Chengdu Forum on UN-GGIM

The Roles and Challenges of National GI for Enhancing Adaptive Capacity of Urban Flood Disaster

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01 The roles of National GI for disaster management

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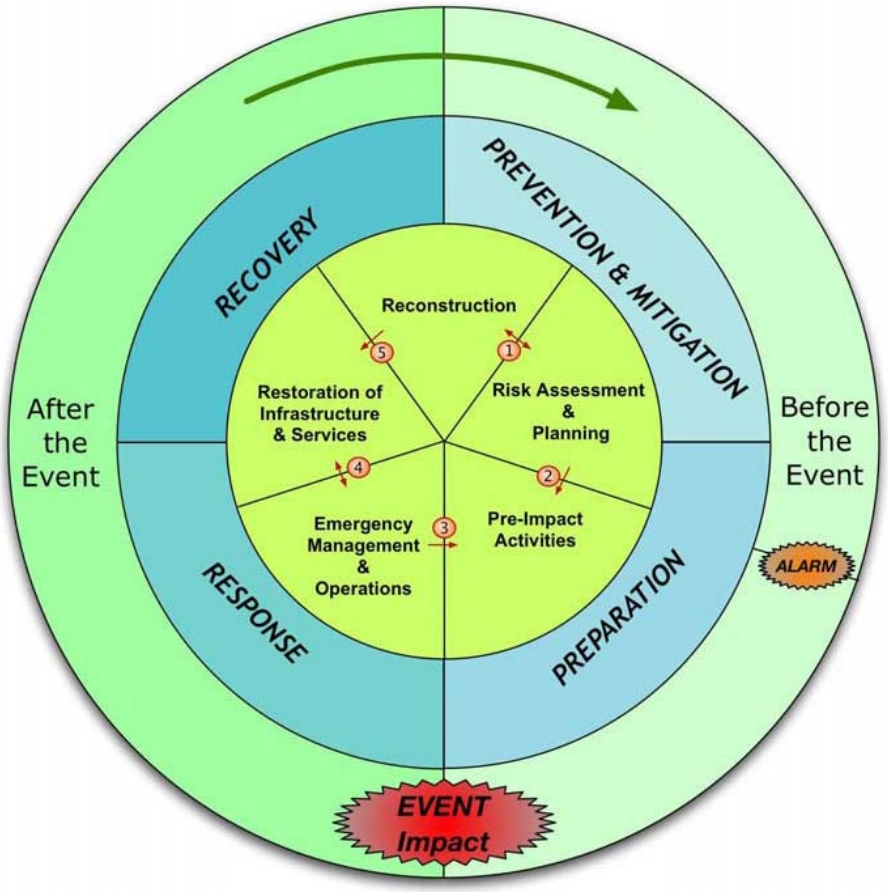
03 Emerging mapping tools for disaster events collection

The roles of National Geospatial information for Flood Disaster Management

GI in the Disaster Cycle

- **Analyse and Visualise static and incident specific dynamic GI**
- **Share situational awareness map**
- **Take actions pre-disaster or post-disaster**



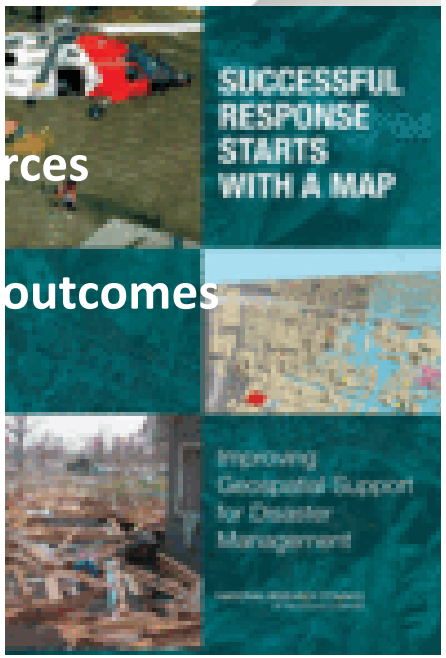
The component of Disaster Mgmt.

- Hazard Analysis (disaster history, analysis)
- Vulnerability Analysis (historical/community experience, technical evaluation, land-use, standards, disaster specific vulnerabilities)

- Prevention and mitigation
- Preparedness
- Prediction and warning
- Response
- Recovery

Requirements for Disaster Mgmt.

- The five major characteristics of Disaster
  - Large, rapid-onset incidents relative to the size and resources of an affected jurisdiction
  - Uncertain with respect to both their occurrence and their outcomes
  - Risks and benefits are difficult to assess and compare
  - Dynamic events
  - Relatively rare

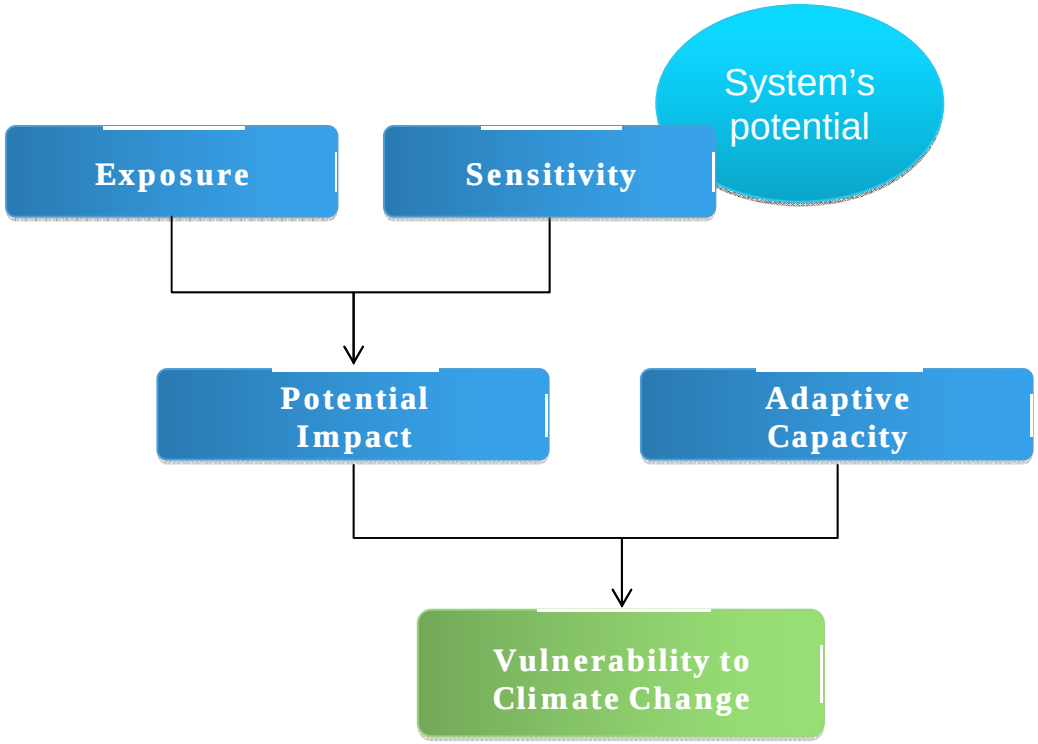


- The bottlenecks in disaster management
  - Difficulty to communicate with difference actors; integration of data
  - Lack of meta-data; platform for data exchanges
  - Variety of narrow specialized systems only for emergency situations
  - Management of information from field (reports, images, video, etc)
  - Access to existing data is generally very slow.

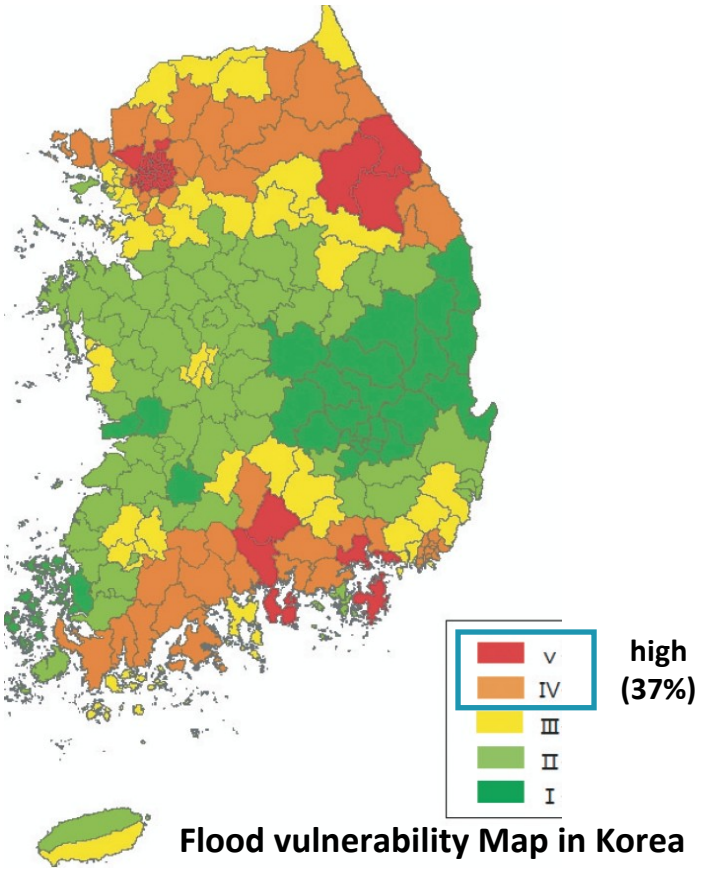
The Needs for reliable and seamless geospatial information platform to support decision makers

IPCC & Flood Vulnerability

- The Vulnerability to climate change is defined by IPCC(2007)
- Conduct spatial analysis of Flood Vulnerable Regions through climate expose and potential flooding vulnerability
- High flood vulnerable municipals : 92 no. / 232 total , 37%
- Caused by development of low land and impervious areas of urban areas

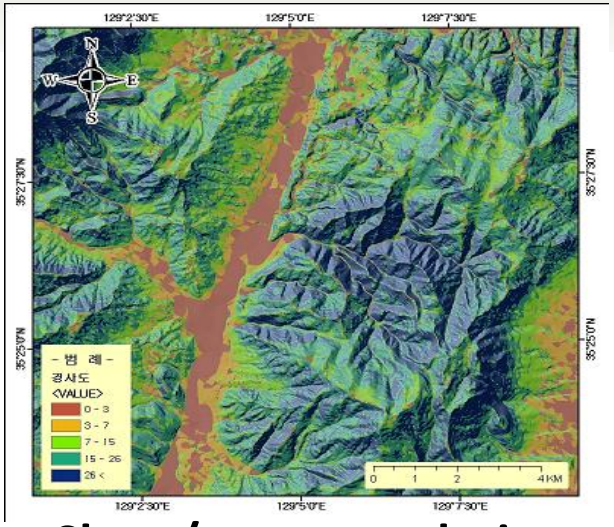


IPCC(Intergovernmental Panel on Climate Change)

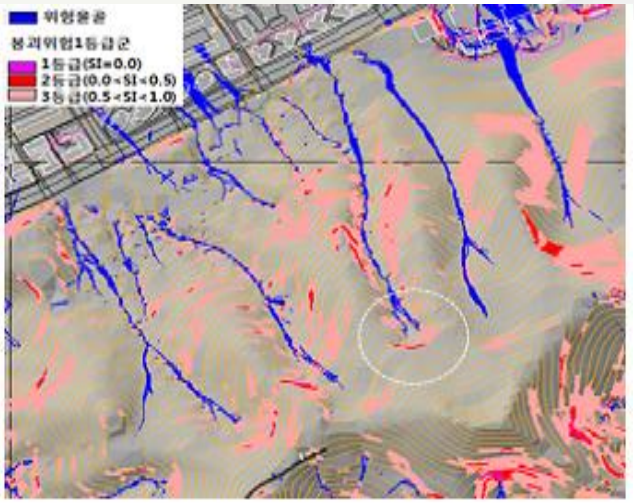


Flood vulnerability Map in Korea

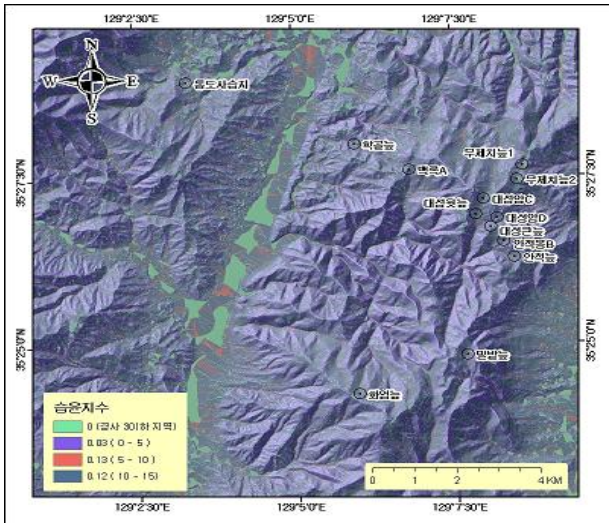
Thematic Maps



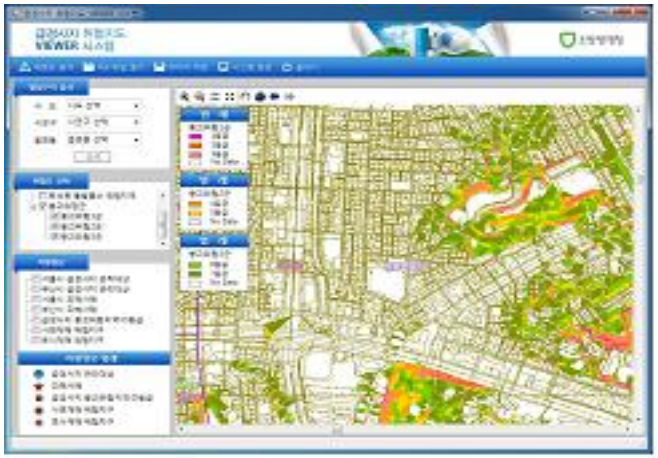
Slope/aspect analysis



Collapse or Erosion risk map

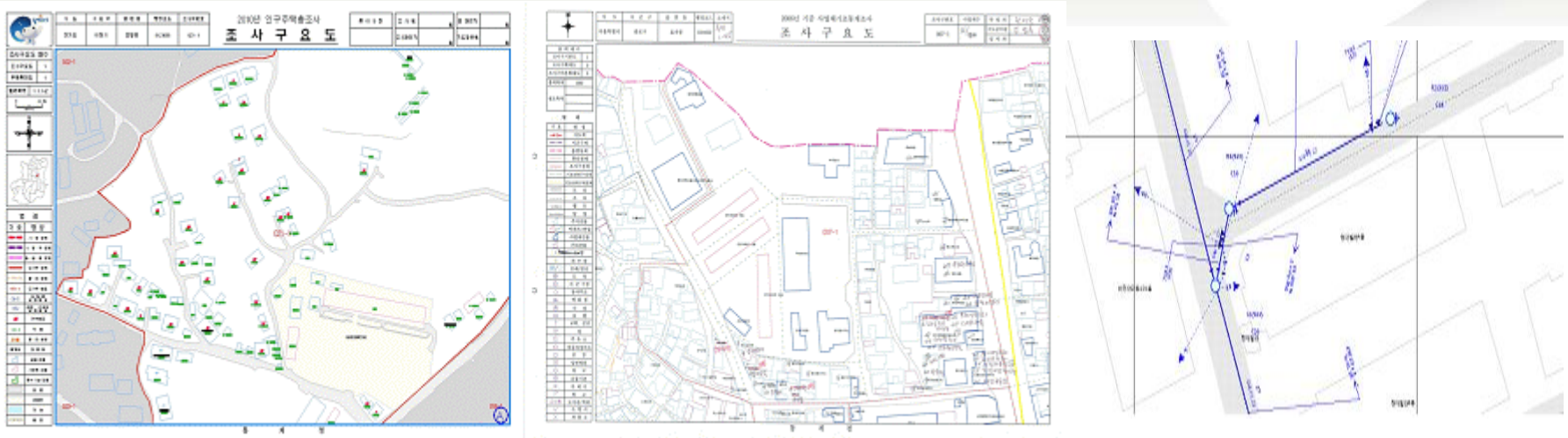


Wet index map

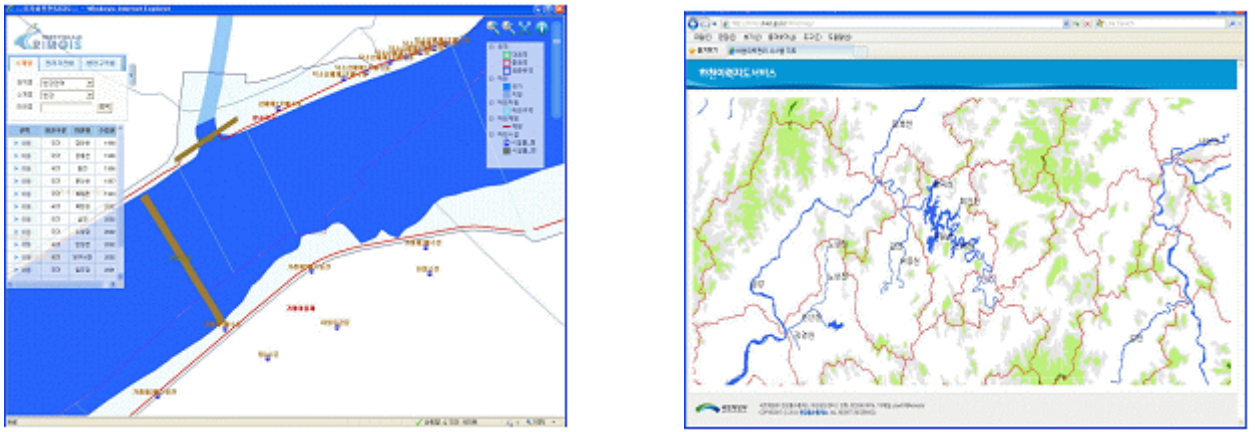


Landslide hazard map

Thematic Maps



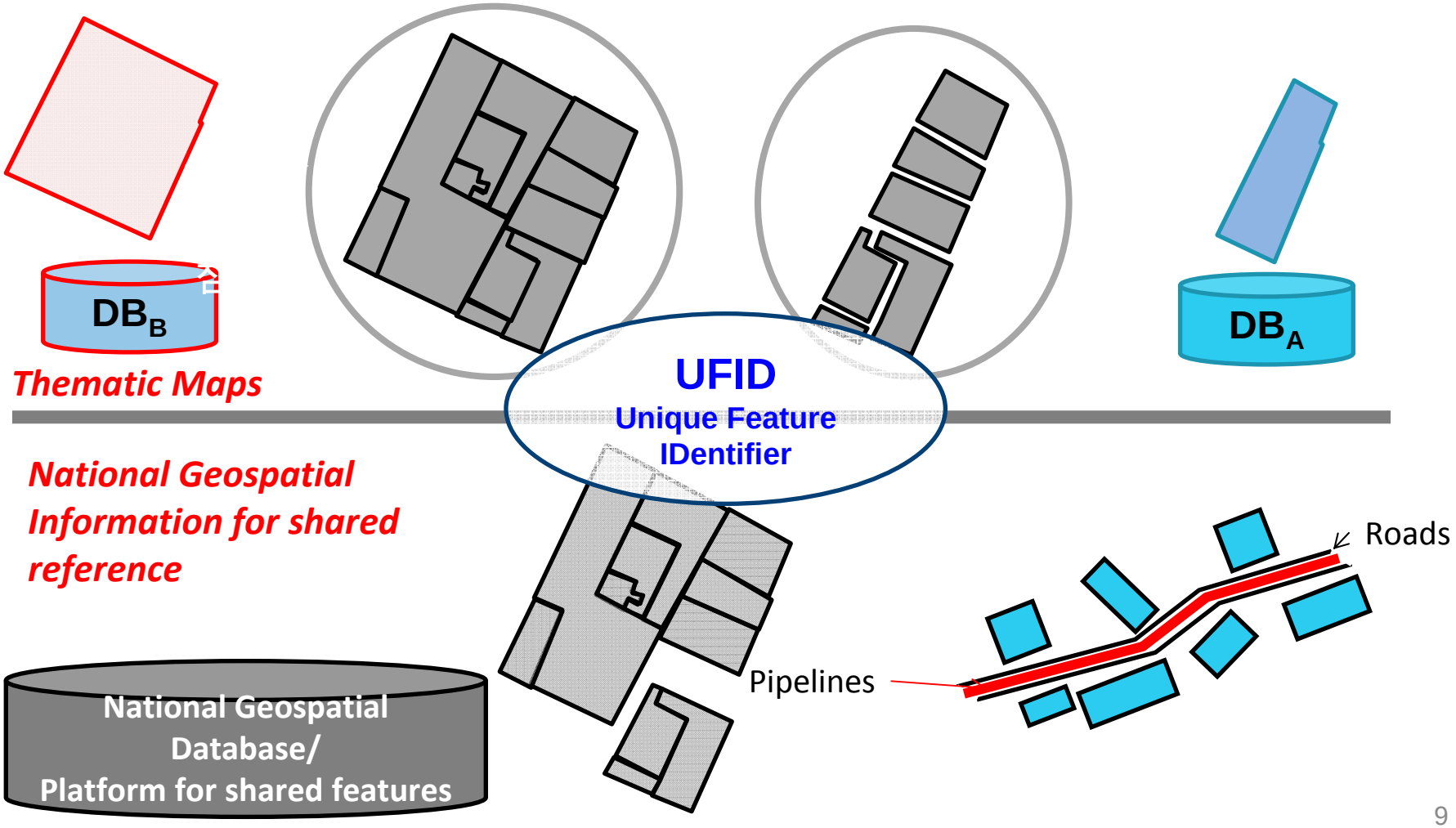
Statistic survey map for damage estimation



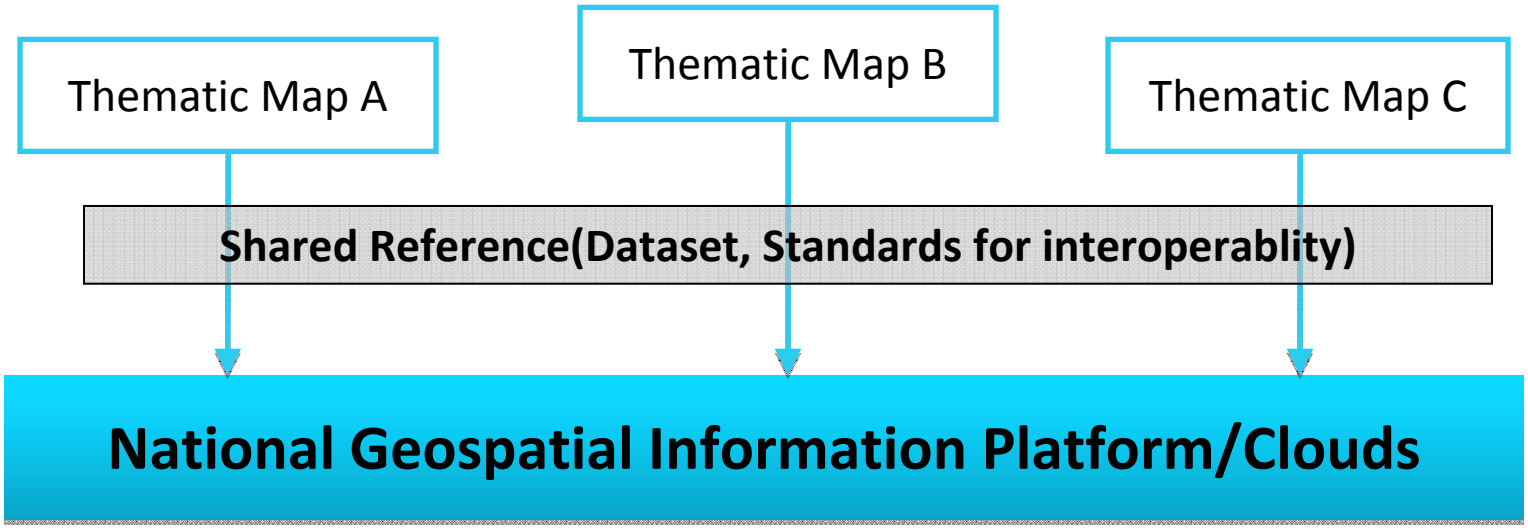
River level & history management system

Consistency of Thematic Maps

The Difficulty of data consistency in integrating or overlying various thematic map



National GI-based Thematic Maps



- Maintain consistent geospatial information
- Decrease in duplication of developing geospatial data
- Supervise related data-set in the moment revision

Time-series datasets

Collaboration with Agencies

Central Government

Policy plan to support preparedness, mitigation, etc

NEMA

Assess & Respond
Recovery action, etc

Municipals Office

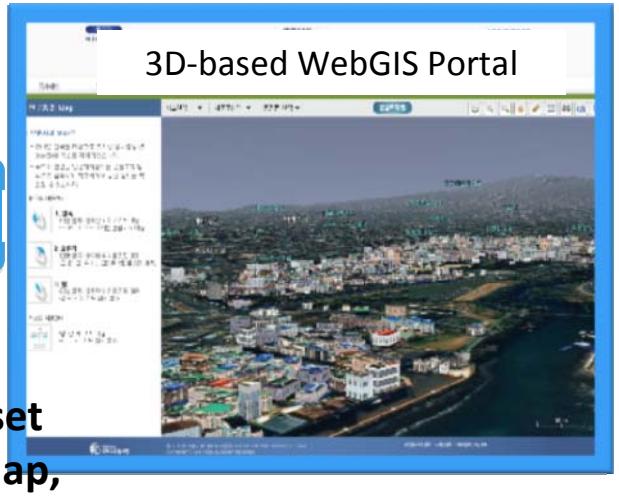
Respond, Recovery,
Re-construction action, etc

NGII

Support to Dataset
(National base-map,
Thematic maps)
& Spatial Analysis

Land Portal

On-Map



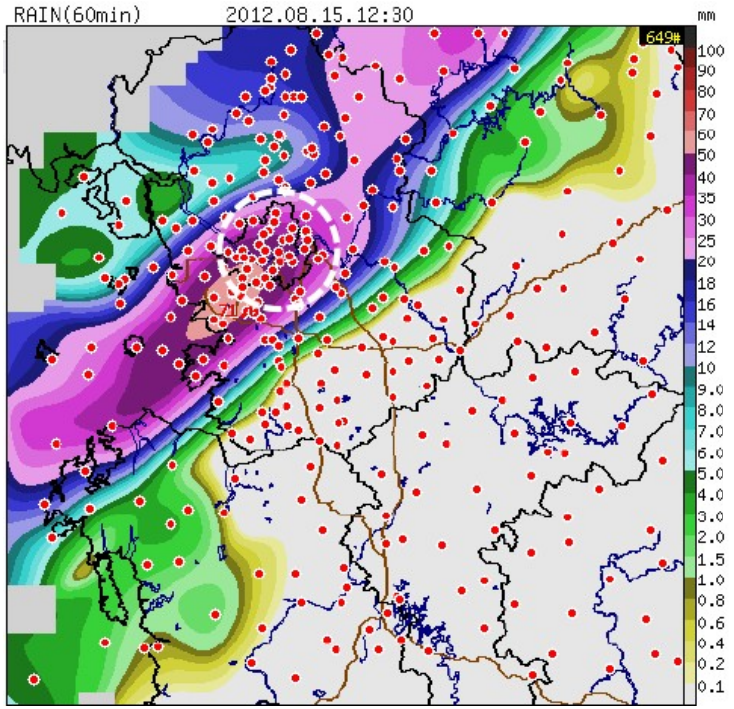
Improve Accessibility and make user-friendly environment

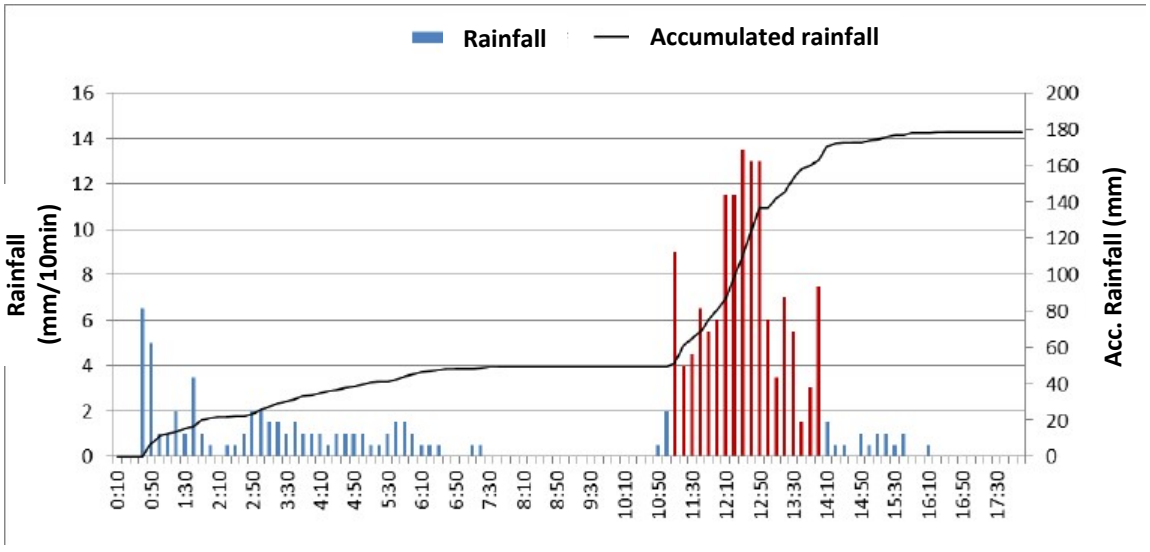
2

Sustainable urban design with National GI-based flood simulation

Urban Flooding Case at Seoul

- **Heavy rainfalls occurred at Southern areas of Seoul, 2012. 8. 15**
- **Observed 178.5mm as accumulated rainfalls (55.5mm in max. rainfall per hrs)**
- **Concentrate on Gang-nam district as 73.9% of total rainfall during 3 hours**





Urban Flooding Case at Seoul

Landslide (dead : 16men, missing : 3men, evacuation: 400men)

Landslide and Houses damage near Umen-mountain, Seoul, 2012

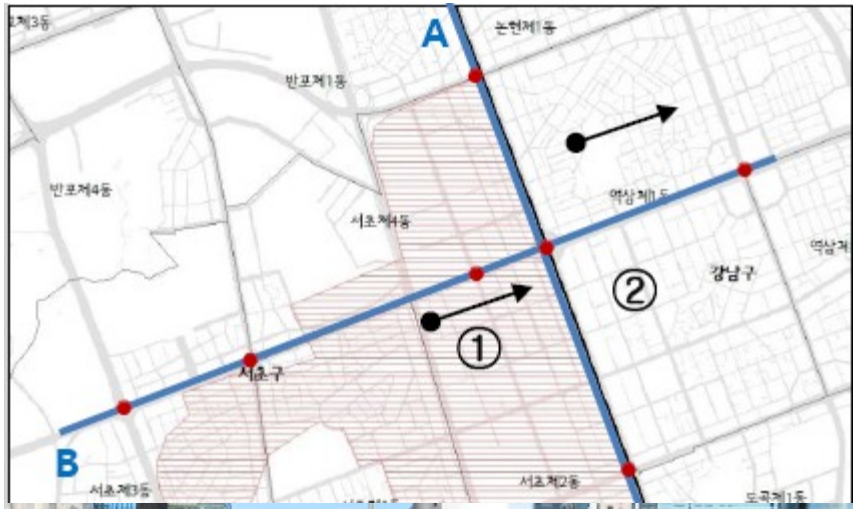
Flooding

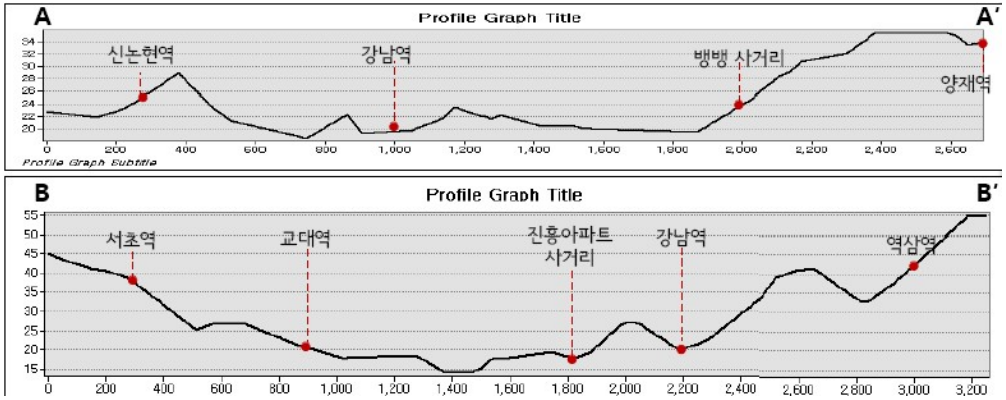
Urban flooding at Gang-nam and Main road flooding near Han-river, 2012

Weak Urban Structure ?

#1 Topographic Analysis

- Lowland with wide catchment area
  - Cross-Section A : mid-slope & wide catchment area
  - Cross-Section B : steep-slope & lowland area in metro station

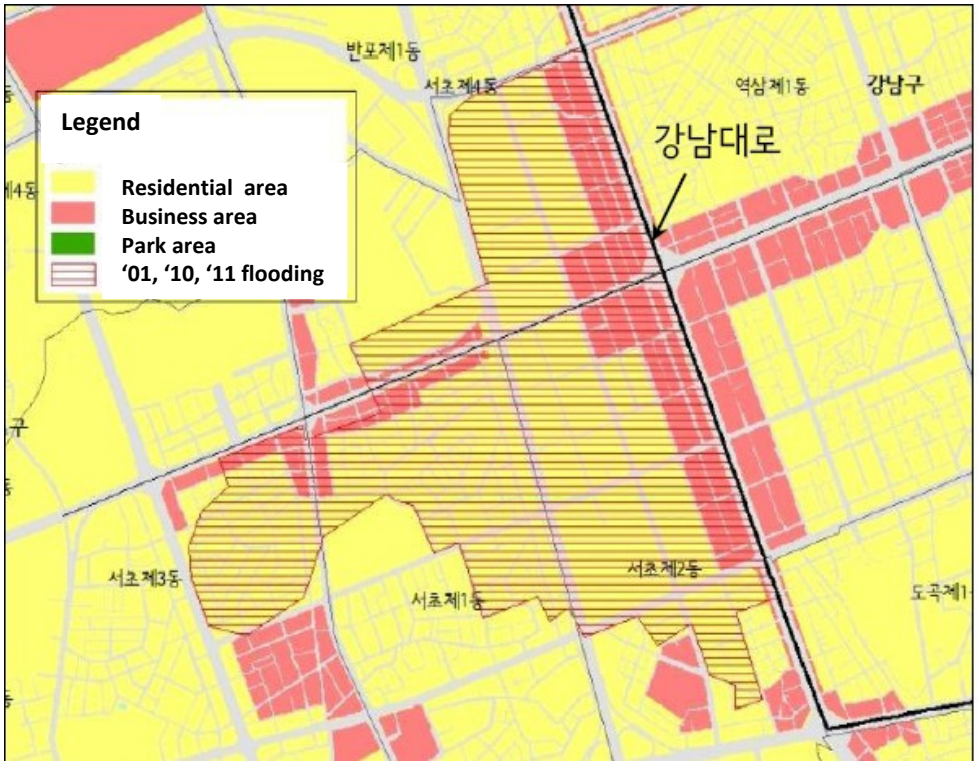




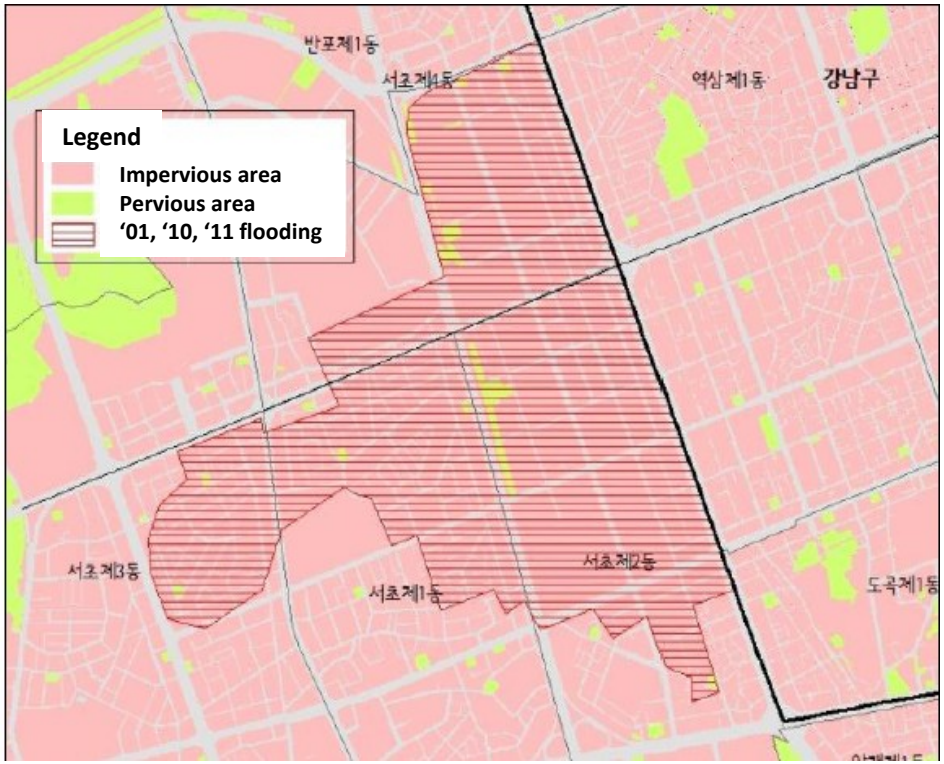
#2 Land-use Analysis

- Mainly Residential area in Gang-nam district
- Highly potential of Flooding casualties near Gang-nam boulevard

- Increase maximum runoff because of lowland and high impervious areas



Land-use in Gang-nam, Seoul

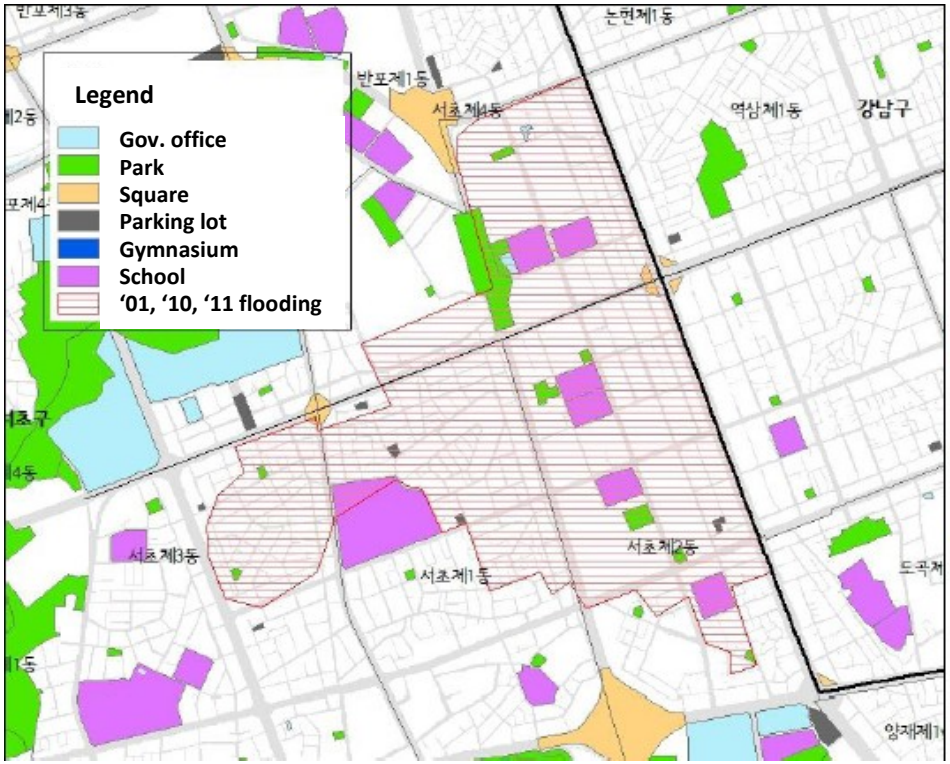


Impervious area in Gang-nam, Seoul

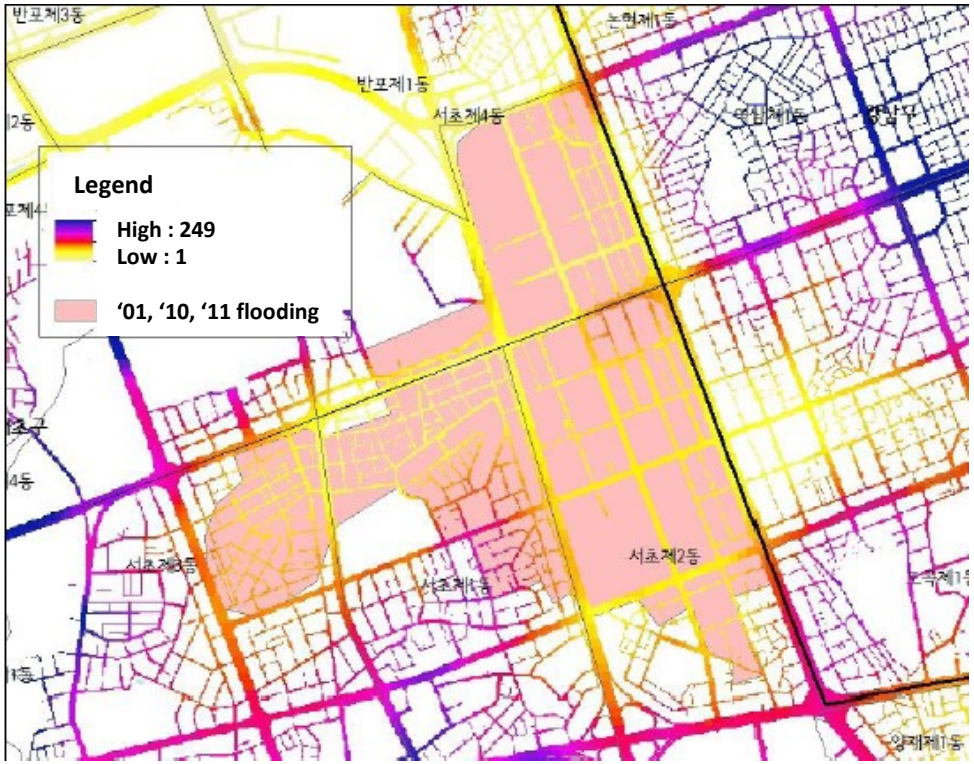
#3 Facility Location Analysis

- **Bad Storm-water retention capabilities of urban infrastructure**
- **Rain-water is concentrated because of high elevation of nearby road**

Where is Drain way or Reservoirs or Capacity ???



Urban Infrastructure in Gang-nam, Seoul



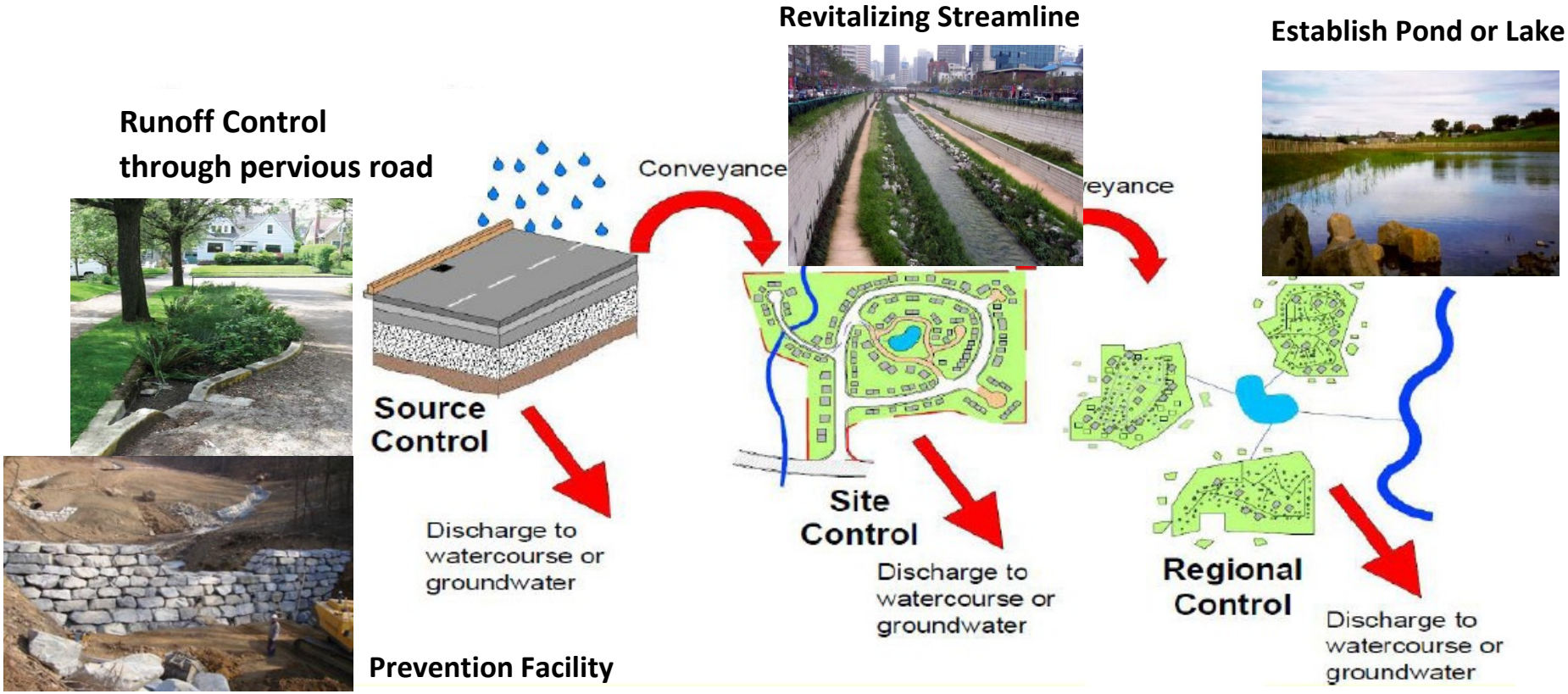
Elevation of nearby road in Gang-nam, Seoul

Urban Design for Disaster Mgmt.

- Alternative urban design with flooding simulations by GI in cooperative manner

- Control Source – Site – Region through hydro-geospatial analysis
- Multi-layered urban stream-line design for run-off's delay

Master plan for urban design included in disaster prevention action-plan



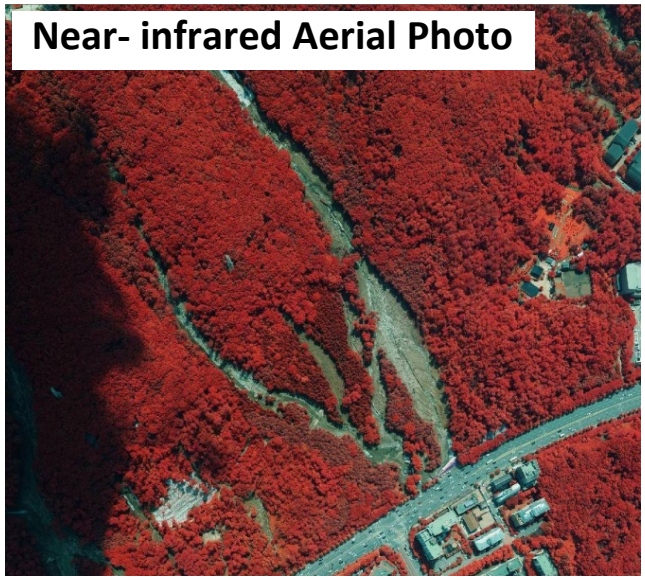
3

Emerging mapping tools for disaster events collection

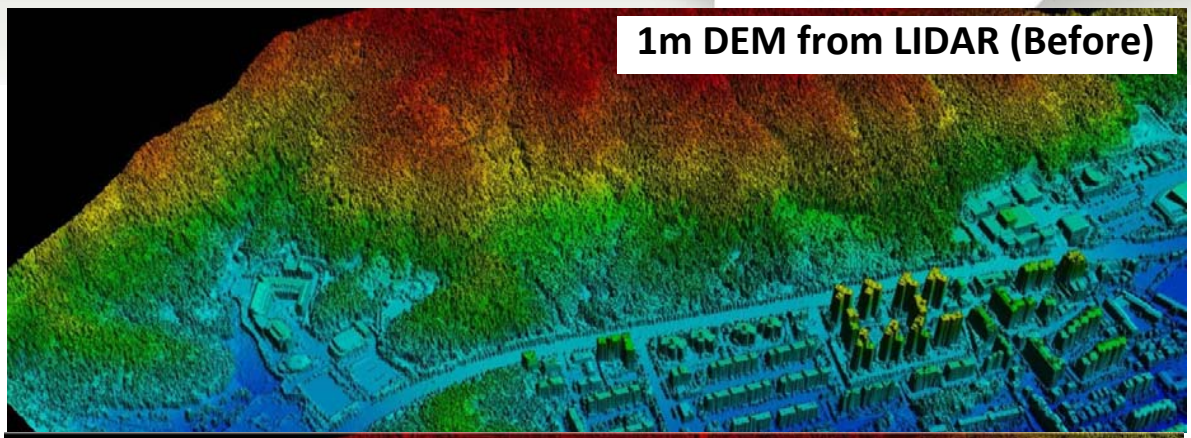
Aerial Photo

Digital Aerial Photo (10cm)

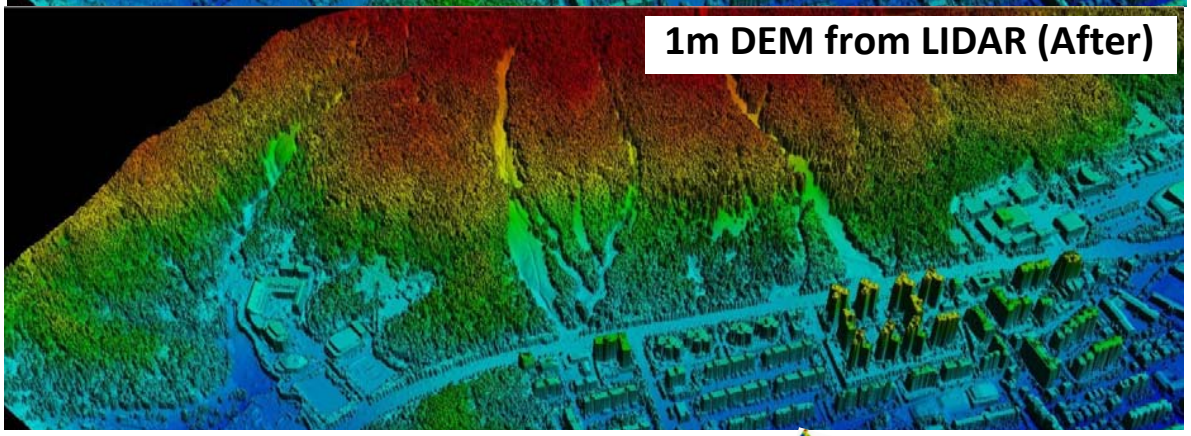
Near- infrared Aerial Photo

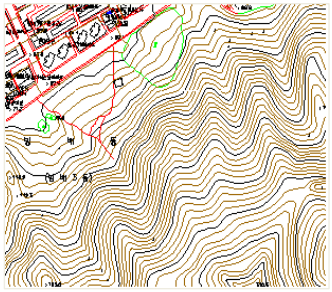


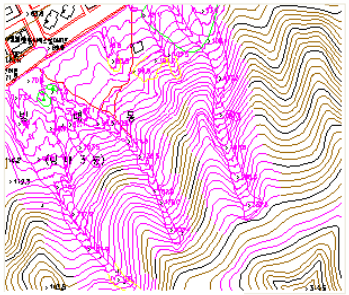
1m DEM from LIDAR (Before)



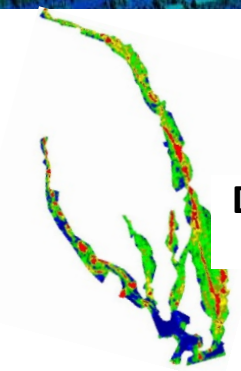
1m DEM from LIDAR (After)







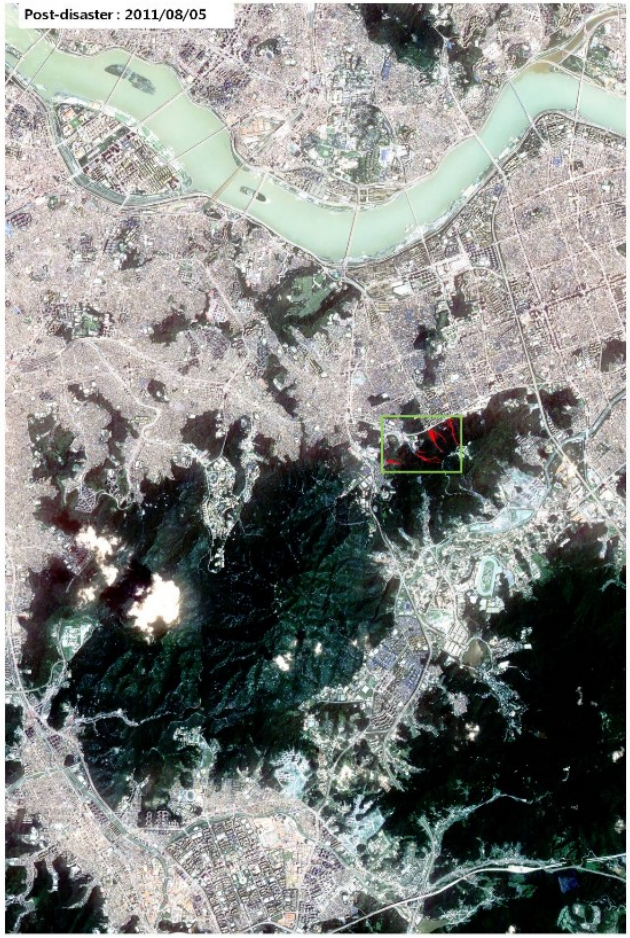
Revision of National Map



Debris flow analysis

Satellite Image

International Charters for Space and Major Disasters



KOREA SEOUL AREA
Landslide Post- Disaster
Charter Call 367

Location Diagrams

Legend

Landslide damaged area

Cartographic Information

Local projection : UTM Zone 52N
Datum : WGS84
Kilometers
Geographic projection: Lat/Long (DMS)

Data Sources

SPOT-5 (10m) acquired the 5th of May 2011
© CNES 2011 distribution ASTRIUM/SPOTIMAGE 2011
Formosat-2 (8m) acquired the 5th of Aug. 2011
© NSPO 2011 distribution ASTRIUM/SPOTIMAGE 2011
Vector data © Google Earth 2011

Framework

All geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials.
No liability concerning the content or the use thereof is assumed by the producer.
Map produced the 17th Aug. 2011 by KARI.

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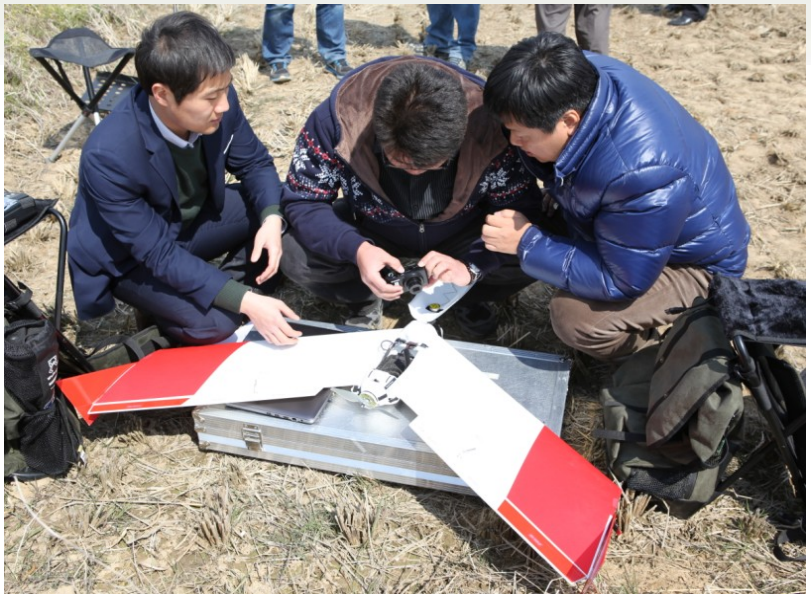
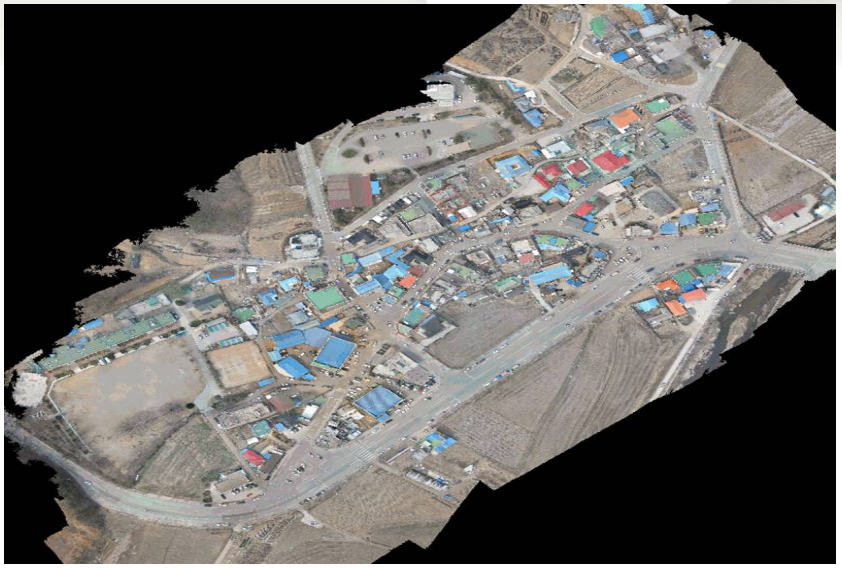
http://www.kari.re.kr

Collaboration

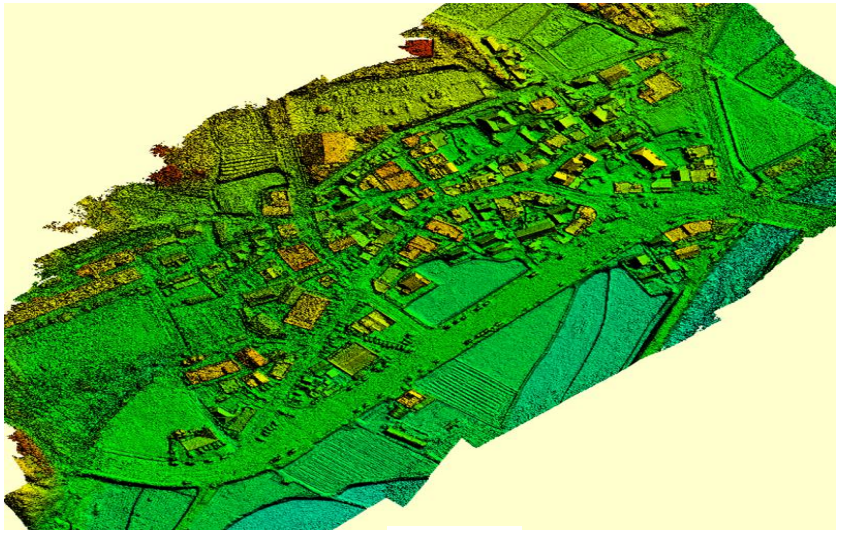
UAVs





Aerial photo (500 m * 300m)

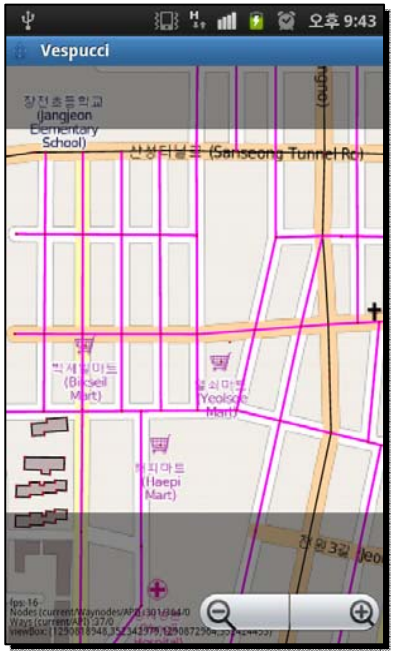
Glider/Helicopter type UAVs (150-300m, 20cm)



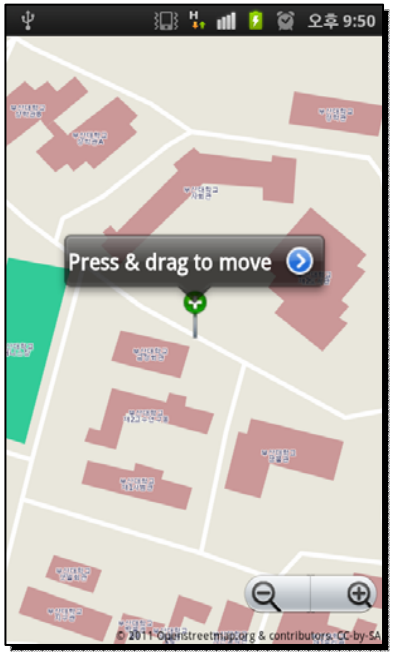
DEM

Volunteered GI

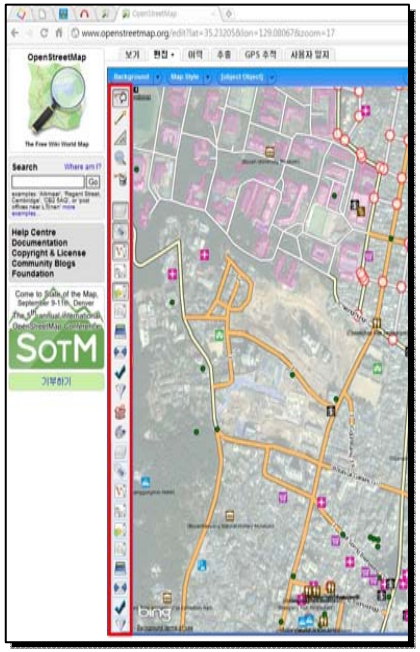
Participation



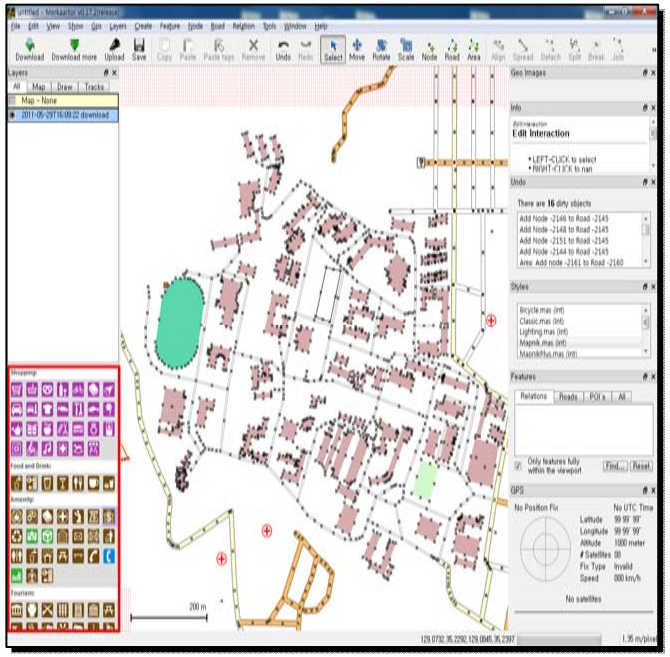
Vespucci



Mapzen POI Collector

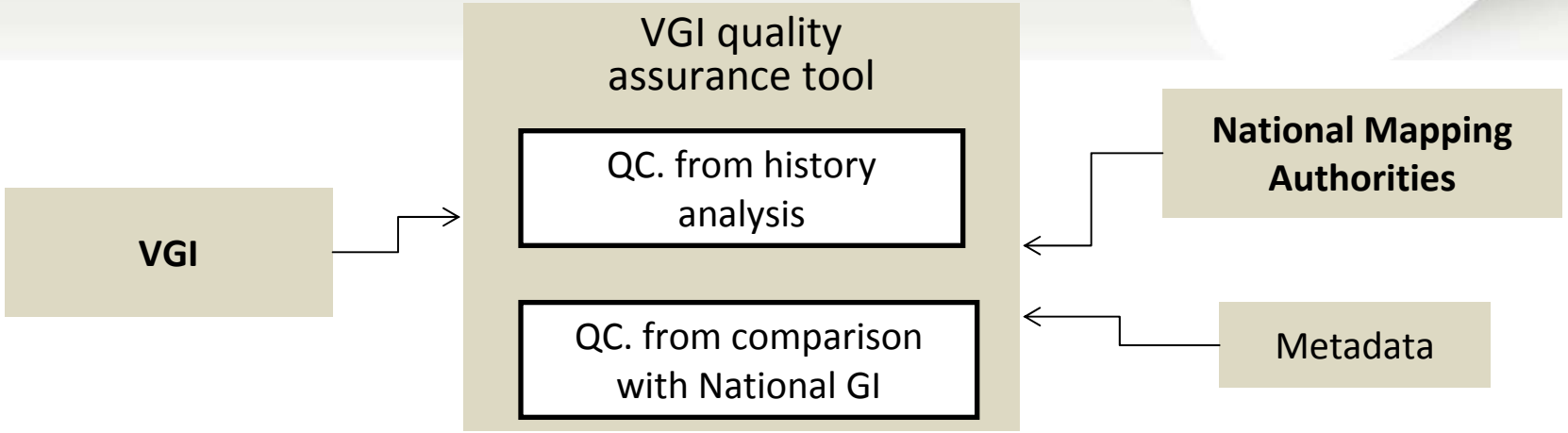


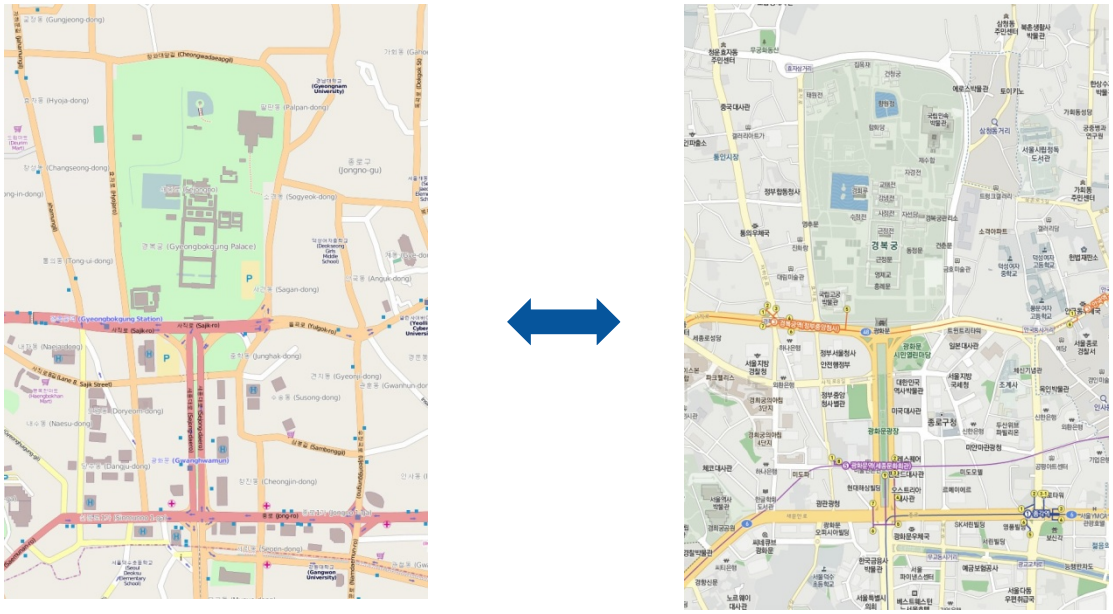
PotLatch



Merkaartor

Quality Assurance in VGI





Example in Korea – OSM and National Map(POI)

Lesson Learned……

Global Issues, Problems, ……..

Collaboration among diverse organisations

The Public Participation

Standards, Shared datasets, Tools, Platform, Clouds

UN-GGIM Initiatives

The Roles and Challenges of National Geospatial Information for Enhancing Adaptive Capacity of Urban Flood Disaster

THANK YOU FOR LISTENING!