



Space Economy meets Information Economy

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Overview

- Introduce perspective for comments
- Economy
- Space Economy
- Information Economy
- Three practical projects to bridge the economies



Overview

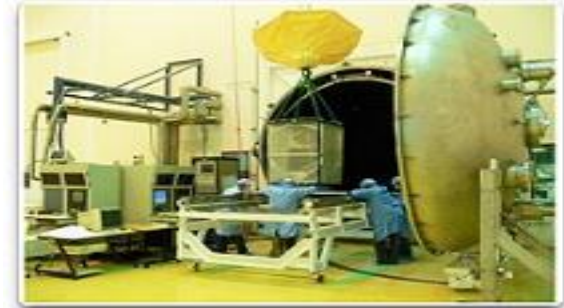
- Space Commercial Services was created in 2008 to support the transition to sustainable space programs for emerging space programs
- Building the bridge from Satellite Engineering to Operational and Commercial Utilisation
- Today consist of three lines of business:
 1. Satellite Engineering
 2. Satellite Components
 3. Global Information Services



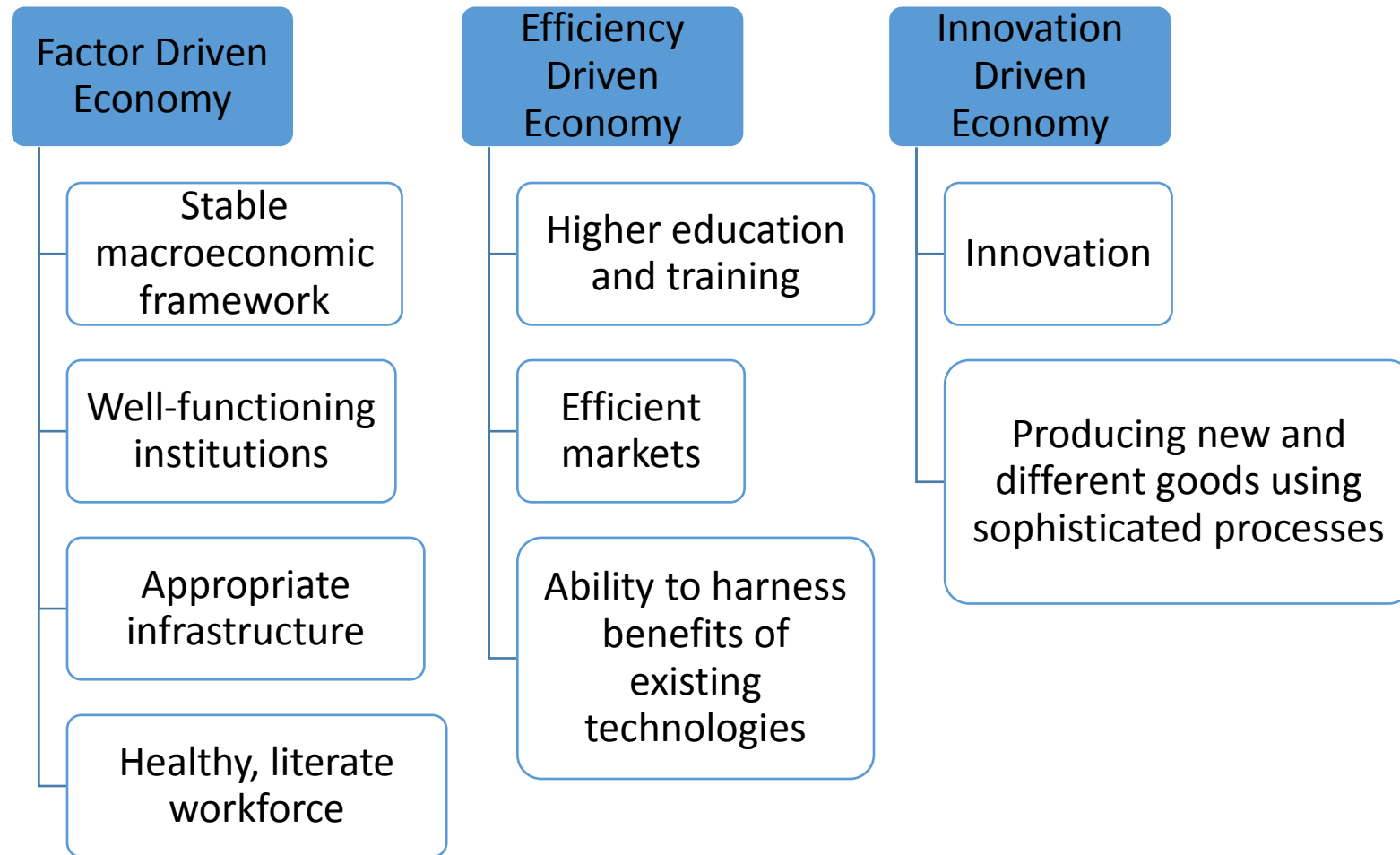
SCS AeroSpace Group

SCS AG

- Three lines-of-business including **satellite solutions** and **global information services**
- **Proven track record** in satellite engineering
- Research and development of small satellites and **data analysis**
- Indigenisation of:
 - **Design and Development Skills**
 - **Manufacturing Capability**



Economic Value Chain – High Level



WEF, Competitiveness Report

Economic Value Chain - Personal Level

Improving the economic wellbeing of a population requires moving their labour up the value chain.

That means moving the economy up the value chain.

That means investing in core competencies to be able to increase the value of labour.

Knowledge
Economy

Industrial
Economy

Extraction
Economy

Agrarian
Economy

Human Security –
Maslow's basic needs

Value of Labour	Vulnerabilities
\$100/h	Wealth effects (Japan)
\$10/h	Shifting efficiencies
\$5/h	Commodity prices
\$2/h	Floods, Drought
\$1.25/day	Life

Space Economy

Exploration

National Capability
Programs

Public Good

Broadcast and
Telecomms

National Security

Information Economy

- Today

Weather – for all

Communication – for some

Broadcast – for any

Information – for security

- For Tomorrow

Weather – for all

Communication – for any

Broadcast – for all

Information – for consumers

Strategy and Plan to Bridge the Gap – Space-to Information Economy

- Continental **coordinated African constellation**
African Space Policy – Linking Policy with Real User Needs
- Use existing **international satellite capacity**
SCSGi African Satellite Constellation, establish as part of **African Space Information Highway**
- **Integrated system** with large scale data dissemination
SKA – SDP - Radio-astronomy Science Data Processor – Driving technology for next generation **Ground Station Processing**

African Space Policy - User Requirements

Disasters

Health

Energy

Climate

Water

Weather

Ecosystems

Biodiversity

Peace &
Security

Education

Communication

Trade &
Industry

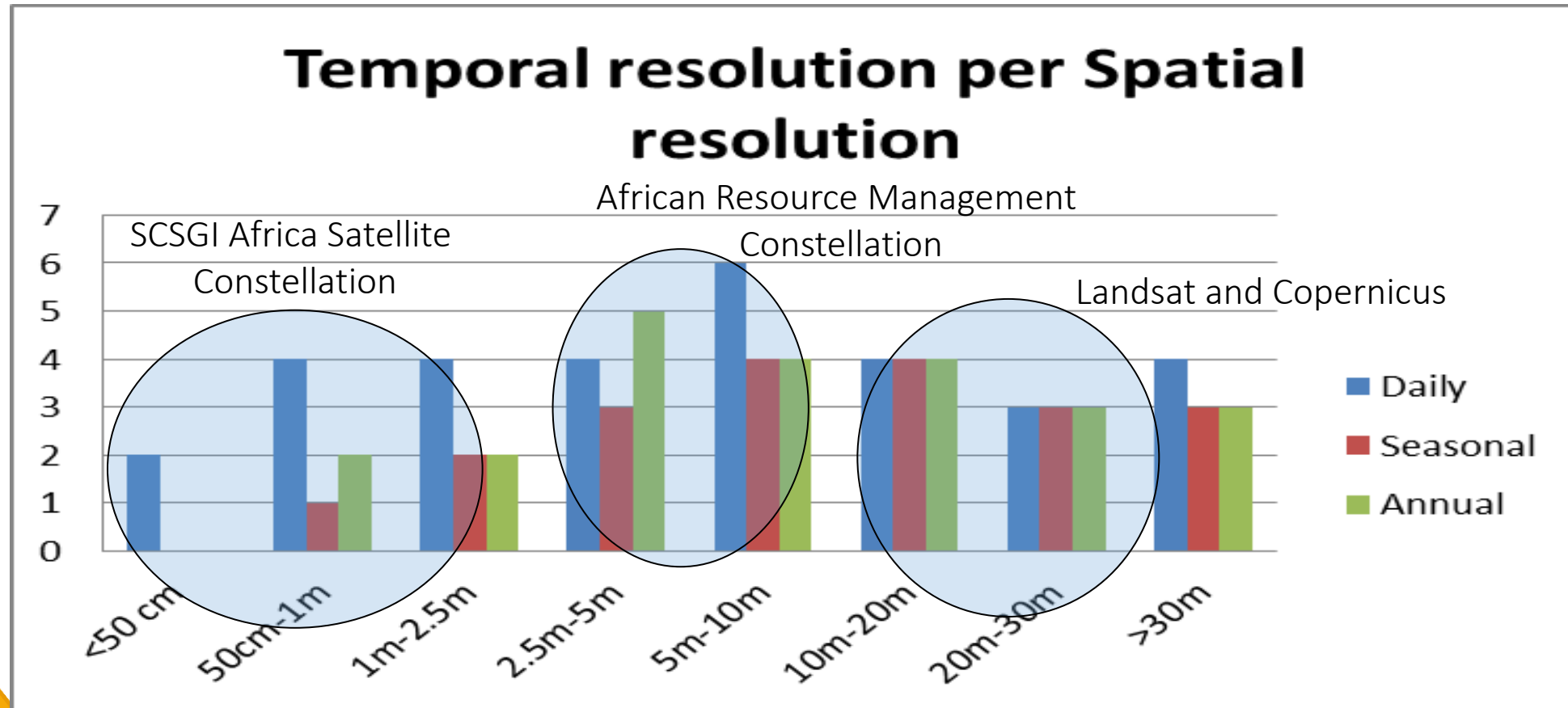
Transport

Infrastructure

Africa Space Policy - User Requirements

User Needs	Earth Observation											Navigation and Positioning	Satellite Communications	Space Science and Astronomy
	Spatial Resolution								Temporal Resolution					
	< 50cm	50cm-1m	1m-2.5m	2.5m-5m	5m-10m	10m-20m	20m-30m	>30m	Daily	Seasonal	Annual			
Disasters	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Health					✓	✓				✓		✓	✓	
Energy				✓	✓	✓					✓	✓	✓	✓
Climate					✓	✓			✓			✓		✓
Water		✓	✓	✓	✓	✓	✓	✓		✓		✓		
Weather		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Ecosystems				✓	✓	✓	✓	✓		✓		✓		
Agriculture				✓	✓	✓	✓	✓	✓			✓	✓	
Biodiversity				✓	✓	✓	✓	✓			✓	✓		
Peace, Safety and Security	✓	✓	✓		✓			✓	✓			✓	✓	✓
Human Migration and Settlements		✓	✓	✓							✓	✓	✓	
Education and Human Resources				✓	✓	✓	✓	✓			✓	✓	✓	✓
Communications												✓	✓	✓
Trade and Industry			✓	✓	✓	✓	✓	✓		✓		✓	✓	
Transport		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	
Infrastructure			✓	✓	✓	✓			✓			✓	✓	

ASP - User Requirements – Filling the Gaps



Africa Satellite Constellation – International Partners – African Priorities



But we need high temporal resolution - Constellations

Dnepr

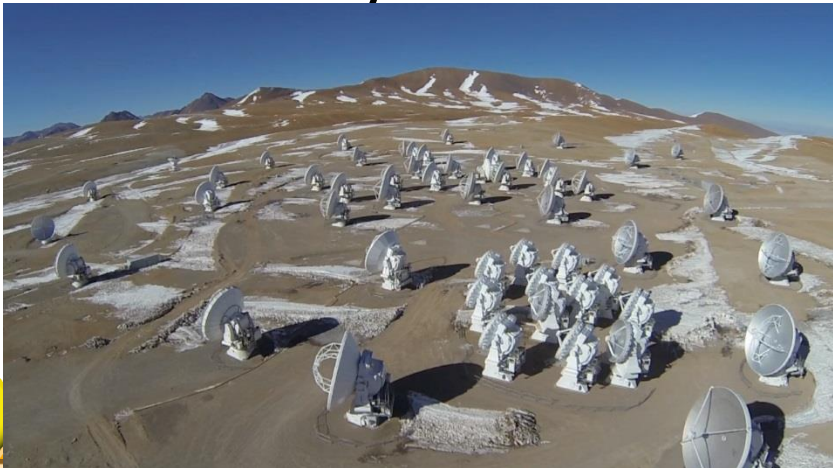


SCS100 10 min Constellation	
Orbit	500km / SS
Orbital planes / Launches	5
Number of satellites	45 (9 per plane)
GSD at nadir	1m
Swath at nadir	8km
10 min coverage	9:00 - 17:00



SKA - SDP Challenge unique among comparable astronomy systems

- SDP is an intrinsic element of the SKA telescopes; not a separately scheduled remote processing facility. Hence:
- The computational requirements to process the incoming data into scientific useful data products are significantly greater (\sim two orders of magnitude) than the largest systems currently used in astronomy.



Atacama Large Millimetre Array (ALMA), Chile

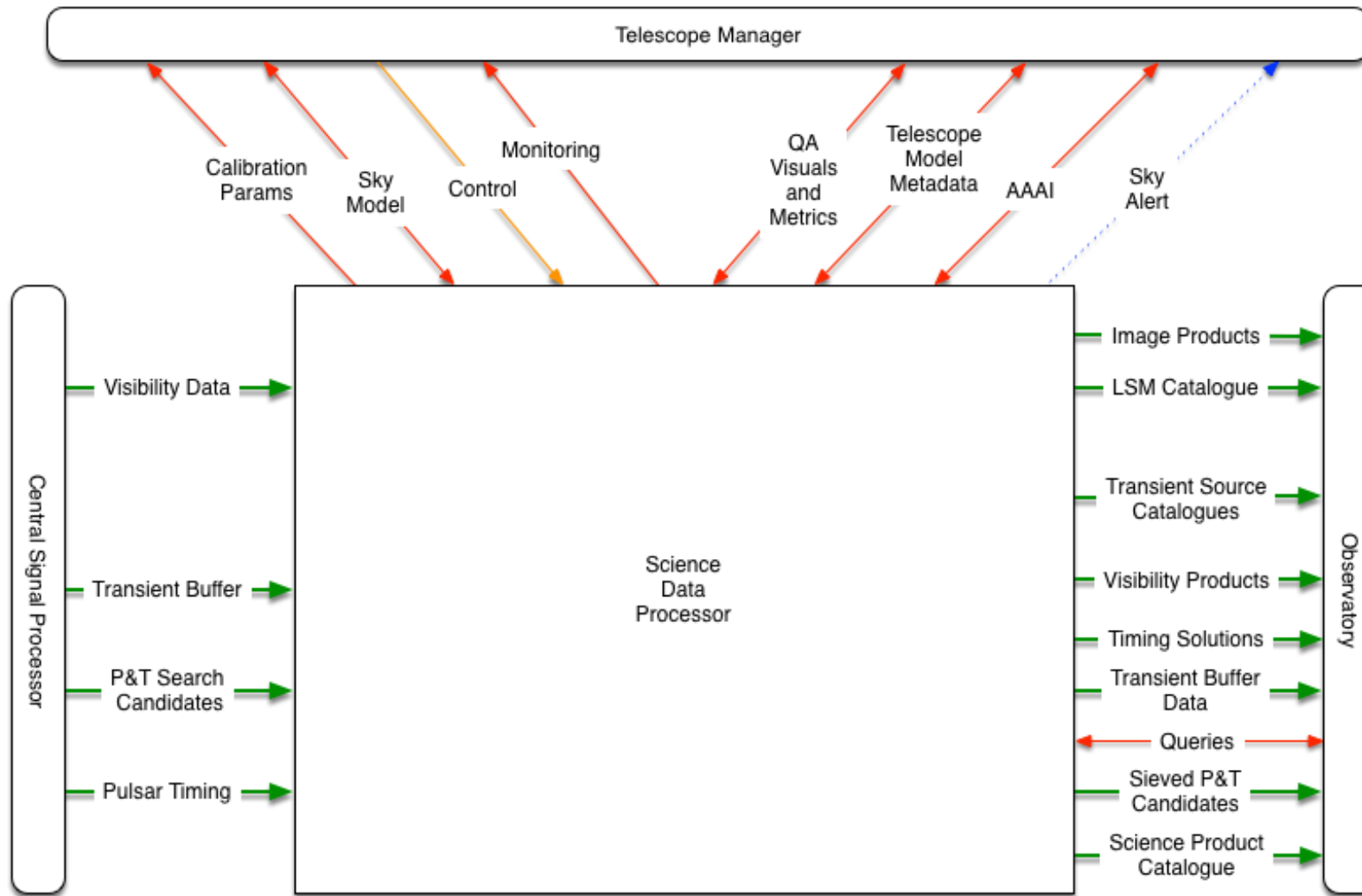


MeerKAT, Northern Cape, South Africa.

SKA - SDP challenge

- Data processing within strict deadlines (e.g., around 15s for real-time calibration)
- Over the telescope's 50-year lifespan, the SDP must have sufficient flexibility to allow for continual long term improvement and upgrades
- Lifetime of the compute hardware, and need to minimise power consumption
- Strict System Engineering to ensure longevity
- Very high data processing requirements drive new generation solutions

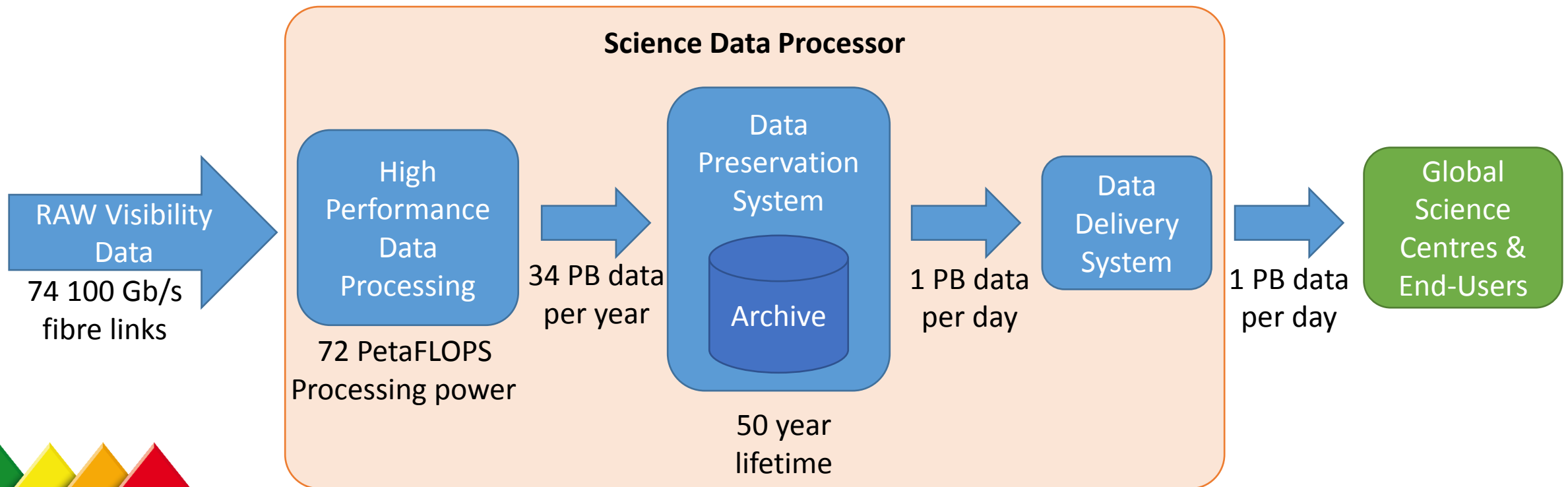
SKA - SDP Scope

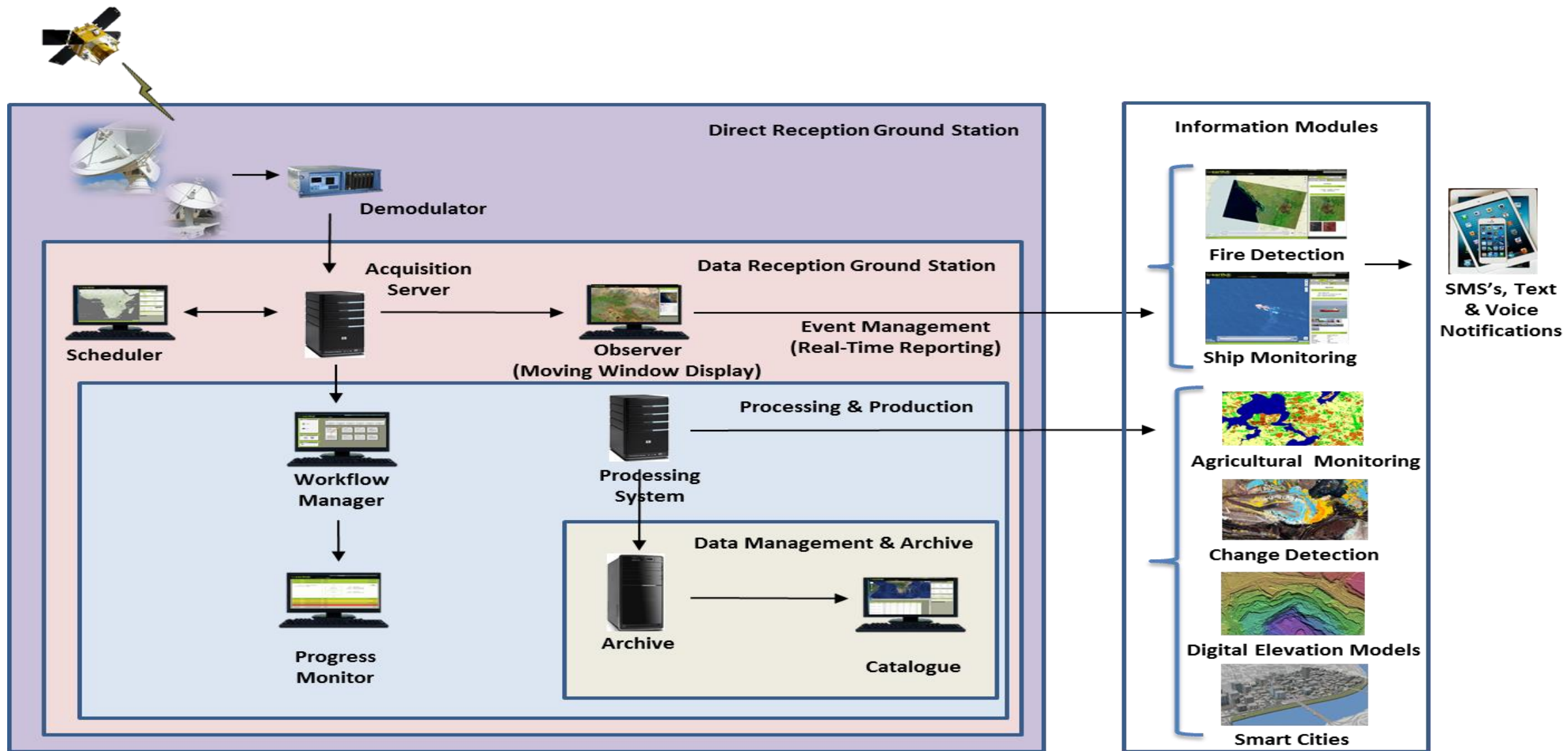


SDP Scope Concept
Diagram illustrating how raw astronomic data is input from the CSP and combined with data and metadata input from the TM to process and output as Science Products which can be queried.

SKA Data Infrastructure

Data rates and sizes for the **Science Data Processor** of the SKA1-MID Telescope to be built in South Africa.





Conclusion – Space Economy Meets Information Economy

- From perspective of emerging space capability
- Need consensus on what outcomes are desired for the Space Economy and the Information Economy
- Benefiting from the synergy requires - creating the links with practical projects that builds on capacity and builds new capacity
- Described three practical projects
 - African Space Agency – continent wide coordination on user requirements
 - SCSGi Africa Satellite Constellation – immediate data access for monitoring and managing key processes
 - SKA Science Data Processor – setting the stage for next generation data processing requirements