optemis

EMERGENCY OBSERVATION CONSTELLATION PLANNING PLATFORM

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GISTDA (Geo-Informatics and Space Technology Development Agency)

THAICHOTE (THEOS) Earth Observation Satellite

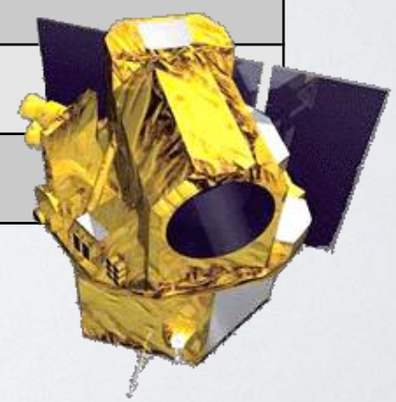
- Optical Payload
  2m Panchromatic, 15m MS
  (22km swath) (90km swath)

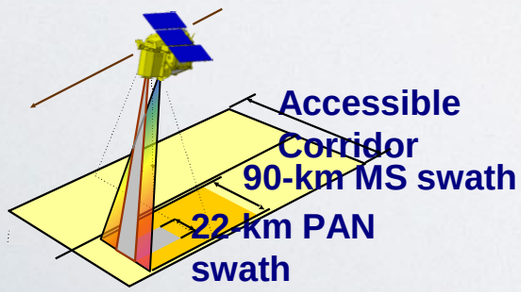
- 'Agile' satellite with high fine pointing accuracy

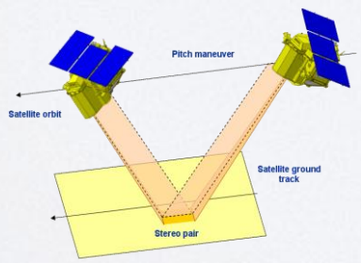
- Sun-synchronous orbit, 14 orbits/days, 4 access/day over Thailand

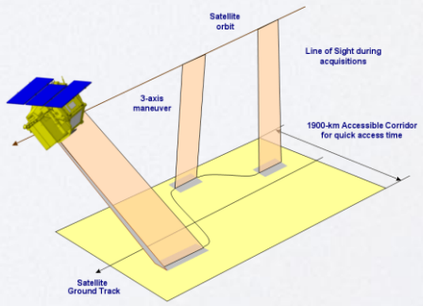
THEOS-2 (50cm resolution) TBL 2020
THEOS-3 TBL 2021

THAICHOTE (THEOS)	
Mission Type	*Earth Observation*
Launch date	Oct 2008
Mass	*715 kg*
Power	840 W
Orbit	*LEO, Sun-synchronous, Polar*
Inclination	98.78 deg
Altitude	*822 km*
LTAN	10:30
Orbital period	*101.4 minutes*









GISTDA ACADEMY

STRATEGIC AND OPERATION AEROSPACE RESEARCH

SOAR

optemis

บำเพ็ญ

GISTDA

GISAVIA
geo informatics platform for aviation

Simple

optemis

[**O**peration **P**lanning Tool for **Earth-observation MIS**sion]

… satellite resources in space

How to 'OPTIMIZE' …

… processes, response time

… workflow

… data utilization

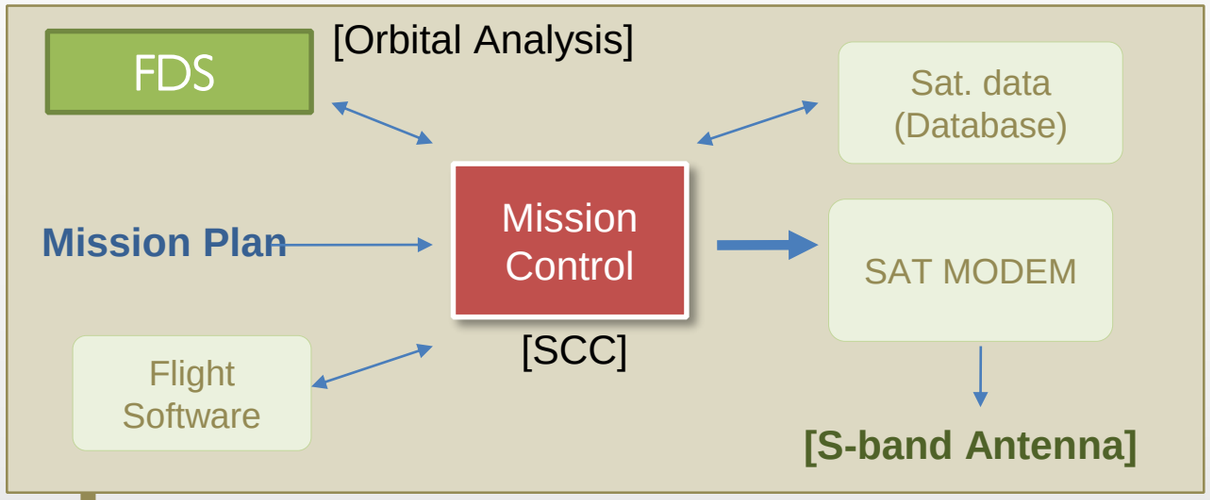
… data provider up to end users?

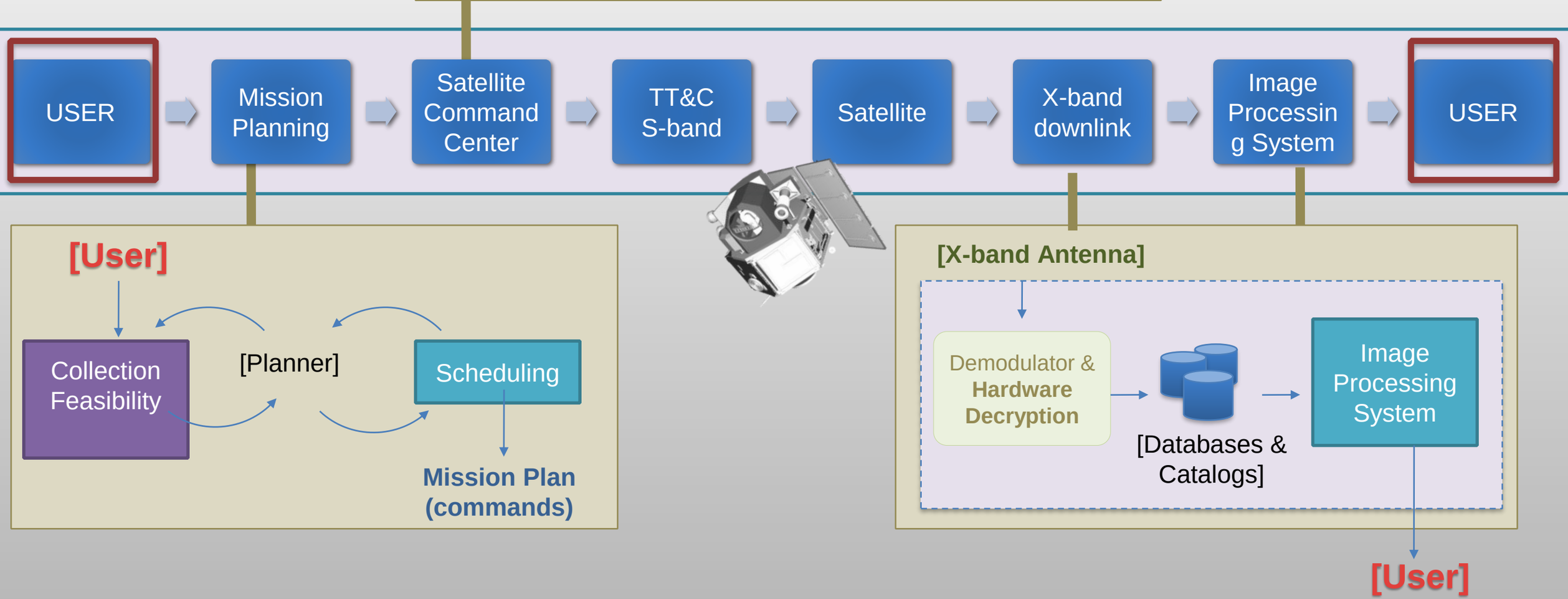
How to 'SYNERGIZE' …

… agencies, organizations

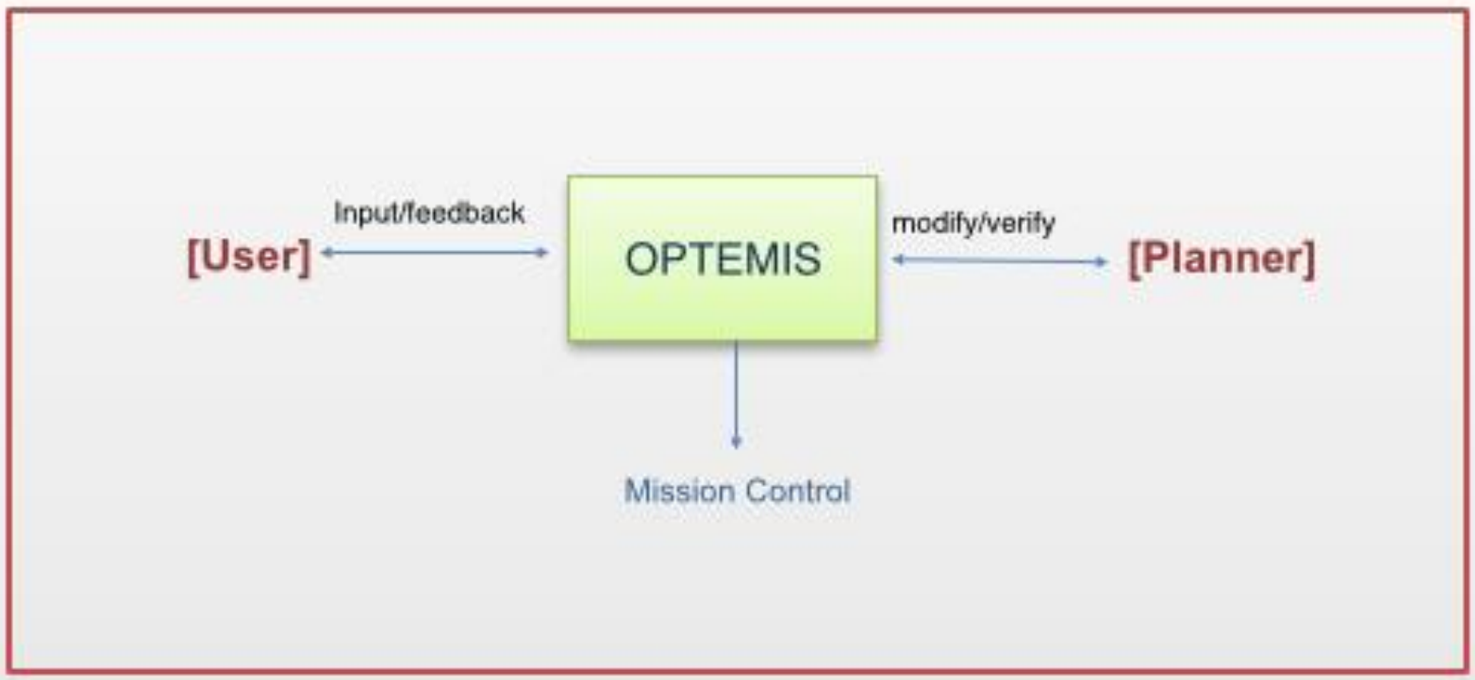
… international collaborations

Earth-Observation Satellite Operation

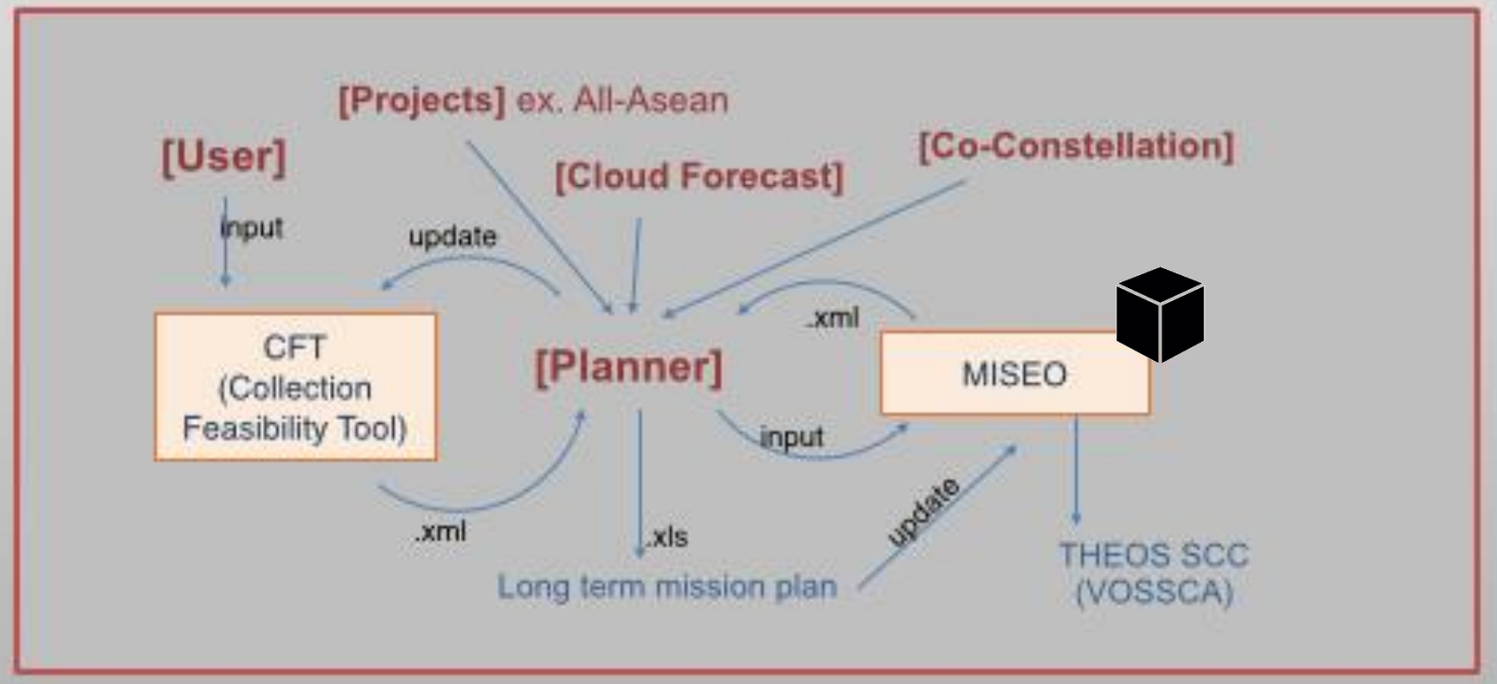




24 HOURS from requesting to data product

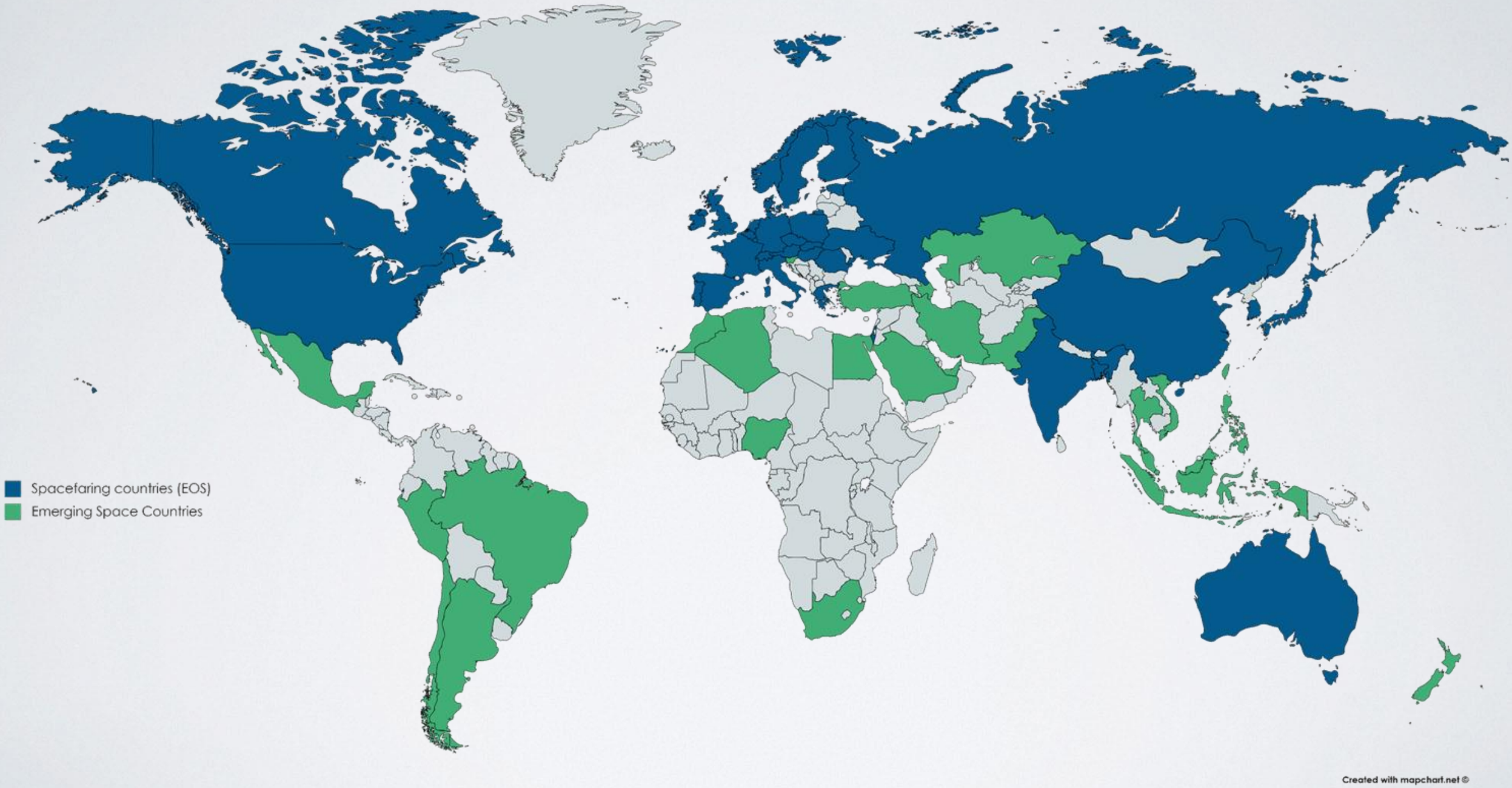


Uncluttering the Workflow

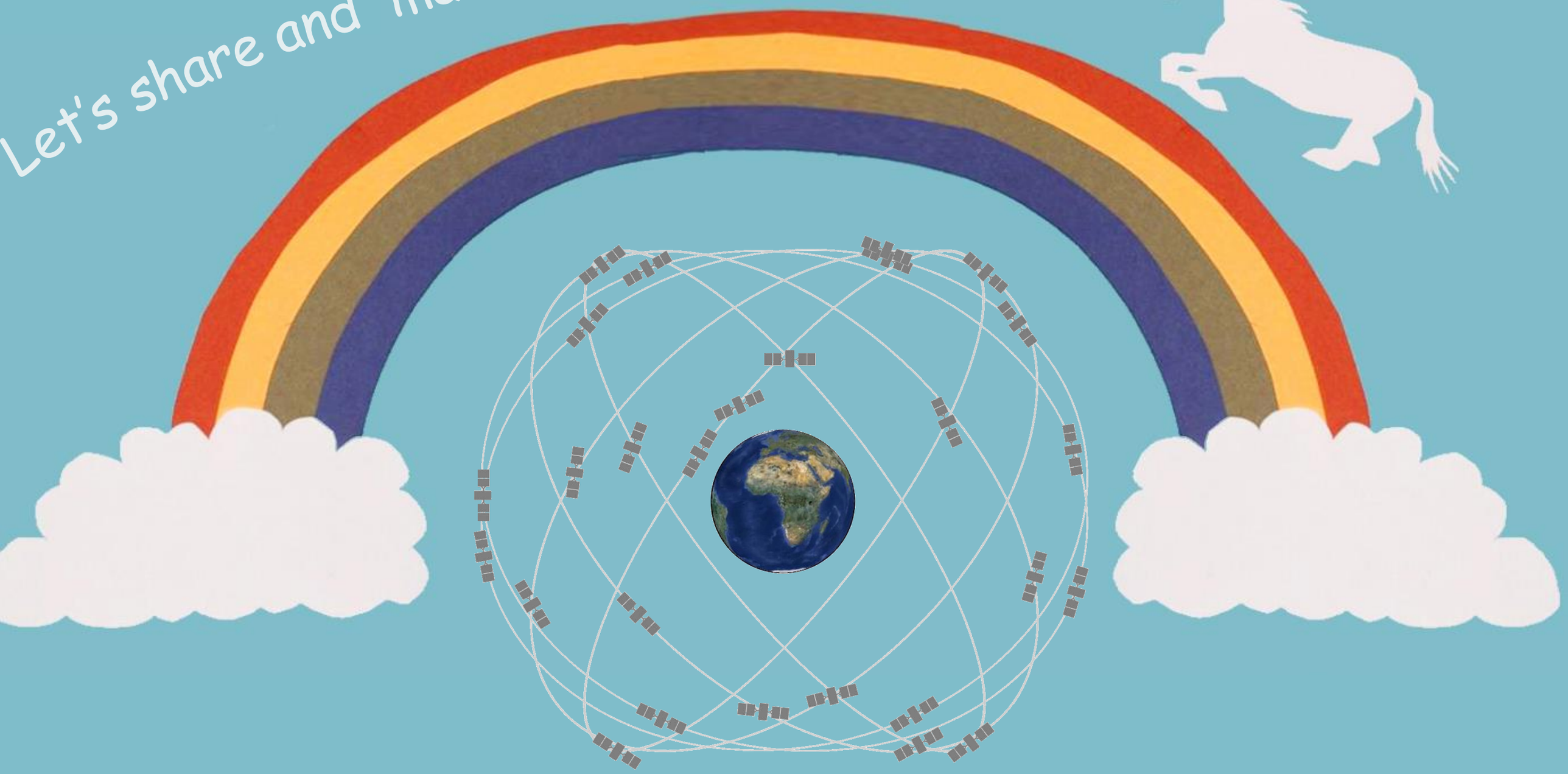


Emerging Space Countries

(Earth Observation Satellites)



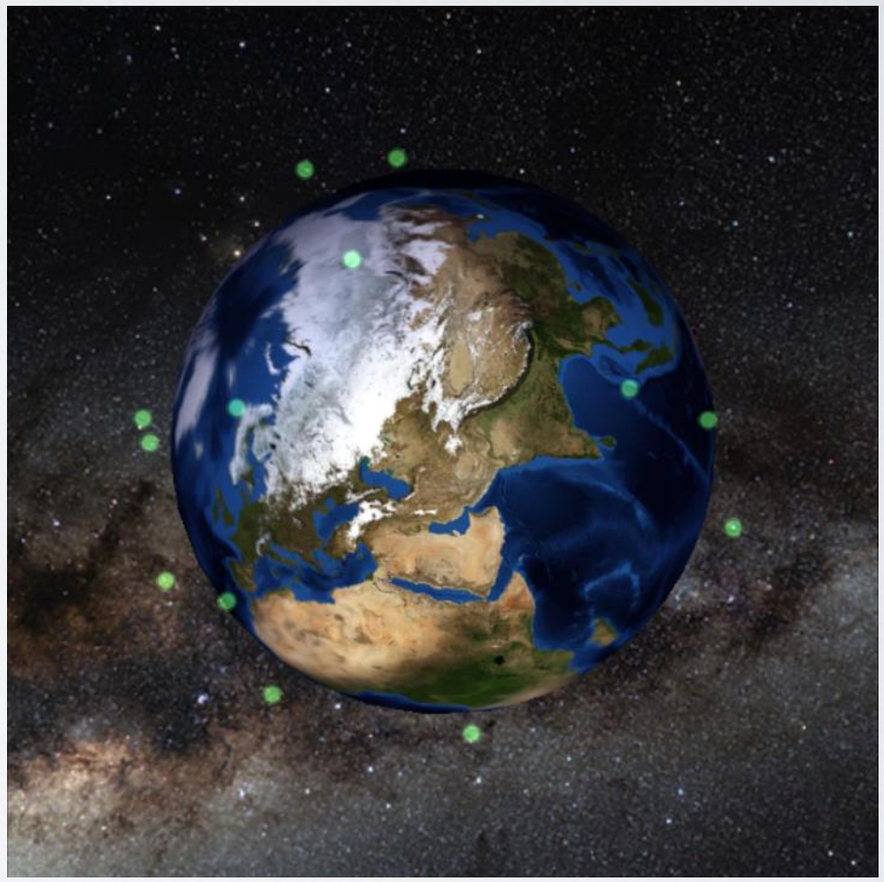
Let's share and make a CONSTELLATION !



IDEAL

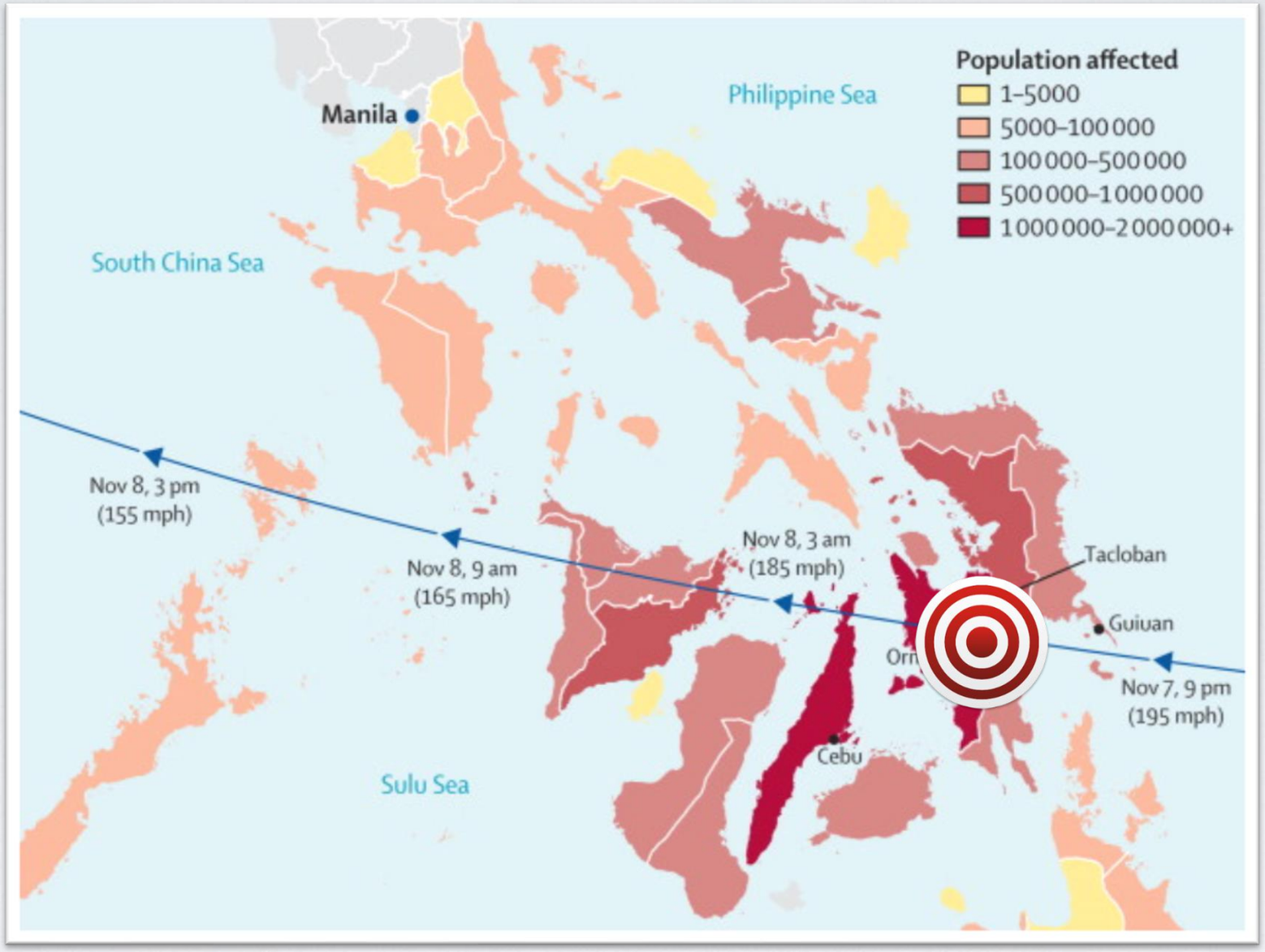
Homogeneous
Coordinate

REALITY

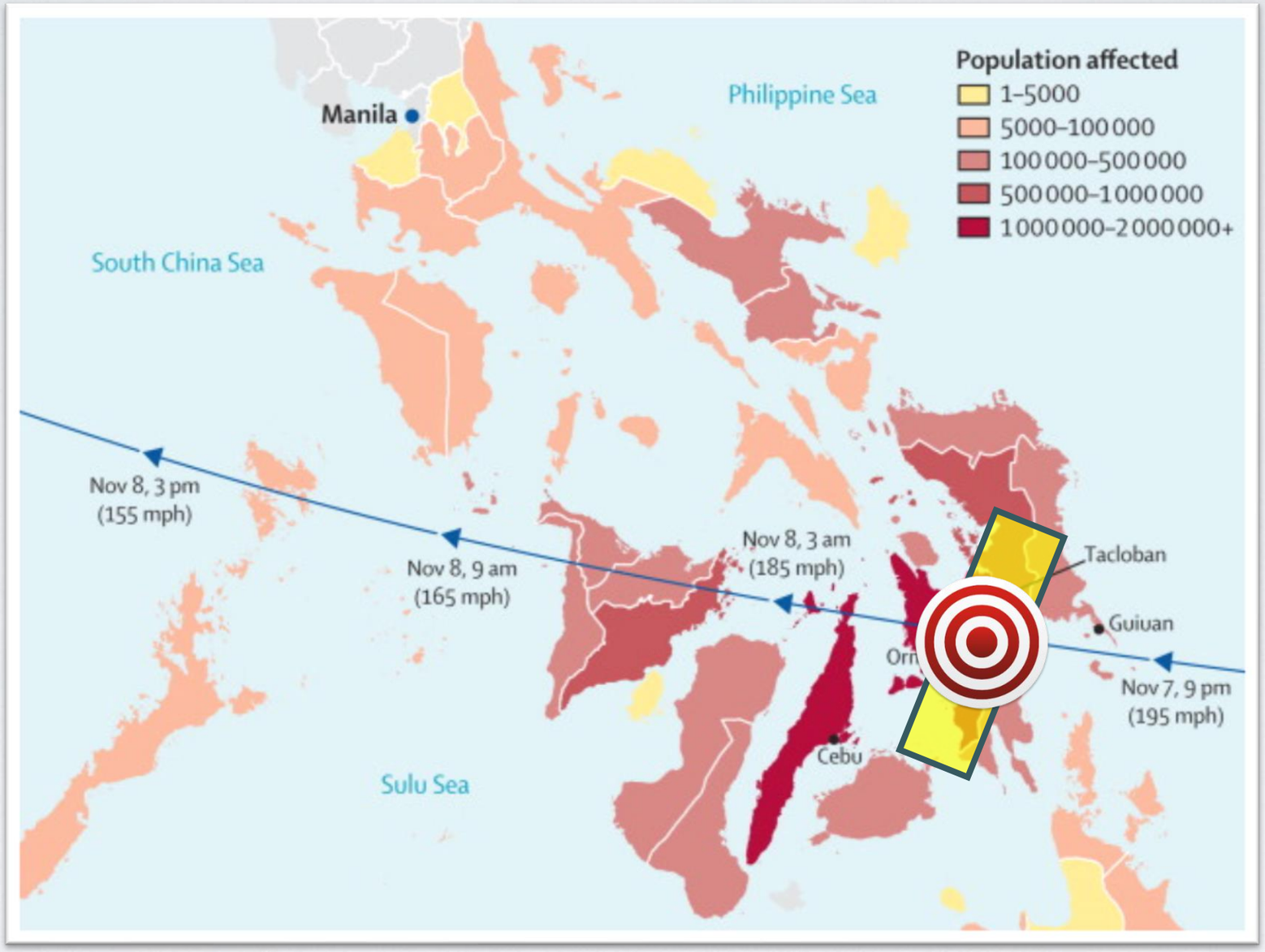


Non-homogeneous
Non-coordinate

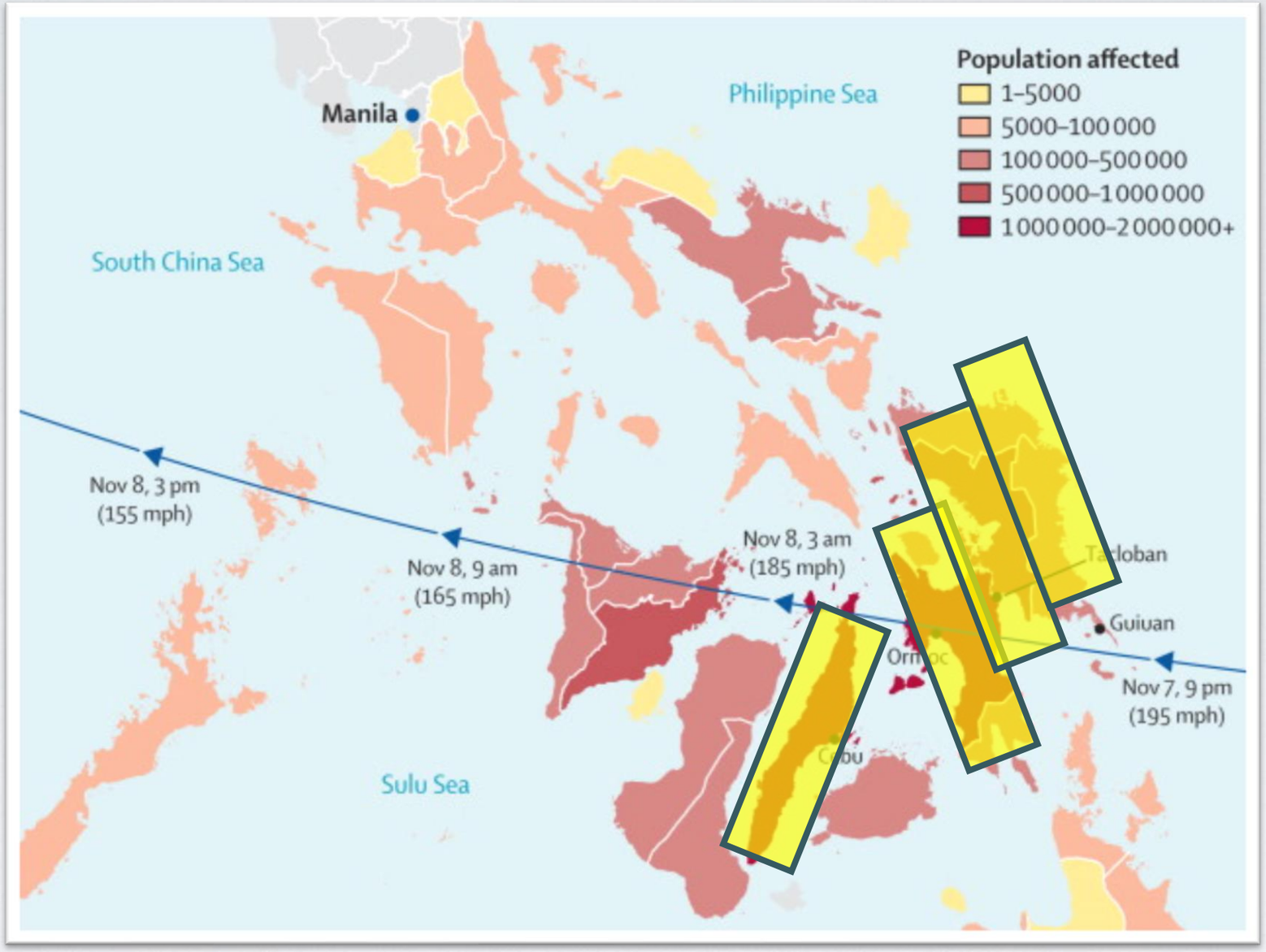
Example: Disaster Acquisition Request



Example: Disaster Acquisition Request



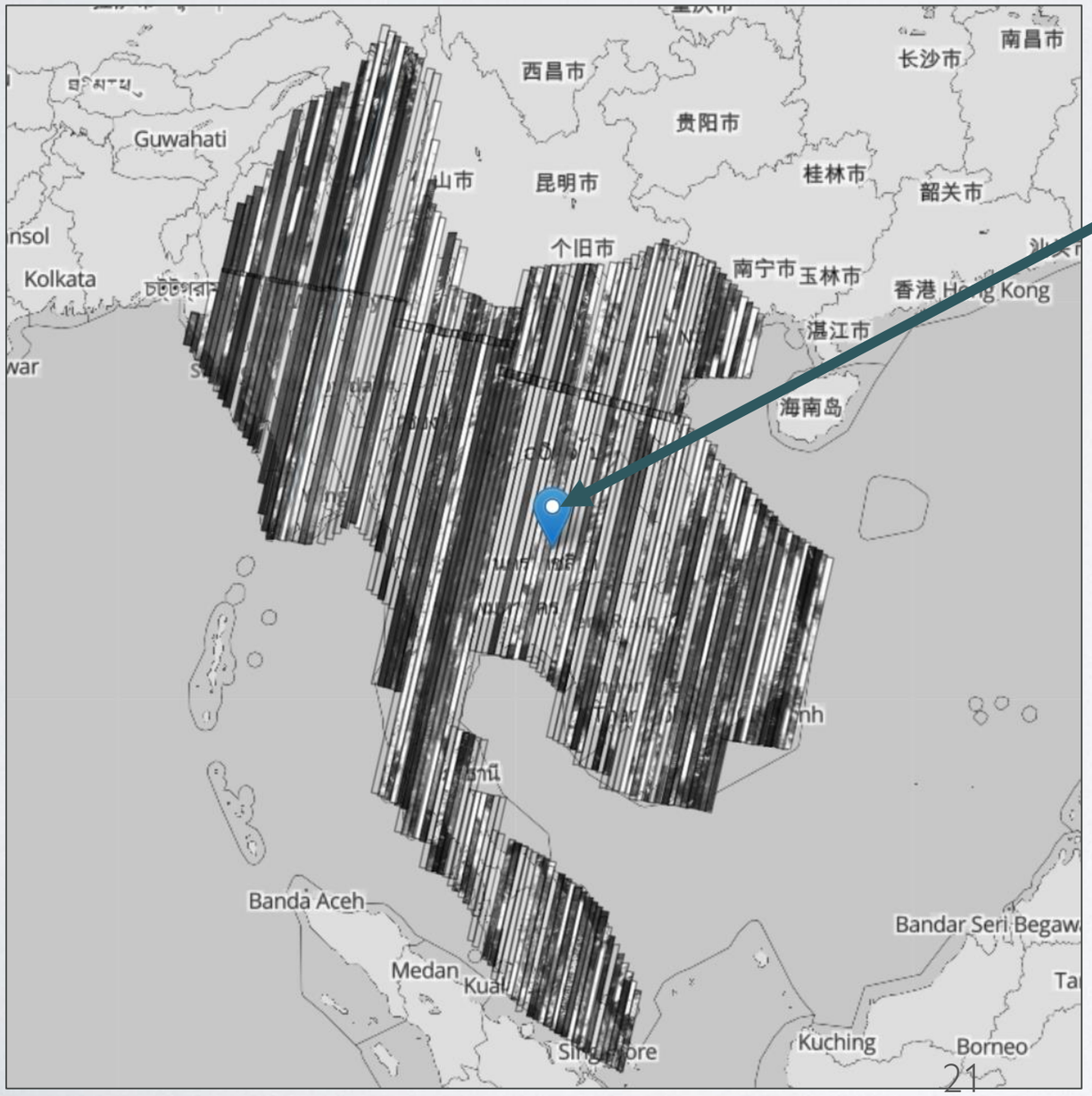
Example: Disaster Acquisition Request

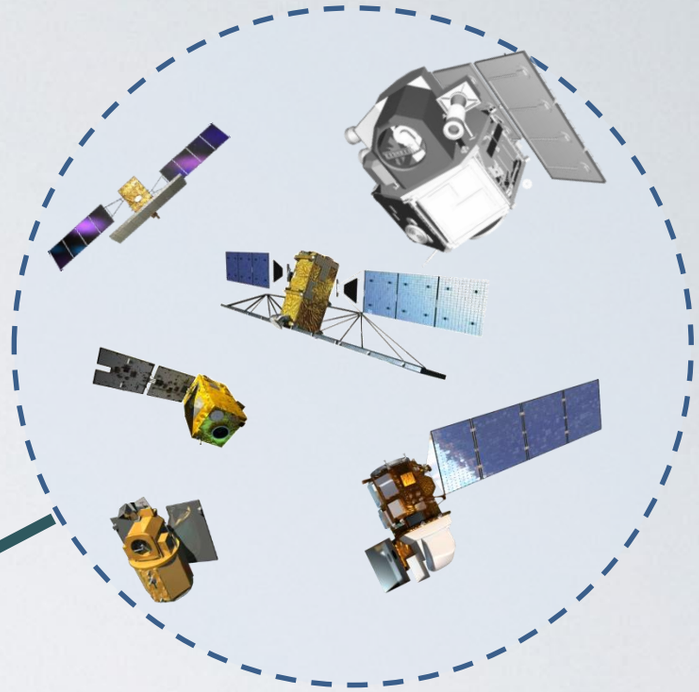


Examples…

Requirements:

2m Multispectral image every 15 days…





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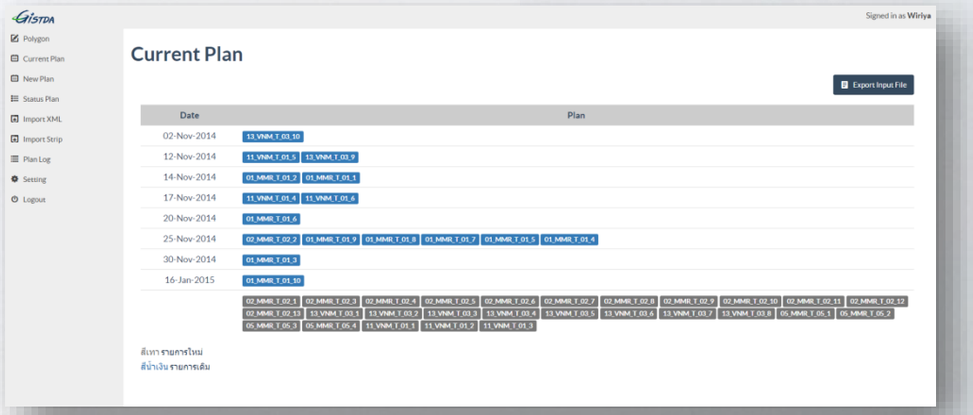
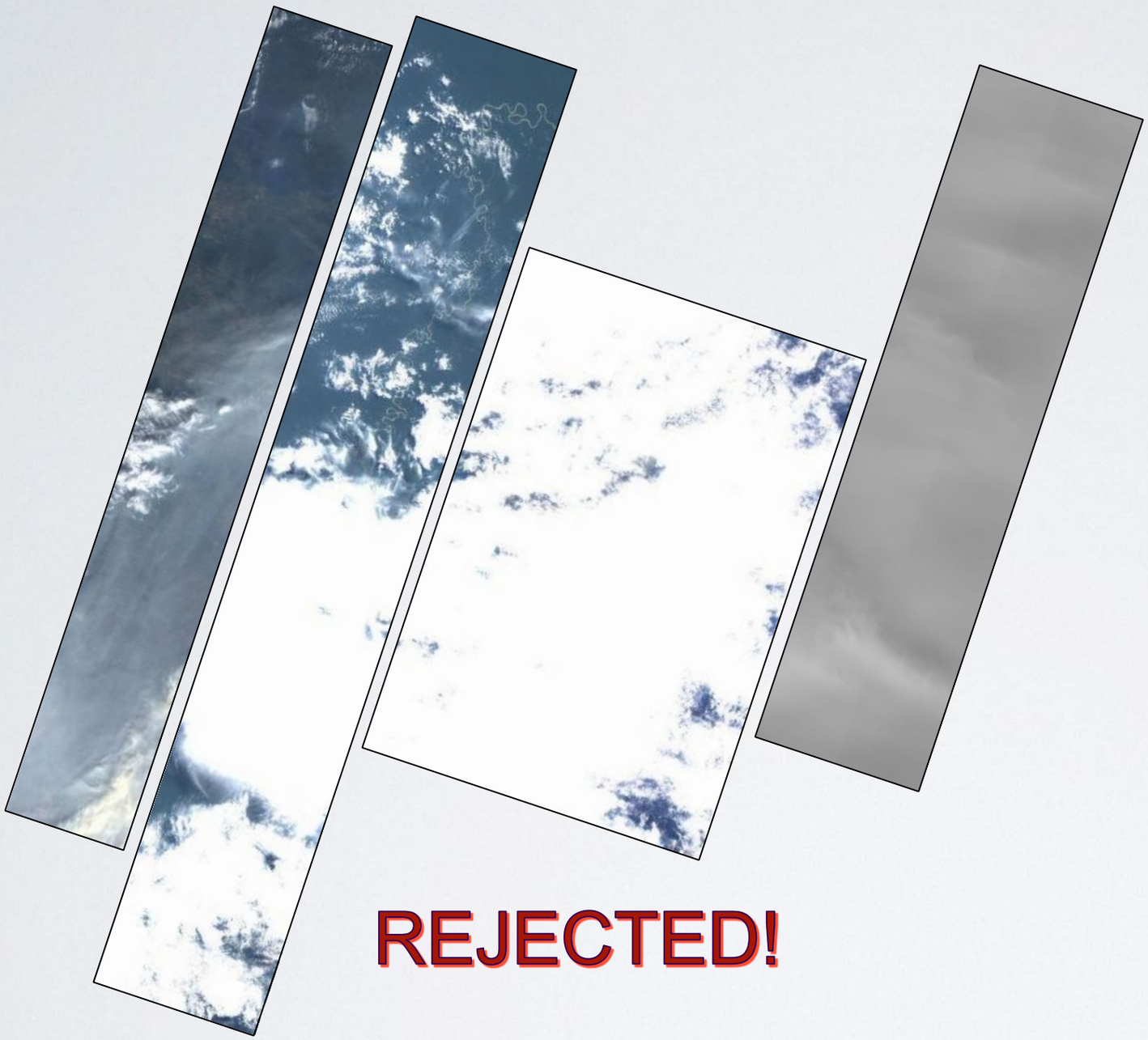
Acquisition schedule



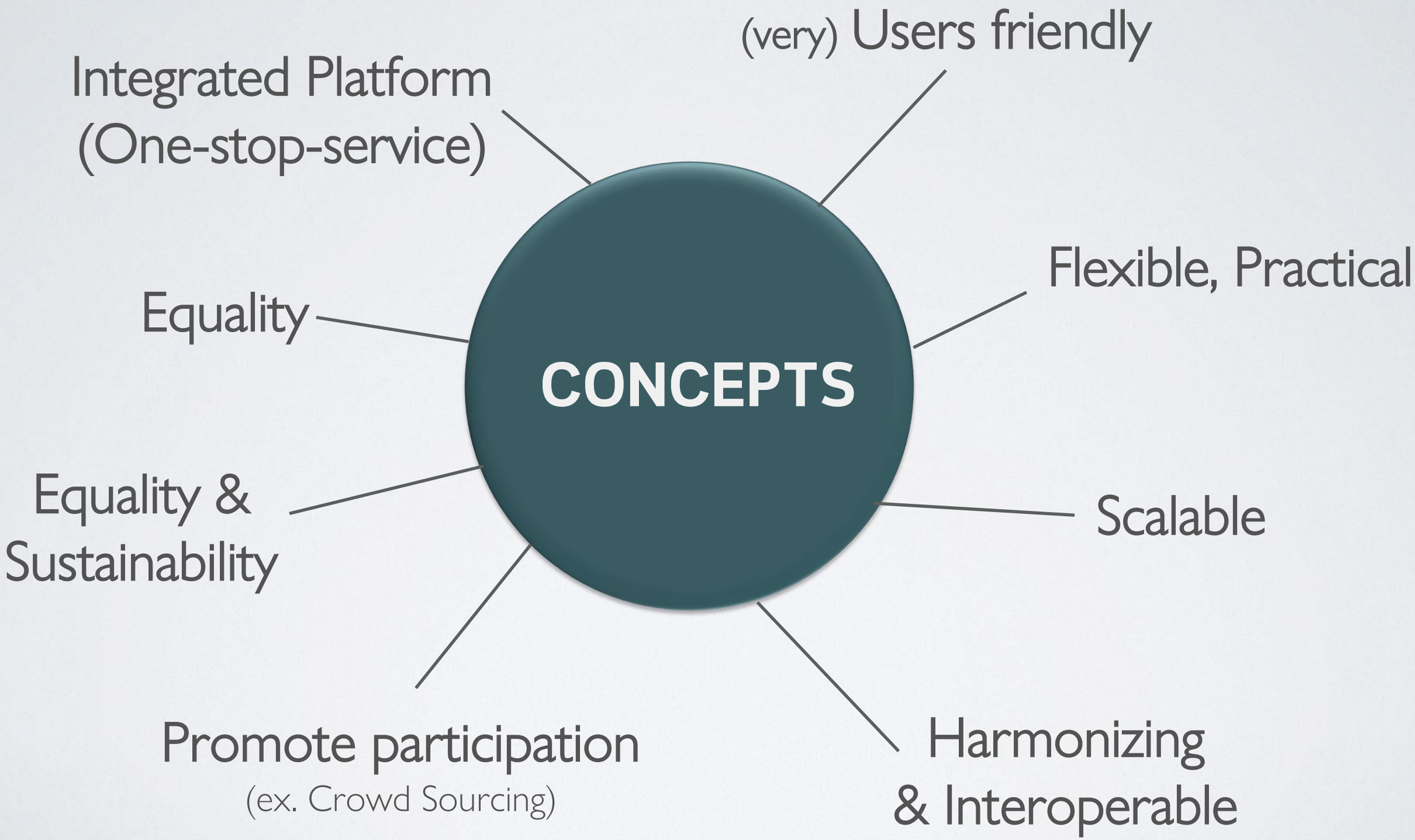


REJECTED!

User has downloaded, but could not be use because of cloud coverage.

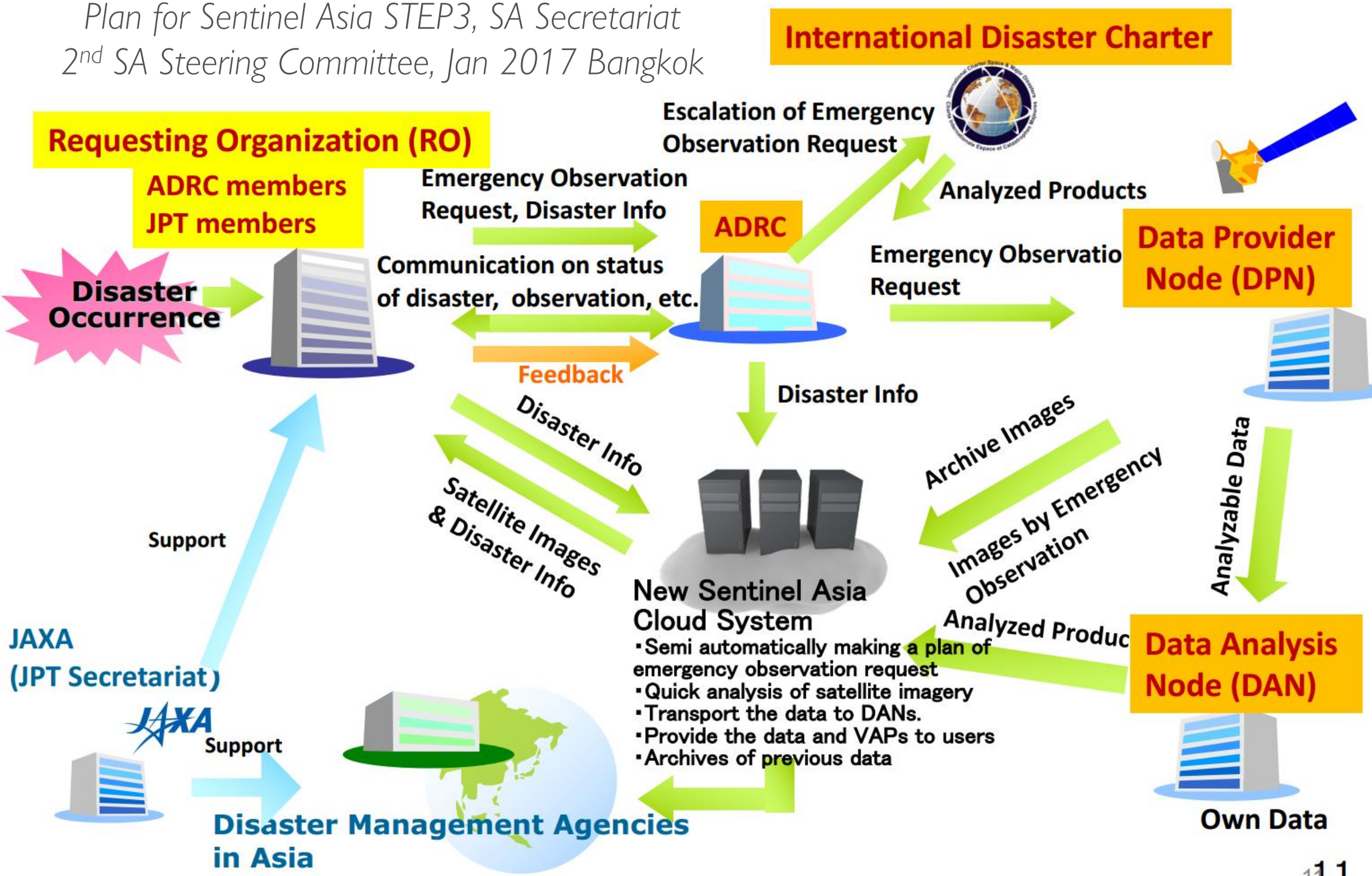
Objectives:

- To develop a platform to synergize the users, members, providers and coordinator.
- To optimize the resources



Emergency Observation Flow

Plan for Sentinel Asia STEP3, SA Secretariat
2nd SA Steering Committee, Jan 2017 Bangkok



DATA PROVISION - ONLINE SERVICES FRAMEWORK

(Proposed by GISTDA, at SA JPTM meeting 8/3/2017)

Sentinel Asia

REQUESTING

LOGIN optemis

Coordination Information optemis

GLIDE, Request Info. optemis

Target Area optemis

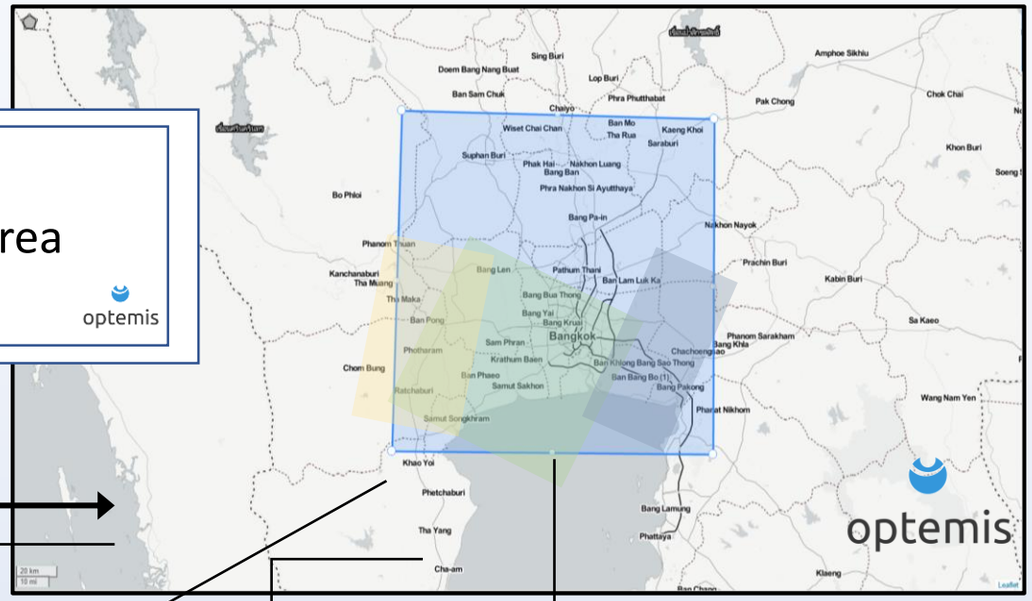
Validation

YES (ACTIVATE)

NO

SA Secretary

Tasks Distribution, Data Fetching System



Requestor

- Date, Time, Sensors for Upcoming Data optemis
- Online Tools, Procedures, Help Info. optemis
- Available Default Products
- Tutorials
- **All Disaster Support Information**

DPN

- optemis Satellite Tasking
- optemis Status Tracking
- DATA from Satellites

Other Data Sources

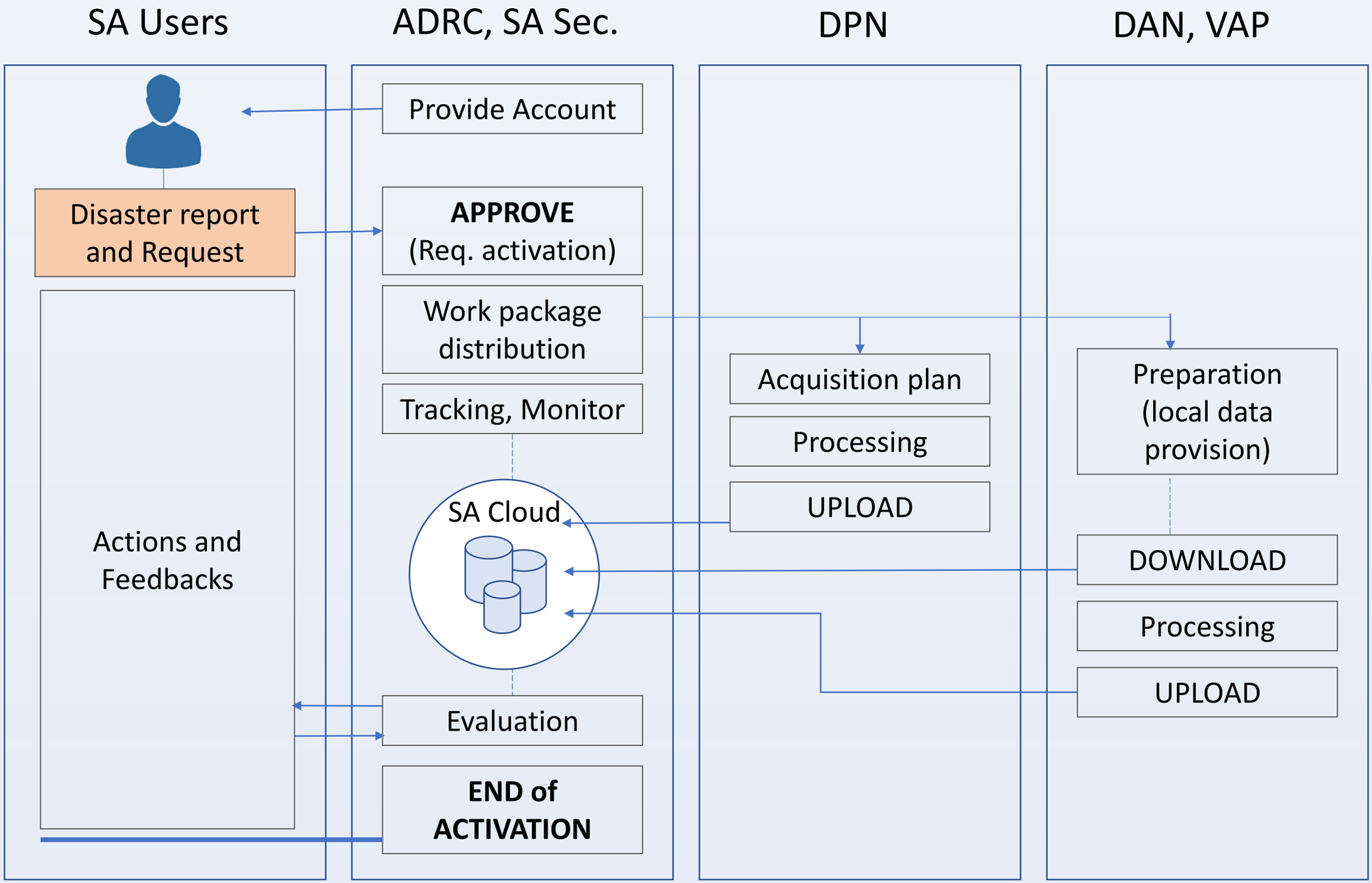
- USGS (Landsat)
- Copernicus
- MODIS, CEOS, etc.

SENTINEL ASIA CLOUD

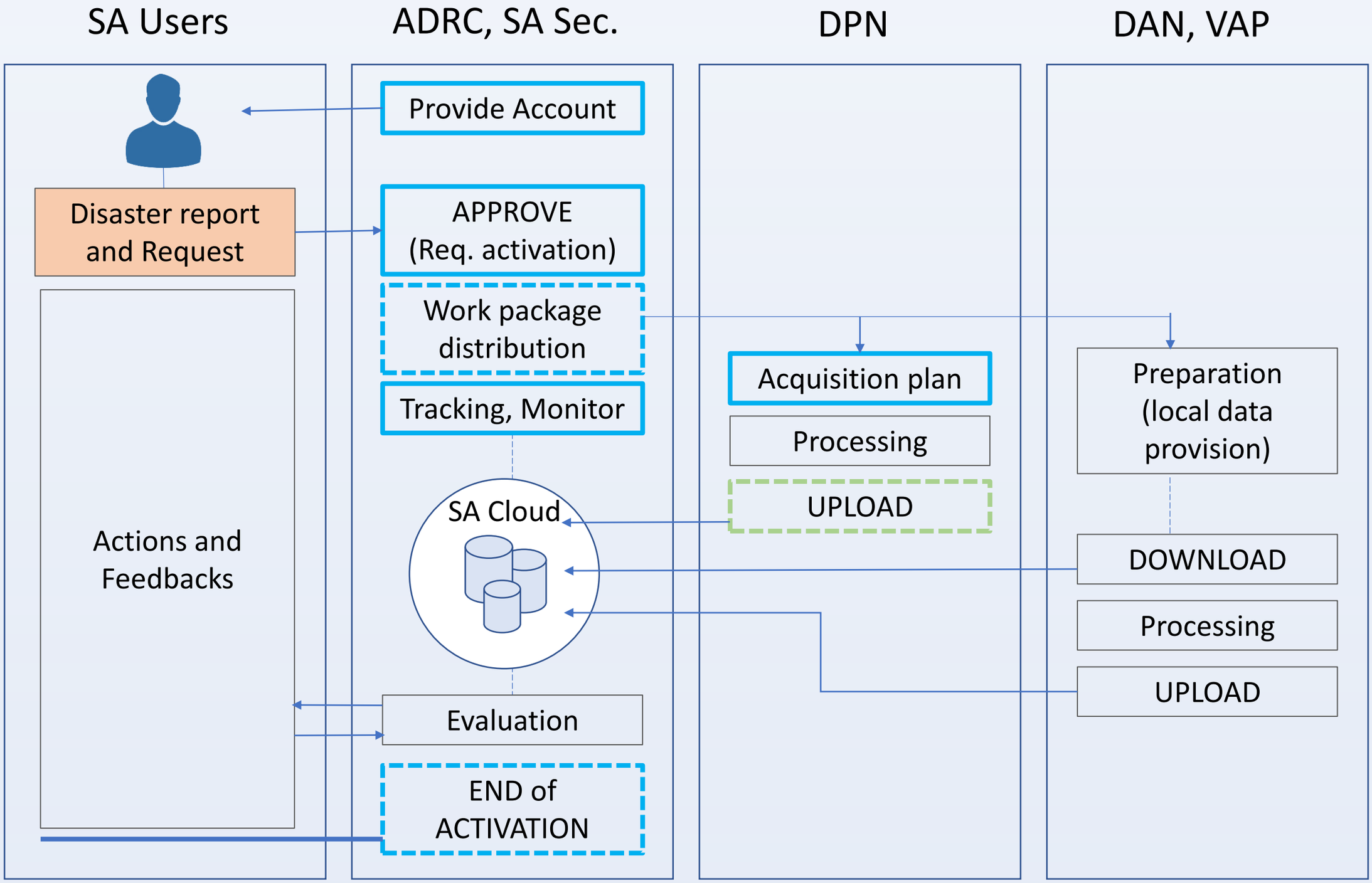
- Activity logs
- Inventory, Toolboxes, Etc.
- Disaster Data Management and Archiving System

VAP nodes

SA Procedures and Modules



SA Procedures and Modules (optemis ready)



OVERVIEW
Emergency Request Platform

Request and help desk for Sentinel Asia User's and Public

SENTINEL ASIA CLIENT INTERFACE

SA OPERATOR DASHBOARD

Tools for administrator and operators to collaborate

User's Guide and Tutorials

Easy to access user's reference guide

DATABASE

Link with others (ex. DAN)

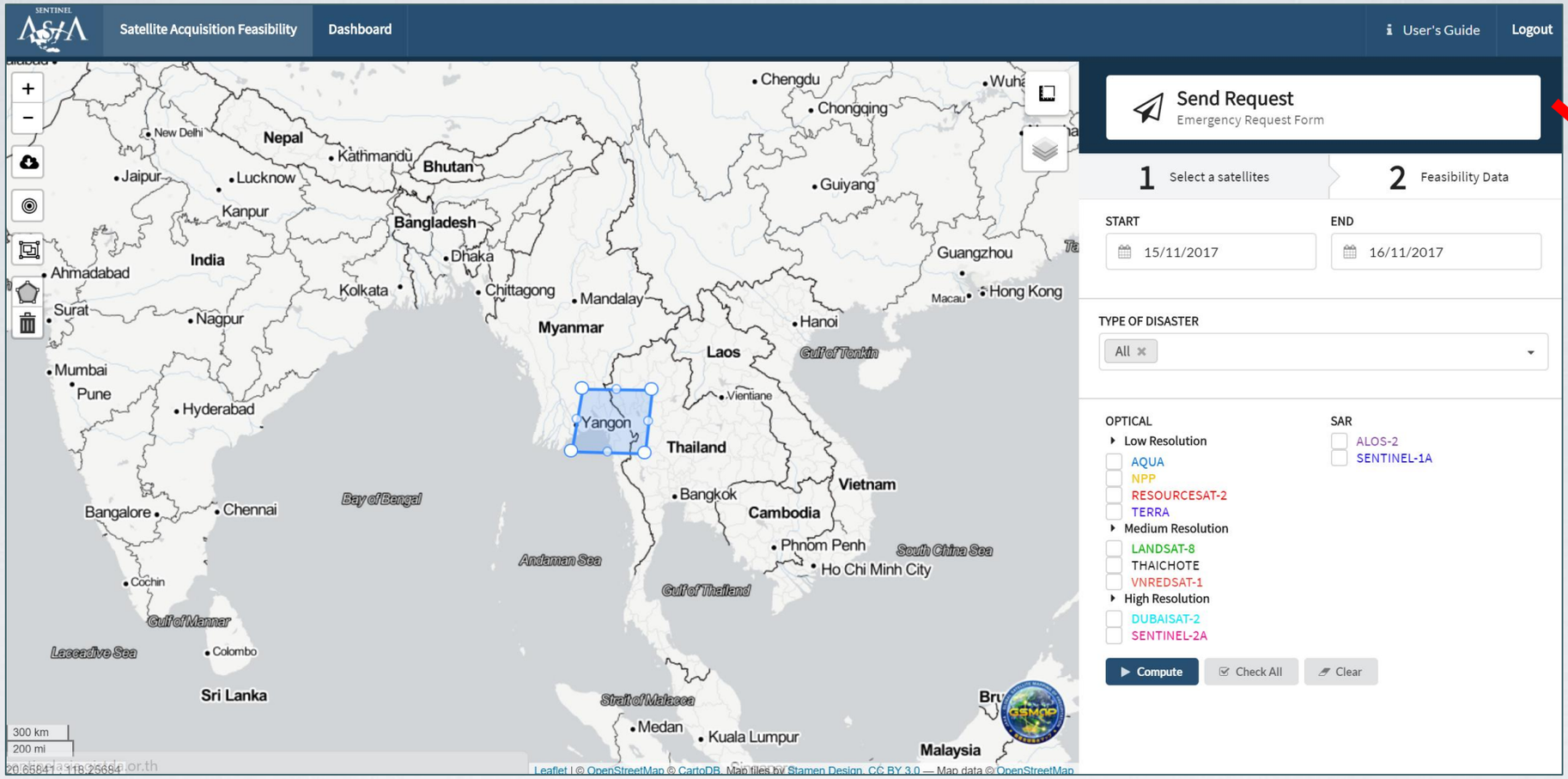
Provide one stop service for every users, integrity of the system

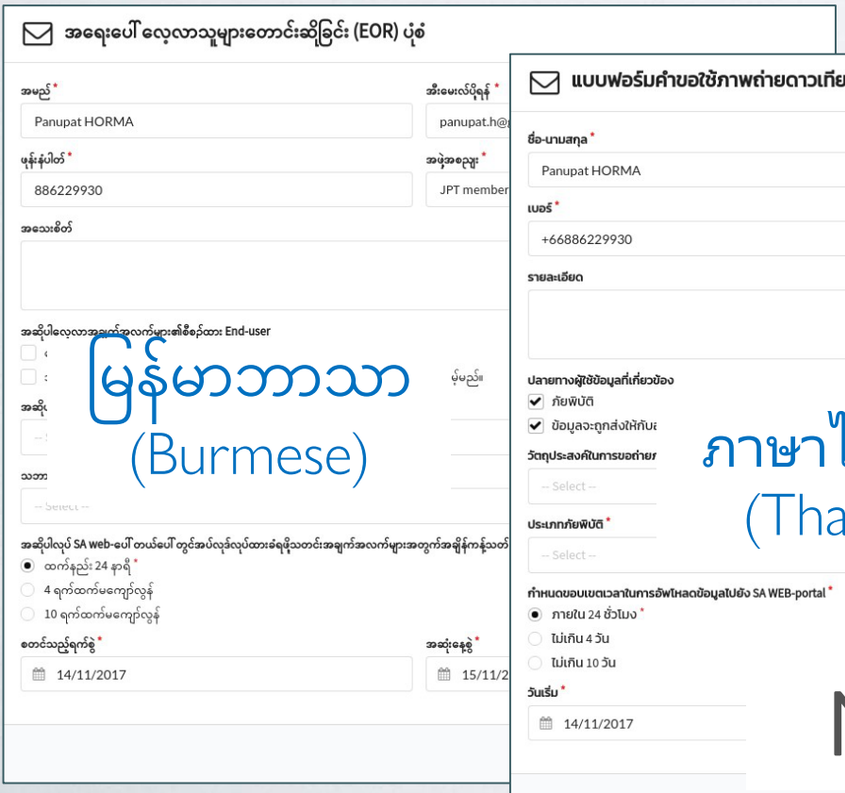
Sentinel Asia Gallery

Provide summary, Statistics and case studies of Sentinel Asia.

Source of data for better disaster response, big-data ready.

Emergency Request User's Interface



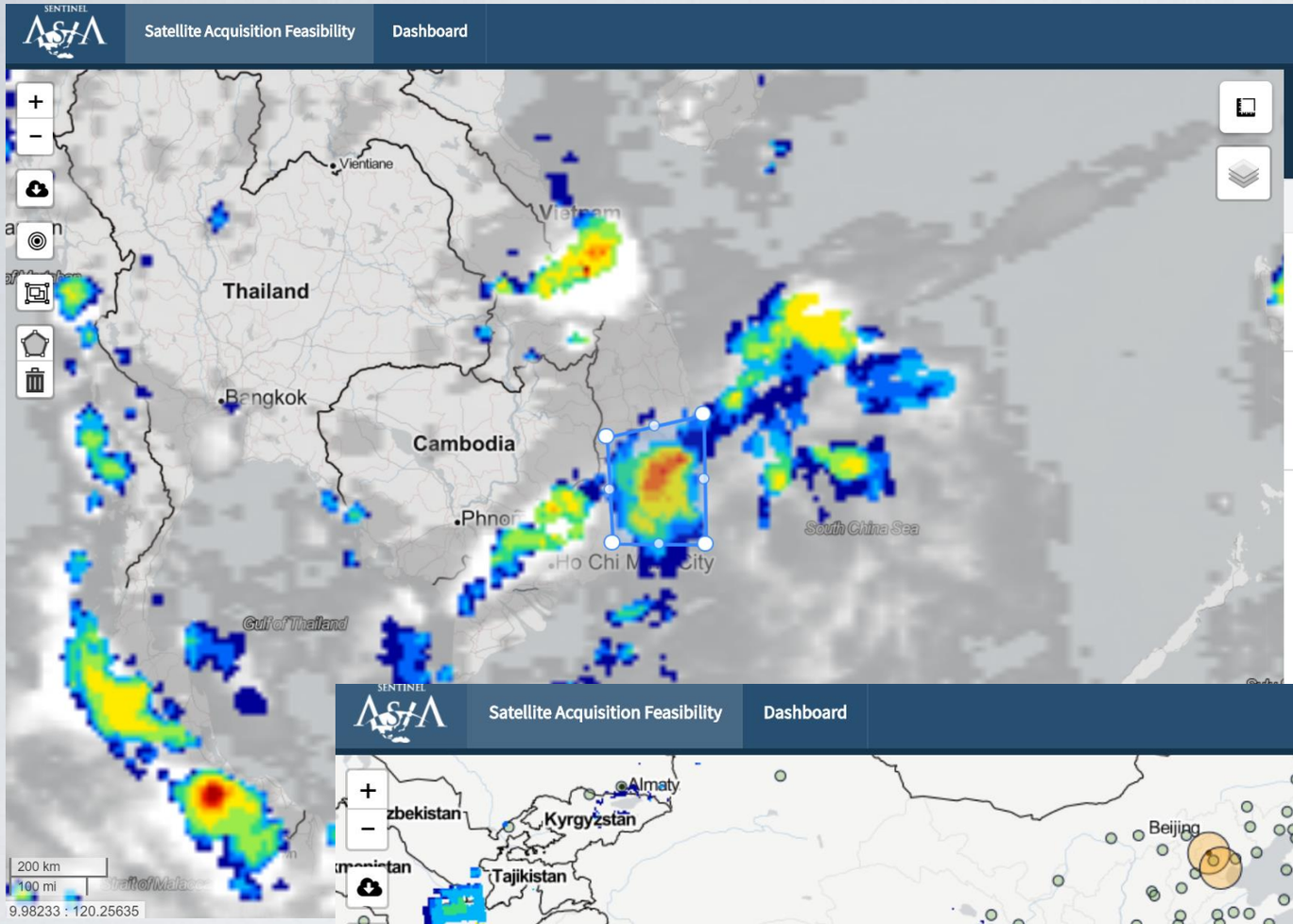


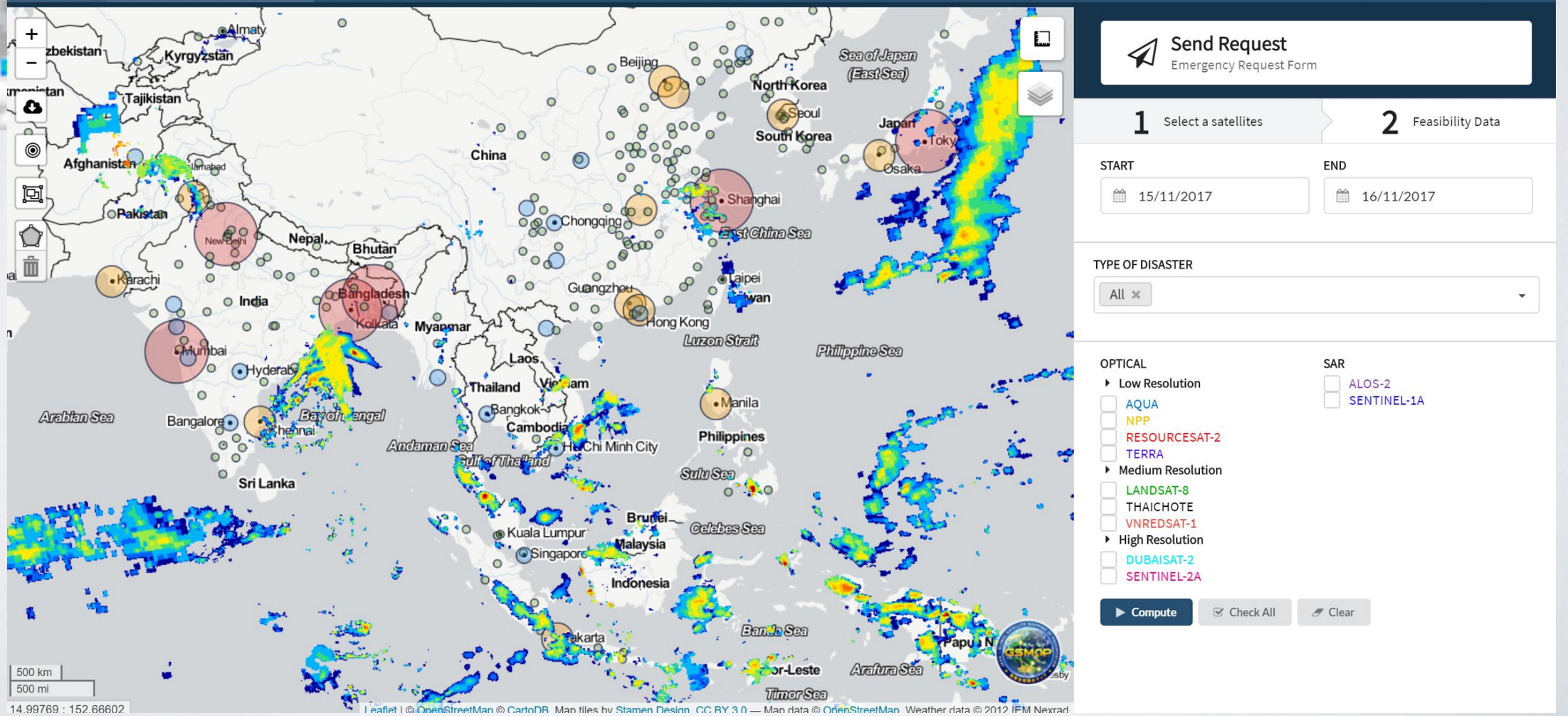
Multi-Language EOR Form

Emergency Request User's Interface : Decision Aid Layers

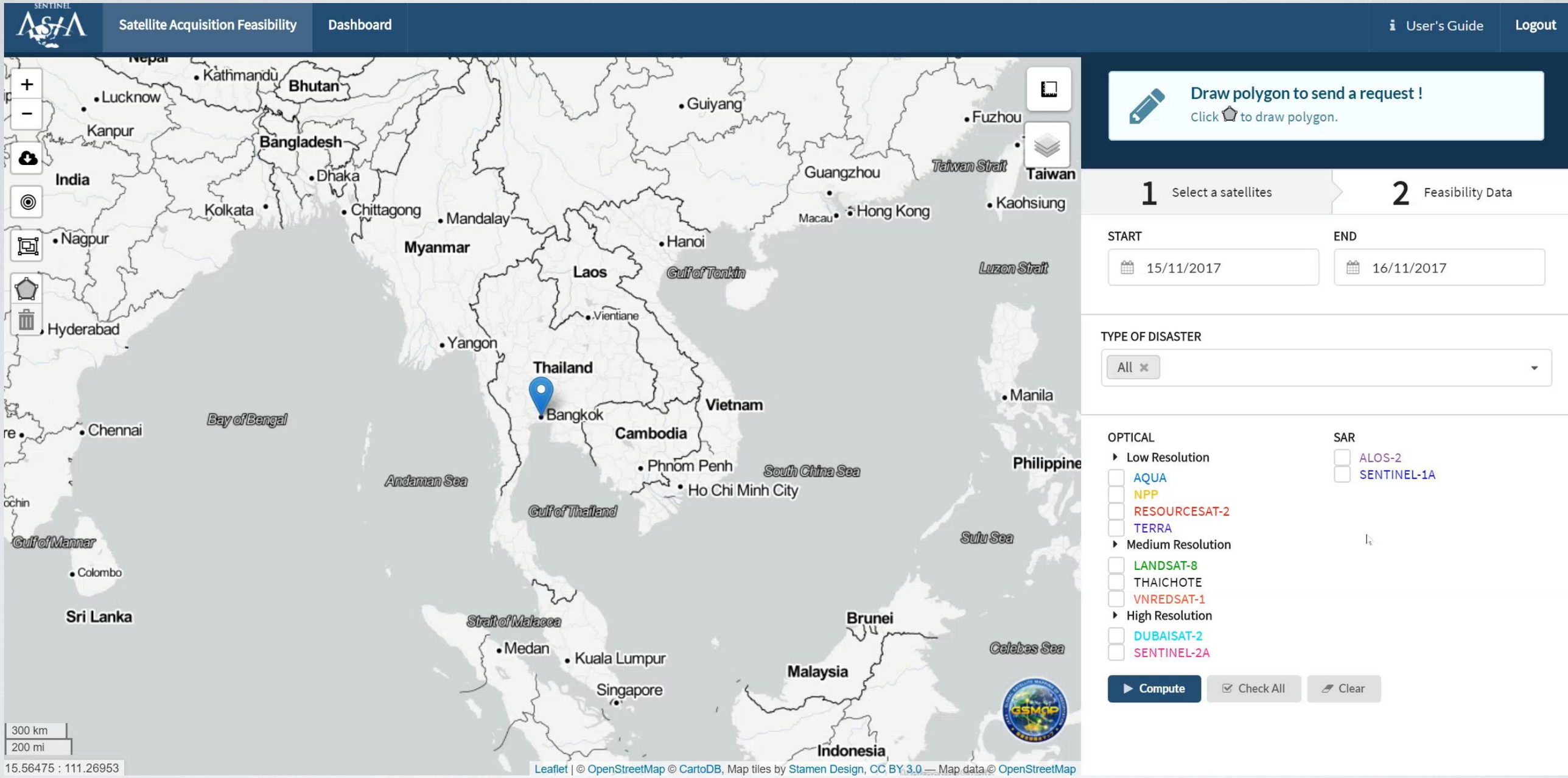
Cloud + Rain
Forecast from GSMAP

Rain +
Populated Zone

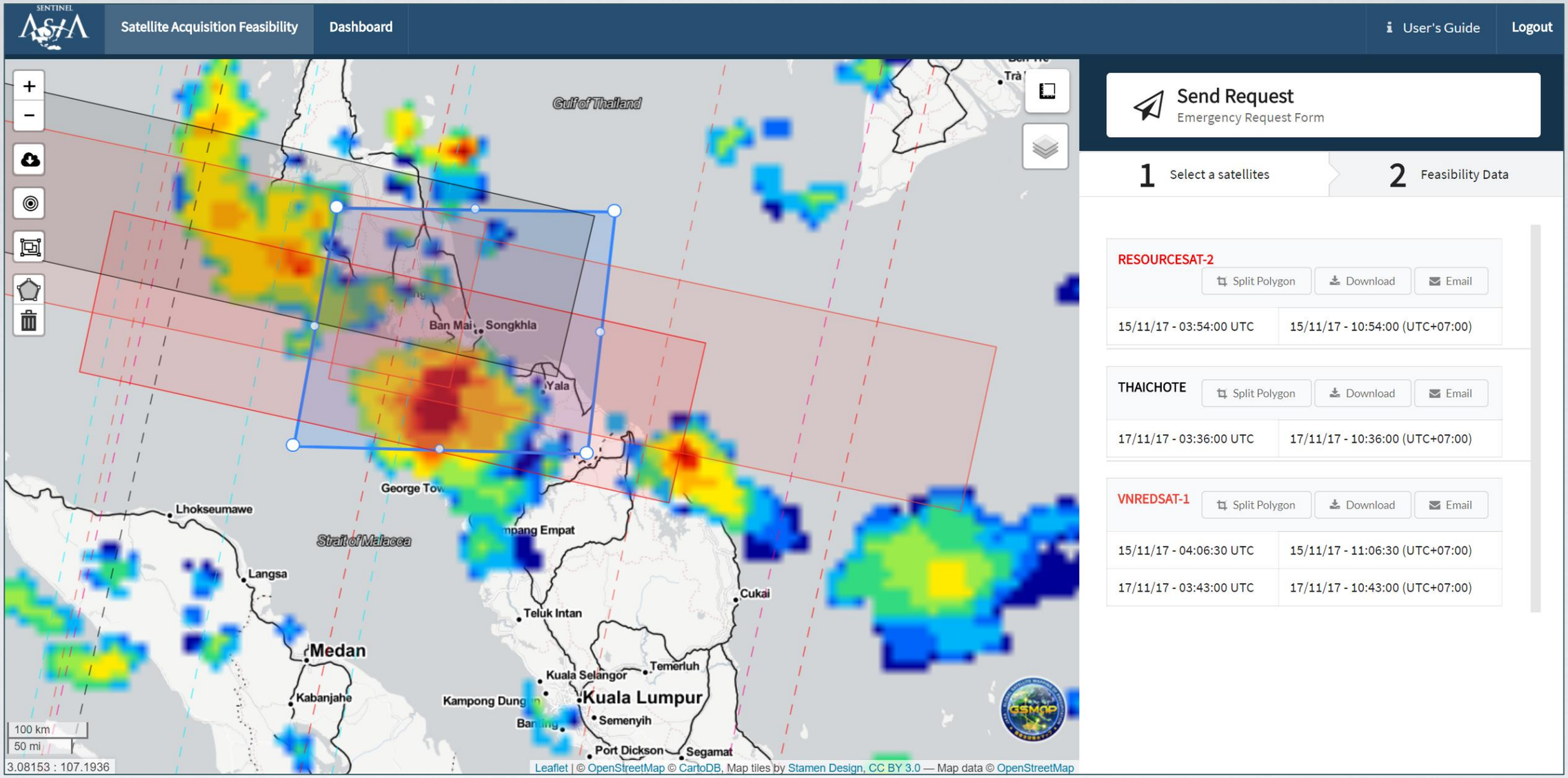


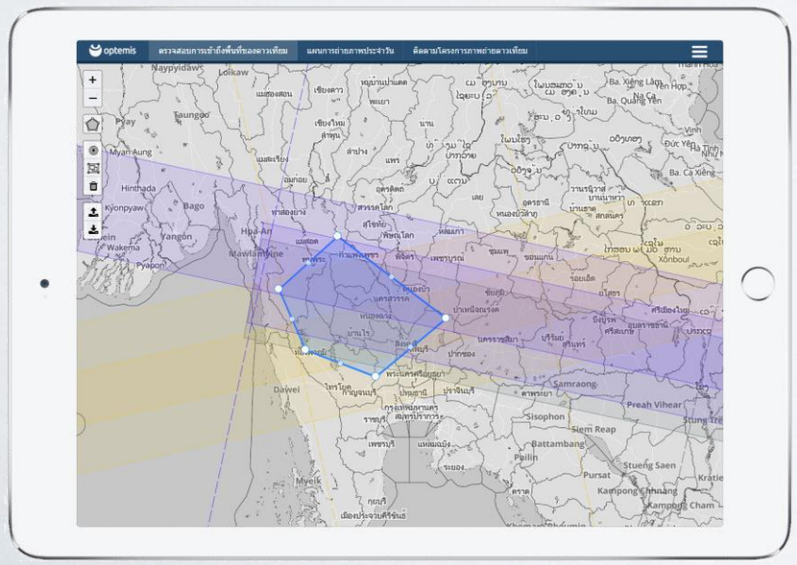


Emergency Request User's Interface : DEMONSTRATION



Emergency Request User's Interface : Acquisition Feasibility



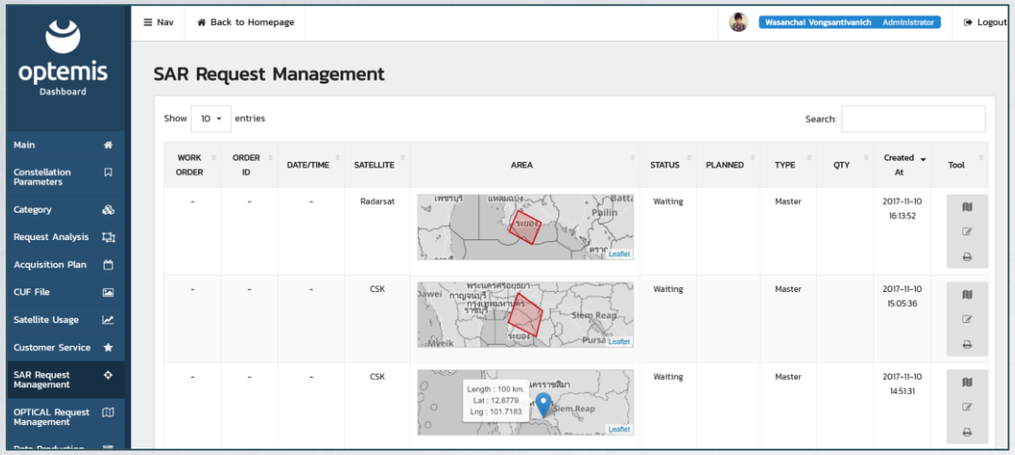


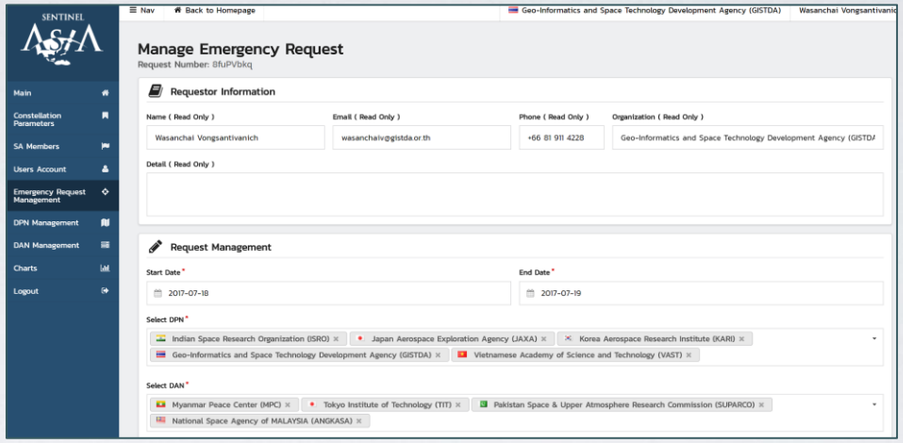
Satellite accessible time can be estimate, so that every users, DAN, VAP, Requestors are able to know exactly when they will get the images.

Playform can be used remotely with minimal internet connection.

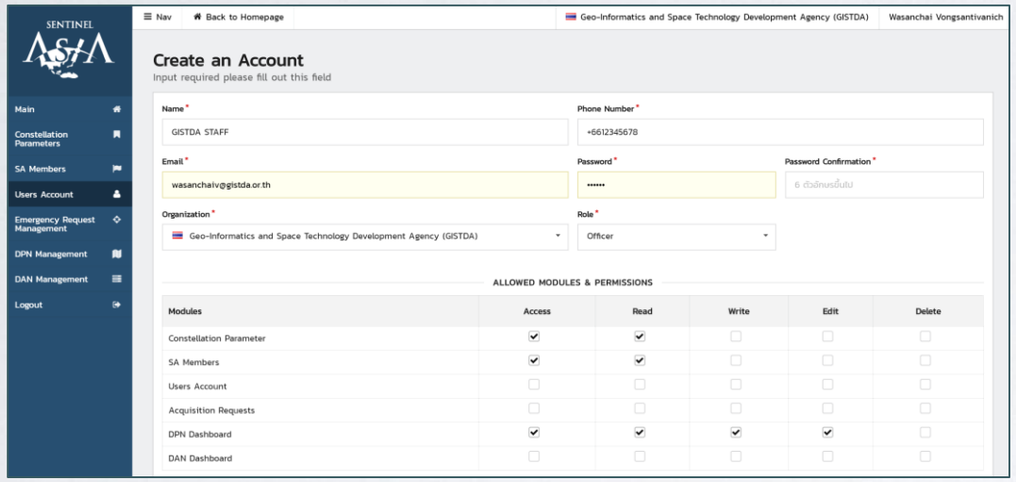
Sentinel Asia mobile platform

Coordinator Dashboard

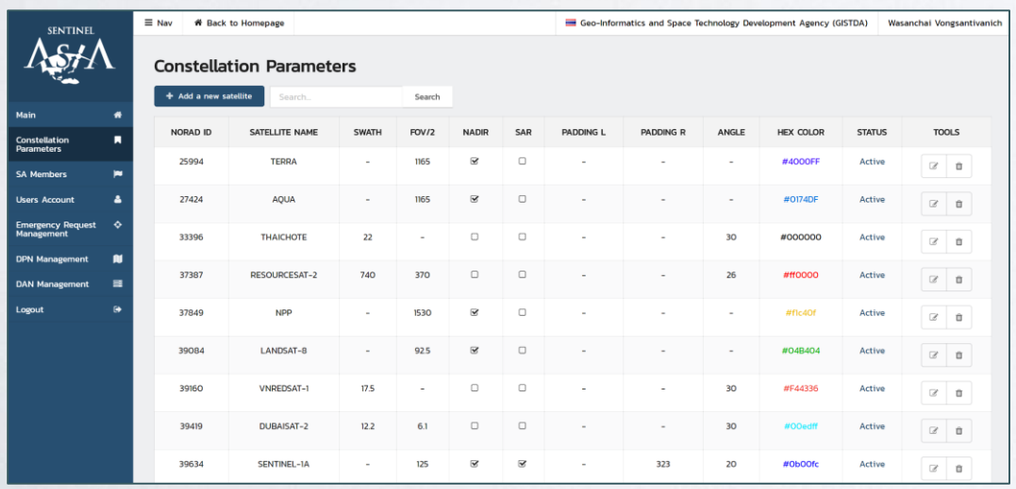




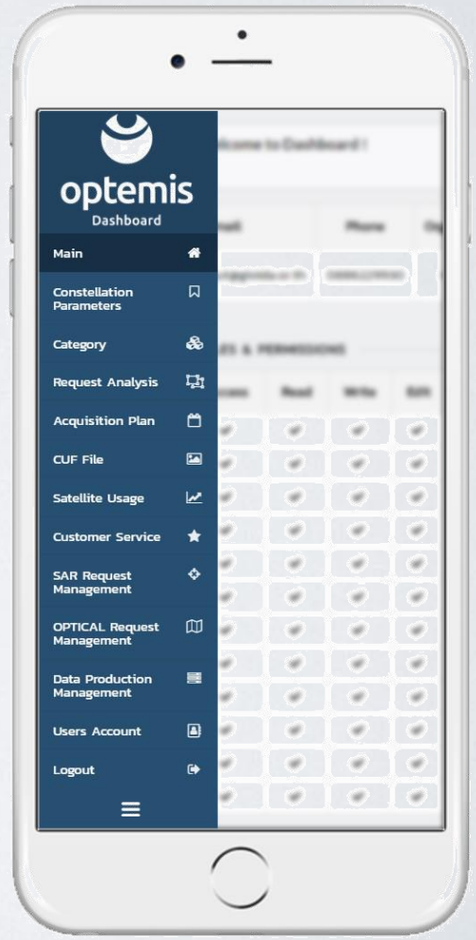
Acquisition requests management



SA User's management



Constellation Management



Sentinel Asia mobile

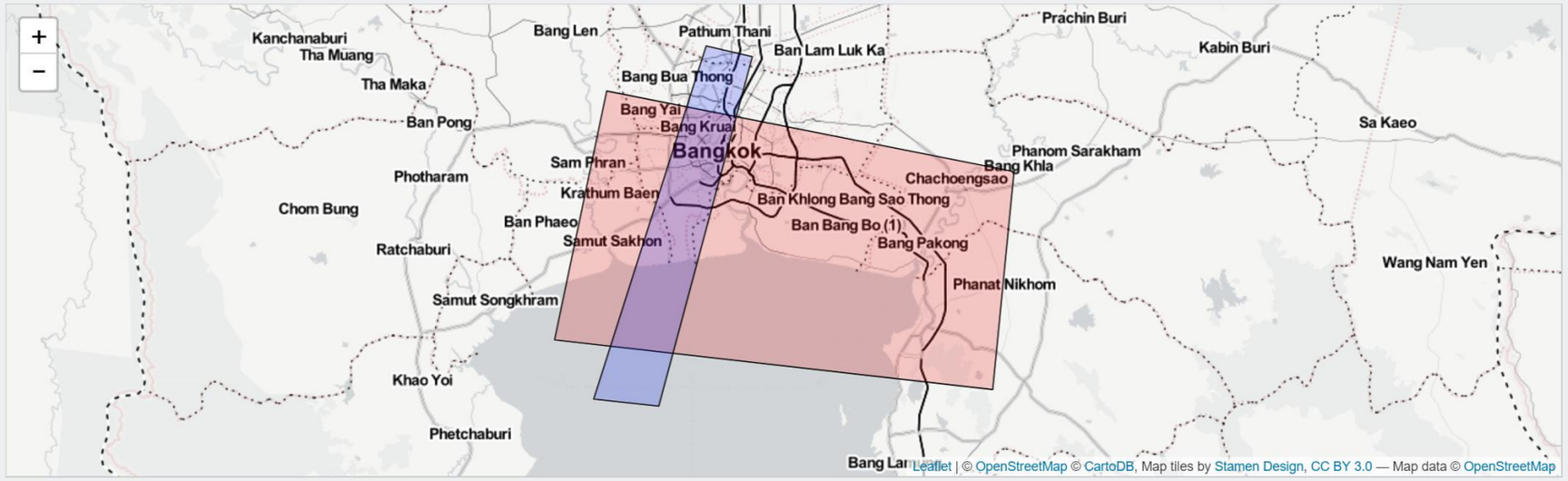
Data Provider Node (DPN) Dashboard

Main
Constellation Parameters
SA Members
Users Account
Emergency Request Management
DPN Management
DAN Management
Charts
Logout

Request Information and Tracking

Request Number: 8fuPVbkq

Download Shapefile (AOI) | Send Email | Back



Request Data

Approve Request | Decline Request

Type of Disaster	Purpose	Period	Detail
• Flood • Forest fire • Earthquake	• Emergency Response • Post Disaster Needs Assessment(PDNA) • Detection of an advance warning of hazardous situation	**Start** : 18/07/2017 **End** : 19/07/2017	

Tracking

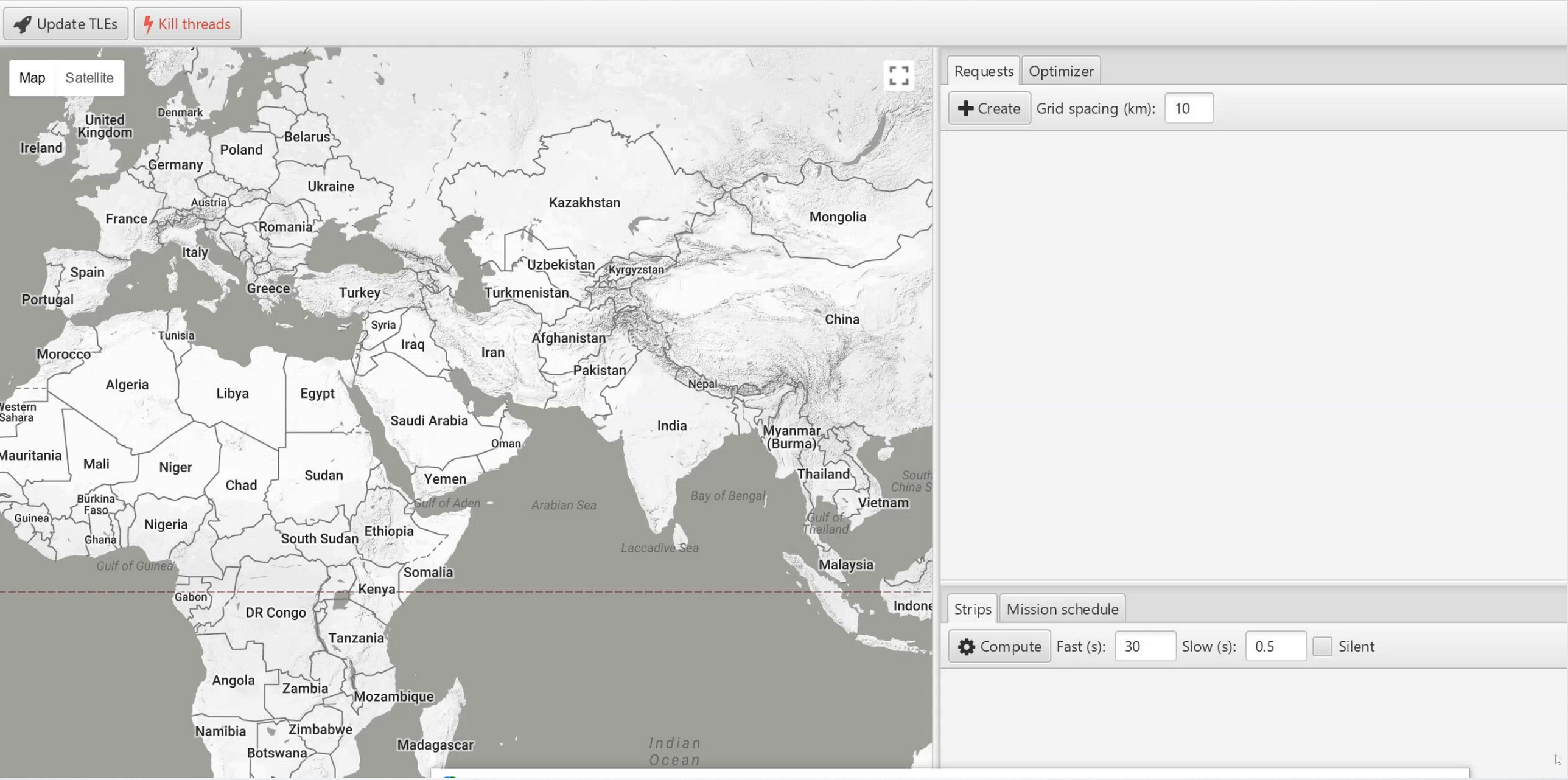
Data Provider Node | Data Analysis Node

Organization	Area (Km^2)	Status				Comments	Acquisition Area
		Acknowledge	Planned	Processed	Uploaded		
Indian Space Research Organization (ISRO)							
Japan Aerospace Exploration Agency (JAXA)							
Korea Aerospace Research Institute (KARI)							
Geo-Informatics and Space Technology Development Agency (GISTDA)		✔	✔	✔		please wait 2 days	Download
Vietnamese Academy of Science and Technology (VAST)							

Back

DEMONSTRATION

Optimized co-constellation mission planning algorithm,
for disaster response. (meta-heuristic optimization, simulated annealing)



WORKFLOW

Emergency Request

- Acquisition feasibility check
- Request tracking
- Coordinating

Request Activation

Tasks Allocation

- Optimized task allocation

DPN → DAN

VAP

Scientists, Academics, Organizations, etc.

CLOUD

CONCLUSION AND FUTURE WORKS

- EOS satellite mission is expensive, optimize mission planning should be highly considered. Co-constellation is also a way to optimize space sensor resources.
- This presentation gives the overview of the OPTEMIS mission planning system, its concept, current development/implementation status and its demonstration.
- EOS satellite is the sensor resource that is, by nature, easy to be shared globally. Viable balanced solutions for EOS co-constellation is presented.
- With a correct tool, to **sharing, collaborating and harmonizing satellite resources** is easily achievable.
- **OPTEMIS can be used to manage and facilitate observation requests, satellites acquisition planning. Speed-up the workflow and let the end-users use the satellite resources efficiently.**

FUTURE WORKS: Multi-language OPTEMIS, Real-time summary dashboard, Multi-sensor Tasking Harmonization

THANK YOU FOR LISTENING

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SentinelAsia.gistda.or.th