



International Training Workshop on Smart Cities for Building Inclusive,  
Resilient, Livable, and Sustainable Cities in Asia and the Pacific



# Nippon Koei's Smart DRR Solutions

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Revenue



¥**130.6** billion

Number of employees



**6,163** (consolidated)

Number of subsidiaries



**84**

Number of projects per year



Approx. **9,000**

Overseas sales ratio



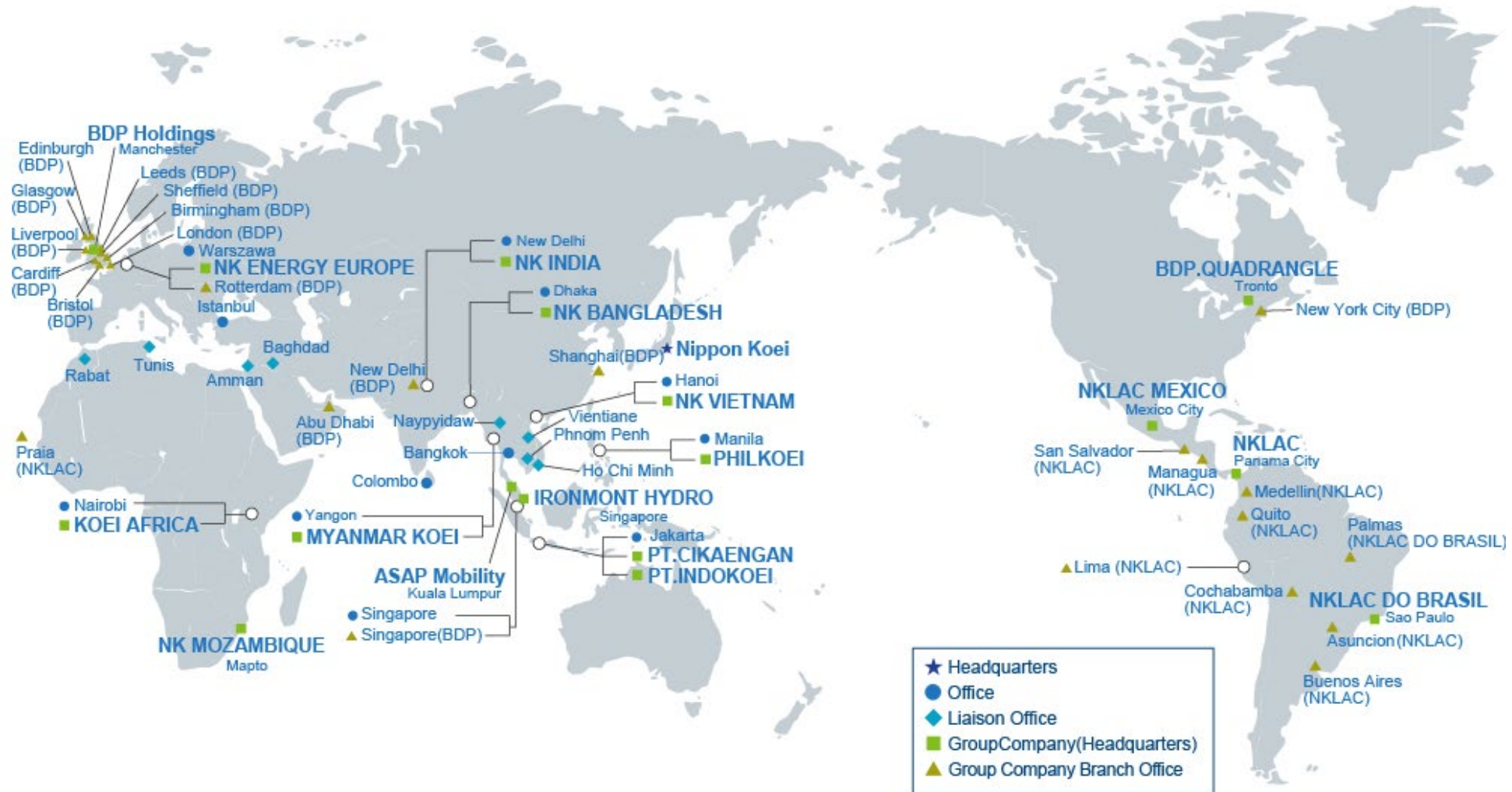
**36.1%**

Operations



in **160** countries

# Nippon Koei Offices World Wide



# Nippon Koei's Current Services

## Consulting Business

- River, water resources
- Agricultural and rural development
- Dam & power generation
- Urban & regional development
- Transportation
- Environment
- Management
- Disaster prevention and reduction

## Energy Business

- Machinery and equipment manufacturing
- Construction of electrical equipment
- Mechanical and electrical consulting
- Geotechnical measurement services/  
Sales of civil engineering
- Measuring equipment
- Safety equipment products
- Energy management

## Urban & Spatial Development Business

- Urban development
- Social infrastructure
- Comprehensive survey
- Architecture

**NIPPON KOEI**



## Urban & Area Management

- SDGs assessment system for SMEs (KIBOH2030®)
- SDGs assessment system for municipalities (TSUMUGI@®)
- Smart city strategy planning & implementation support
- Data-driven area management

## Disaster Prevention & Reduction

- Satellite disaster management information service
- Disaster prevention information platform (Bosuke®)

## Data PF Development

- Integrated data platform development & operation support
- SMART VISION 360 (3D digital PF for urban & area development)

## Infrastructure Development

- Smart city infrastructure development support
- Project management system (TRESSA)

## Smart City Services

- Infrastructure maintenance & management
- PPP commercialization support consulting
- Participation in PPP & PFI businesses
- Infrastructure maintenance & management system (Manesus)
- Network asset management system (Smallworld)

## Energy/Decarbonization

- CEMS
- Storage battery
- Grid energy storage business
- Micro grid business
- Aggregation business
- Next-generation power integration system
- Aggregation coordinator system

## Mobility

- Support for social implementation of autonomous vehicles
- Data utilization for MaaS

## Area & Real Estate Development

- Smart township development support

# Nippon Koei's Smart Solutions

PF: Platform

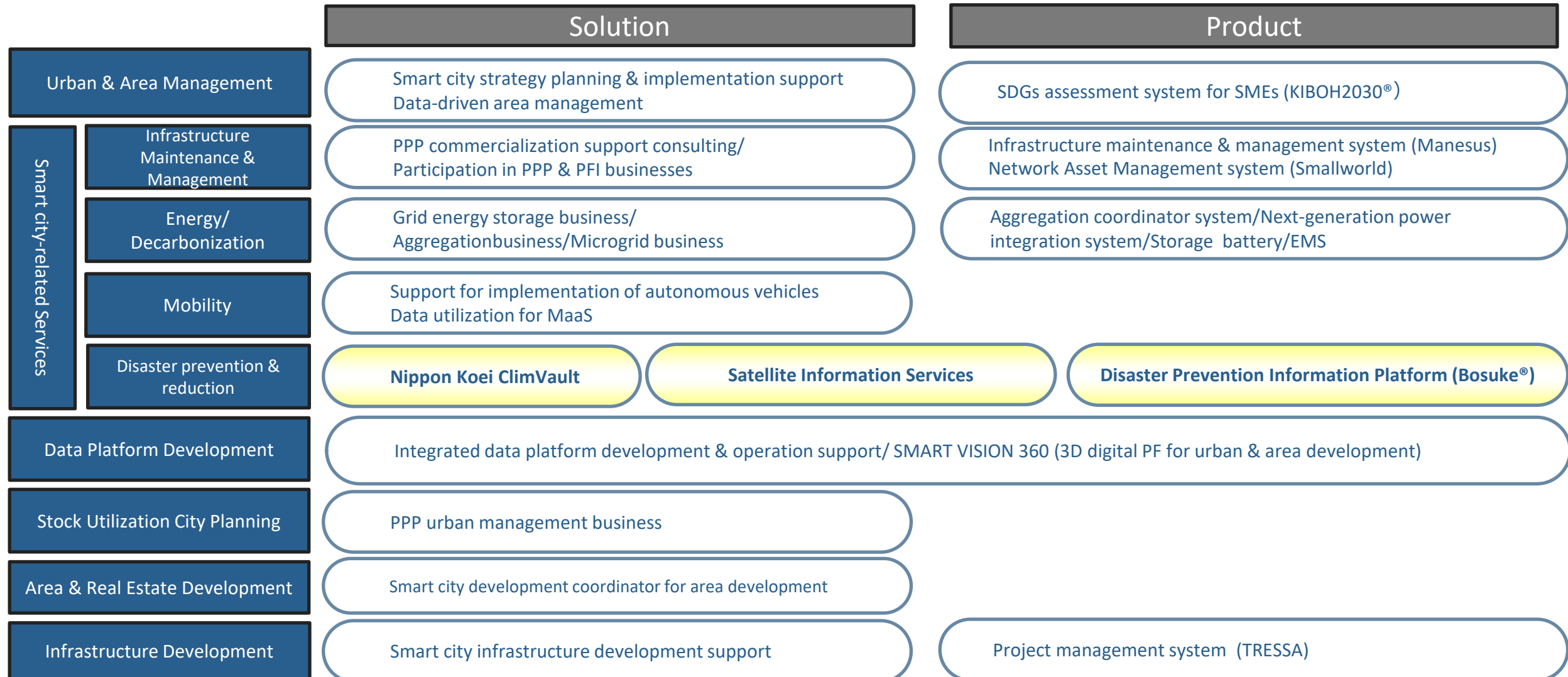
PPP: Public Private Partnership

PFI : Private Finance Initiative

CEMS: Community Energy Management System

# Smart City-related Services

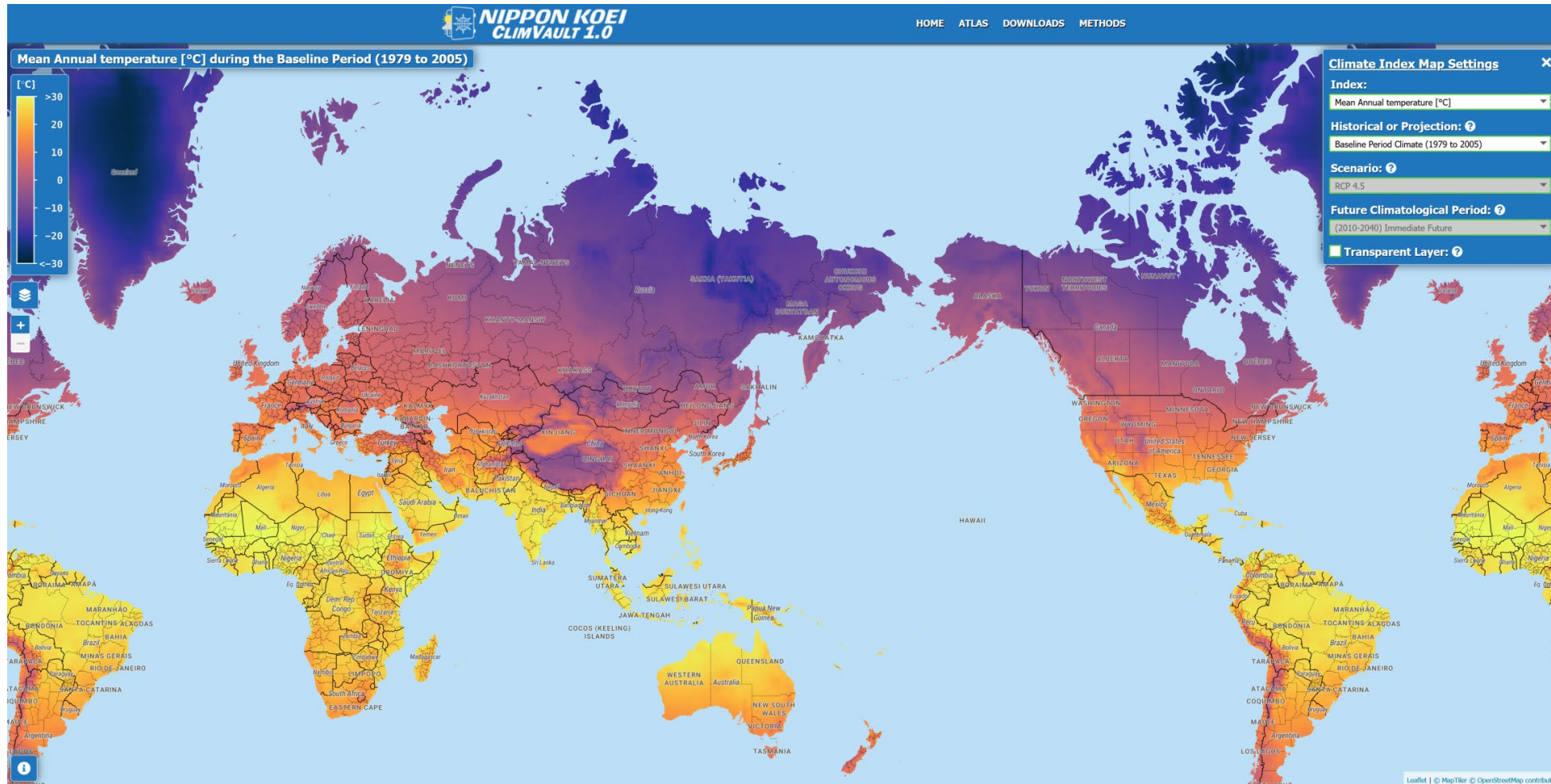
- As a leading engineering consulting firm in Japan, Nippon Koei is a one-stop provider of a wide range of solutions and products for smart city development.



# Climate Change Prediction for Adaptation Planning and Risk Analysis

Nippon Koei ClimVault, a portal site for obtaining future climate forecast information on rainfall, temperature, etc. for major cities, is now available for free.

<https://nk-climvault.com/>



As a tool that allows anyone to obtain highly accurate basic information, Nippon Koei ClimVault can be used in climate change adaptation business and research in various fields.

# Satellite Information Services

## Challenge

- Until now, it has been difficult to monitor a wide area on a regular basis and with the same accuracy over a long period of time.

## Solution

- Utilize optical satellites, SAR satellites, etc. to enable periodic, highly accurate, and long-term information collection, analysis, and evaluation.

### Optical satellite



- Observe sunlight reflected from an object.
- Capable of recognizing the color, size, shape, etc. of an object.
- Intuitive and easy to understand, just like a camera.
- Clouds are not transparent and nighttime photography is not possible.

### SAR satellite



- Observe the reflection of microwaves irradiated on its own object.
- The presence/absence, material, structure, change, etc. of the object can be determined.
- The image showing the intensity of the reflection is in black and white and difficult to understand.
- Capable of taking pictures regardless of clouds or nighttime.
- As the images are taken under the same conditions, they are suitable for viewing changes in the state of an object.

## Impact

- Information can be analyzed and evaluated according to various needs.

### Used in case of disaster

#### Identification of inundation areas



©Planet  
Automatically extract inundated areas from optical and SAR satellite data taken immediately after a disaster

### Used in case of disaster

#### Identification of landslide areas



©Planet  
Automatically extract landslide areas from optical and SAR satellite data taken immediately after a disaster

#### Monitoring of development status



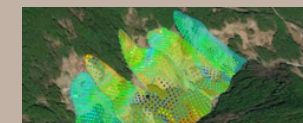
Analyze images taken regularly by optical satellites and identify areas where urban development has taken place.

#### Vegetation Monitoring



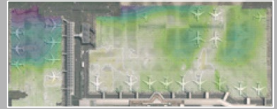
©DigitalGlobe  
Confirm the distribution area and condition of vegetation by optical satellite, and extract locations of decaying wood, etc.

#### Slope change monitoring



Confirm a wide range of slope variation conditions and evaluate the degree of risk with time-series interferometric analysis of SAR satellite data

#### Infrastructure Facility Monitoring



Observe aging change of a wide range of infrastructure facilities and conduct risk assessment through time-series interferometric analysis of SAR satellite data.

## Track Record

- A solid track record in providing support for many municipalities and government agencies.
- Investigation work for deciphering and analyzing inundation areas using satellite images (MLIT)
- Advanced Satellite Remote Sensing Data Application Model Demonstration Project for Problem Solving (Cabinet Office, Government of Japan)



# Disaster Prevention Information Platform (Bosuke®)

## Challenge

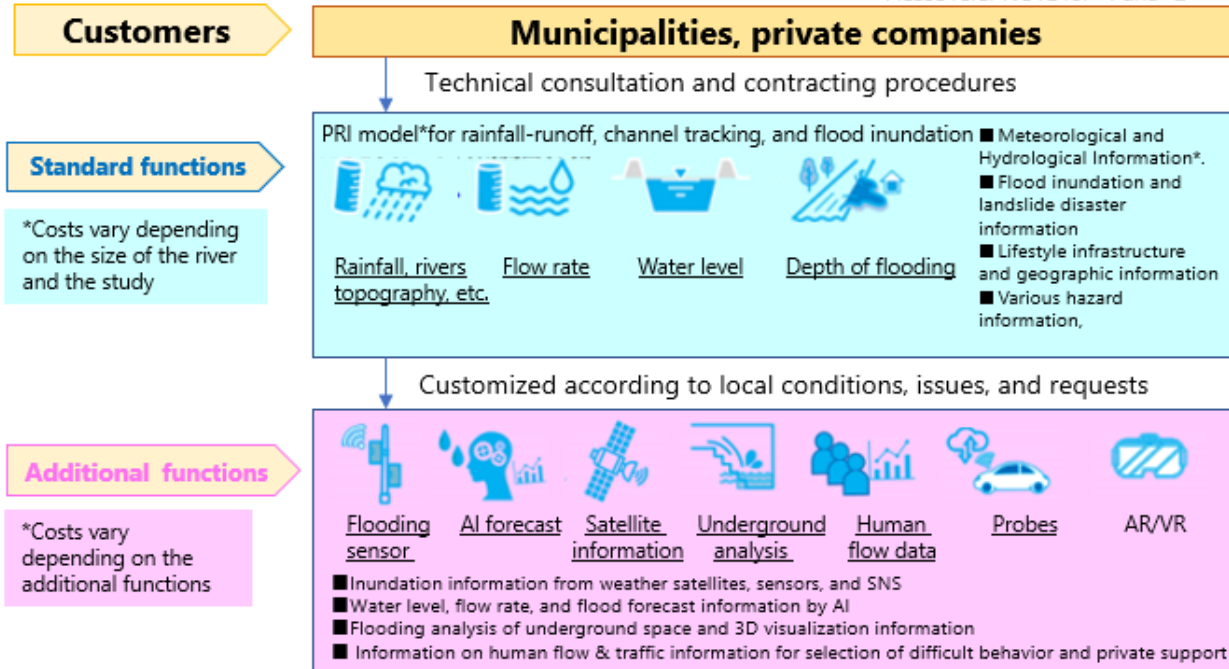
- Strengthening local resilience
- Difficulty in grasping information centrally and responding quickly
- Insufficient local inundation status and risk information

## Product

- **Cloud-based real-time disaster evacuation plan service**
- **Supporting disaster response and evacuation actions leading to the safety and security of local communities**
- **Disaster risk analysis and visualization of damage prediction**

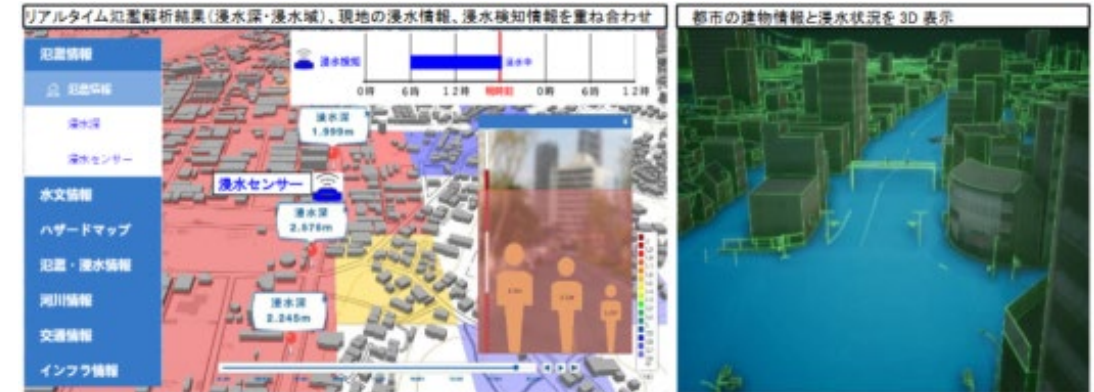
Service image of disaster prevention PF

Please refer NOTE for \*1 and \*2

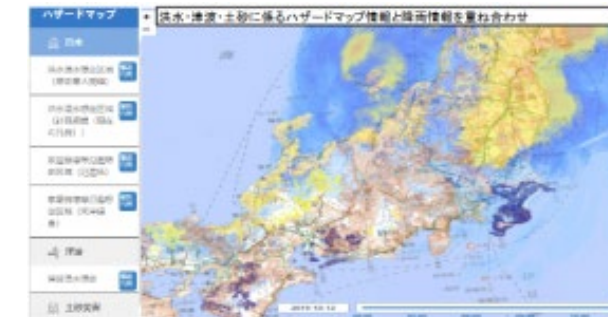


## Impact

- Various services are realized on the platform by storing, processing, analyzing, visualizing, and evaluating



Visualization of urban 3D inundation conditions by displaying real-time inundation analysis results and inundation sensor information



Overlays national hazard maps and weather information

## Track record

- Studies and PoC are being implemented in Davao City, Iwaki City, Fujimino City, and Shizuoka City, etc.



**CLIENT**

**Municipalities, Private Companies**

**STANDARD**

**Rainfall runoff, channel routing, and inundation analysis using RRI model<sup>1)</sup>**

Overlay Data

- Meteorological and hydrological information<sup>2)</sup>
- Flood and landslide information
- Infrastructure and geological information
- Other natural hazard information

Rainfall, DEM      Flow volume      Water level      Inundation

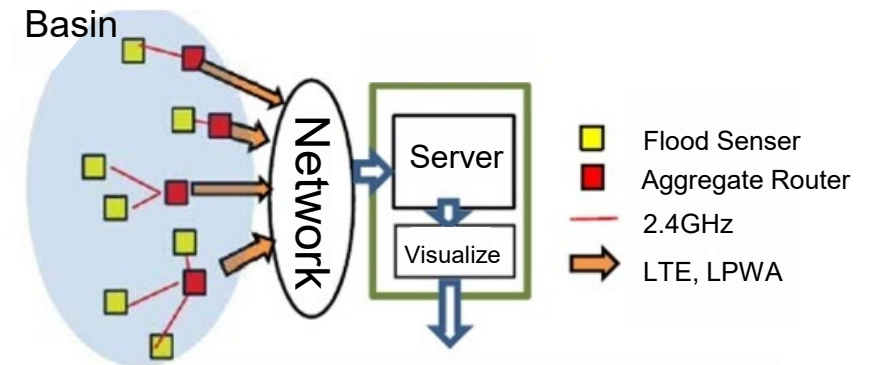
**ADD-ON**

Flood sensor      AI prediction      Satellite analysis      Underground inundation analysis      People flow      Probe traffic data      AR/VR

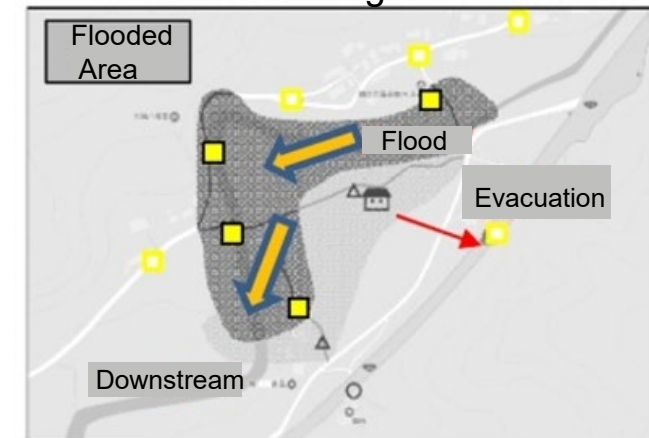
1) RRI (Rainfall-Runoff-Inundation) Model, developed by Public Works Research Institute, Japan  
2) Data provided by JMA (Japan Meteorological Agency) and MLIT (Ministry of Land, Infrastructure, Transport and Tourism) in Japan

## Monitoring changes of flooded area in real-time

- Monitoring changes of signal from sensor
- Browsing on smartphone as well as office PC



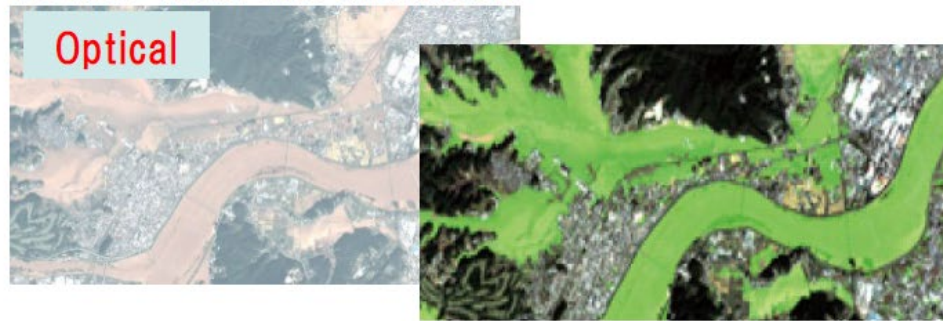
Realtime Monitoring MAP



## Observation of Inundation area:

Detect inundation area by analyzing satellite images after disaster.

Compared to planes or drones, wide areas can be observed within 24 hours after the disaster.



## Observation of Landslide area:

Detect landslide area by analyzing satellite images after disaster.

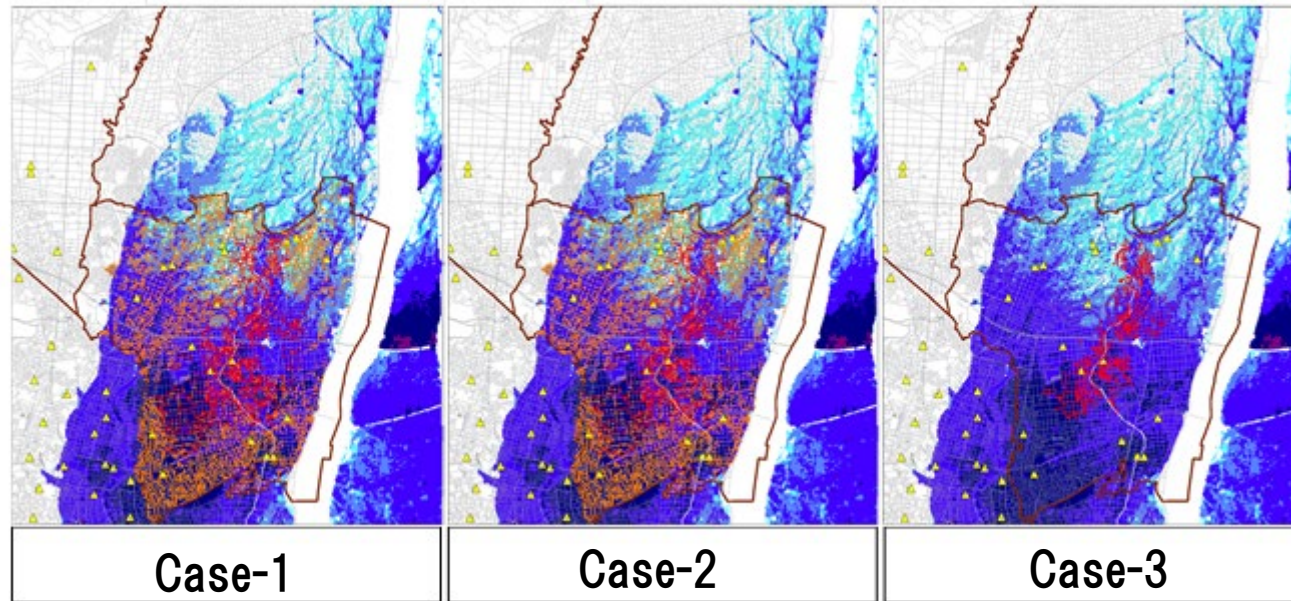


# Add-on: Evacuation Simulation (Bosuke<sup>®</sup>)

Case-1: Normal case

Case-2: Case-1 plus early evacuation in 2 hours advance

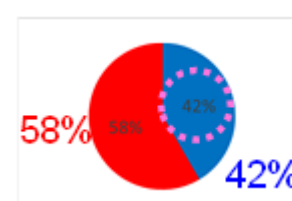
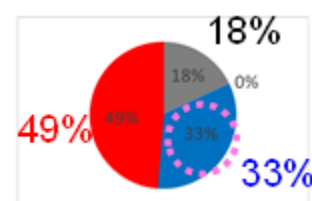
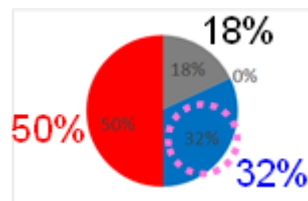
Case-3: Case-2 plus 100% execution of evacuation order by government



- Evacuation Fail
- No Action
- ▲ Evacuation Center

### Inundation Depth

- 5.0 m -
- 3.0 m - 5.0 m
- 1.0 m - 3.0 m
- 0.3 m - 1.0 m
- 0.0 m - 0.3 m



- No Action
- Evacuation Fail
- Evacuation Success



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