



# optemis

## EMERGENCY OBSERVATION CONSTELLATION PLANNING PLATFORM

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6<sup>th</sup> SENTINEL ASIA JPTM STEP-3

November 1<sup>st</sup> 2018,



# Strategic and Operation Aerospace Research center

Geo-Informatics and Space Technology Development Agency (GISTDA)

Ministry of Science and Technology



## Our Mission

- Aerospace operation research.
- Innovative solutions provider.
- Develop decision-aid tools, provide analytic supports for national strategic plan and policy makers.
- Build up national capacity for aerospace technology and aerospace/aeronautical applications, contribute to sustainable technology development.

## Our Expertise

- Aerospace operation research.
- Applied mathematics, System modelling.
- Optimization.
- Spatial-based applications





# optemis

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[**O**peration **P**lanning **T**ool for **E**arth-observation **MIS**sion]

... satellite resources in space

**How to 'OPTIMIZE' ...**

... processes, response time

... workflow

... data utilization

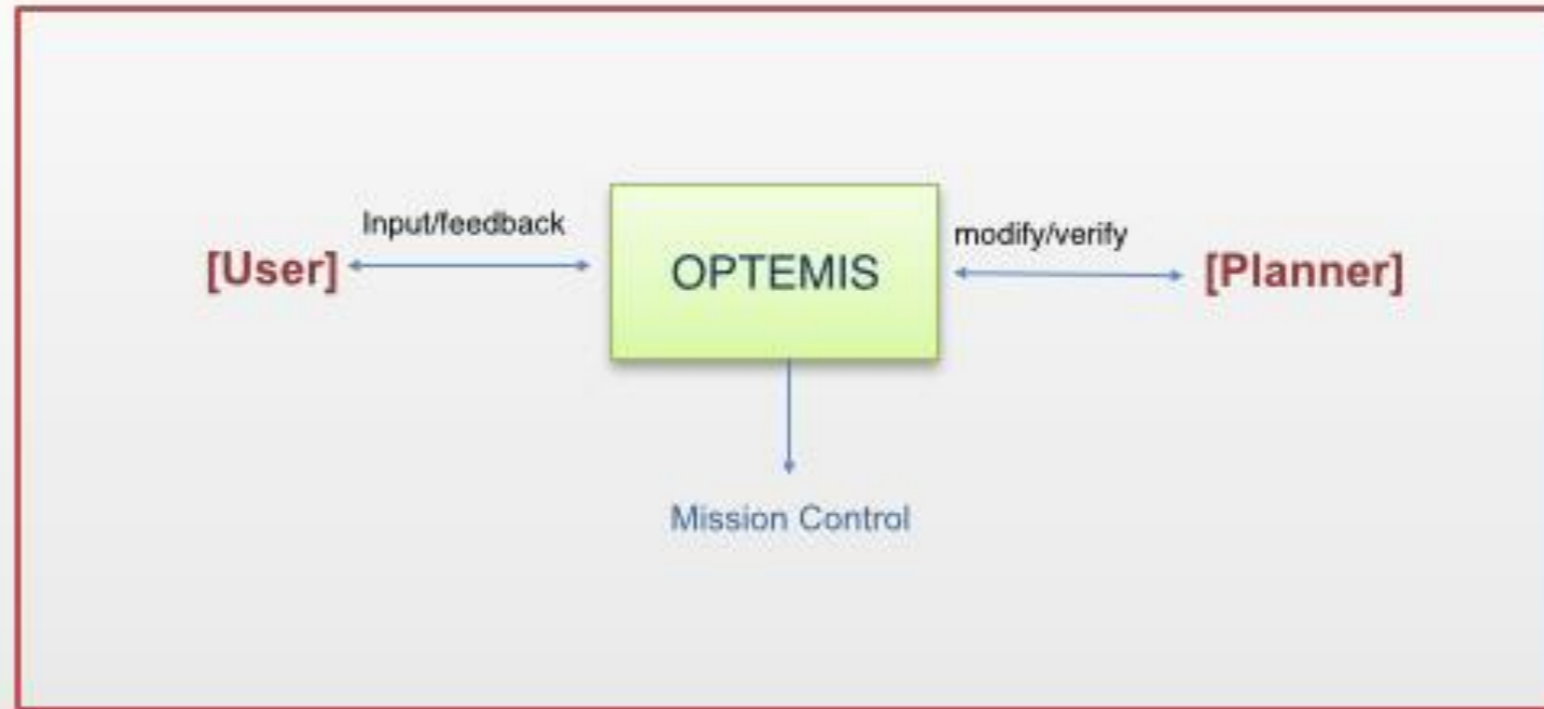


... data provider up to end users?

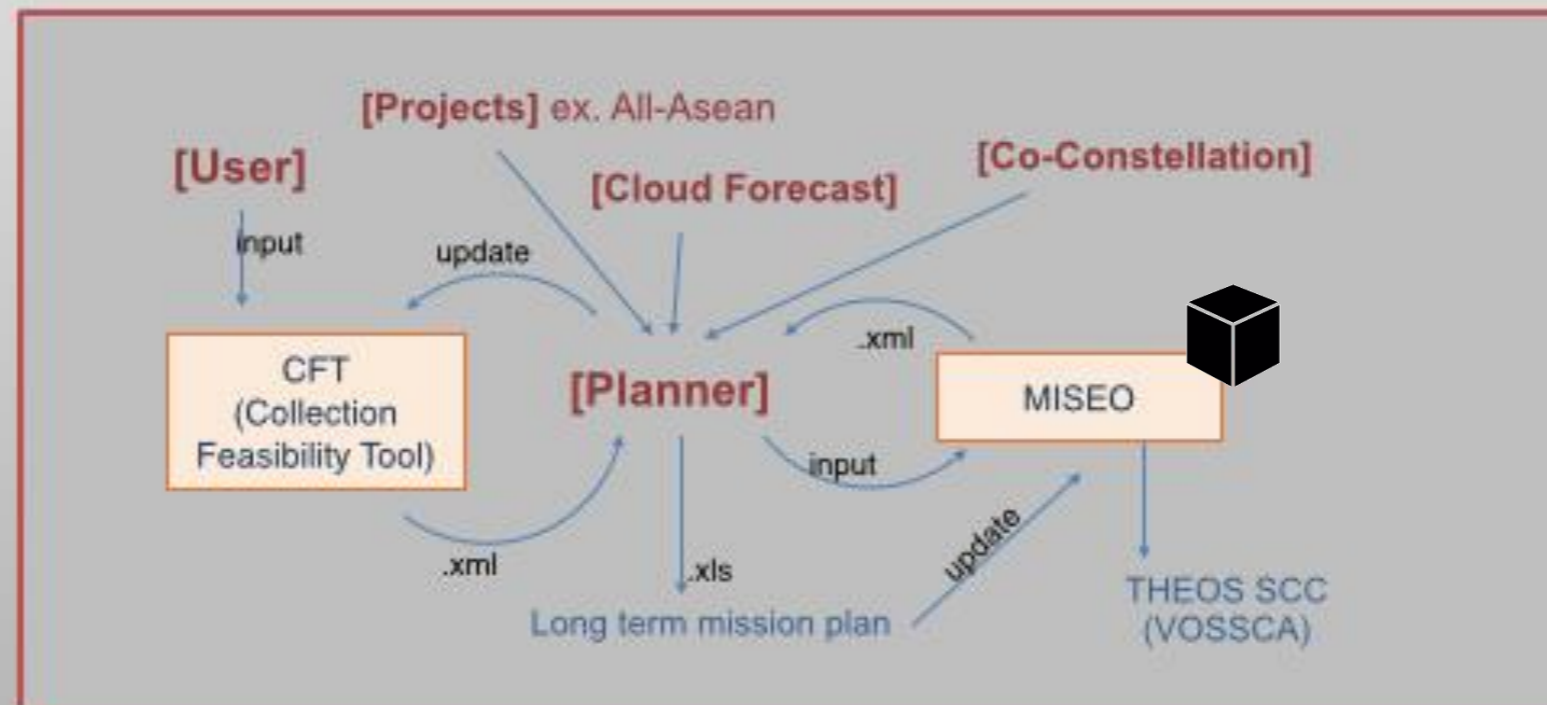
**How to 'SYNERGIZE' ...**

... agencies, organizations

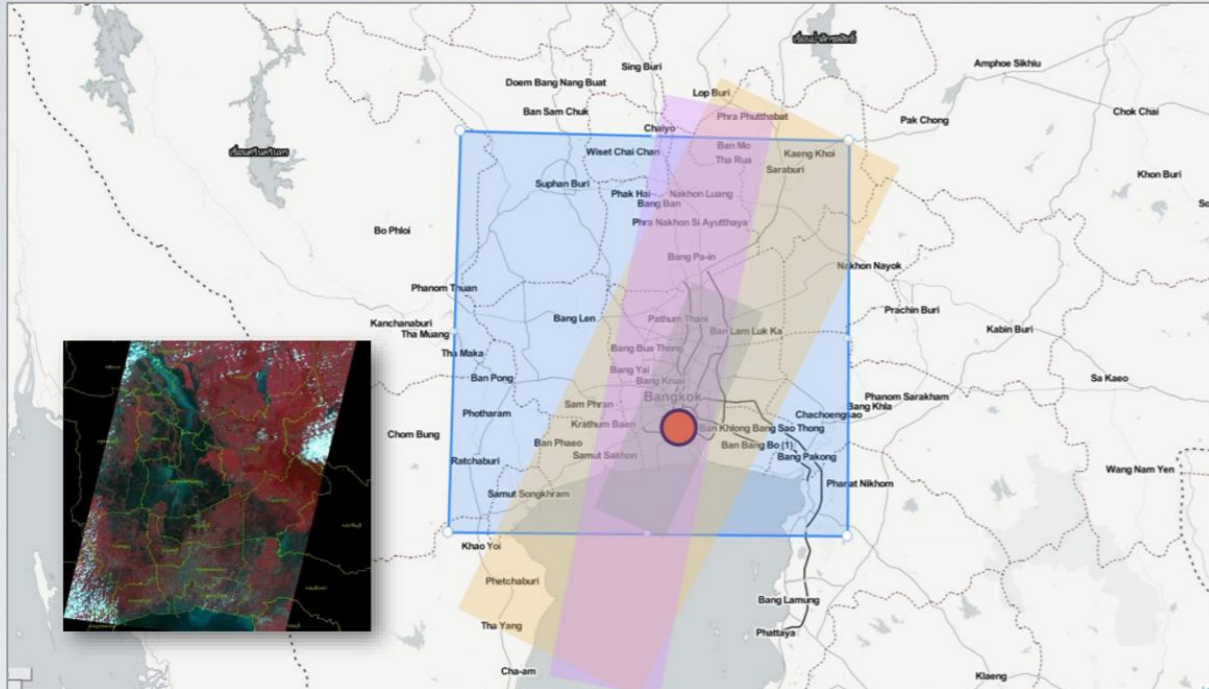
... international collaborations



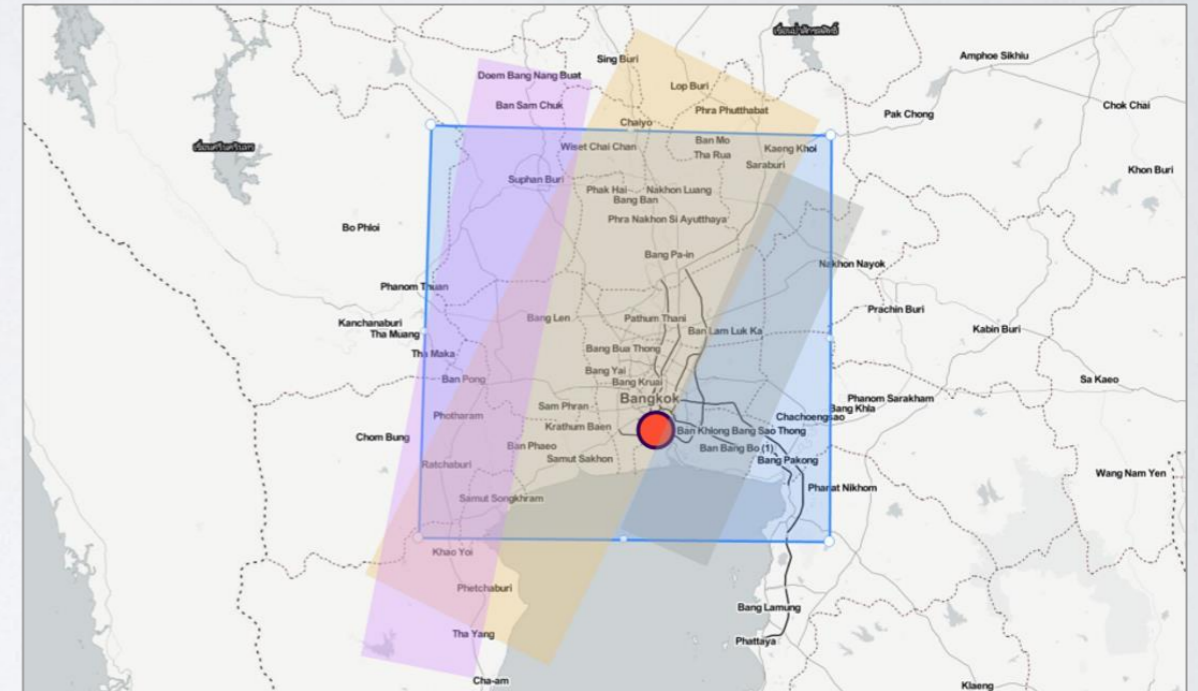
Uncluttering the Workflow



# Agile Remote Sensing Satellite → Acquisition Tasking



Not Optimized Tasking



Optimized Tasking

# Attapeu Dam Collapse, Laos 2018

## Laos dam collapse: Race to rescue flooded villagers

© 25 July 2018

f t e Share



GETTY IMAGES

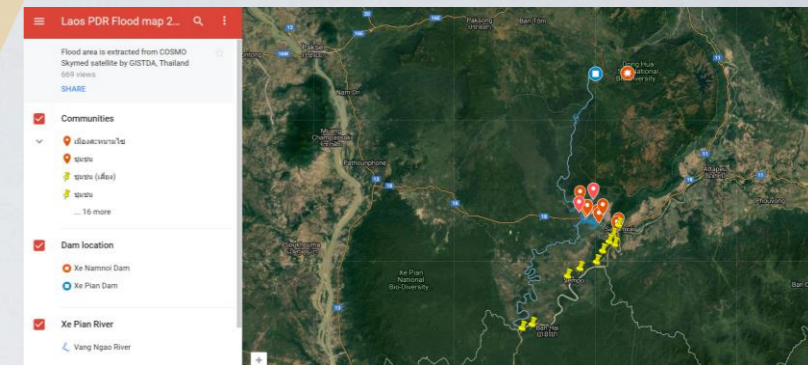
Rescuers are racing to find survivors after a dam in Laos collapsed late on Monday, flooding several villages and killing at least 20 people.

At least 100 people are still missing, and thousands have lost their homes.

The authorities in Attapeu province have been using helicopters and boats to try to evacuate stranded villagers.

The dam that collapsed is part of the Xe-Pian Xe-Namnoy hydroelectric power project, which involves Laotian, Thai and South Korean firms.

Local authorities have appealed to government bodies and other communities to provide emergency aid such as clothing, food, drinking water and medicine.



# Emergency Observation Flow

Plan for Sentinel Asia STEP3, SA Secretariat  
2<sup>nd</sup> SA Steering Committee, Jan 2017 Bangkok



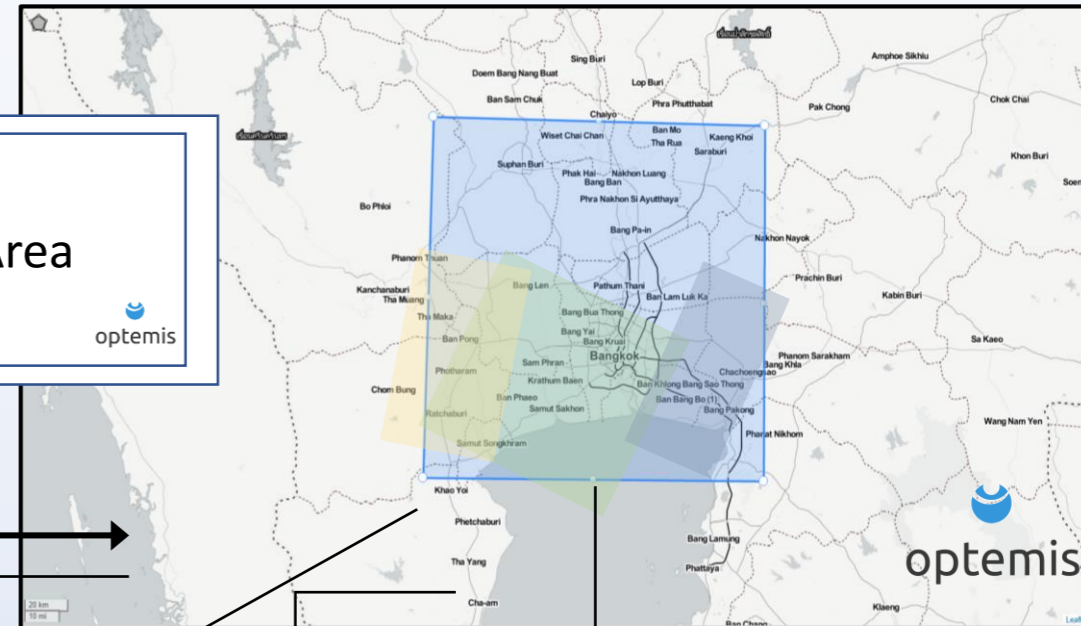


# DATA PROVISION - ONLINE SERVICES FRAMEWORK

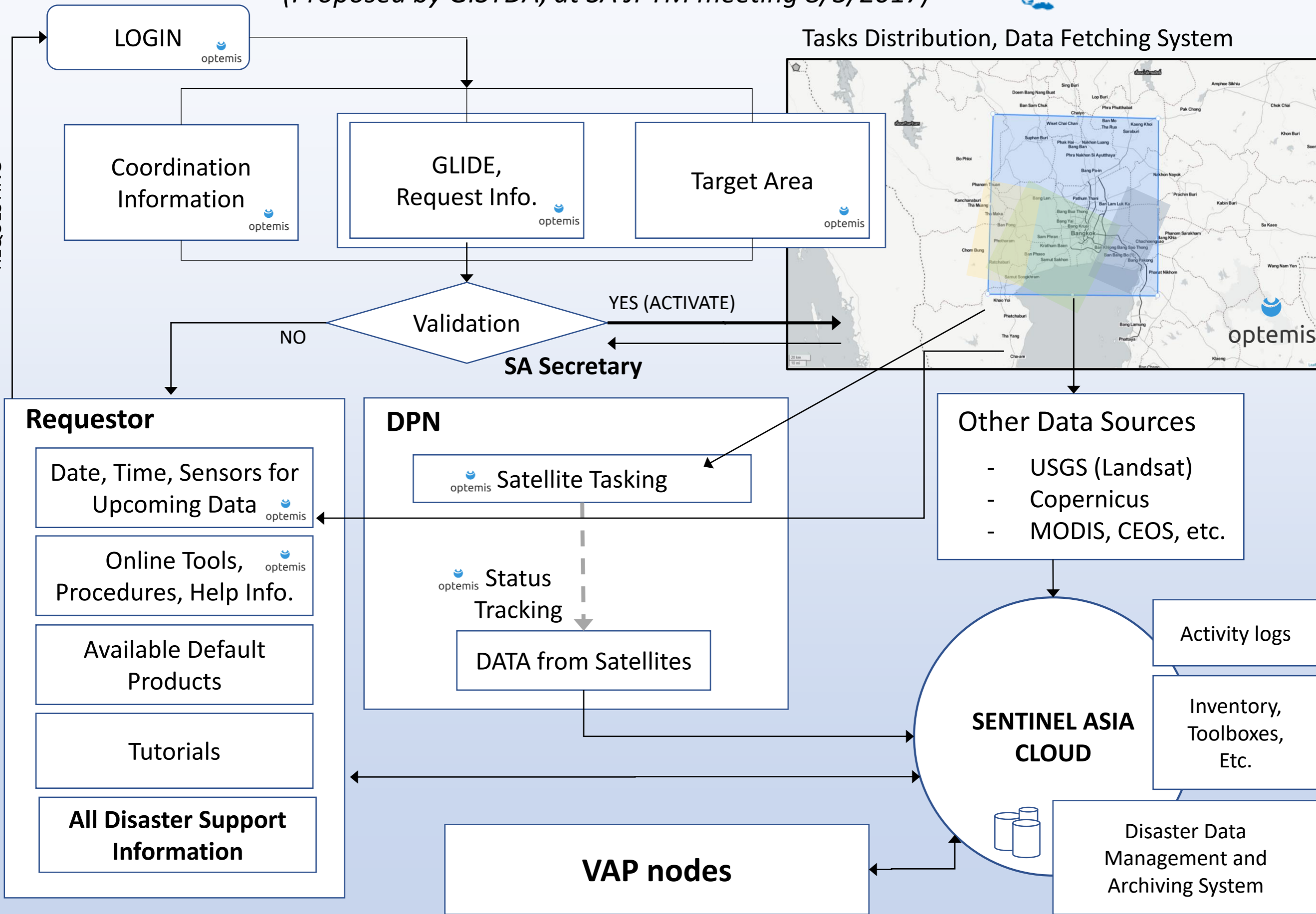
(Proposed by GISTDA, at SA JPTM meeting 8/3/2017)



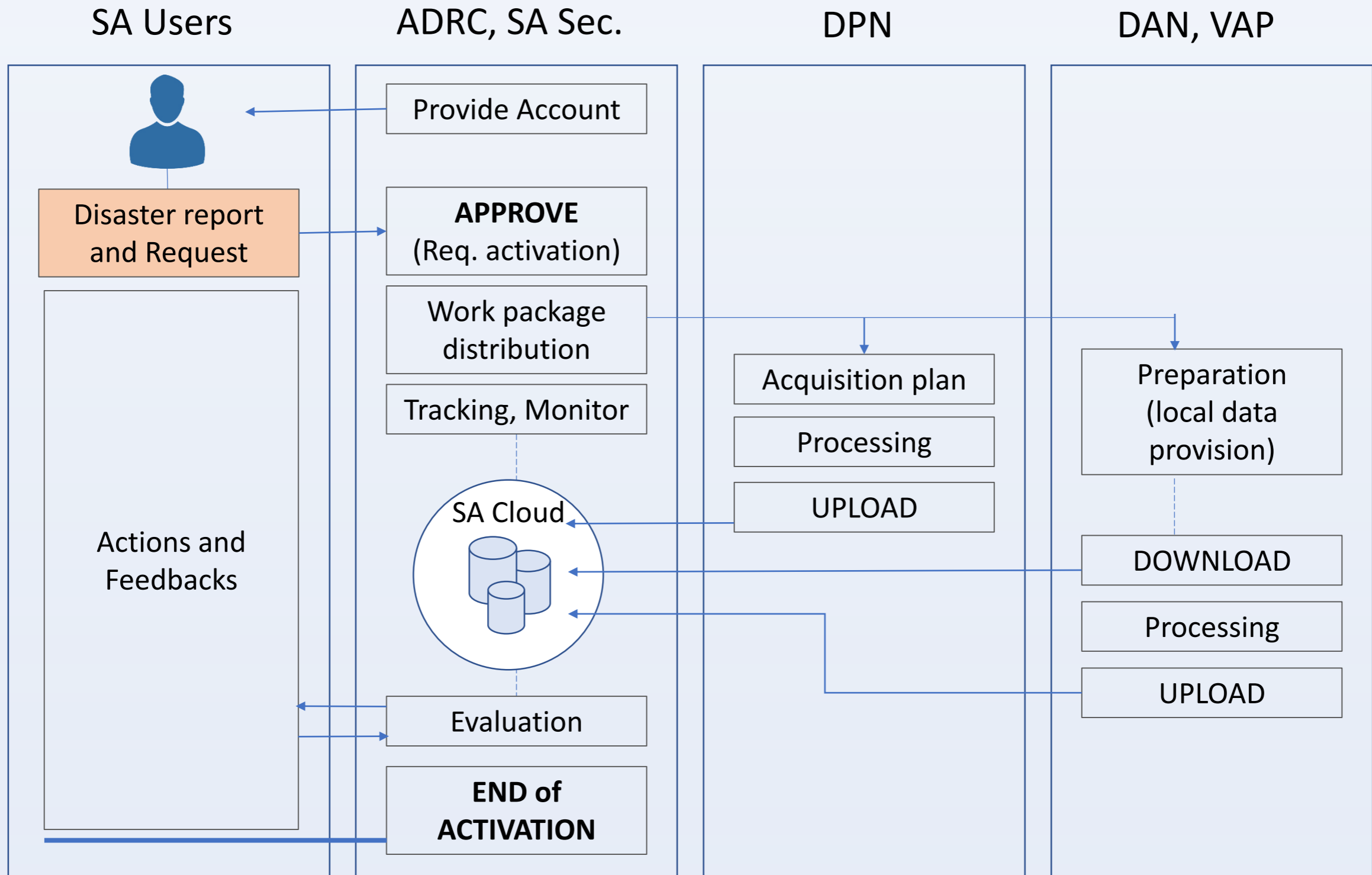
## Tasks Distribution, Data Fetching System



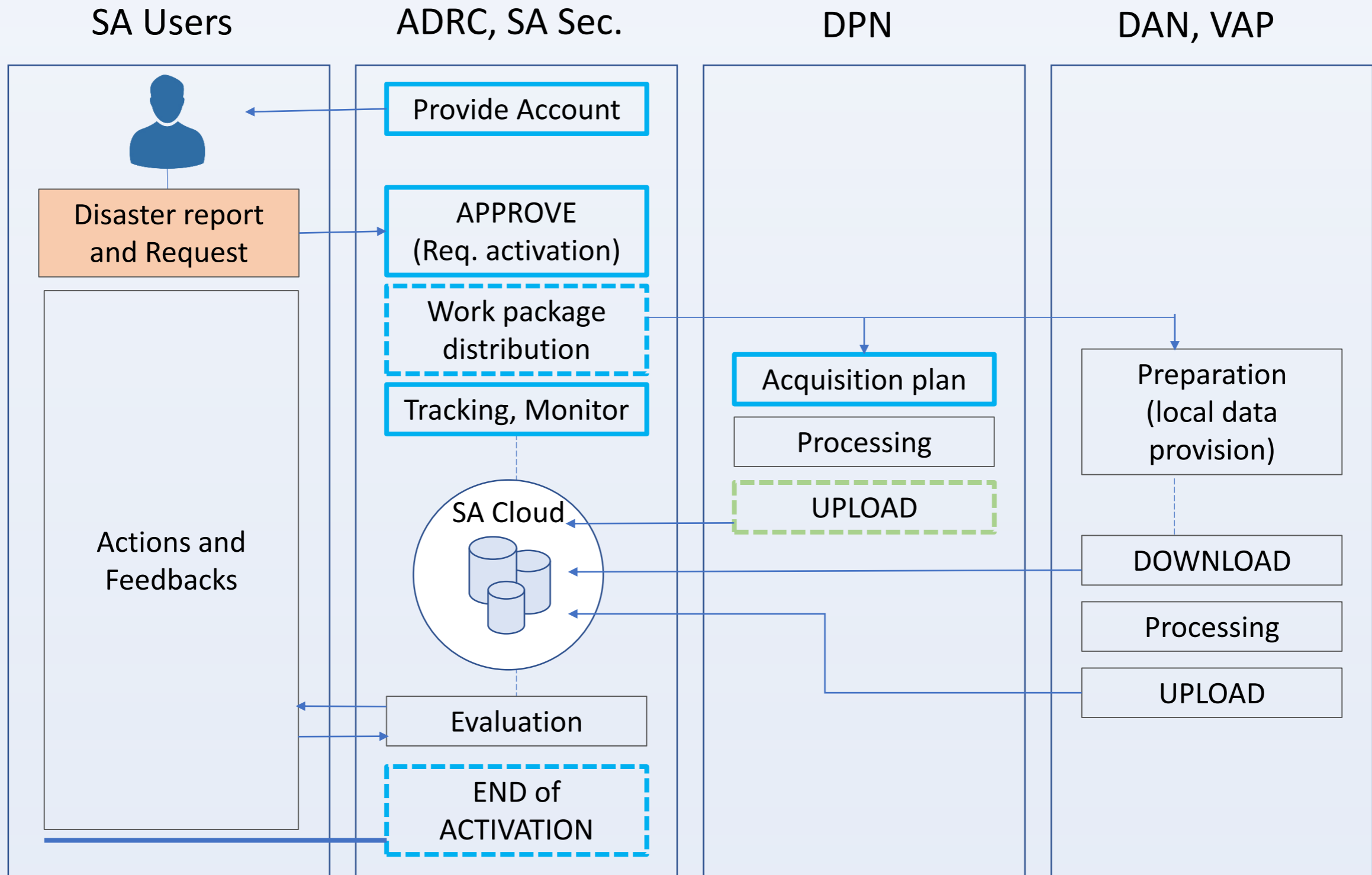
REQUESTING



# SA Procedures and Modules

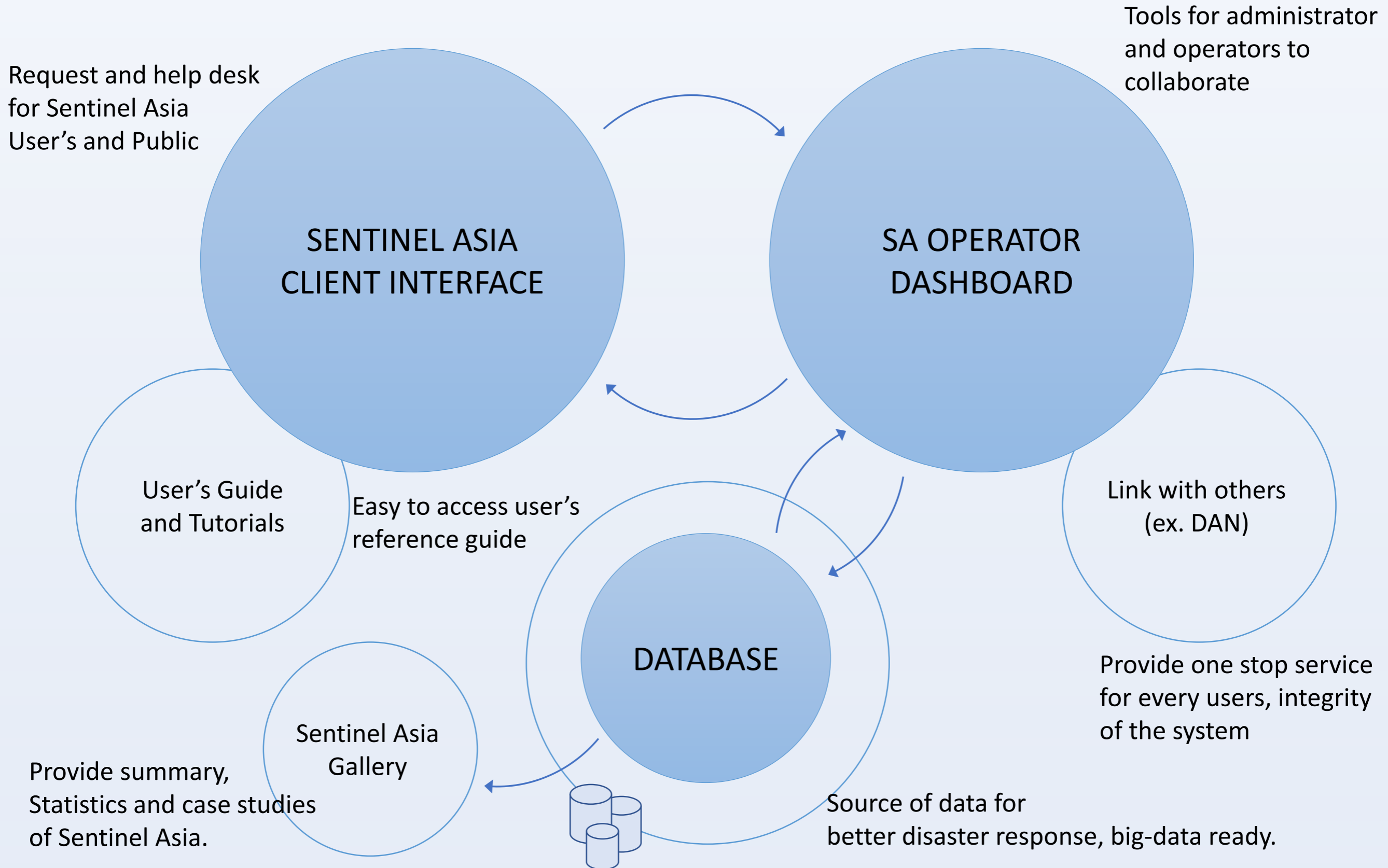


# SA Procedures and Modules ( ready)



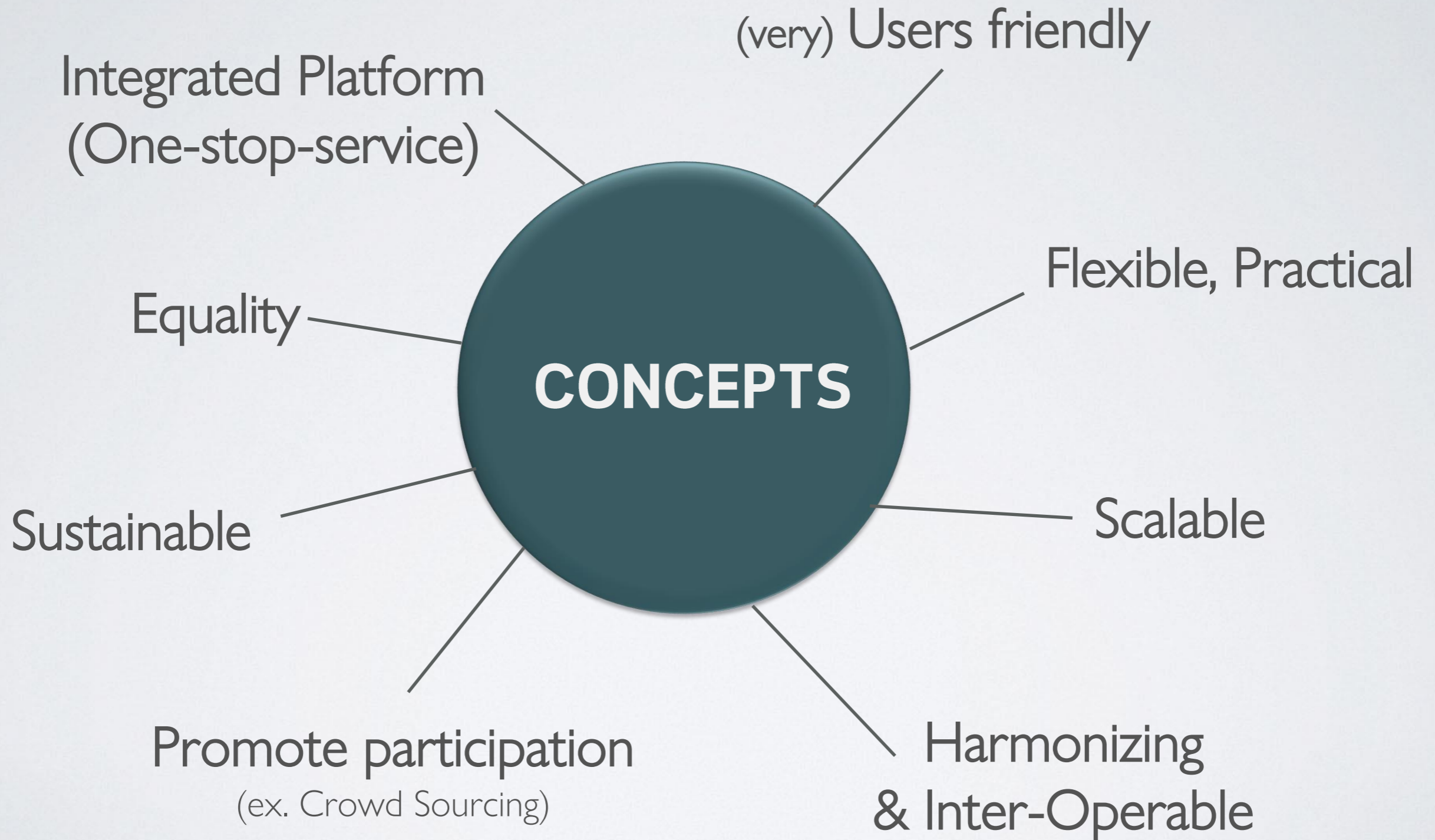
# OVERVIEW

## Emergency Request Platform

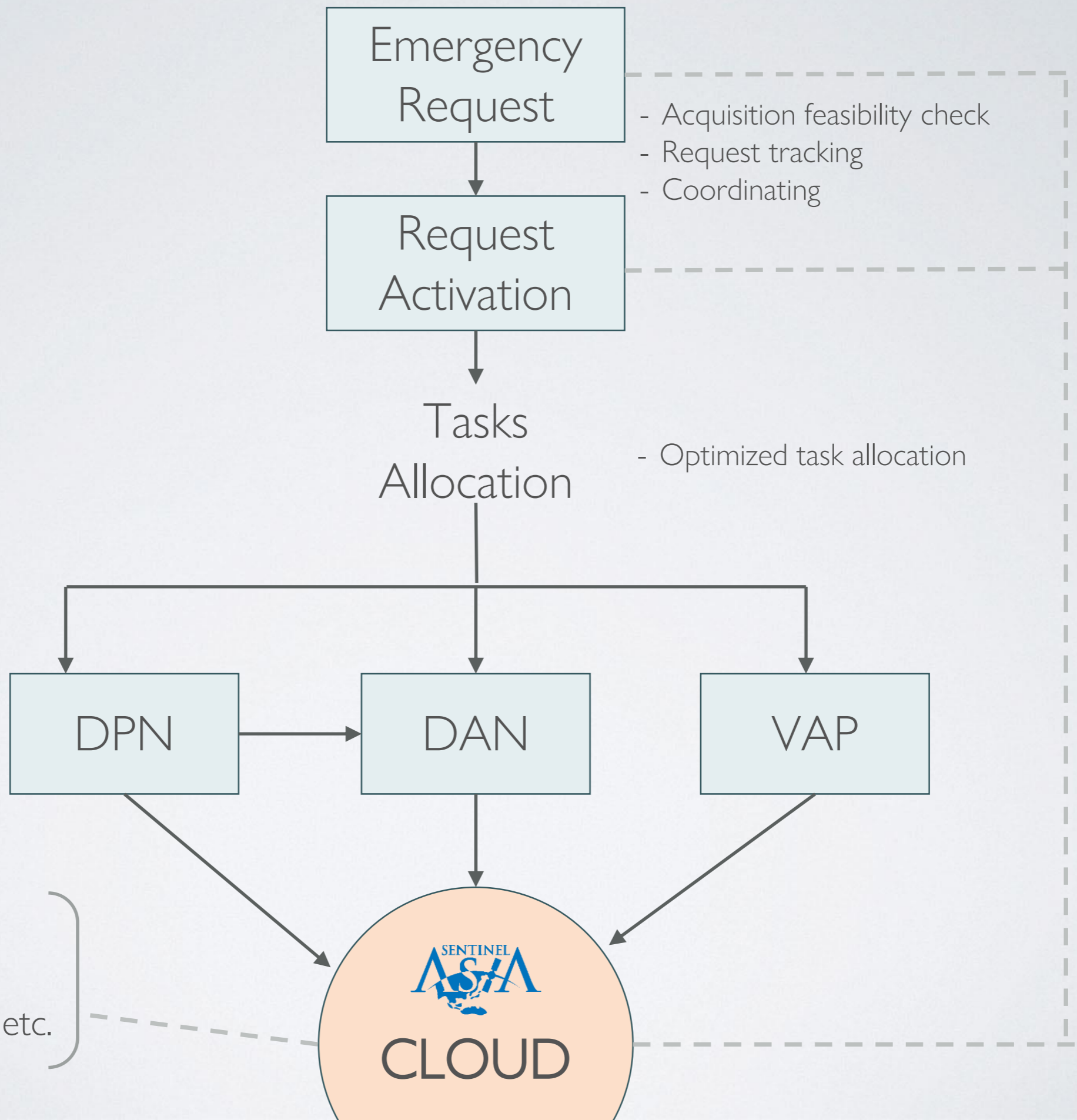


## Objectives:

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



# WORKFLOW



- Acquisition feasibility check
- Request tracking
- Coordinating

- Optimized task allocation

Scientists,  
Academics,  
Organizations, etc.



# 1. Emergency Observation Request (EOR)

# 1. Emergency Observation Request (EOR)

The screenshot displays the Sentinel Asia Emergency Request Form (EOR) interface. The top navigation bar includes the Sentinel Asia logo, the text "Satellite Acquisition Feasibility", and "Emergency Request Form". On the right side of the navigation bar, there are links for "Create an account" and "Login".

The main area is dominated by a map of Asia, showing the continent and surrounding regions. The map is interactive, with a sidebar on the left containing various map controls like zoom in (+), zoom out (-), and a full-screen button. The bottom left corner of the map shows the coordinates "58.14897 : 223.94531" and a set of navigation icons (home, back, forward, refresh, close).

On the right side, the "Send Request" panel is visible, titled "Emergency Request Form". It is divided into two main sections: "1 SELECT A SATELLITES" and "2 FEASIBILITY DATA".

In the "1 SELECT A SATELLITES" section, there are two date pickers: "START (00:00 UTC)" with a "Start Date" field, and "END (23:59 UTC)" with an "End Date" field. Below these is a "TYPE OF DISASTER" dropdown menu currently set to "All".

The satellite selection options are categorized into "OPTICAL" and "SAR".

**OPTICAL**

- Low Resolution
  - AQUA
  - NPP
  - SENTINEL-3A
  - TERRA
- Medium Resolution
  - LANDSAT-8
  - SENTINEL-2A
  - THAICHOTE
  - VNREDSAT-1
- High Resolution
  - DEIMOS-2
  - GEOEYE-1
  - WORLDVIEW-2
  - WORLDVIEW-3

**SAR**

- ALOS-2
- CSK-1
- CSK-2
- CSK-3
- CSK-4
- RADARSAT-2
- SENTINEL-1A

At the bottom of the satellite selection panel, there are four buttons: "Compute", "Select All", "Clear", and "Update Satellite".



## 2. Request Activation (Sentinel Asia Secretariat)

# 2.1 EOR Activation

**SENTINEL ASIA Sentinel Asia** Satellite Acquisition Feasibility Emergency Request Form [Create an account](#) [Login](#)

**Send Request**  
Emergency Request Form

**1** SELECT A SATELLITES **2** FEASIBILITY DATA

START (00:00 UTC)  END (23:59 UTC)

TYPE OF DISASTER

**OPTICAL**

- Low Resolution
  - AQUA
  - NPP
  - SENTINEL-3A
  - TERRA
- Medium Resolution
  - LANDSAT-8
  - SENTINEL-2A
  - THAICHOTE
  - VNREDSAT-1
- High Resolution
  - DEIMOS-2
  - GEOEYE-1
  - WORLDVIEW-2
  - WORLDVIEW-3

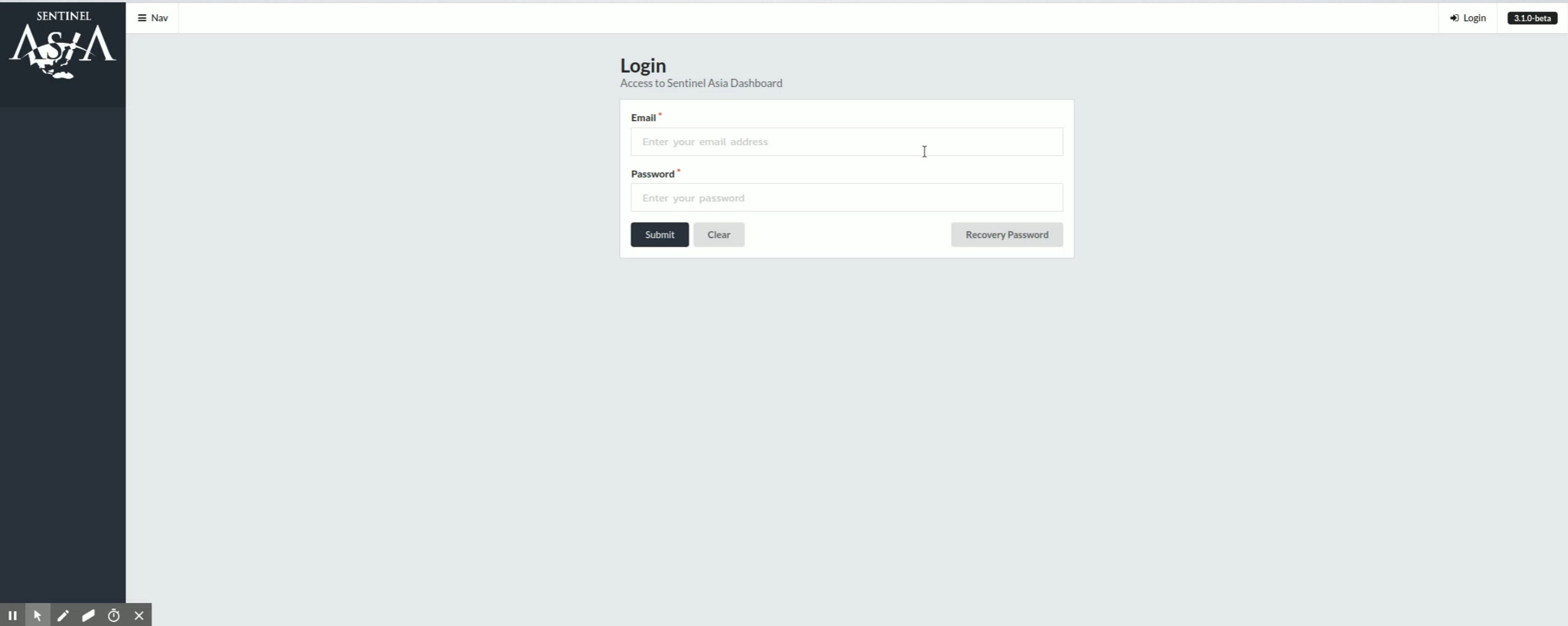
**SAR**

- ALOS-2
- CSK-1
- CSK-2
- CSK-3
- CSK-4
- RADARSAT-2
- SENTINEL-1A

42.65214 : 247.14844

Leaflet

# 2.2 EOR Tasking to DPN, DAN



The screenshot displays the Sentinel Asia Login interface. On the left, there is a dark sidebar with the 'SENTINEL ASIA' logo. The main content area features a 'Login' section with the subtitle 'Access to Sentinel Asia Dashboard'. This section contains two input fields: 'Email' with the placeholder 'Enter your email address' and 'Password' with the placeholder 'Enter your password'. Below these fields are three buttons: 'Submit', 'Clear', and 'Recovery Password'. The top navigation bar includes a 'Nav' menu icon, a 'Login' link, and a '3.1.0-beta' version indicator. At the bottom left, a standard browser toolbar is visible.

# 3. Data Provider Nodes (DPN)

# 3.1 DPN (NSPO)

The screenshot shows the Sentinel Asia login interface. On the left is a dark sidebar with the 'SENTINEL ASIA' logo. The main content area features a 'Login' section with the subtitle 'Access to Sentinel Asia Dashboard'. It contains two input fields: 'Email' with the placeholder 'Enter your email address' and 'Password' with the placeholder 'Enter your password'. Below these fields are three buttons: 'Submit', 'Clear', and 'Recovery Password'. The top navigation bar includes a 'Nav' menu icon, a 'Login' link, and a '3.1.0-beta' version indicator. A video player control bar is visible at the bottom left.

SENTINEL  
ASIA

Nav

Login 3.1.0-beta

## Login

Access to Sentinel Asia Dashboard

**Email\***  
Enter your email address

**Password\***  
Enter your password

Submit Clear Recovery Password

# 3.2 DPN (GISTDA)

SENTINEL ASIA

Nav

Login 3.1.0-beta

## Login

Access to Sentinel Asia Dashboard

Email \*

Enter your email address

Password \*

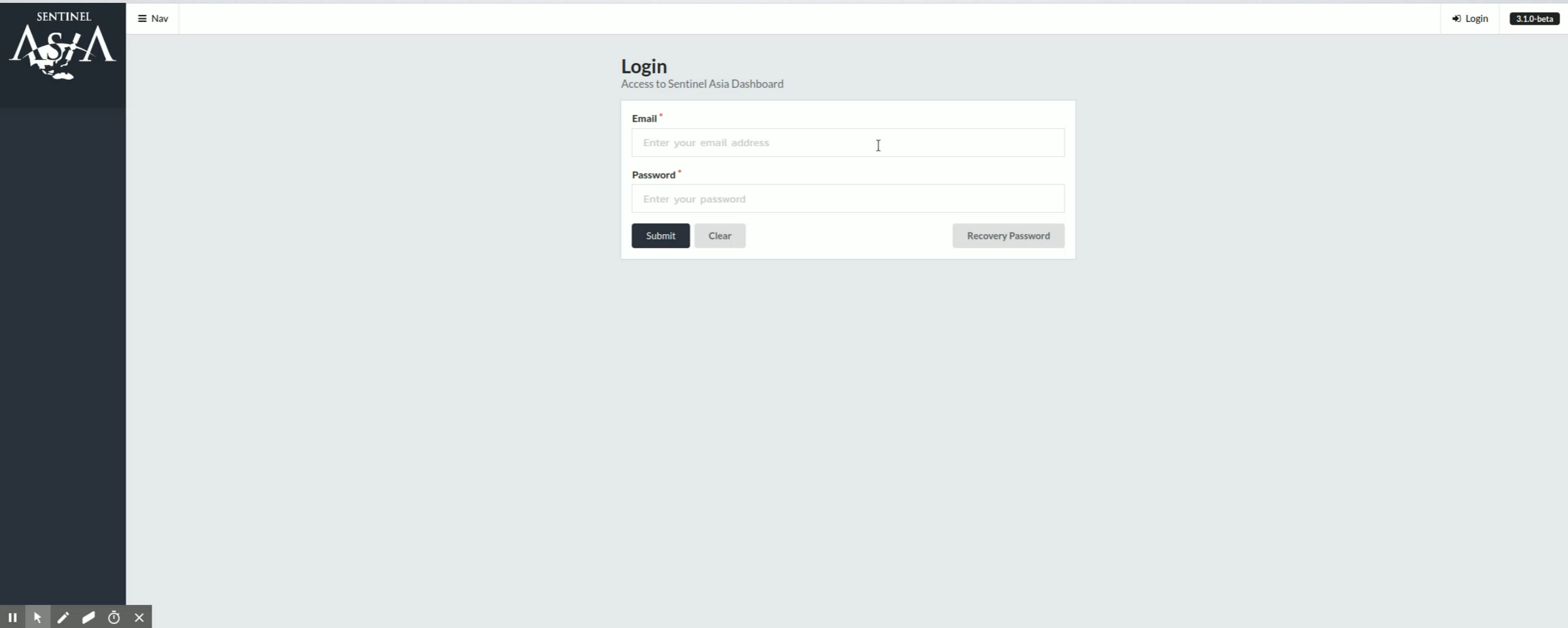
Enter your password

Submit Clear Recovery Password

|| ⏪ ⏩ ⏸ ⏹

# 4. Data Analysis Nodes (DAN)


# 4. DAN





# 5. Administrative & Summary

# 5. Summary



Nav Back to Homepage Geo-Informatics and Space Technology Development Agency (GISTDA) SOAR Sales Logout 3.1.0-beta

Hi SOAR, Welcome to Dashboard!  
You are already logged in.

Name	Role	Email	Phone	Organization
SOAR	ADRC Member	soar@gistda.or.th	0886229930	Geo-Informatics and Space Technology Development Agency (GISTDA)

### Permission

Allow Modules and Permissions

Modules	Read	Write	Edit	Delete
Constellation Parameter	✓	✓	✓	✓
SA Members	✓	✓	✓	✓
User Accounts	✓	✓	✓	✓
Emergency Request Management	✓	✓	✓	✓
DPN Management	✗	✗	✗	✗
DAN Management	✗	✗	✗	✗

### Latest Emergency

List of 5 the latest requests

Request ID	Country	Disaster	Activation Time	Status
<a href="#">5bdaeb05-b888153a-325745fc</a>	Thailand	Flood, Landslide, Storm	0 days   00:11:56	Approved
<a href="#">5bdad69b-b888153b-f448f988</a>	Thailand	Flood, Landslide, Storm	0 days   01:39:02	Approved
<a href="#">5bdacc9d-b888153a-325745ed</a>	Thailand	Flood, Landslide, Storm	Ended	Approved
<a href="#">5bd81579-b888157a-2b577780</a>	Thailand	Flood, Landslide, Storm	Ended	Approved
<a href="#">5b97562b-b8881504-fe4fec14</a>	Japan	Earthquake	Ended	Approved

### Members

List of your organization members

No	Name	Email	Phone
1	OPTEMIS	<a href="mailto:optemis@gistda.or.th">optemis@gistda.or.th</a>	08886229930

Summary

# FUTURE WORKS (TO BE LAUNCHED NEXT JPTM)

- Accessibility to publicly available data sets (ex. Landsat, Copernicus, MODIS, etc.)
- Multi-language platform... (need translators)
- Quick-look and metadata panel...  
discussion for Standards for uploaded data (DPN, DAN)
- Optimized task allocation tool.
- Provide tutorials
- Deploy the system with Sentinel Asia cloud server.

# Emergency Request User's Interface : Decision Aid Layers

The screenshot displays the 'Emergency Request User's Interface' for 'Satellite Acquisition Feasibility'. The interface is divided into a map area on the left and a request form on the right.

**Map Area:** Shows a satellite acquisition feasibility map of Southeast Asia, including Thailand, Cambodia, Vietnam, and Brunei. A blue rectangular selection box is drawn over a region in Vietnam, centered around Ho Chi Minh City. The map uses a color scale from blue (low feasibility) to red (high feasibility). A scale bar indicates 200 km and 100 mi. The map data is attributed to OpenStreetMap.

**Request Form:** Located on the right, it includes the following sections:

- Send Request:** Emergency Request Form
- Steps:** 1 Select a satellites, 2 Feasibility Data
- START:** 15/11/2017
- END:** 16/11/2017
- TYPE OF DISASTER:** All x
- OPTICAL:**
  - Low Resolution: AQUA, NPP, RESOURCESAT-2, TERRA
  - Medium Resolution: LANDSAT-8, THAICHOTE, VNREDSAT-1
  - High Resolution: DUBAISAT-2, SENTINEL-2A
- SAR:** ALOS-2, SENTINEL-1A
- Buttons:** Compute, Check All, Clear




**GSMCP**

# DEMONSTRATION

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

Update TLEs Kill threads

Map Satellite



Requests Optimizer

+ Create Grid spacing (km): 10

Strips Mission schedule

Compute Fast (s): 30 Slow (s): 0.5  Silent

# CONCLUSION

- We are ready to deploy the EOR system (OPTEMIS) for all Sentinel Asia users.
- We welcome all the ideas and comments to improve this tool for Sentinel Asia.

*‘Space program is not about raising society’s awareness of space, but raising space’s awareness of the society.’*

THANK YOU FOR LISTENING



**optemis**

[SentinelAsia.gistda.or.th](http://SentinelAsia.gistda.or.th)

[wasanchaiv@gistda.or.th](mailto:wasanchaiv@gistda.or.th)