

SMART INDIA HACKATHON 2025



- **Problem Statement ID :** SIH25039
- **Problem Statement Title :** Integrated Platform for Crowdsourced Ocean Hazard Reporting and Social Media Analytics
- **Theme :** Disaster Management
- **PS Category :** Software
- **Team ID :** Rebel Coders
- **Team Name :** Rebel Coders



Problem Statement

- Despite INCOIS' advanced early warning systems for ocean hazards, there exists a **critical gap in real-time ground-level information and citizen engagement**, which limits the accuracy, responsiveness, and effectiveness of advisories.
- Current systems **primarily issue** one-way advisories, lacking interactive platforms for citizens to report hazards back to INCOIS, which **restricts** collaborative disaster risk reduction.
- Limited real-time ground-level reporting, untapped social media insights, and gaps in last-mile connectivity hinder effective ocean hazard monitoring.

Uniqueness & Innovation

- Real Time Alerts** to Citizens to head towards the nearest safe area when High alert of disaster and **tracking of location of citizens** while disaster.
- A **voice-activated emergency alert system** that detects repeated calls for help, captures the **user's location**, and **notifies the nearest coastal rescue team even in low-connectivity areas**.

Proposed Solution

MarineVoice is a (**Mobile/Web , Multilingual, Offline Capable**) integrated platform that **bridges the gap** between official **ocean hazard warnings** and **real-time ground realities**, enabling two-way communication that **empowers citizens** and **enhances authorities' situational awareness**.

Citizen Reporting App : A multilingual mobile & web app that lets coastal citizens report hazards with geotagged photos/videos, even offline in low-connectivity areas.

Unified Command Dashboard: A real-time interactive map for INCOIS and disaster agencies that merges citizen reports, forecasts, and social media insights, highlighting "credibility-weighted hotspots" to quickly identify and prioritize risk zones.

Credibility-Weighted Hotspots: Advanced algorithms analysis and cluster incoming reports, prioritizing credible and verified inputs to highlight areas of concern, ensuring authorities can respond to the most critical events first.

Social Media Intelligence (SMI) Engine: An AI/NLP-powered backend that continuously scans regional social media platforms for hazard-related content, filters misinformation, analyzes sentiment (panic, inquiry, awareness), and plots emerging trends on the dashboard.

Integrated Situational Awareness: Combines citizen reports, social media insights, and official alerts into a single system for faster validation, better communication, and efficient resource use."

TECHNICAL APPROACH

Methodology

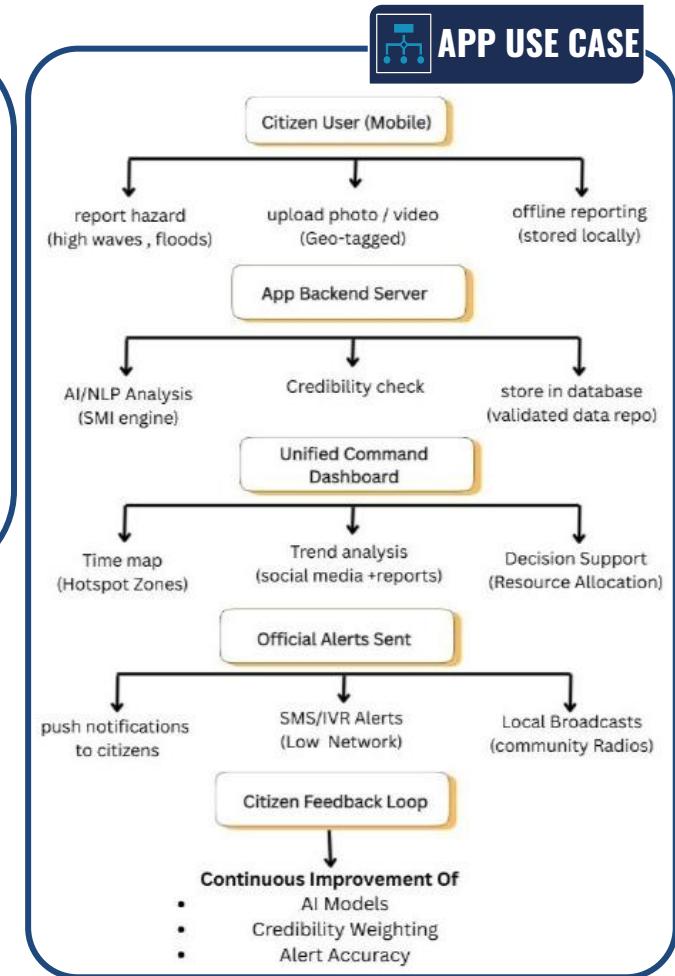
Data Collection & Integration: Gather real-time inputs from citizens (via mobile/web app), social media feeds (via NLP engine), and satellite/ocean datasets (via Google Earth Engine).

Processing & Analysis: Apply AI/ML algorithms for sentiment analysis, credibility scoring, and clustering to generate validated hazard hotspots.

Visualization & Decision Support: Present integrated insights on the Unified Command Dashboard with interactive maps, overlays, and alerts for rapid, informed action.



High Resolution Satellite image showing High Tides



TECH-STACK

FrontEnd

- React Native 
- React js , Tailwind CSS 

BackEnd

- Node js , Express js 
- Google Earth Engine 

Database

- MongoDB , Firebase 

APIs

- ChatBot by Hugging Face model 
- Vapi voice Agent 
- Google Maps for maps 
- Push Notification via FCM & Resend 
- WebSockets / Socket.io 
- Twitter/X API, Facebook Graph API, regional sources 

AI / SMI Engine

- Python (FastAPI/Flask)
- Elasticsearch + Kibana 
- Apache Kafka / RabbitMQ 

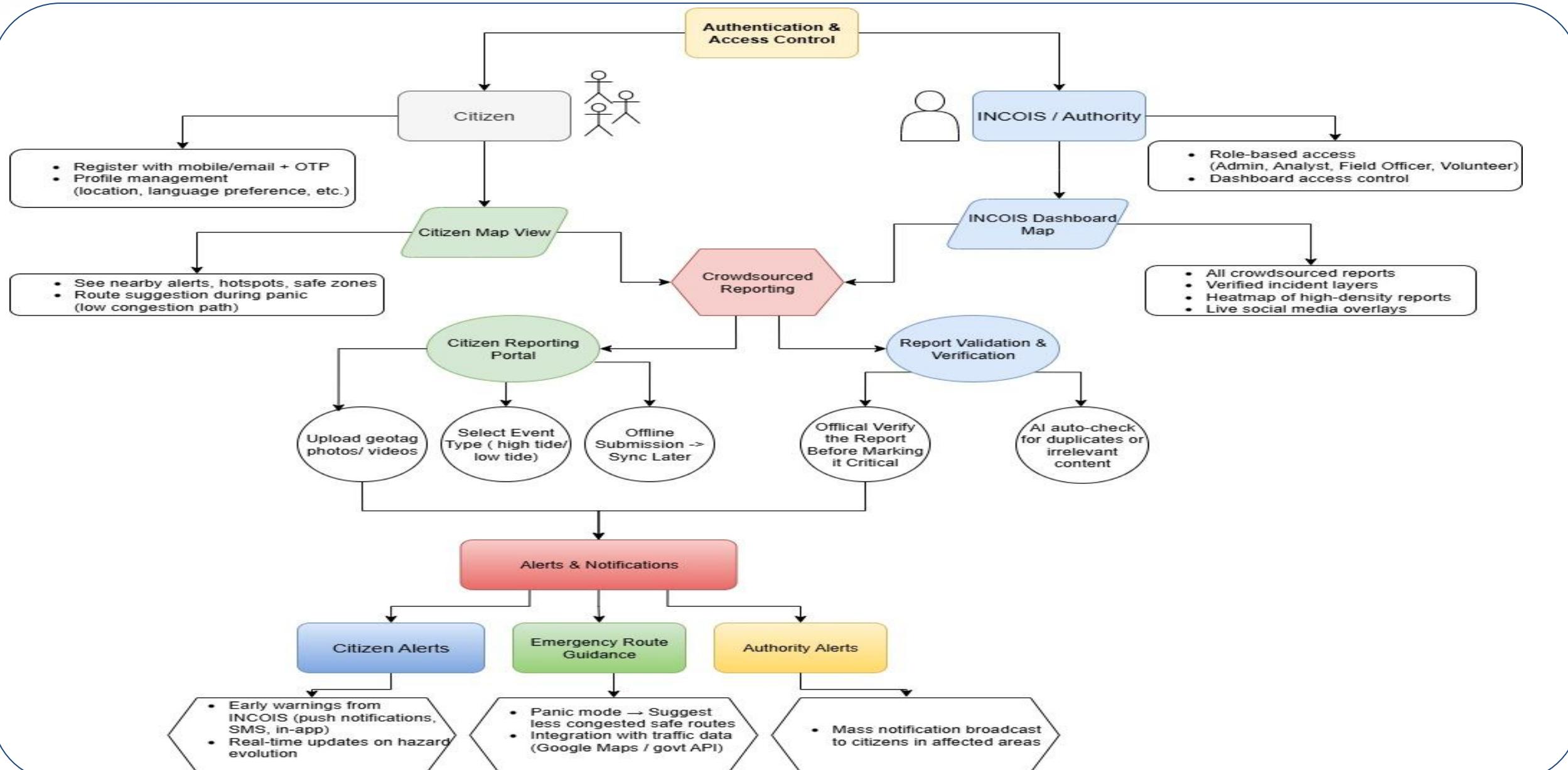


Cloud & DevOps

- Hosting: AWS 
- Authentication: OAuth2 (Gov.  official logins) + Firebase/Auth0  citizens.

CI/CD: GitHub Actions

FLOW-CHART



FEASIBILITY AND VIABILITY

⚠ Challenges & Risks

- **Funding & Sustainability:**

Insufficient long-term financial support may affect maintenance and scaling.

- **False Alarms or Misinformation:**

Inaccurate citizen reports or misinterpreted social media data could trigger unnecessary panic.

🔍 Feasibility

Technical Feasibility:

- The required technologies—mobile/web apps, cloud hosting, AI/NLP engines, and Google Earth Engine—are readily available and well-supported.

Social Feasibility:

- The platform encourages community participation and awareness, improving trust in official advisories.
- By enabling real-time reporting, it empowers citizens to actively contribute to disaster management.

Operational Feasibility:

- INCOIS and disaster management agencies already possess the infrastructure to monitor and act upon incoming hazard data.

🎯 Strategies

Community Engagement & Awareness:

- Partner with local authorities, NGOs, and coastal organizations to drive adoption.

Phased Technical Deployment:

Data Integration & Validation:

- Establish protocols for real-time data ingestion from citizens, social media, and satellite sources.
- Use AI/ML algorithms to filter noise, assess credibility, and validate reports before visualization.

Monitoring, Evaluation & Scaling:

- Continuously monitor platform usage, data quality, and response times.
- Collect feedback from citizens and authorities to improve features.

IMPACT AND BENEFITS



Impact on the audience

- **Enhanced Safety & Early Awareness:** Citizens receive real-time alerts about ocean hazards, enabling timely evacuation or precautionary measures.
- **Informed Decision-Making:** Access to credible, localized hazard information allows individuals and communities to make better decisions during emergencies.
- **Reduced Loss of Life & Property:** Faster validation of hazards through citizen reports and satellite data helps authorities respond more efficiently, minimizing casualties and damage.
- **Strengthened Public Engagement & Trust:** Two-way communication with citizens boosts confidence in INCOIS' advisories and strengthens its role as a trusted authority.
- **Optimized Resource Allocation:** Authorities can prioritize response efforts in areas most affected, based on verified reports and trend analysis.



Benefits of the solution

Social Impacts :

- Empowered Communities
- Enhanced Safety
- Strengthened Trust

Economic Impacts:

- Reduced Property & Infrastructure Damage
- Efficient Resource Allocation
- Support for Livelihoods

Environmental Impacts:

- Better Disaster Response Planning
- Monitoring Coastal Changes
- Sustainable Community Practices

RESEARCH AND REFERENCES

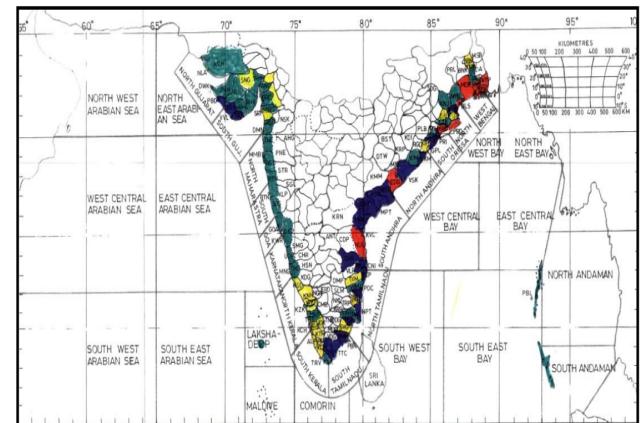
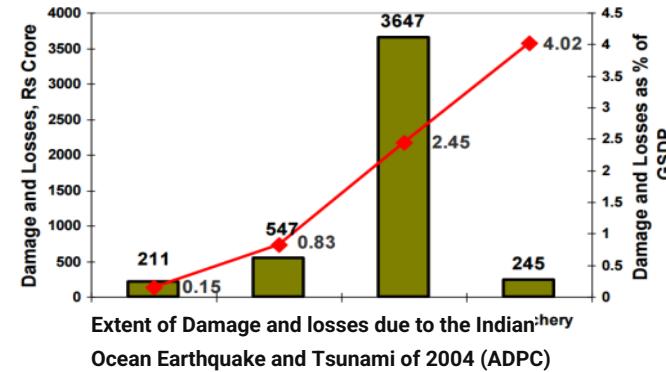


Research

- Coastal Vulnerability:** India's 7,500+ km coastline faces tsunamis, storm surges, high waves, and cyclones (**13% of global cyclones**).
- A report in **Down To Earth** highlights that while warnings for Cyclone Ockhi were issued, they failed to reach the fishermen who were already deep at sea. Hundreds of fishermen went missing or died.
- 2004 Tsunami:** ~10,000 deaths in India; \$5B economic loss regionally.
(en.wikipedia.org/wiki/Effect_of_2004_tsunami)
- Data Gaps:** INCOIS provides early warnings using satellites and models, but lacks **real-time citizen field reports** and social media insights.
- 117 districts in India are cyclone-prone (NDMA Cyclone Hazard Report, <https://ndma.gov.in/sites/default/files/PDF/cyclone/cyclonepronodistrict.pdf>).
- Social Media Potential: 65% of Facebook posts during 2018 Kerala floods were disaster-related, aiding response.

References

- INCOIS Overview, Ministry of Earth Sciences. (<https://www.incois.gov.in/site/aboutus.jsp>)
- Cyclone Hazard Report, NDMA.
(<https://ndma.gov.in/sites/default/files/PDF/cyclone/cyclonepronodistrict.pdf>)
- 2004 Tsunami Impact, Wikipedia (en.wikipedia.org/wiki/Effect_of_2004_tsunami).
- Cyclone Ockhi, Down To Earth Report. ([Report of Ockhi](#))
- Social Media in Kerala Floods, 2018 Analysis.
- Crowdsourcing Case Study, Hurricane Sandy.



Cyclone Hazard Prone Districts of India



Kerala 2018 floods