

Research Plan and Progress of SATREPS Peru Project



March 15, 2012

Fumio YAMAZAKI



Professor, Chiba University, Japan.

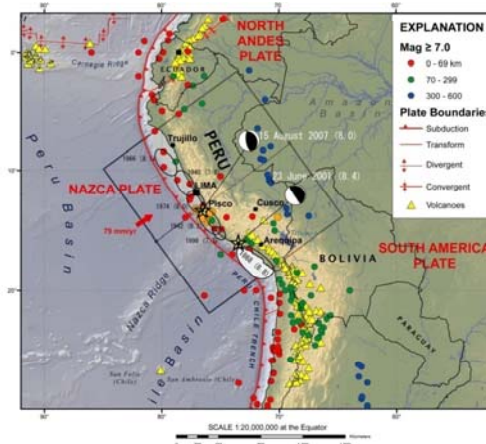
Doctor Honoris Causa, UNI, Peru.



1

Needs of EQ & T Disaster Mitigation in Peru (1)

- Peru locates in the **circum-Pacific seismic belt** with high seismic and tsunami risks.
- Large **inter-plate earthquakes** occurred in Atico (2001) and in Pisco (2007), and thus **EQ & T disaster mitigation** draws significant **attention in Peru**.



2

Needs of EQ & T Disaster Mitigation in Peru (2)

- Peru has a long term **relationship with Japan** since 1873.
- **CISMID** was established within **UNI** in 1987 by the support of **Gov. of Japan**. CISMID became the **leading center** of earthquake engineering research in South America.
- CISMID has been in collaboration with Japanese research institutions.



2008 APEC-Peru

3

Significance of joint research between Peru and Japan

Both countries are located in a similar seismic environment, frequently hit by damaging earthquakes & tsunamis.

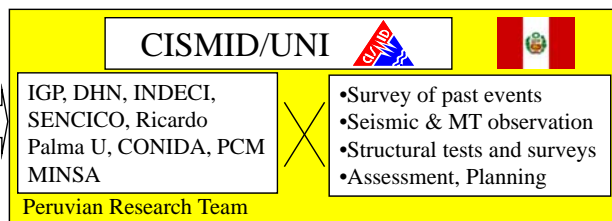
- **Contribution of Japanese science & technology** to disaster mitigation in Peru
- Merits to Japanese **geoscience** since subduction-zone EQs are **rare events**
- **Tsunamis** caused by subduction-zone earthquakes in **South America** hit **Japan** (1960, 2010 Chile EQs) and vice verse (2011 Tohoku EQ). Thus the joint-research contributes to **the tele-tsunami study** in the world.
- Promotion of **disaster mitigation** and **capacity building** through **sharing the knowledge** from the international joint research



4

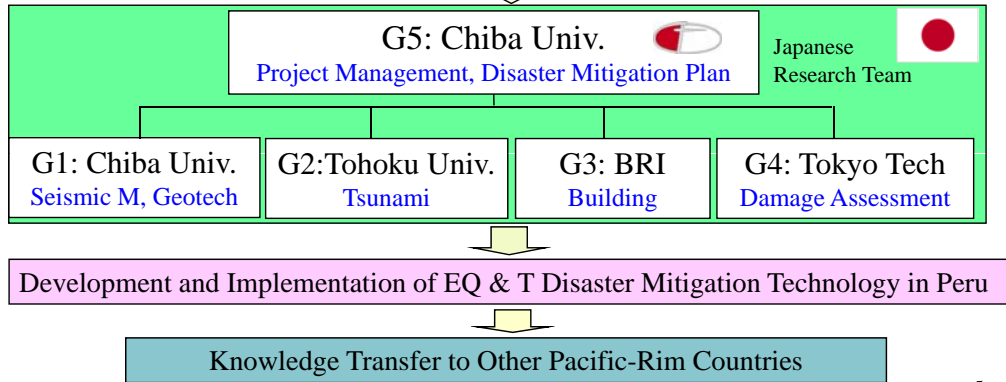
Needs in Peru

- Sustainable Development
- Reduction of Losses from EQ
- Regional Characteristics
- Implementation Technology



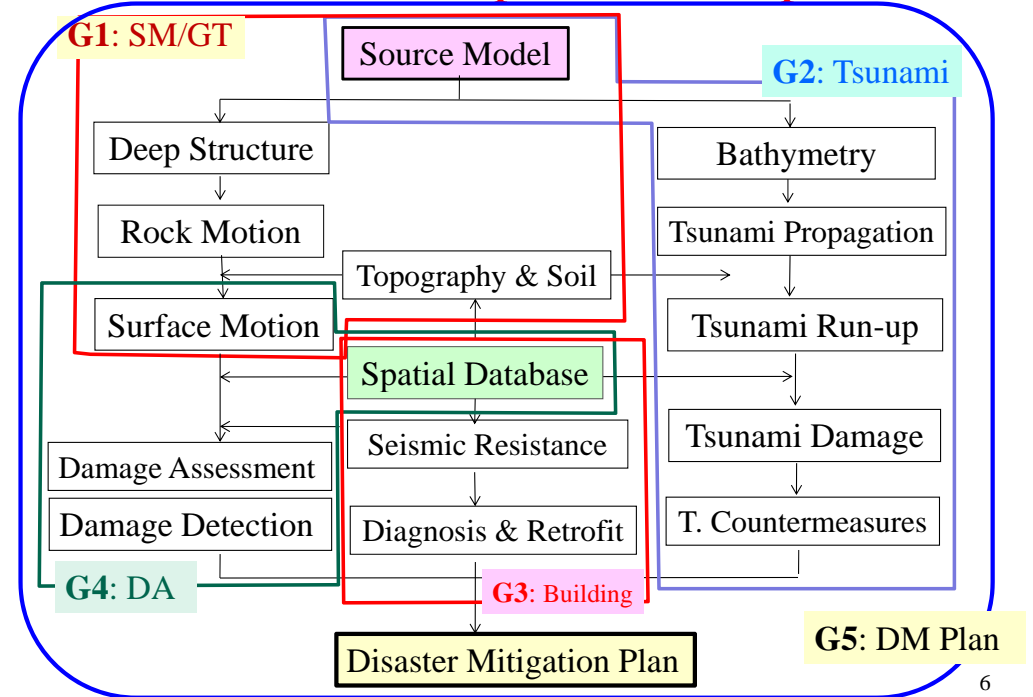
International Joint-research Project

Enhancement of Earthquake and Tsunami Disaster Mitigation Technology in Peru



5

Research Topics and Groups



6

Research Plan

Project Management and Coordination

PI: F. Yamazaki (Chiba U), C. Zavala (CISMID/UNI)

- Project Management, International & domestic coordination
- Public relations, Information dissemination
- International workshops, symposia <http://ares.tu.chiba-u.jp/peru/>

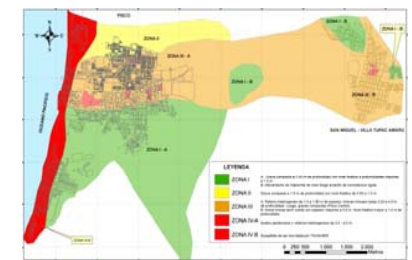
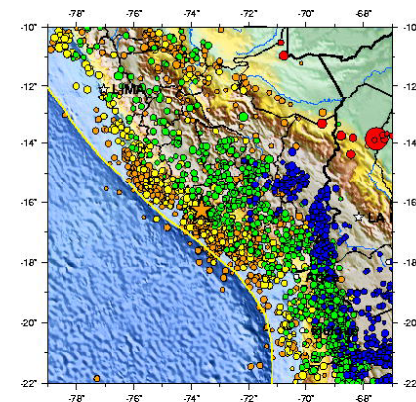


7

G1: Seismic Motion and Geotechnical Issues

GL: S. Nakai (Chiba U), Z. Aguilar (UNI) & H. Tavera (IGP)

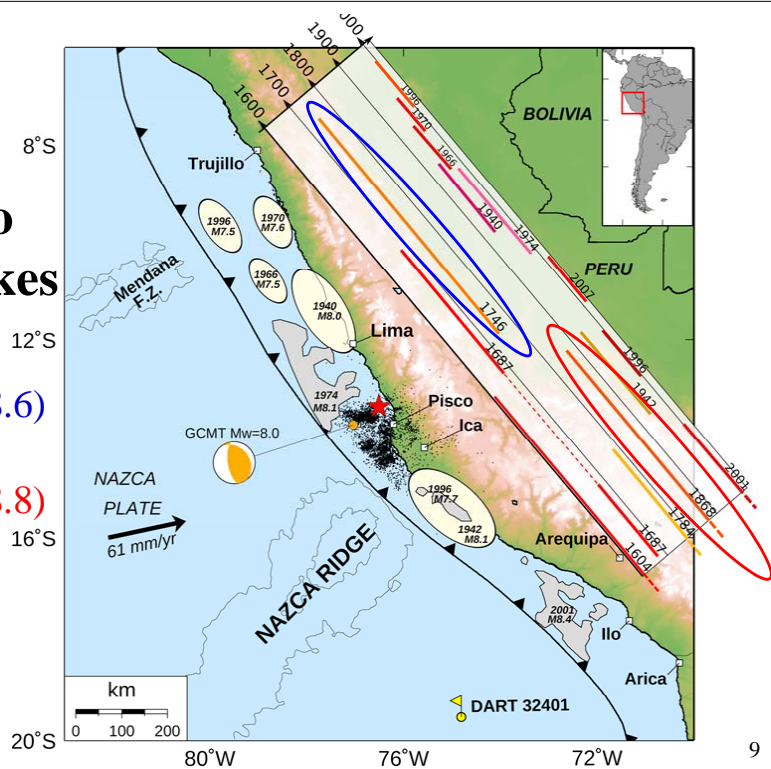
- Source Modeling and Simulation of Seismic Motion
- Microzonation based on EQ and MT observations
- Risk Assessment of Slope Failures



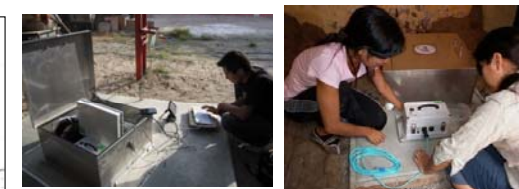
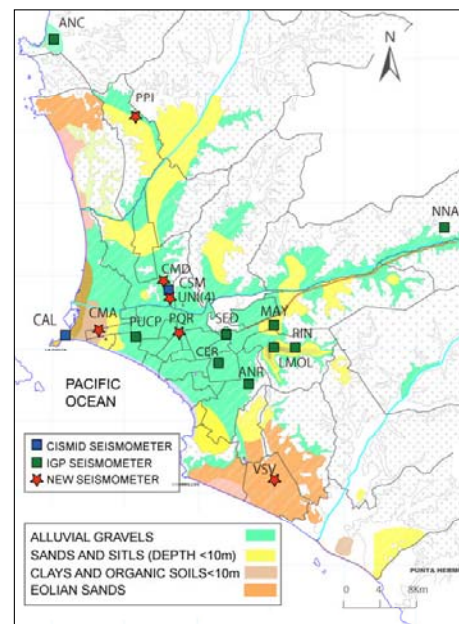
8

Scenario Earthquakes

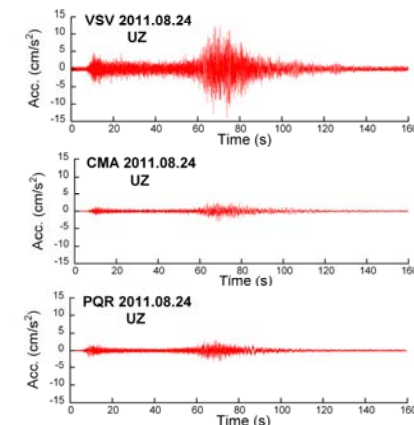
1746 (Mw=8.6)
and
1868 (Mw=8.8)



Implementation of New Seismometers



Contamana Earthquake 2011.08.24 M_L 7.0



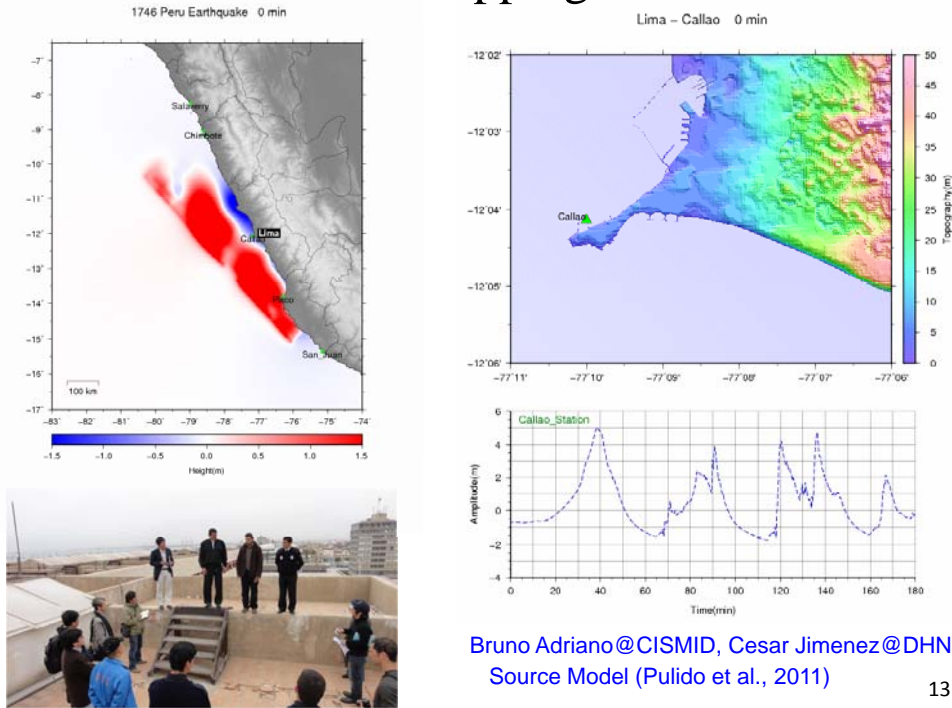
G2: Tsunami Simulation and Damage Mitigation

GL: S. Koshimura (Tohoku U), C. Jemenez (DHN), IGP, CISMID

- Tsunami Source, Propagation and Impacts
- Tsunami Hazard and Impacts Mapping
- Implementation of Tsunami Disaster Mitigation Technology

Data Collection, Hazard Mapping, and Evacuation Planning

Tsunami Hazard Mapping in Lima-Callo



G3: Seismic Resistance of Buildings

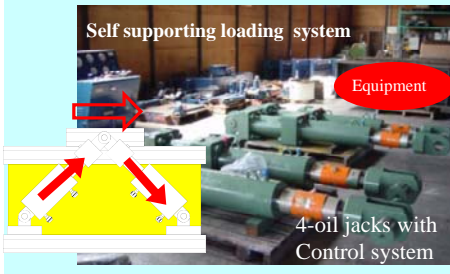
GL: T. Saito (BRI), C. Zavala (UNI)

- Develop Database of Structural Tests for Masonry Buildings
- Develop Seismic Diagnosis and Retrofit Technologies
- Assessment and Retrofit of Historical Buildings



Equipment introduced to Peru

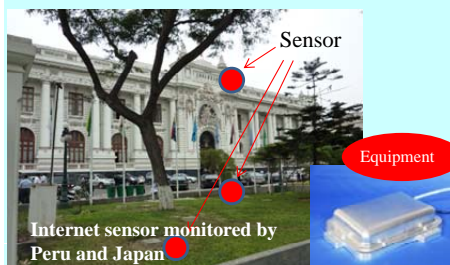
Structural testing



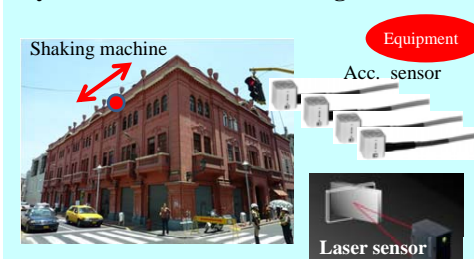
Material testing



Building monitoring

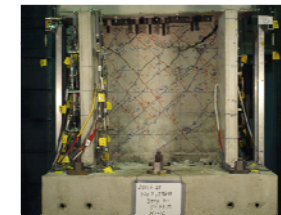


Dynamic behavior monitoring & test



Research Progress of Building Group

Seismic Test Database



Computer Simulation of Seismic Diagnosis

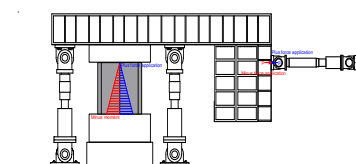


Vibration Characteristics of Adobe-Quincha Buildings

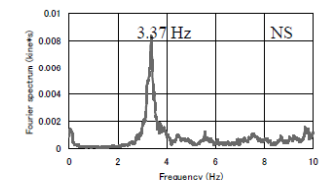
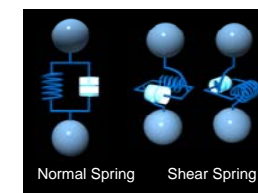


Structural Test at National Yokohama University (2010-2011)

BRI and Akita Pref. Univ.



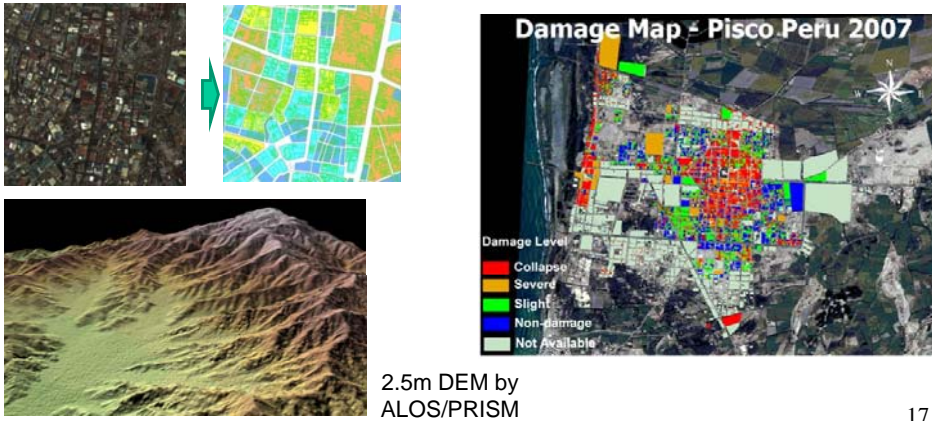
- Cyclic load
- 1/3 Scale
- Displacement control



G4: Geo-spatial Database and Damage Assessment

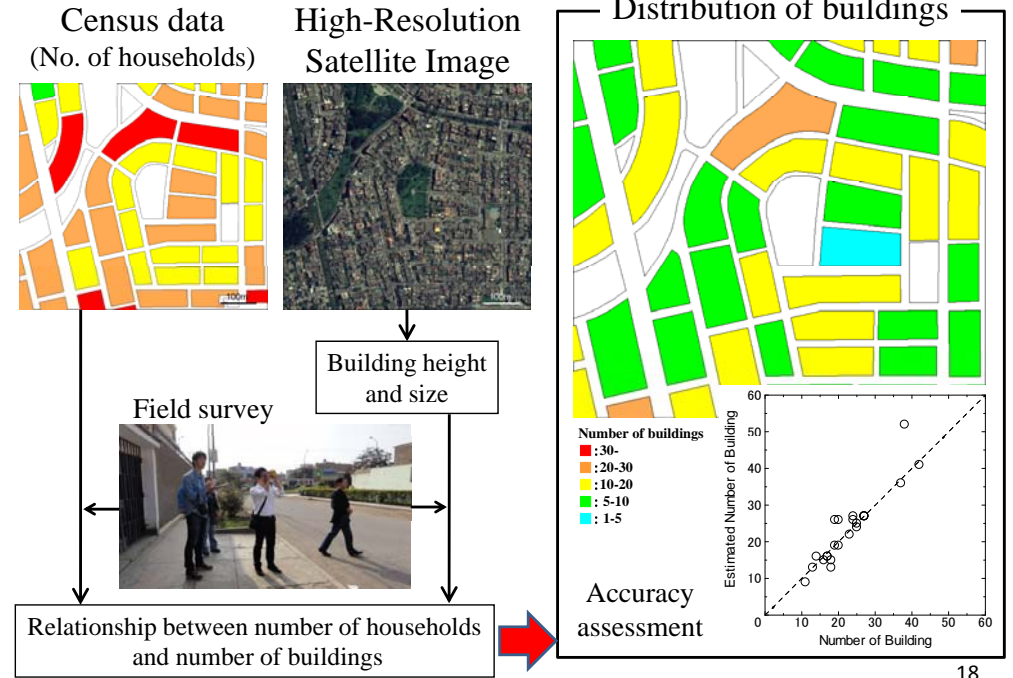
GL: S. Midorikawa (Tokyo Tech), M. Estrada (UNI)

- Development of **Geo-spatial Database**
- **Damage Detection** using Satellite Images
- **Damage Assessment** for Scenario Earthquakes



17

G4: Development of Building Inventory Data in Lima

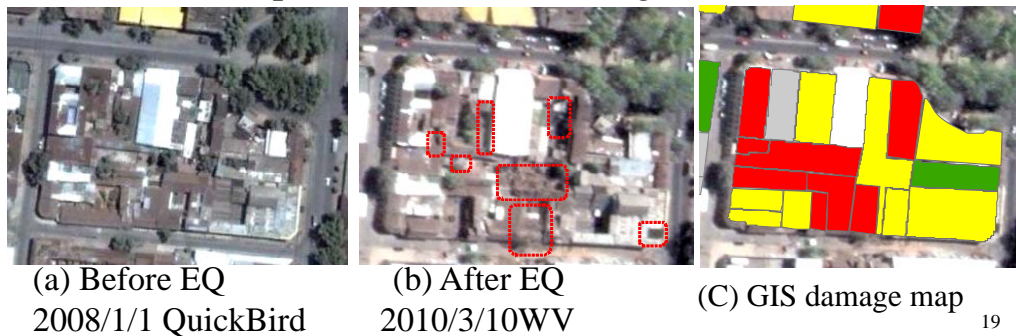


18

2010 Chile EQ joint survey (G4+G5) by 5 SATREPS members



Comparison of satellite images in Talca

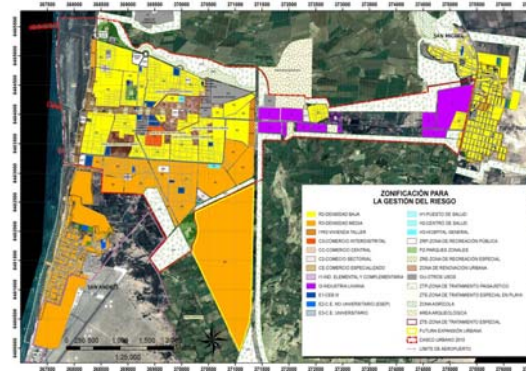


19

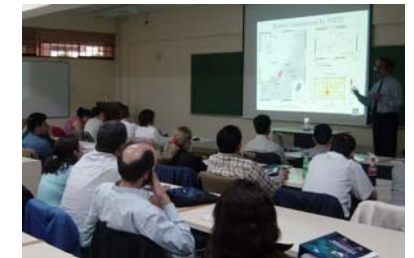
G5: Development of Disaster Mitigation Plan

GL: F. Yamazaki (Chiba U), A. Bisbal (INDECI)

- Formulate **Land-use Policies** for Disaster Mitigation
- Develop **Local Disaster Mitigation Plans** for the **Study Areas**
- **Awareness Raising and Dissemination** Activities



Land-use plan after the 2007 Pisco EQ (CISMID)



Technical seminar (JICA-Peru, 2004)

20

G5 Activities in 2010-2011

Selection of target areas and field survey

Public Relations

Meeting with INDECI



Field survey in Tacna



Seminar at Peruvian Congress



Recovery survey in Pisco



Meeting at Tacna Private Univ.



Human Resources Development



Trainees from CISMID to Chiba U.



Tsunami Training Course at CISMID



Attending a practical class at Chiba U.



C. Jemenez in Onagawa

Schedule of the Research Project

Research Items	Period FY (2010-2014)				
	2010	2011	2012	2013	2014
Project Management 【Chiba U and CISMID/UNI】	WS▼	ws▼ JCC▼	WS▼ JCC▼	ws▼ JCC▼	ws▼ JCC▼
G1: Seismic motion & Geotechnical 【Chiba U and CISMID, IGP】					
1-1 Source modeling and seismic motion	← Source modeling	← Simulation of SM			
1-2 Site response & Microzonation	← EQ and MT observation, Geological survey		← Microzonation		
1-3 Slope failure assessment	← Field survey, measurement		← Seismic Response Analysis		← Hazard map
G2: Tsunami 【Tohoku U and DHN, CISMID】					
2-1 Tsunami propagation and impacts	← Tsunami simulation	← Inundation and impact			
2-2 Tsunami hazard mapping	← Data collection	← Damage assessment method		← Tsunami damage analysis	
2-3 Tsunami DM technology	← Historical tsunami data		← Tsunami DM technology		
G3: Buildings 【BRI and CISMID】					
3-1 Seismic tests database	← Literature Survey, Tests		← Database development		
3-2 Diagnosis and Retrofit	← Develop diagnosis method		← Retrofit technology, Validation tests		← Guideline
3-3 Retrofit of historical buildings	← Survey, Risk assessment		← Retrofit Technology		← Guideline
G4: Damage Assessment 【Tokyo Tech and CISMID, CONIDA】					
4-1 Geo-spatial database	← Data collection	← Geospatial data		← Database development	
4-2 Damage detection using RS	← Data collection	← Methodology		← Damage detection	
4-3 Damage assessment for Scenario EQ	← Damage assessment method		← Assessment, risk map		
G5: Disaster Mitigation Plan 【Chiba U and INDECI, CISMID】					
	← Literature Survey		← Planning	← Dissemination, Education	

Thank you very much!

Muchas Gracias!

ご清聴ありがとうございます。

