

Collaboration between Government and Private Sectors toward Digital Transformation of Disaster Risk Reduction (DRR) in Japan

Yoshihiro Katsuhama, Ph.D.

日本工営株式會社 勝濱 良博

Chief Specialist, Digital Business Development Office

Nippon Koei Co., Ltd.

1. Disaster Events and Characteristic of Disasters in Japan
2. Activities of Digital Authority, Japan
3. Public-Private Digital Transformation Committee in DRR
4. Examples of Digital Solutions in DRR

Disaster Events and Characteristics of Disasters in Japan

Incident: Kumamoto Earthquake (熊本地震) April 2016



Photo: Kumanichi.com



Photo : Kyodo News



Photo: The Sunday Morning Herald World



Photo Taro Karibe/Getty

Incident: Kinugawa River Flooding (鬼怒川洪水) Sep. 2015



Incident: Mt. Ontake Eruption (御嶽山噴火) September 2014

Photo: Kuroda Terutoshi, from the video



Photo: The Huffington Post

Photo: Pronk Palisades



Photo: golden-tamatama.com



Incident: Hiroshima Debris Flow (広島土石流) August 2014

Photo: Manila Bulletin



Photo: Sankei Shimbun



Photo: Tomo News



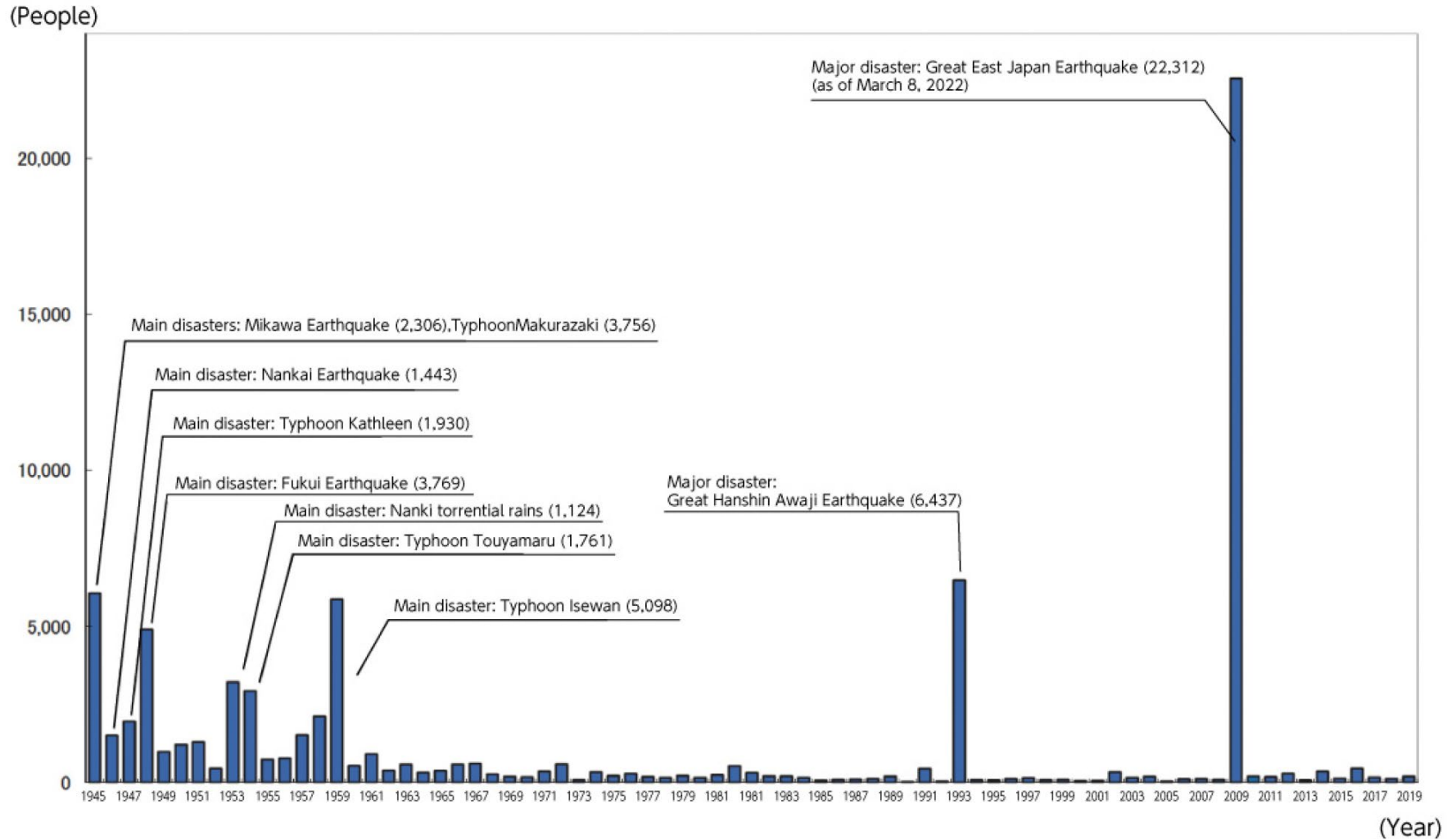
Photo: AsahiShimbun

Incident: Snow Disasters (雪害)

Photo: un-farm.com



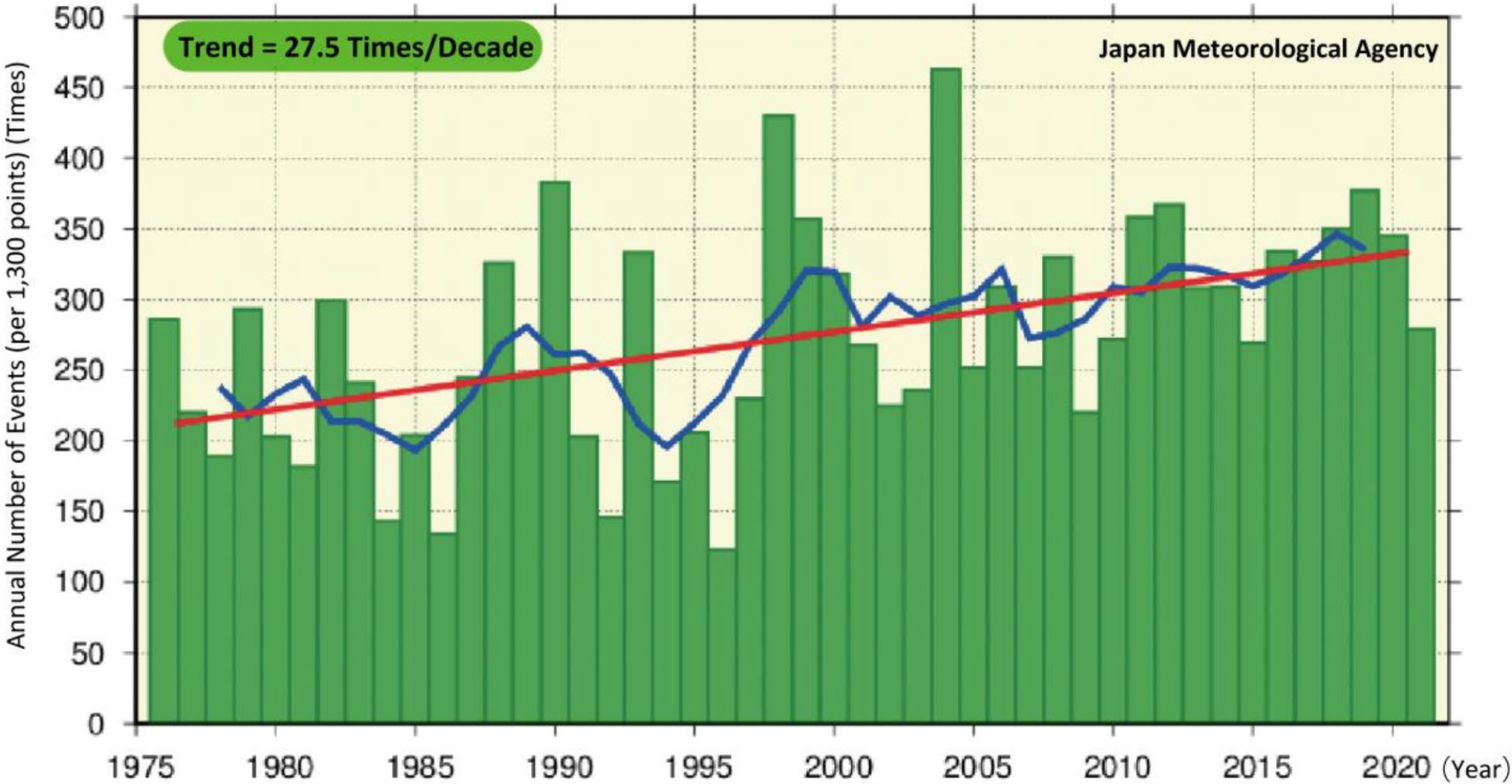
Number of Deaths and Missing Persons Caused by Natural Disaster in Japan NIPPON KOEI



Source: White Paper; Disaster Management in Japan, 2022 (防災白書)

Note: With regard to the Hanshin-Awaji Earthquake (阪神淡路大震災) and the Great East Japan Earthquake (東日本大震災), those figures include earthquake-related deaths.

Annual Number of Events with Precipitation $\geq 50\text{mm}/\text{hour}$



Source: White Paper; Disaster Management in Japan, 2022 (防災白書)

Activities of Digital Authority, Japan

- Established in September 2021
- One-third of officials are from private sector
- Aiming at digitalization, not only digitization

The screenshot shows the homepage of the Digital Agency website. At the top, there is a navigation bar with links for 'Home', 'General', 'Government/Business', and 'Media/Relations', along with a search bar and 'Global Site' link. Below the navigation, there is a 'Important Notice' section with two announcements. The first notice, dated June 30, 2023, concerns the registration of pre-savings accounts. The second notice, dated May 27, 2023, addresses issues with My Number Card services. Below this is a 'Topics' section featuring a 'My number card' callout box and a statistics dashboard. The dashboard displays the total number of applications (97,904,418) and the number of cards delivered (95,182,404), with a 78.1% completion rate as of September 3, 2023. A footer note mentions the 'Policy Data Dashboard'.

デジタル庁

ホーム 一般の方 行政・事業者の方 報道関係者の方 | 検索 Global Site メニュー

重要なお知らせ

公金受取口座にご本人名義の預貯金口座を登録されていない可能性がある方へ、お手紙を郵送しています
2023年6月30日

マイナンバーカード関連サービスの誤登録等の事案について、ご自身での確認方法やご質問・ご不安にお答えします。マイナンバー総合フリーダイヤル（0120-95-0178）でも受け付けております
2023年5月27日

トピックス

My number card

マイナンバーカード

累計申請件数（有効申請）
97,904,418

累計交付枚数
95,182,404

人口に対する申請件数率
78.1%

2023年9月3日時点

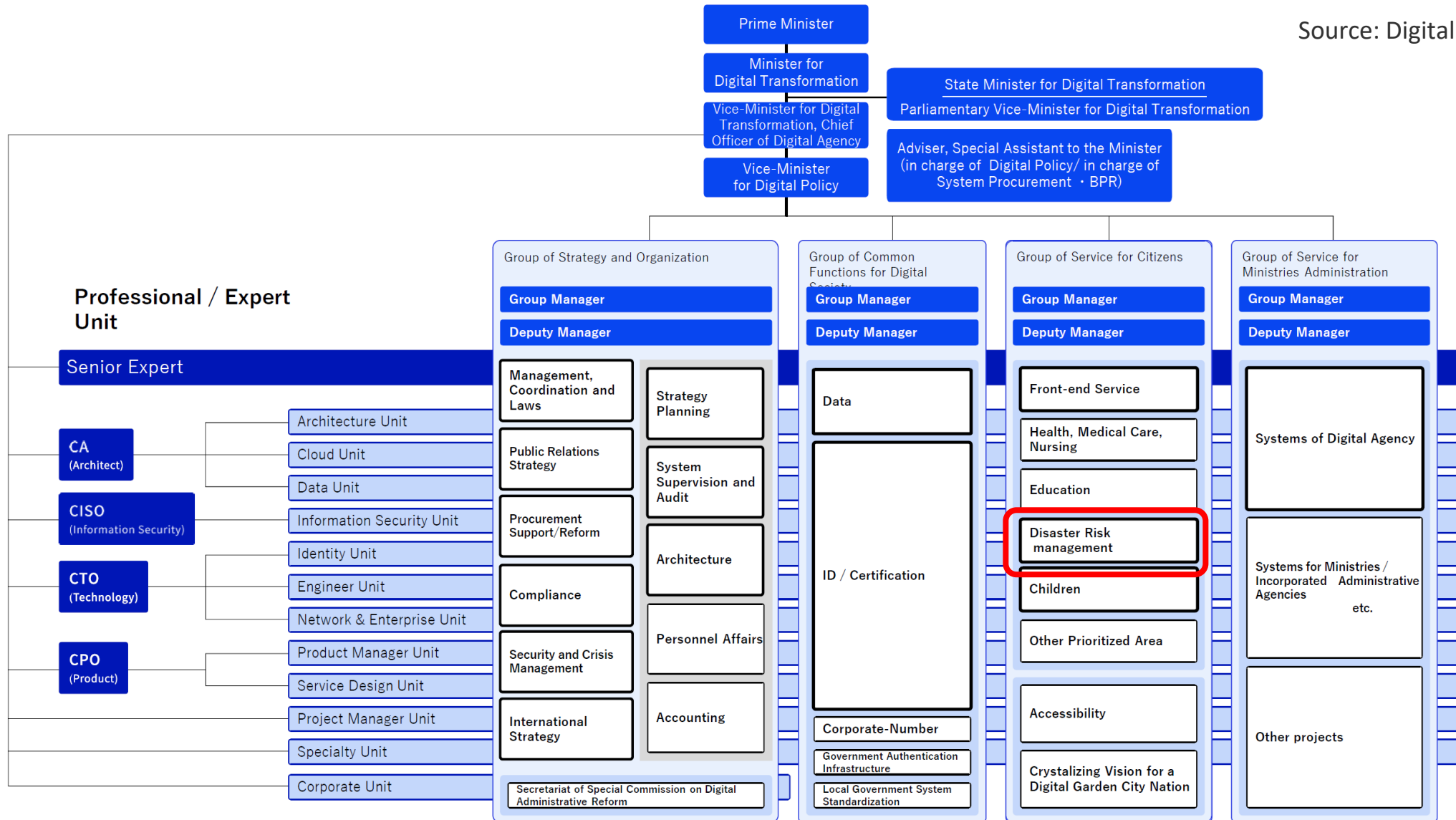
マイナンバー制度・マイナンバーカードのご質問・ご不安にお答えします

政策に関するデータを一元的に表示した「政策データダッシュボード」を公開しています

Homepage of Digital Agency Website

Organization of Digital Agency as of November 2022

Source: Digital Agency Website



Public-Private Digital Transformation Committee in DRR

Public-Private Digital Transformation Committee on DRR

<https://ppp-bosai-dx.jp/>

The screenshot shows the homepage of the Disaster DX PPP Agreement Council. At the top left is the organization's name. To the right is a navigation menu with links for 'お知らせ' (Notice), '活動目的' (Activity Purpose), 'ミッション' (Mission), '活動内容' (Activity Content), '組織体制' (Organizational Structure), '協議会活動の基本方針' (Basic Policy of Council Activities), '検討部会の活動方針' (Activity Policy of Study Committee), '資料公開' (Material Release), '会員リスト' (Member List), '入会案内' (Joining Guide), and '防災DXサービスマップ' (Disaster DX Service Map). A blue button labeled 'お問い合わせ' (Contact Us) is on the far right. The main content area features the title '防災DX 官民共創協議会' in large blue characters. Below the title is a paragraph of text in blue: '防災分野におけるデータ連携等の推進を通じた住民の利便性の向上を目指し、防災分野のデータアーキテクチャの設計やデータ連携基盤の構築等の検討を行う協議会'.

Purpose:

To realize DRR both in usual and emergency situation by public-private collaboration

Members:

357 entities as of August 24, 2023 consisting of 84 local public entities (prefecture government, municipalities, public organizations) and 273 private entities (data providers, consultants, transportation, startups, Siers, insurance, finance, media, medical, NPOs, etc.)

1. **Clarification of issues**; To clarify issues relevant to DRR to decide direction of public-private collaboration
2. **Platform Development**; To propose ideal data linkage platform especially from the view point of platform users, such as citizens and municipalities
3. **Market Development**; To create new business opportunities to realize digital transformation of DRR by public-private collaboration

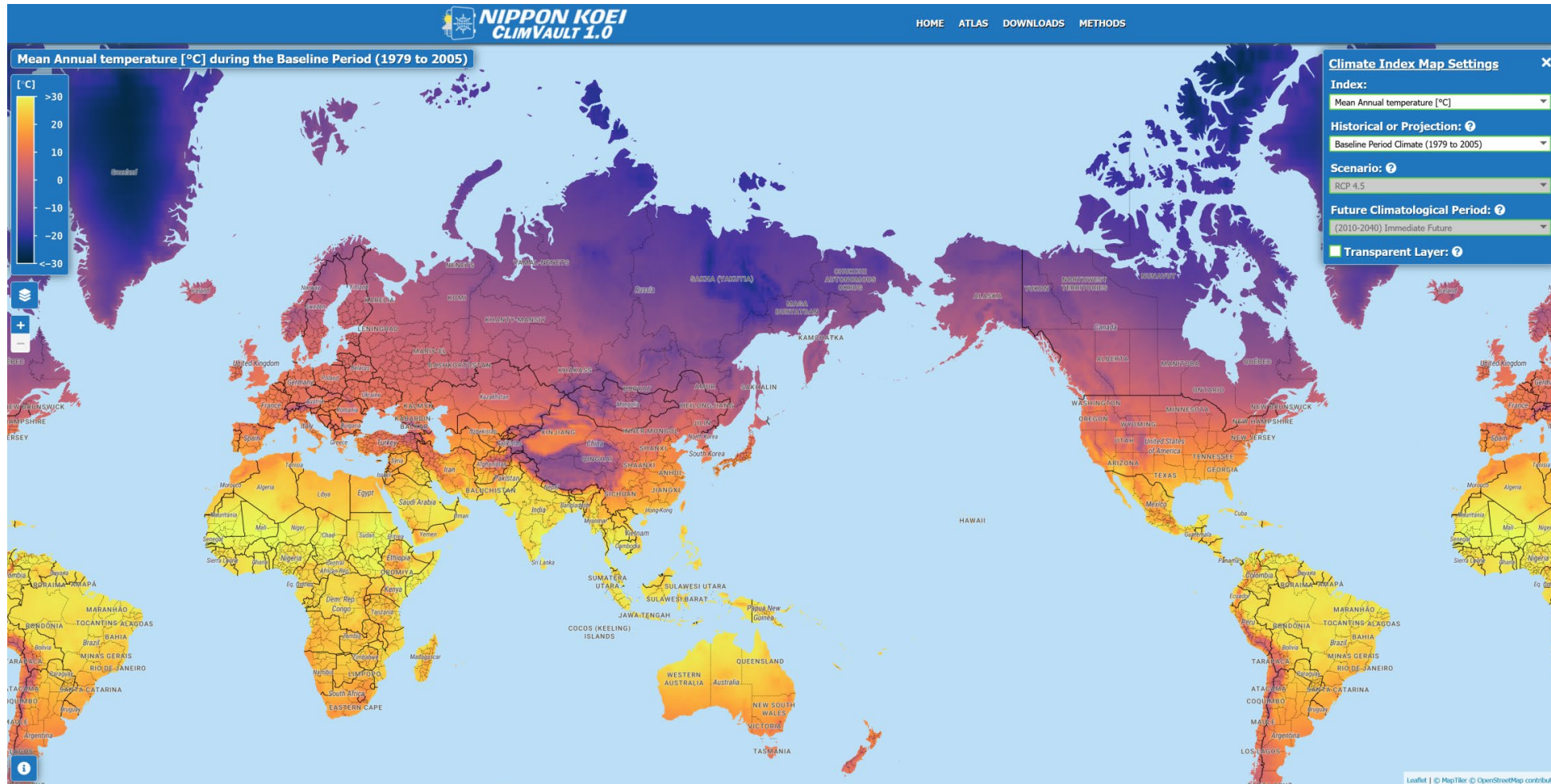
1. Interview and questionnaire surveys to entities relevant to DRR to identify issues
2. Identification of technological trend to determine areas of emphasis and accelerate dissemination of DRR solutions
3. Design of data architecture and data linkage platform
4. Design of data items for DRR applications
5. Design of procurement criteria for applications and systems
6. Design of usage of my number (ID) card for DRR
7. Other subjects to accelerate digital transformation on DRR

Examples of Digital Solutions in DRR

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



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

Used in case of disaster

Identification of landslide areas



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

Monitoring of development status



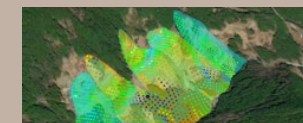
Analyze images taken regularly by optical satellites and identify areas where urban development has taken place.

Vegetation Monitoring



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

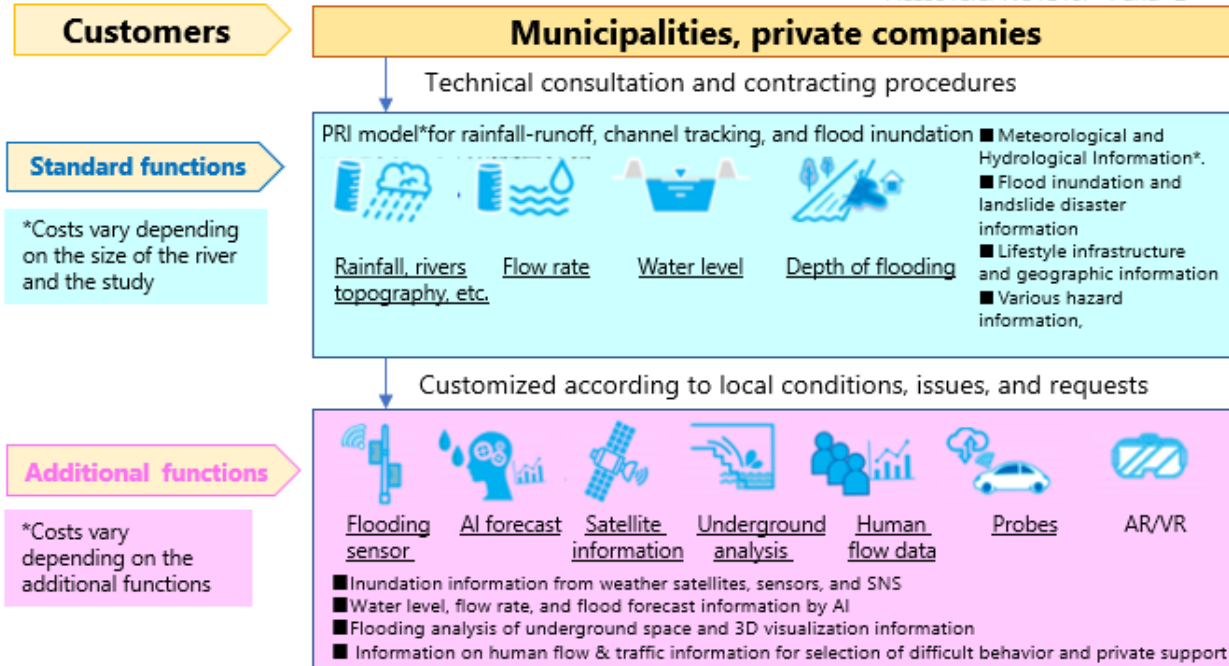
- Strengthening local resilience
- Difficulty in grasping information centrally and responding quickly
- Insufficient local inundation status and risk information

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**

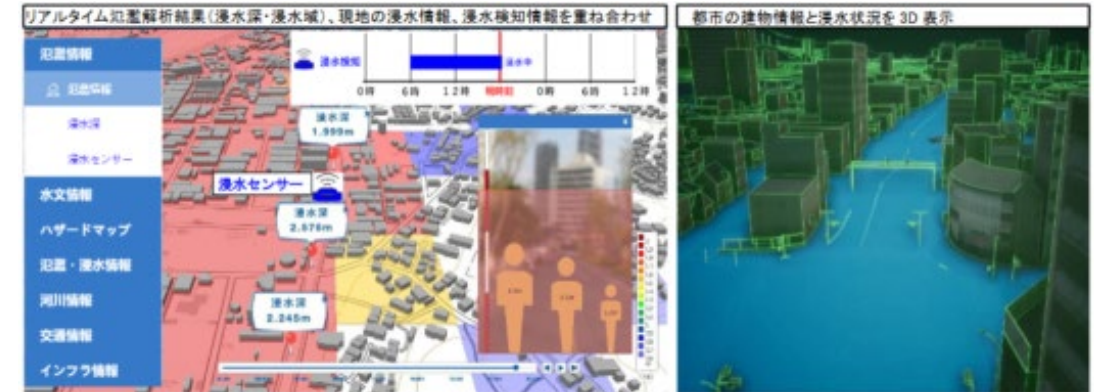
Service image of disaster prevention PF

Please refer NOTE for *1 and *2

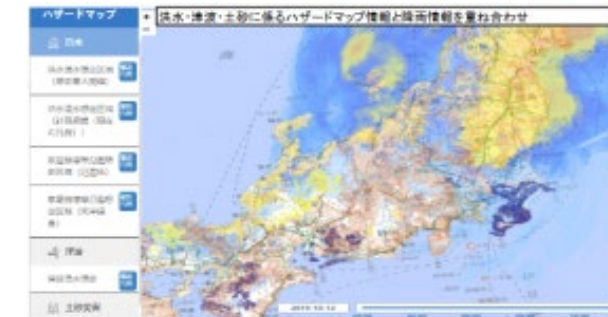


Impact

- 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

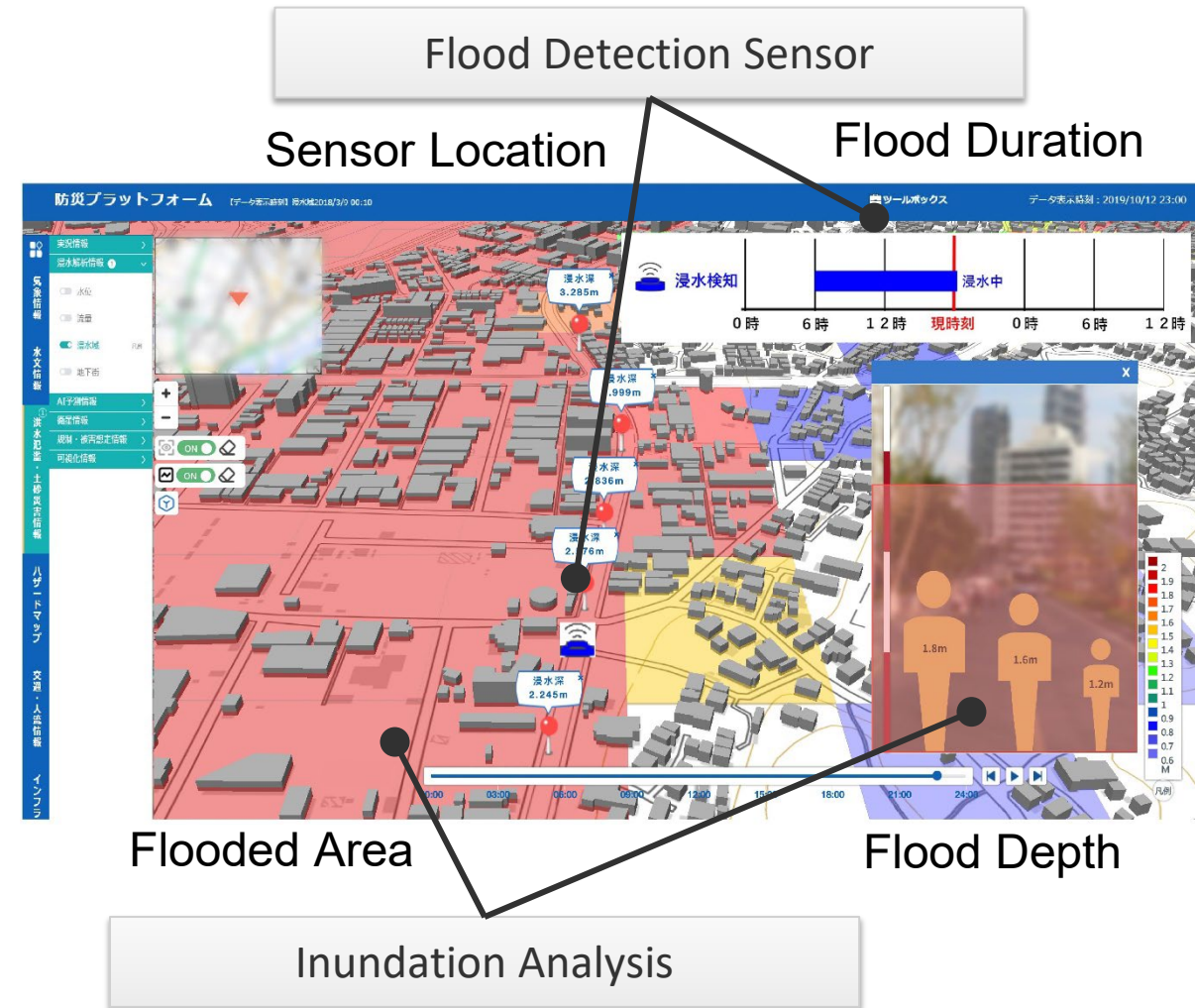


Overlays national hazard maps and weather information

Track record

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

- Cloud basis one-stop solution for providing flood risk information
- The system provides prediction of water level rising, flow volume, overflow to flood plain by inundation analysis in real-time.
- The analysis can be customized.



CLIENT

Municipalities, Private Companies

STANDARD

Rainfall runoff, channel routing, and inundation analysis using RRI model¹⁾

Overlay Data

- Meteorological and hydrological information²⁾
- Flood and landslide information
- Infrastructure and geological information
- Other natural hazard information

Rainfall, DEM Flow volume Water level Inundation

ADD-ON

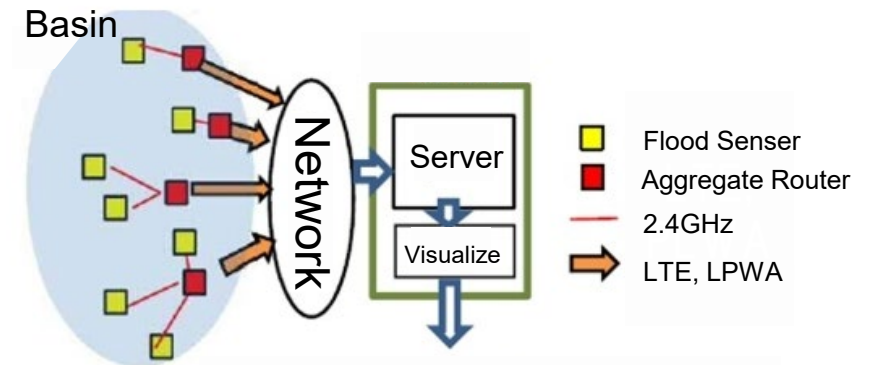
Flood sensor AI prediction Satellite analysis Underground inundation analysis People flow Probe traffic data AR/VR

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

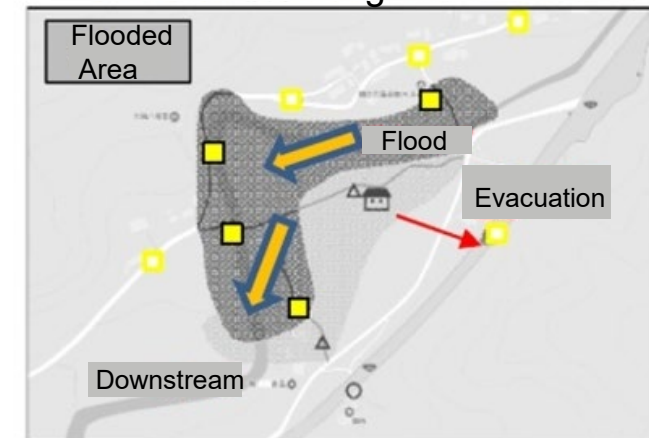
Add-on: Flood Detection Sensor (Bosuke[®])

Monitoring changes of flooded area in real-time

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



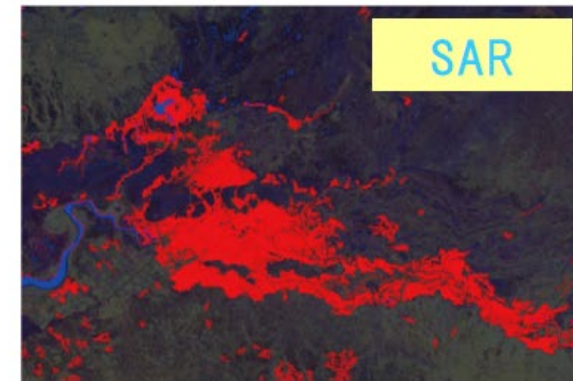
Realtime Monitoring MAP



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.

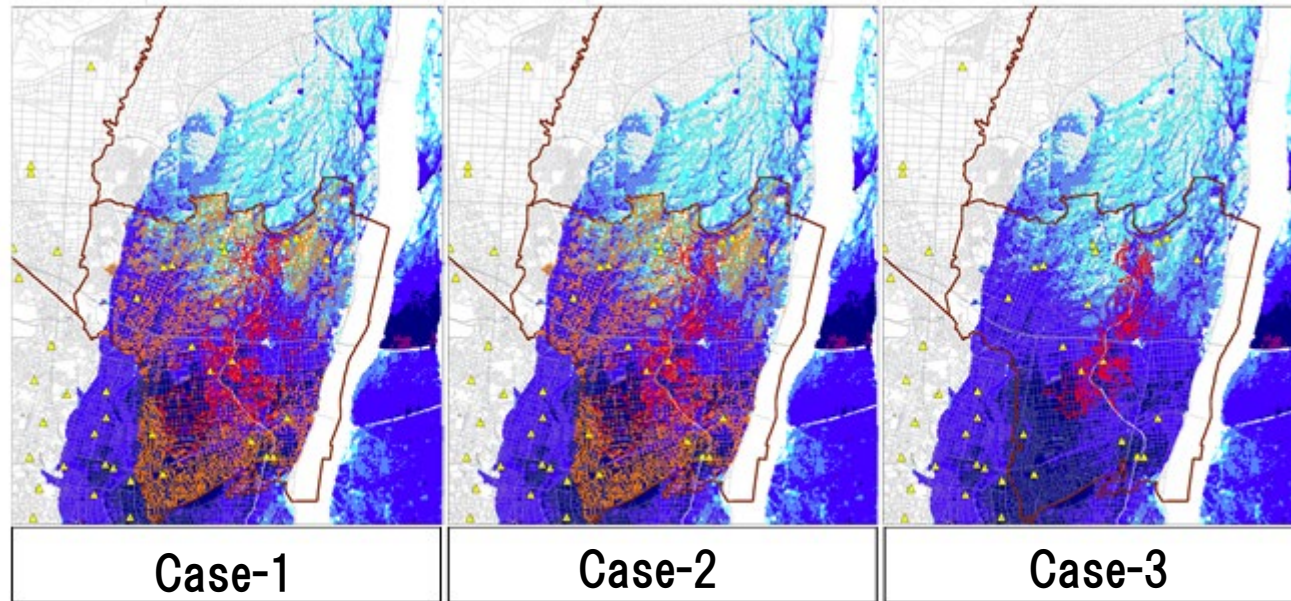


Add-on: Evacuation Simulation (Bosuke[®])

Case-1: Normal case

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

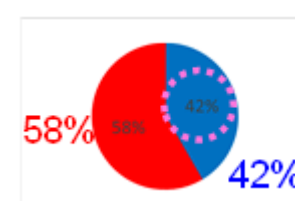
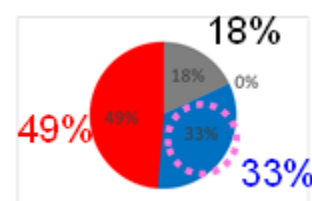
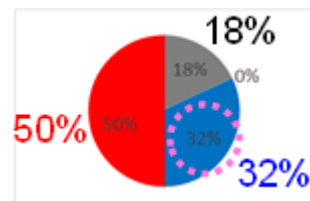
Case-3: Case-2 plus 100% execution of evacuation order by government



- 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



Contact:

Yoshihiro Katsuhama

Chief Specialist, Digital Business Development Office, Nippon Koei Co., Ltd.

Email: a4766@n-koei.co.jp