



IRDR Flagship Project

Implementation of integrated science and technology to empower local governments on disaster risk reduction and emergency preparedness

IRDR ICoE Taipei, NCDR and IRDR Japan

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Secretary General, NCDR, Taipei

13th Meeting of the IRDR Science Committee, Qingdao, Shandong Province, China

Developments of IRDR Flagship Project



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- **Initiation:**

- Tony Liu and Kuniyoshi Takeuchi had proposed in previous meetings

- **Project goal:**

1. Reviewing regional and sub-regional plans of disaster management to understand the current status of **physical and social vulnerabilities**.
2. Hosting dialogues with representatives of local governments to **find out gaps and demands** on science-based disaster management.
3. Seeking **trans-boundary comparisons** with others and inter-disciplinary collaborations with IRDR working groups and relevant scientific programs.
4. Compiling a final report to address the ideal approaches to **introduce science and technology for better disaster risk reduction**.

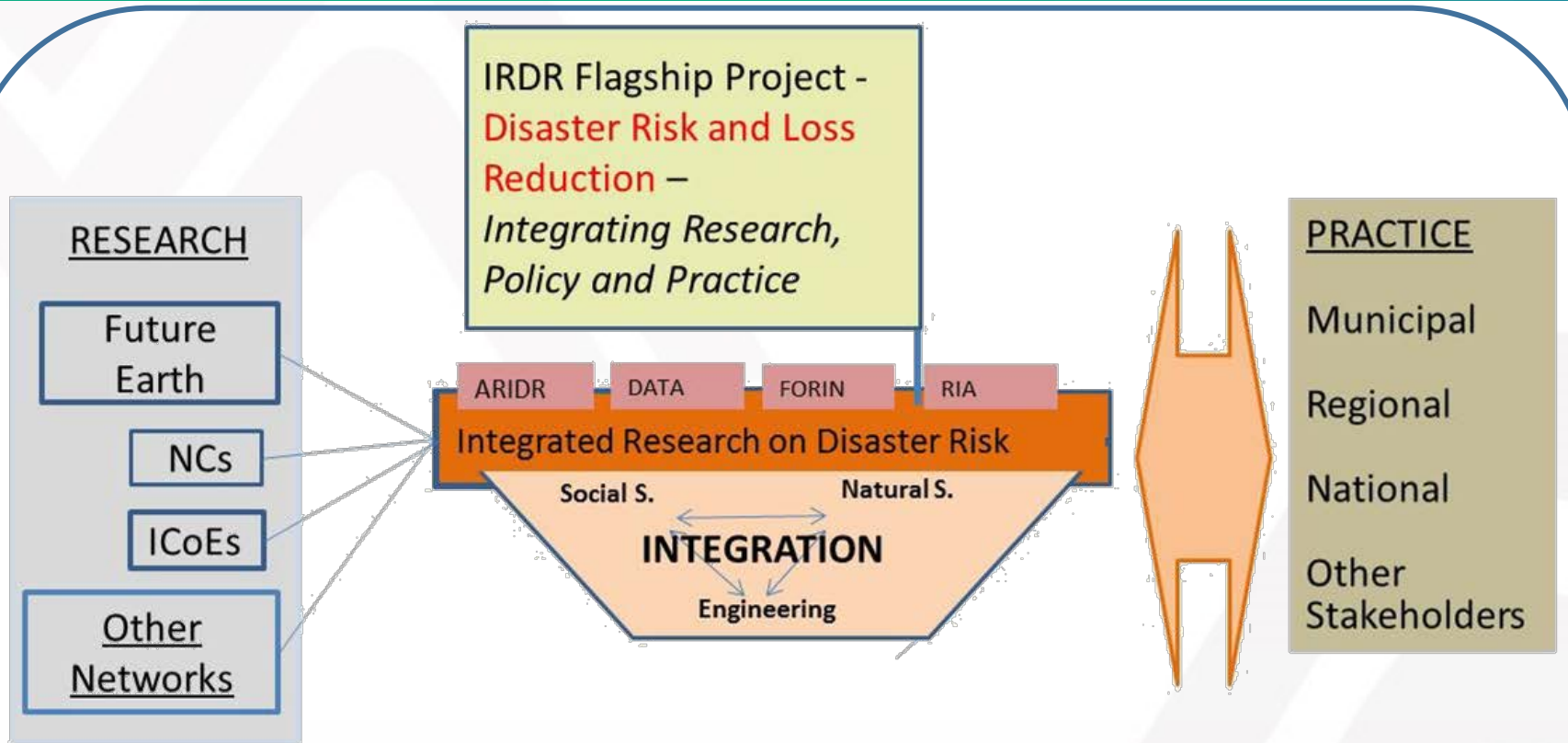
- **Core spirits of the project**

- **Co-design , Co-work and Co-implement** with local governments proposing their demands

- **Two local governments suggested by ICoE Taipei and NCDR**

- **New Taipei City and Hsinchu County**

IRDR Flagship Project based on outcomes of all scientific research achievements and four IRDR groups



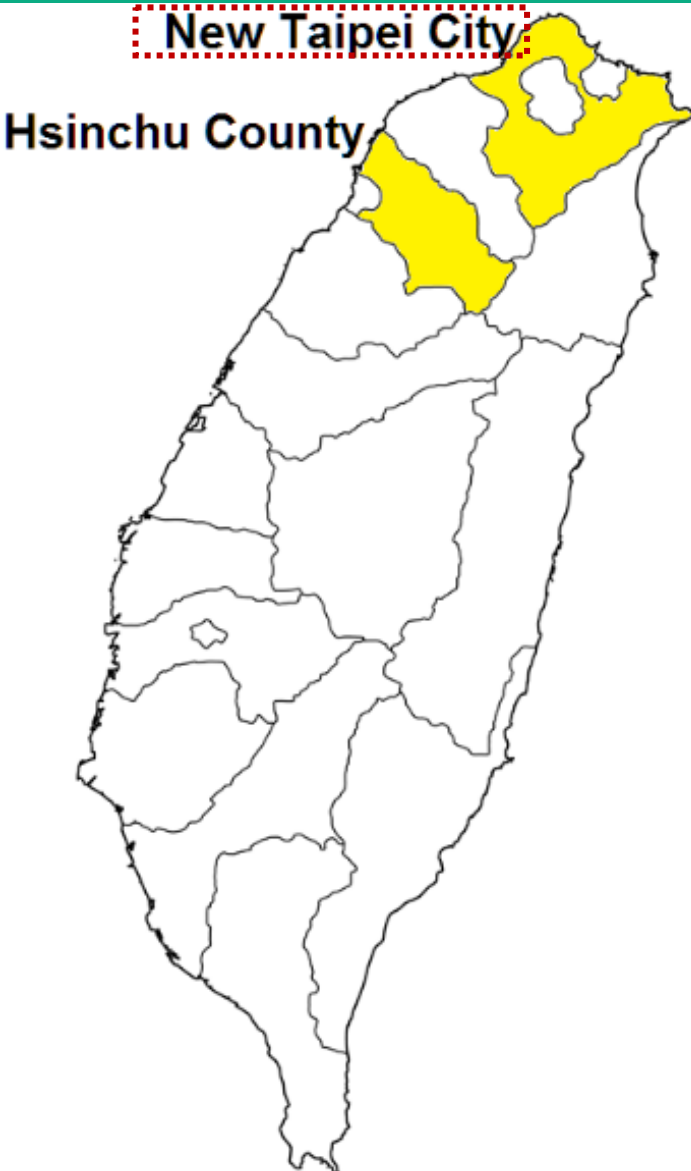
1. To integrate sciences;
2. To work with policy makers/practitioners;
3. To provide the vision as well as the practical steps to be followed;
4. To reduce loss.

A pilot project by ICoE Taipei and NCDR in 2015

“Focus on real application of science for reducing risk”

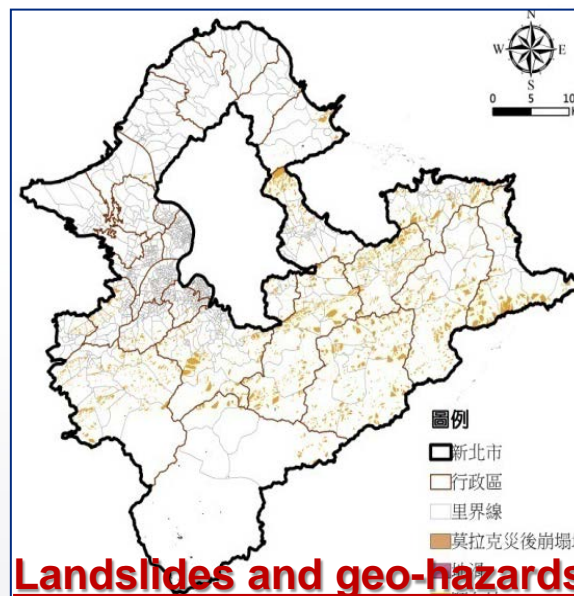
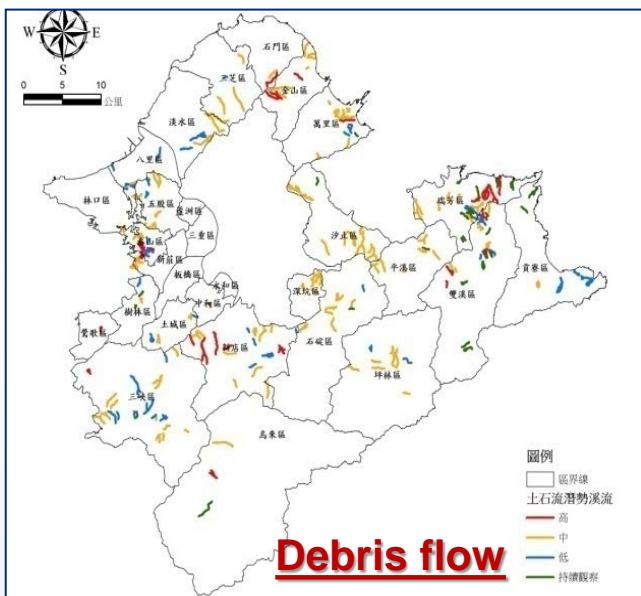
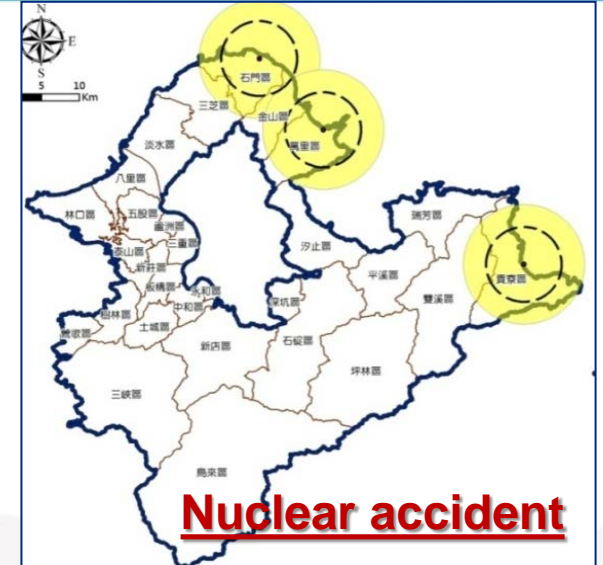
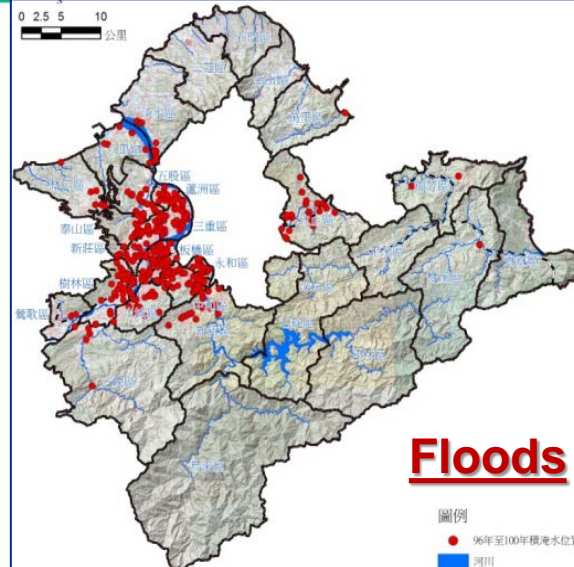
- Selected Hazards: typhoon and earthquake
- Target key stakeholders: Central, local and district governments, communities
- Focal issues:
 1. Plans for risk reduction
 2. Common operating picture for emergency operation
 3. Capacity building
Invite developing country for mutual learning

Profiles of New Taipei City



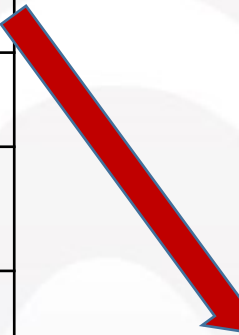
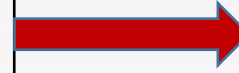
- **The most populous municipality**
 - **Population: 3,967,571 (Jan, 2015)**
- **Total area: 2,052.57 Km² divided into 29 districts**
- **Major natural hazards:**
 - **typhoon, flood, landslide, debris flow and earthquake**
- **Major vulnerabilities**
 - **urban areas suffer from flash floods**
 - **inadequate seismic capacity in existing old buildings**
 - **improper cultivations along hillsides**
 - **aging infrastructure**
 - **active seismic faults running through the city.**
- **New Taipei City is an ideal one to understand how science and technology help to**
 - **better enhance defense level and emergency operation**

Potential hazard maps of New Taipei City



Historical events in New Taipei City

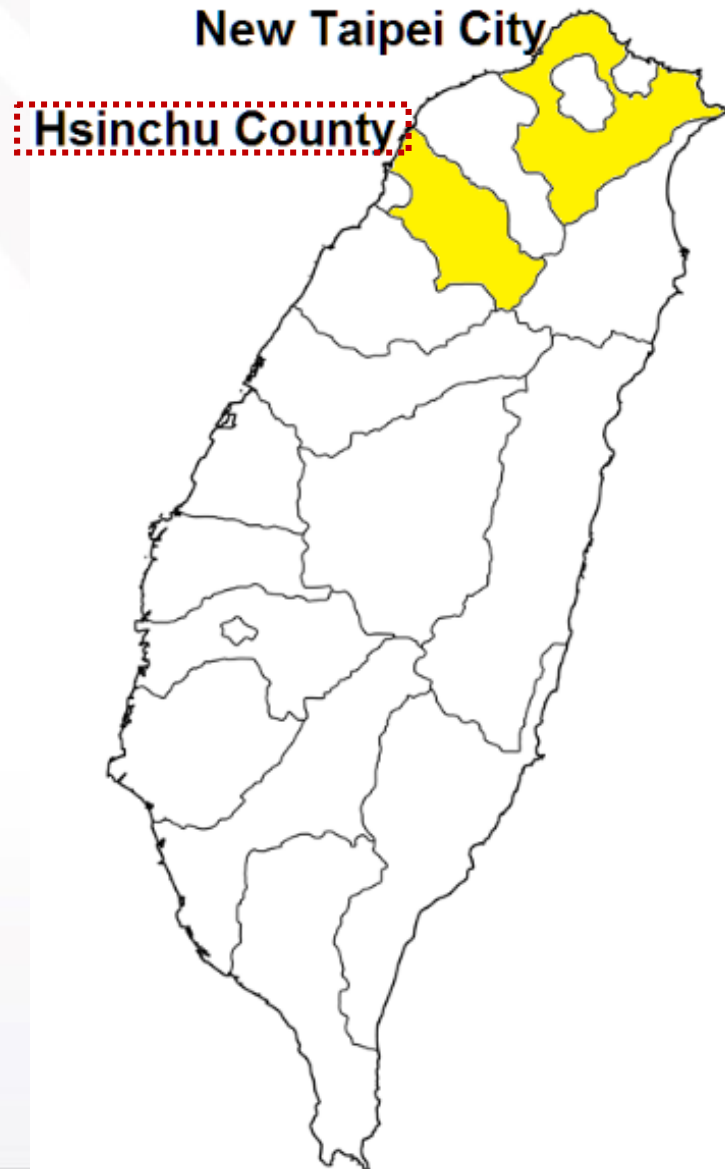
Event	Date	Causalities and damages
Typhoon Herb	1996.08.01	5-meter floods in Banqiao Dist.
Residential buildings buried by landslide	1996.08.18	28 died and 50 injured in Xizhi Dist.
Typhoon Zeb	1996.10.15	6-meter floods in Xizhi Dist.
Typhoon Babs	1996.10.25	4-meter floods in Dist.
Residential building collapsed by the Chi-Chi Earthquake	1999.09.21	38 died, 7 missing and 730 injured in Xinzhuang Dist.
Typhoon Xangsane	2000.10.31	7-meter floods in Xizhi Dist.
Debris flow	2000.11.01	7 died, 1 missing and 4 injured in Ruifang Dist.
Typhoon Nari	2001.09.15	24 died, 5 missing and 80 injured in Xizhi Dist., Ruifang Dist. And Shuangxi Dist.
Earthquake	2002.03.31	223 buildings needed further check and 28 were listed as dangerous ones in Xinzhuang Dist., Tucheng Dist., Zhonghe Dist.
Typhoon Aere	2004.8.23	2 died, 2 injured, 18,000 households flooded in Sanchong Dist., Xinzhuang Dist.,



Profiles of Hsinchu County



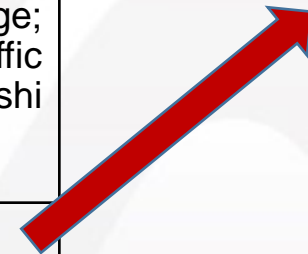
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- Provides supports and human resource to the Hsinchu Science Park, which is the locomotive leading economic momentum of growth.
- Indigenous tribes discretely inhabit mountainous areas where are prone to landslides or debris flow.
- Population: 537,907 (Jan, 2015)
- Total area: 1,427.53 Km² divided into 13 districts
- Major natural hazards:
 - typhoon, flood, landslide, debris flow and earthquake

Historical events in Hsinchu County

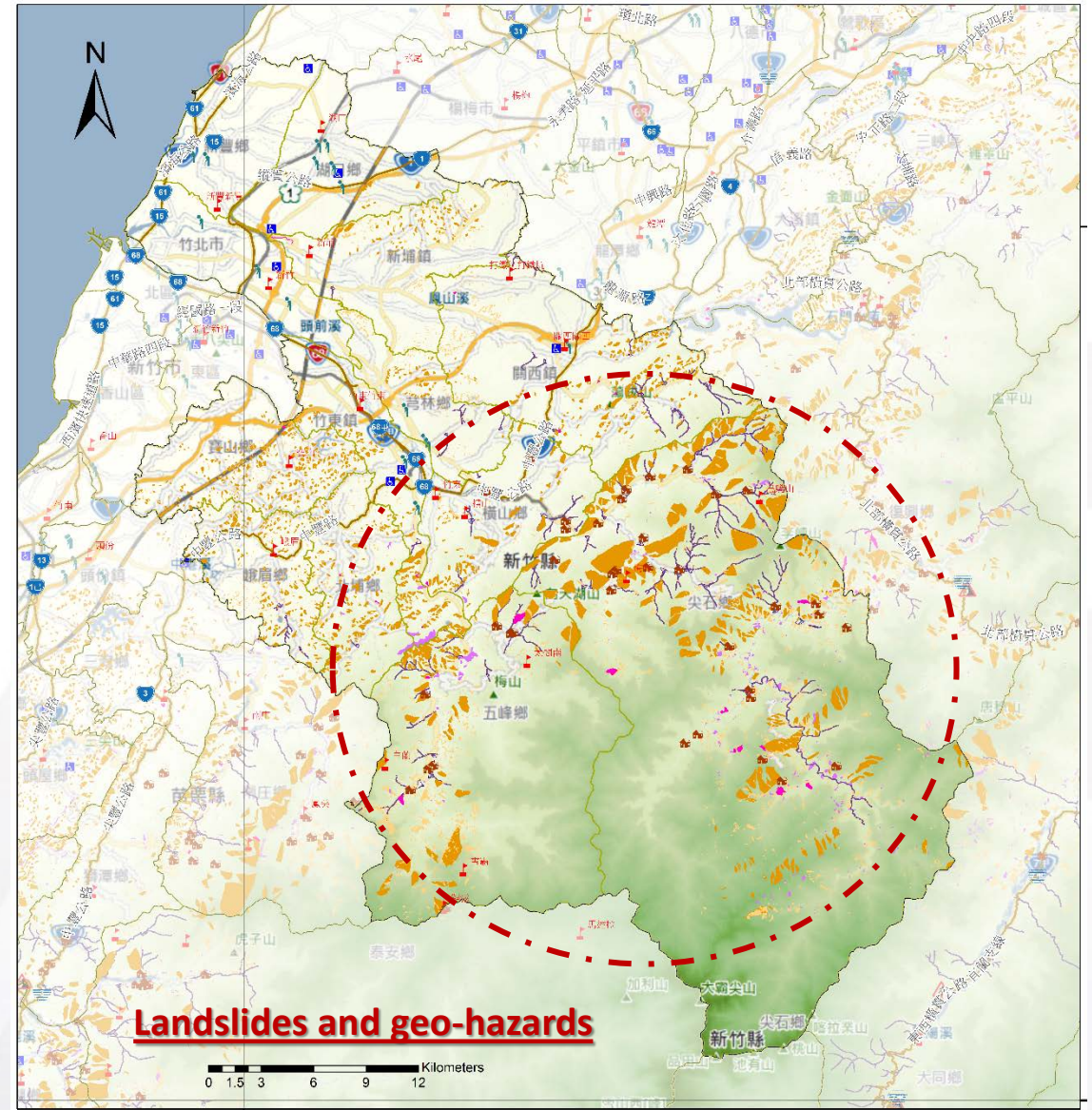
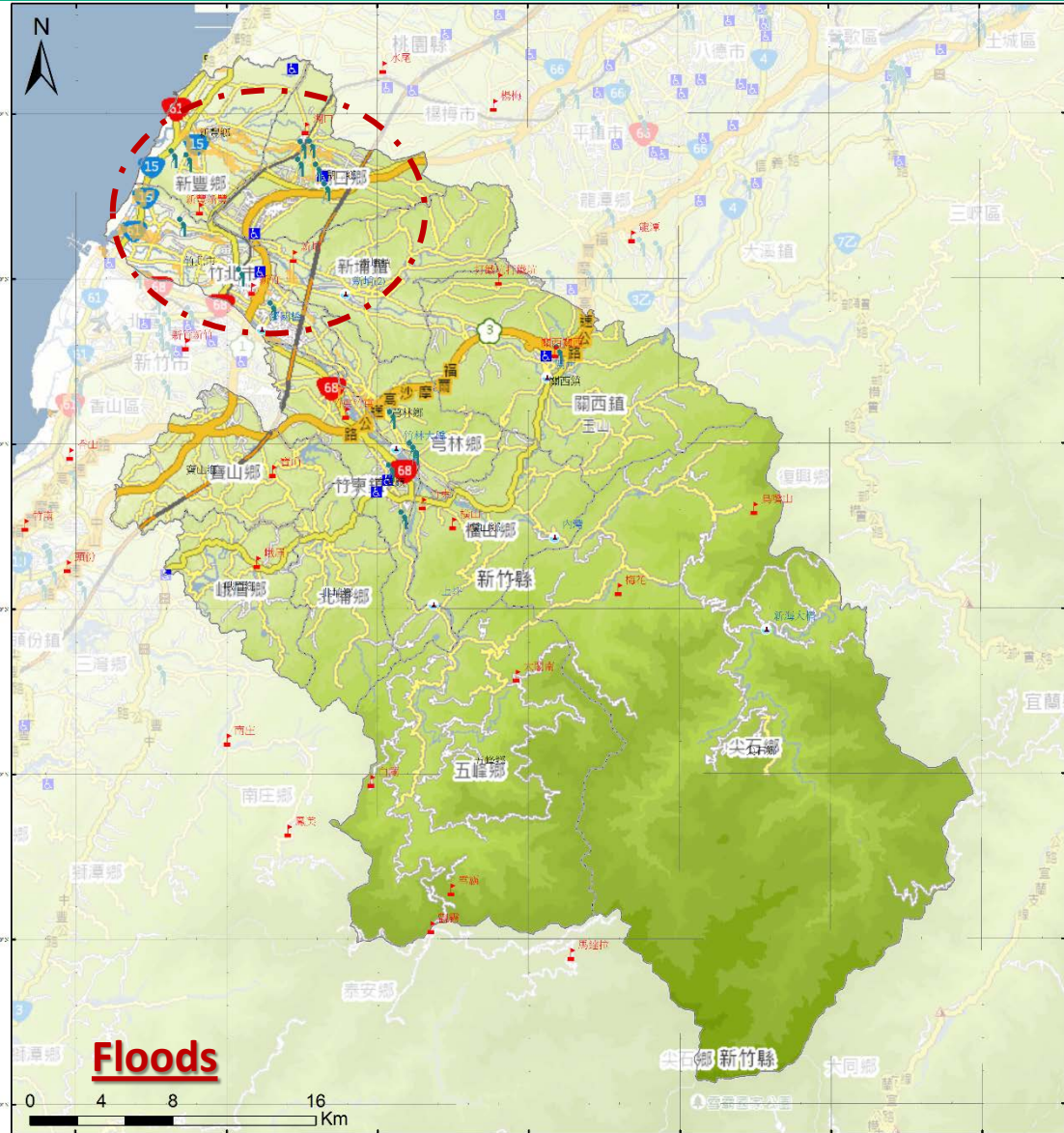
Event	Date	Causalities and damages
Hsinchu-Taichung Earthquake	1937.04.21	<ul style="list-style-type: none"> ● Causalities: 3,276 died and 12,053 injured ● Damages: 17,907 houses totally collapsed and 36,781 partially collapsed
Typhoon Herb	1996.07.25	Floods and storm surges in Zhubei City, Xinpu Township and Xinfeng Township
Typhoon Winnie	1996.08.16	Floods in Zhubei City, Xinfeng Township and Wufeng Township
Typhoon Nari	1996.08.13	<ul style="list-style-type: none"> ● Causalities: 3 died ● Damages: (1) 117 houses totally or partially collapsed; (2) 4,831 households power outage; 4,992 households tap water outage; (3) traffic interruptions affected Wufeng Townshi, Jianshi Township
Debris flow	1999.09.21	16 died and 5 missing in Wufeng Township,
Typhoon Aere	2004.08.24	22 died in Wufeng and Jianshi Township,
Typhoon Haima	2004.09.11	4 died in Jianshi Township



Potential hazard maps of Hsinchu County



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Discussion Meeting of IRDR Flagship Project 20th April 2015 in NCDR



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13:40 1. BRIEFINGS OF CURRENT IMPLEMENTATIONS AND CHALLENGES OF DRR BY TWO LOCAL GOVERNMENTS

- 8.1 New Taipei City [30 min]
- 8.2 Hsinchu County [30 min]
- 8.3 Q and A [20 min]

15:00 2. Tea Break [20 min]

15:20 3. THE MECHANISM TO ASSIST LOCAL GOVERNMENTS IN DEVELOPING DRR CAPACITY IN TAIWAN [40 min]

- 10.1 Information sharing for plans of disaster risk reduction and operations of emergency response
- 10.2 Annual national-wide evaluation on performance of disaster management at local governments.
- 10.3 Joint collaborations with local research institutes to provide technical supports.

16:00 4. DISCUSSION ON PROJECT IMPLEMENTATIONS

- Key topics for pilot study
- Timeline of the pilot study
- Major outputs

• Participants

- Japan: Kuniyoshi Takeuchi, Kenichi Tsukahara
- ICoE Taipei: Tony Liu
- NCDR: Wei-Sen Li
- IRDR IPO: Rudiger Klein
- New Taipei City: Tony Lee (Vice Commissioner of Fire Department)
- Hsinchu County: Jen-kuo Tai (Section Chief of Fire Department)
- START: Hassan Virji



Report and demands by New Taipei City



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- **Focal issues**
 - Seismic risk and safety in densely populated areas
 - A effective approach to evaluate seismic risk with consideration of land use and locality factors
 - Earthquake early warning in schools
 - Appropriate loss estimation system (now there are two systems in operation)
- **Future plan for the next big quake**
 - To integrate real-time monitoring, early warning system and loss estimation system
 - To exchange data and disseminate information through cloud technology
- **Current on-going collaboration with NCDR**
 - NCDR provides common operation picture for emergency operation
 - New Taipei City offers real-time CCTV images to improve situation monitoring
 - Mutual collaboration on scenario-based situations of large-scale quakes

Target to cooperate in New Taipei City- Taishan district



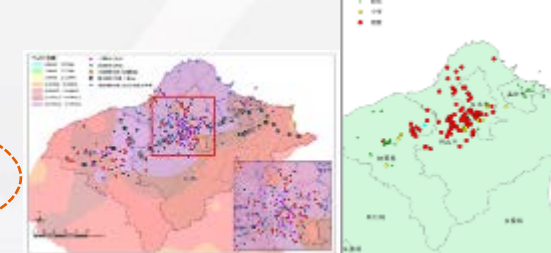
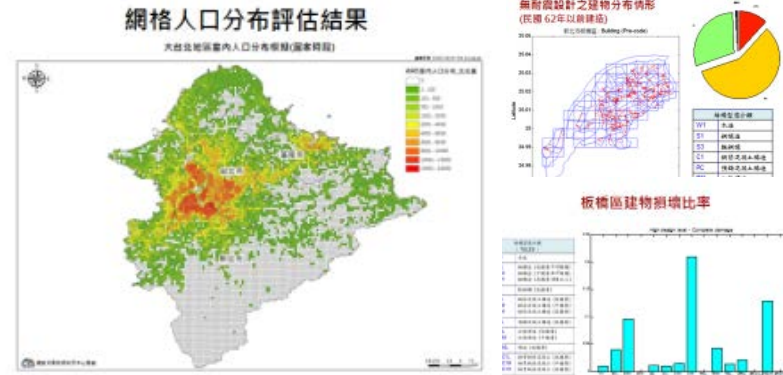
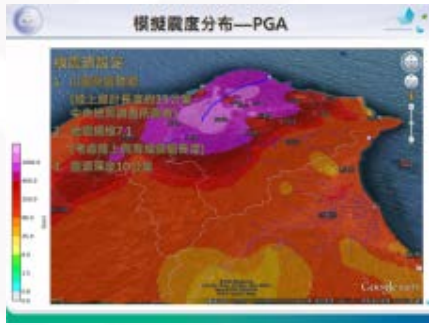
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- To work out a solution to evaluate seismic risk in Taishan district
- Considered factors
 - Mixed land use: residential areas (old existing and newly built apartments) and factories (legal or illegal ones)
- To combine data (big and social) data for analyses
 - Data of business registration (location and type)
 - Data of taxation (details of buildings)
 - Data of dynamic population distribution (cell phone)
 - Numerical models
 -

- Area: 19.1603 Km²
- Household: 27,802
- Population: 78,488人

Scenario-based analysis for urban area by grid method (under implementation with New Taipei City)



Simulated EQ

Casualties cause by collapsed buildings

Transportation

Water supply

Liquefaction

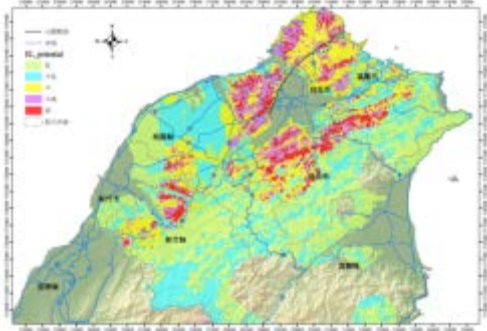
Power supply

Landslides

System failures



Application for Large-scale earthquake

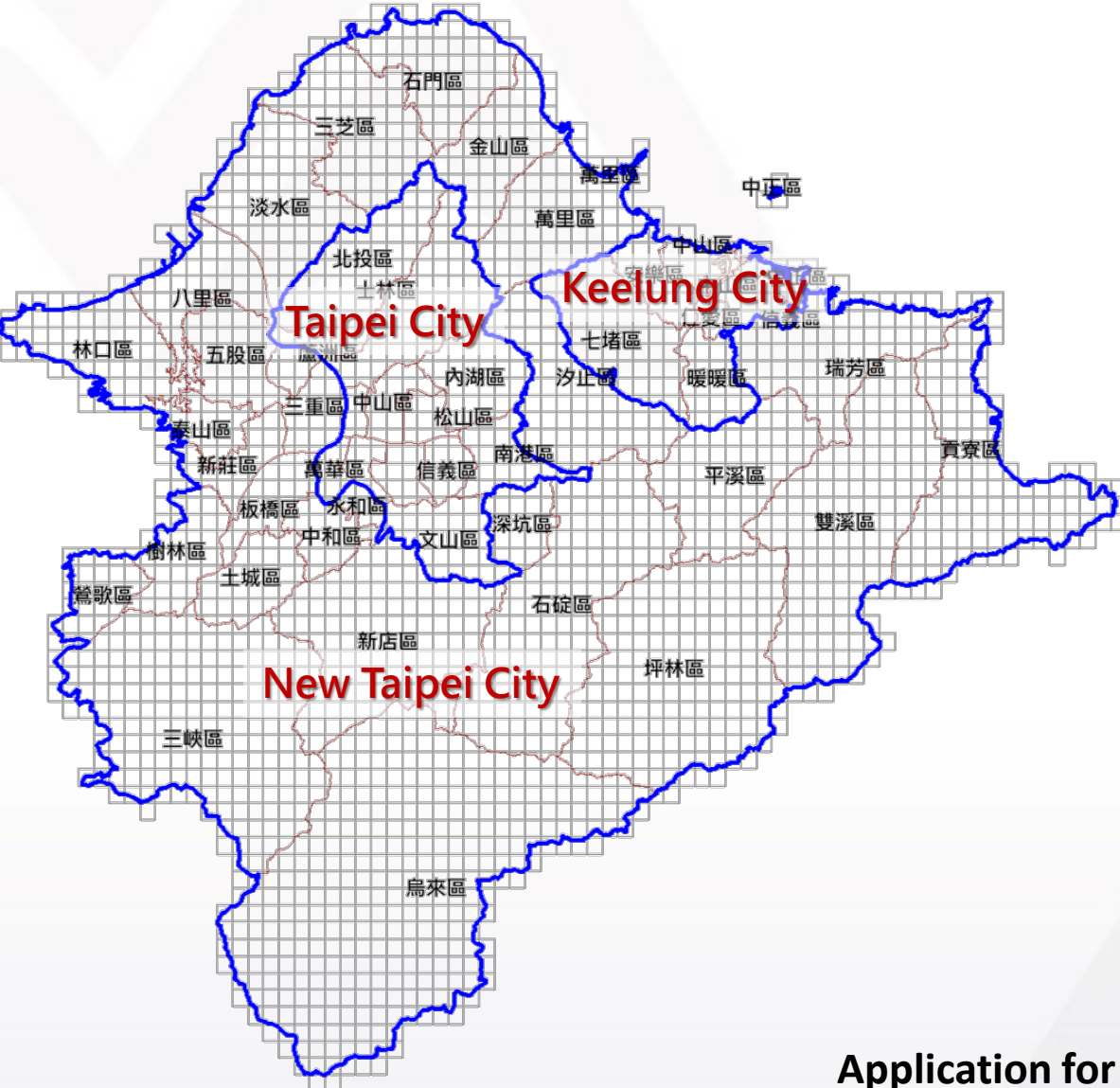


Data mesh and data sampling

Big data produced by the Chunghwa Telecom



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- Coverage: **Taipei City, New Taipei City and Keelung City**

- Grid size: 1.0 km x 1.0 km (2,388 grids in total)

- Population (by August, 2014)

- Taipei City: **2,695,007**

- New Taipei City: **3,959,855**

- Keelung City: **373,721**

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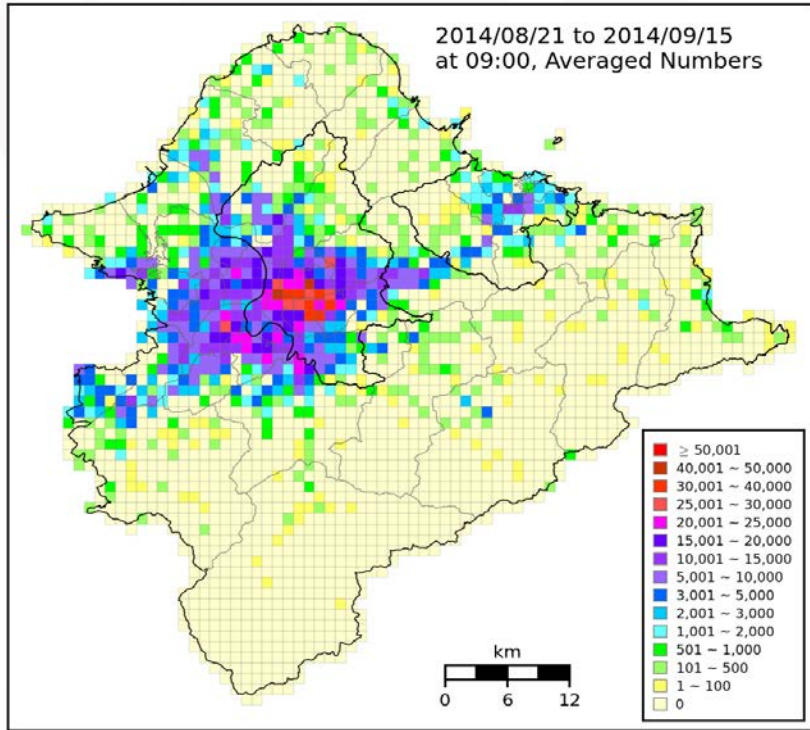
- Data sampling

- 9 am, 3 pm and 9 pm

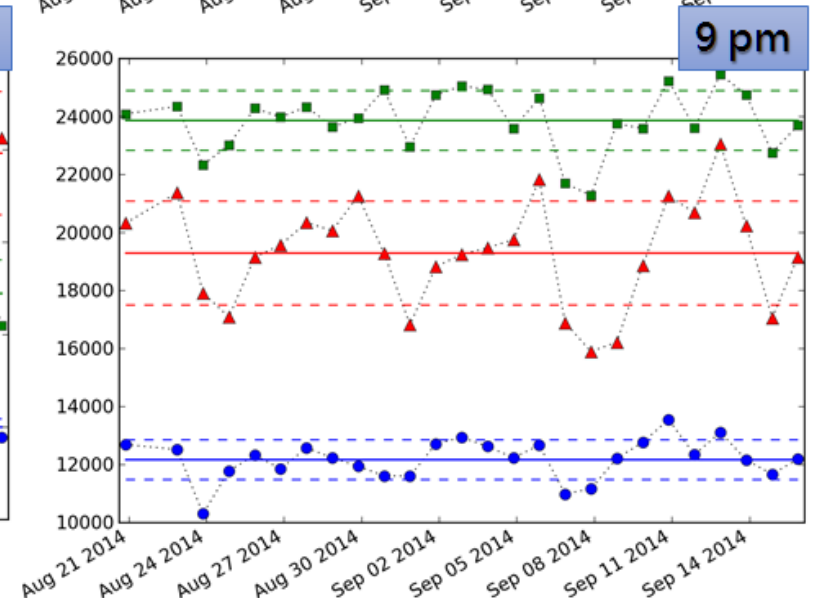
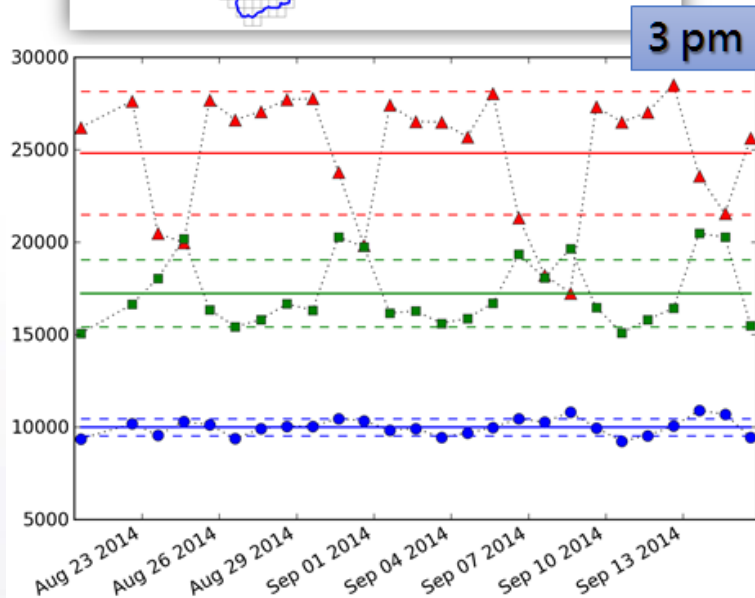
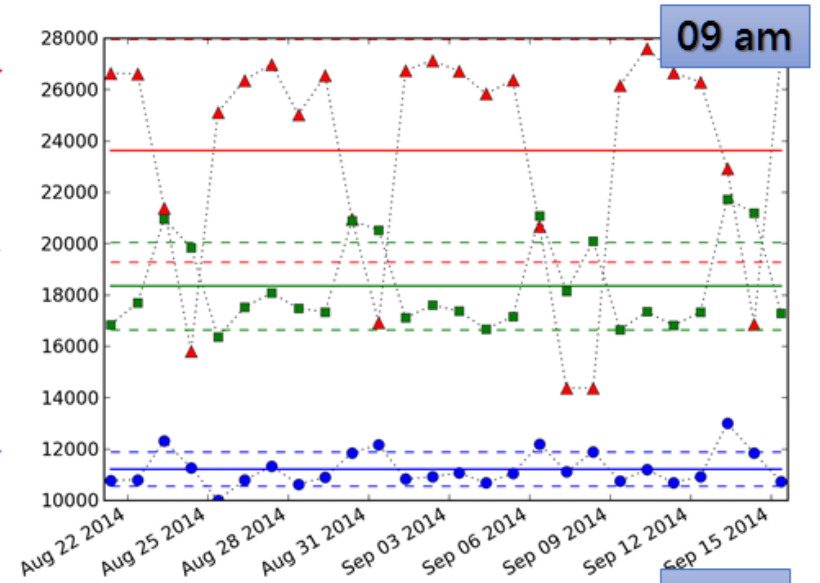
- Not receiving data in real-time mode

Application for Large-scale earthquake

Application: population distribution pattern



Averaged data at 9 am



Collaboration with Hsinchu County



- **Problems found after Typhoon Area in 2004**
 - Access to and dissemination of emergency information at times of disaster
 - Implementation of evacuation and shelter management
 - Distribution and storage of emergency relief materials
 - Public awareness
- **Solutions to the known problems**
 - Improved plan and SOP to conduct evacuation and shelter management
 - Deployment of special taskforce to possibly affected areas in advance
 - Upgraded telecommunication systems – digital radio, cell phone tower, Cell Broadcasting Service
 - Rules for storage of emergency relief goods (remote areas up to 14 days)
 - Assigned spots for air-dropping operation in advance
 - Community-based disaster management
- **Last-mile to cooperate**
 - Public education to further raise awareness

Next Steps (1/2)



- **Project items to carry out**

- Forensic analysis of past major events
- Potential integrated hazard maps of floods and landslides
- Scenario-based simulation of seismic hazards for risk reduction
- Decision making support during times of emergency response
- Education and training to staff of local governments

- **Complete project proposal**

- Study cases proposed by ICoE Taipei and NCDR after One more preparatory meeting with tow local governments
- Study case proposed by Japan
- Set timeline of implementation

Next Steps (2/2)



- **Partnership**

- ICoE Taipei
- NCDR
- National Taiwan University and New Taipei City
- National Central University and Hsinchu County
- Others

- **Funds**

- ICoE Taipei

- **Expected final products**

- Based on integration for into trans-disciplinary approach and implementation
- New Taipei City: 1. seismic risk evaluation; 2. plan for seismic safety management; 3. practice duplications to other districts in New Taipei City
- Hsinchu County: 1. better information for decisions on evacuation; 2. policy of shelter management; 3. education and capacity for practitioners
- Publications: journal papers or book related implementation

Thanks

Welcome your attention