



RFI No.: EO/001/05/2019

Request for Information (RFI) for

Digital Earth South Africa

Date of issue: 10 May 2019

Response deadline: 24 May 2019

1. BACKGROUND

The South African National Space Agency (SANSA) is a public entity under the National Department of Science and Technology (DST), and was established in terms of South African National Space Agency Act, 2008 (Act No 36 of 2008).

SANSA has a mandate to drive the promotion and use of space and cooperation in space-related activities. To achieve this mandate, the Agency fosters research in space science and technology, advances space engineering programmes, and supports the creation of an environment conducive to industrial development in space technologies within the framework of national government policy. More information about the organization can be found at <http://www.sansa.org.za>.

Furthermore, SANSA has a legislative mandate for acquisition, archiving, storing and dissemination of satellite imagery, to enable the development of public and commercial Earth observation derived products and services. The major challenge faced by SANSA in the implementation of this mandate is the archiving, processing and dissemination of huge volumes of Earth observation data (greater than 1 PB) that demands high-performance computing resources, large data storage capabilities, easy and timely data access and delivery of data in formats that are easily usable.

Throughout the world, space agencies, and big data repositories are facing similar challenges and are leveraging Fourth Industrial Revolution technologies such as cloud computing services, machine learning and Analysis Ready Data standards to convert raw data into actionable data for decision-making products, tailored for local needs and challenges. SANSA to competently serve South African and African users aims to leverage these emerging technologies towards the development of Digital Earth South Africa.

Digital Earth South Africa (DESA) will build on Data Cube technology and Analysis Ready Data standards to deliver a unique capability to store, manage, process, interrogate, and present Earth observation data in formats that further promote its usefulness to support information based decision making process. DESA will provide users, by translating over 30 years of Earth observation satellite imagery in SANSA's archives, into information and insights, with reliable, standardised, and easily accessible products and services. In addition to the satellite data, DESA will look at integrating in-situ measurements such as ground-based, airborne and ship observations and measurements as well as demographic data for richer and multi-level analysis.

The Earth Observation Data Centre (EODC) located at the Hartebeesthoek ground station is the primary location where storage and processing servers are hosted, DESA solution will therefore be based in that location.

1.1. How does DESA work?

The data cube is a series of data structures and tools which organise and enable the analysis of large Earth observation satellite data collections and uses the open source code and application development provided by the Open Data Cube community. This technology has been proven at continental scale in Australia and is being implemented in many other countries including Columbia, Switzerland, Vietnam and the UK.

A key element is the calibration and standardisation of the data. This increases the value which can be derived from Earth observation and other sources of large datasets, as it allows for the rapid development of information products to enable informed decision making across government and private industry.

In the past, satellite imagery and other geospatial datasets were downloaded, analysed, and provided to users on a custom basis. This took a long time to produce at a high cost, for a single purpose. By calibrating the entire data stream to the same standard in advance and by making the data accessible in a High Performance Data (HPD) structure co-located with a High Performance Computing (HPC) facility, DESA provides an enabling infrastructure for data-intensive science.

DESA then organises this calibrated data into stacks of consistent, time-stamped geographic 'tiles' so that they can be rapidly manipulated in an HPC environment. A database is used to track the data in DESA. Although DESA will contain trillions of individual observations, the database can be used to track every observation back to the point of collection. DESA will continually synthesise satellite images collected over the last 30 years and future images and provide these images and derived products in a platform that can be accessed by any user, and will deliver a unique capability to process, interrogate and present this data in response to specific issues, for example crop yield, water quality, land use, and forest cover.

2. PURPOSE OF THE RFI

This RFI aims to determine and identify capability in the South African Information Technology sector that could assist SANSA in the development and deployment DESA. Vendors are thus invited to provide information that would enable SANSA to determine their capability to design, procure and deploy DESA at SANSA. Vendors are further invited to provide information that would support building the requisite capacity at SANSA to maintain and further develop DESA.

The outcome of this RFI is therefore the following:

- Provide a unique, innovative and locally developed architectural solution given the technical performance requirements in Section 3.
- Devise an approach that will facilitate skills transfer for SANSA
- Provide an indication of the cost of procuring, developing and maintaining the solution.

In addition, to the outcomes highlighted above vendors must consider the content listed in Section 4 as a guide in response to this RFI.

All information submitted in response to the RFI will not be distributed by SANSA to any other respondents or other third parties. In responding to this RFI, vendors should note that any information provided is only intended to enable SANSA to understand the extent of South African market capability to develop and deploy DESA. This information will be used by SANSA to inform

its DESA development and deployment strategy. SANSA will not pay for any information submitted nor will it pay for the use of such information. The information could, in the future, be used to solicit responses to a Request for Proposal (RFP) for the purchase and implementation of a preferred solution. SANSA would follow normal tender processes in that instance.

This RFI shall not limit any rights of SANSA, and SANSA reserves all its rights including but not limited to its right to elect not to procure the goods and/or services that are the subject of this RFI and its right to procure them from a vendor that has not responded to this RFI.

3. Submission dates and contact details

Vendors are kindly requested to provide their responses to this RFI in duplicate to SANSA by no later than 12:00pm on the 24 May 2019. Submissions can be made in person at the SANSA offices located at the Enterprise Building, Mark Shuttleworth Street, Innovation Hub, Pretoria 0087

Or electronically to: eo-scm@sansa.org.za

4. Technical performance requirements

These technical requirements are informed by platforms that are currently implemented and similar to DESA.

Type	Quantity	Details
Public User Interface and Firewall	1	1 x Xeon 2126G 32GB RAM 2 x 1TB HDD RAID 1 1 x 25 GbE SFP28 2 x 1 GbE Dual PSU Remote management including KVM 3yr support and NBD warranty Installation and configuration service Rail Kit
User Interface Server	2	1 x Epyc 7351P 64GB RAM 2 x 1TB SSD (at least 3 DWPD) Raid 1 1 x 25GbE SFP28 2 x 1 GbE Dual PSU Remote management including KVM 3yr support and NBD warranty Installation and configuration service Rail Kit

Database Server	1	<p>2 x Xeon 6126 2.5" chassis 128GB RAM 2 x 1TB SSD (at least 3 DWPD) RAID 1 6 x 1TB SSD (12 Gbps SAS) RAID 5 - Other configurations permitted as long as at least 4TB usable space in RAID 5 configuration 1 x 25GbE SFP28 2 x 1 GbE Dual PSU Remote management including KVM 3yr support and NBD warranty Installation and configuration service</p>
Processing Server	2	<p>2 x Epyc 745 3.5" chassis 128GB RAM 2 x 1TB SSD (at least 3 DWPD) RAID 1 8 x 4TB 7.2K RPM NLSAS 12Gbps RAID 10 1 x 100GbE QSFP28 2 x 1 GbE Dual PSU Remote management including KVM 3yr support and NBD warranty Installation and configuration service</p>
Switch - Top of Rack	1	24 Port 1GbE + 10 GbE SFP Uplink Managed
Cables	6	25GbE Copper 3M
Cables	2	100GbE Copper 2M
Storage System	1	<p>1 PB raw capacity with at least 8 x 25GbE and at least 2 x 100GbE customer uplink ports providing both S3 and NFS interfaces.</p> <p>3 year support and maintenance agreement including off site monitoring and monthly reporting. Installation and configuration to be included. Separately costed upgrade to 2PB raw capacity to be included.</p> <p>Rack(s) and PDU to be provided with storage system. Must provide at least 16U spare rack space and at least 14 x C13 outlets spare.</p>

5. Vendor responses

Vendors must prepare their responses using the following format.

5.1 Company Information

5.1.1	Vendor Contact Details
	Registered Company Name Company Registration Number VAT Registration Number Registered Address Trading Address Main Telephone Number Website Address
5.1.2	Vendor Background
	Abridged History Description of Company's primary line of business
5.1.3	Vendor Offering
	Respond to the key factors for consideration about the solution presented on the table to follow.

5.2 Key factors for consideration

	Category	Required documentation	Yes/No
1	Company developed a High Performance Computing Cluster that processes complex huge datasets (i.e imaging data in the medical, astronomy and/ or security field) which are over 1PB in size and the system has been running for a minimum of 5 years.	Provide a reference of the project, CV of Technical lead in the team as well as documents that indicates the flow of the system from ingest, analysis, product development, delivery through web services interfaces and networking.	
2	Company has developed innovative in house development and localization of content storage system that supports at least Network File System (NFS) and system has been running for a minimum of 5 years	Provide a reference of the architecture used for the storage, performance and costs compare to similar solutions.	
3	<p>Experience in engineering management for a HPC solution with similar size and complexity this includes:</p> <ul style="list-style-type: none"> ● Systems engineering practices and agile development practices ● Project management for a large scale HPC solution with a similar size and complexity. ● Skills transfer and integration with SANSA 	<p>Provide a reference of the project</p> <ul style="list-style-type: none"> ● Provide a CV of a Systems Engineer in your team that worked in a project of this nature ● Provide a CV of a Project Manager in your team that worked in a project of this nature ● Devise an approach on how you will facilitate skills transfer for SANSA 	
4	Procured hardware for a large scale HPC solution with a similar size and complexity.	Provide a reference of hardware procured and value of hardware.	