National Center for High-performance Computing

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NCHC

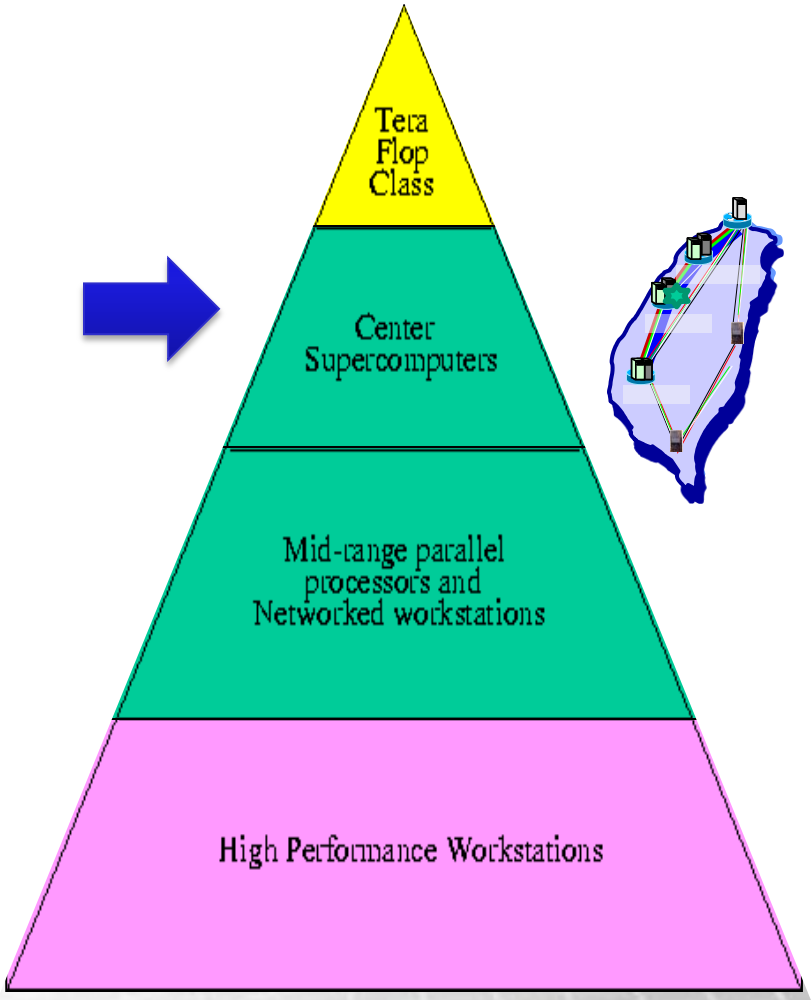
Development and Practices in Location-based Environmental Observation

Fang-Pang Lin , Jyh-Horng, Jeanne Wang, Jurgen Schulze, Peter Arzberger, Whey-Fone Tsai

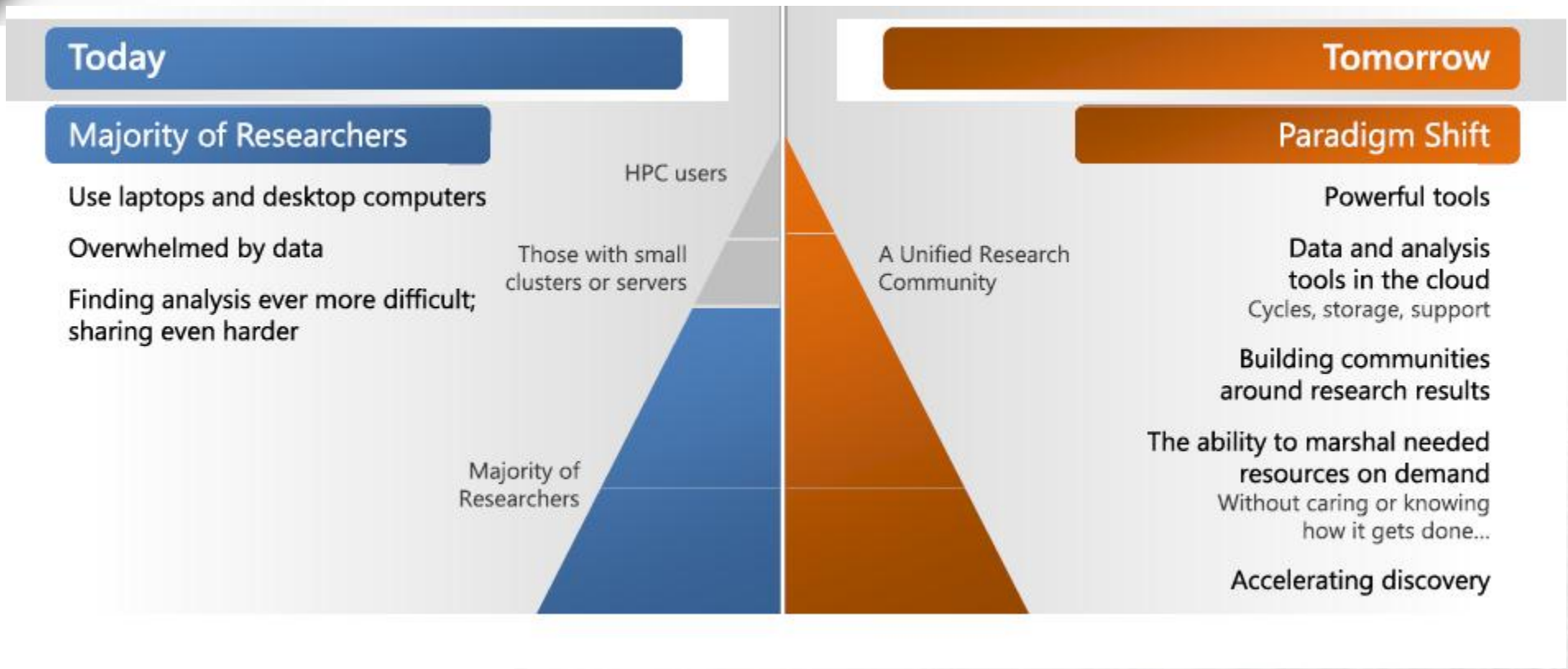
財團法人國家實驗研究院
國家高速網路與計算中心
NATIONAL CENTER FOR HIGH-PERFORMANCE COMPUTING

Background: The Branscomb Pyramid (1993)

- Major Recommendations from the Branscomb Report
  - NSF should make **investments at all levels** of the Branscomb Pyramid as well as investments in aggregating technologies (today's cluster and grid computing). **NSF should make balanced investments.**
  - Increase support of **HPC-oriented SW. algorithm, and model** development
  - Coordinate and continue to **invest in Centers.** Develop **allocation committees** to facilitate use of resources in community.
  - Develop an OSTP advisory committee representing states, HPC users, NSF Centers, computer manufacturers, computer and computational scientists to **facilitate state-federal planning for HPC.**



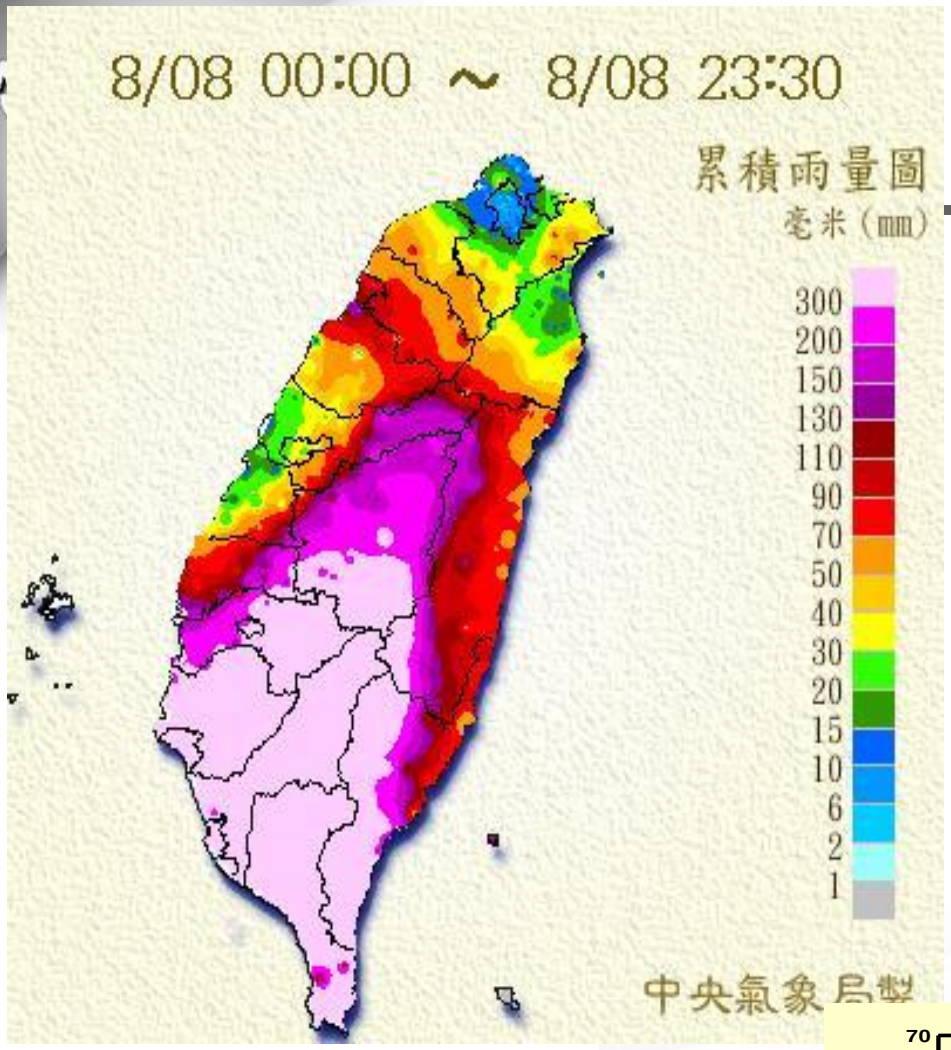
Background: Democratize Research

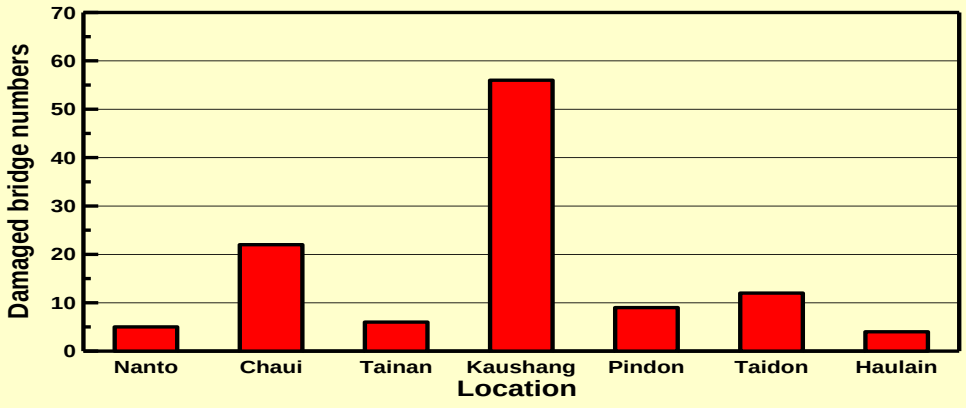


Source: Dan Reed

Morale

- Environmental Observation is inherently location based.
- Enhance the use of geospatial information as a service in Env. Observation:
  - Two-ways communication
  - Mobility
- Sensors in Smartphone





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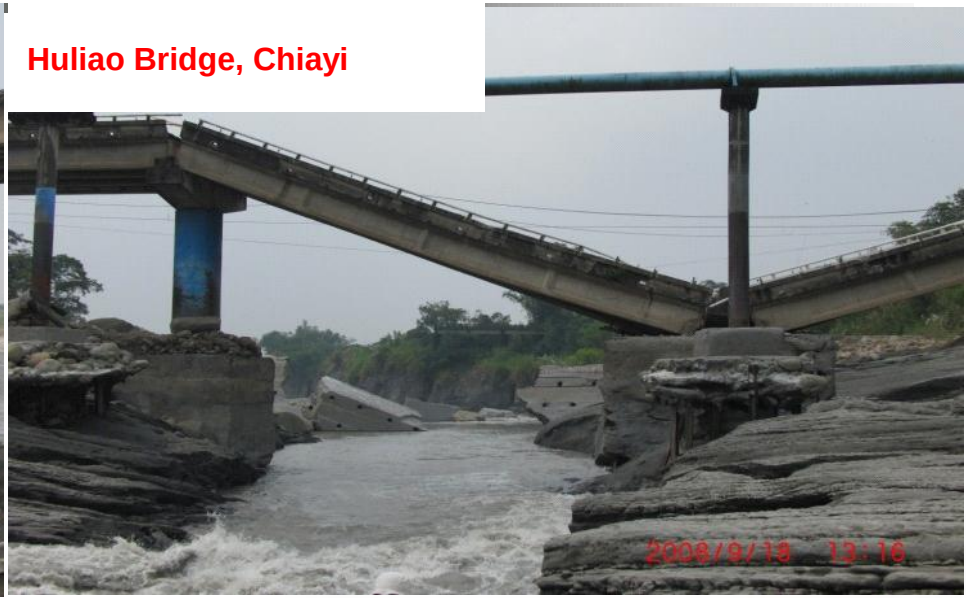
Source: NCREE

Cases (2008.9.6 Sinlaku)

Ho-Fon Bridge, Taichung

Huliao Bridge, Chiayi



Jiashian Bridge Kaoshiung

Niumeng Bridge, Nantou

Source: NCREE

Cases (2009.8.8 Morakot)

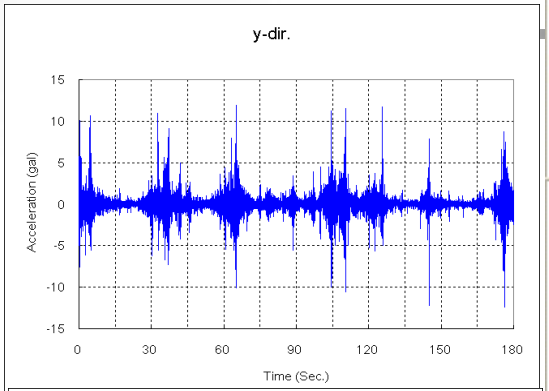
Chiwei ,Kaoshiung

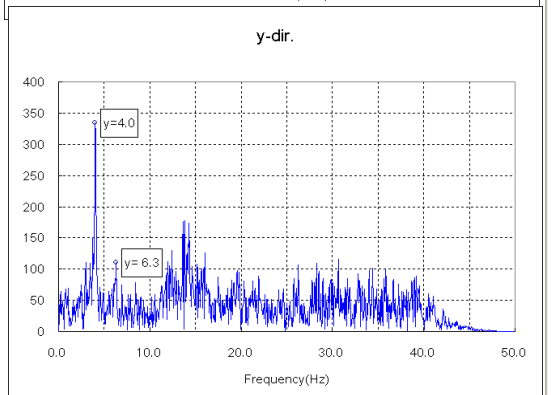
Xuanyuang Bridge, Kaoshiung

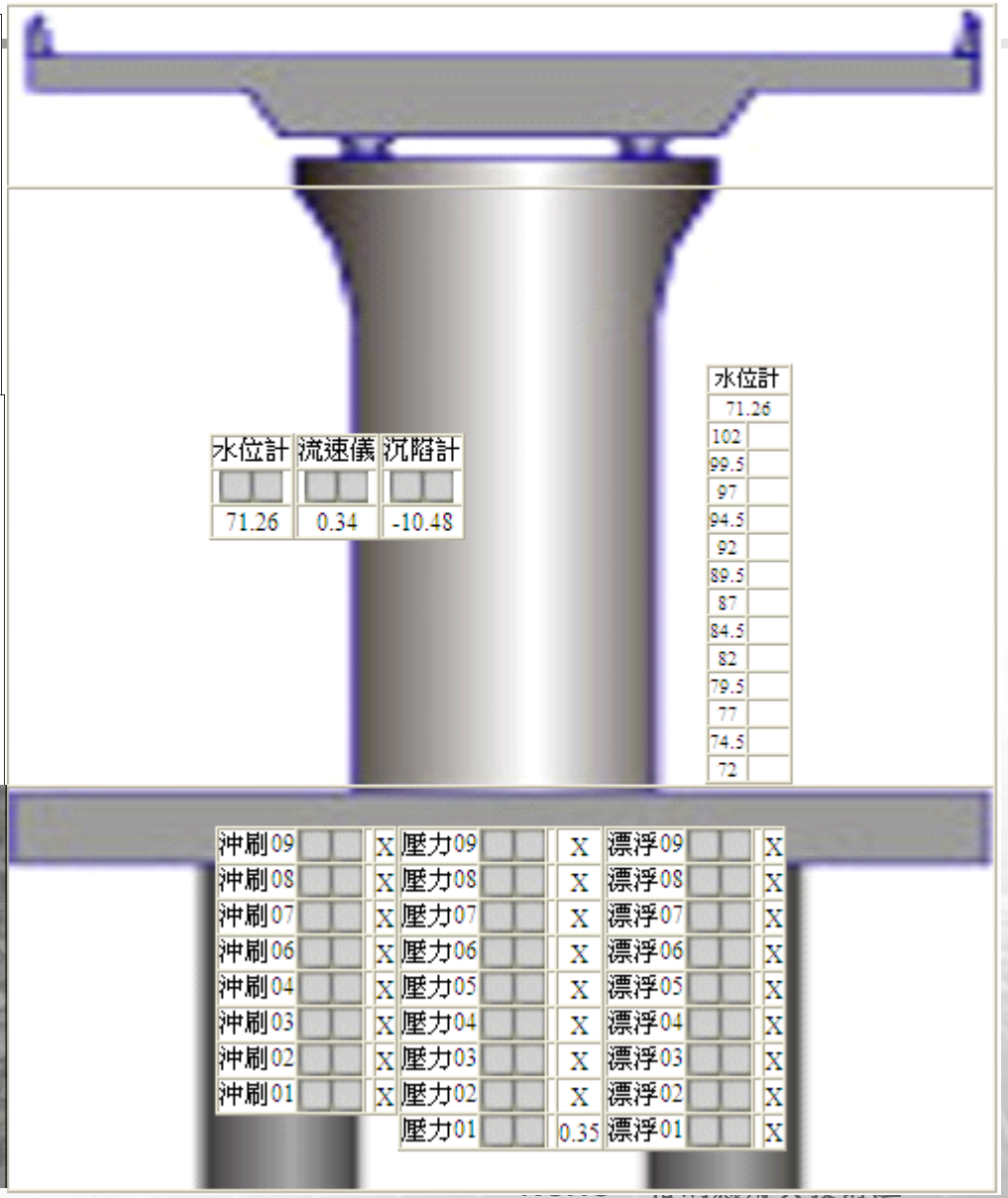
Taiyi Bridge, Pingtung

Laiyi, Pingtung

Source: NCREE

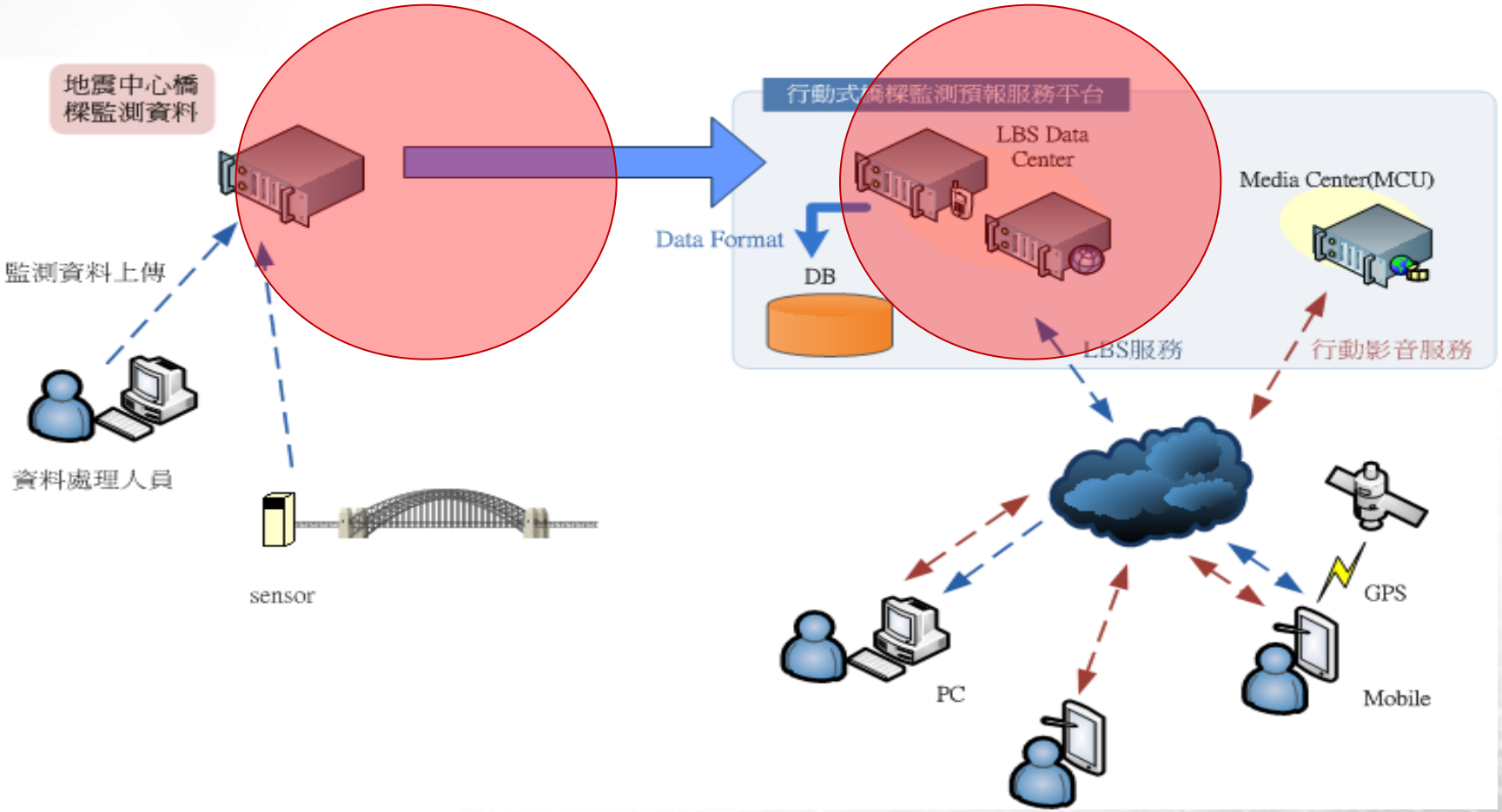






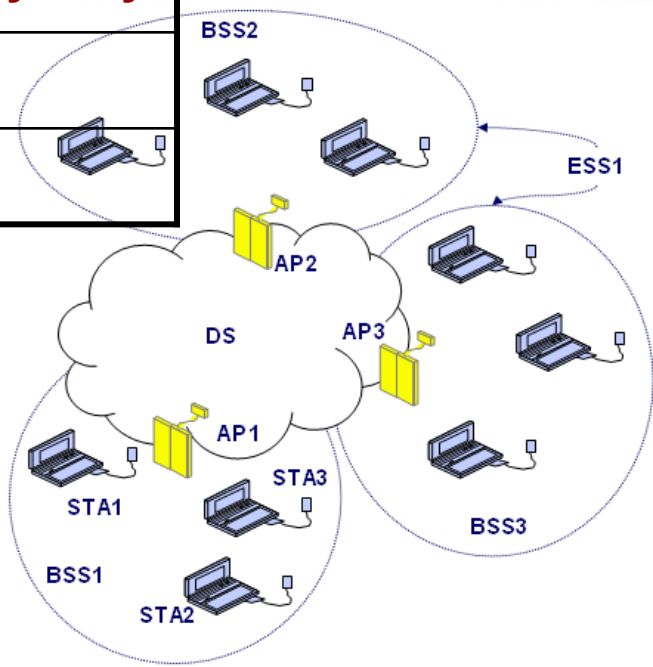
Source: NCREE

System Architecture



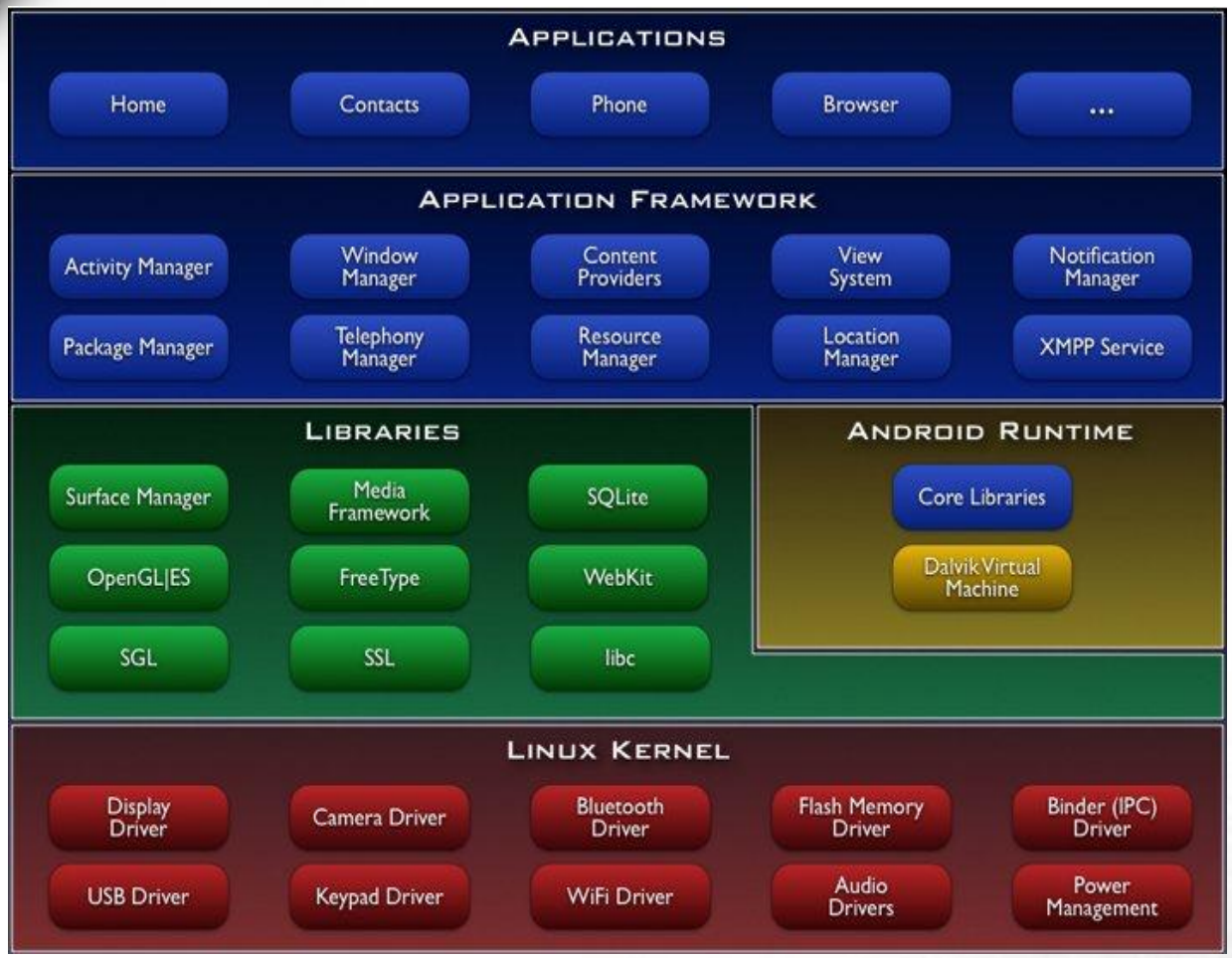
Last Mile Comm.: WiFi+3.5G, WiMax+3.5, LTE or Others

	WiFi IEEE 802.11	WiMax IEEE802.16	3.5G
Max speed	100Mb/11n	70~100Mb	2~10Mb
Range	100m/25km	40km	300m~km
Coverage	Indoor/outdoor	Indoor/outdoor	mobile
users	hundreds	thousands	everybody
service	Yes	Yes	Yes
License	No	No?	Yes



- WiMax (Worldwide Interoperability for Microwave Access) is based on 802.x
- LTE (Long Term Evolution) is from 3GPP based on 3G infrastructure

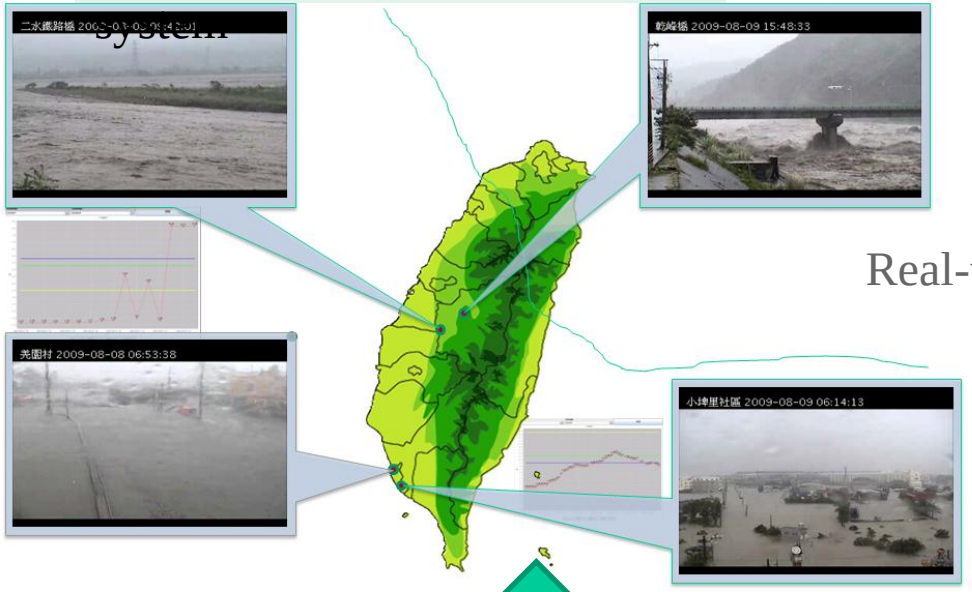
Android architecture



What tickles:
- Open Standard
- Broad Connectivity
  - -Phone & IP networks
- Rich mobile sensors
  - - Positional
    - - Accelerometer
    - - Orientation
    - - Geospatial
  - - Electromagnetic
    - -Magnetic
    - -Ambient

Hazard mitigation GRID System
Applied Android-based Mobile device

Hazard mitigation GRID



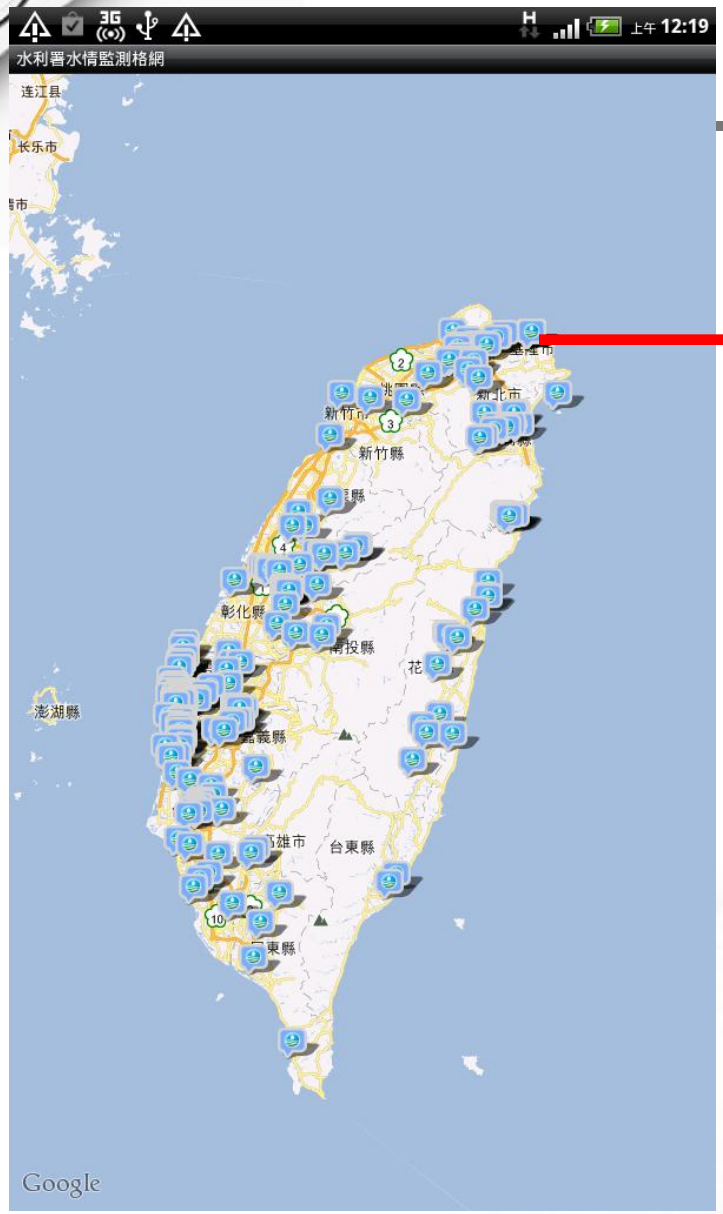
Real-time monitoring

Flood watching and remote device control

LBS for disaster warning system.
Earthquake, flood, and dangerous bridges, etc.

Disaster report

GPS + Video Stream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澎湖縣
嘉義縣
台東縣
Google


上午 12:57
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2
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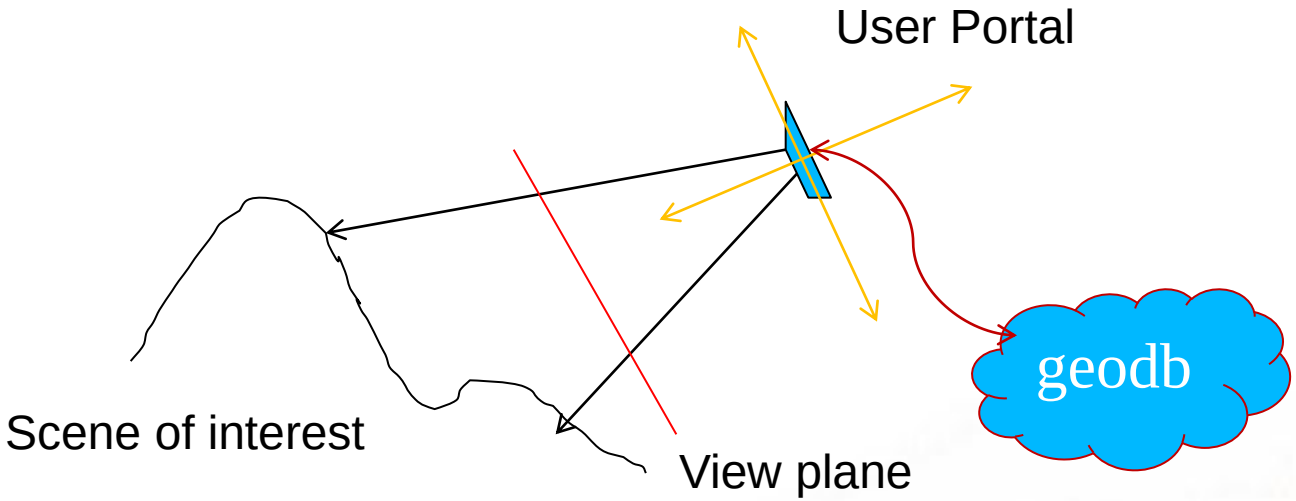
圓山抽水2
OK

App in Visualization (from PRIME Project)



Sensors: Camera, Gyroscope, Accelerometer, (GPS coords)

- **Software:** ARToolkit, AndAR, COVISE, OpenSceneGraph
- **Hardware:** Acer Iconia Tab A500, Android 3.0 (Dual core 1GHzARM Cortex-A9 Processor, ULP GeForce GPU and Tegra 2 T20 Chipset)