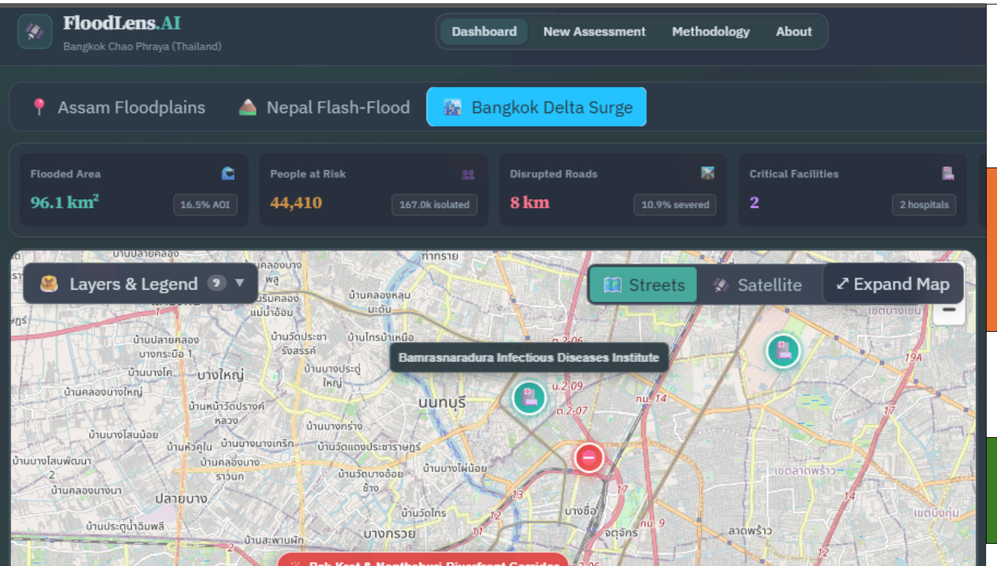
Event: Space Innovation Challenge – Final Oral Presentation and Judging

Format: APRSAF-32 Side Event

- Date: 26th October 2026 (Monday)
- Venue: Hilton Garden Inn Bangkok Riverside, Bangkok, Thailand
- Organised By: Japan Space Forum (JSF)
- In Cooperation with: UNISEC and Kyushu Institute of Technology (Kyutech)

Proposal Title: FloodLens AI: From Satellite Observations to Actionable Flood Response



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THE SCALE OF THE CRISIS

44% of all global natural disasters are floods
35M+ people displaced annually across South & SE Asia
72h Golden Window dictates 80% of preventable mortality

When floods strike

- Floods can leave entire communities cut off from help.
- Heavy rain and clouds make it difficult to observe flooded areas.
- Roads and bridges may become unusable.
- Rescue teams may not know which villages need help first.
- Hospitals and essential services can become difficult to reach.
- Delayed information can delay rescue operations.

Key Facts:

According to the UN and WMO's multi-decade EM-DAT disaster database, floods account for 44% of all recorded disaster events globally

Documented by the Asian Development Bank (ADB) and the IDMC, which show that monsoon floods and storms in South and SE Asia trigger upwards of 35 million internal displacements each year

This is the standard UN-INSARAG and WHO Search & Rescue golden window doctrine after 72 hours without food, clean water, or triage, survival rates plummet by more than 80%

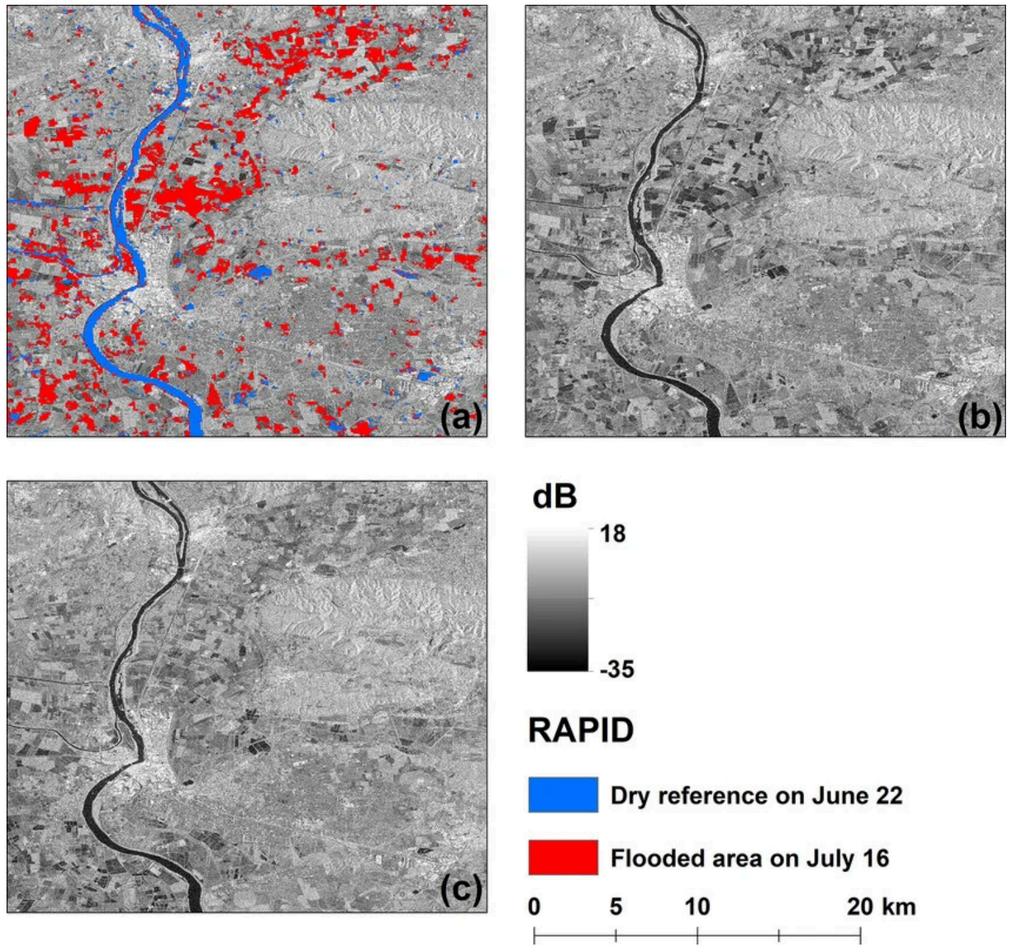
The key problem:
Rescue teams need to know where the water is, which routes are blocked, and who needs help most

Contribution of Space

Satellites can help us understand floods across large areas, even when conditions on the ground are difficult.

- Optical satellites take images using reflected sunlight, but clouds can block their view.
- Radar satellites, such as Sentinel-1, can collect useful observations through clouds and in darkness.
- Satellite images help identify areas that may be covered by floodwater.
- Combining these observations with other geographic data helps build a wider picture of the situation.

Why it matters: Satellites can help rescue teams see beyond the places they can safely reach.



(a) RAPID flood map; (b) Sentinel-1 SAR image in VH polarization sensed on 16 July; (c) Sentinel-1 SAR image in VH polarization sensed on 22 June.

Reference: Brief communication: Western Europe flood in 2021 – mapping agriculture flood exposure from synthetic aperture radar (SAR) - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/a-RAPID-flood-map-b-Sentinel-1-SAR-image-in-VH-polarization-sensed-on-16July-c_fig3_363283068 [accessed 18 Oct 2026]

Quality of the Proposed Solution

Proposed Solution:
FloodLens AI: From Satellite Observations to Actionable Flood Response Intelligence

A live system that guides both headquarters and rescue teams on the water.

The Problem: Heavy storm clouds hide floods from normal cameras, satellites, and drones.
The Space Fix: Space radar sees straight through dark clouds and heavy rain 24/7.
Fast Results: Turns raw radar data into clear flood maps in **under 90 seconds**.

Powered by SpaceShift AI

- **Finds Damaged Buildings:** Uses Space Shift's AI (SateAIs) to automatically spot collapsed or washed-away homes from orbit.
- **Works Online & Offline:** Connects to live space data during real floods, or runs offline for rescue team practice drills.
- **Easy to Run:** Lightweight software that runs on everyday laptops without expensive equipment.

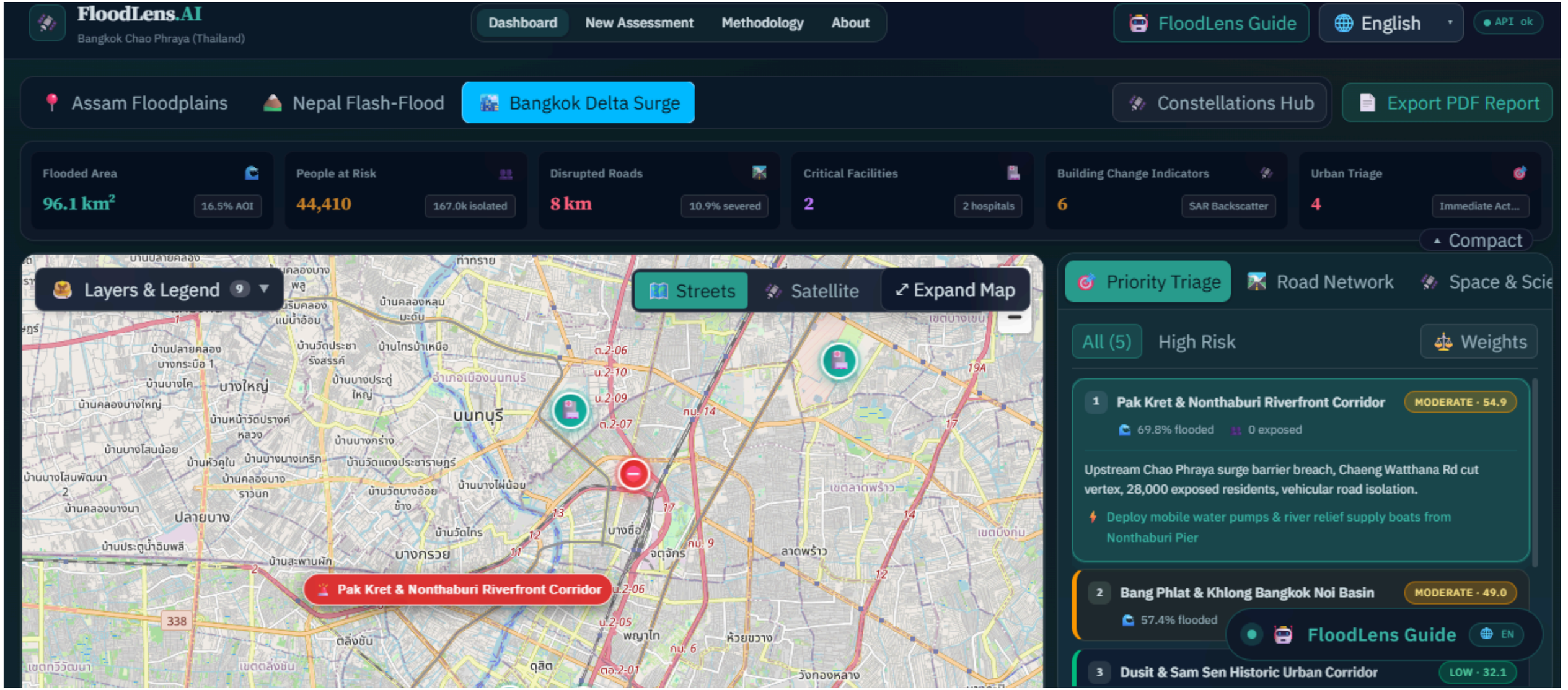
Made for 3 Key Users

- **Disaster Chiefs (Web Screen):** See which areas are submerged and get 1-click rescue reports.
- **Rescue Boat Crews (Android Phone App):** Live GPS navigation in their pocket that works even when phone towers go down.
- **Local Families (Friendly AI Guide):** Plain warnings in 5 local languages with zero confusing terms.

"Most satellite tools stay stuck on office computers. FloodLens AI actually reaches the front line. We use Space Shift's AI to spot destroyed buildings from space in minutes, and we put that live map onto an Android phone so rescue teams in boats know exactly where to go."

Web-based solution: https://floodlens-ai-ncql.onrender.com

Video Recording: https://drive.google.com/file/d/19x_m8ljCxTja2dB_2T_4KHowoV-E_U-A/view?usp=sharing



Quality of Solution

FLOODLENS AI

Space-Enabled Flood & Disaster Impact Assessment

From Multi-Constellation Satellite Observations to Actionable Humanitarian Intelligence

Scenario: BANGKOK — Bangkok Metropolitan Region & Chao Phraya Corridor, Thailand
Analysis window: 2024-10-01 to 2024-10-20
Generated: 2026-10-18 12:51 UTC
Mode: DEMO / MOCK DATA
Confidence: HIGH (qualitative decision-support)

FloodLens AI provides satellite- and GIS-derived decision-support information for rapid assessment. Results are indicative and should be validated with authoritative field observations and official disaster-management information before operational decisions.

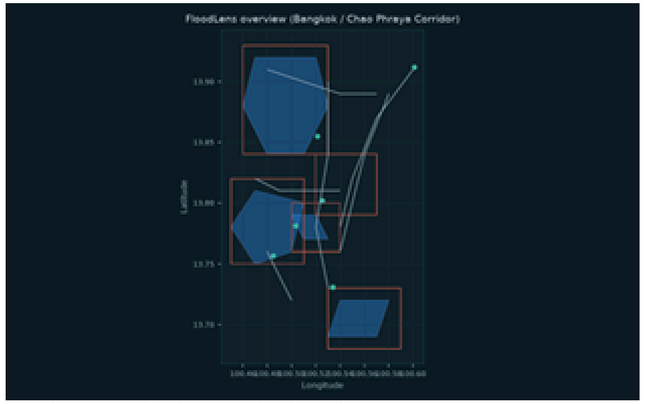
1. Executive Summary

- Indicative flood extent covers approximately **98.12 km²** (16.5% of the demo AOI).
- Satellite-derived building-change indicators intersecting flood: **6** (of 6 indicators).
- Potentially affected road length (GIS intersection): **7.97 km**.
- Estimated population potentially exposed: **44,410**.
- Critical facilities in flood zone (indicative): **2**.
- Highest prototype Response Priority Score: **Pak Kret & Nonthaburi Riverfront Corridor** — MODERATE (54.9).

Prototype decision-support scoring; not an official emergency classification. Building indicators are not confirmed structural damage.

2. Overview Map

Static overview of demonstration layers (flood extent, roads, facilities, priority zones). Interactive map available in the FloodLens dashboard.



Map content is DEMO DATA unless a live SateAIs result has been applied.

3. Flood Extent

Prototype flood extent derived from demonstration inundation polygons (or user-provided / SAR-change layers in later workflows). Labeled as indicative, not operational-grade flood classification.

Affected area	98.12 km²
Share of demo AOI	16.5%
AOI area	583.19 km²

4. Building Impact Indicators

Satellite-derived building change / potential damage indicators. These are **not** confirmed damaged buildings.

Total indicators	6
Potentially affected (in flood)	6
Share affected	100.0%

5. Road Accessibility

Satellite/GIS-derived accessibility impact describing **potential route disruption** — not confirmed road closures.

Road length total	72.88 km
Potentially affected length	7.97 km
Network nodes / edges	12 / 6
Connected components	6
Median hospital detour ratio	1.0

Potential critical links (top):

- Chaeng Watthana Road (Route 304) - Pak Kret Bridge Approach — flood 52.5%, factor 5.1 (bridge risk if removed)
- Charoen Nakhon / Thonburi Riverside Artery — flood 14.3%, factor 1.5 (bridge risk if removed)
- Sirat Elevated Expressway - Central Lifeline Corridor — flood 10.4%, factor 1.5 (bridge risk if removed)

6. Population Exposure

Estimated population potentially exposed: 44,410. Values are area-weighted estimates from demonstration population zones.

7. Critical Facilities

Facilities in flood zone	2
Hospitals in flood	2
Schools in flood	0
Emergency / police in flood	0

8. Priority Areas

Response Priority Score is a transparent weighted prototype (flood, population, facilities, roads, buildings). Not an official emergency classification.

Weights: flood 30.0%, population 25.0%, facilities 20.0%, roads 15.0%, buildings 10.0%.

Rank	Locality	Score	Category	Flood %	Pop. exposed
1	Pak Kret & Nonthaburi Riverfront Corridor	54.9	MODERATE	69.8	0
2	Bang Phlat & Khlong Bangkok Noi Basin	49.0	MODERATE	57.4	0
3	Dusit & Sam Sen Historic Urban Corridor	32.1	LOW	35.2	0
4	Khlong Toei Tidal Surcharge Basin	17.0	VERY LOW	40.0	0
5	Bang Sue Transit & Drainage Pumping Hub	10.0	VERY LOW	0.0	0

Why is the top area prioritized?

- 70% flood exposure within locality
- 1 critical facility nearby / in affected zone
- Significant potential road disruption (High)
- Building-change indicators detected (2)

Recommended action: Monitor conditions and validate with local authorities.

9. Methodology

- Flood exposure: polygon area of inundation layers within the demonstration AOI (metric CRS EPSG:32646).
- Building indicators: point-in-polygon against flood extent; SateAIs disappearbuilding results may replace demo indicators when completed.
- Roads: NetworkX multigraph with flood-intersection disruption factors applied to edge costs.
- Population: area-weighted share of intersecting population zones.
- Priority score: components normalized 0–100, then weighted sum with configurable weights.

10. Data Sources

- Demonstration GeoJSON under demo_data/ (Assam / Barpeta scenario).
- Optional SateAIs Sentinel-1 disappearbuilding analysis (MOCK_MODE uses saved example GeoJSON).
- OpenStreetMap-style road / facility attributes in demo layers.
- Basemap attribution in the interactive client: OpenStreetMap / CARTO.

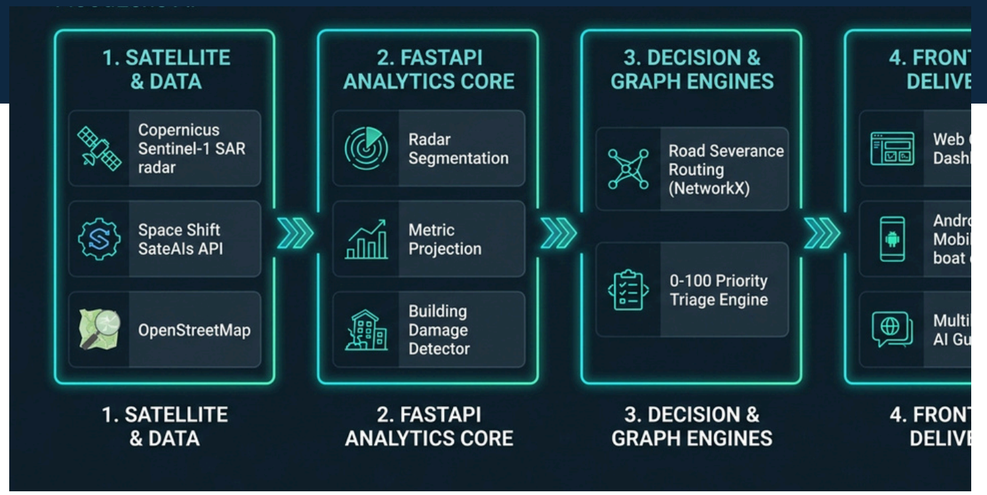
11. Confidence / Limitations

- Overall qualitative confidence: HIGH.
- DEMO DATA may be present; do not present mock outputs as live satellite observations.
- No claim of confirmed structural failure, casualties, or guaranteed evacuation routes.
- SAR change detection and OSM completeness vary by location and time.
- Priority weights are configurable and not scientifically validated for all events.
- Future observation layer (not connected): NISAR L/S-band SAR.

FloodLens AI provides satellite- and GIS-derived decision-support information for rapid assessment. Results are indicative and should be validated with authoritative field observations and official disaster-management information before operational decisions.

Technical Architecture

1. We take all-weather radar from Sentinel-1 and building damage vectors from Space Shift's SateAIs API.
2. Our analytics core applies Otsu thresholding to segment calm floodwater in decibels and filters steep terrain using elevation models.
3. Our graph engine models the road network to detect cut hospital routes via Dijkstra routing, while an objective 5-factor formula calculates an auditable 0-to-100 rescue priority score.
4. Finally, this intelligence is delivered both to command center screens and directly into rescue boats on an Android app with offline GPS navigation all executing in under 90 seconds.





Innovation

Multilingual AI Chatbot: An easy-to-use conversational assistant that answers practical questions (*"Is the road to the hospital flooded?"*) in **5 local languages** (Thai, Hindi, Assamese, Nepali, English).

Zero Learning Curve: Simple, non-technical dashboard that anyone can use without GIS expertise includes **1-click automated PDF reports** for commanders.

Instant Building Damage (Space Shift AI): Connects to Space Shift's sateais AI to detect collapsed and washed-away homes in **minutes**, replacing 3-5 days of slow manual inspection.

Smart Road & Hospital Routing: Automatically traces road networks to identify severed bridges and calculates the safest open detour corridors to emergency rooms.

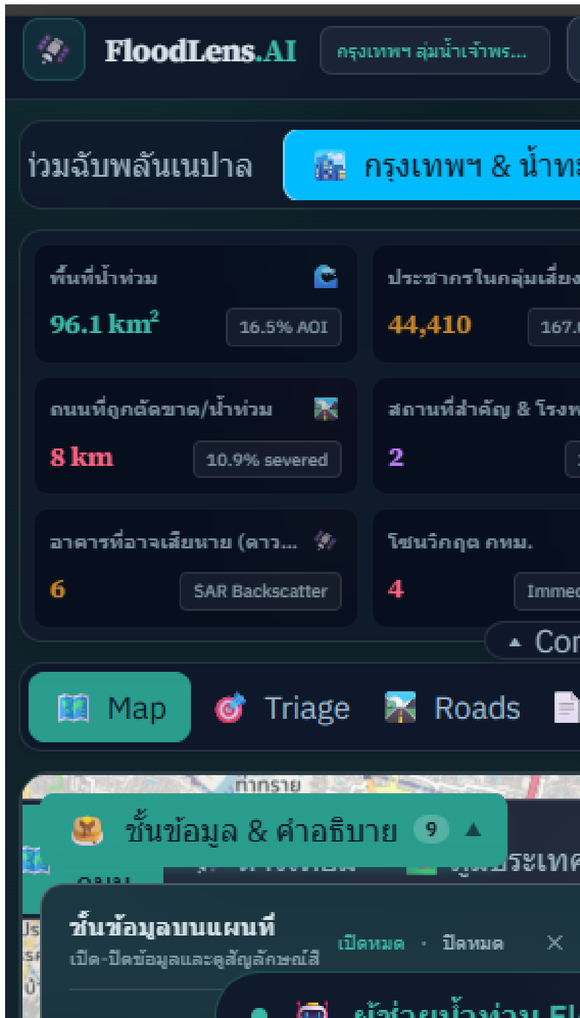
0–100 Rescue Priority Score: Removes confusion by ranking neighborhoods into **Very High, High, and Moderate** priority so lifeboats know exactly where to go first.

Offline-Ready Android App: Equips frontline rescue boat crews with **live GPS tracking and offline-cached maps** that keep working even when cellular towers drown.

Multilingual Android Application

Download and Install "**app-debug.apk**" file from here https://drive.google.com/drive/u/4/folders/1h4K1GlmpvceAgS8AaAOucbhNbC3iZQk





Expected Impact

Concrete Societal Benefits

- **Humanitarian (Saving Lives):**
  - Delivers lifeboats and medical supplies within the critical **72-hour golden rescue window**.
  - Guides ambulances away from submerged bridges to open emergency rooms.
- **Economic & Asset Protection:**
  - Uses Space Shift building-change data to provide rapid, indisputable satellite proof for farmer and homeowner insurance relief payouts.
  - Protects power sub-stations and drinking water facilities with proactive floodwall alerts.
- **Global Climate Resilience (UN SDGs):**
  - Democratizes space technology for vulnerable delta and river communities across India, Thailand, and Nepal.
  - Directly advances **UN SDG 11 (Resilient Cities)**, **SDG 13 (Climate Action)**, and **SDG 3 (Good Health)**.



85% Faster Intelligence: Cuts assessment time from **36 hours down to under 90 seconds**.

Handheld Mobile Deployment: Frontline rescue boats navigate submerged neighborhoods directly via the **Android App**.

Space Shift Industry Synergy: Direct commercial integration with Space Shift's SateAIs ecosystem for rapid scaling across Asia-Pacific.

Thank You!