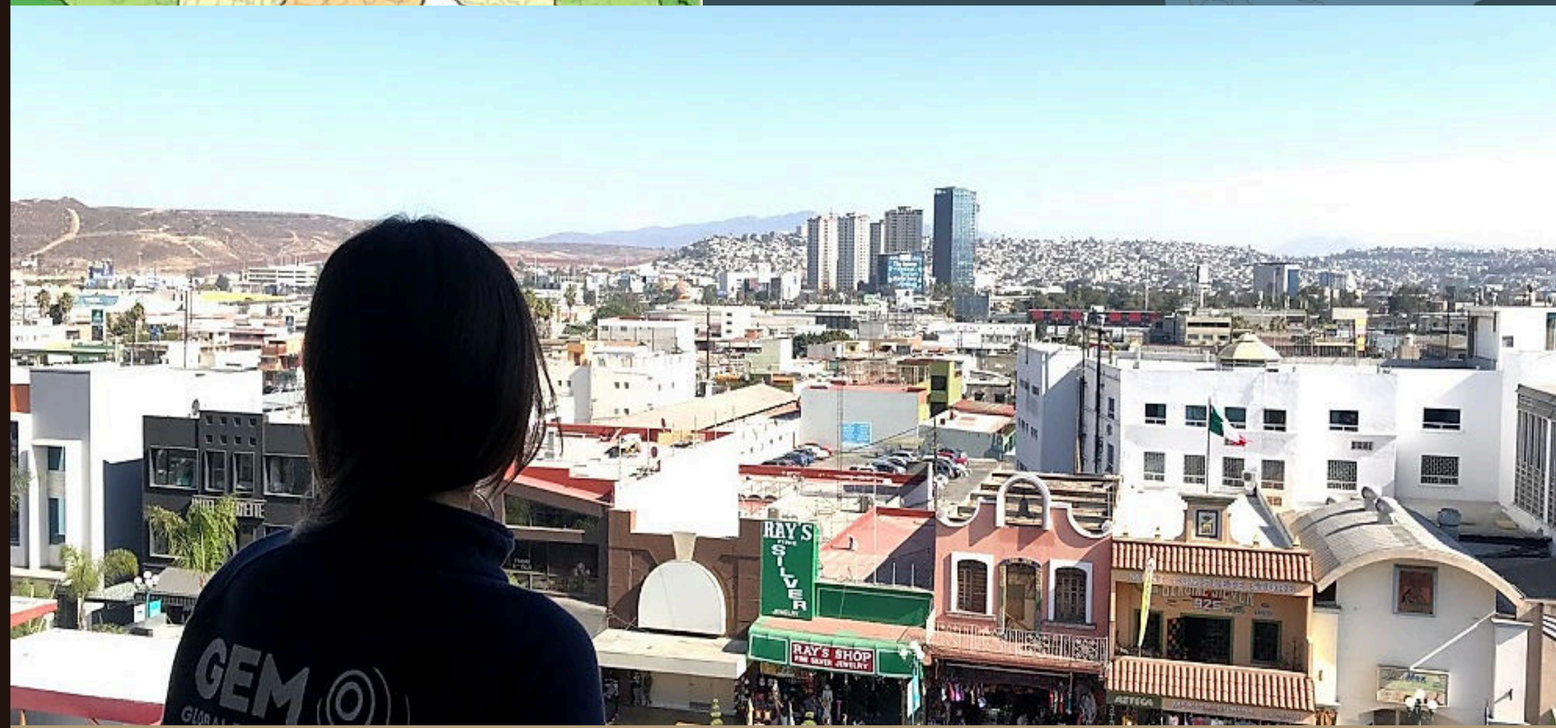
LOCAL LEVEL

TREQ PROJECT

- Quito, Santiago and Cali
- Develop capacity for urban earthquake hazard and risk assessment in Latin America

FUNDING PARTNER





THE FRAMEWORK

LOCAL LEVEL

TREQ PROJECT

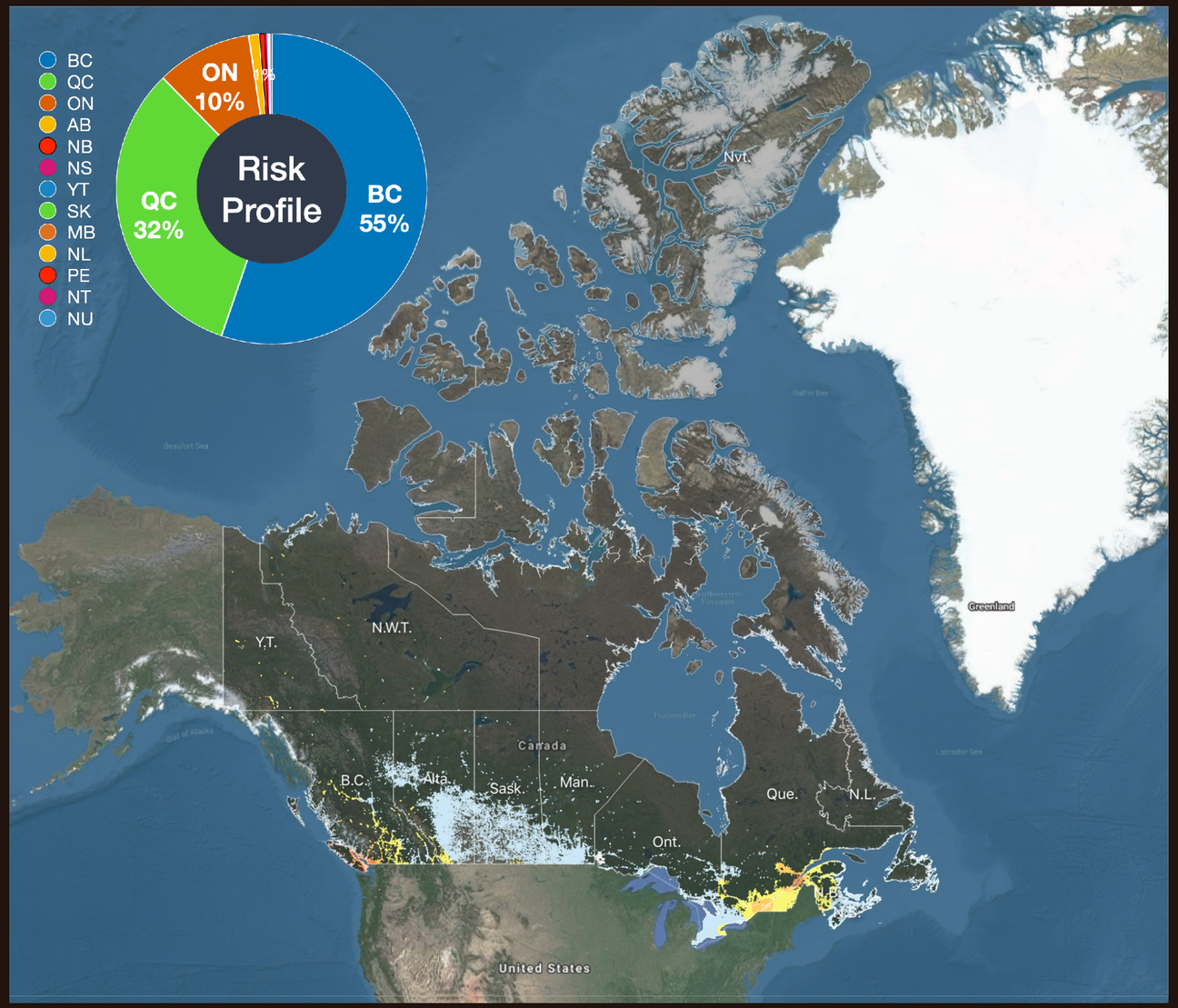
- Close collaboration with local stakeholders
- Outputs contributed to many policies implemented:
  - *Emergency and Disaster Response Plan of the Metropolitan Quito*
  - *Cali Risk Management Plan*
  - *Santiago Urban Development Plan*

THE FRAMEWORK

NATIONAL LEVEL

NATIONAL SEISMIC RISK MODEL FOR CANADA

- A new generation risk model
- Comprises updated hazard and new exposure information country-wide
- Developed with NRCanada



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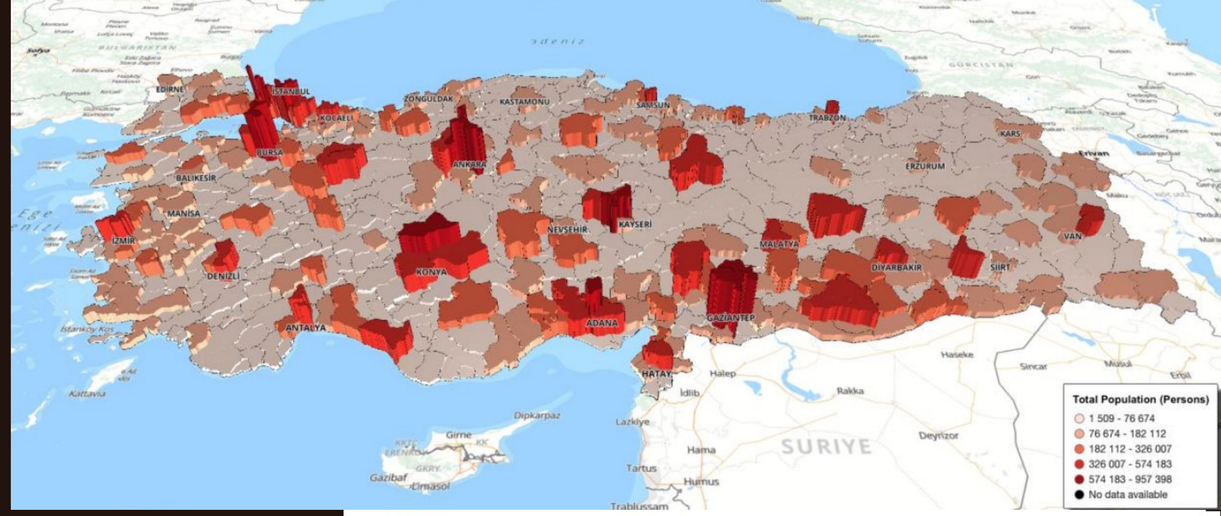
THE FRAMEWORK

NATIONAL LEVEL

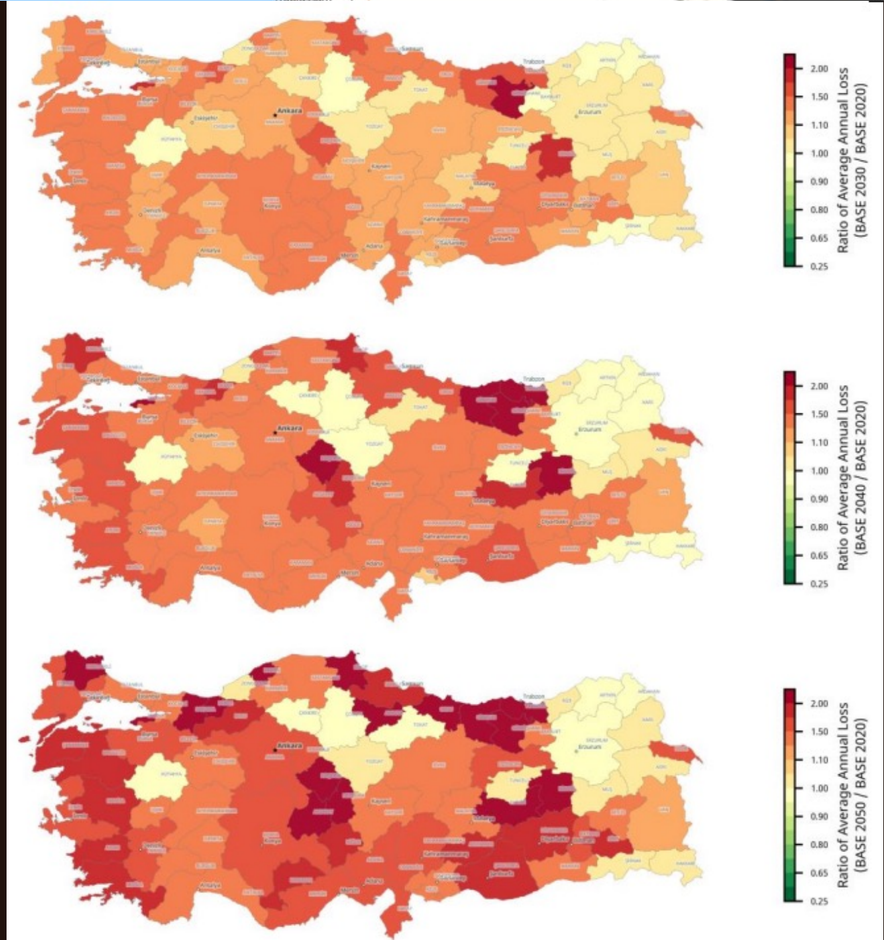
EARTHQUAKE RISK ASSESSMENT AND RETROFIT SCENARIOS FOR TURKEYE

- Developed for the World Bank
- Considers evolution of risk towards 2050
- Used to appraise a WB loan of $265M and a further expansion of $512M to retrofit public buildings

THE WORLD BANK



PROJECTION OF RISK 2020 - 2050



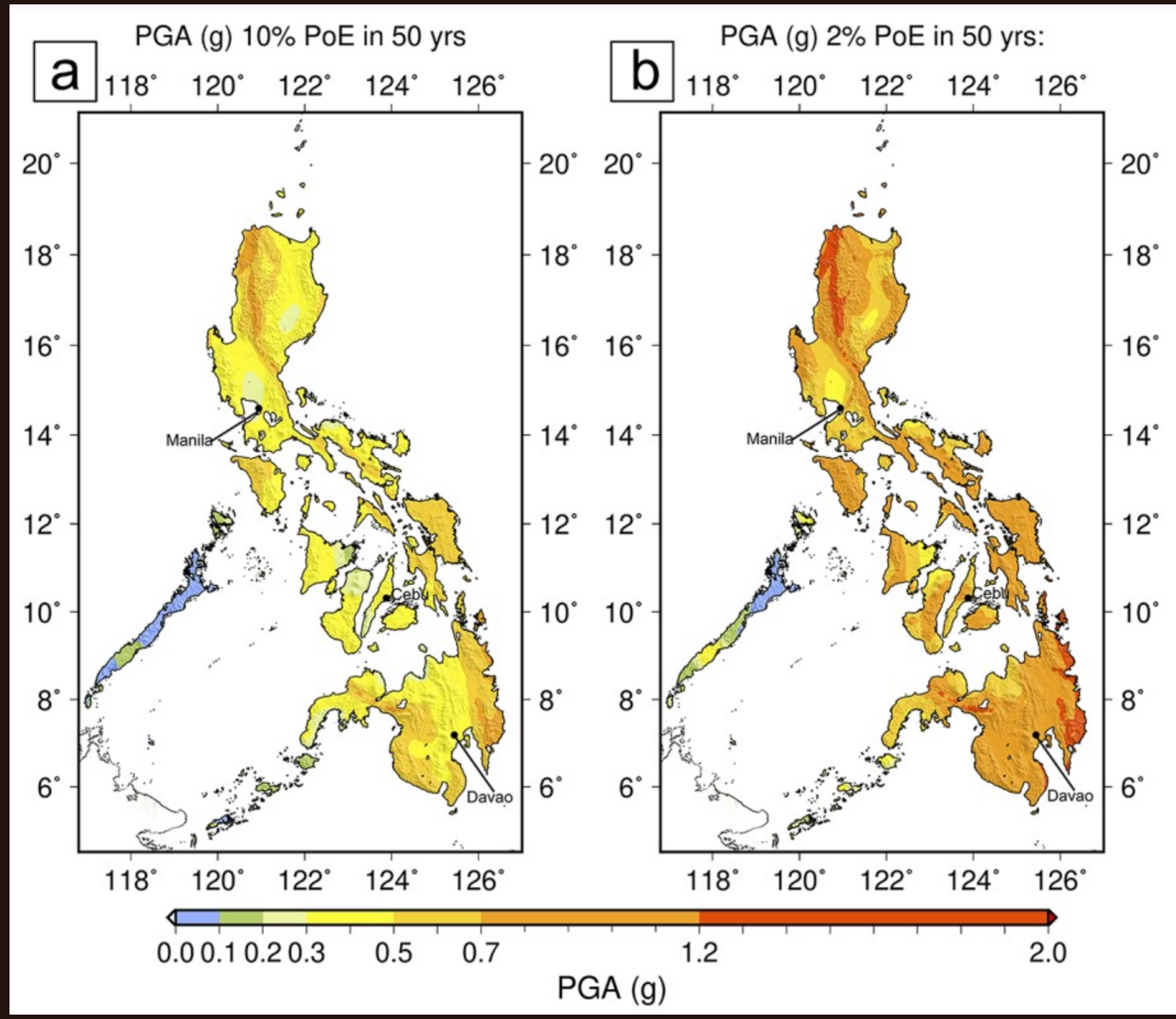
THE FRAMEWORK

NATIONAL LEVEL

EARTHQUAKE HAZARD MODEL FOR PHILLIPINES

- Developed jointly by the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and GEM
- Implemented in OpenQuake
- Used to determine demands of the National Structural Code of the Philippines

Department of Science and Technology
PHIVOLCS
Philippine Institute of Volcanology and Seismology



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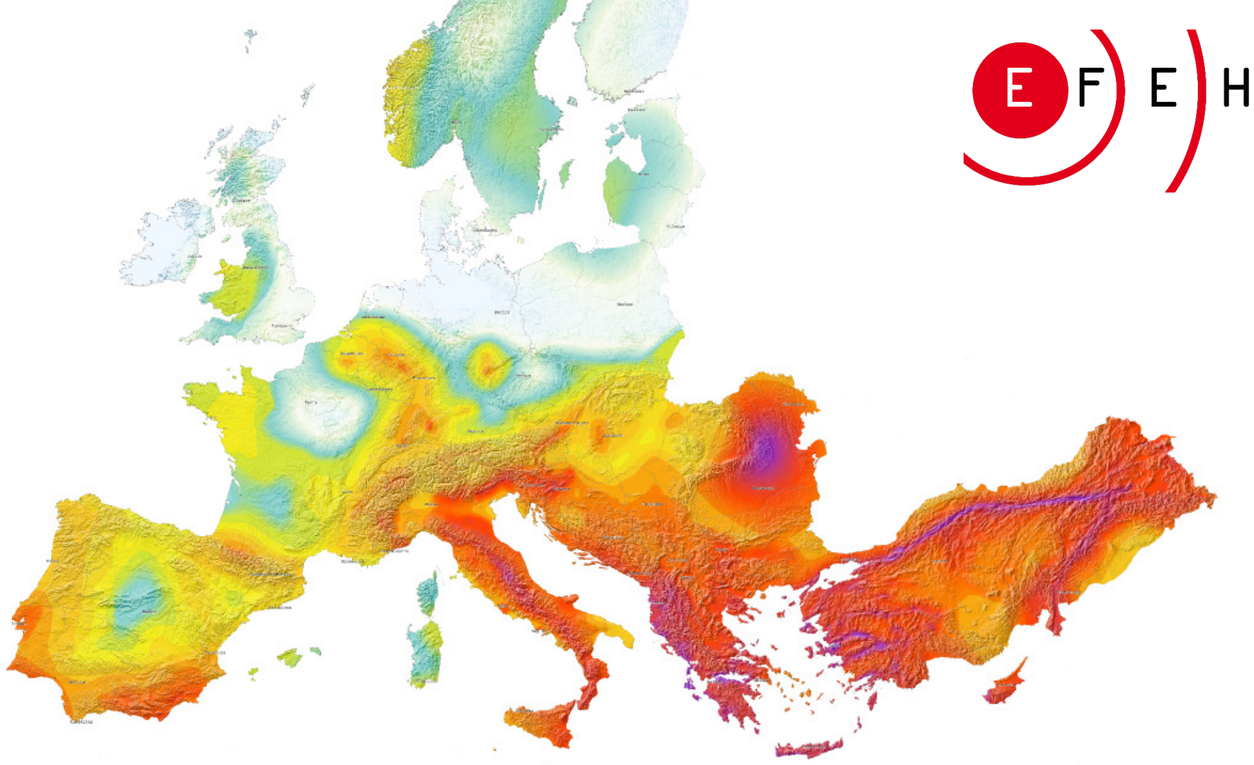
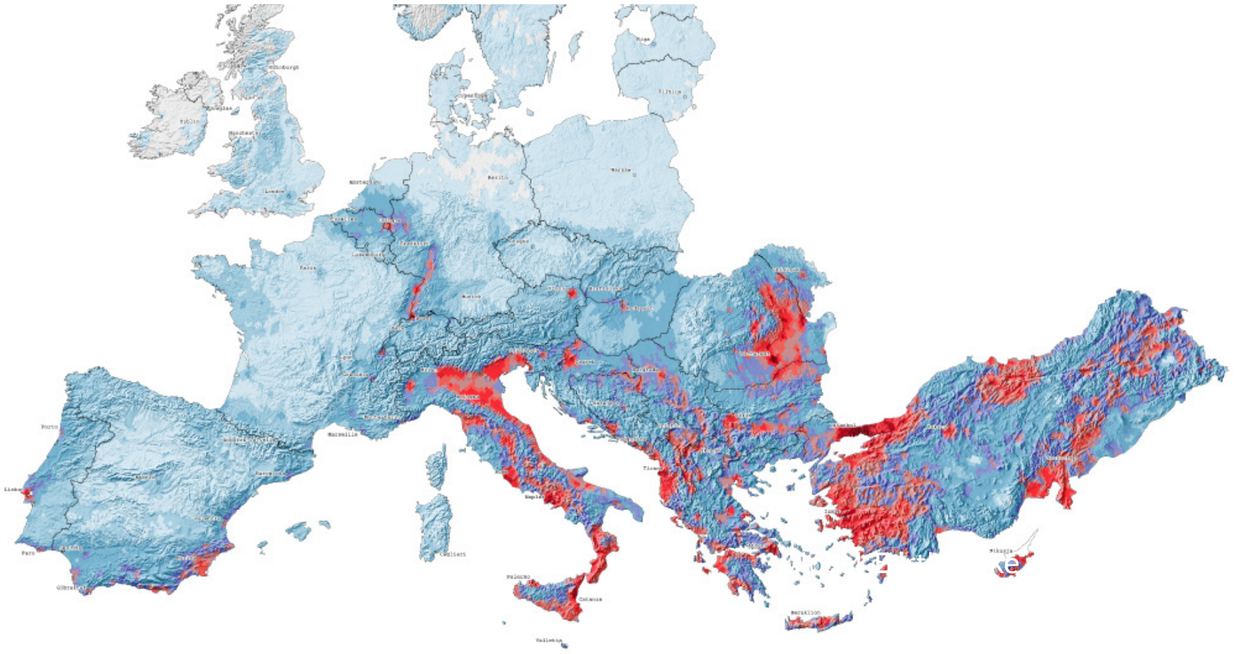
THE FRAMEWORK

REGIONAL LEVEL

EUROPEAN SEISMIC HAZARD AND RISK MODEL

- Computed using OpenQuake
- Provide the basis for engineering regulations in the area (CEN/TC 250/SC 8)
- Contributes to the development of Eurocode 8 within the European Committee for Standardization (CEN)



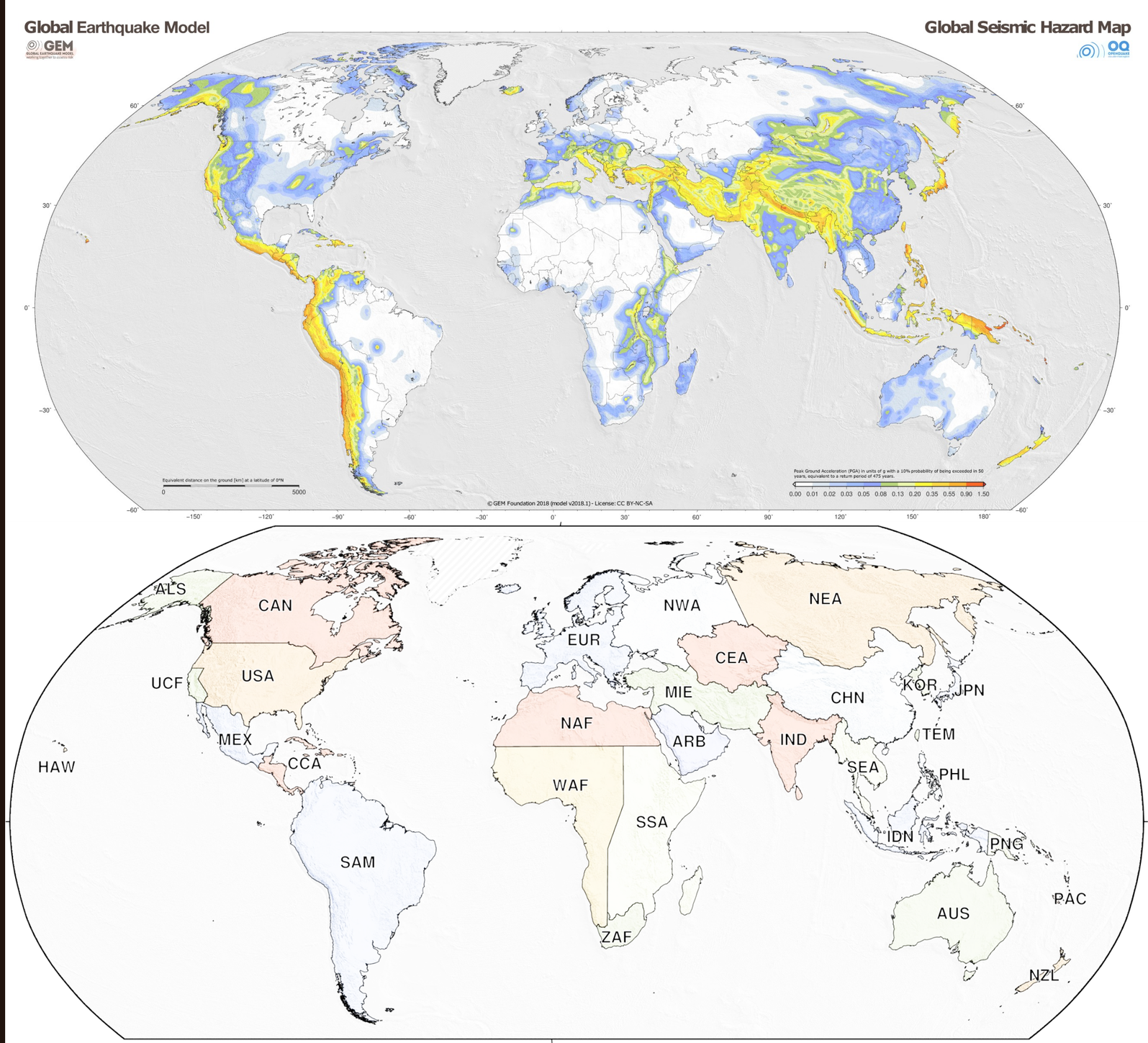


THE FRAMEWORK

GLOBAL LEVEL

GLOBAL EARTHQUAKE RELATED PRODUCTS

- One of a kind in coverage and quality
- Built from the efforts from the local, national and regional
- Mosaic of models covering the world

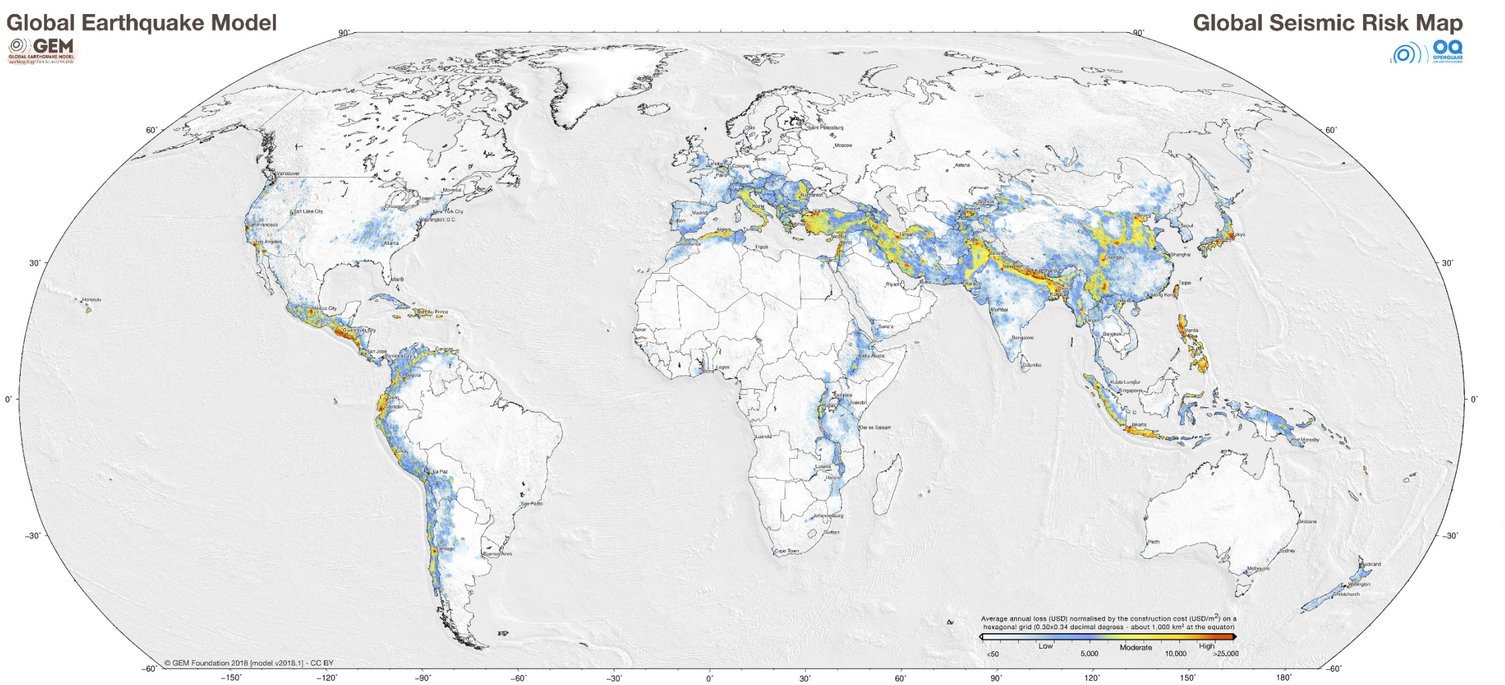


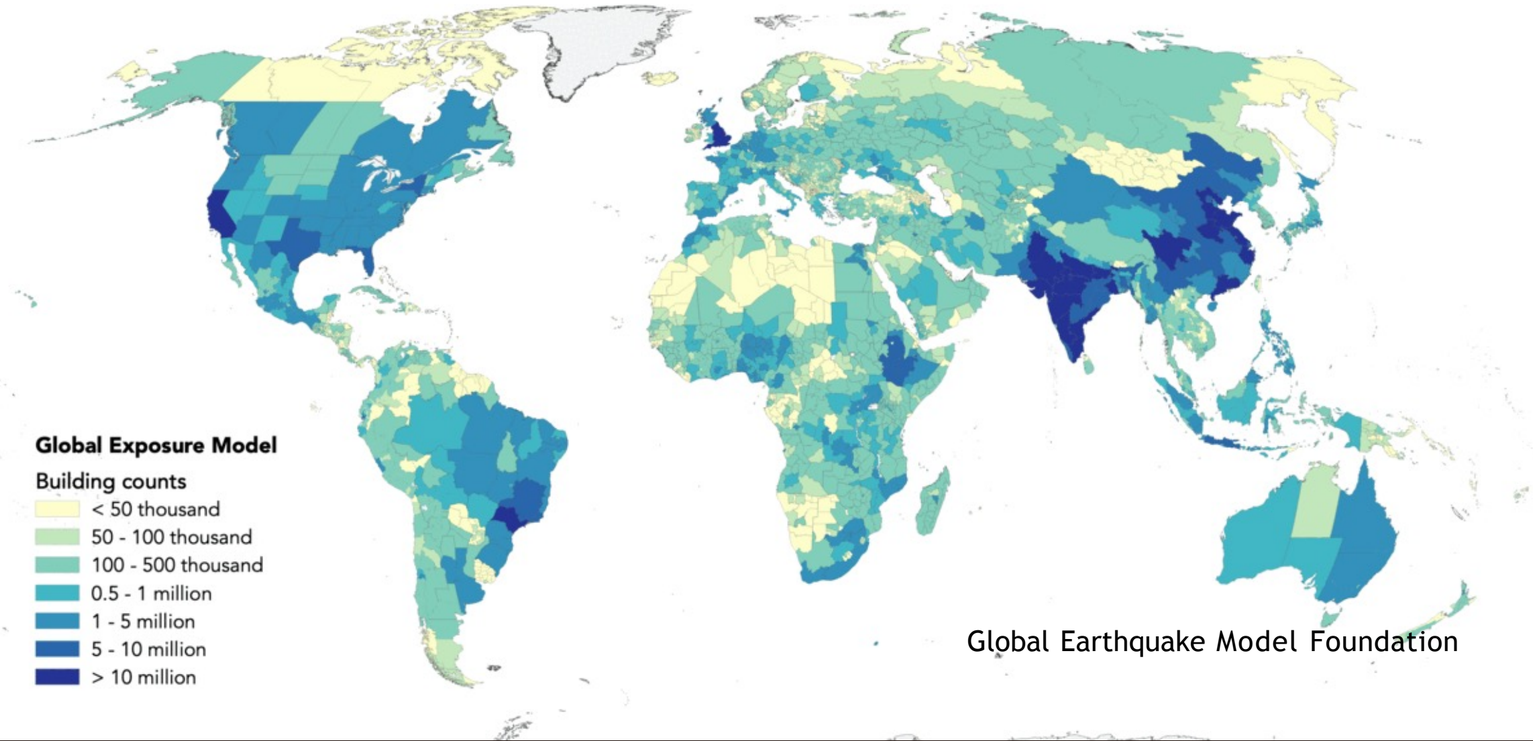
THE FRAMEWORK

GLOBAL LEVEL

GLOBAL EARTHQUAKE RELATED PRODUCTS

- One of a kind in coverage and quality
- Built from the efforts from the local, national and regional
- Detailed Global Exposure Model covering Residential, Commercial and Industrial buildings



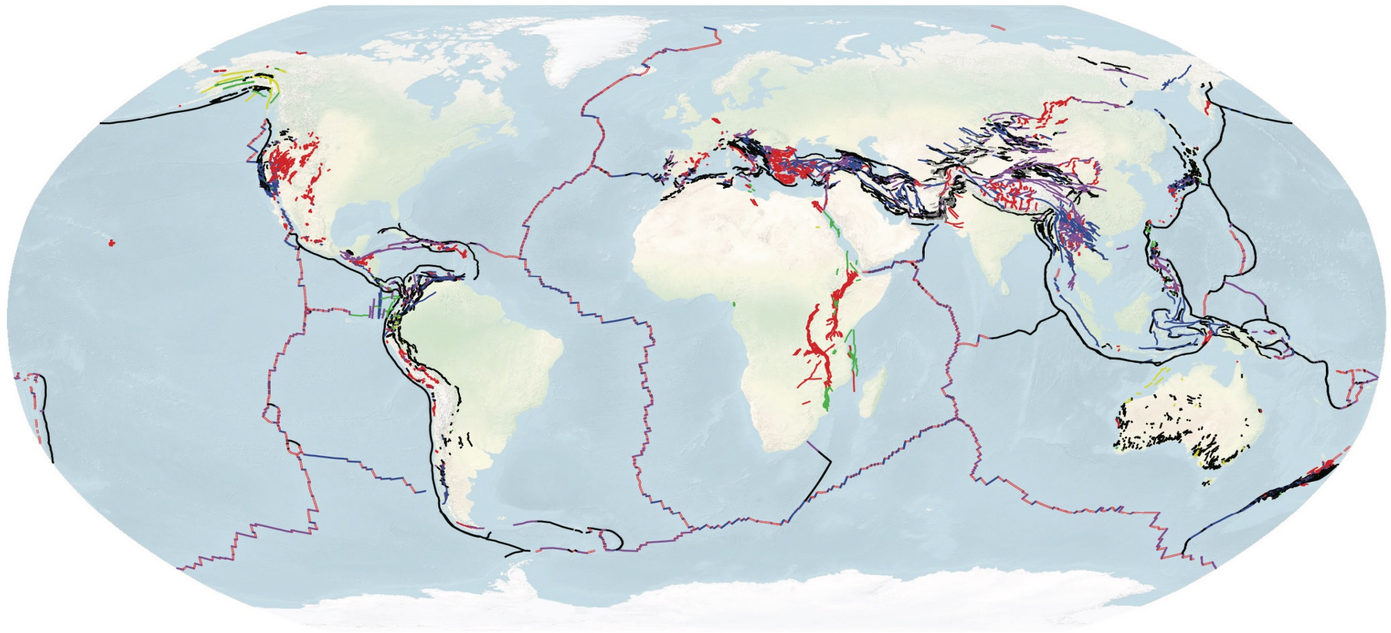


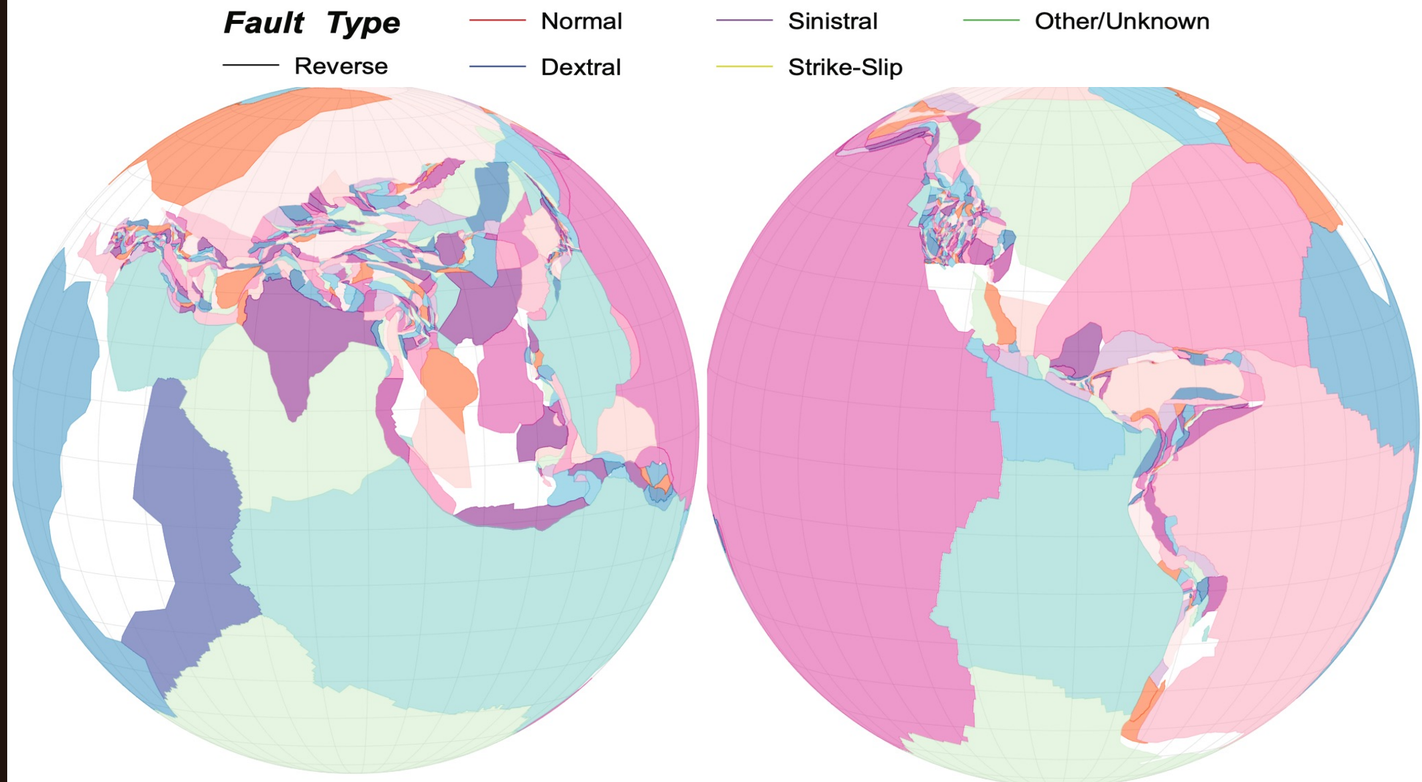
THE FRAMEWORK

GLOBAL LEVEL

GLOBAL EARTHQUAKE RELATED PRODUCTS

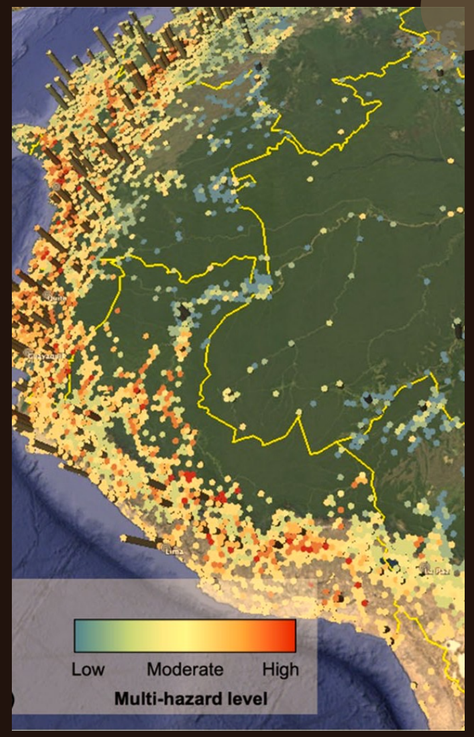
- More in the works from the geological perspective
- Active Fault Database
- Global Block Model
- Developed in-house with global collaboration
- Open to sharing data and establish collaborations



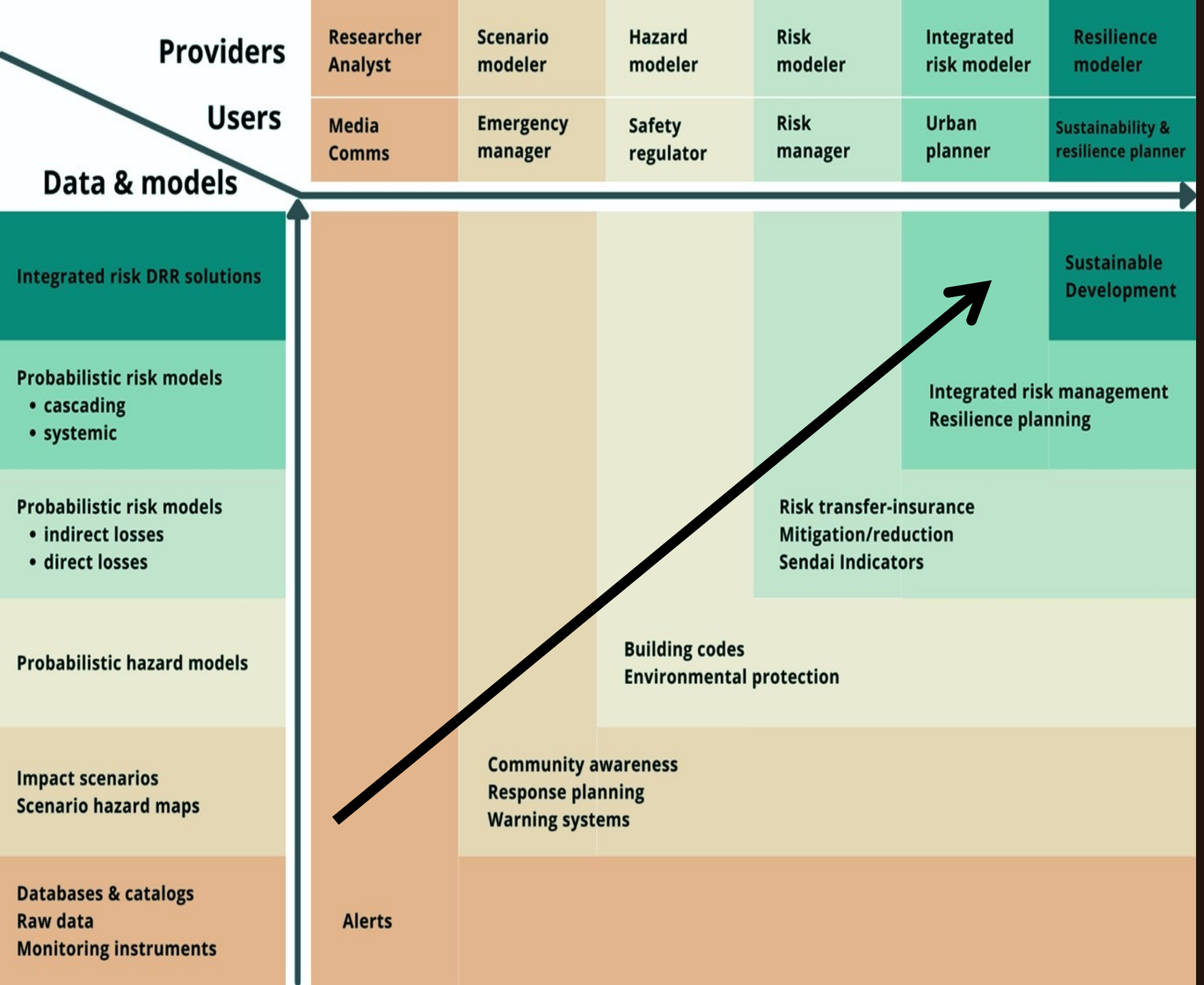


THE ROAD TO 2030

OUR STRATEGY FOR THE FUTURE



- Maintain earthquake expertise and global leadership.
- Advance core capability toward multi-hazard, future-risk models and maps.



THE FRAMEWORK

ROAD TO 2030

Roadmap toward integrated risk resilience and solutions

THE ROAD TO 2030

HOW CAN GEM SUPPORT YOU?

VARIOUS WAYS WE CAN COLLABORATE

- Provide tools and training for risk assessment
- Collaborate to develop national hazard and risk maps
- Connect you with other organisations globally

GLOBAL EARTHQUAKE MODEL FOUNDATION

OUR CONTACT

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