

# **A Local ICT Platform with AI Capabilities for On-site Disaster Response**

**October 1<sup>st</sup> , 2026**

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- Background
- Needs of local ICT platform in disaster situations
- “X-FACE” as a local ICT platform and its features
- Feasibility studies conducted so far
- AR and AI capabilities for usability improvement
- Summary

Part of this work was supported by Council for Science, Technology and Innovation(CSTI), Crossministerial Strategic Innovation Promotion Program (SIP), “Development of a Resilient Smart Network System against Natural Disasters” Grant Number JPJ012289 (Funding agency:NIED).

# Natural Disasters Impact Lives Worldwide

In 2025,  
**358** large-scale  
 natural disasters  
 occurred  
 worldwide\*.

They resulted in  
**16,607** deaths,  
**110.2 million**  
 people affected,  
**US\$169.7 billion** in  
 economic damage.

Figure 1

Number of Disasters by Continent  
 and Top 10 Countries in 2025

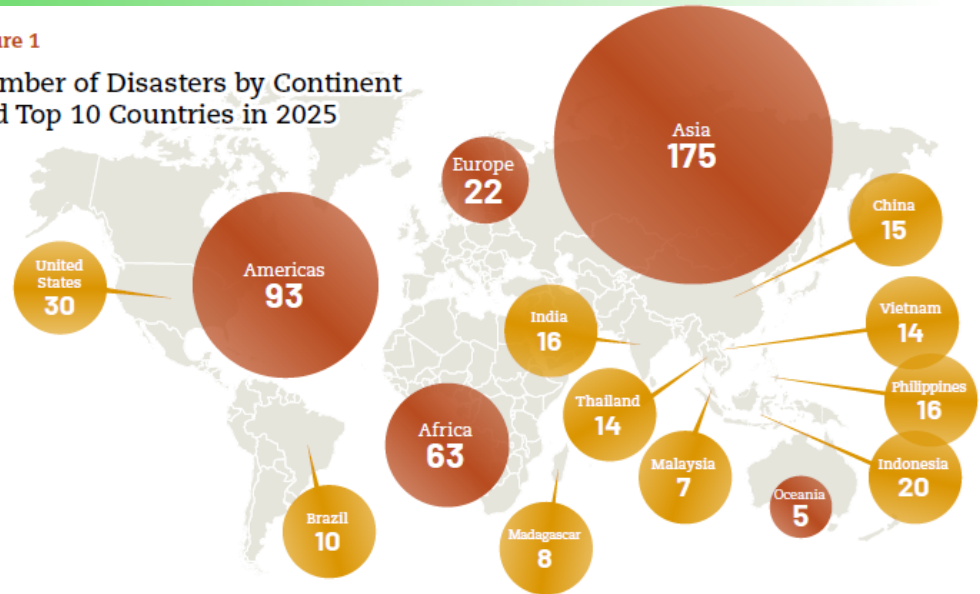
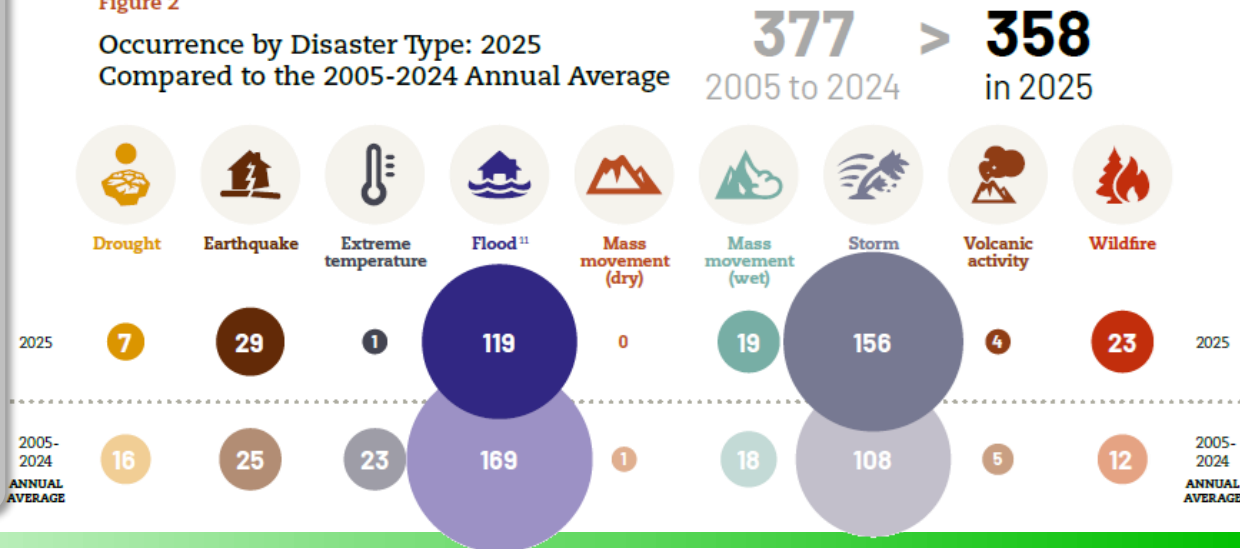


Figure 2

Occurrence by Disaster Type: 2025  
 Compared to the 2005-2024 Annual Average



# Communication Challenges During Disasters

- **First responders**—including police, fire departments, Self-Defense Forces, and medical teams—work to assess damage, search for and rescue victims, and restore essential services.
- Their activities depend on **timely and accurate information**, such as the **extent of damage**, missing-person lists, and the activities of other response teams.
- **Disaster survivors** also need to **communicate with others** and **access critical information** to stay safe.
- However, **disruptions to communication networks** can **severely hinder** these activities.
- There is an **urgent need for reliable local communication and information-sharing systems** that can operate even when conventional networks are unavailable.

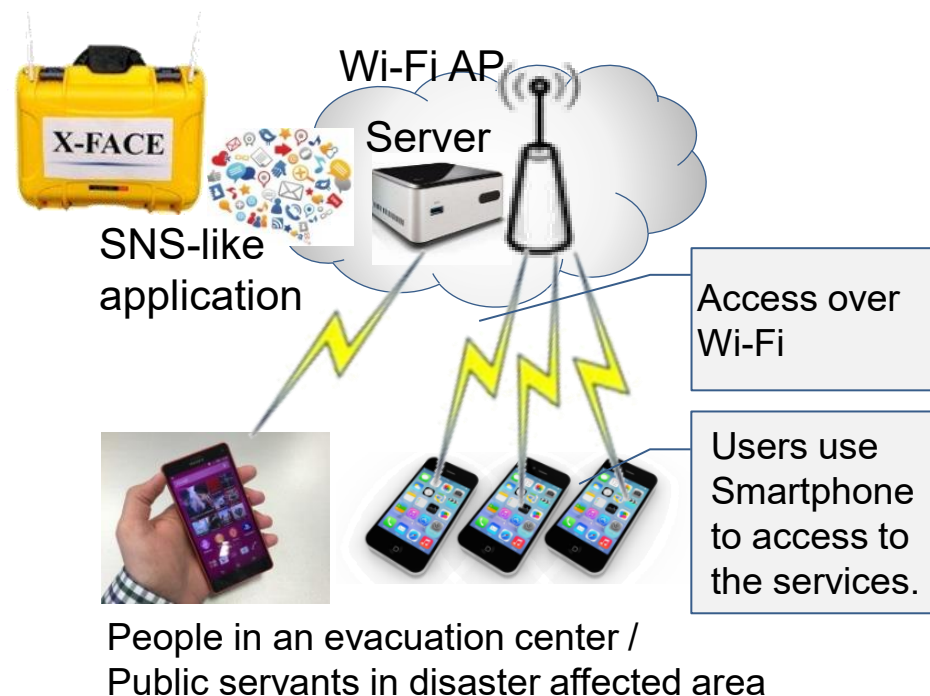


# X-FACE as a local ICT Platform

We have proposed and developed a portable local ICT Platform called X-FACE (eXtensible Front-line Augmented Communications Exchanger)

X-FACE consists of a small server, a Wi-Fi access point, and a battery, all integrated into a portable case.

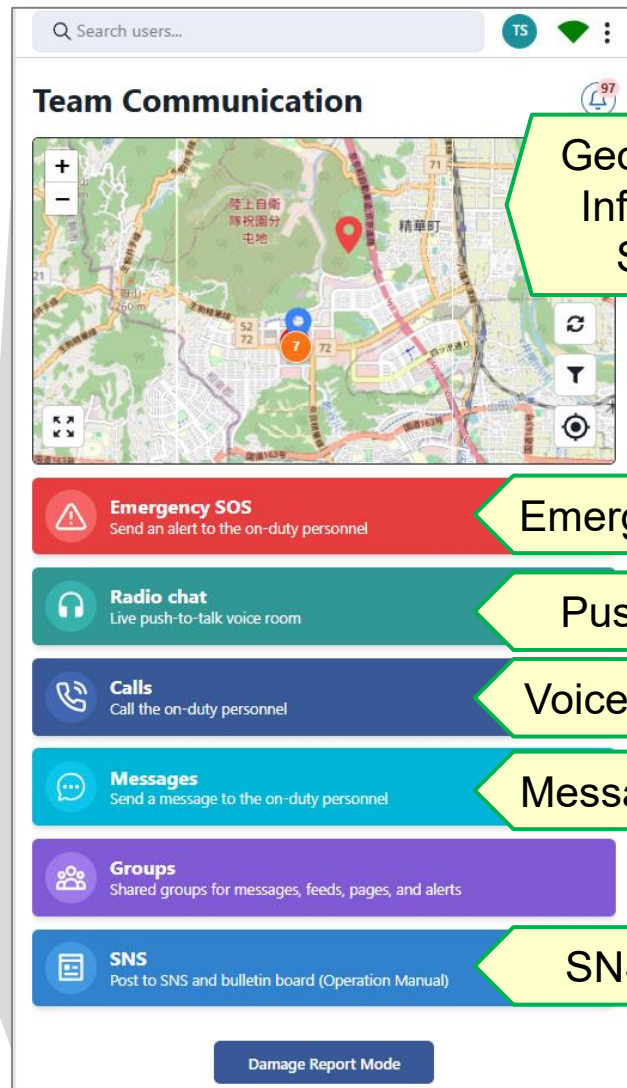
It provides local communication and information-sharing functions for people in the disaster affected area.



## What is X-FACE?

X-FACE is a portable local communication system that integrates a compact edge server, battery, wireless LAN access point, and other components in a rugged, shock-resistant case.

# X-FACE functions for local communications



The main interface of the X-FACE app, titled "Team Communication", features a map at the top with location markers. Below the map are several functional buttons: "Emergency SOS" (red), "Radio chat" (green), "Calls" (blue), "Messages" (light blue), "Groups" (purple), and "SNS" (dark blue). A "Damage Report Mode" button is located at the bottom. A yellow callout box labeled "Geographical Information System" points to the map. Other yellow callout boxes label the "Emergency alert", "Push-to-talk", "Voice/Video call", "Messaging/Chat", and "SNS/Feeds" functions.

**Geographical Information System**

**Emergency alert**

**Push-to-talk**

**Voice/Video call**

**Messaging/Chat**

**SNS/Feeds**

Search users... TS

**Team Communication**

**Emergency SOS**  
Send an alert to the on-duty personnel

**Radio chat**  
Live push-to-talk voice room

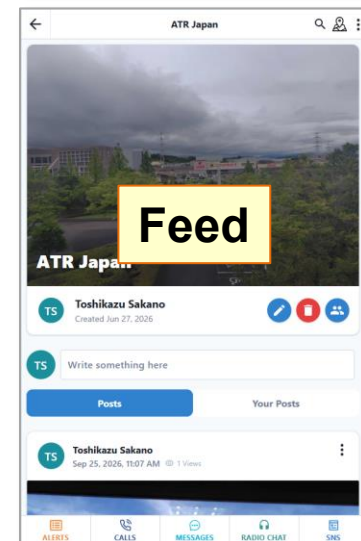
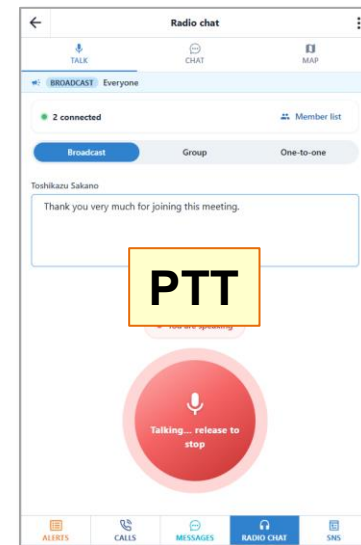
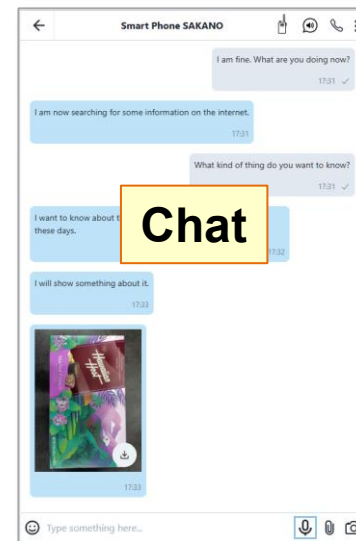
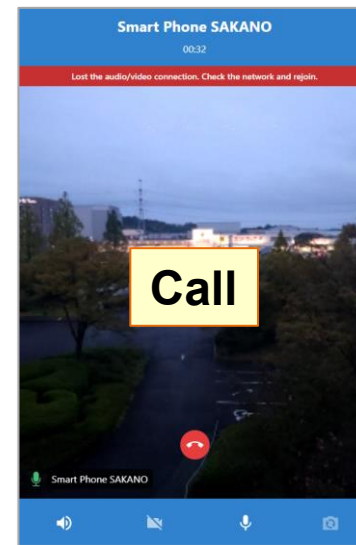
**Calls**  
Call the on-duty personnel

**Messages**  
Send a message to the on-duty personnel

**Groups**  
Shared groups for messages, feeds, pages, and alerts

**SNS**  
Post to SNS and bulletin board (Operation Manual)

Damage Report Mode

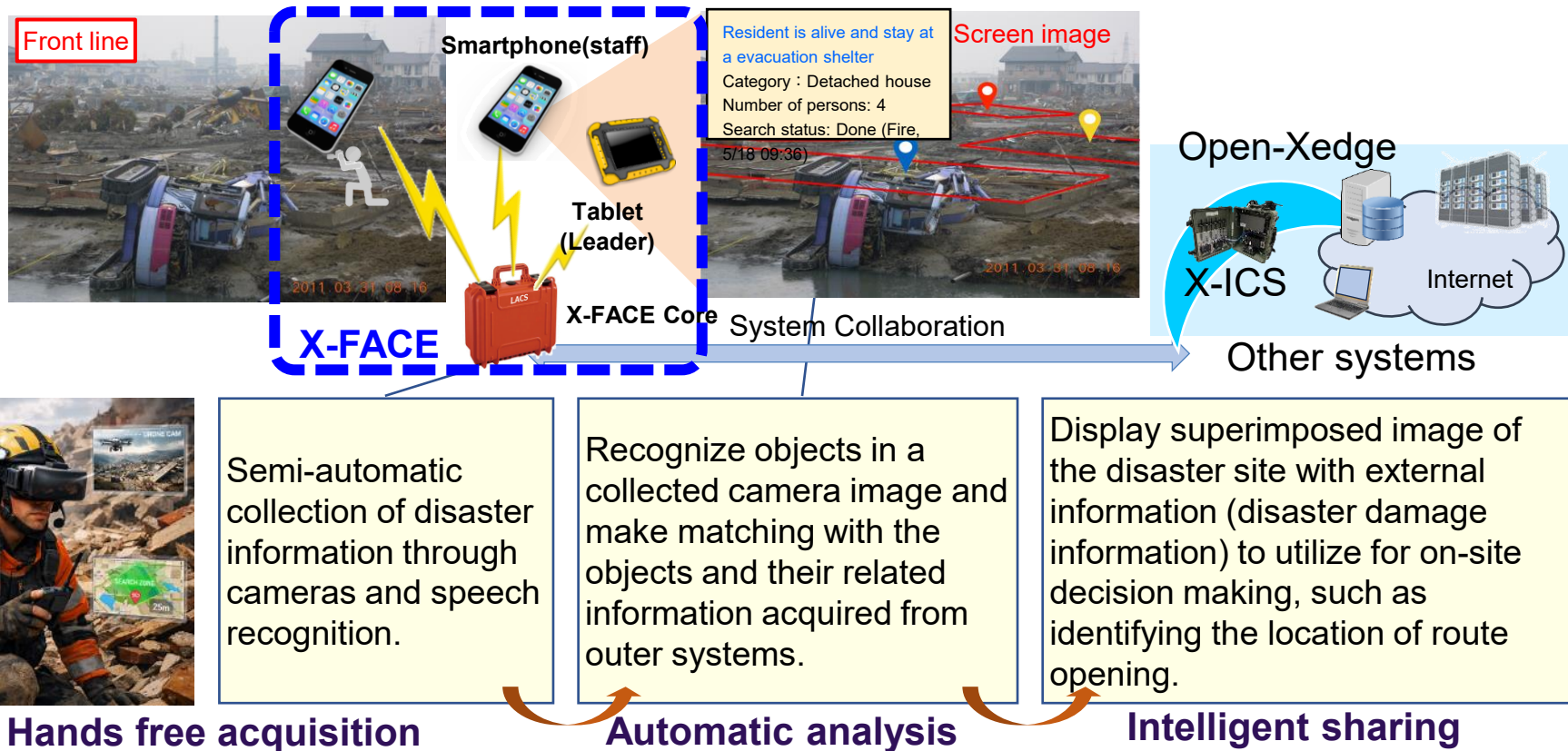


User device

# X-FACE functions for first responders

X-FACE offers functions enabling to automatically handle disaster information at the front line with the support of AI.

It also has functions for data sharing and delivery with other related systems like X-ICS for relaying the Internet and Open-Xedge for disaster information system.



# X-FACE simulation with DOST7

Simulation of X-FACE usage in disaster situations was conducted in Cebu in 2024 with the support of DOST7 and a Cebu based NPO, CVISNET.

Around 25 people from DRRMOs of Lapu-Lapu City and Mandaue City, Bureau of Fire Protection, Philippine National Police, DOST7 and others participated.



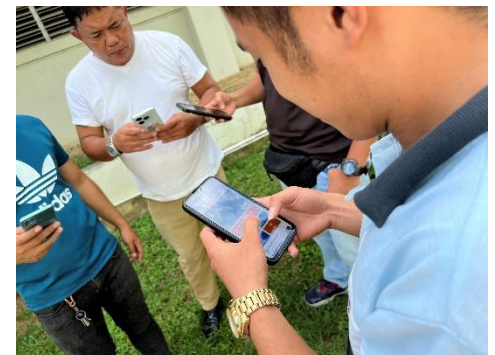
Training of system usage



Discussion of usage



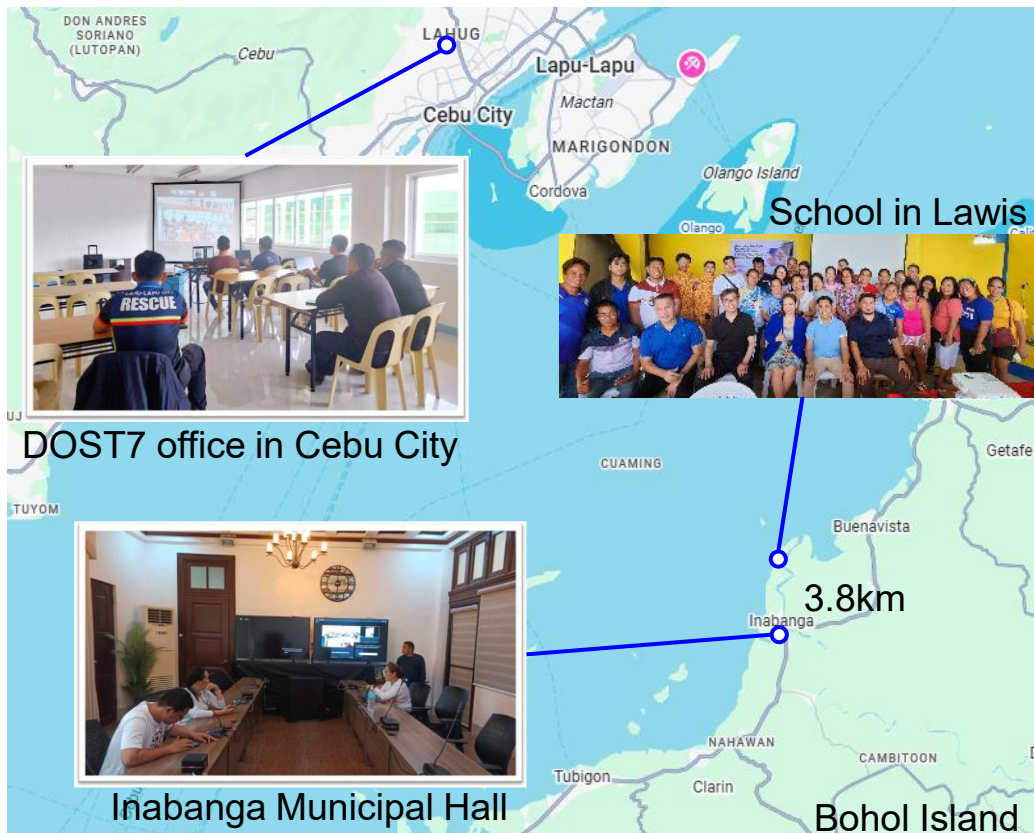
Simulation of searching missing person



# Feasibility study in Inabanga, Bohol

A feasibility study of X-FACE was conducted in Inabanga, Bohol in 2025, with the support of DOST7 and CVISNET.

X-FACE functions were demonstrated at a school in Lawis, Inabanga, and the situation of the site was shared by Municipal Hall of Inabanga and also DOST7 in Cebu city over the Star-link and the Internet.



**X-Face: a Technological Breakthrough for Disaster Response in Inabanga**

Inabanga's emergency response units, led by Mayor Jono Jumamoy, joined the disaster simulation program with representatives from the Bohol Provincial Fire Marshal, BFP Inabanga, Barangay Officials, LGU Councilors, RHU, and MDRMO. Mr. Kenneth Santianez, IT Head of CVISNET, showcased X-Face's key features to enhance disaster response communication and coordination.

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**AR** for increasing visibility of the status of disaster area

**AI** to make information input easier and simpler [Automatic Speech Recognition(ASR)]

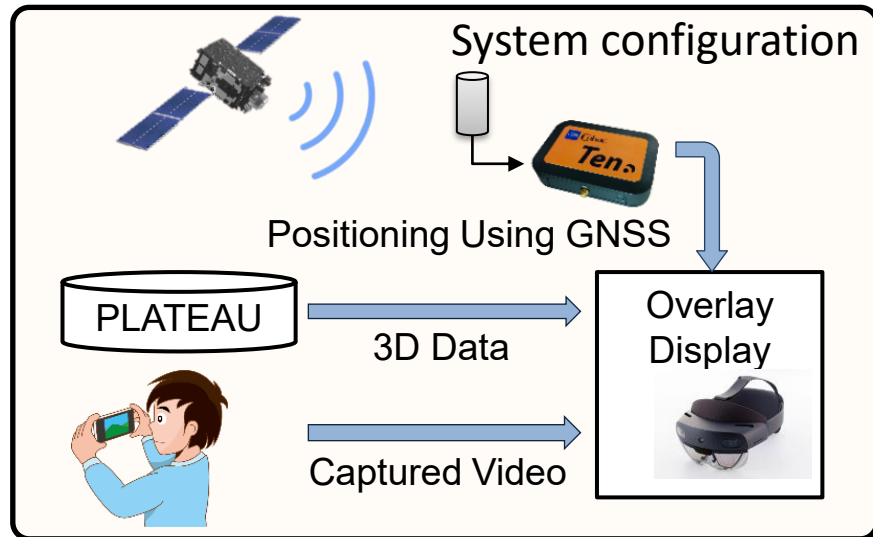
**AI** to select, organize, and present relevant information from diverse inputs. [Attribute extraction]

**AI** to select essential information and reduce data transmission [ASR and TTS(Text-to-Speech)]

# Application of Augmented Reality in X-FACE

We demonstrated following:

- input a PLATEAU 3D city model data and captured visible scene to the system,
- overlay them using high-precision positioning system,
- displayed the overlaid scene on a MR devices (HoloLens 2) or smartphones (iPhone), and
- Pointing a building and input related comment



GNSS: Global Navigation Satellite System



# Another demonstration of AR usage

Overlay 3D model to the captured scene



User

Pointing the building and input comment with ASR



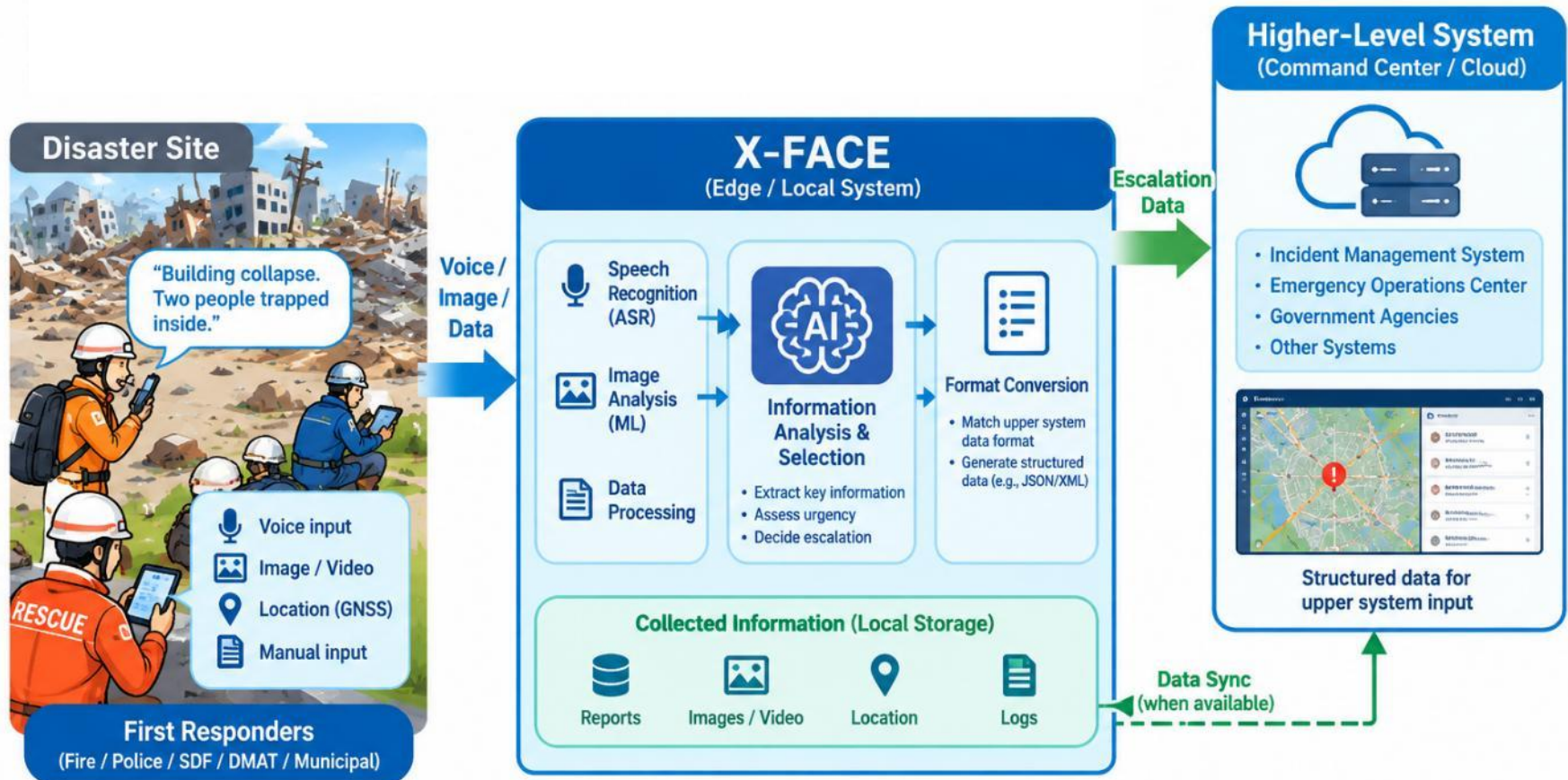
The comment is on the displayed scene



The framework and requirements of these AR use cases for disaster systems were included in the recently published ITU-T recommendation H.430.11.

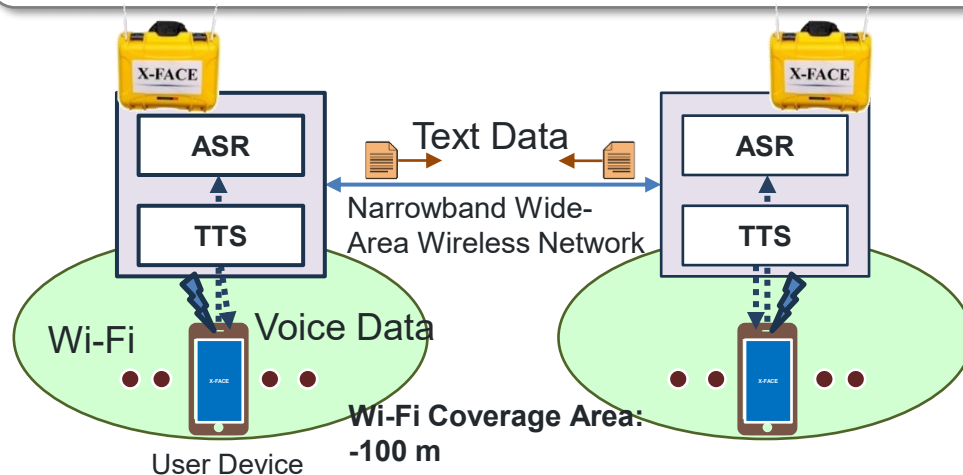
# AI for frontline information processing

X-FACE plays a key role in collecting information at disaster sites. Edge AI and ASR are used to identify and select critical information that needs to be escalated to higher-level systems and output it in the format required by those systems.



# AI for extending the voice service coverage to km order

- First responders primarily rely on voice communication. A key limitation of Wi-Fi-based X-FACE is its limited coverage, typically up to around 100 m.
- ASR (Automatic Speech Recognition) and TTS (Text-to-Speech) can extend the communication range by converting voice into text.
- Voice data from the transmitting device is converted into text by ASR at the local X-FACE and transmitted to a remote X-FACE. The remote X-FACE converts the text back into voice using TTS and sends it to the receiving device.
- By connecting remote X-FACEs via LPWA (Low Power Wide Area) communication, the coverage can be extended to several kilometers.



- A local ICT platform designed to support first responders during disasters: X-FACE was introduced.
- The system can be used as an information-hub in the local area. First responders can communicate and share information with surrounding members even in the critical situations.
- AR and AI for primary information processing contribute to increase usability of the system.
- We are now seeking opportunities to deploy our system to support first responders and disaster survivors in real situations.

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**Thank you for your attention.**

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