# Disaster Resilience
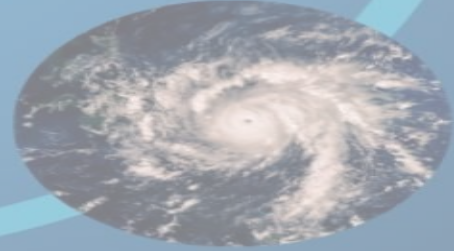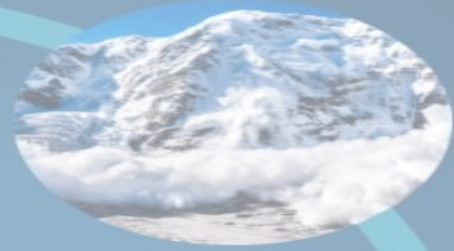
Big Idea: Disaster Management

Essential Question: How could AI help us mange natural disaster?

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# Engage:

- ❑ **How could AI help us manage natural disasters? How could mobiles aid disaster response?** How can we ensure AI develops as a force for good rather than harm?
- ❑ AI can help us solve this problem at its roots, with triggered alerts.
- ❑ Our project addresses that **Artificial intelligence can improve disaster response**, from reducing the time to assess damage to monitoring social media to more quickly and effectively deliver aid.
- ❑ **We have selected this as a problem because** Artificial intelligence has potential to alleviate the damage by marshalling relief resources more efficiently and effectively.

- It can accelerate the delivery of aid and sharpen the decisions of relief workers on the front lines.
  Natural disasters are out of the reach and influence of human beings. However, a lot can be done to minimize loss of lives. There is a lot of untapped potential in terms of AI usage, especially in humanitarian areas.
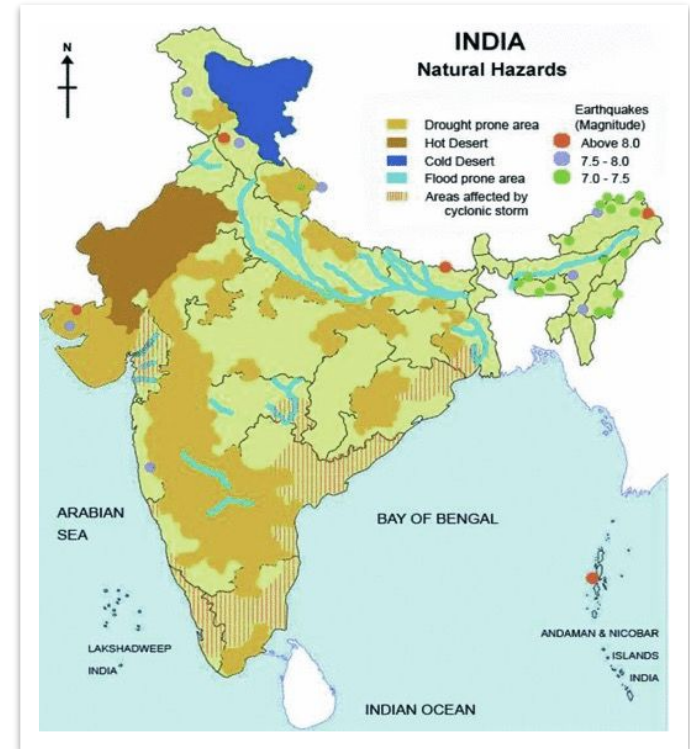
# Investigation:

- **Natural disasters are on the rise due to climate change**
- People across the world are facing a wide and diverse range of risks associated with health emergencies and disasters. These comprise infectious disease outbreaks, natural hazards, conflicts, unsafe food and water, chemical and radiation incidents, building collapses, transport incidents, lack of water and power supply, air pollution, antimicrobial resistance, the effects of climate change, and other sources of risk.
  - **It is needed** because AI could transform how disaster agencies humanitarian crisis by enabling them to pinpoint where the aid is needed most after disasters.
  - **Geospatial Technology** is an emerging field of study that includes Geographic Information System (GIS), Remote Sensing (RS) and Global Positioning System (GPS). Geospatial technology enables us to acquire data that is referenced to the earth and use it for analysis, modelling, simulations and visualization.

❑ It will dramatically improve the efficiencies of our workplaces and can augment the work humans can do. **Our app will impact various causes and harmful effects of disasters like loss of life, physical injury, illness.**
People caught in disasters need not to hesitate or worry to do their tasks or help them in any form. It protects one of the mos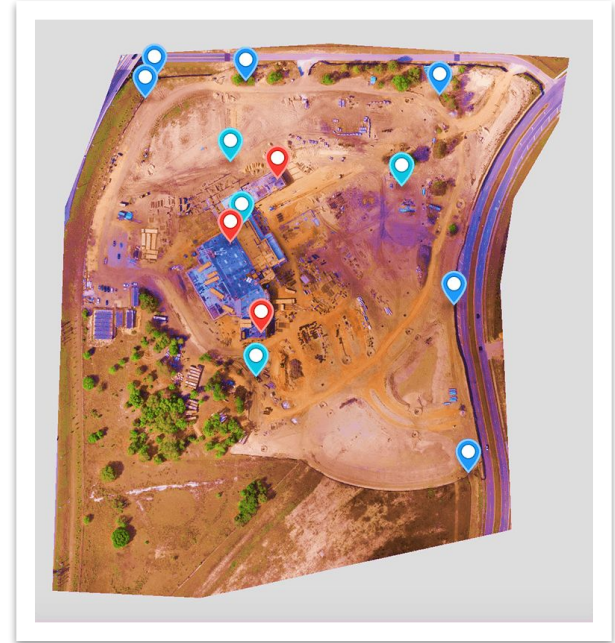t important resource i.e., **human resource**. **AI can map, analyze and model disaster zones to provide updated travel advisories, help mobilize and find citizens, and ensure that disaster response teams know what resources need to be deployed. Drones, robots and sensors** can provide intelligent and accurate information concerning landscapes and damaged buildings. **AI can also be used to extend the capability of emergency workers.**



INDIA
Natural Hazards

| | Earthquakes (Magnitude) |
| Drought prone area | Above 8.0 |
| Hot Desert | 7.5 - 8.0 |
| Cold Desert | 7.0 - 7.5 |
| Flood prone area | |
| Areas affected by cyclonic storm | |

N

ARABIAN SEA

BAY OF BENGAL

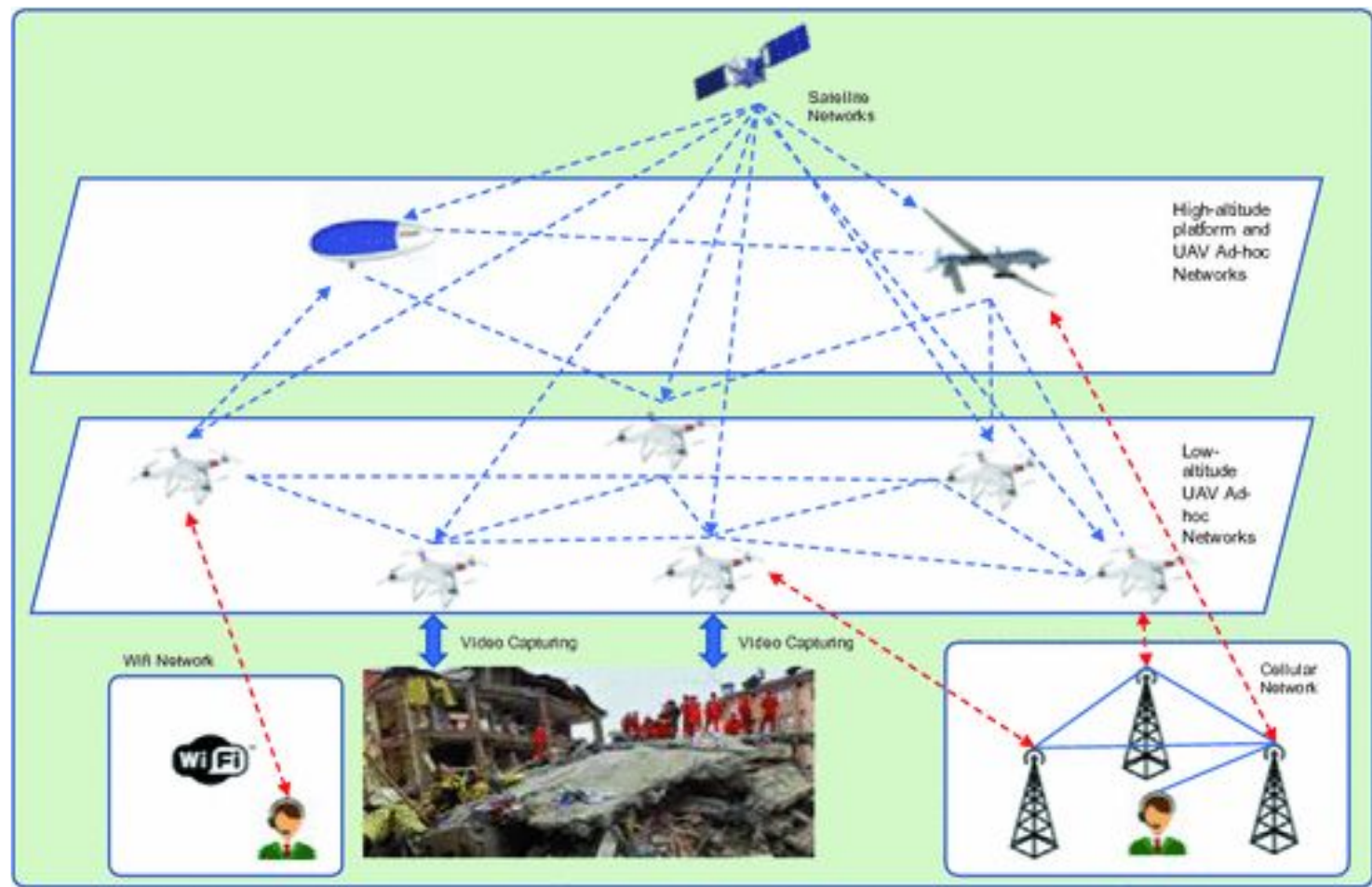LAKSHADWEEP INDIA

ANDAMAN & NICOBAR ISLANDS INDIA

INDIAN OCEAN

# Action:

- Natural disasters are out of the reach and influence of human beings. However, a lot can be done to minimize loss of lives. There is a lot of untapped potential in terms of AI usage, especially in humanitarian areas. The impact could have a multiplier effect in developing countries, where resources are limited.

- **Our concept will solve the problem (disaster resilience)** as it will try helping people in at every place efficiently whenever required. It will be providing some **basic knowledge about disasters, helpline numbers, informing friends family of the person trapped, providing emergency kit, maps location, managing the shelter, capacity of the shelter and current population, the associated disaster event and the specific shelter address and location** Artificial intelligence is one viable option that can potentially prevent massive loss of lives while at the same time make rescue efforts easy and efficient.
  **We use Artificial Intelligence to support disaster response, displaced persons, and the needs of the people buried under debris.**
  When disaster does strike, a timely, coordinated alarm is vital. AI can tie into existing technological systems, expanding their reach and offering faster responses and reduced costs.

- AI's ability to quickly and intelligently analyze large datasets makes it an invaluable resource during times of disaster. By applying it to **search, vision, decision and speech .**

- ❏ AI demonstrates some of the behavior that is linked with human intelligence such as planning, reasoning, learning, manipulation, creativity, and more.
- ❏ **AI can map, analyze and model disaster zones to provide updated travel advisories, help mobilize and find citizens, and ensure that disaster response teams know what resources need to be deployed. Drones, robots and sensors** can provide intelligent and accurate information concerning landscapes and damaged buildings**.**
- ❏ **Drones can be used to find victims trapped in debris allowing rescue workers to get to them quickly. AI can also be used to extend the capability of emergency workers.**
- ❏ Technology used in our project is **drone**.
- ❏ The technical component used are **aerial reconnaissance and 3D ortho-mapping.**

Satellite Networks

High-altitude platform and UAV Ad-hoc Networks

Low-altitude UAV Ad-hoc Networks

Wifi Network

Video Capturing

Video Capturing

Cellular Network

Six steps from offline training of AI model to online detection



**1. Offline training**
A neural network is trained on 70 videos containing disaster management, which have been enabled. The model is tested with other videos.
API: Computer vision



**2. Drone Deployment**
Drones are flown over crisis zone, capturing thermal infrared images.
API: Decision



**3. User interface**
Video and still images are transmitted via radio waves to a computer.
API: Search, Vision, Decision



**4. Preprocessing**
The infrared images may need to convert to " white-hot" format, where warm objects are lighter against a dark background.
API: Vision, Decision



**5. Detection**
The video is processed in batches and sent to the cloud for analysis. Each image is treated as an input into the neural network.
API: Vision, Decision



**6. Output**
The neural network outputs annotations that are overlaid on top of the original image. This enables identification of the people whereabouts.
API: Search, Vision, Decision

**AI-powered image classification and object detection**

AI-powered image classification and object detection can be used to combat the crisis.

# Sustainable Development Goal 9



❑ **Sustainable Development Goal 9 (Goal 9** or **SDG 9)** is about "industry, innovation and infrastructure" and is one of the 17 Sustainable Development Goals adopted by the United Nations General Assembly in 2015.[1] SDG 9 aims to build resilient infrastructure, promote sustainable industrialization and foster innovation.

❑ Technologies can play a central role in the achievement of the Sustainable Development Goals (SDGs). A critical components of economic growth and development is the investment in infrastructure and innovation.

❑ **Drone-technology** has **invigorated innovation** in several industries.

❑ We use drone in our project to rescue people trapped under debris and serve them with necessities.

# Case for funds

- ❑ We **identified** people who live in **disaster prone areas** and thought of helping them. **Community support** plays an **essential role** in this project. We used existing resources to make the working prototype and use it in the best possible way.
- ❑ **Award funding will help us invest more** in this and make it more efficient on a bigger scale which includes **drone deployment, app development, medicines and other essential items** required to make it successful.

# Thank You!