DSM Team

DESA Challenges & Way Forword

1. Objection / Aim / Vision

The DESA system is at a crossroads. It has been deployed in a beta version state with incomplete functionality, older data and little user involvement for some months, and it risks becoming obsolete and defunct if left in this state for too long. To realize its potential and generate a return on its investment, DESA needs to be revitalized, revamped and rebranded to a robust system that truly meets the user requirements and is an asset to SANSA EO.

The main objective of the project is to provide an efficient platform that allows for ingesting, processing, analysis, archiving and disseminating data and information to end users. The platform will take away the requirement of end users to have data storage and processing infrastructure and will provide capabilities for end users to process, access share and derive information from Earth observation data. The main objectives of DESA are:

- Provide a platform that pre-processes data according to a predefined standard that is consistent and produce ARD data.
    - ARD successfully processed on the DESA system by the SBD team
- Provide a sensor independent data management system.
    - SPOT 6 and 7 is the sensor prioritised for the DESA project
- Increase temporal resolution of imagery by aggregating satellite data
    - SPOT 1.5m datasets ingested into the Datacube
    - Airbus has higher resolution data than what SANSA has acquired
- Provide a product, algorithm and information sharing platform
    - DESA makes use of the opendatacube and Jupyterhub
- Efficient data access and dissemination
    - DESA has integrated web portals for data access and dissemination remotely for all users who have access to the platform

- Data interoperability
    - DESA makes use of an integrated platform (Jupyterhub) for data interoperability. Data algorithms and processed datasets can be interchanged amongst users of the platform.

2. User Feedback

The DESA system needs to holistically re-look at how it aims to meet user expectations, keeping in mind that several user archetypes have been identified, covering a spectrum ranging from non-technical users expecting high-level analysis summaries to highly technical users who wish to develop their own low-level analysis application in the geoworkroom. Some of the limited user feedback that has been gathered thus far points to users feeling that the system is too fragmented and technical for them to use. A framework needs to be established to solicit much more feedback volume and needs to be targeted to gather this from across the user archetype spectrum. Feedback needs to be categorized into operational, aesthetic, technical and process related items.

3. Technical Aspect & Functionality

DESA has 4 applications (Maps, GeoWorkRoom, Explorer & Web Services). One of the major outstanding technical aspects of the system is the OWS serving of the SPOT 6/7 data, which is used by the TerriaJS based web mapping application. The conversion of the SPOT 6/7 data to the Cloud Optimized GeoTIFF (COG) format is a key priority in ensuring that global standards are followed and the OWS systems are restored so that users can view the imagery in the web map. Currently, frequent down-time due to HBK power-outages and limited storage on the DESASTORE1 system for the converted imagery are some of the blockers in overcoming the OWS technical issue.

- **DESA Maps / TerriaJS**

DESA Maps is a web-based geospatial data catalogue explorer. This application allows the users to view changes and compare areas using time series capability. Users can upload their own datasets from different formats and create their own stories.

- **GeoWorkRoom**

Different users now have their own pre-configured workspace and create their own products without having to worry about resources. Users can get access to some products developed by other users in shared workspaces.

- **Explorer**

Users get to see the range of available data and metadata.

- **Web Services**

DESA provides different Web Service capabilities which allow users to explore dataset in many GIS & Remote Sensing applications. Users can access DESA data in their own workstation without having to worry about storage.

4. Turn Around Time

DESA has been built on an open-source system Kubernetes. This system allows for scalability of resources using containerisation mechanism.The DESA system needs to be more responsive in both onboarding and supporting users and also in incorporating new features or notebooks to meet new user needs. Teams with well-defined responsibilities should be allocated to support and new product/service/feature development. Additionally, there is a requirement for an issue-tracking system to follow up on support and change tickets on the various aspects of the system.

5. Challenges

Some of the systemic challenges faced by the current DESA include limited storage and inadequate server infrastructure to support a big enough Kubernetes cluster for a fully on-premises solution. Frequent power cuts at HBK that lead to downtime on the EODC is another challenge that has arisen since November 2022.

- Hardware interruptions due to consistent power failures in the datacentre
- Applications are unstable / unreachable, implementation and installation ongoing
- Hardware resources limited, physical servers and storage
- Dependencies of processing systems unavailable

- Renewal of contracts for the support and maintenance of processing systems require renewal

  - **Internal**
    - OWS
      - Argo-workflow needs to be resolved
    - Argo-workflow
      - Blank screen after logging in
    - Keykloak
      - Takes time to log into Keyloak prod
        - Network seems to be OK at HBK
        - Issues seem to be internal within the cluster
          - Possibly checking vouch
    - Hardware
      - Datastore storage capacity reached
    - Datacentre Infrastructure
      - Consistent power interruptions at HBK
      - High temperature occurrence

- Processing of data (GXL) delays

6. Where to from now?

A holistic turn around for DESA can be achieved through the following actions

a. Expansions of the storage and server resources allocated to the DESA production cluster. This is very crucial in ensuring the system has high uptime and robustness.
b. Completion of the SPOT 6/7 COG conversion and usage in OWS
c. Indexing of new high-resolution urban imagery that is less than 12 months old
d. Introduction of a series of training materials that users can use to familiarize themselves with the system at beginner to advanced levels. This can include videos, step-by-step tutorials and even some live sessions, which are recorded and can be viewed later.

e. Cosmetic rebranding of the DESA website
f. A new round of formal, controlled, well-documented user engagements aimed at capturing user needs and expectations and also measuring user appetite for each user archetype.
g. Technical maintenance is crucial. A team needs to be established to regularly assess and make technological refreshes to the system, across both infrastructure and software.