NARLabs 國家實驗研究院
國家地震工程研究中心
NCREE National Center for Research on Earthquake Engineering

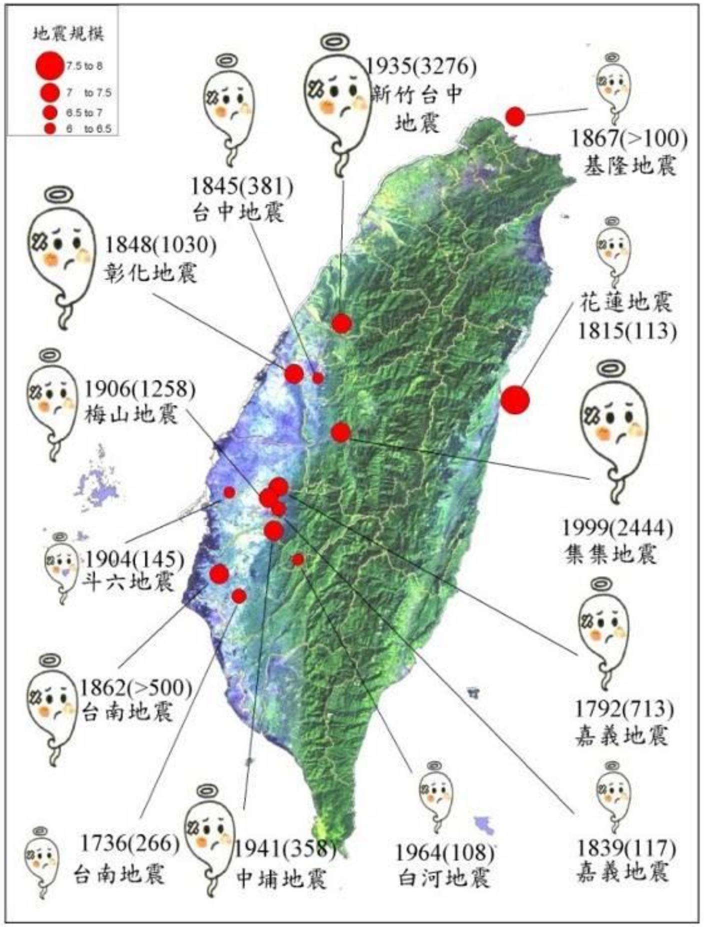
Recent Activities of NCREE on Seismic Disaster Reduction

National Center for Research on Earthquake Engineering
Director Kuo-Chun Chang

20160206 Meinong Earthquake
Collapse of Weikuan Building caused 115 deaths

Earthquake frequency and loss in Taiwan

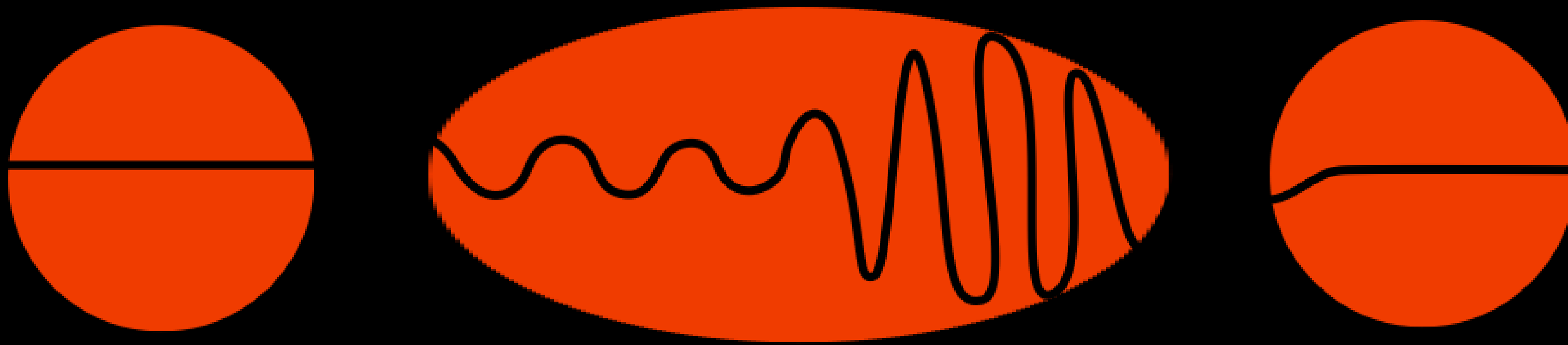
- Based on disaster earthquake in 300 years
  - Every 20 years has a catastrophic earthquake
  - Caused more than 10,700 death
- 1999 Chi-Chi earthquake
  - Caused 2,444 death, 50 missing, 758 seriously injured, 38,935 buildings collapsed, 45,320 buildings nearly collapsed, NTD 4,500 economic loss(GDP 4.86%)



鄭世楠教授提供


When next earthquake comes,
Except pray,
What can we do ?

After 1999 Chi-Chi earthquake, the NCREE cooperates with the MOI, MOE, MOTC, and city governments to promote "Three Steps"



Pre-Earthquake

- Seismic code
- Seismic evaluation and retrofit
- Equipment isolation
- Loss estimation

During Earthquake

- Early warning
- Fast loss evaluation

Post-Earthquake

- Emergency relief
- Structural health monitoring

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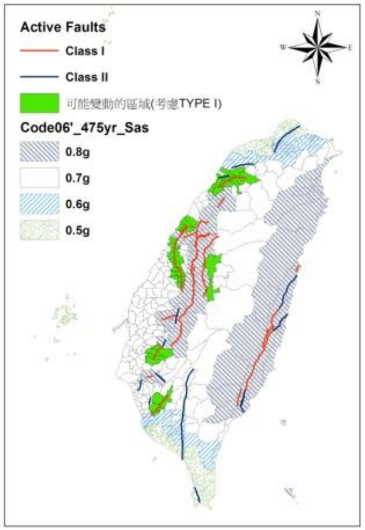
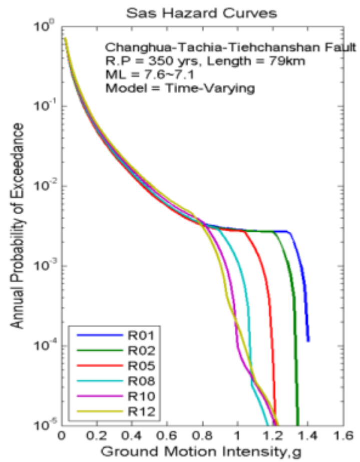
Pre-Earthquake

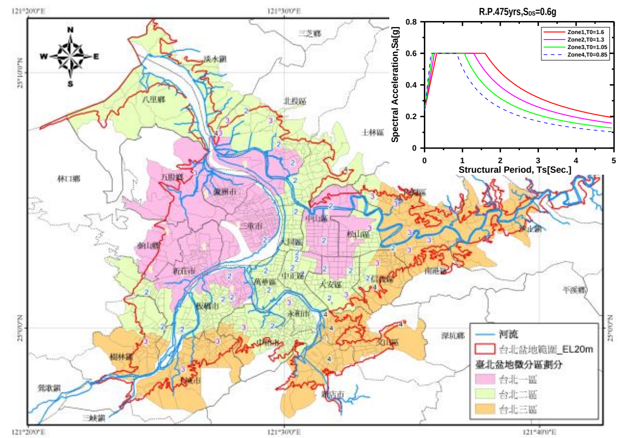
Seismic design codes

Seismic Design Earthquake Estimation and Ground Motion Selection

Seismic Design Earthquake Estimation

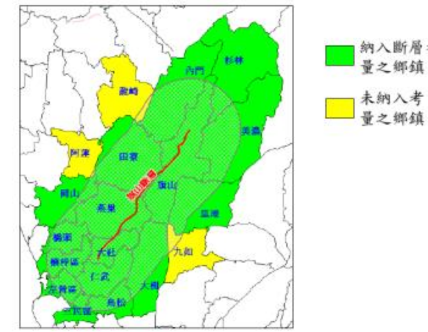






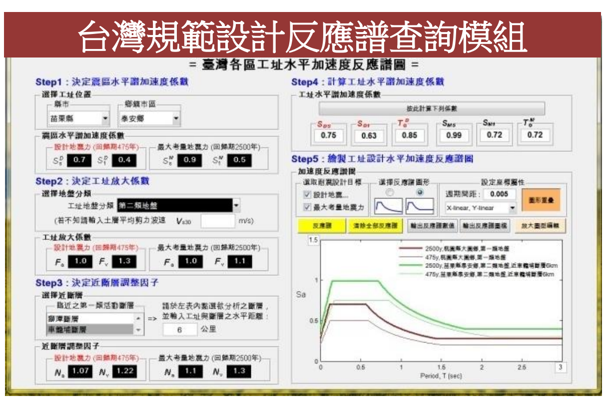
seismic microzonation

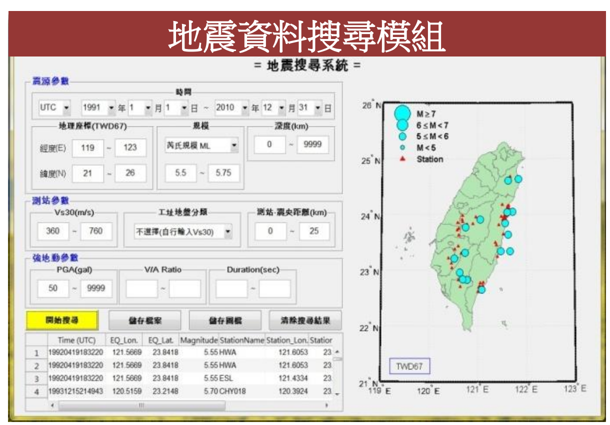
新增斷層：旗山斷層

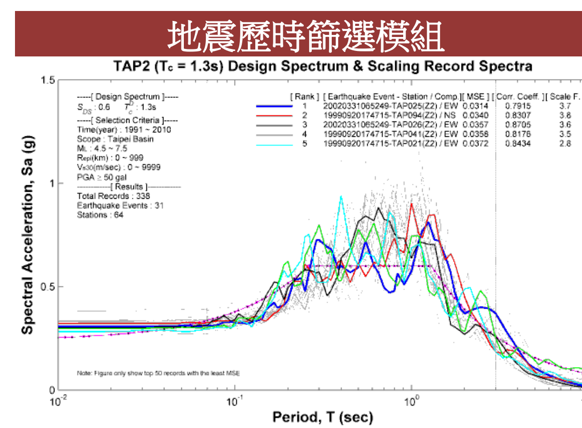


Near-Fault Effect for Seismic Code of Building and Bridge

Ground Motion Selection for Engineering Applications







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Pre-Earthquake

Seismic Evaluation and Retrofit of Buildings

Seismic Evaluation and Retrofit of School Buildings

- Development of the associated technologies.
- Establishment of a task force to conduct the project supervised by the ministry of education.
- Ensured the life safety of 1.47 million students and faculties of 86% of the high schools and elementary schools all over Taiwan.

An in-situ test of school building in Taoyuan

A full-scale test of school frame in lab

An in-situ test of school building in Yunlin

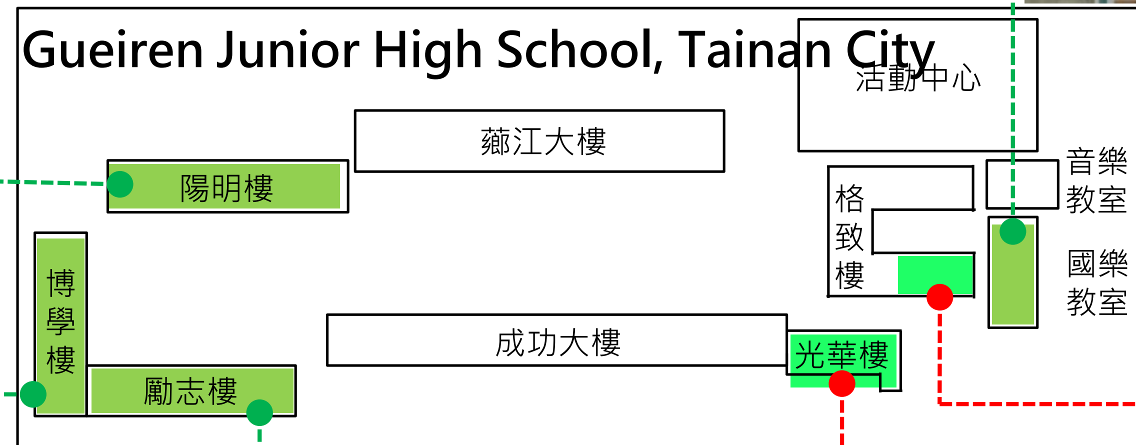
Seismic Damages of School Buildings in Tainan City under Meinong Earthquake Strike

- None of the 58 retrofitted school buildings was damaged.
- Only one of the 151 school buildings without need of retrofit was damaged (0.7%).
- 18 of the 85 school buildings waiting for seismic retrofit were damaged (21%).

Validation of the Effectiveness of Seismic Retrofit

Retrofitted in 2011
(wing walls)

Retrofitted in 2011
(wing walls)
No damage



Waiting for seismic retrofit
damages along the expansion joint

Retrofitted in 2014
(enlarged columns)

Retrofitted in 2011
(enlarged columns and wing walls)

Waiting for seismic retrofit
Shear failure of a first-story column

No damage

No damage


about 1.2 km between
the two schools
Yujing Junior High School
(no need of seismic retrofit,
structural damage but no
collapse)
PGA = 400 gal
(seismic intensity = 7)
Yujing Elementary
School
(retrofitted , no damage)
PGA = 445 gal (N-S)
(seismic intensity = 7)
about 22.7 km from
the epicenter
Epicenter of Meinong
Earthquake

400 gal PGA at Yujing Junior High School was larger than the design PGA (i.e., 280 gal).

The seismic performances of retrofitted school buildings are expected to be no damage in frequent earthquakes, repairable in moderate earthquakes, and no collapse in rare earthquakes.

The shear cracks occurred in the first-story columns are acceptable according to the expected seismic performances.

District Hall of Gueiren, Tainan City

Retrofitted before Meinong earthquake —
No damage and normal in operation

Before retrofitted (Google Map)

Retrofitted by adding shear walls

District Hall of Nanhua, Tainan City

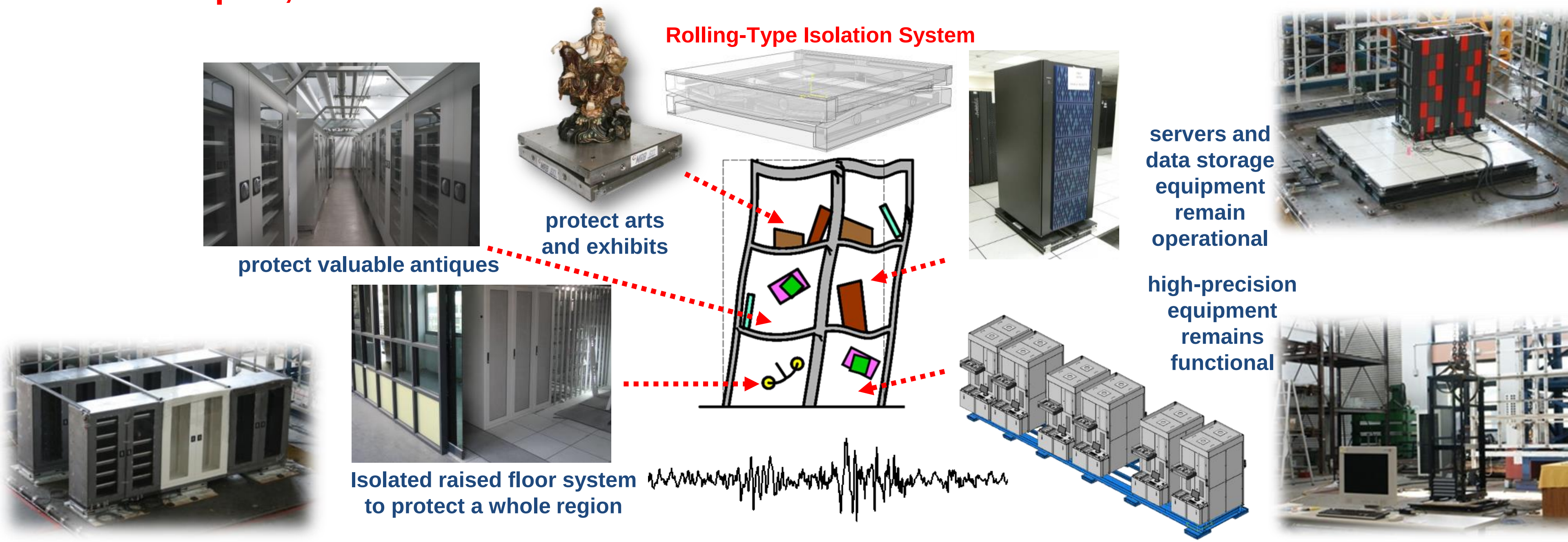
Without seismic retrofit before Meinong earthquake — became a dangerous building

Pre-Earthquake

Equipment, taking High-tech Factory for Instance

Multi-Function Rolling-Type Isolation System

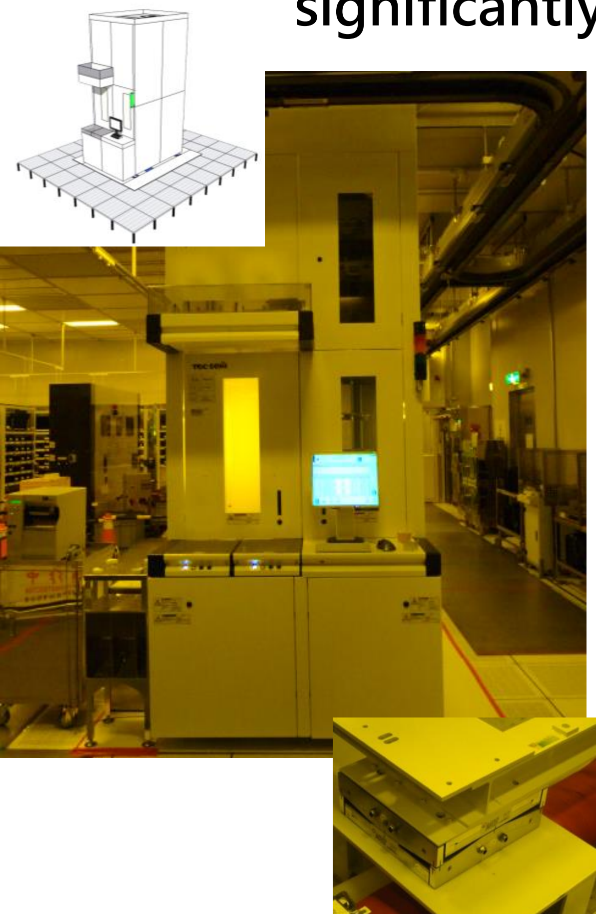
- Developed by NCREE and receive several invention patents
- Reduced and constant acceleration responses, excellent energy dissipation and self-centering capabilities
- Effective seismic protection for high-precision equipment in high-tech factories, telecommunication industries, banks and hospitals, and valuable antiques, arts and exhibits in museums

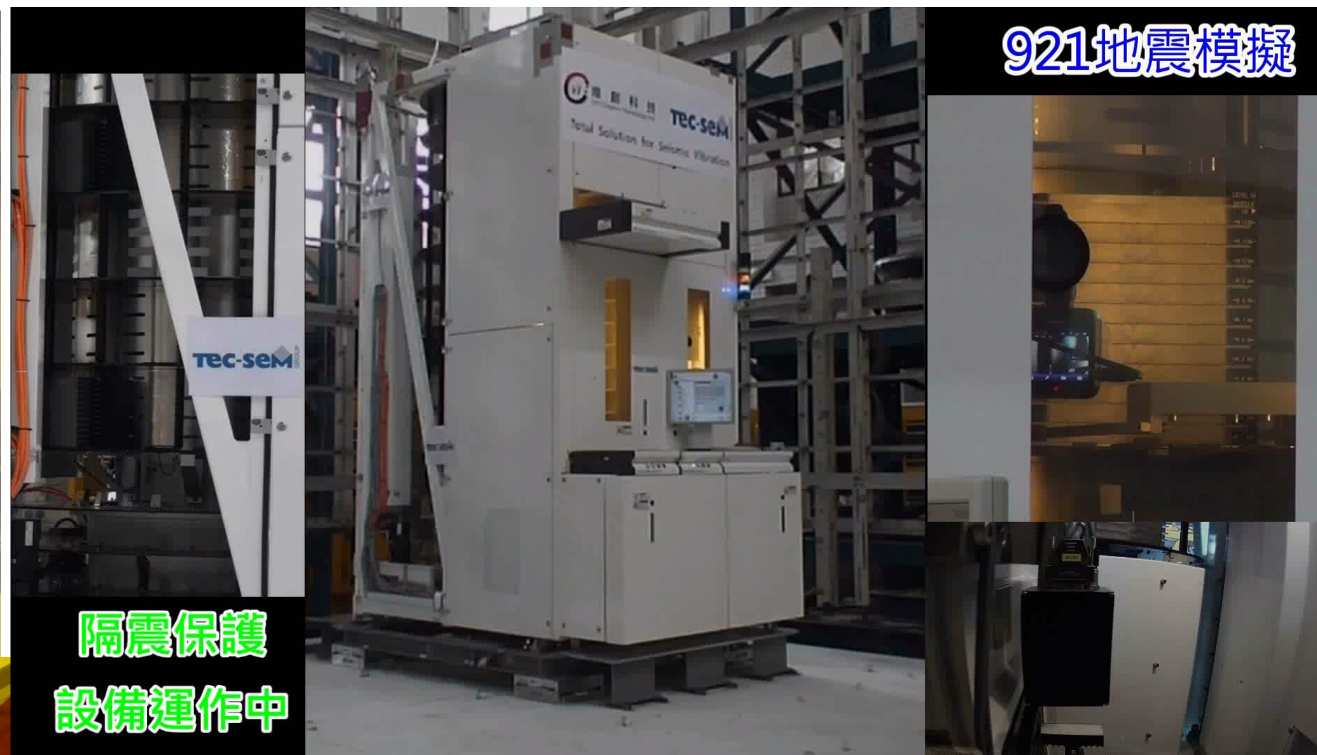


Practical applications: (1) Institute of History and Philology, Academia Sinica; (2) Branch of National Disasters Prevention and Protection Commission (NDPPC); (3) Central Weather Bureau (CWB); and (4) National Center for High-performance Computing (NCHC)

Performance in the 0206 Meinong Earthquake

- During this quake, the adoption of rolling-type isolation technology protects reticle stockers in a well-known high-tech factory from malfunction or even damage, thus significantly reducing production losses and downtime cost.





Shaking Table Test Video of Rolling-Type Isolation System

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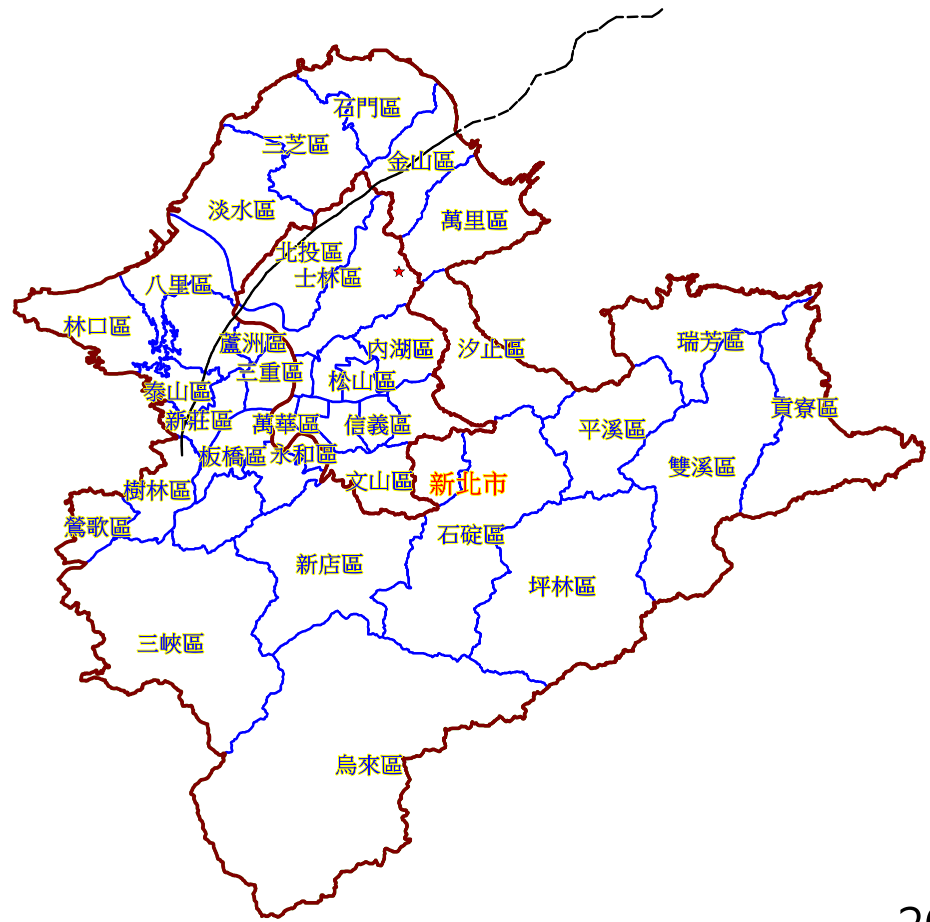
Pre-Earthquake

Scenario Simulation and Risk Assessment

Estimation of Losses and Resource Needs

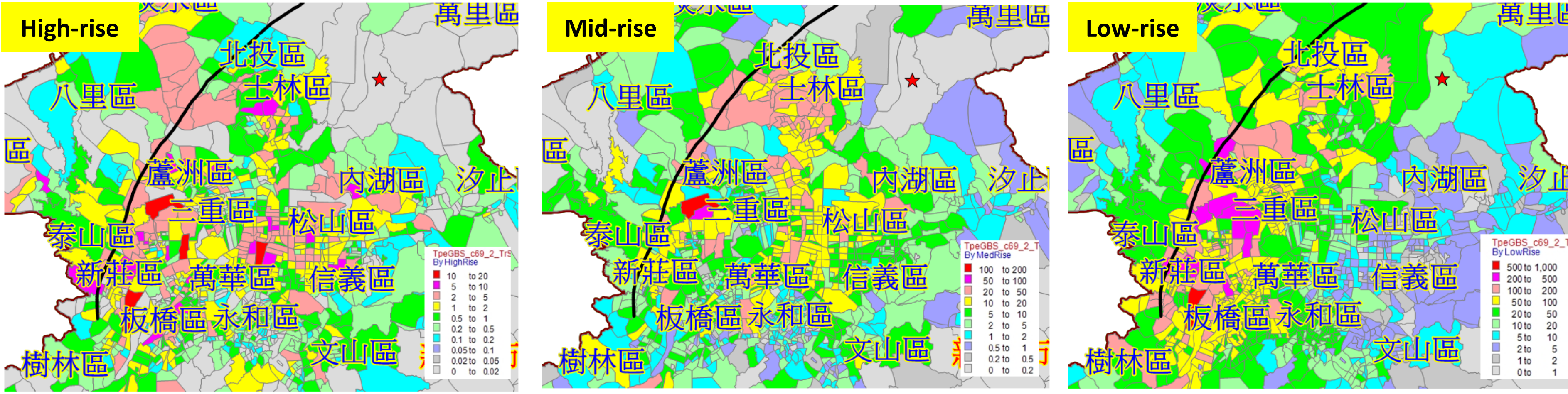
- Estimation of losses and resource needs under various scenarios can provide data to be used in disaster planning and drills

- Source settings of an extreme large earthquake in Metropolitan Taipei
  - Shanchiao fault rupture
  - M6.9, focal depth 8 km, epicenter in Shihlin district (121.589E, 25.139N)
  - Rupture length 56 km, width 20 km, dip 50°



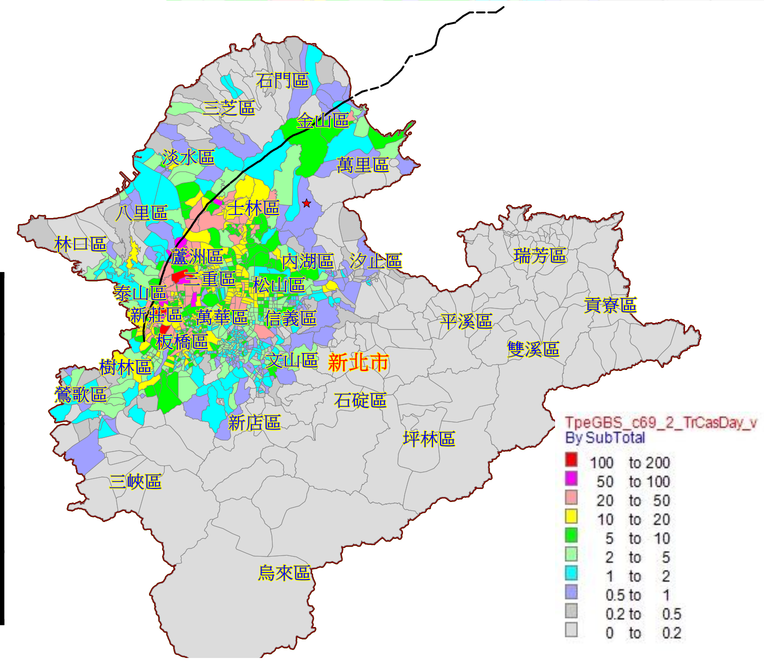
Estimates of Building Damages

County	Number of building collapse			
	Low-rise	Mid-rise	High-rise	Subtotal
New Taipei	38,165	3,461	682	42,307
Taipei	7,491	4,615	539	12,645
Total	45,656	8,076	1,221	54,952

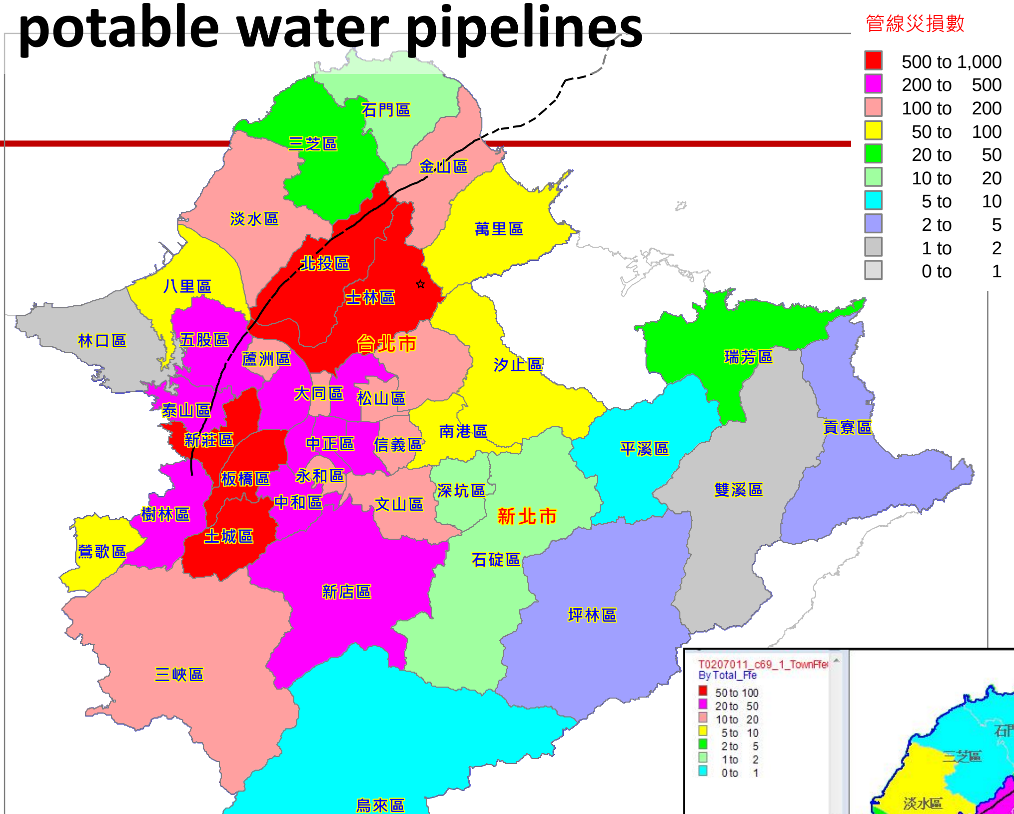


Estimates of Casualties (day-time)

County	Number of casualties				
	Minor injuries	Moderate injuries	Serious injuries	Death tolls	Subtotal
New Taipei	11,067	4,668	2,935	2,134	5,069
Taipei	7,220	2,800	1,723	1,245	2,968
Total	18,287	7,468	4,658	3,379	8,037



Damage estimates of potable water pipelines



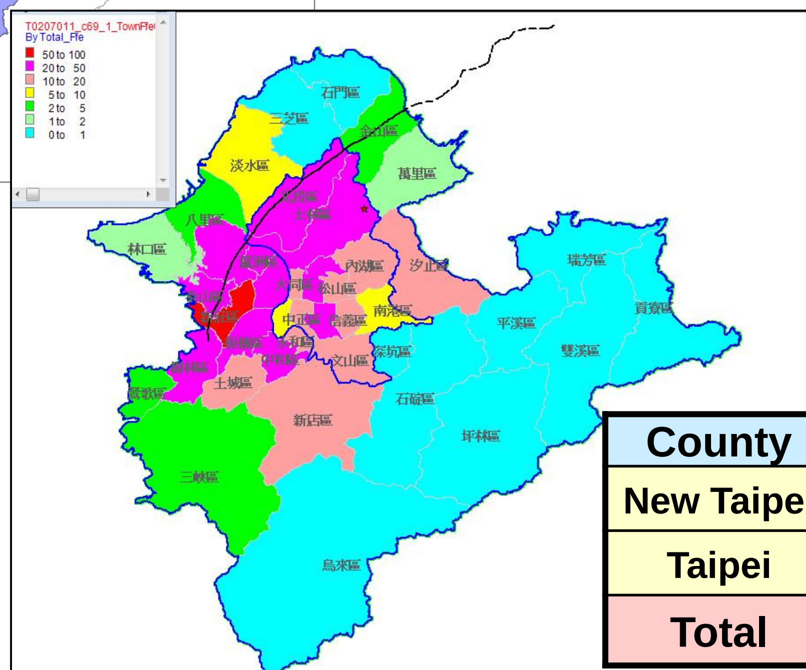
No. of breaks and leaks

Transmission pipeline: 185

Distribution pipeline: 5,826

Other pipeline: thousands

Number estimates of post-quake fires



County	Number of ignitions
New Taipei	368
Taipei	203
Total	571

Estimates of Rescue and Medical Resource Needs

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county	Day Time						
	Entrap People	Rescue Teams (12 H, teams)	Rescue Teams (24 H, teams)	Hospital beds	Corpse bags	Ambulance	Helicopter
New Taipei	340	170	85	7,817	2,721	902	507
Taipei	200	100	50	4,647	1,590	481	297
Total	540	270	135	12,464	4,311	1,383	804

county	Night Time						
	Entrap People	Rescue Teams (12 H, teams)	Rescue Teams (24 H, teams)	Hospital beds	Corpse bags	Ambulance	Helicopter
New Taipei	388	194	97	8,923	3,111	1,003	579
Taipei	205	103	51	4,760	1,642	489	306
Total	593	297	148	13,683	4,753	1492	885

county	Commute Time						
	Entrap People	Rescue Teams (12 H, teams)	Rescue Teams (24 H, teams)	Hospital beds	Corpse bags	Ambulance	Helicopter
New Taipei	342	171	86	7,866	2,741	890	510
Taipei	188	94	47	4,386	1,502	451	280
Total	530	265	133	12,234	4,243	1341	790

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During Earthquake

Earthquake Early Warning System

Earthquake early warning and drills - Schools

First-floor students had evacuated to open space

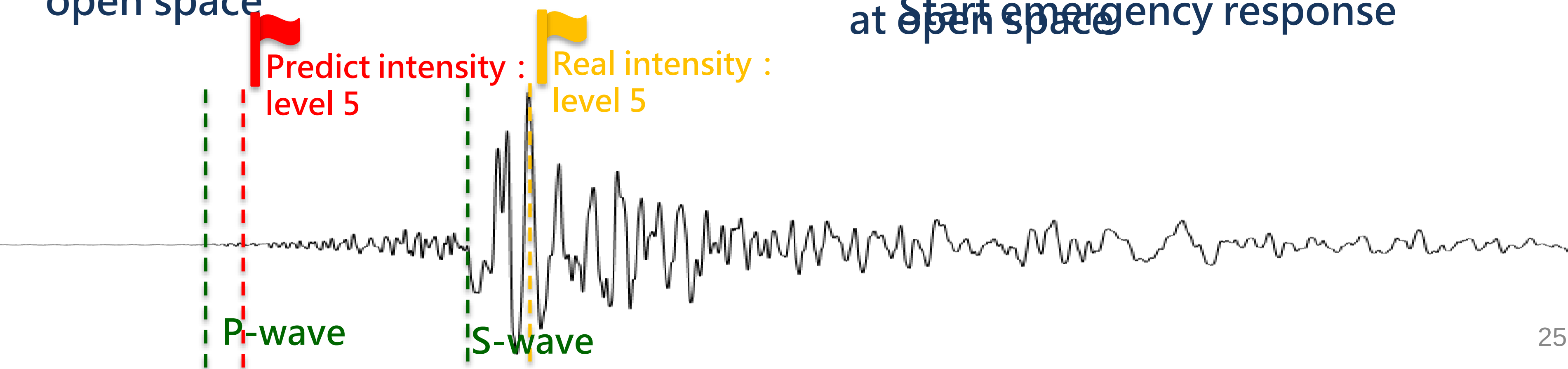
After earthquake, evacuate to open space

Cover head and evacuate to open space

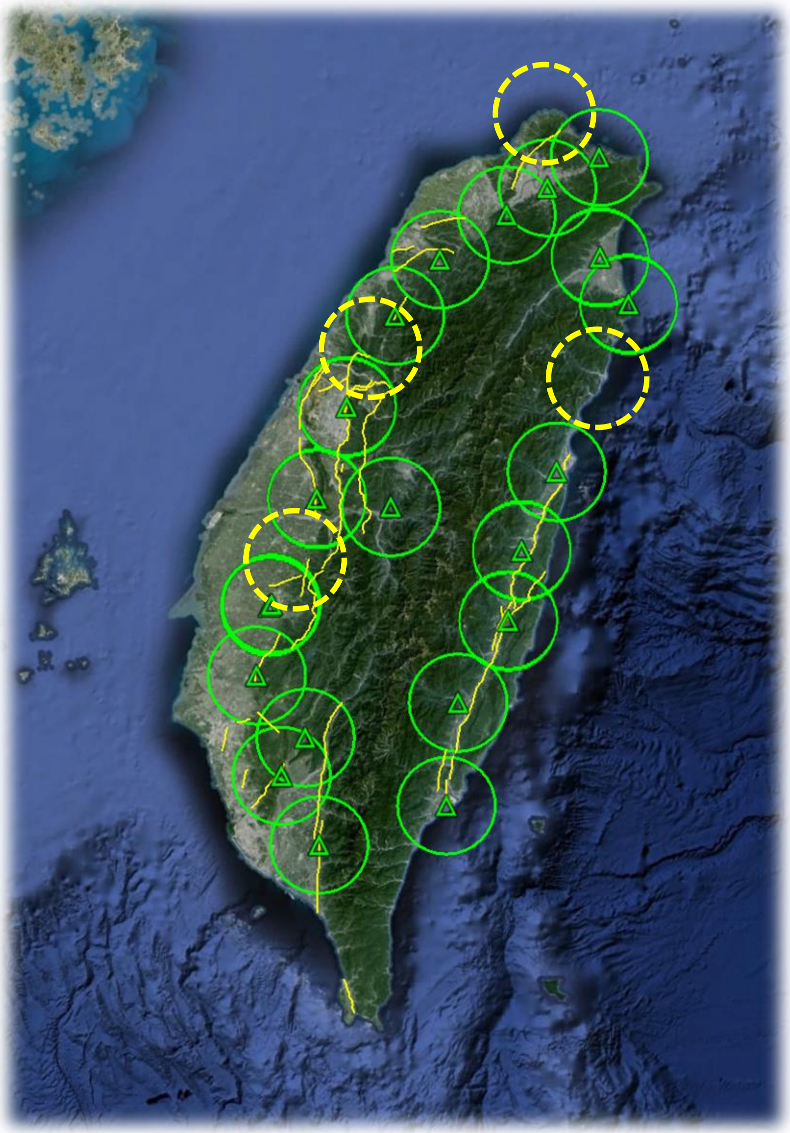
Report number of people at open space

Drop, cover and hold on

Start emergency response



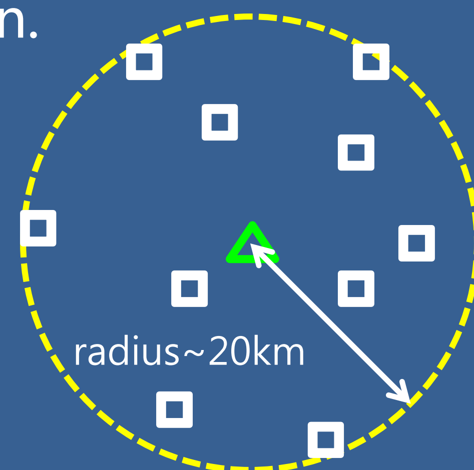
Plan of Installation of EEWS



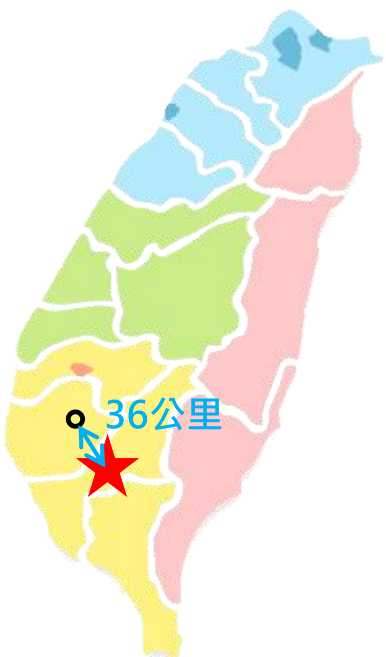
Main-station：25 (21 done)

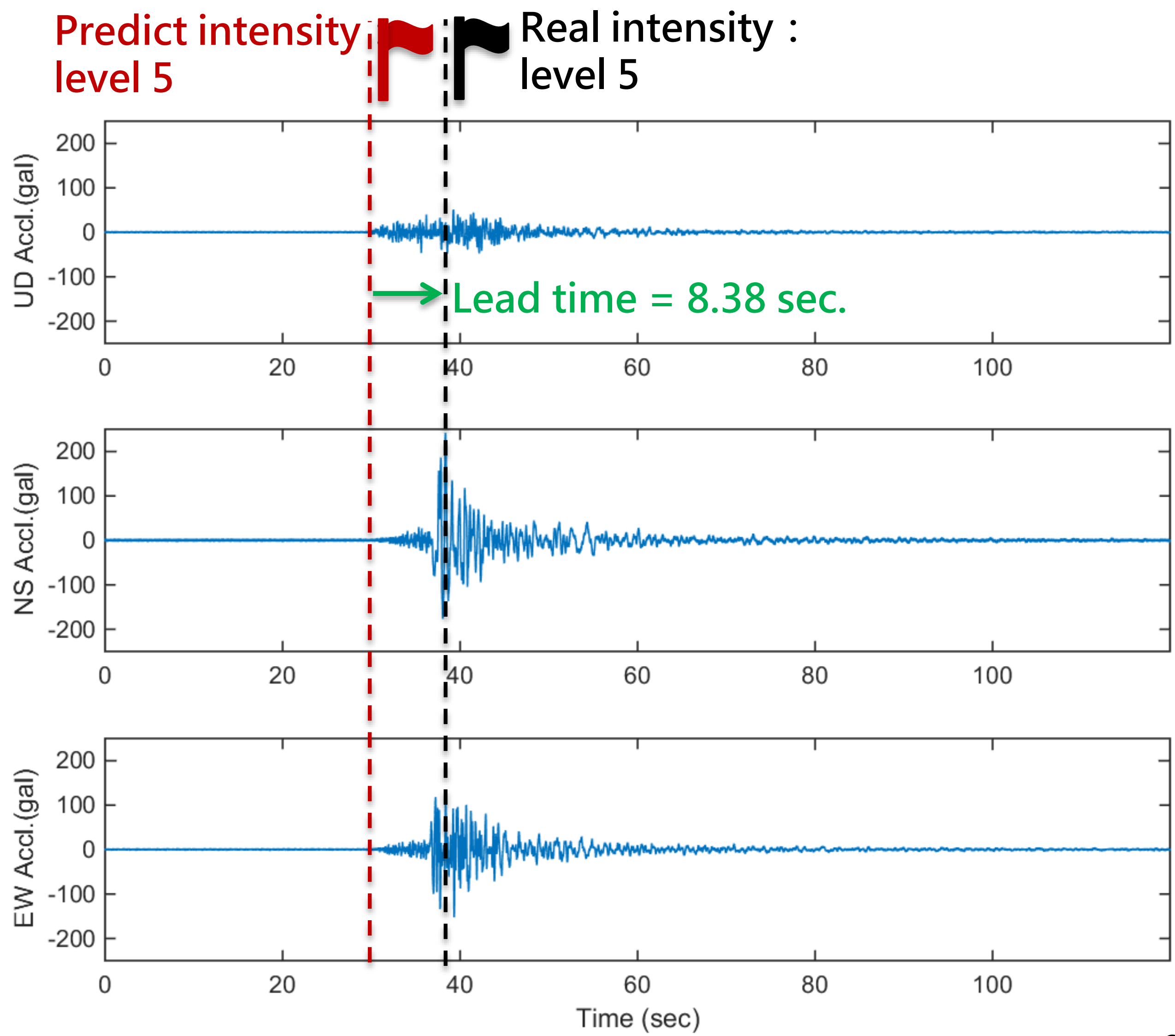
Sub-station：3419 (215 done)

Main-station with high accuracy EEWS pass the warning information to Sub-stations within the service region.

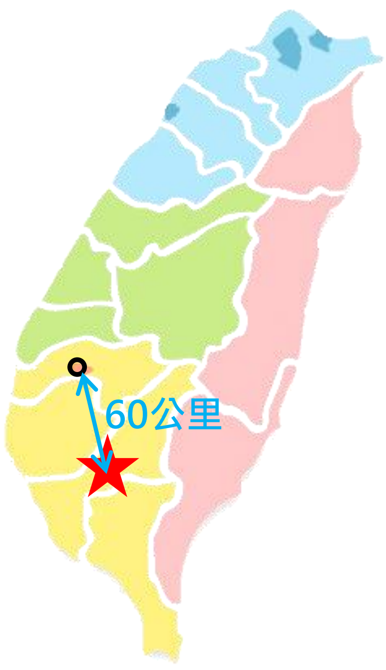


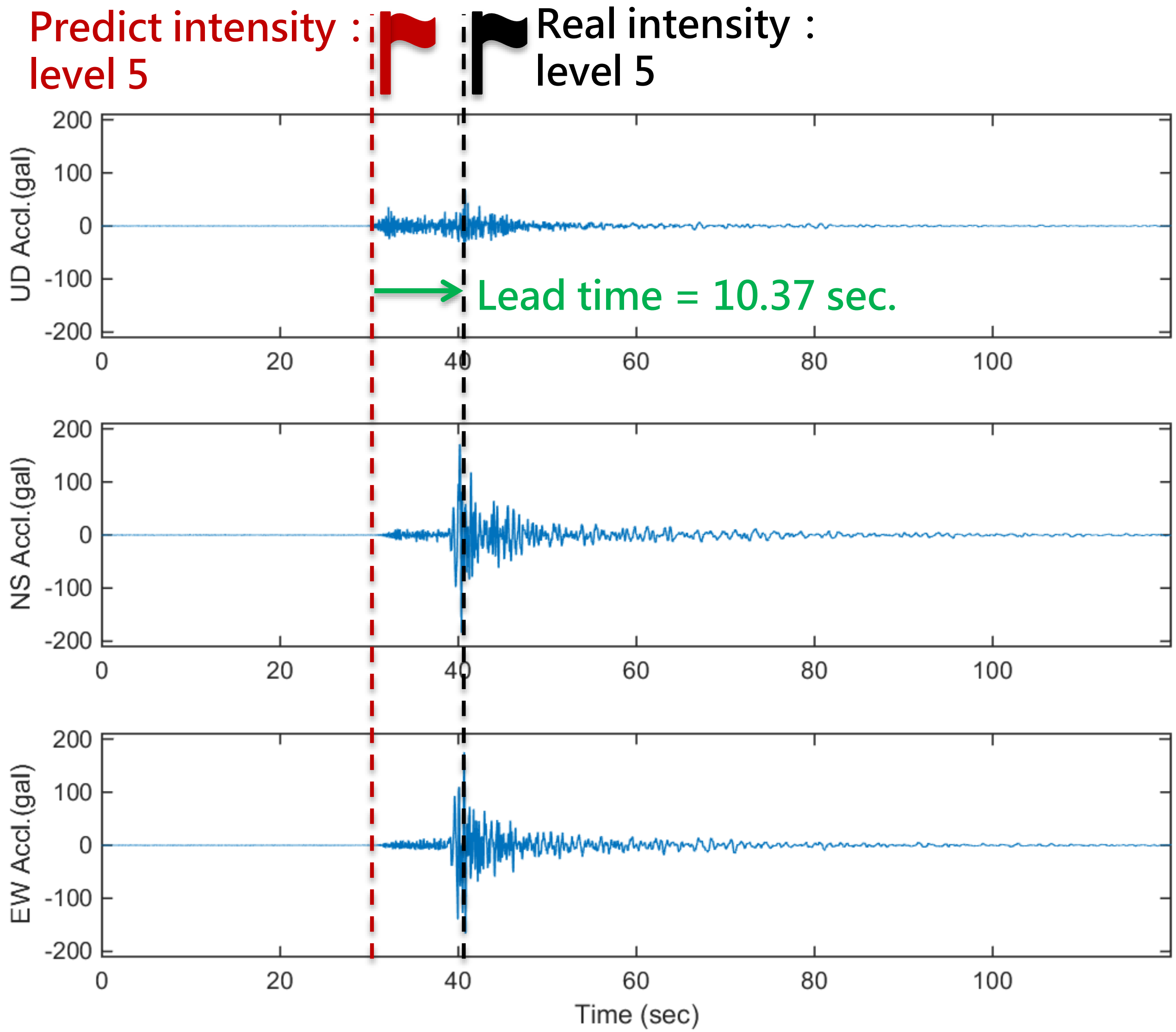
Records at the Chia-Nan elementary school in Tainan



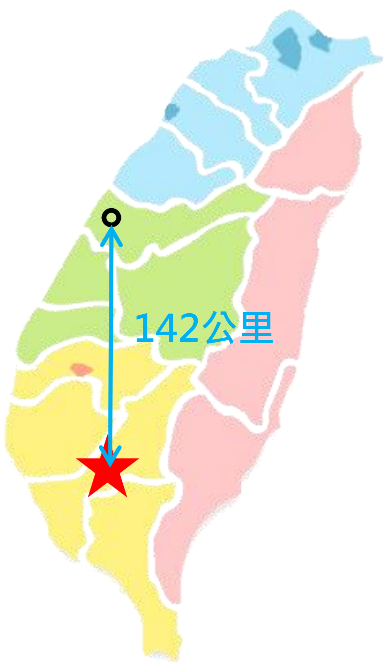


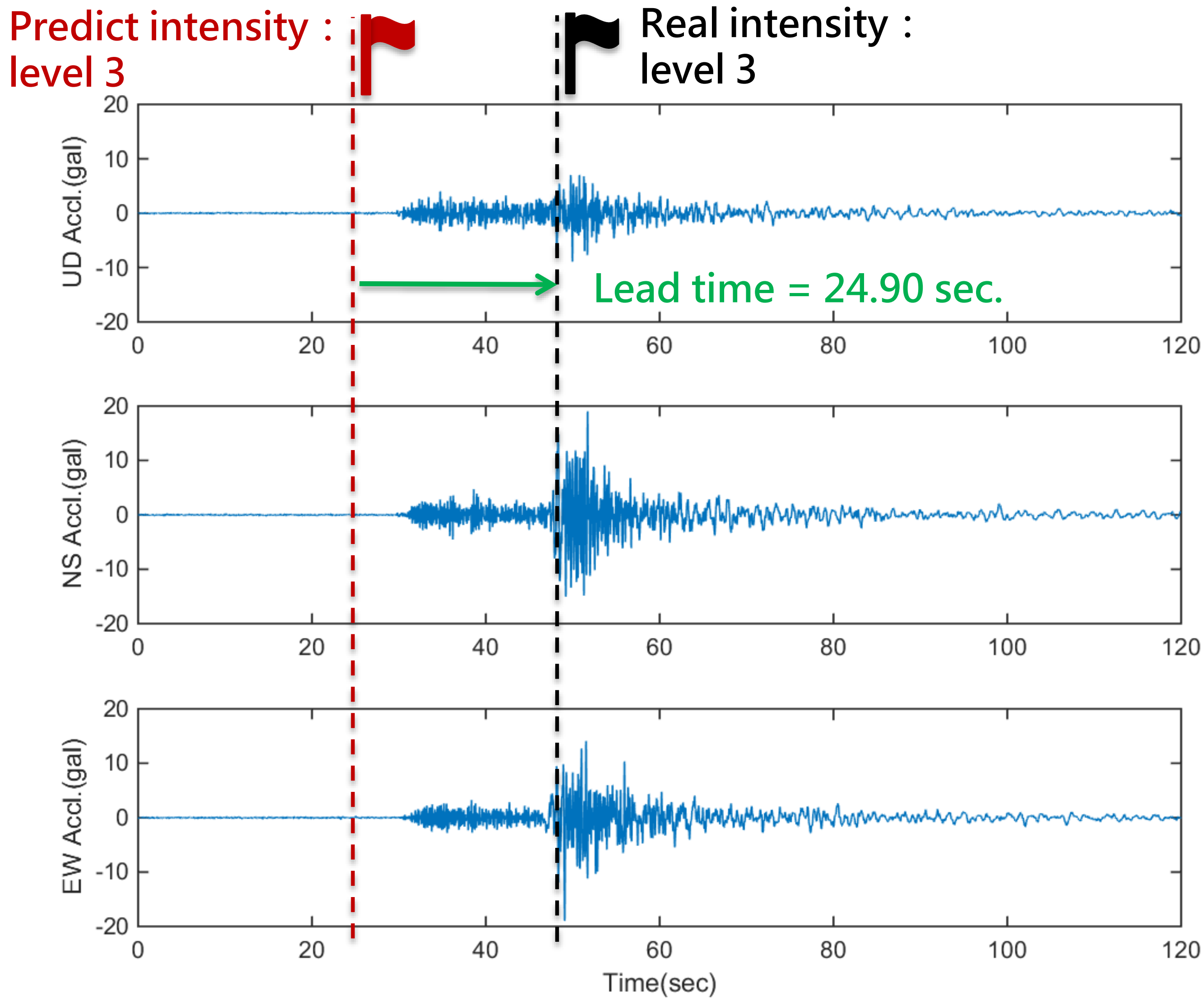
Records at the Yu-Ren elementary school in Chiayi



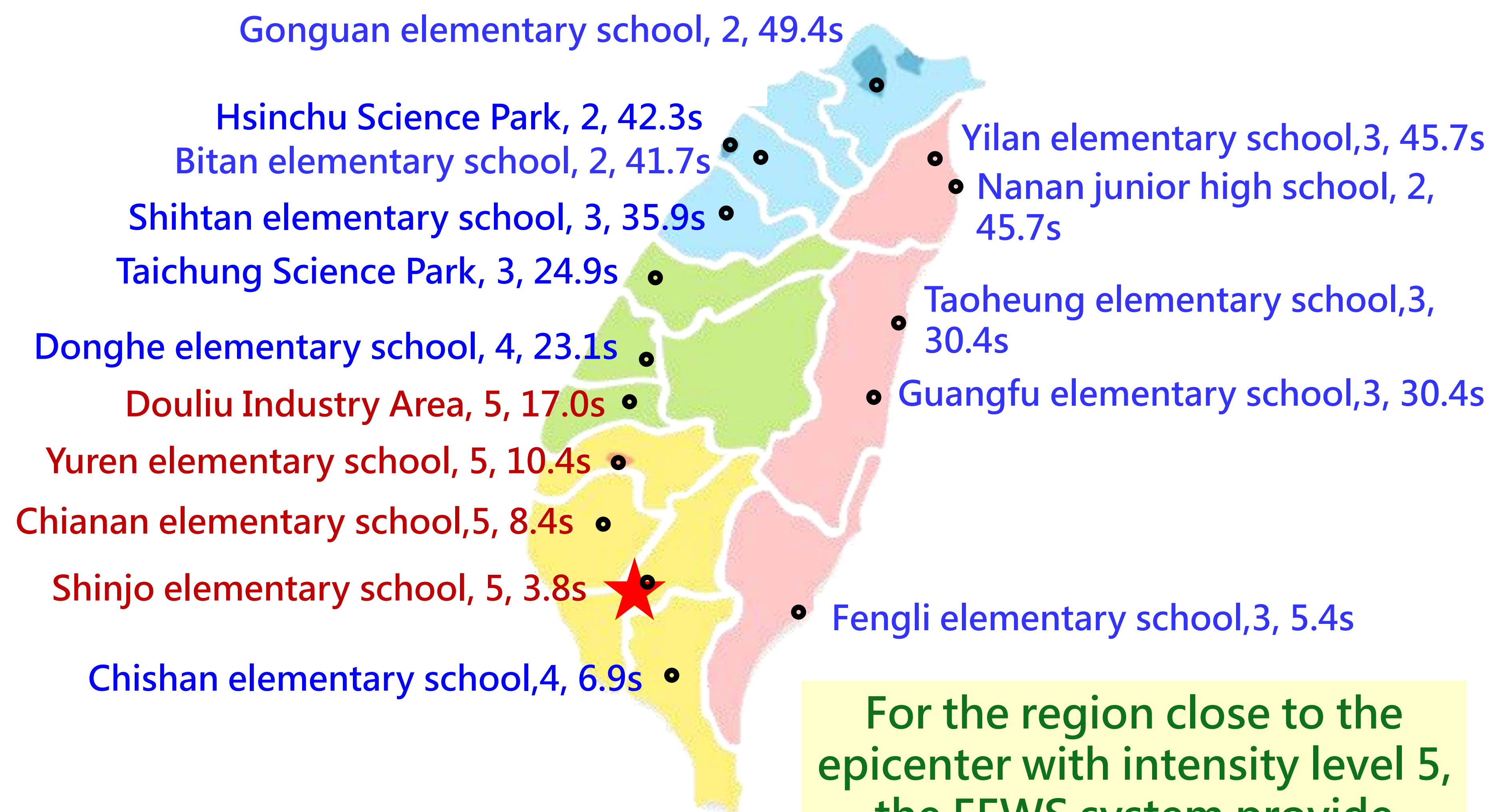


Records at the Taichung Science Park



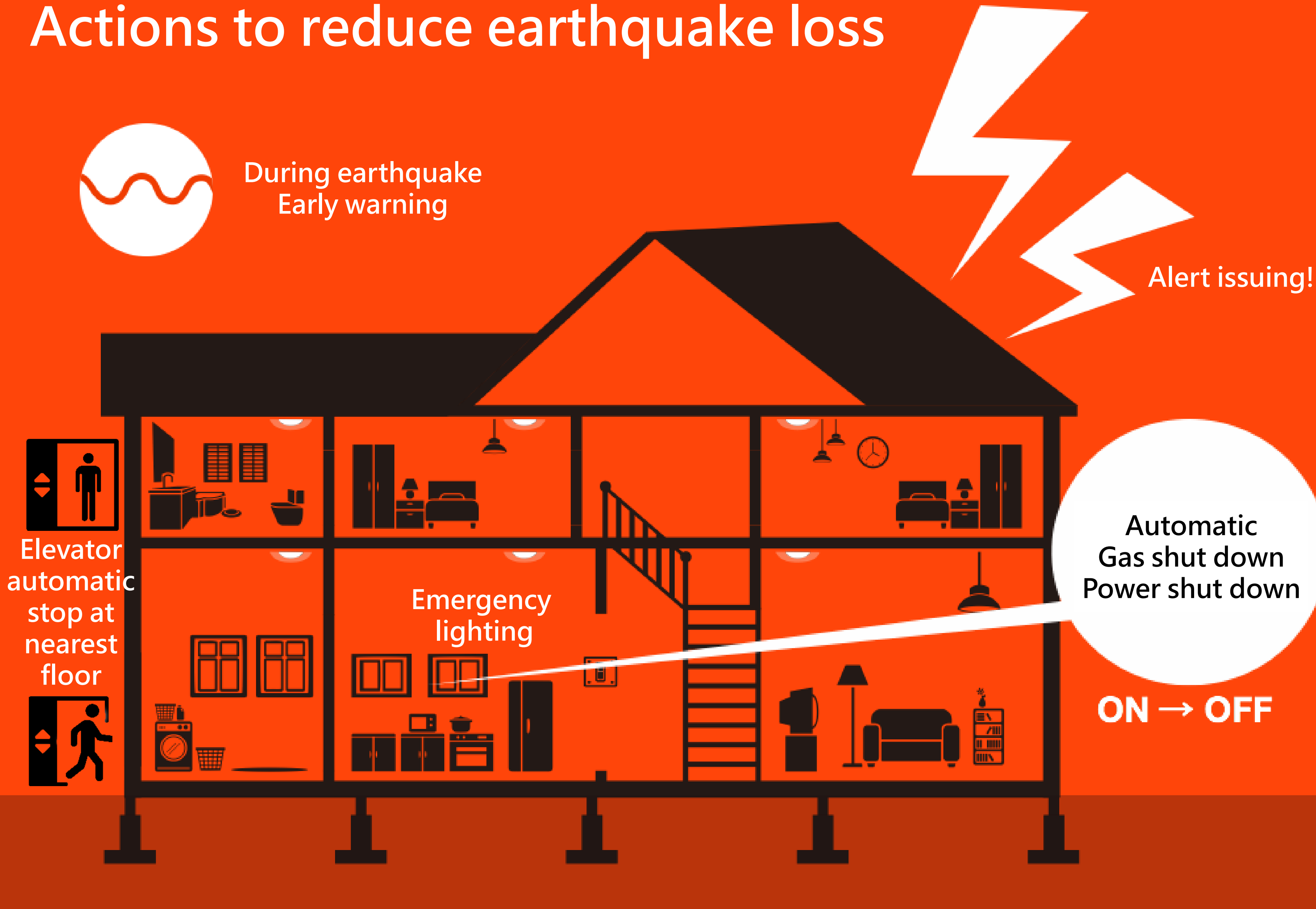


Provide lead-time in the region with high intensity



For the region close to the epicenter with intensity level 5, the EEWS system provide 4-17 seconds of lead-time

Actions to reduce earthquake loss



During-Earthquake

Early Seismic Loss Estimation

Necessity of Early Seismic Loss Estimates

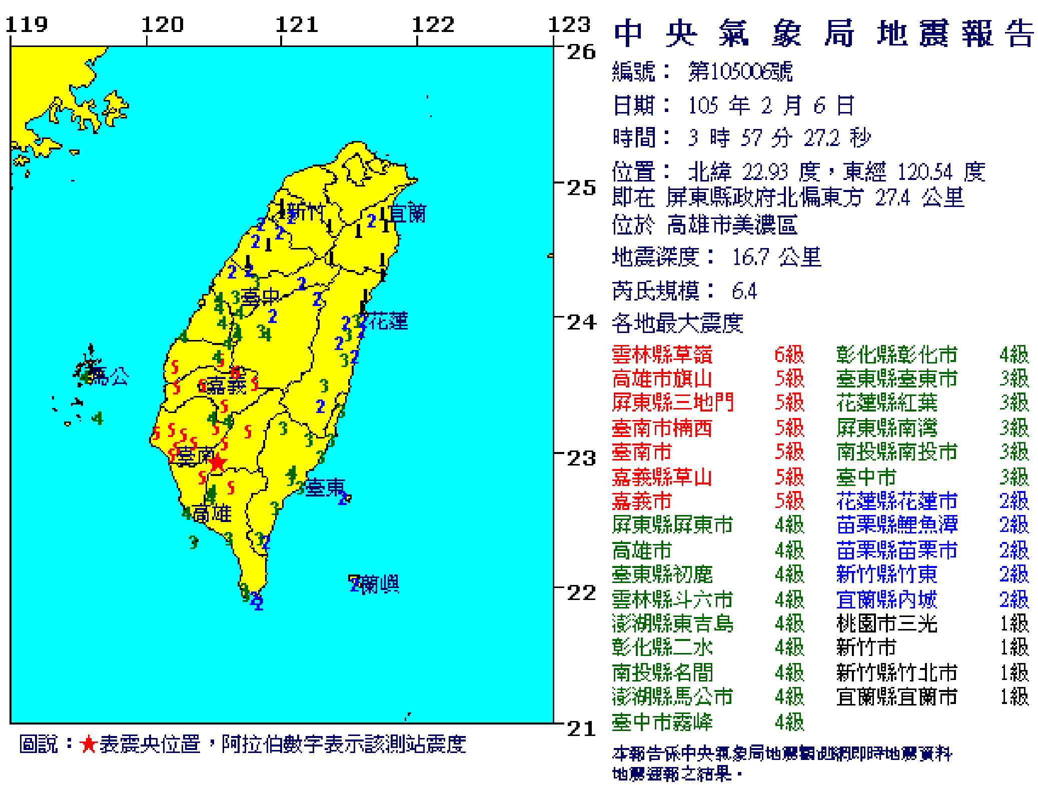
- Right after earthquakes, emergency response personnel of governments and enterprises need information to assess severity due to the earthquakes
- Once emergency operation centers initiated, it is required to assess probable distribution of disasters ASAP in order to dispatch rescue resources
- ESLE can be auto-triggered by email from CWB, complete estimation and send messages to response personnel within 2 minutes

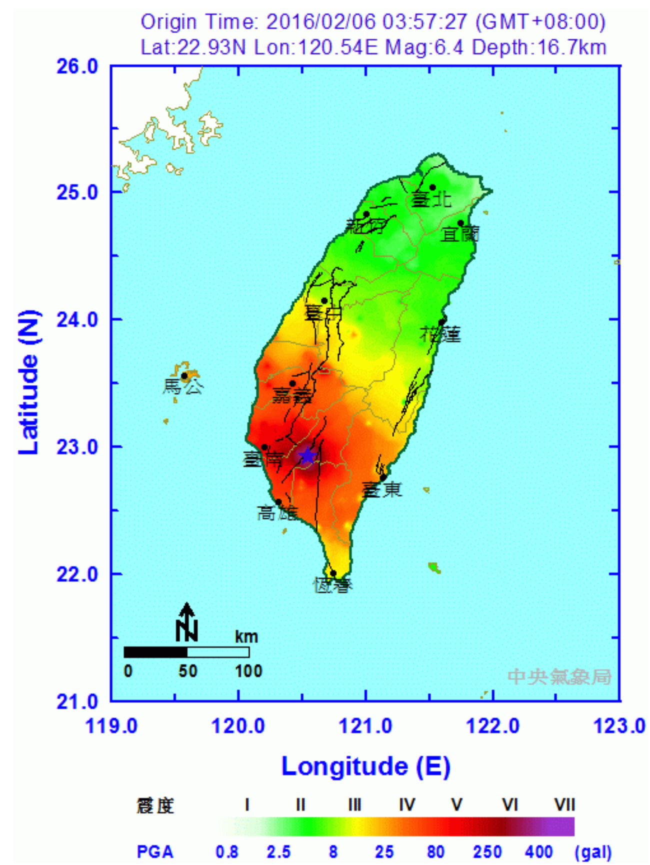
Benefits of ESLE in Emergency Response

Stage 1 (within 2 minutes)	Stage 2 (within 6 hours)
– Can be auto-triggered by email from CWB – Complete estimation of probable disasters and send messages to emergency response personnel – Save time to judge necessity of emergency response centers	– Integrate available information, such as monitoring data, fault plane solutions, aftershock distribution, etc, to propose reasonable seismic source parameters – Avoid existence of neglected disaster regions through rigorous scenario simulation – Provide estimation results and assist in dispatching rescue, medical and livelihood resources

Case Study of Meinong Earthquake

- At 3:57 on February 6, 2016, an earthquake with M_L=6.4 and focal depth 16.7 km occurred in Meinong, Kaohsiung
- Maximum intensity 6 in Tsaoling, Yunlin





Stage 1

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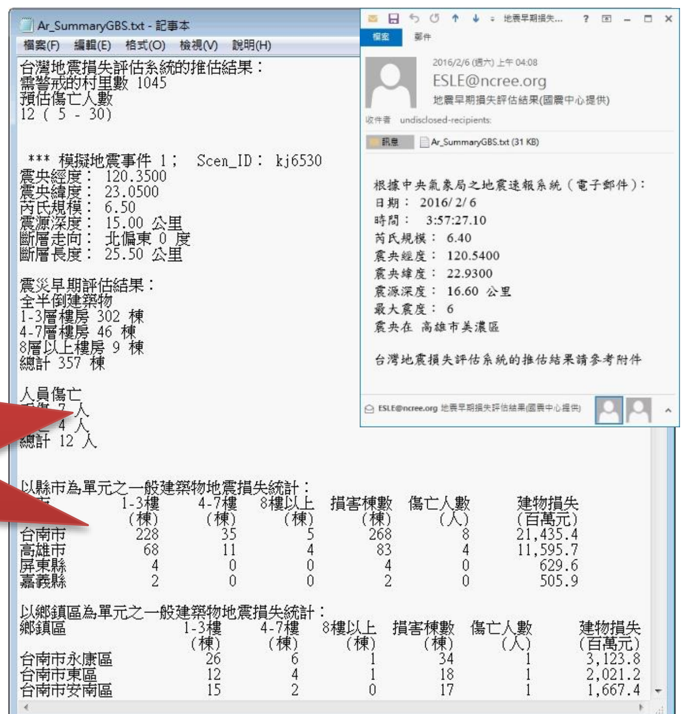
ESLE was auto-triggered by receiving E-mail from CWB, completed estimation and sent messages to emergency response personnel in one minute

SMS: brief Info.

Customizable content in SMS and E-mail

E-Mail: detailed Info.



台灣地震損失評估系統的推估結果：
需警戒的村里數 1045
預估傷亡人數
12 (5 - 30)

*** 模擬地震事件 1； Scen_ID： kj6530
震央經度： 120.3500
震央緯度： 23.0500
芮氏規模： 6.50
震源深度： 15.00 公里
斷層走向： 北偏東 0 度
斷層長度： 25.50 公里

震災早期評估結果：
全半倒建築物
1-3層樓房 302 棟
4-7層樓房 46 棟
8層以上樓房 9 棟
總計 357 棟

人員傷亡
7 人
4 人
總計 12 人

以縣市為單元之一般建築物地震損失統計：

	1-3樓 (棟)	4-7樓 (棟)	8樓以上 (棟)	損害棟數 (棟)	傷亡人數 (人)	建物損失 (百萬元)
台南市	228	35	5	268	8	21,435.4
高雄市	68	11	4	83	4	11,595.7
屏東縣	4	0	0	4	0	629.6
嘉義縣	2	0	0	2	0	505.9

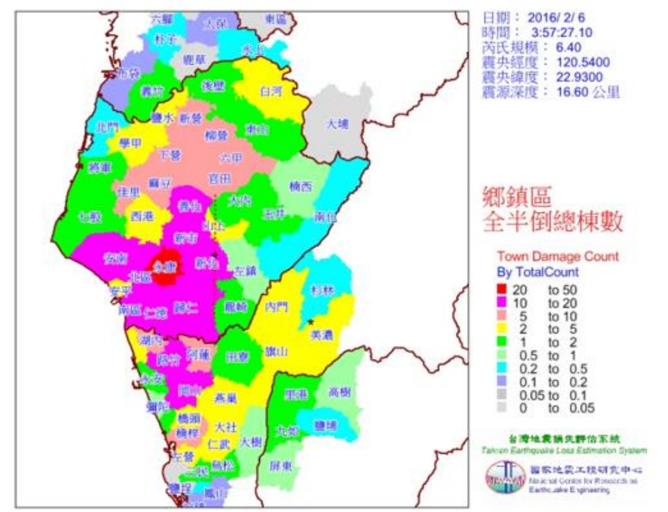
以鄉鎮區為單元之一般建築物地震損失統計：

鄉鎮區	1-3樓 (棟)	4-7樓 (棟)	8樓以上 (棟)	損害棟數 (棟)	傷亡人數 (人)	建物損失 (百萬元)
台南市永康區	26	6	1	34	1	3,123.8
台南市東區	12	4	1	18	1	2,021.2
台南市安南區	15	2	0	17	1	1,667.4

根據中央氣象局之地震速報系統（電子郵件）：
日期： 2016/ 2/ 6
時間： 3:57:27.10
芮氏規模： 6.40
震央經度： 120.5400
震央緯度： 22.9300
震源深度： 16.60 公里
最大震度： 6
震央在 高雄市美濃區

台灣地震損失評估系統的推估結果請參考附件

Web Page: with GIS map



No. of building damages (357)

- 1-3 floors (302), 4-7 floors (46), above 8 floors (9)

Stage 2

Assess the most probable seismic source parameters using available data within 3 hours after the earthquake

Source	Stage 1	Stage 2
Magnitude	6.5	6.4
Depth	15	15
Direction	0	110
Dip Angle	90	90
Length	25	20

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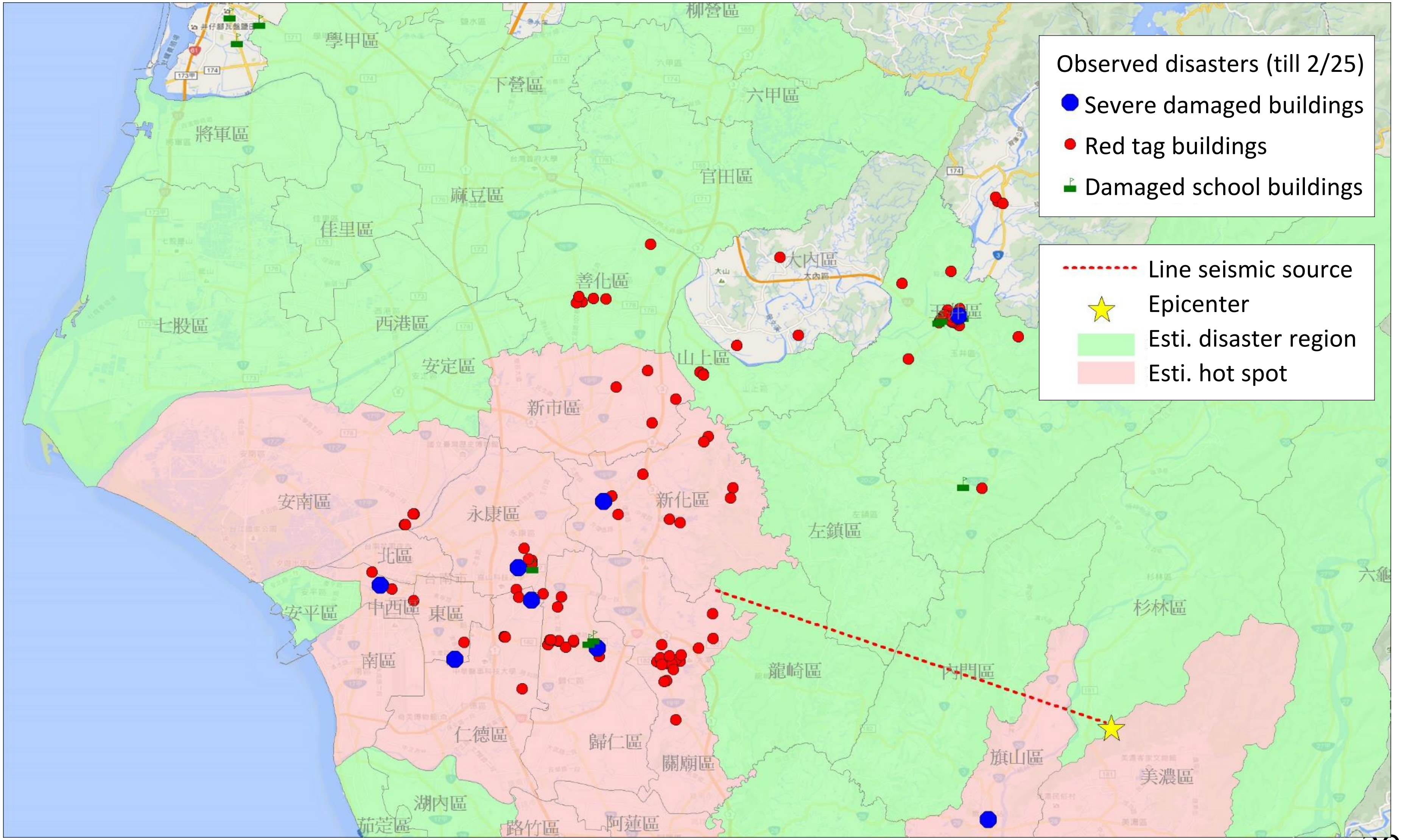
Comparison of ESLE and Observed Losses

Besides 115 persons died in Weiguan Jinlong building, the rest of death tolls was 2

	1-7 floor damaged buildings	>8 floor damaged Buildings	Total damaged buildings	Seriously injured or died	Insurance losses (million NT$)
Observed Losses	236	10	246	117	>170
ESLE Stage 1	348	9	357	12	528
ESLE Stage 2	210	6	216	6	252

note：Damaged building data was from Tainan City Government by Feb. 25, 2016

Distribution Comparison of ESLE Results and the Observed



Customized Services for

Taiwan Residential Earthquake Insurance Fund (TREIF)

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2月6日 03:57

M_L 6.4 earthquake In Meinong

2月6日 04:04

ESLE was auto-triggered by E-mail

2月6日 04:05

Sent SMS and E-mail to emergency response personnel

2月6日

Initiated central disaster response center

2月9日

Set up Union Service Center for Insurance Claims

2月6日

Preliminary number of total losses: 85

2月9日

Starts to pay contingent living expense

……

5月6日

Number of total losses: 100

Data source: http://www.treif.org.tw/

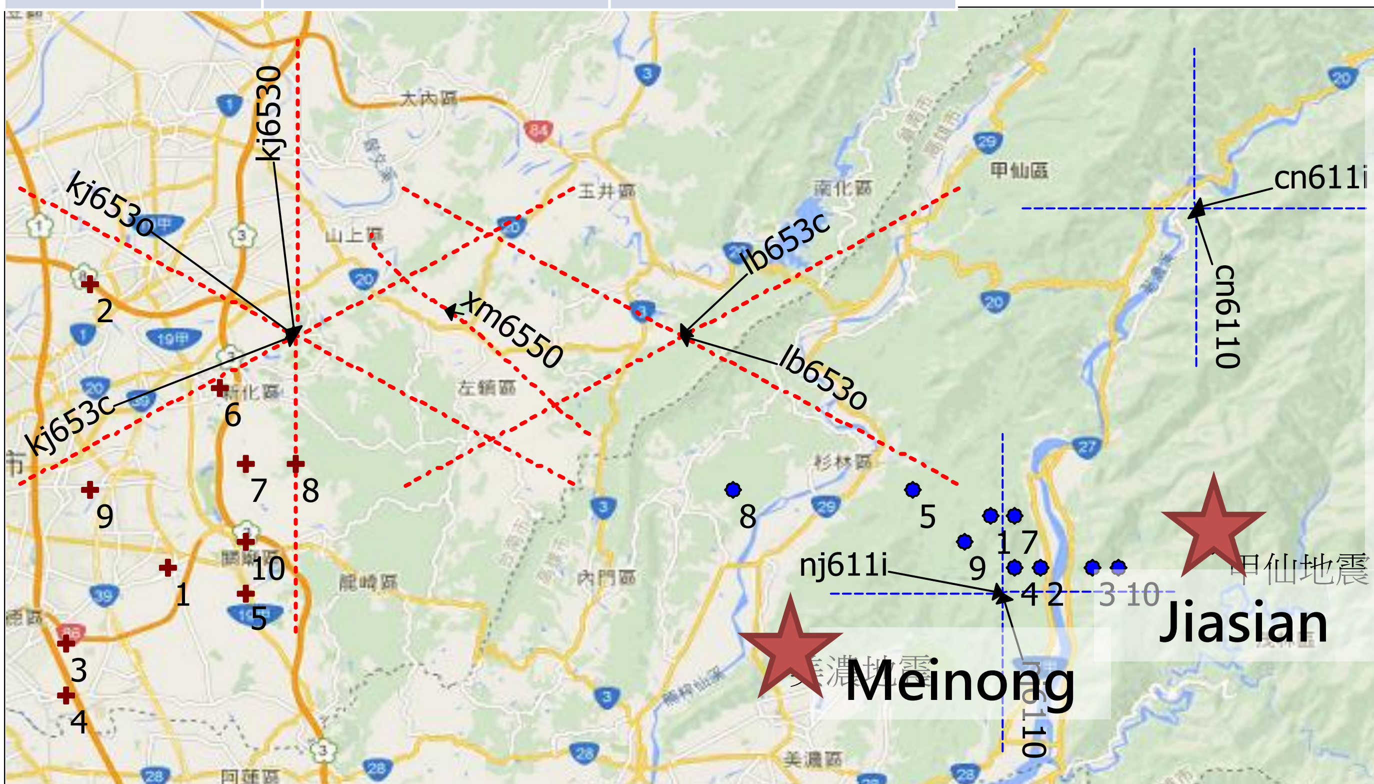
Comparison of ESLE Results and History Observed

Date	Time	Epicenter	M_L	depth (Km)	Estimate Casualties	Actual Casualties	Estimate Insurance Claims (million NT$)	Actual Insurance Claims (million NT$)
2009/12/19	21:02	花蓮壽豐外海18公里	6.8	46	0(0-0)	0	3.8(0.1-15.7)	0
2010/03/04	08:18	高雄縣桃源鄉	6.4	5/23	1(1-3)	0	2.6(1.8-4.5)	2.76
2010/11/21	20:31	花蓮壽豐外海17公里	6.1	41	0(0-0)	0	0.0(0.0-0.0)	0
2012/02/26	10:35	屏東縣霧台鄉	6	20	0(0-0)	0	0.0(0.0-0.6)	0
2013/03/27	10:03	南投縣仁愛鄉	6.1	15	0(0-3)	1	3.5(0.1-25.0)	0
2013/06/02	13:43	南投縣仁愛鄉	6.3	10	2(0-3)	5	9.3(1.3-19.3)	0
2013/10/31	20:02	花蓮縣瑞穗鄉	6.3	19	0(0-0)	0	0.4(0.3-0.7)	0
2014/05/21	08:21	花蓮縣鳳林鎮	5.9	18	0(0-0)	0	0.1(0.1-0.1)	0
2014/12/11	05:03	台北萬里外海72公里	6.8	280	0(0-0)	0	0.0(0.0-0.0)	0
2015/02/14	04:06	台東外海33公里	6.1	18	0(0-0)	0	0.0(0.0-4.5)	0
2015/03/23	18:13	花蓮壽豐外海23公里	6	26	0(0-0)	0	0.0(0.0-0.0)	0
2015/04/20	09:42	宜蘭南澳外海69公里	6.3	18	0(0-0)	1	0.0(0.0-0.0)	0
2016/02/06	03:57	高雄市美濃區	6.4	17	12(5-30)	117	252(179.2-545.8)	>170

2010 Jiasian earthquake vs. 2016 Meinong earthquake

	Jiasian	Meinong
Date	2010/3/4	2016/2/6
Time	8:10 a.m.	3:57 a.m.
Magnitude	6.4	6.4
Epicenter	N22.97, E120.71	N22.93, E120.54
Depth	5 km / 22.6 km	16.7 km

ESLE Results	Jiasian	Meinong
Casualties	1 (1-3)	12 (5-30)
Insurance Claims (million NT$)	2.6 (1.8-4.5)	528.7 (179.2-545.8)
No. of Damaged Buildings	~36	~357



The magnitude and the focal depth were similar, and the epicenters located very close (18 km). ESLE predicted differences caused by the two earthquakes

NARLabs

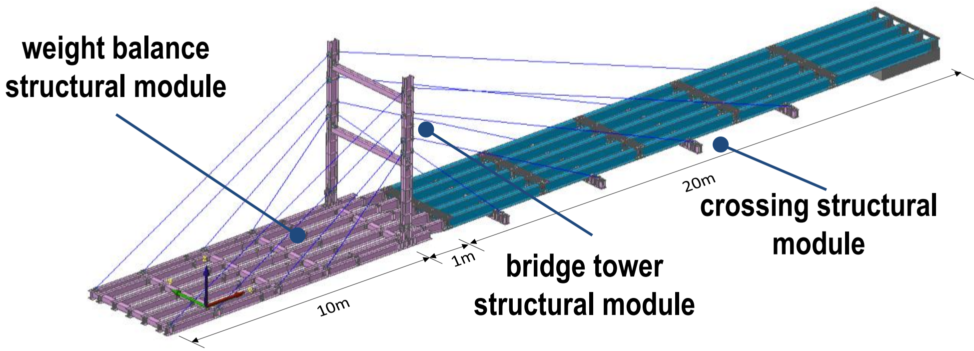
Post-Earthquake

- **Disaster Relief**
- **Rapid Seismic Assessment of Damaged Buildings**

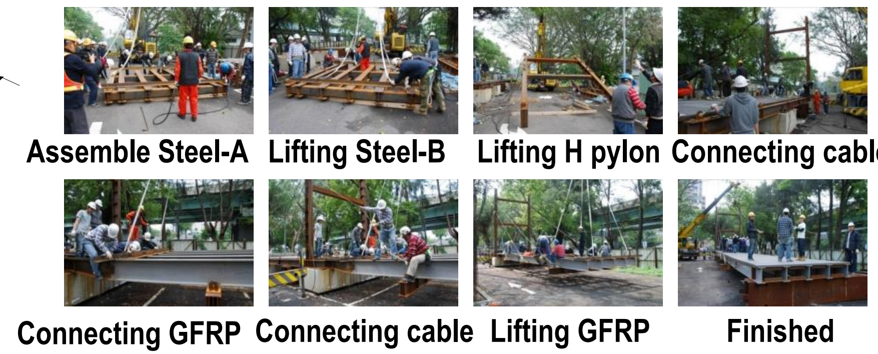
Steel-GFRP Hybrid Composite Bridge for Emergency Disaster Relief

NARLabs

- NCREE developed an asymmetric self-anchored cable-stayed bridge system for emergency disaster relief. The proposed bridge can be assembled within 6 hours, and possesses the advantages of (1) quick assembly, (2) do-it-yourself use by residents, and (3) reusability.



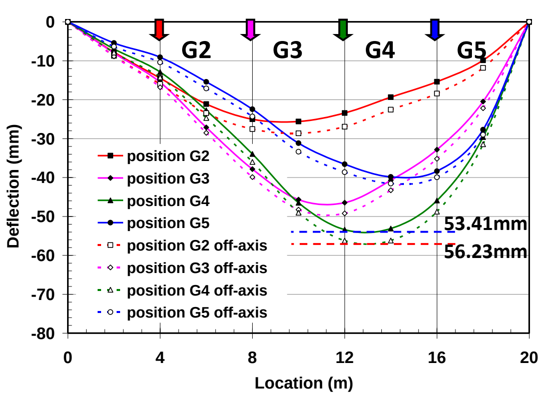
Innovation and concept of a composite bridge



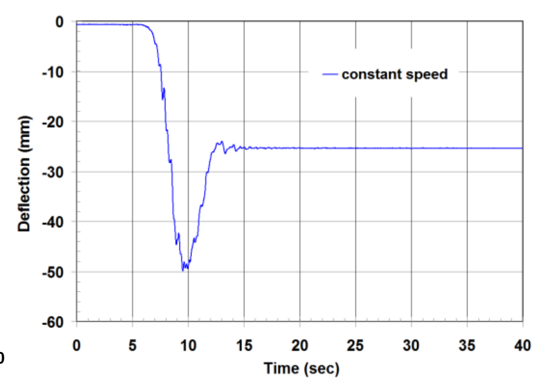
River-crossing tests

Position G4

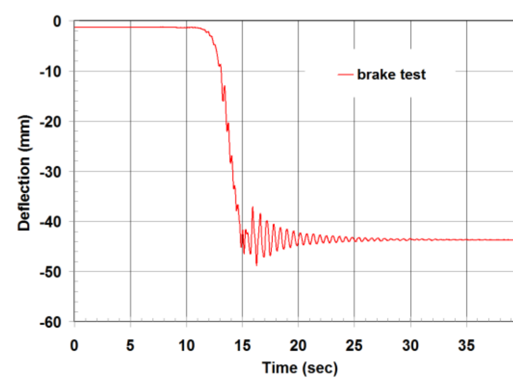
Position G5



The deflection-to-span ratio is around L/356



Constant speed dynamic test

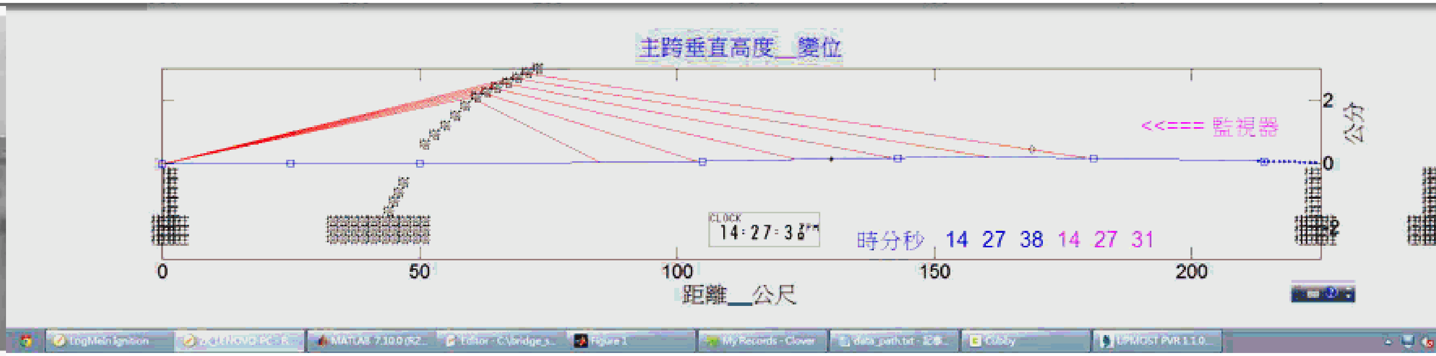


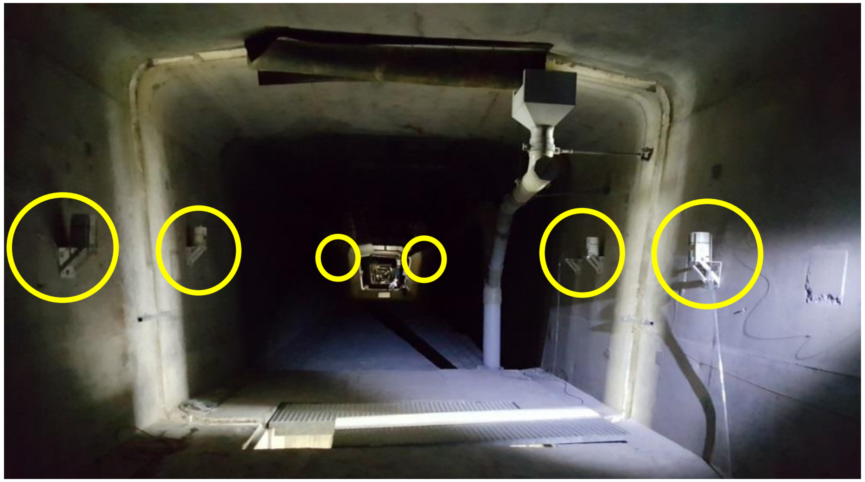
Dynamic brake test

In situ full scale flexural and dynamic tests

FBG-Based Bridge Health Monitoring System

NCREE developed **FBG-DSM (Differential Settlement Sensor)** which could monitor the real-time vertical deflection of bridge. The system has been applied to cable-stayed bridges and Taiwan High-Speed Railway bridges.





Post-Earthquake Rapid Assessment of Damaged Buildings

NCREE collaborates with ABRI to develop the methodologies of post-earthquake rapid assessment of damaged buildings, which are to be tagged with red or yellow sheets.

Inspect the appearance of buildings and the damage states of indoor structural members.

壹、結構體及大地工程受災程度評估	
一.建築物整體或部分樓層傾斜程度	1.建築物傾斜率（　　　　）。 2.傾斜受災程度等級評估：(　)甲　(　)乙　(　)丙。 ※（甲_輕微：傾斜率未滿 1/60；乙_中等：傾斜率 1/60 至 1/30；丙_嚴重：傾斜率超過 1/30）。
二.基礎與上部結構脫離錯開及基礎淘空程度	1.柱基總數（　　）。 2.柱基淘空或與上部柱牆結構脫離、錯開達 5 公分以上（　）根。 3.前項佔柱基總數(　)%。 4.柱基受災程度等級評估：(　)甲　(　)乙　(　)丙。 ※(甲_輕微：未滿 10%；乙_中等：10%至 20%；丙_嚴重：超過 20%)。
三.局部坍塌風險評估	1.梁兩端主筋挫曲嚴重：有（　）；無（　）。 2.梁核心混凝土脫落：有（　）；無（　）。 3.樓層下陷：有（　）；無（　）。 ※（有上述情形之一者，表示存有局部坍塌風險）。
四.地裂影響本建築物安全程度	以地裂寬度、長度、條數以及是否穿過本建築物或距建築物最短距離而致危害基礎之虞等因素綜合評估其影響程度： (　)甲　(　)乙　(　)丙。 ※（甲_輕微；乙_中等；丙_嚴重）。
五.邊坡及擋土牆損害對建築物安全影響程度	1.評估建築物受邊坡（含溪川河道之護岸邊坡）滑動等影響程度：（請直接在表上圈選）（建築物在邊坡滑動範圍 2 倍外不評估。）

建築物與邊坡相對位置 / 邊坡受損程度	建築物在邊坡滑動範圍內	建築物在邊坡滑動範圍邊緣至 1 倍距離內	建築物在邊坡滑動範圍 1 倍至 2 倍距離之間者
邊坡受損嚴重	丙	丙	乙
邊坡受損中度	丙	乙	甲
邊坡受損輕微	甲	甲	甲

Added

The building structures are categorized into RC, steel, brick, and wood structures

貳、結構構件受災程度評估

一.鋼筋混凝土或加強磚造結構

加總柱、結構牆、磚牆各損害程度之數量，並計算SDI

一-4.結構物損壞指標計算(SDI)

1.構件損害程度數量總和

		I 級(n_I)	II 級(n_{II})	III 級(n_{III})	IV 級(n_{IV})
柱					
結構牆	未開口				
結構牆	開口				
磚牆	未開口				
磚牆	開口				

2.構件影響權重

柱	結構牆		磚牆	
	未開口	開口	未開口	開口
1	10	2.5	2	0.5

3.等效柱構件數量

(=構件損害程度數量總和×構件影響權重)

		I 級	II 級	III 級	IV 級
柱					
結構牆	未開口				
結構牆	開口				
磚牆	未開口				
磚牆	開口				
合計		N_I	N_{II}	N_{III}	N_{IV}

4.等效柱構件數量比

$$R_I = \frac{N_I}{N_I + N_{II} + N_{III} + N_{IV}} \ ; \ R_{II} = \frac{N_{II}}{N_I + N_{II} + N_{III} + N_{IV}} \ ;$$

$$R_{III} = \frac{N_{III}}{N_I + N_{II} + N_{III} + N_{IV}} \ ; \ R_{IV} = \frac{N_{IV}}{N_I + N_{II} + N_{III} + N_{IV}}$$

R_I	R_{II}	R_{III}	R_{IV}

5.結構損壞指標 $SDI = \frac{R_{II}}{1.7} + \frac{R_{III}}{0.7} + \frac{R_{IV}}{0.2} =$ ________

Damaged buildings are tagged according to their damage indexes and the likelihood of local collapse.

貳、結構體及大地工程受災程度調查（填寫適合項目，無適合者不填寫）	
說明： 1. 填寫下列表列各項災害評估等級時，請根據災害後危險建築物緊急評估明細表之評估結果。本表最後備註欄所述項目，務請詳盡填寫。	
鋼筋混凝土或加強磚造結構	依右列評估等級填寫 1～5 項：甲（輕微）、乙（中等）、丙（嚴重） 第 6 項勾填有／無；第 7 項填寫計算所得之結構損壞指標值
	1.建築物整體或部分樓層傾斜程度。（　）
	2.基礎與上部結構脫離、錯開及柱基礎淘空程度。（　）
	3.地裂影響本建築物安全程度。（　）
	4.邊坡及擋土牆損害影響本建築物安全程度。（　）
	5.鄰近建物傾斜度數影響本建築物安全程度。
	6.局部坍塌風險評估：(　)有；(　)無
	7.結構損壞指標（SDI）：________

Added

肆、緊急評估結果

建築物經緊急評估結果有危險之虞者，直轄市、縣（市）政府應於建築物主要出入口及損害區域適當位置，張貼危險標誌告示，並依下列方式處理：

□一、張貼**黃單標誌**，並劃定一定區域範圍，限制或禁止人民進入或命其離去。
- □參之墜落物與傾倒物受災程度調查表有 1 項或以上評為丙（嚴重）者。
- □貳之第 5 項評為乙（中等）以上者。
- □緊急評估人員判斷有危險應暫時停止使用，並敘明理由者。

□二、張貼**紅單標誌**，並劃定一定區域範圍，限制或禁止人民進入或命其離去。
- □除貳之第 5 項外，有 1 項評為乙（中等）以上者。
- □鋼筋混凝土或加強磚造構造有局部坍塌風險評估者。
- □鋼筋混凝土或加強磚造構造之結構損壞指標（SDI）為 1
- □緊急評估人員判斷有危險應暫時停止使用，並敘明理由者

Added

NARLabs

Challenge & Countermeasure

Challenge & Countermeasure(1/3)

- Improve early warning technique and accelerate its applications to get more lead-time
  - Earthquake monitoring and develop advanced early warning technique
  - Apply to schools, high-speed rail, power plants, high-tech factories, and Petrochemical factories
- Improve the seismic capacities of critical facilities to ensure the seismic resilience of cities.
  - Continue the task of seismic evaluation and retrofit of school buildings.
  - Perform the seismic evaluation and retrofit of public markets, district halls, and police/fire fighting department buildings.
  - Accelerate the research and improvement of the seismic capacities of critical facilities(e.g., nuclear power plants, dams etc.), and lifelines(e.g., water, electricity, gas, and bridges).

Challenge & Countermeasure(2/3)

- Identify the buildings similar to Weikuan Complex Building, and then complete their seismic retrofit before the strike of next intense earthquake.
  - One of the possible challenges in the seismic evaluation and retrofit of private buildings is the difficulty of reaching a consensus among residents. In addition, the huge engineering expenses may impede the residents' will to do seismic retrofit.
  - By using compulsory and/or rewarding approaches, upgrade the seismic capacities of opened-to-public private buildings.
  - Because of the limited resources, the priorities should be set while performing seismic evaluation and retrofit of existing buildings.

Challenge & Countermeasure(3/3)

- Promote earthquake insurance and distribute the risk of building losses
  - Encourage people to buy earthquake insurance
  - Enhance financial risk management of governments
- Many critical facilities are close to the 33 active faults in Taiwan. However, no laboratory in Taiwan can simulate the long displacement with high velocity impulse of a near-fault ground motion. Therefore, NCREE is establishing a Long-stroke High-velocity Shaking Table in its South Lab to counter the near-fault effect.

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國家實驗研究院

Thank You for Your Attention

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