HADR Challenge 2022

Geographic Information System
to
Analyze, Predict and Warn About Natural Disasters

Introduction

Humanity has consistently felt the wrath of mother nature and as our population grows, the damage caused increases proportionally. Adding to this is the impact that human activities have on the environment. In recent years, weather has become increasingly unpredictable and extreme. Disasters such as cold spells, storms and droughts are more intense and last longer. Recent natural disasters have hit record numbers in fatalities and financial damages. Increased population and depleting resources make aid, relief, and recovery efforts more challenging.

This change in our habitat has increased the demand for humanitarian assistance and disaster relief systems globally. Understanding, predicting, preventing, and managing disasters is becoming increasingly vital to humanity. Singapore Space & Technology Ltd. runs HADR studies with partner organizations to explore solutions to this demand. These projects help to conceptualize feasible solutions to current and future HADR problems and demands regionally and globally.

This year, SSTL is conducting a HADR Joint Feasibility Study with Changi Regional HADR Coordination Centre. Launched on September 12th, 2014, "Changi RHCC seeks to facilitate military-to-military coordination in HADR". Changi RHCC provides comprehensive situational data through OPERA, facilitates sharing of information & coordination of operations, and deploys help within 48hrs to affected states to facilitate aid coordination.

This study aims to understand how the disaster damage assessment process can be improved. We wish to study the various possible solutions to predicting the damage caused by disasters using satellite data to effectively understand and predict the damage caused by natural disasters in-real time.



Problem Statement

Propose the design of a Geographic Information System for Southeast Asia that can:

A. Curate satellite data and knowledge database of past data about natural disasters focusing on Earthquakes, Fires, Floods, Tsunamis, Typhoons and Volcanoes;

B. Conduct in-real time predictive analysis using AI on the extent of potential damage caused by the above-mentioned impending natural disasters using the satellite data and past data;

C. Display predictive damage impact visualizations with sensitivity analysis;

D. Update the data base and analytics as new data from future disasters are collected post catastrophe and;

E. Distribute warnings autonomously (without human intervention) based on the analysis as a preliminary warning system in real time to HADR agencies for timely interventions. (OPTIONAL)

Format & Overview

A. This project is a call for technical proposals and feasibility studies to understand the various options deployable to address the problem of effectively predicting the damage caused by natural disasters.
B. Companies are expected, but not required, to collaborate with other companies to achieve the four mandatory objectives stated above.
C. All participating entities will have to submit their preliminary proposal by February 28th, 2022.
D. Teams will participate in co-development workshops and webinars and work closely with Changi RHCC to better understand the project requirements and improve their proposals between March to September 2022.
E. All teams need to submit a final technical write-up and detailed feasibility study on their solution by 30th September, 2022.

Deliverables – Phase 1 (Conceptualization)

1. Preliminary proposal on the concept to solve the given challenge statement not exceeding 10 pages. It must include your executive summary, preliminary suggested methodology to the problem statement and a rudimentary execution plan including the list of companies that are collaborating together and their individual roles, if applicable. This report may also include any existing systems that you will use and methods of procuring the satellite data. This is due on 28th February, 2022.

Deliverables – Phase 2 (Exploration)

1. Up to 2 progress reports on the project not exceeding 2 pages. This should include any progress made in the project and any new limitations or constraints that have been discovered along the way.

Deliverables – Phase 3 (Feasibility Study of Deployment)

1. Final proposal of the solution including the information from the initial report, the proposed solution timeline, cost analysis, potential limitations, and a comprehensive feasibility study of the deployment of the whole project. This report should not exceed 30 pages and is due on 30th September, 2022.
2. A short presentation on the solution (TBC)

Please contact Mr Adhitya at adhitya.rajasekaran@space.org.sg