Information-intelligence-based Disaster Risk Management
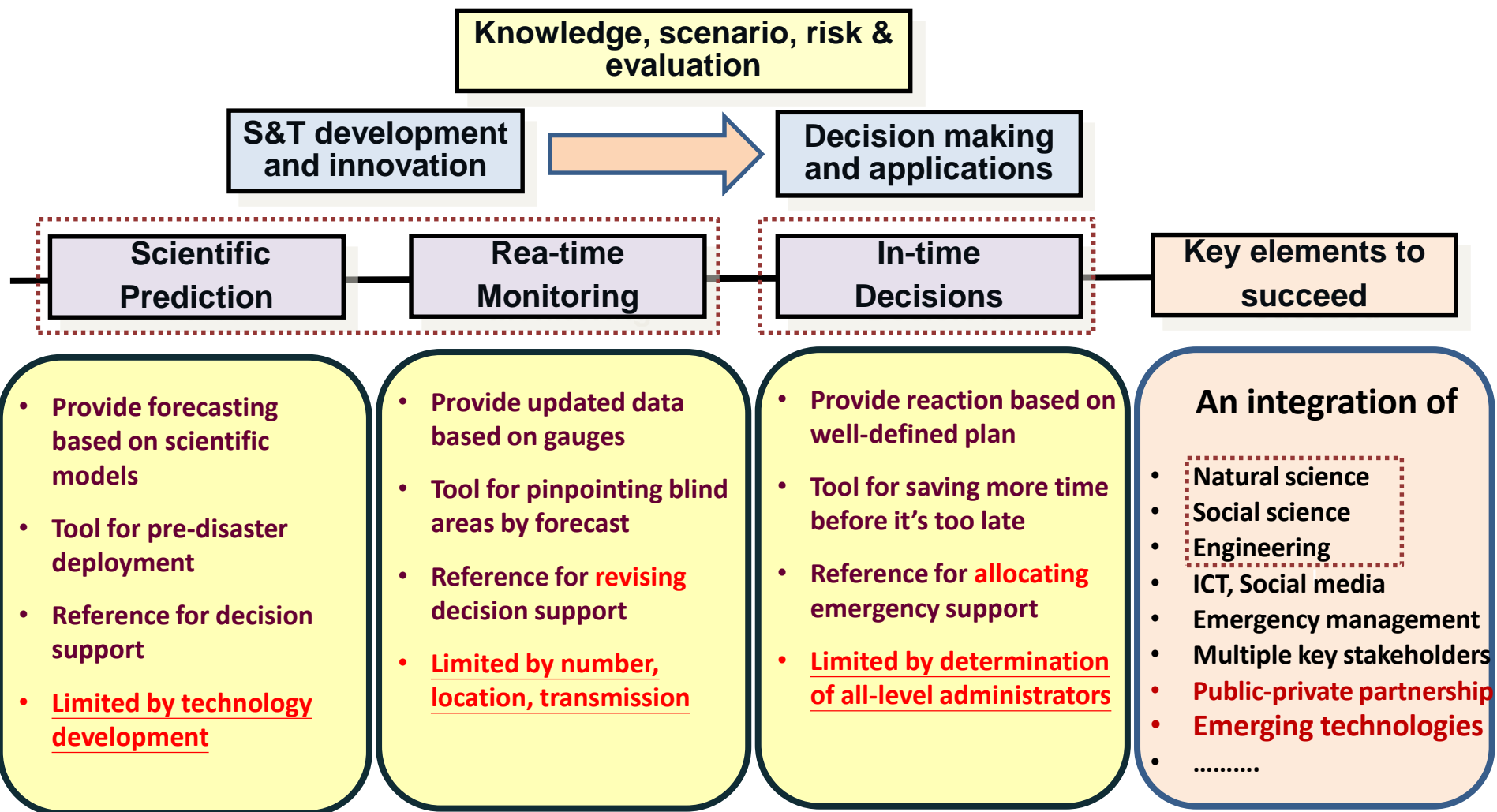
- Applying science, information, communications, scenario, big data and open data for actions

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**Scientific Committee, Integrated Research on Disaster Risk (IRDR)**

Policy Dialogue on Leveraging Technology and Innovation for Disaster Risk Management and Financing,
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Sceince and technology innovate disaster risk management - From science to actions

Knowledge, scenario, risk & evaluation

S&T development and innovation → **Decision making and applications**

Scientific Prediction	Rea-time Monitoring	In-time Decisions	Key elements to succeed
• Provide forecasting based on scientific 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-level administrators	**An integration of** • Natural science • Social science • Engineering • ICT, Social media • Emergency management • Multiple key stakeholders • Public-private partnership • Emerging technologies • ……….

Impact assessment during typhoon emergency operation

Through impact-assessment-based preparedness to mitigate

Personnel dispatch

Early evacuation

Water pump
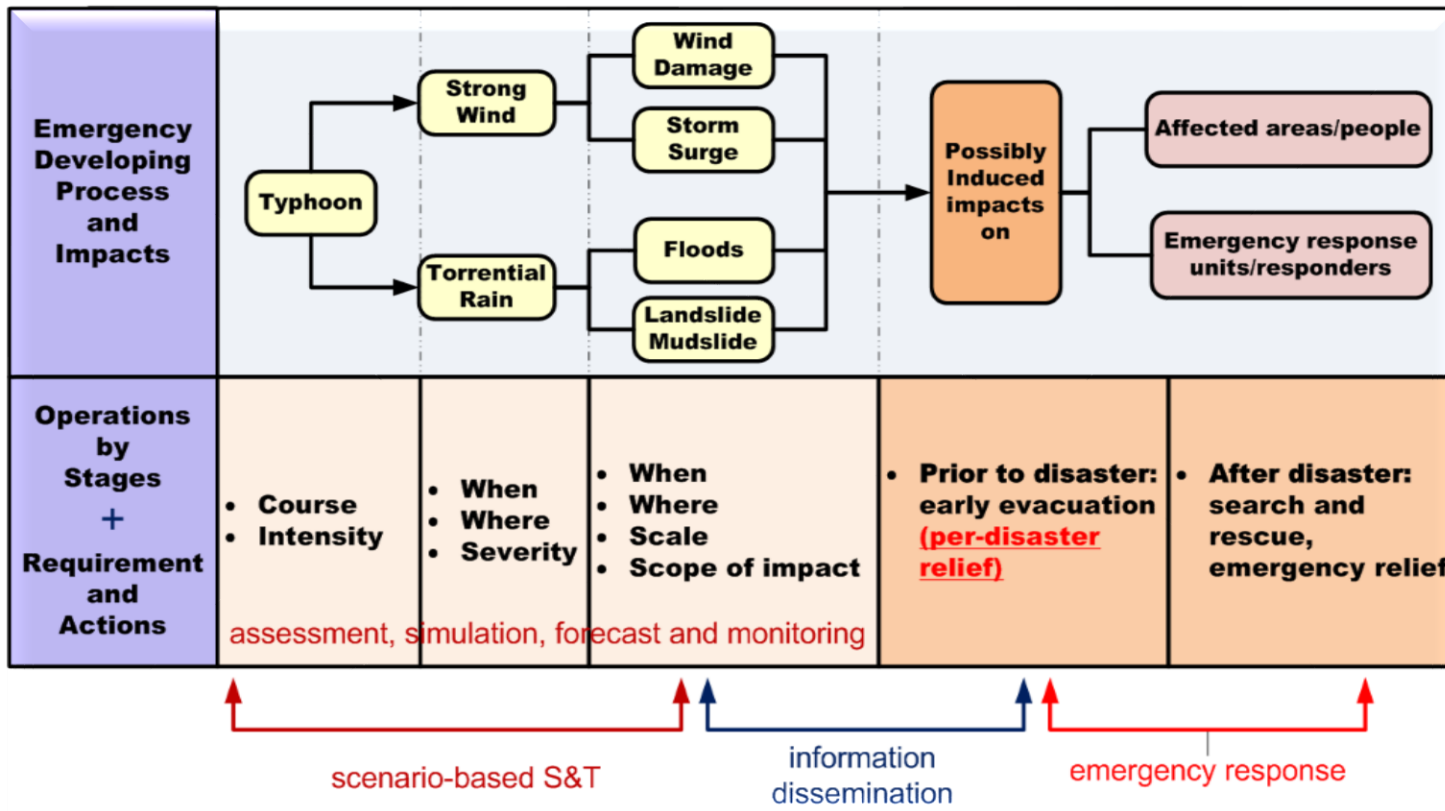
Scientific outputs (impacts)	Cross-cutting synergies	In-time operations (actions)

Innovations by making use of data and information to connect all stakeholders

learned lessons actions from disaster

Too much or too little information at emergency operations
- **Channels to acquire useful information – information integration**
- **A system of systems to integrate information – cloud system**

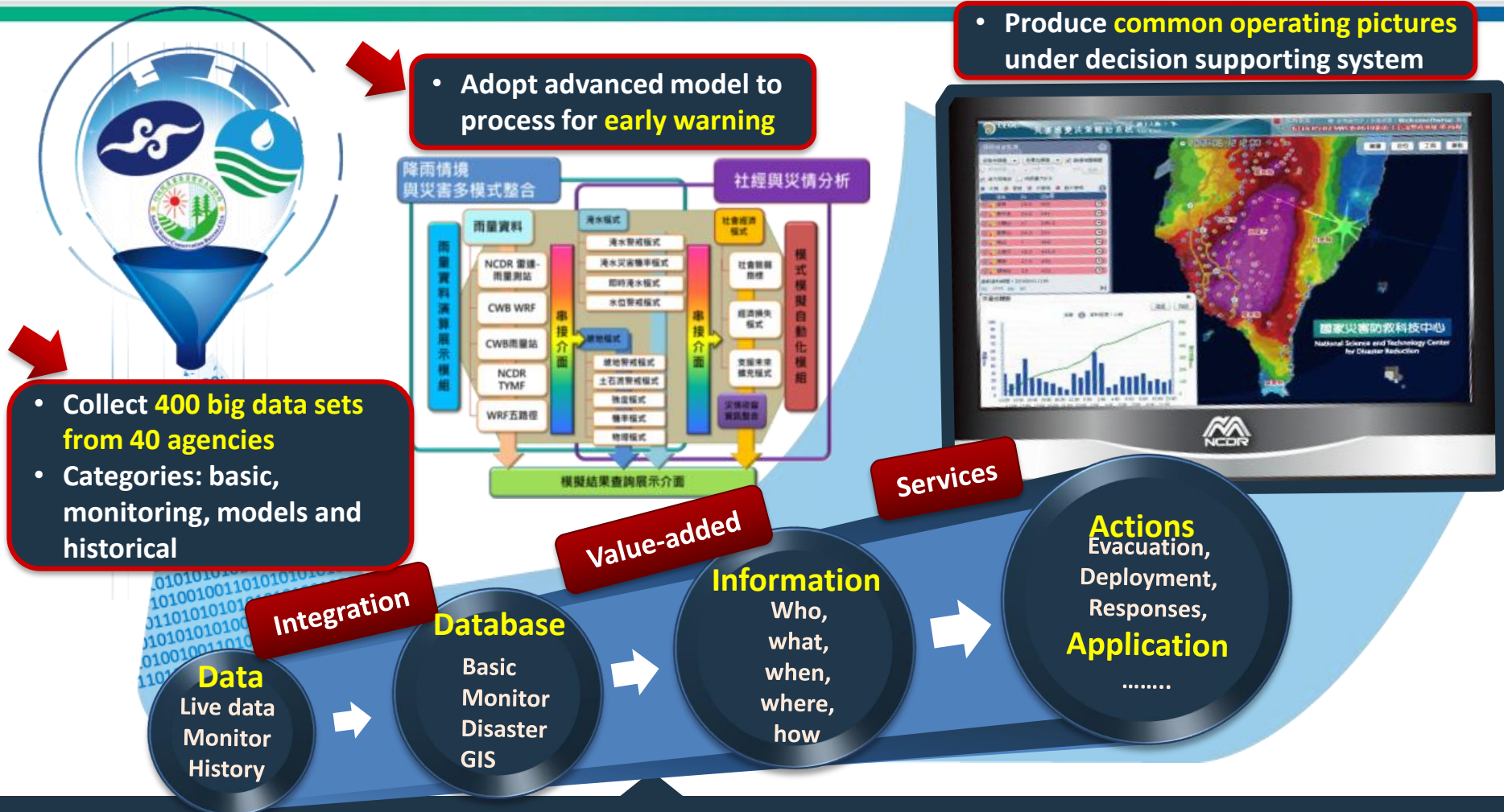**Lack of common operational picture to coordinate actions**
- **Potential risk maps for operation – information link**
- **Situation maps for operation – decisive operations**

When and how to make timely operations
- **Well-organized teams – information-intelligence-based decisions**
- **Digital emergency preparedness – information sharing**

Preparation: aggregating big data for open data–
"Cross-cutting Synergies" , "Information sharing", "Actionable"

- Adopt advanced model to process for **early warning**

- Produce **common operating pictures** under decision supporting system

- Collect **400 big data sets from 40 agencies**
- Categories: basic, monitoring, models and historical

Integration

Value-added

Services

Data
Live data
Monitor
History

Database
Basic
Monitor
Disaster
GIS

Information
Who,
what,
when,
where,
how

Actions
Evacuation,
Deployment,
Responses,
Application
……..

Information Platform for Disaster Management

Portal to access information	Registration	Authorization	Information Exchange service
	Categorization	Integration	

Maintenance operations

N (data sources) to 1 (unified operation biddies) to Many (diverse users) – DRR information supply chain

- **N kinds of data sources**
  - Monitoring data, numerical outputs, physical data, statistic data
  - Social data, geo-data, historical data,
  - **Non-structure data (to foresee trend)**

- **1 unified operation bodies**
  - EOCs at central or local governments

- **Many diverse users**
  - Tailor-made product
  - Citizens
  - Decision makers

End-to-End connections

To bridge over **"information gaps" with sharing, integration and innovation**

Multiple channels to connect and reach end users

Channel 1: Open Data Platform for Disaster Information (Common Alerting Protocol format)

Combine 30 kinds of alerts from DGPA, CWB, SWCB, WRA, THB, TRA, THSRC and etc.

Released a total of 30 categories of instant supporting information

Channel 2: Public-private partnership on enhancing information coverage (with Google) –PPP model

- Initiation of Open Data in 2013, through Google Crisis Map and Google Public Alerts to disseminate typhoon warning messages.
  Typhoon Soulik (7/10-14) : number of system access about **1.3 million**

- In 2014, the total number of accessing Google services is around **14 million**
- In 2015, the total number of accessing Google services is around **16 million**
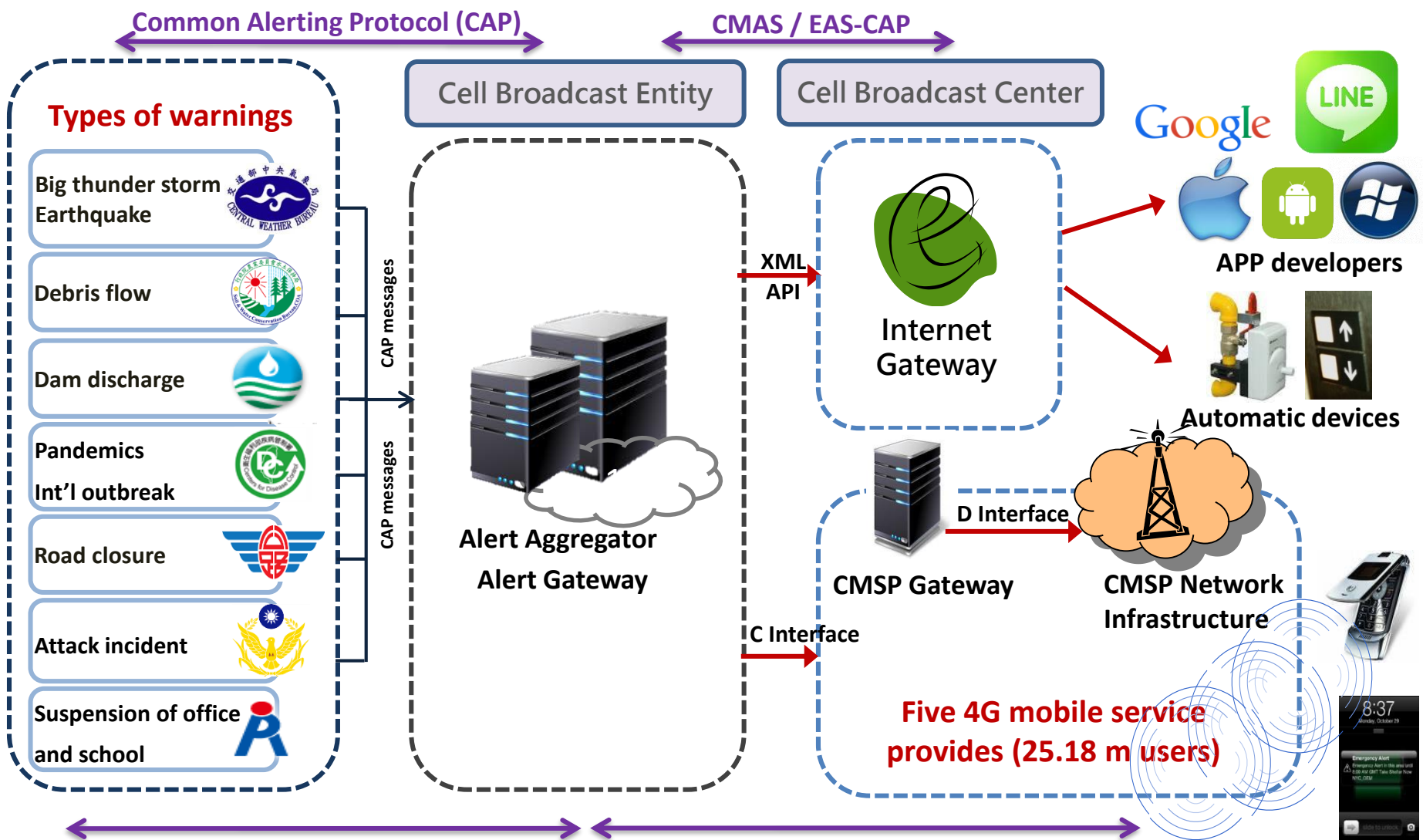- In 2016, the total number of accessing Google services is around **21 million**

Google Public Alerts
Location-based

Google Crisis Map
Easy-to-use

Channel 3: Cell Broadcast Service to end user
- to enhance info coverage at the most efficient way

Government Agency › Alert delivery › Broadcasting › Applications

Common Alerting Protocol (CAP)

CMAS / EAS-CAP

Cell Broadcast Entity

Cell Broadcast Center

Types of warnings

Big thunder storm
Earthquake

Debris flow

Dam discharge

Pandemics
Int'l outbreak

Road closure

Attack incident

Suspension of office
and school

CAP messages

CAP messages

**Alert Aggregator
Alert Gateway**

XML
API

**Internet
Gateway**

APP developers

Automatic devices

CMSP Gateway

D Interface

**CMSP Network
Infrastructure**

C Interface

**Five 4G mobile service
provides (25.18 m users)**
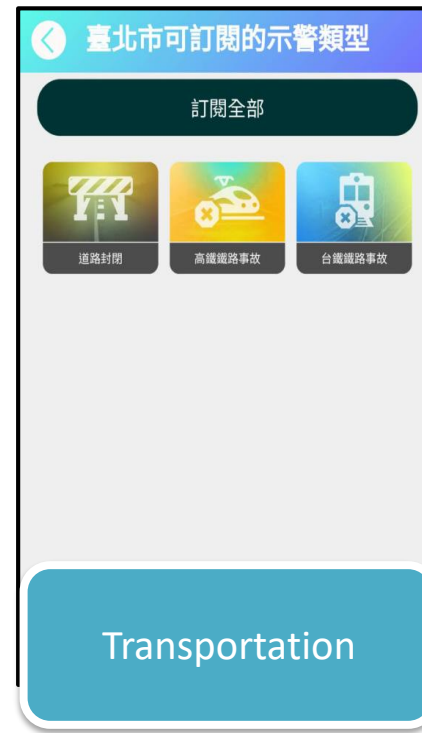
2014 ~ 2015

2015 ~ 2018

Channel 4: Instant messenger Reach out users through LINE
- location-based warnings pushed to LINE channel

LINE

- All 30 alerts at 4 categories (free to users)
- Subscribers over **1.07 m since March 2018**

Wearer Earthquake

Hydraulic situation

Transportation

Others

Conclusion: Innovations of Emergency Management
- collective involvement among stakeholders by phases

Experience-based

- **Leader: emergency responders**
- Tools: paper maps, radio, fax……
- Actions: evacuations, S&R (during and afterwards)
- Info source: 911, faxes, news……
- Other stakeholders: limited participation

Risk understanding

S&T and Data make management different!!

Science-based

- **Leader: ERs, scientists**
- New tools: digital risk maps, scenarios
- Actions: **early warning and evacuations**, deployments of personnel and equipment (before)
- Info source: **data**, models, readings, Internet,
- Other stakeholders: invited participation

Demands on intelligence for impact assessments

Information-based

- **Leader: ERs, scientists, general public**
- New tools: social media, real-time data, **big data**
- Actions: risk communication, **impact-based preparedness**(before)
- Info source: live videos, social media,
- Other stakeholders: active participation

Thanks for your attention