

SLIDE FOR DISCUSSION NICOLE & KATE

Outline presentation Tuesday December 4th at 1PM Hawaii time (?)
14th US-Japan Workshop on the improvement of structural design & construction practices
Session 3: Risk Management and Loss Estimation

Message: **Will this help the engineering community**

Kit: GEM can be bases for new tools

Outline:

Risk Portrait under single scenario event for large portfolio, that includes spatial correlation

Use cases:

- Uniform Hazard Spectra to a common standard
- retrofit-cost-benefit-calculator
- Exposure DB (interface)
- Damage assessment (vulnerability, replacement cost)

What can you do: be involved....

** GOOGLE BUSINESS FOR GEM



working together to assess risk



Transparent Global Earthquake Risk and Loss Estimation

Nicole Keller | GEM Foundation



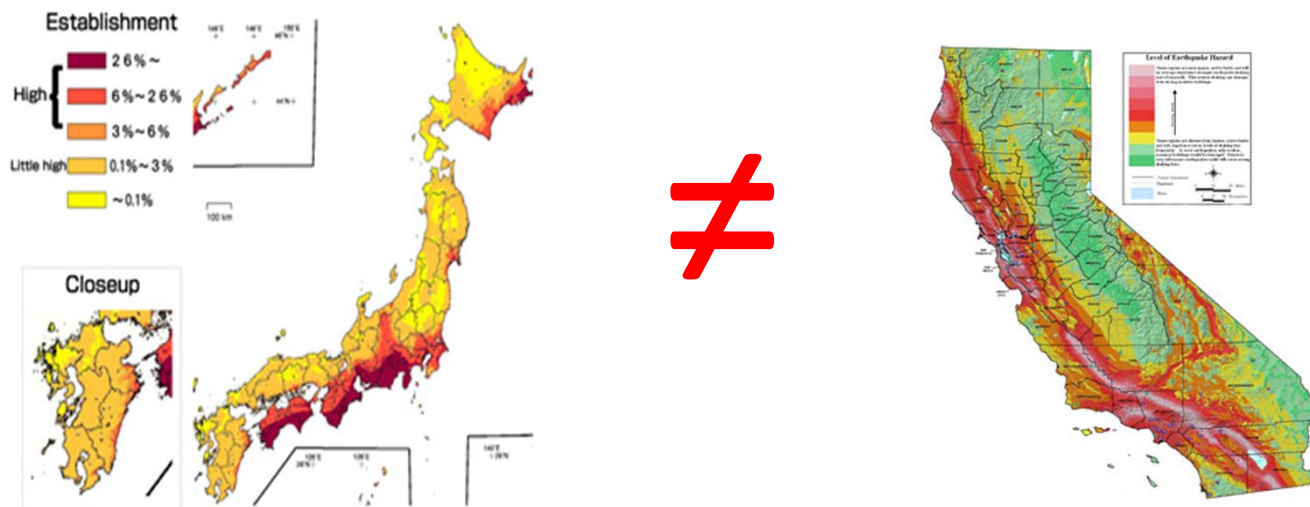
working together to assess risk



Why GEM?



- ▶ ‘advanced’ tools and resources for quantifying seismic hazard and risk as critical input to risk management are inaccessible to many
- ▶ there is a wide body of knowledge and science but it is not connected nor leveraged to the max
- ▶ worldwide we face similar issues, but use different approaches, tools and platforms to deal with it, and therefore cannot really share data and improve risk assessment together

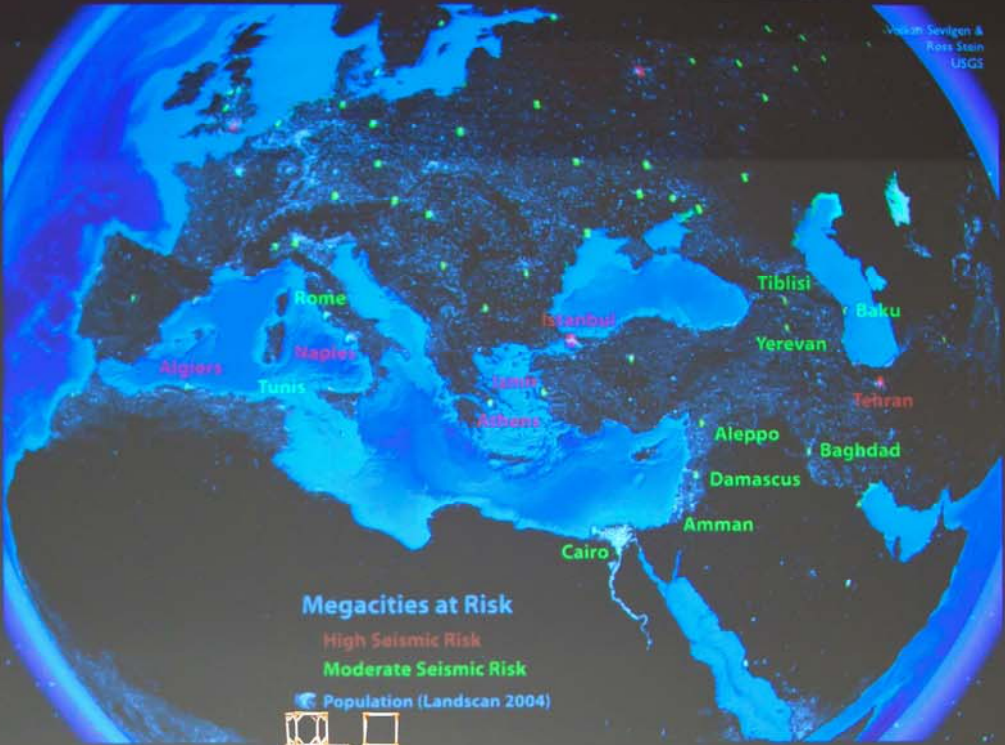


UR

UNDERSTANDING RISK

Commission on Disaster Risk Assessment

www.understandrisk.org



GEM
A uniform, independent standard to calculate and communicate earthquake risk worldwide
Outreach Meeting 2010



A global collaborative effort driven by public-private partnership

(1) global data, methods, guidelines and tools

(2) linking up with and facilitating regional Initiatives



(3) open-source platform and (software) tools

(4) knowledge sharing and technology transfer

How is GEM different?



Scientific

Quantitative measures and outputs based on (the latest) science

Humanitarian

Empowering organisations and individuals at various levels to manage risk;
risk transfer, building codes, planning

Global

A framework and platform for collaboration, sharing data and knowledge
and hereby joint learning – worldwide

Credible

Make information clear and accessible; be transparent in what we know and don't

Independent

open-source (software) tools, transparency in methods and process,
leading to independent outcomes

Working together to assess risk



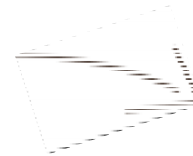
Organisations and individuals
(data, results)



Local - national, regional -
programmes & collaborations
(data, methods)

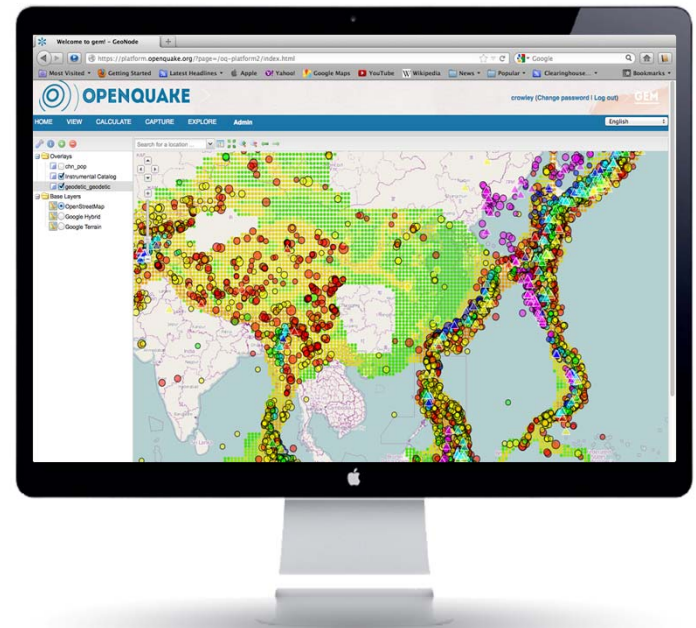


Global Framework
(tools, data, methods)



OpenQuake

Calculate, Share, Explore

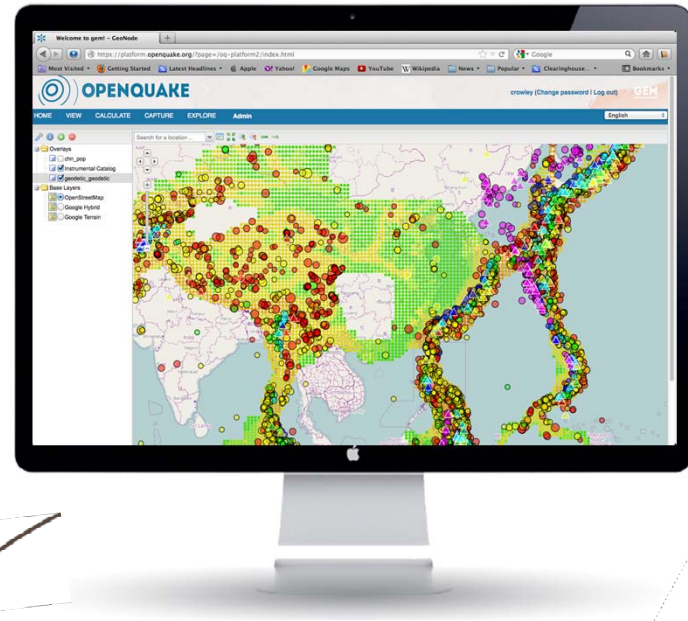


One network, two interfaces



data ↔ tools

↙ ↘
methods



v1 in 2014

OpenQuake Expert

CALCULATE
MODEL
VIEW
EXPLORE
CAPTURE

OpenQuake Essential

VIEW
EXPLORE
CAPTURE

A holistic approach: 'total risk'



Integrated Seismic Risk



Physical Seismic Risk

Probability of damage and loss to people and structures due to earthquakes

Socio-Economic Vulnerability and Resilience

Vulnerability of society and economy and their capacity to cope with earthquake events



Seismic Hazard

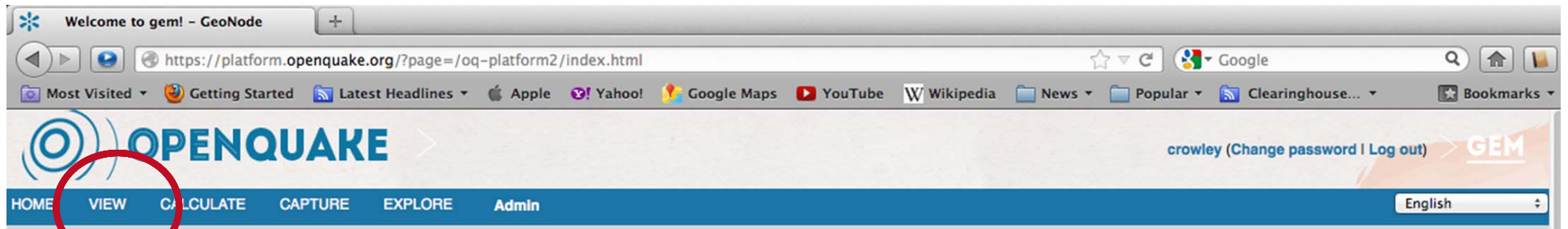
Probability of ground shaking due to earthquakes

Exposure

Elements at risk

Physical Vulnerability

Vulnerability of structures and their occupants to seismic hazard



Models

- ▶ Seismic source models
- ▶ Ground motion models
- ▶ Physical exposure models
- ▶ Physical vulnerability models
- ▶ Composite index models (social vulnerability, resilience, indirect loss)

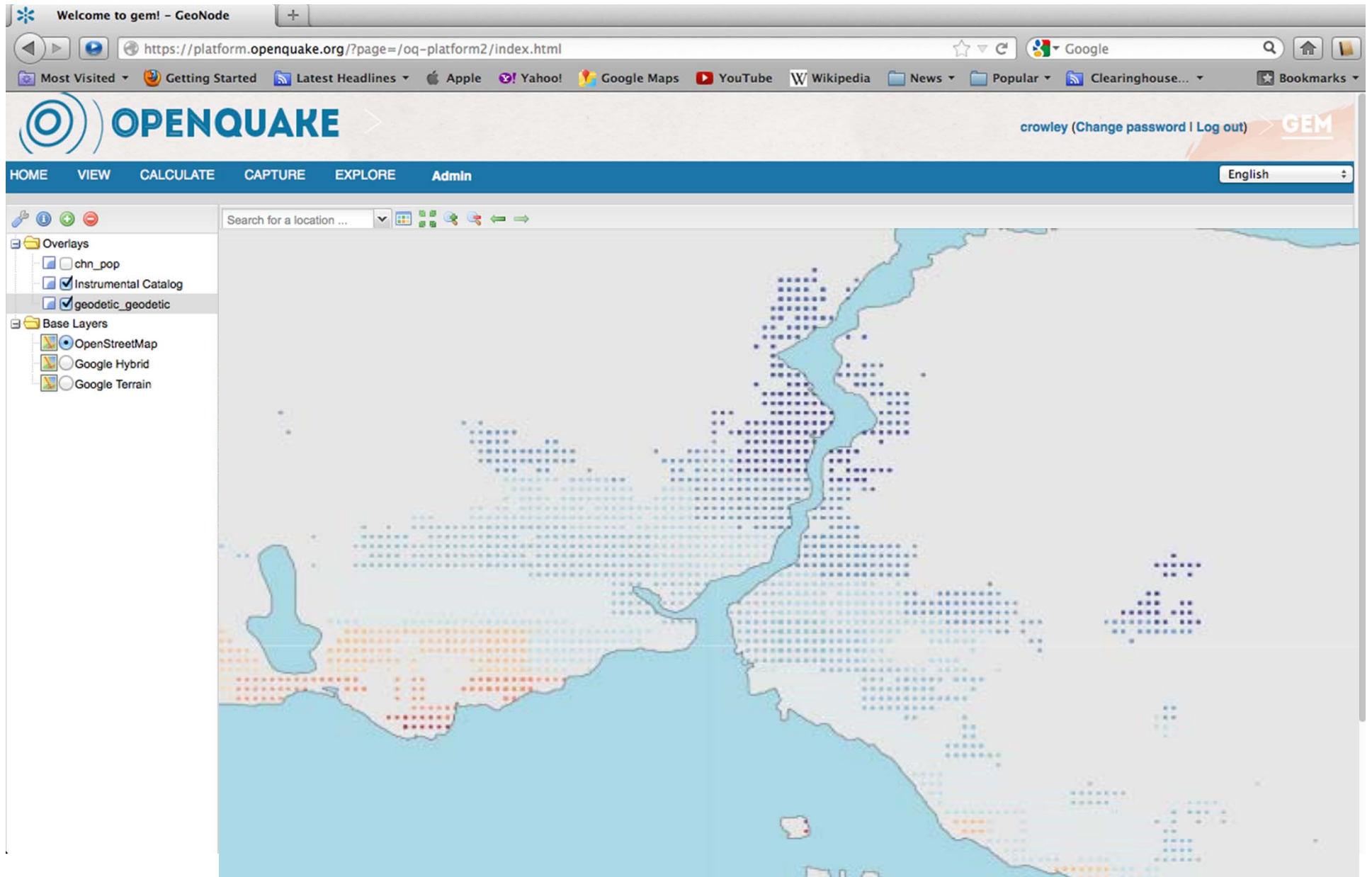
Products (pre-computed results)

- ▶ Hazard maps
- ▶ Hazard curves
- ▶ Stochastic event sets
- ▶ Risk maps (physical and total)
- ▶ Average annual losses (total and insured)
- ▶ Event loss tables

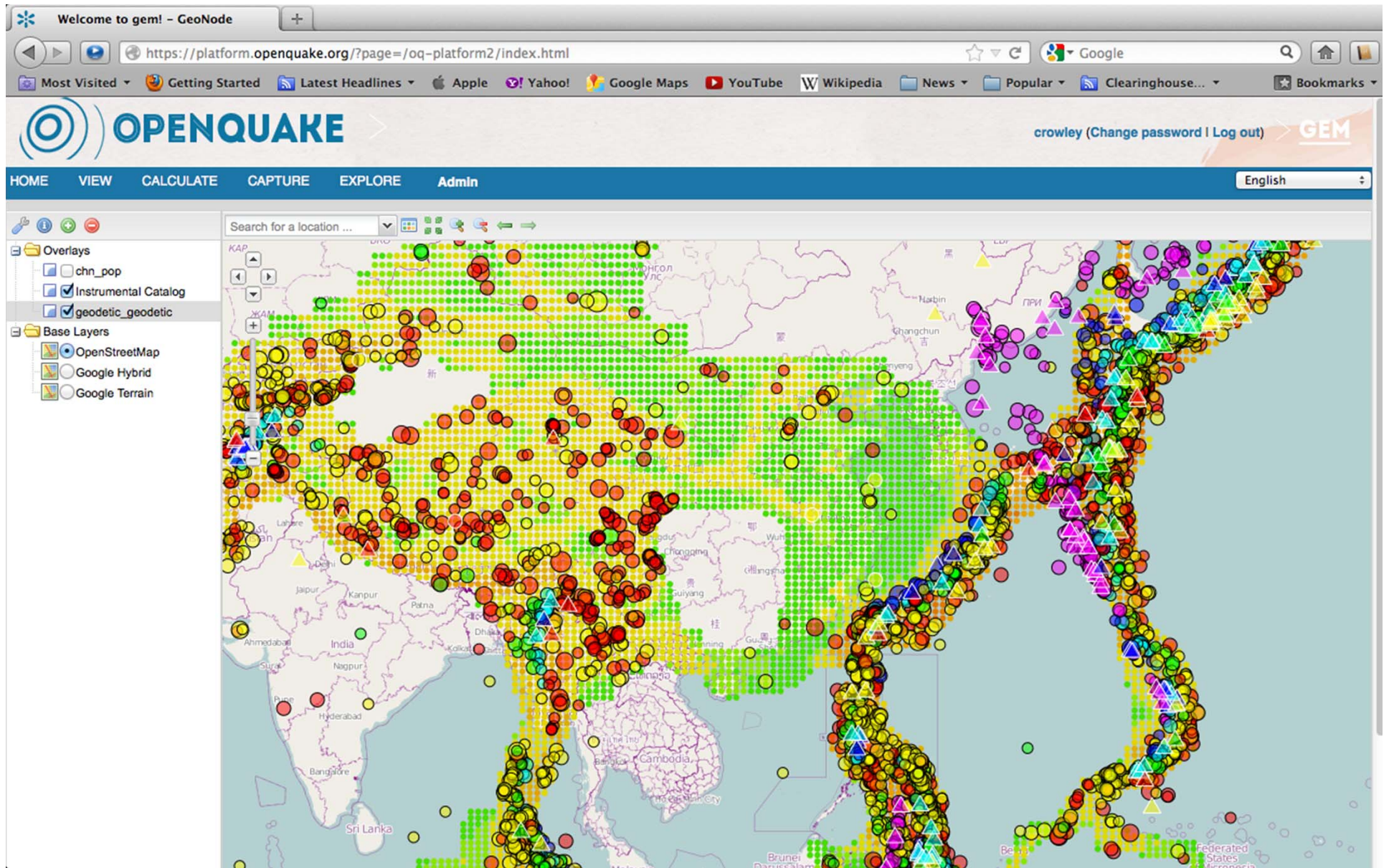
Datasets

- ▶ Earthquake history
- ▶ Instrumental catalogue
- ▶ Geodetic strain rate
- ▶ Active faults
- ▶ Tectonic regionalisation
- ▶ Buildings and population
- ▶ Earthquake consequences
- ▶ Physical Vulnerability
- ▶ Vulnerability and resilience indicators

Global by default; upload, share, use more local products



Facilitate decision-making: retrofit cost-benefit map



Use, share, collaborate on data

Welcome to gem! - GeoNode

https://platform.openquake.org/?page=/oq-platform/faultedearth_index.html

OPENQUAKE

crowley (Change password | Log out) GEM

HOME VIEW CALCULATE CAPTURE EXPLORE Admin English

Help Wellington, New Zealand

Layers

Trace Form

Search for key word in notes:

Create or modify a trace: Draw Modify

Upload a trace: Upload

From the table below press either the Shift or ctrl to select the Traces you would like to join into a Fault Section

Neotectonic Section Name:

Neotectonic Section Summary

Events (Site Observation) Form

Displacement (Site Observation) Form

Slip Rates (Site Observation) Form

Fault Geometry (Site Observation) Form

Neotectonic Fault Form

Fault Source

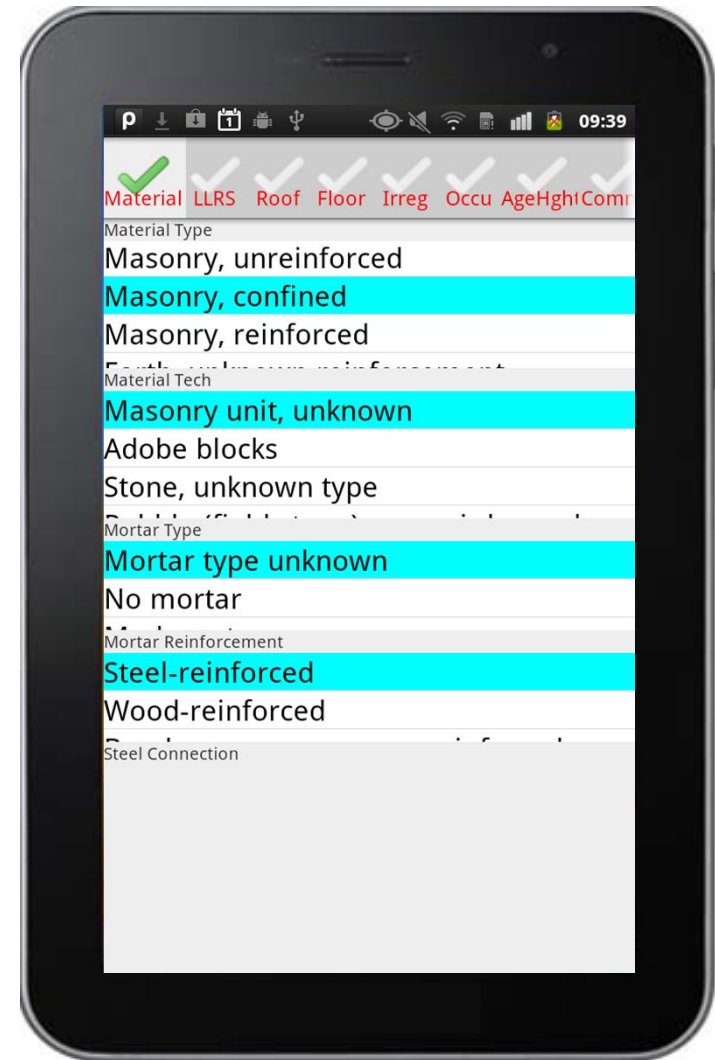
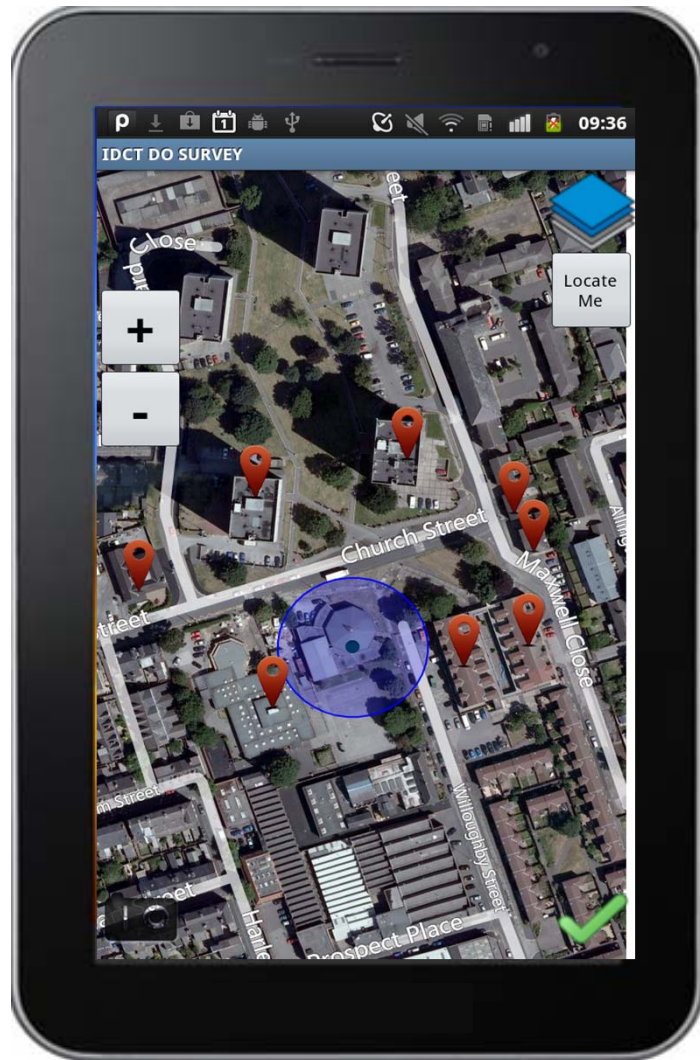
Legend

Map data ©2012 Google, Whereis(R), Sensia Pty Ltd, Imagery ©2012 TerraMetrics - Terms of Use

Observations: Events Observations: Displacement Observations: Slip Rates Observations: Fault Geometry Traces **Fault Section Summary** Faults Fault Sources

Fault Section N...	Length Min	Length Max	Length Pref	Strike (...*)	Episodic behavi...	Upper seismog...	Upper seismog...	Upper seismog...	Upper seismog...	Lower seismog...	Lower seismog...	Lower seik
Ohariu South						0.0	0.0	0.0	1.0	12.0	18.0	15.0
Joined junk fault	2.0	5.0	4.0	15		0.0	0.0	0.0	2.0	15.0	20.0	17.5
joined fault												

Capturing NEW data: continuous updating



Handheld and crowdsourcing devices for inventory of buildings – for risk assessment or to process damage data after an earthquake