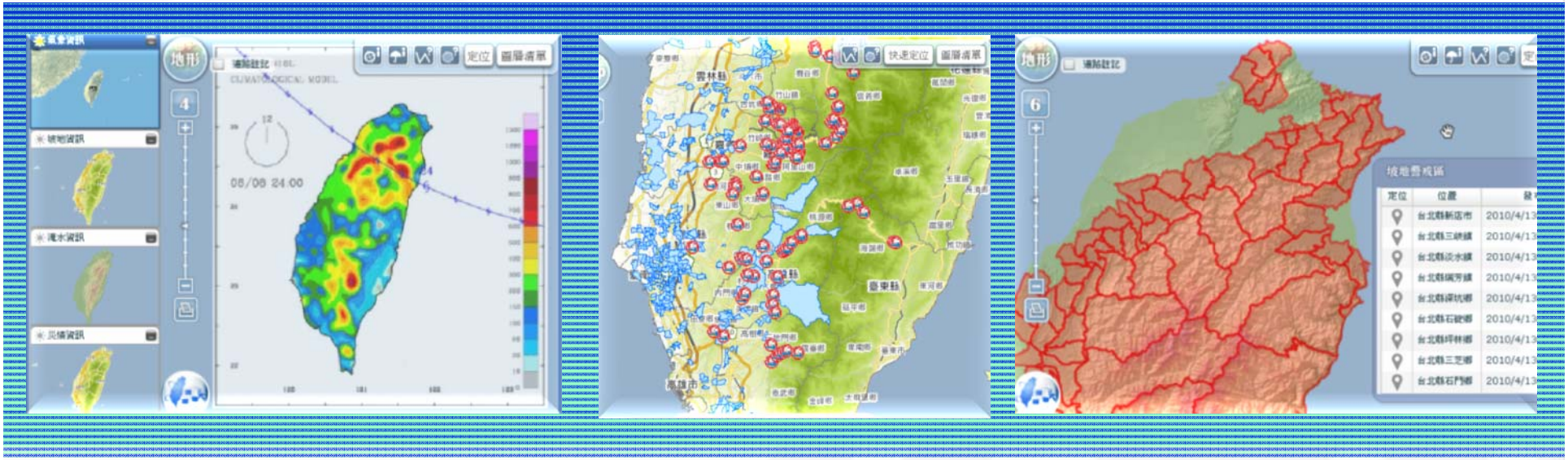
Improvement of emergency response with technology-based solutions

- Pre-disaster relief for reducing impacts by typhoon



Liang-Chun Chen
Chinese Taipei
2010/10/21

Outlines

- Collaboration and integration between S&T and emergency response
- Demands and supports of S&T according to emergency operation stages
- Joint operation among inter- & intra- agencies, media and communities
- Conclusions

Global major disasters in 2009 six in APEC economies

www.ncdr.nat.gov.tw

Natural disasters by number of deaths(1) - 2009

● Earthquake, September	Indonesia	1 195
Flood, July-September	India	992
● Typhoon Morakot (Kiko), August	**Chinese Taipei**	630
● Typhoon Pepeng (Parma), October	Philippines	539
● Tropical storm Ondoy (Ketsana), September	Philippines	501
● Extreme temperature, January-February	Australia	347
Flood, September-October	India	300
Earthquake, April	Italy	295
Hurricane 'Ida', November	El Salvador	275
● Extreme temperature, May-August	Peru	274

(1): Includes the reported missing persons

● APEC member economies

Source: UN/ISDR, 2010

APEC region
a high disaster-prone area

Earthquake, China
2008

Five Common Disasters

Landslide, Indonesia
2009

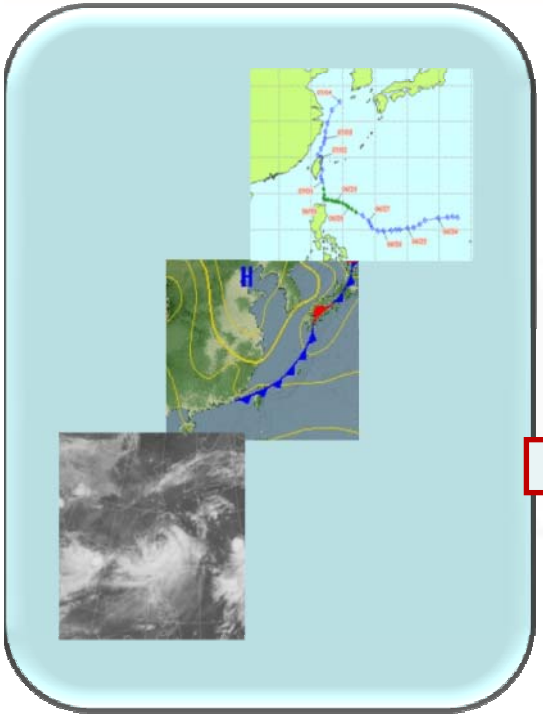
Typhoon, Philippines
2009

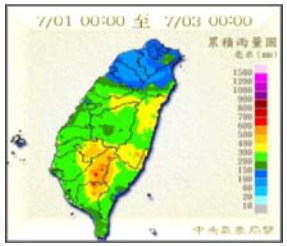
Flood, Chinese Taipei
2009

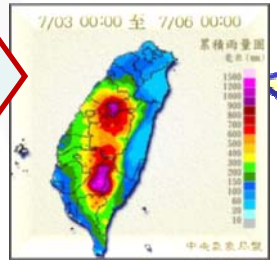
Debris flow, China
2010

Collaboration and integration between S&T and emergency response

www.ncdr.nat.gov.tw





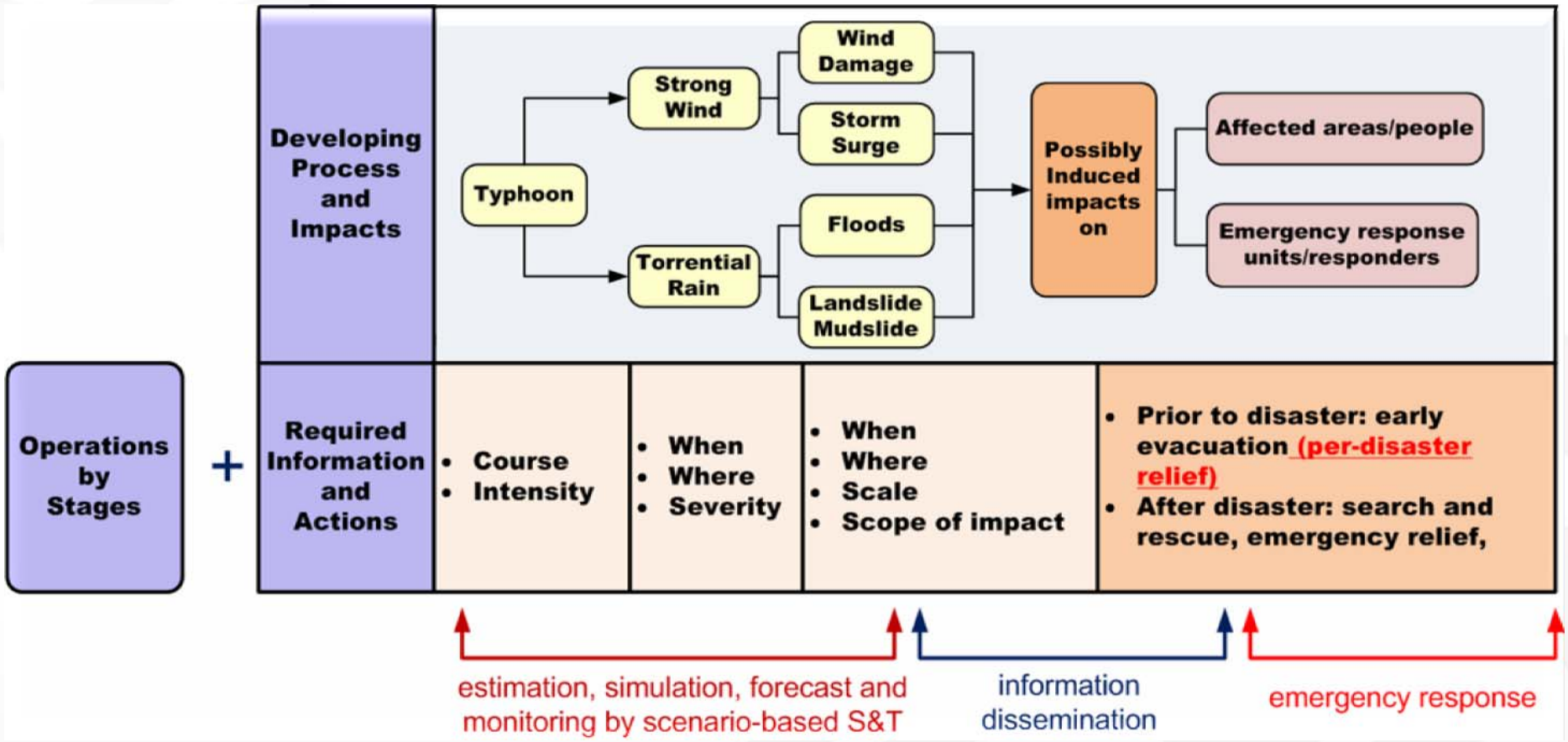


Typhoon → Gust/Rain → • Floods • Landslide • Mudslide • Others → Damages and Causalities

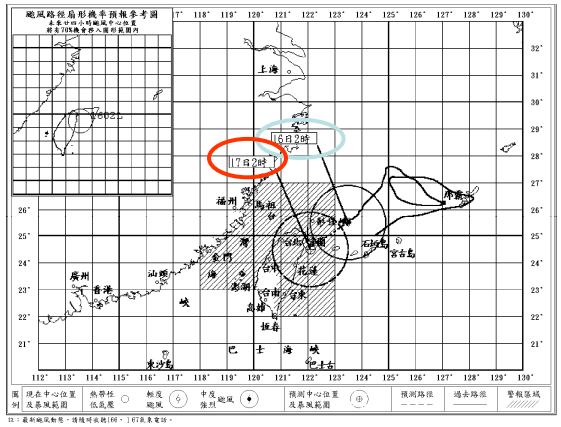
Approaching *Triggering* *Aftermaths*

Science and Technology ⇄ **Emergency Response and operation**

Demands and supports of S&T according to emergency operation stages

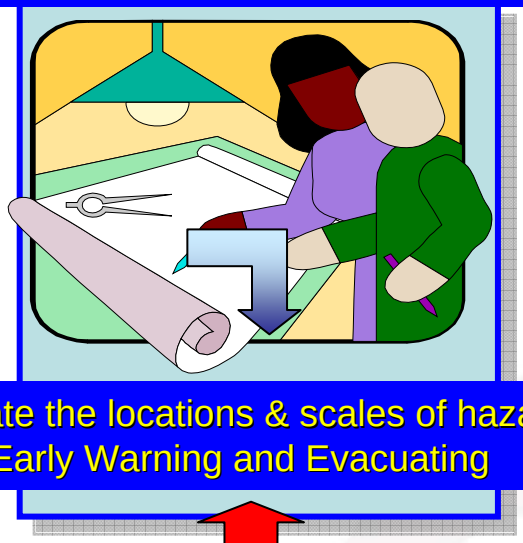


Technology support to reduce possible damage through integrated information

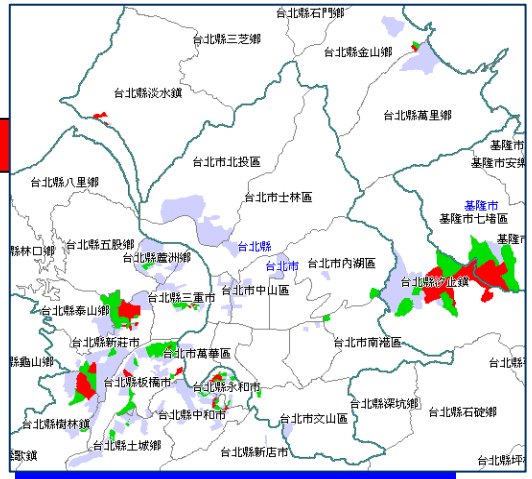


Monitor & Forecasting of CWB

CEOC
Assessment Group

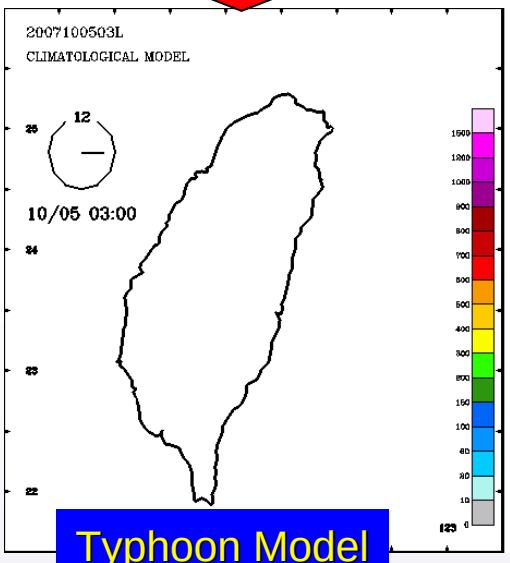


Evaluate the locations & scales of hazards
Early Warning and Evacuating

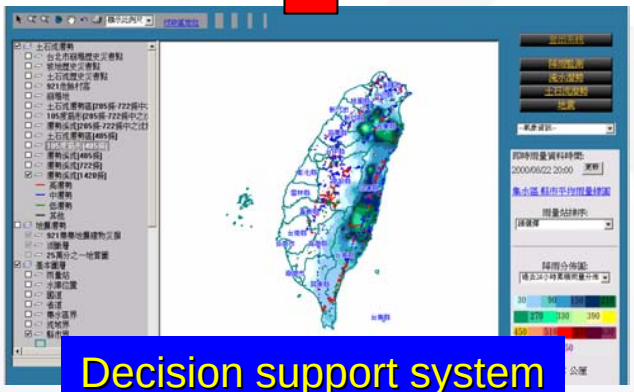


Flood potential areas

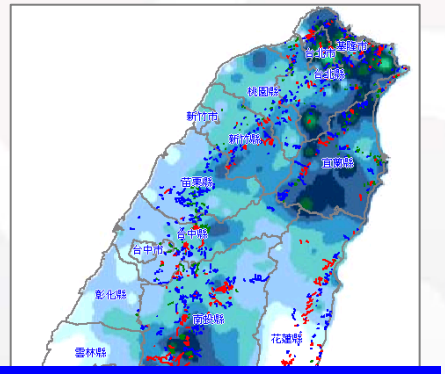
+



Typhoon Model



Decision support system
(Hazard potential)

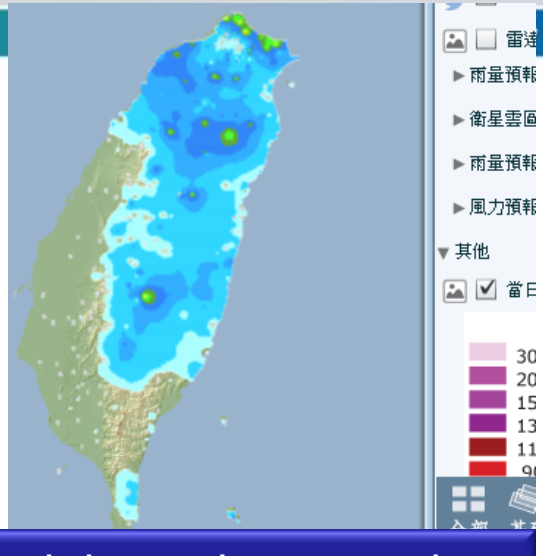


Landslide & debris flow
potential areas

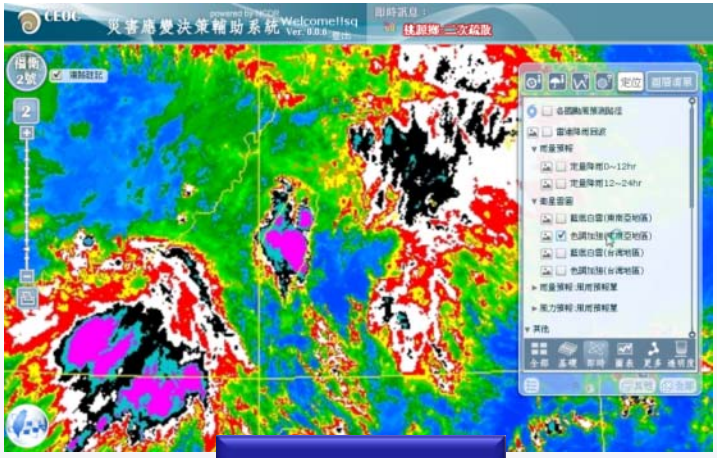
Basic elements for information integration 1/3
Information module – Weather

Course Predictions

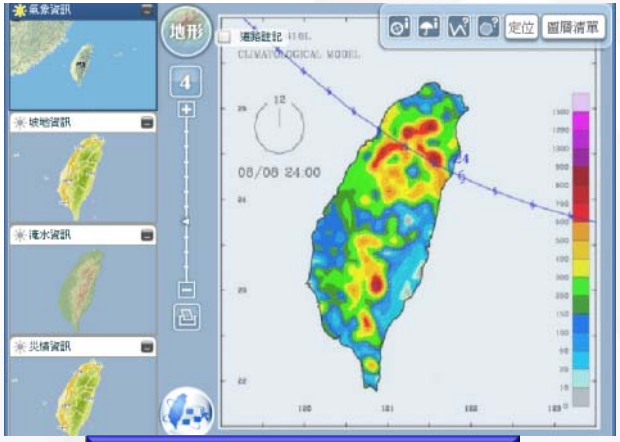
Radar



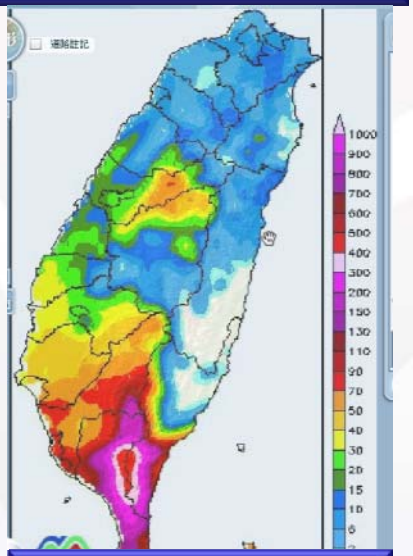
Real-time rain gauge data



Satillite

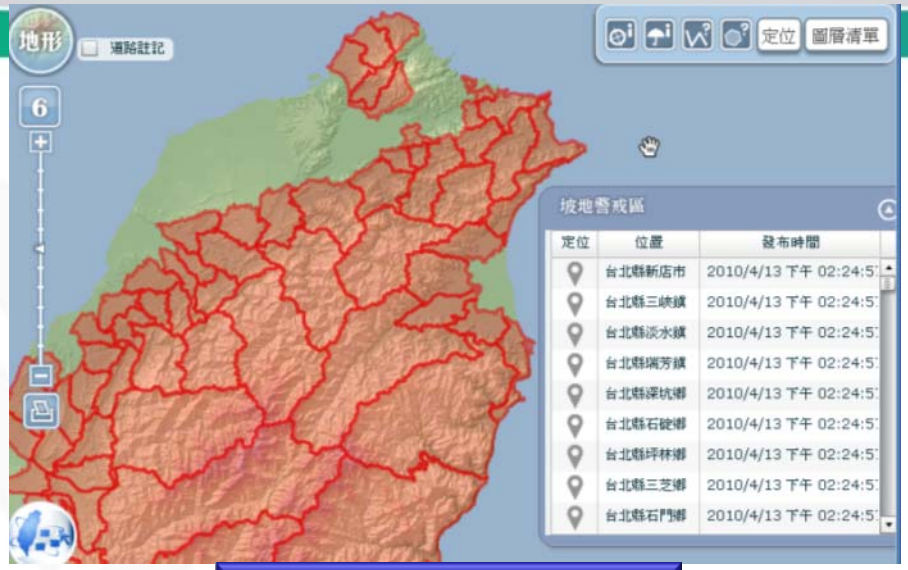


Climate model

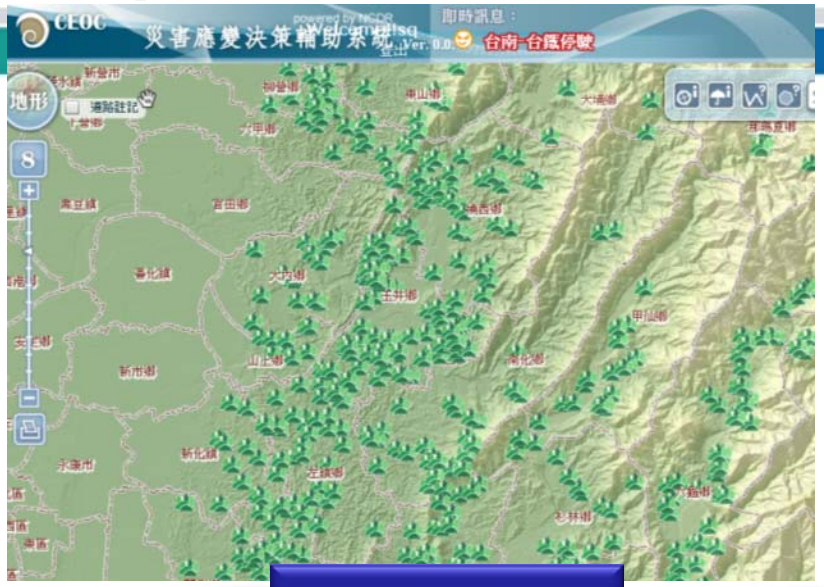


Dynamic model

Basic elements for information integration 2/3
Information module – Slopeland



Risk potential

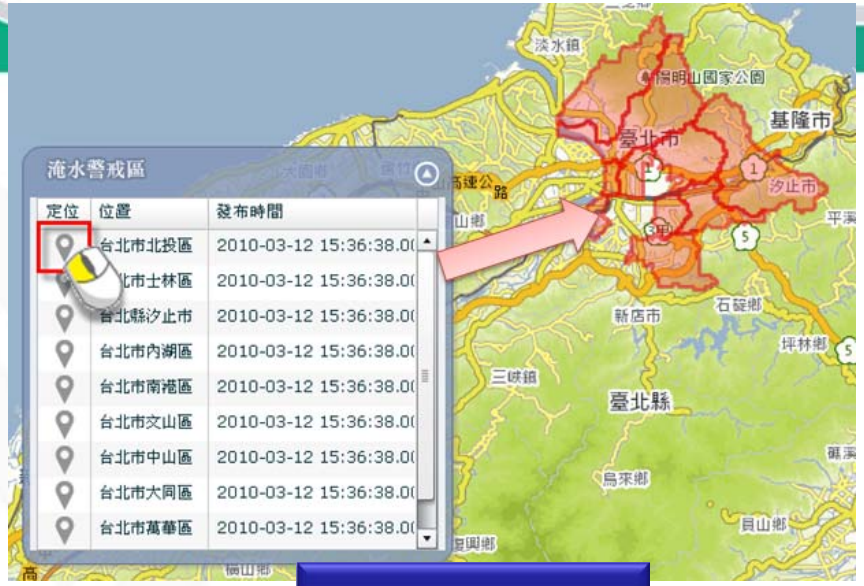


Past events

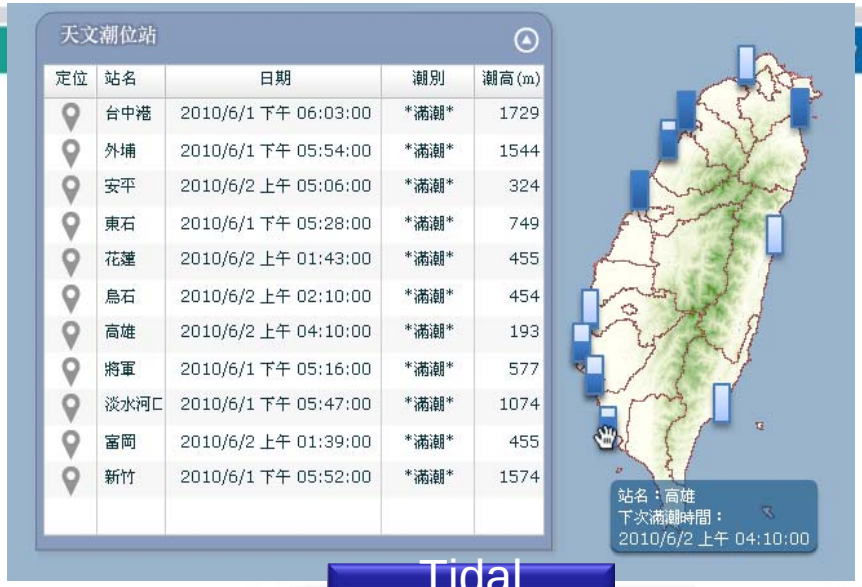
Debris flow

Highly vulnerable villages

Basic elements for information integration 3/3
Information module – Floods

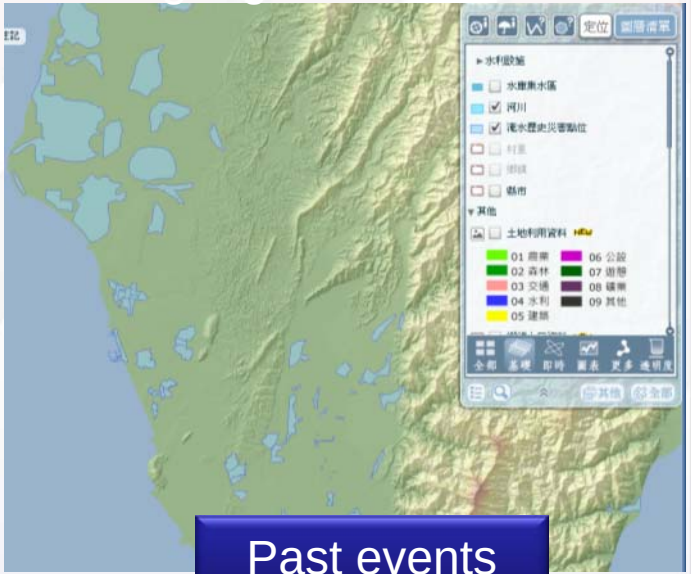


Risk Potential



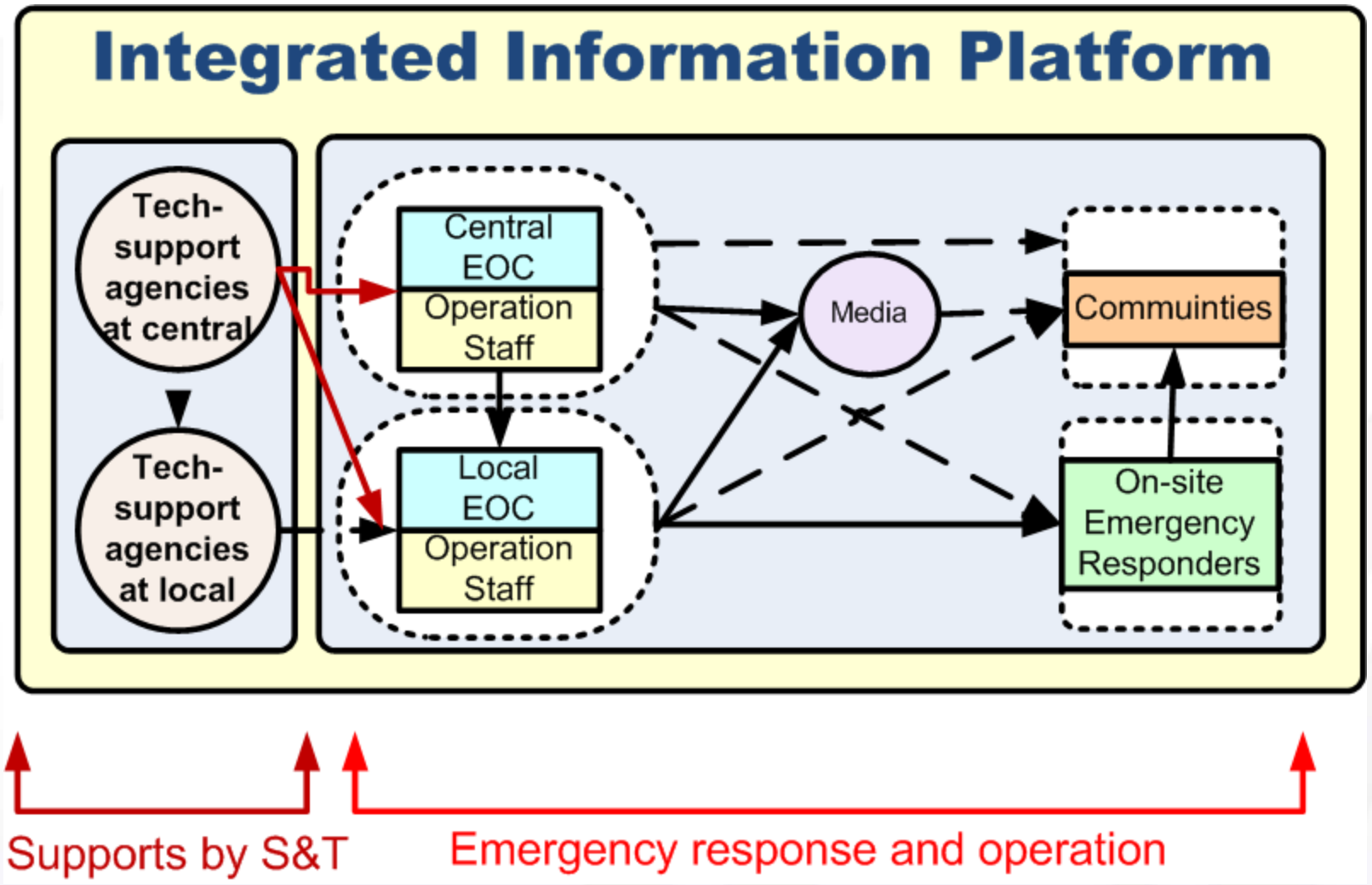
Tidal gauge

Water level gauge (rives, reservoirs)



Past events

Joint operation among inter- & intra-agencies, media and communities



Collaboration- S&T and emergency response

NCDR runs scientific analysis

NCDR summons the meeting

NCDR reports to commander

NCDR

- Internal Meeting every 3hrs
- Provide Analysis

1. Rainfall estimation
2. Flood potential
3. Debris flow potential
4. Precaution notice

CEOC

- Satiation assessment Meeting every 3hrs
- Generate Suggestions

1. Warning zones
2. Evacuation
3. Reinforcement
4. Bulletin to local government

CEOC

- Working Meeting
- Overall Review

1. Situation reports
2. Readiness report
3. Assistance and deployment
4. Emergency response

Technology → Policy → Actions

Progressive Improvements for Typhoons in Chinese Taipei

Typhoon Event	Maximum Intensity (mm/hr)	Total Accumulated Rainfall (mm)	Evacuation (Person)	Ceased and Missing (Person)
2001.07.28 Toraji	147	757	----	214
2001.09.17 Nari	142	1,462	24,000	104
2004.06.30 Mindulle	167	2,005	9,500	41
2005.07.18 Haitang	177	2,124	1,208	15
2005.09.01 Talim	119	766	1207	6
2005.10.02 LongWang	154	776	945	2
2006.07.12 Bilis	95	1,013	409	3
2007.08.16 Sepat	122	1,399	2,531	1
2008.07.16 Kalmaegi	161	1,027	179	26 Compound Disaster
2008.07.28 Fung-Wong	121	830	1,303	2
2008.09.10 Sinlaku	97	1,608	1,987	22 Compound Disaster
2008.09.27 Jangmi	85	1,137	3,361	4
2009.08.07 Morakot	100	2,965	24,775	695 Extreme weather
2010.09.19 Fanapi	125	1,128	16,568	2

Three elements to succeed emergency response by per-disaster relief

Scientific Prediction	Rea-time Monitoring	In-time Operation
• Provide forecasting based on models • Tool for pre-disaster deployment • Reference for decision support • Limited by technology development	• Provide updated data based on gauges • Tool for pinpointing blind areas by forecast • Reference for revising decision support • Limited by number, location, transmission	• Provide reaction based on well-defined plan • Tool for saving more time before it's too late • Reference for allocating emergency support • Limited by determination of all-leve administrators

Conclusions

- **Integration & collaboration between S&T and emergency responses**
- **Challenges possibly induced by extreme weather and compound**
- **Future improvements to better prepare for typhoon:**
  - **Enhancing effectiveness and efficiency of S&T for extreme events.**
  - **Deliberating emergency operation and pre-disaster relief for compound disasters.**
  - **Establishing a platform for comprehensive information sharing to support emergency response, situation awareness, decision support and relief.**

Thank for your attention