

Sediment Disasters and Mass Movement

- Progress and application -






Tai-Hoon Kim

National Disaster Management Institute
Ministry of Public Safety and Security

Contents

- **Main goals of the theme**
- **Issuance of warning**
 - Identification of disasters
- **Improvement of capacity**
 - ODA project in the Philippines
- **Disseminating information**
 - Safety map
 - Life friendly safety services

Main goals of the theme

- Develop the **Integrated Management Platform** on sediment disasters
 - Connecting with;  **System**
 -  **Policies**
 -  **International cooperation**
- Three perspectives
 - Issuance of warning
 - Improvement in capacity
 - Optimization of disseminating information

Main goals of the theme

- Adjustment of Workplan

WORKPLAN: Sediment Disasters and Mass Movements

Tai-Hoon KIM

Activities	Actions	Outputs	Resources	Milestones	Linkages
1. Issuance of landslide/debris flow warnings and consistently improving upon them	<ul style="list-style-type: none"> - Collect and disseminate materials for assessment of sediment disasters (Priority A) - Investigate warning technologies based on adaptive concepts (Priority B) - Generate sediment disasters risk map (Priority C) 	<ul style="list-style-type: none"> - Guidance materials for implementation of adaptive sediment disasters risk management tools with identification, reduction, and evacuation 	<ul style="list-style-type: none"> - Republic of Korea (ROK) - National Disaster Management Institute (NDMI) 	<ul style="list-style-type: none"> - Case study report for present systems for sediment disasters management by <u>May 2015</u> - Analyzing models for the integrating system by Oct. 2015 - Report for adaptive sediment risk management tools by <u>AUG. 2016</u> 	<ul style="list-style-type: none"> - SOP 2.2.6 - RA2 - WMO Secretariat - ROK (MOSPA and NEMA, etc.) <p style="text-align: center;">↓</p> <p style="text-align: center;">MPSS</p>

Attend Workshop of TC
DRR in May 2015

Activities	Actions	Outputs	Resources	Milestones	Linkages
<p>2. Improvement in capacity for sediment disaster management (2.1.3 in OP)</p>	<ul style="list-style-type: none"> - Attend seminars on sediment disasters in order to communicate and cooperate among member countries (Priority A) - Share and bring related technologies to developing countries (Priority B) 	<ul style="list-style-type: none"> - Workshop on the provision of sharing knowledge for sediment disasters (e.g. Joint Workshop with TC DRR) - ODA projects which transplant knowhow to developing countries <p>e.g. Attend Workshop of TC DRR</p>	<ul style="list-style-type: none"> - Republic of Korea (ROK) - National Disaster Management Institute (NDMI) - WMO/ESCAP Typhoon Committee, Disaster Risk Reduction (TC DRR) 	<ul style="list-style-type: none"> - Report for feasibility survey for ODA projects by April 2016 - Joint Workshop with TC DRR on May 2015 - Strategy plan for distributing adaptive sediment risk management tools by Oct. 2016 - Submission Draft to MG for review (TBA) 	<ul style="list-style-type: none"> - SOP 2.1.3 - RA2 - WMO Secretariat - TC DRR - ROK (MOSPA, NEMA, and KOICA, etc.) <p>↓</p> <p>MPSS and KOICA</p>
<p>3. Optimization of disseminating sediment disasters related information</p>	<ul style="list-style-type: none"> - Collect and analyse disseminating methodologies and related policies for sediment disasters information that alarm people not to be involved to the designated areas 	<ul style="list-style-type: none"> - Standard Operation Plans for sediment disasters information by public broadcasting system and other media (e.g., Facebook, Twitter, etc.) 	<ul style="list-style-type: none"> - Republic of Korea (ROK) - National Disaster Management Institute (NDMI) 	<ul style="list-style-type: none"> - Summary report for present disseminating codes and regulations by June 2015 - Report about the effective disseminating framework by Dec. 2015 	<ul style="list-style-type: none"> - Above SOP - RA2 - WMO Secretariat - TC DRR - ROK (MOSPA and NEMA, etc.) <p>↓</p> <p>MPSS</p>

Issuance of warning

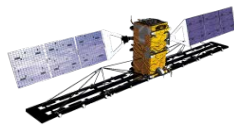
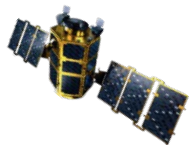
- Collect, review, and develop assessment tools
- Invent warning technologies based on adaptive concepts
- Generate risk map

[Output]

Guidance materials for implementation of risk management tools for identification, reduction, and evacuation

[Current]

Identify the disasters



[Nationwide]



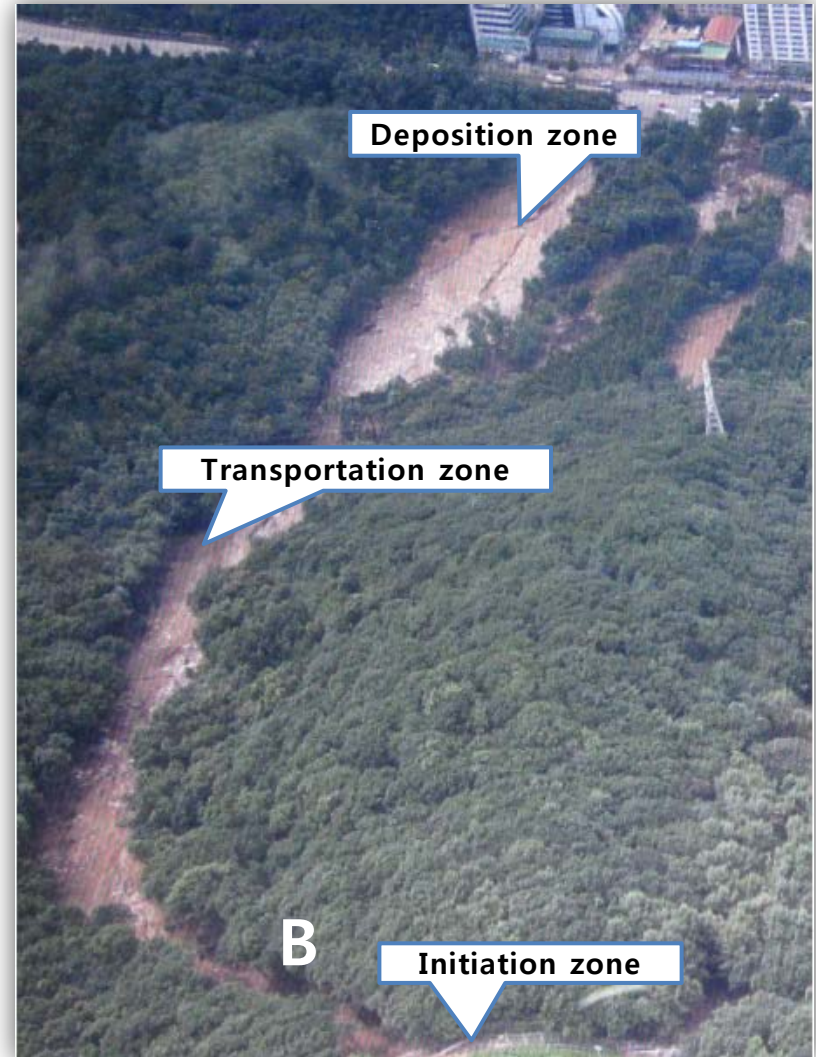
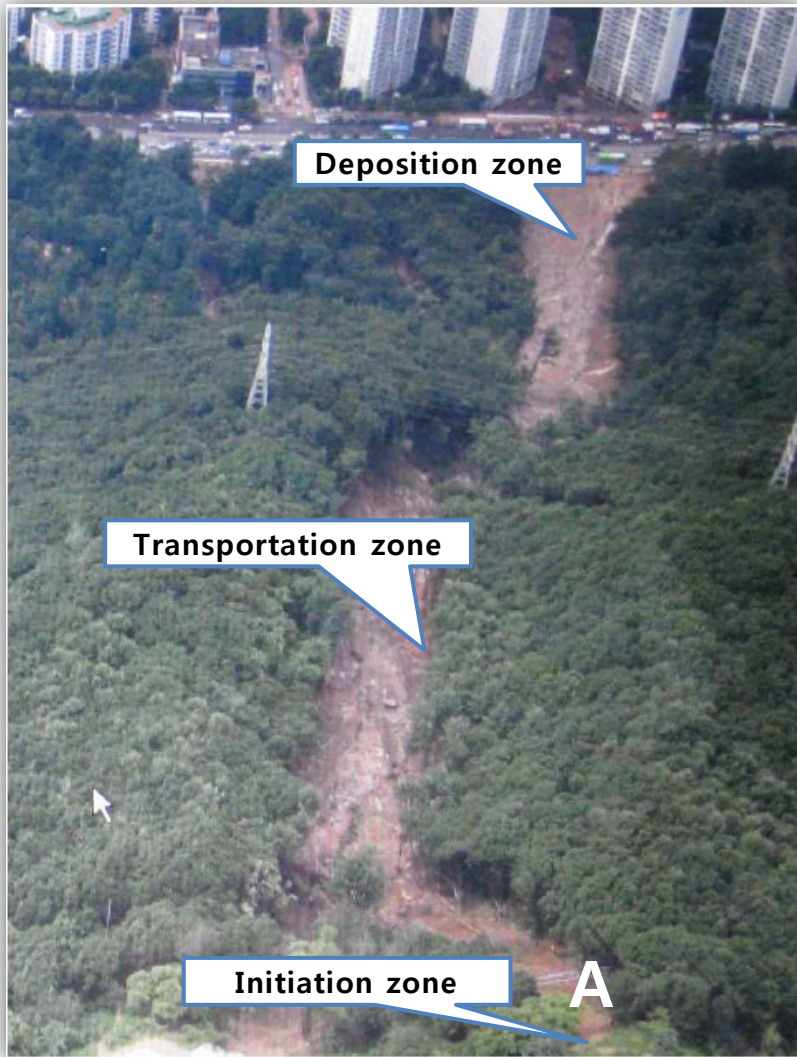
[Local based]

Identification of disasters

- Landslide in Mt. Umyeon (2011)
 - Date: July 27, 2011
 - Casualties: 16
 - Cause: debris flow by heavy rainfall



Identification of disasters



Identification of disasters



Identification of disasters

- Identification of landslides
 - Satellite system
 - Real-time Aerial Monitoring System
 - Micro UAV system
 - Terrestrial LiDAR system



Real-time Aerial Monitoring System



Micro UAV (MD4-1000)

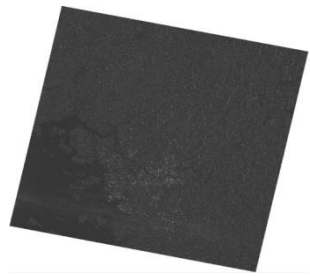


Leica Scanstation 2 Trimble GX Trimble CX

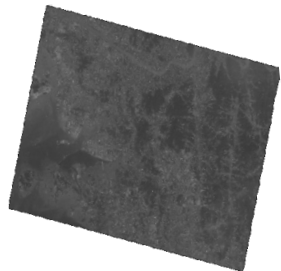
Terrestrial LiDAR system

Identification of disasters

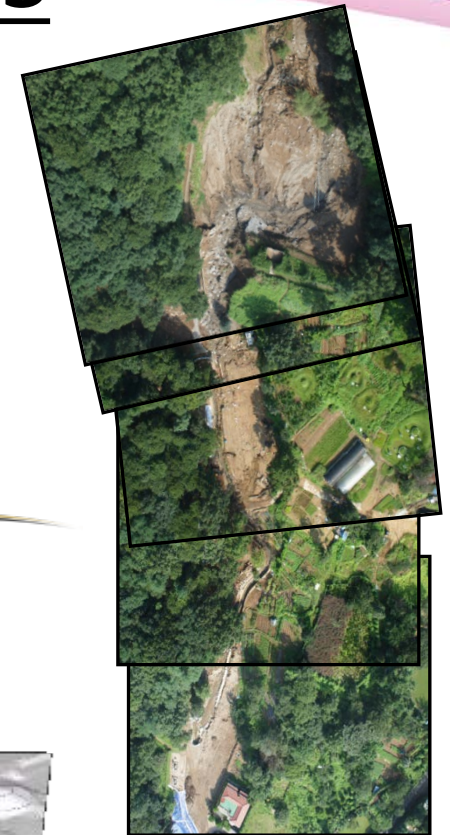
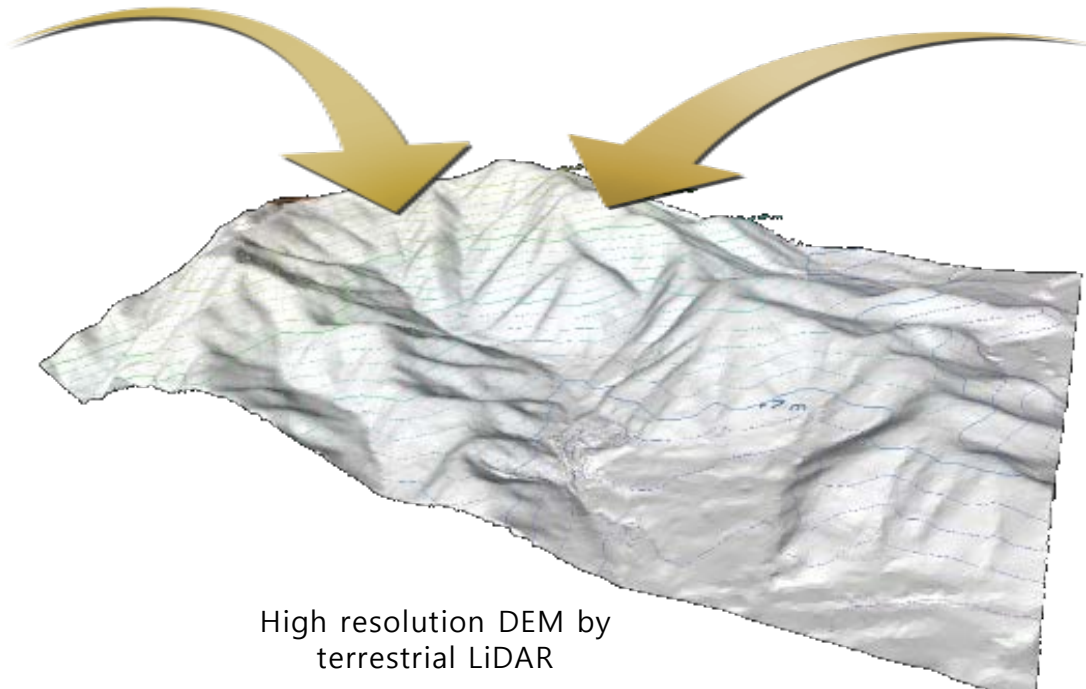
- Acquiring information



Radarsat-1
(Pre-disaster)



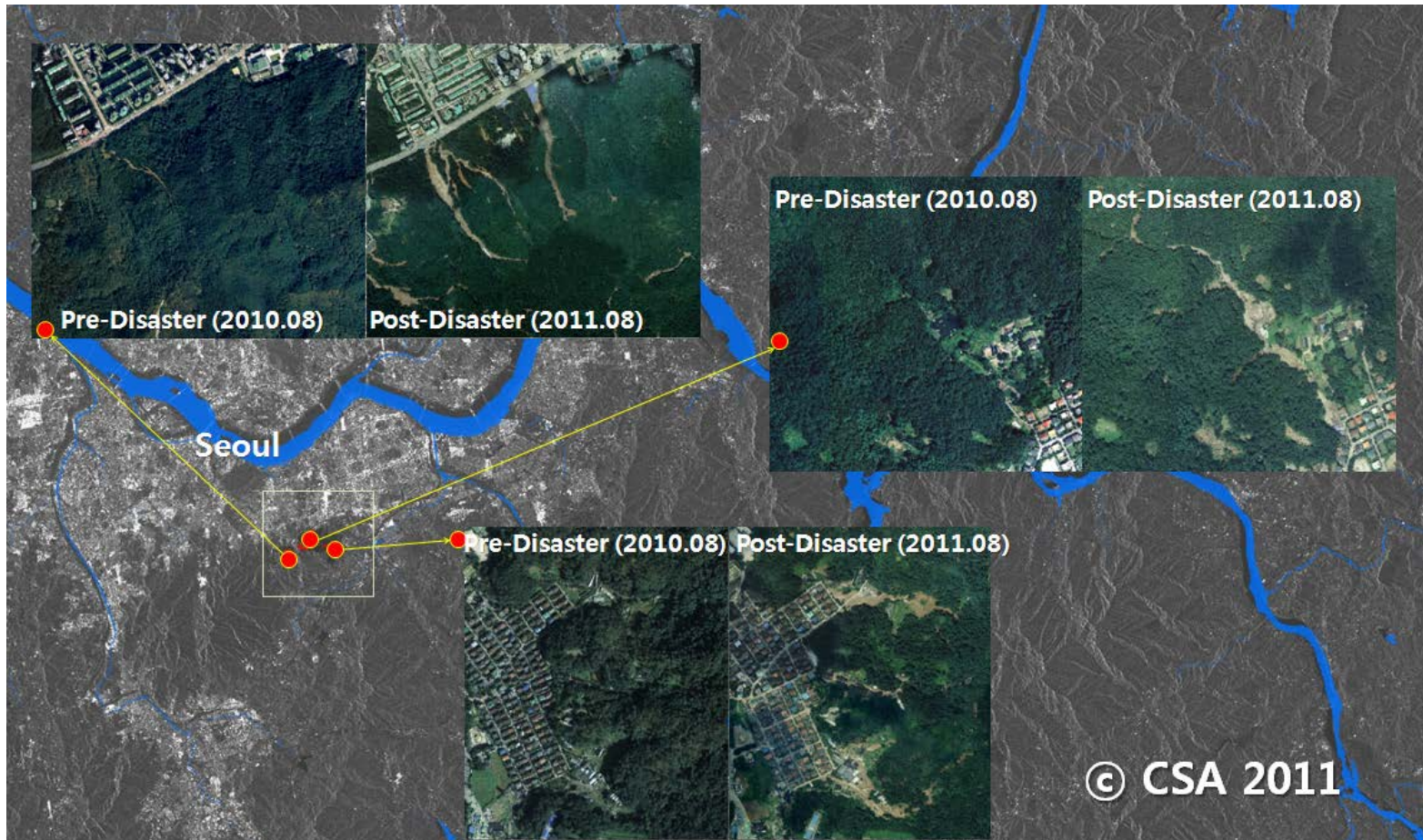
Radarsat-1
(Post-disaster)



Landslide path through
the flight path

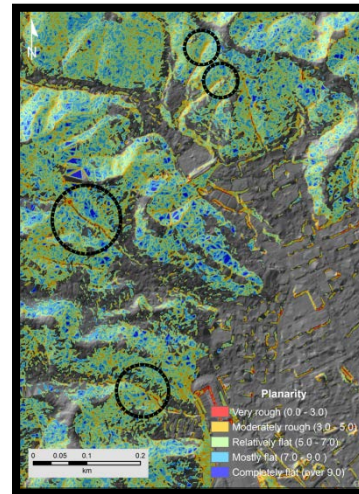
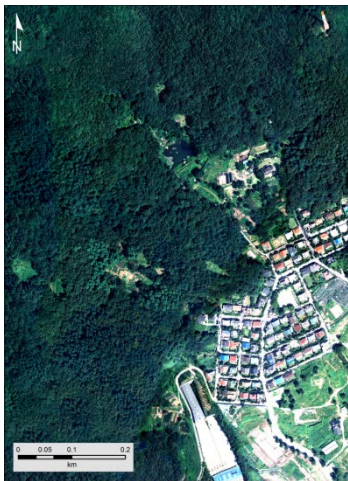
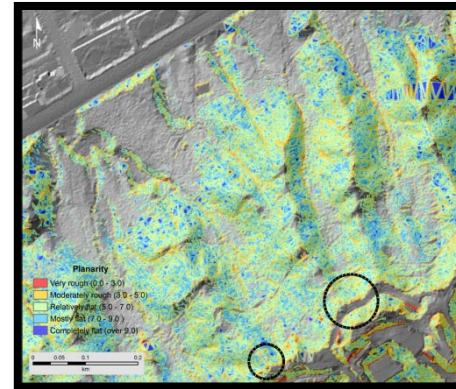
Identification of disasters

- Analyzing information



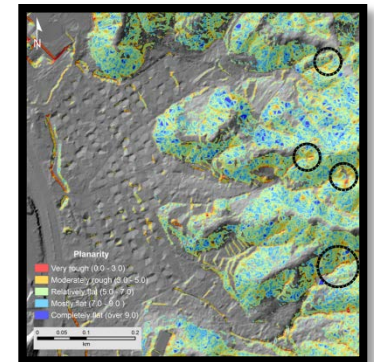
Identification of disasters

- Producing hazard



How can we increase capacity?

NEXT!



Improvement of capacity

- Attend seminars
- Share & bring technologies to other countries
- Cooperate other int. organizations

[Output]

Workshop & ODA projects

[Current]

Implement NDMIs
ODA projects



ODA project in the Philippines

- Based on Phases

ARWS: Automatic Rainfall Warning System

FFAS: Flash Flood Alert System



Schedule

Phase 1 (2013)

- Choice of Pilot Area
- Construction of ARWS
- Construction of FFAS and calibration
- System Education

Phase 2 (2014)

- Construction of additional ARWS
- Advancement of FFAS
- River Survey
- Hydraulic & Hydrological Analysis
- System Education

Phase 3 (2015)

- Advancement of ARWS
- Establishment of Disaster Prevent Master Plan
- Pre-feasibility study on Iponan River



Direction

1 Construction of ARWS and FFAS

2 Construction of additional ARWS and advancement of FFAS

3 Calibration of ARWS and FFAS

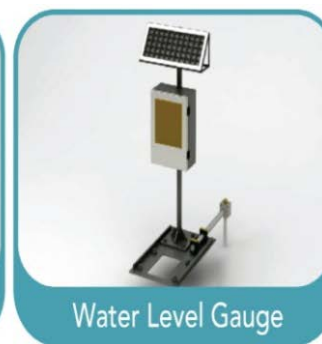
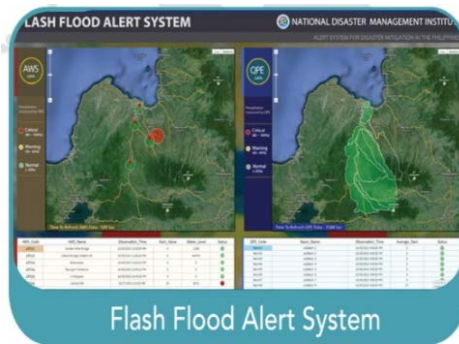
4 Hydraulic & Hydrological Analysis

5 Risk Map through risk analysis for Flash Flood

6 Establishment of education and PR plan for related public officers and experts

ODA project in the Philippines

- Applied systems
 - Designed to forecast the occurrence of flash flood in advance by real-time monitoring



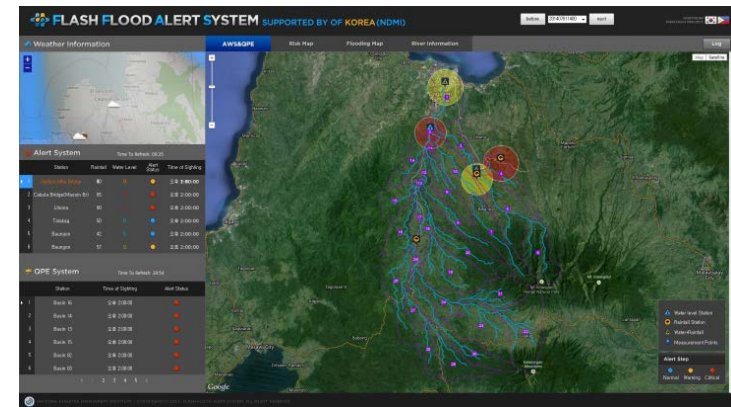
- Expected outcomes
 - Provides information on sudden local torrential rain and subsequent disasters

ODA project in the Philippines

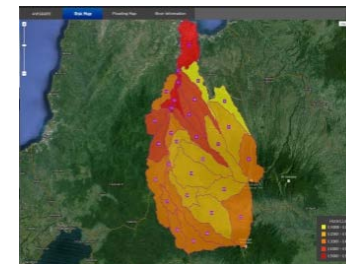
- Results
 - Flash Flood Alert System (FFAS)



Cross-section Survey (Total 8 sites)



FFAW's Main Screen



Flooding Map

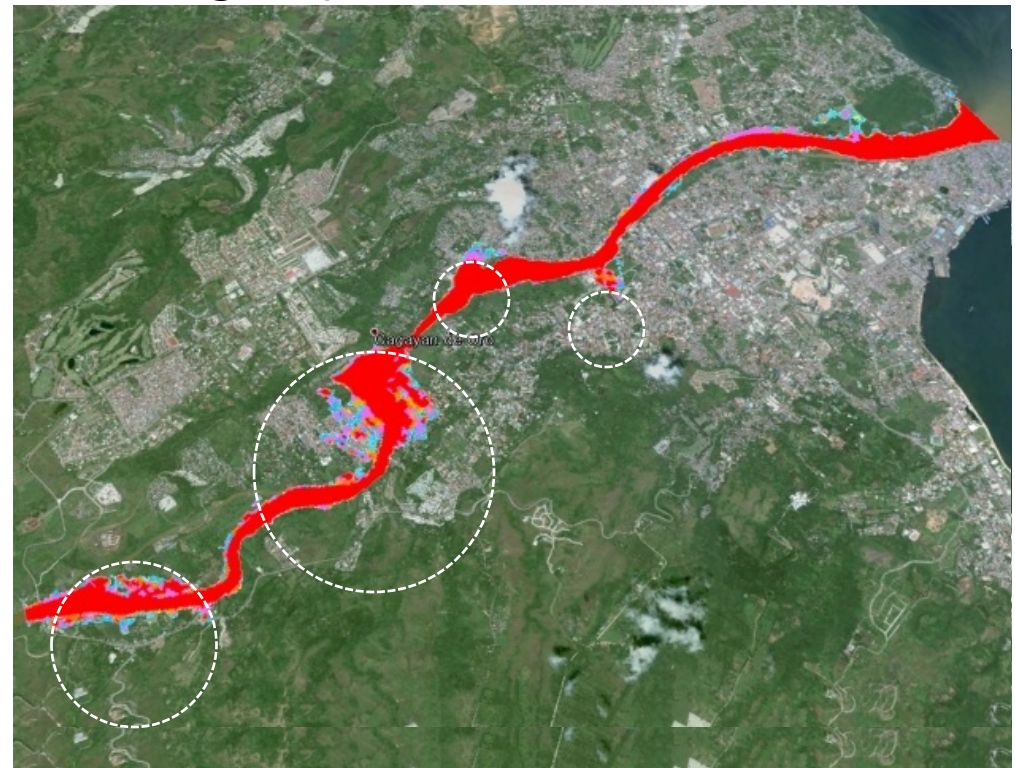
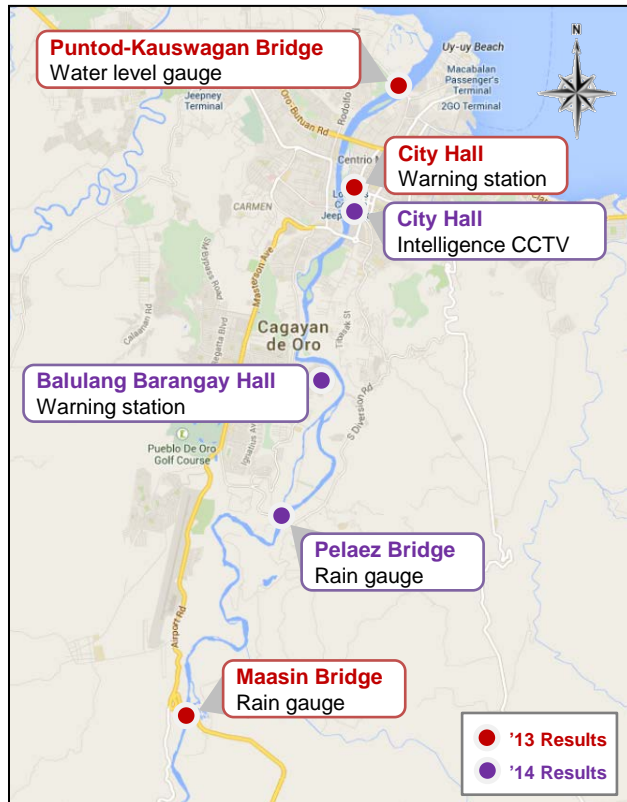
Warning criteria

- **Critical: over 70 %**
- **Warning: 50-70 %**
- **Normal: less 50 %**

ODA project in the Philippines

- Results
 - Automatic Rainfall Warning System (ARWS)

[Flooding map]



Disseminating information

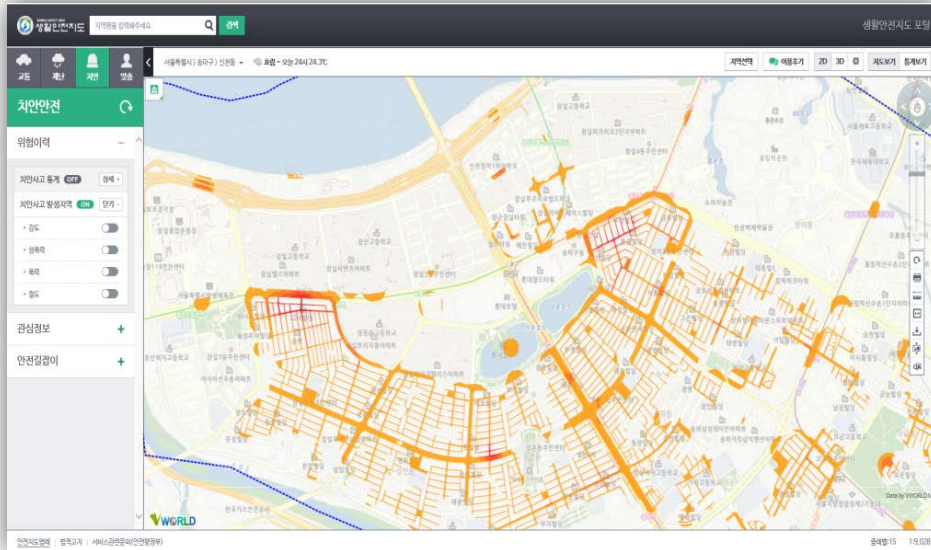
- Distribute related information

[Output]

Standard Operation plans to public and media

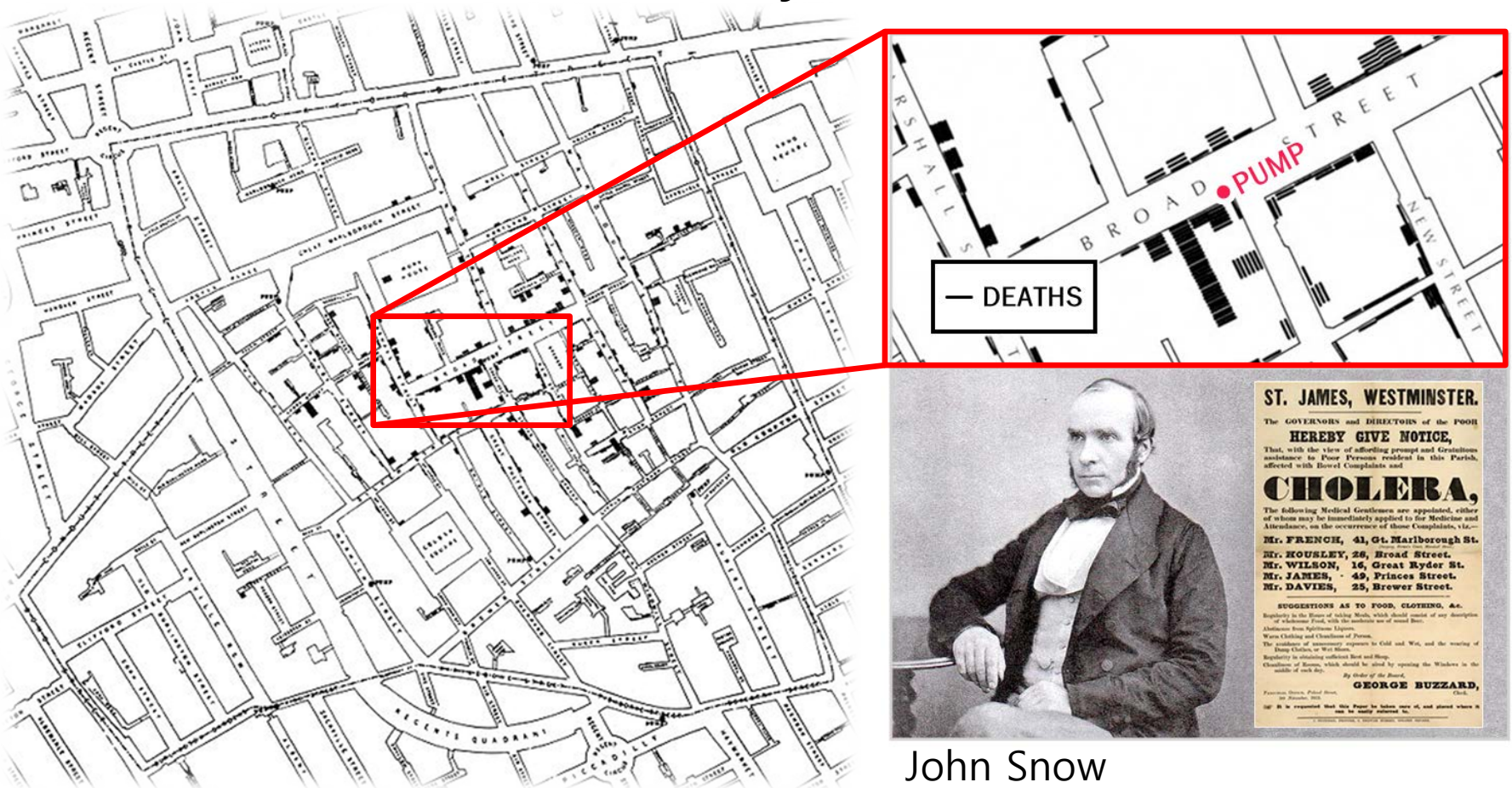
[Current]

Launch the **safety map**
Promote **safety services**



Safety map

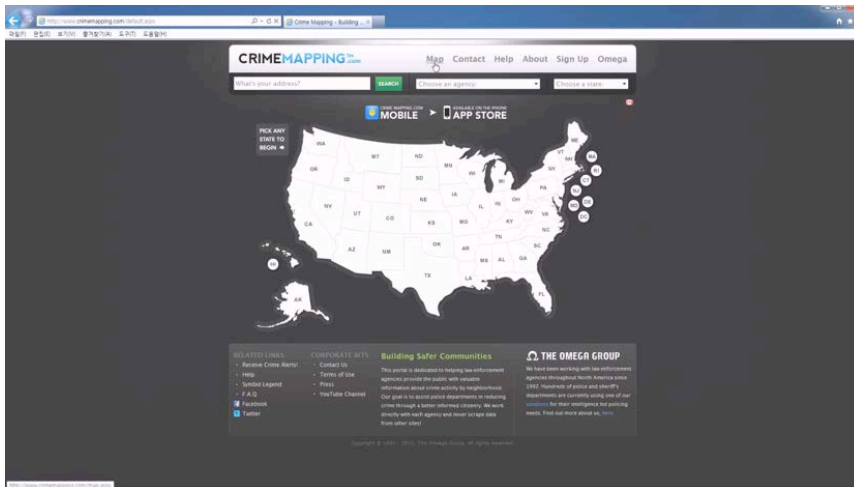
- Past (Brilliant work by John Snow, 1854)



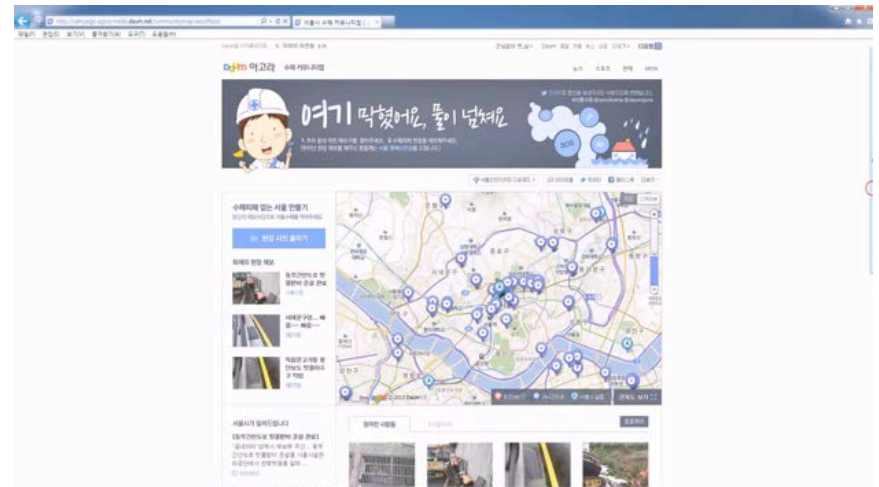
John Snow

Safety map

- Current



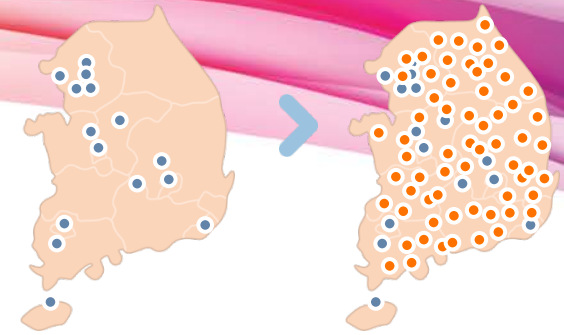
Crimemapping.com (US)



Community Map for Flood Disaster Reduction (Kor)

**Map, Solution for Understanding Social Problems
Easy, Simple and Powerful!!**

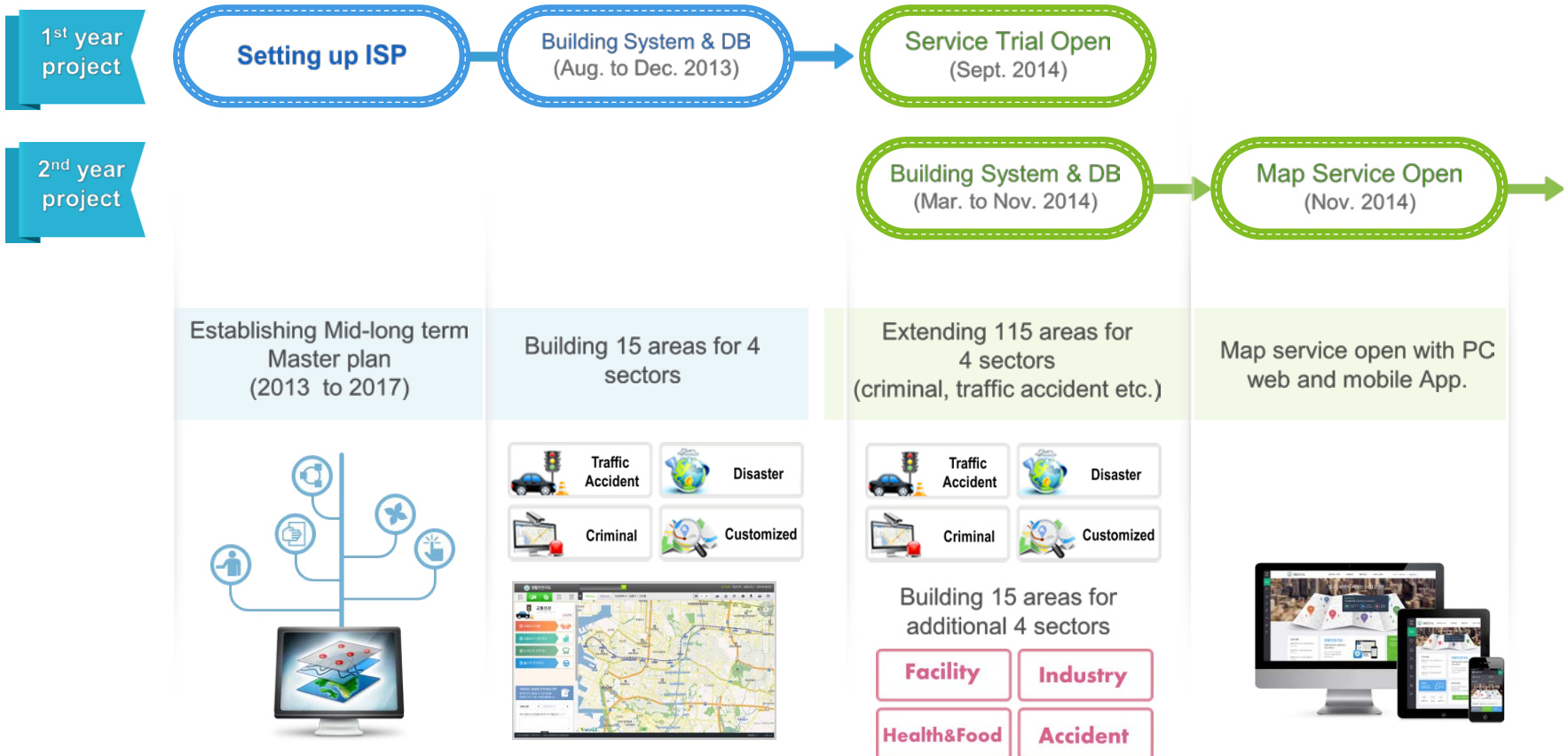
Safety map



• Making the Safety map

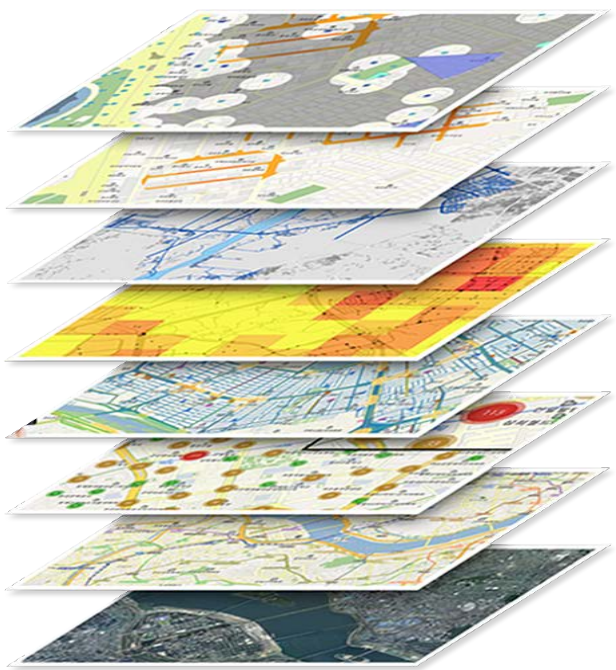
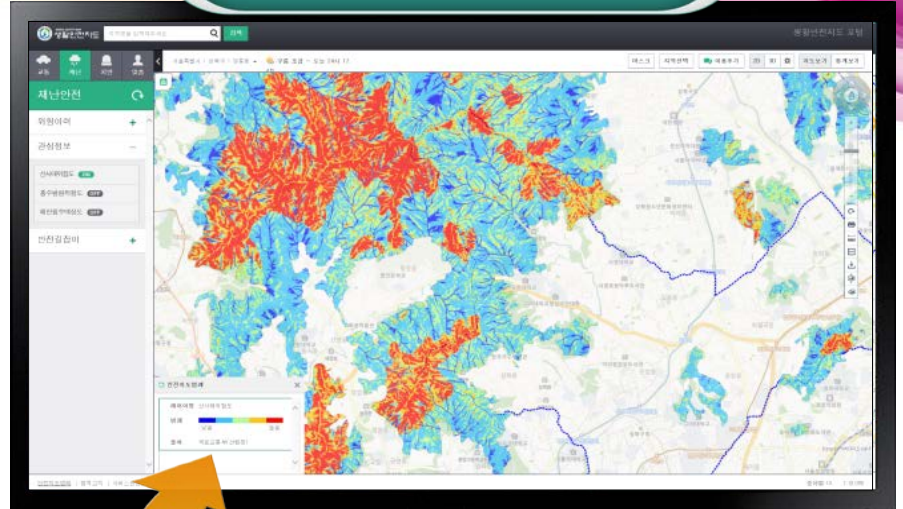
2013

2014



Safety map

- DBs and display



- Traffic accident
- Disaster
- Criminal
- Customized

Landslide/Earthquake occurrence data

Fire occurrence statistical data

Traffic accident statistical data

High-traffic accident occurrence area

High-crime area for children

High-crime area targeting at women

⋮

98 Map Layers!!

Safety map

- Device-driven map service

www.safemap.go.kr

Applicability to
Any Device!

(PC Web, Mobile App.)



Promote safety services

- Life friendly safety services

Many unexpected disasters



Increase the possibility of survival



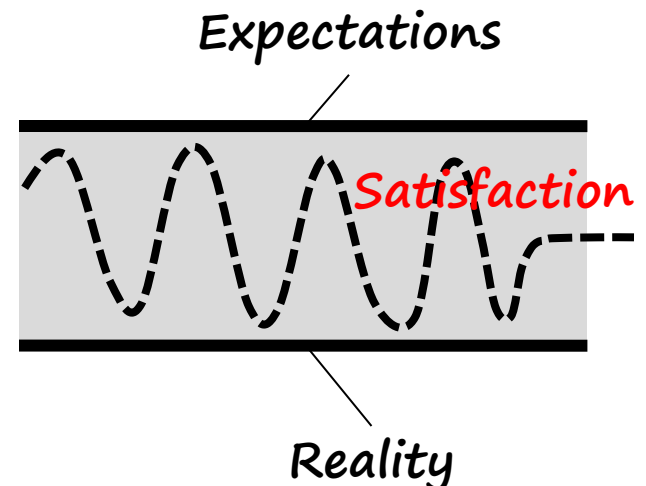
Intuitive actions for rapid evacuation from disasters



Simulation of real disaster situation



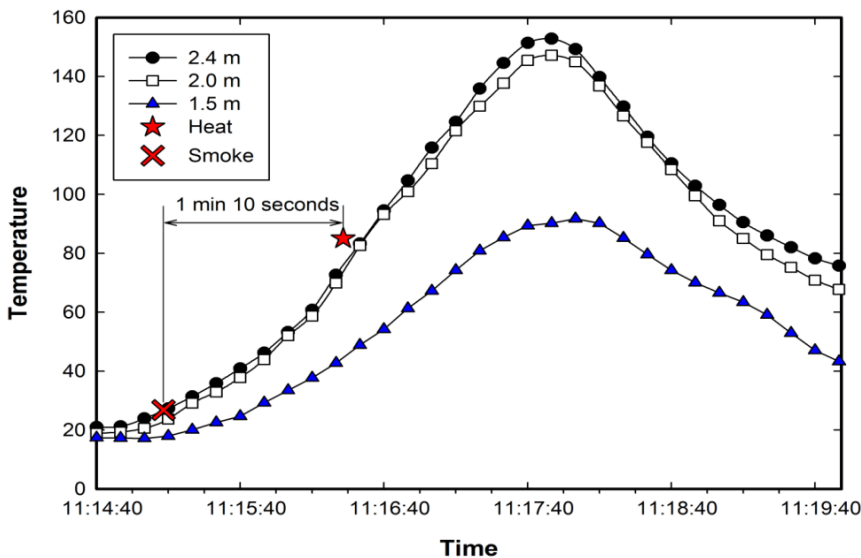
Generate intuitive guidelines



Promote safety services

• Examples

Fire detection



Note	Smoke detection	Heat detection
Time (sec.)	29.1	100.7
Temp. (deg.)	26.8	85.0

1분 10초 차

Underground evacuation



- Flow vel. : side < center
- Threshold of WD to rapid evacuation: **→ knee**
- Threshold of WD to opening the door: **→ 40 cm**

Promote safety services

- Media Promotions



Thank you for your attention!



Tai-Hoon Kim, Ph. D.

Analyst, National Disaster Management Institute
Ministry of Public Safety and Security
E-mail : taihoon@ualberta.ca