Developing a unified engineering maintenance and management system

AMMW 2023 ESS - 26th to 29th September 2023

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A bit about me

SKA Observatory

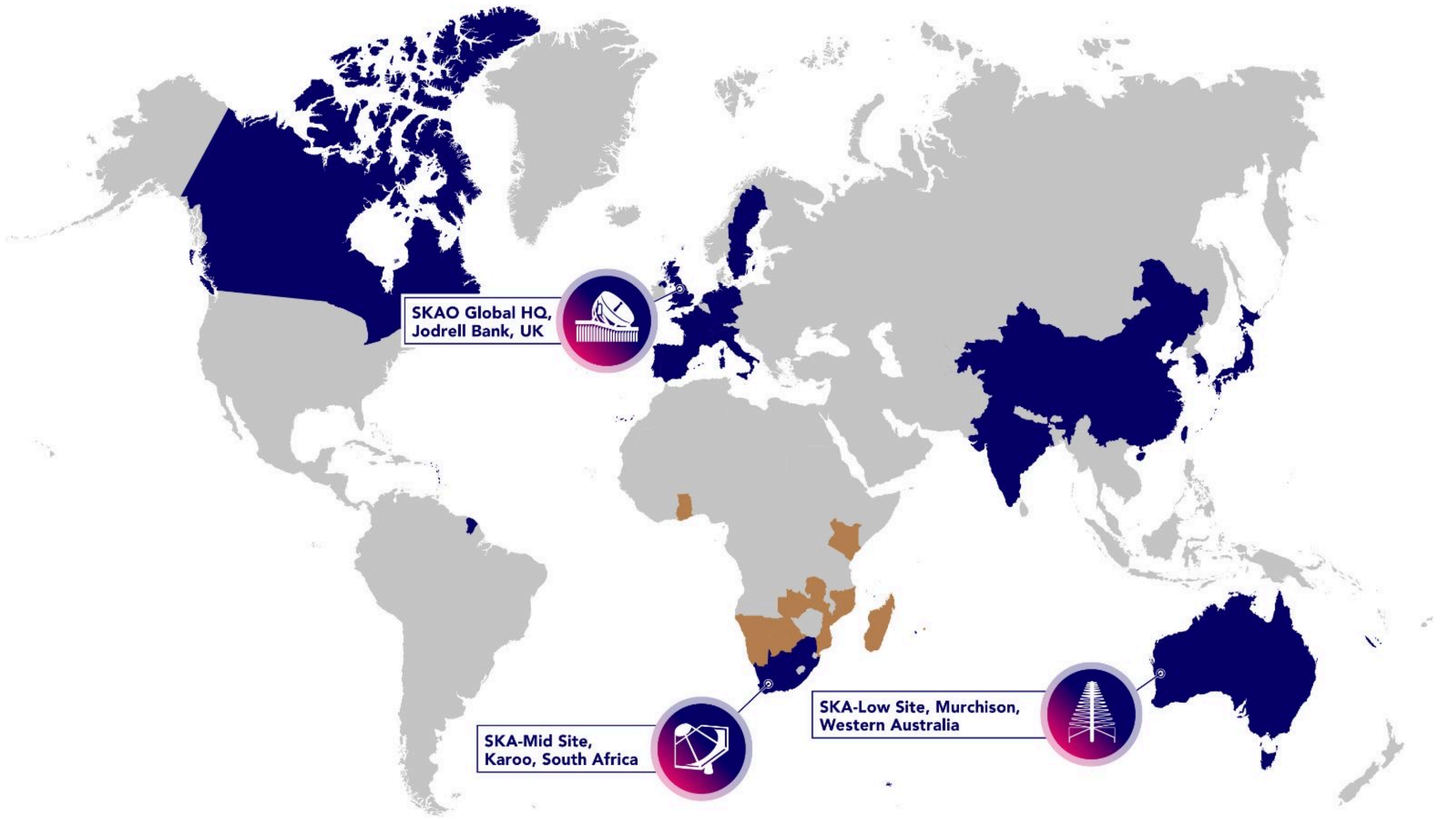
Our Approach

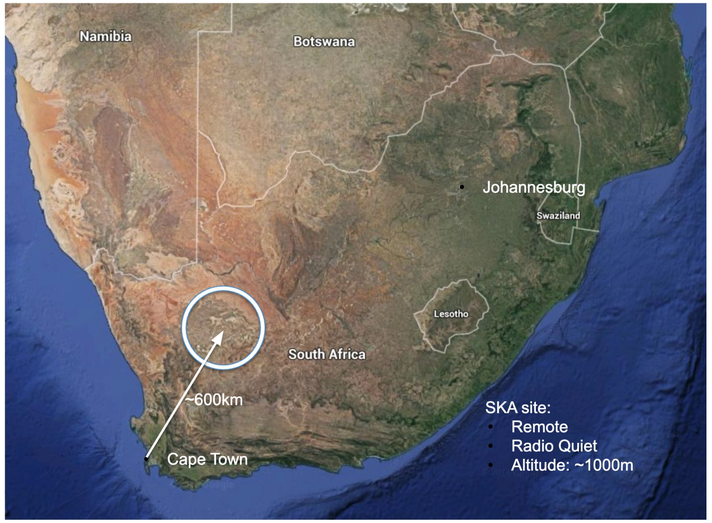
Way Forward

Quick Summary


SKA Observatory
One Observatory
Two Telescopes
Three Host Countries

SKAO - One Observatory, Two Telescopes, Three Sites

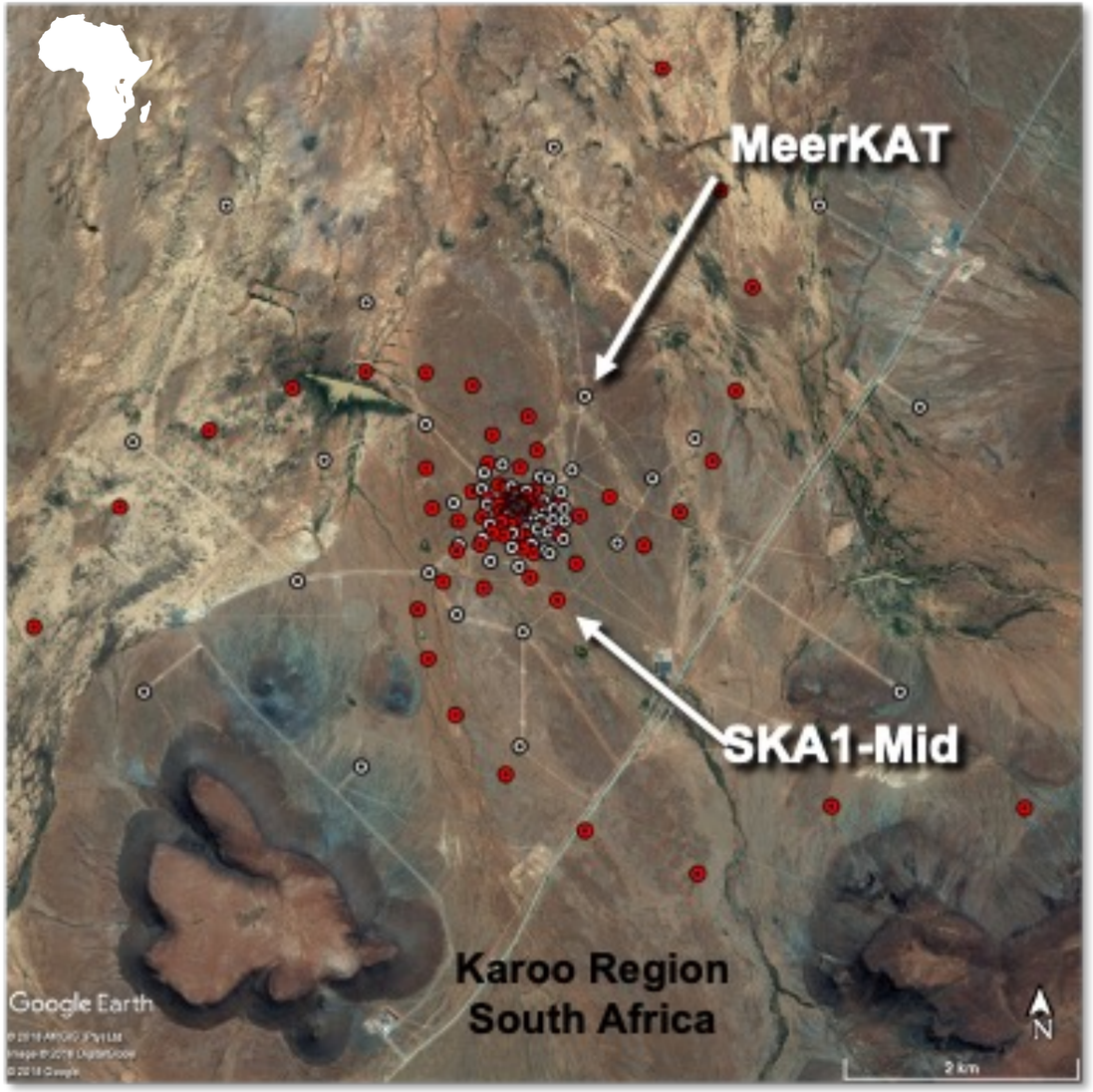




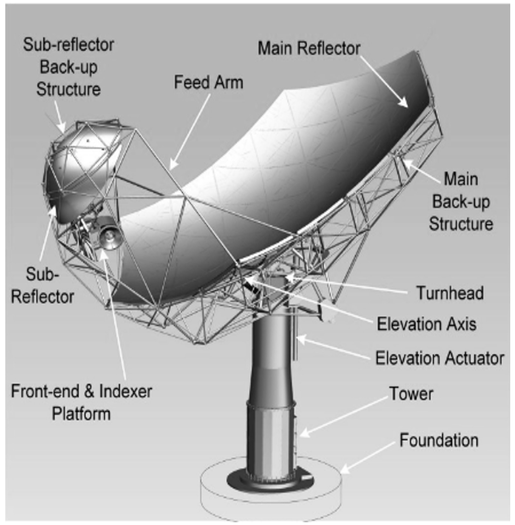
SKAO Partnership - includes SKAO Member States* and SKAO Observers (as of June 2022)

African Partner Countries

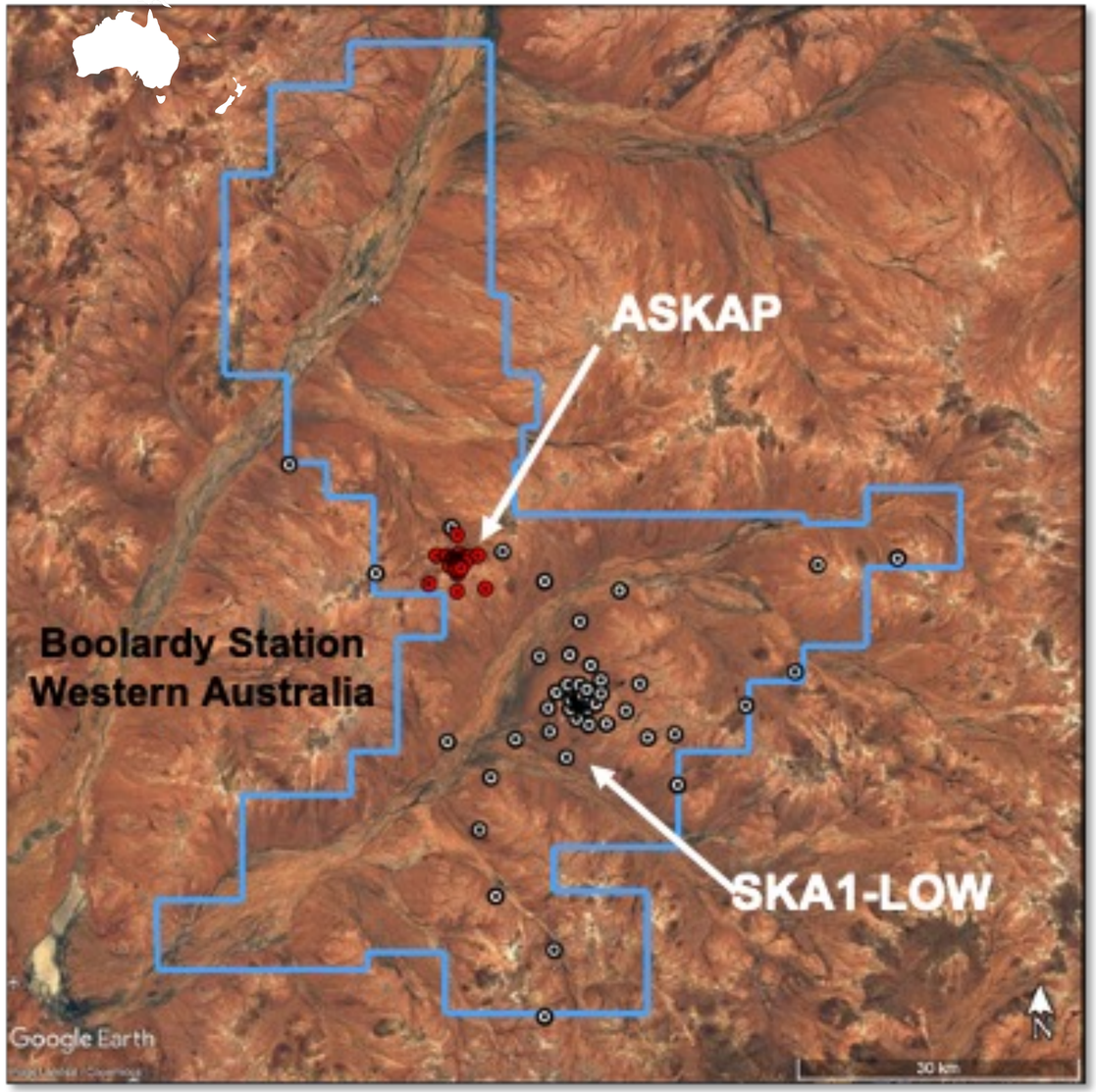
SKAO - SKA MID Telescope



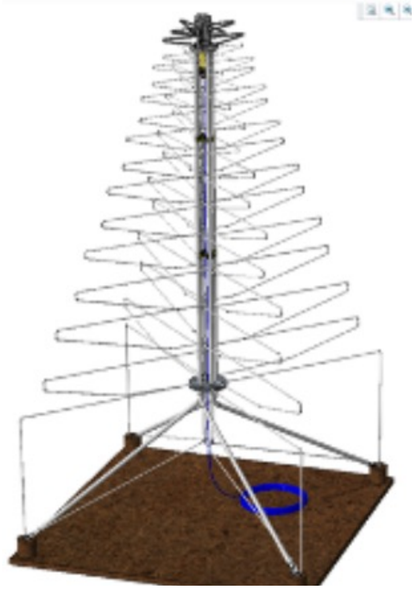
- Nationally protected Radio Quiet Zone
- 133 SKA 15m dishes
- 64 MeerKAT 13.5m dishes
- Maximum baseline 150km
- 3 logarithmically spaced spiral arms
- 50% within ~2 km randomly distributed



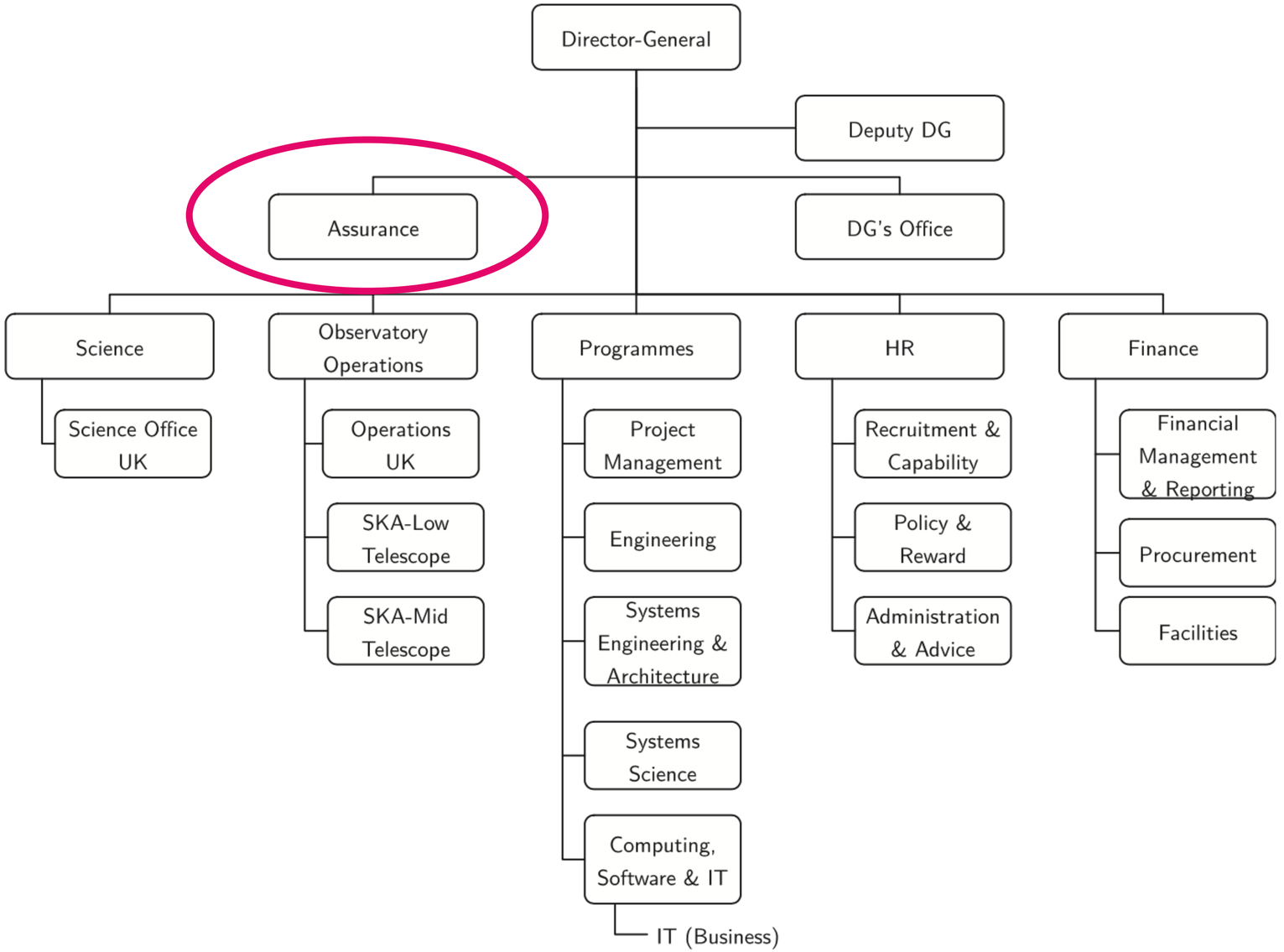
SKAO - SKA LOW Telescope



- Nationally protected Radio Quiet Zone
- 512 aperture array stations
- 256 2m high fixed antennas per 38 m diameter station
- Maximum baseline 65 km
- 3 modified spiral arms



SKAO – Organisation



The overall organisation of the SKA Observatory.

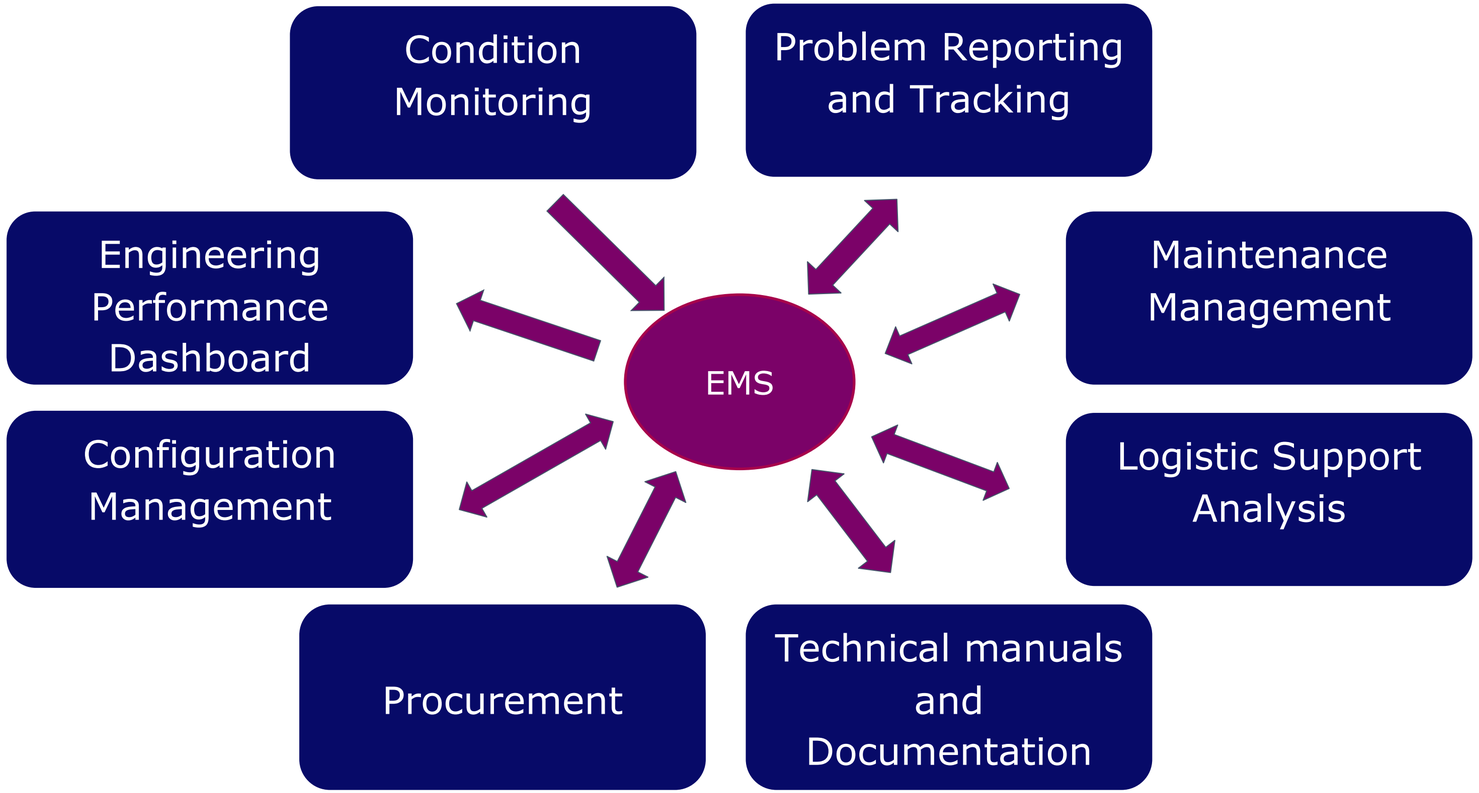
SKAO –Assurance

- Overarching philosophy is rooted in Quality
- Assures compliance with the Observatory’s policies and disciplines
- Provides an independent second line of defence in vulnerable areas and value in routine activities
- Assures the development Business process and system architecture.


Our
Approach

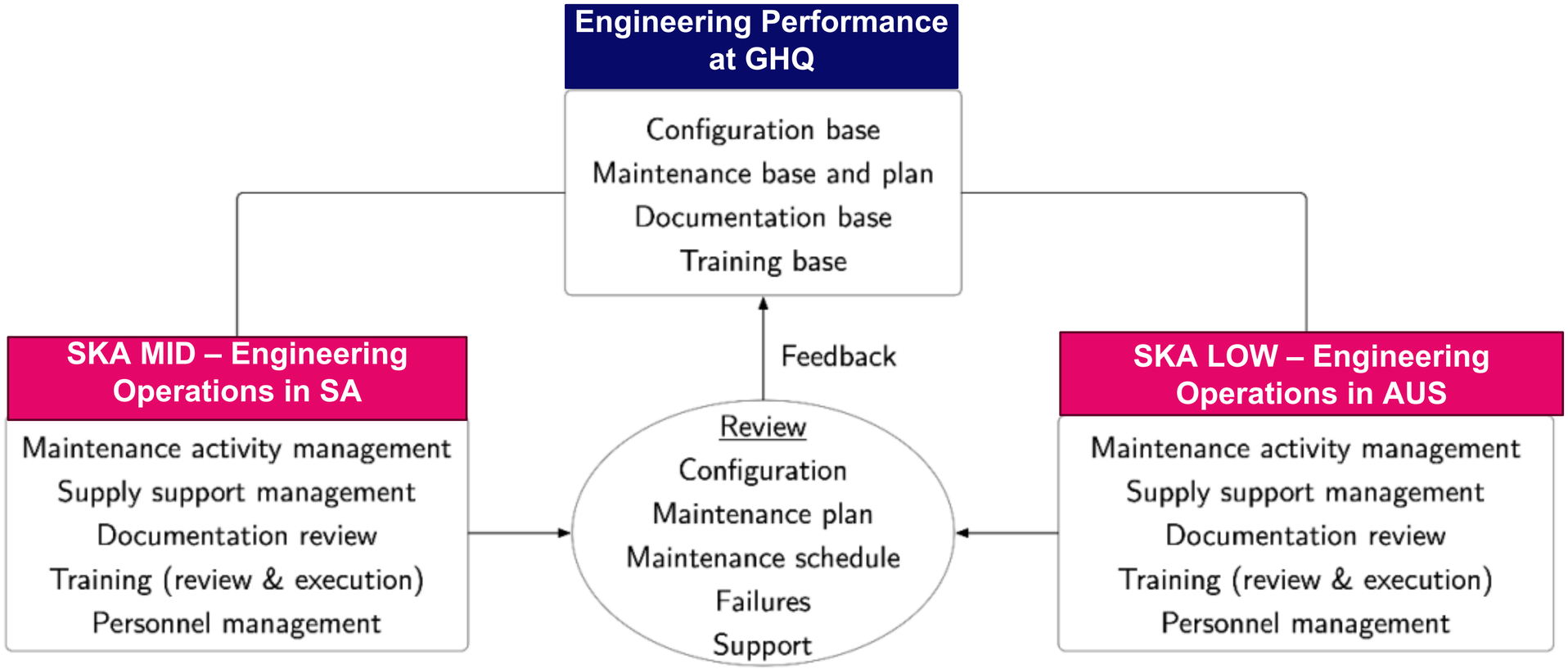
EMS - Engineering management systems

At SKAO, EMS - Engineering Management System is the term used to describe the collection of software systems , processes and integrations that support the engineering, logistics, maintenance and the operations of the two SKAO telescopes – MID and LOW.



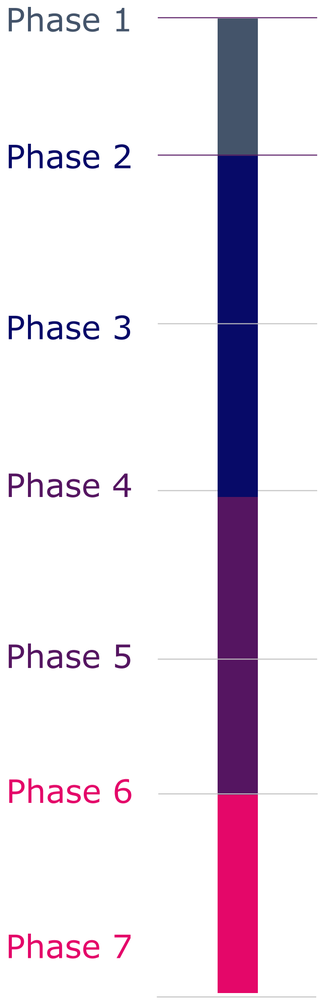
Architectural philosophy

Central Control Tower



Source – SKAO Observatory Establishment and Delivery Plan

Approach – high-level overview



Baseline functional requirements

Setup a glossary with standard definitions & terminology.

Model the Use cases and scenarios

Draw out the Functional Architecture

Assess tools for functional & technical compliance

Conduct SWOT and Cost-Benefit Analysis of tools

Evaluate options & conclude the best way forward

Defining Functional requirements & architecture

- Breakdown the requirements for each functional area.
  - Engineering management
  - Engineering Operations
  - Engineering Performance
  - Configuration management
  - Finance
- Prioritise requirements using MoSCoW
- Define User profile requirements for each system within the EMS scope.
- Set up the EMS glossary to define standard terminology.

Modelling the Use cases

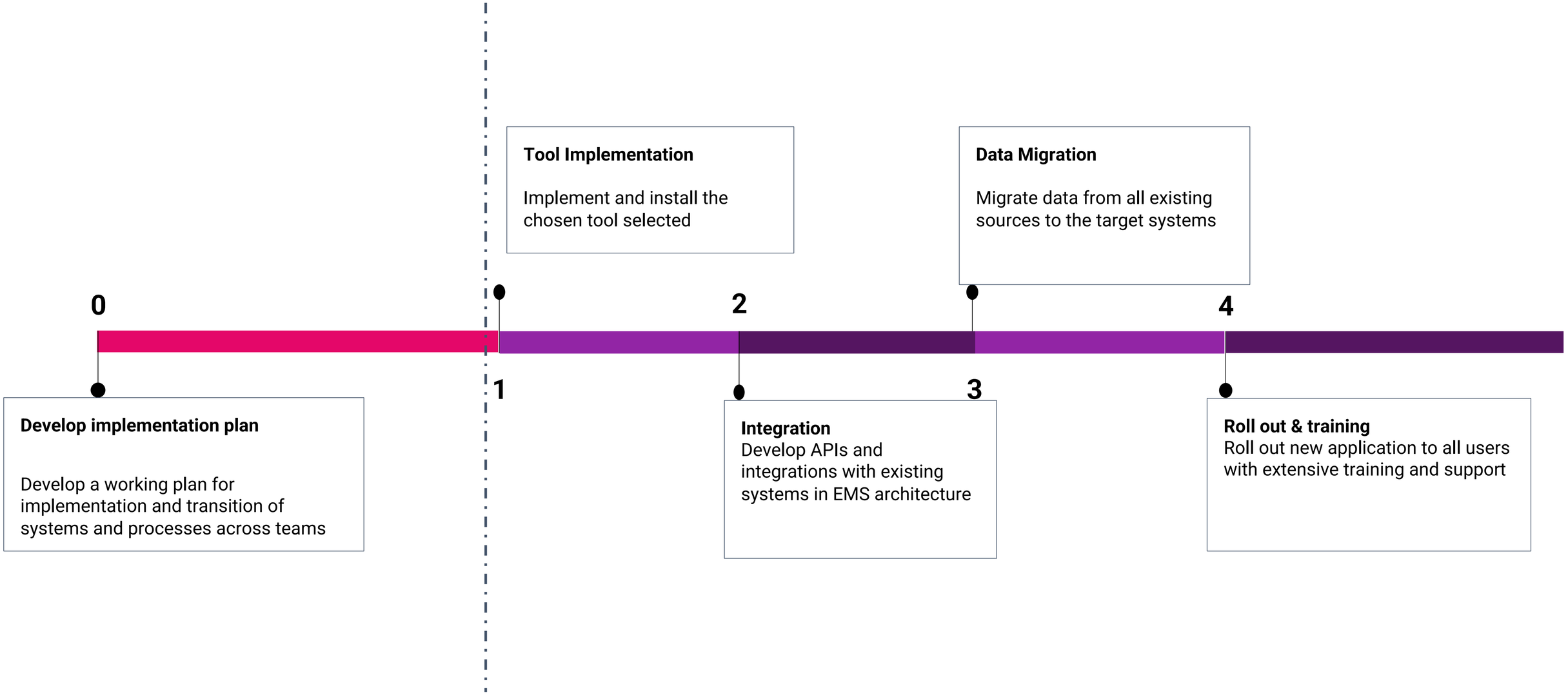
- Agree on definition and approach for creating of a Use case
- Model Use cases for each of the Maintenance activities.
- Review existing procedures and collate all Use cases in a central place captured in a standard format for completeness.

Evaluating the Software Tool(s)

- Functional evaluation based on the finalised functional architecture
- Technical assessment and SKAO software standards compliance
- SWOT technique to do a situational analysis of the internal and external factors affecting our usage of the tool
- Evaluate the financial feasibility of the tool through a systematic approach of Cost-Benefit Analysis

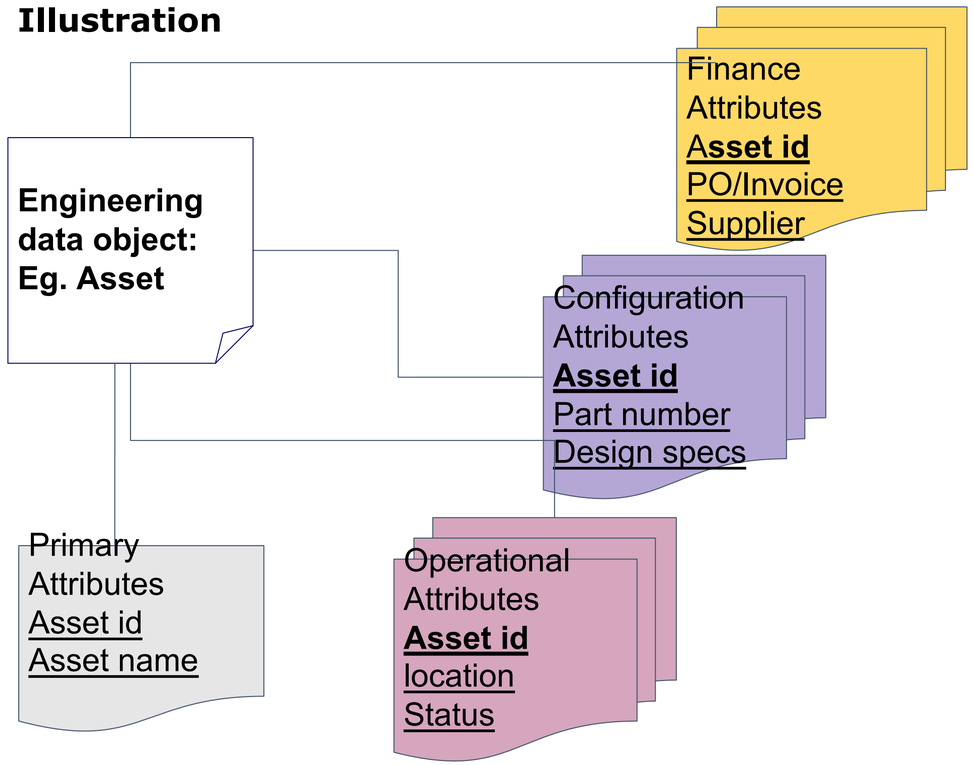
Way forward

Implementation Roadmap



Data model and policy

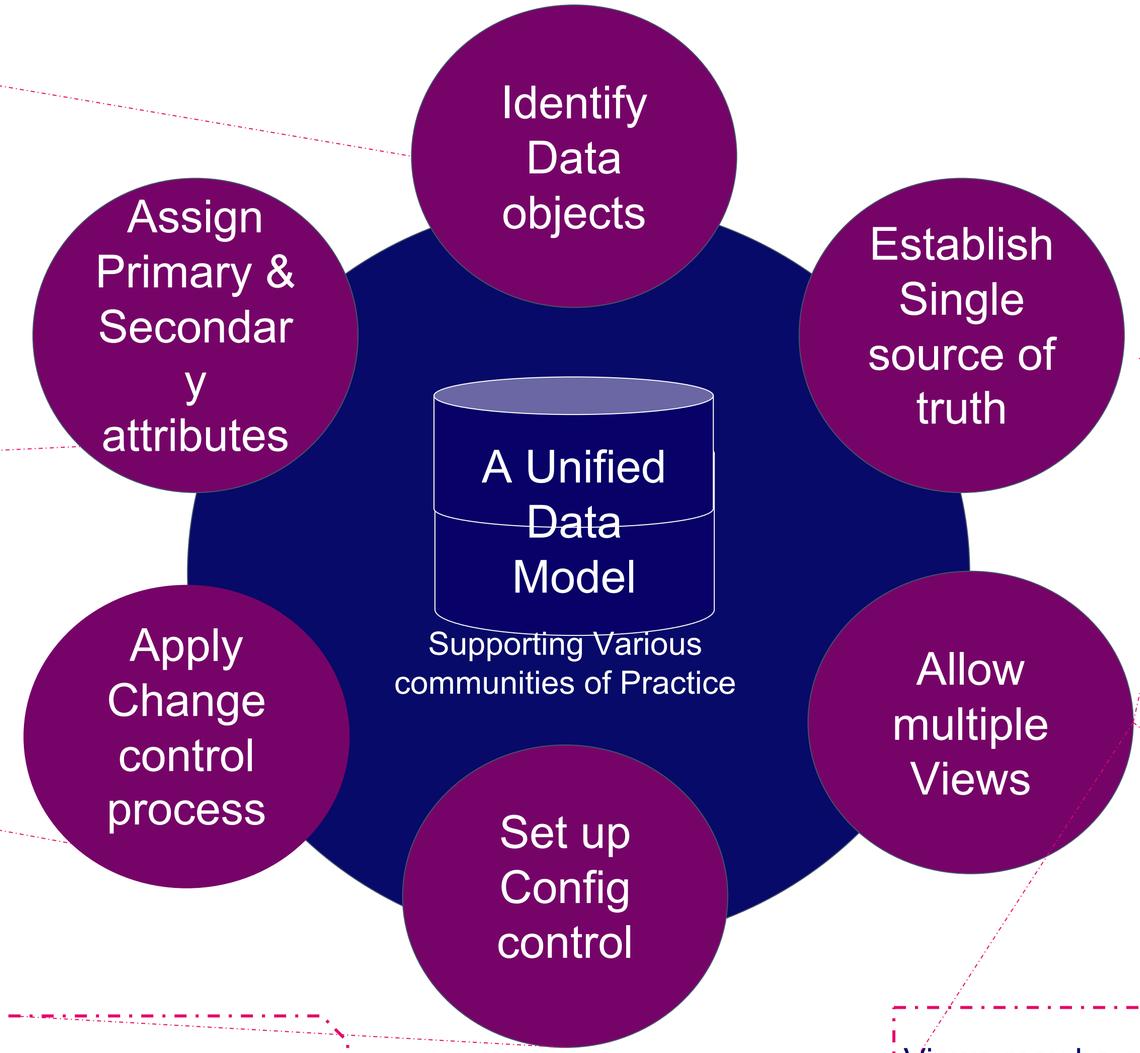
To establish a Unified Data Model and an overarching data policy to govern that model and establish control management of all EMS data objects.



Unified data model

Identify Engineering data objects with its unique attributes

Not duplication of schema or multiple instances allowed



Attributes may be Primary which are universal or Secondary which may be used only in a subset of Views.

A View may be either Global or Local to the users. Local Views may be shared amongst communities of practice

All Objects, Attributes, Schemas, subject to Change Control processes,

Data users can utilise one or more Views, designed to allow them to carry out their responsibilities, of common data

A configuration control will be set based on standard organisation schemas

Views may be created or changed according to local processes and are subject only to centralised change if shared

Developing the model

Conceptual data model

Start with a big-picture view of the relevant data objects and the relationships between them.

Logical data model

Evolve the data objects and its attributes by defining the primary keys, foreign keys, relationship cardinality etc.

Physical data model*

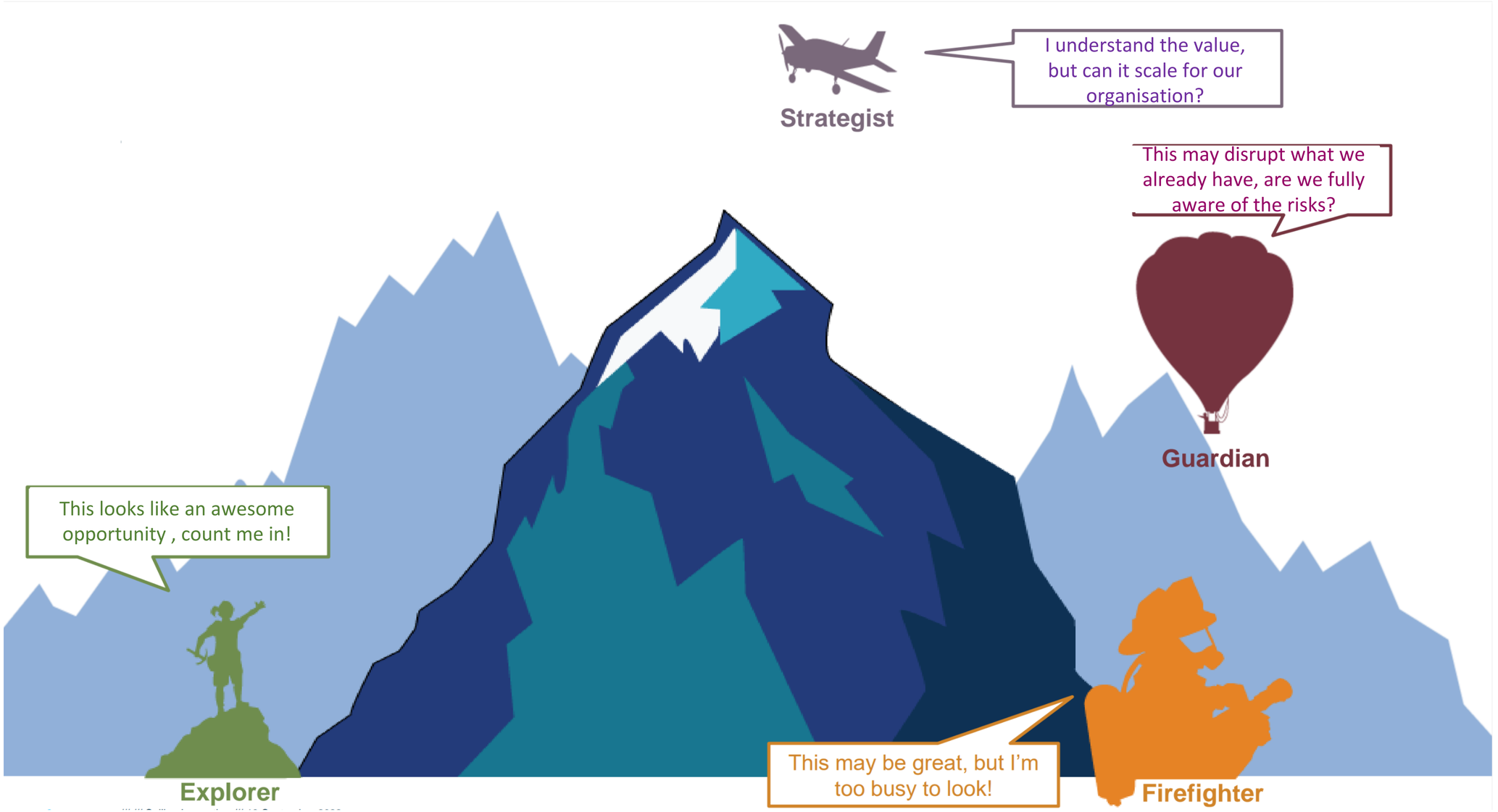
Understand how the data objects and their attributes are currently stored , modified and consumed in the as-is states and apply the data policy to move from a heterogenous, distributed state towards a unified model

Quick Summary

Key take away - Summary

- Start with what you want and baseline of the functional requirement and architecture.
- Capture the current state of processes and procedures in use.
- Drive all discussion and decisions based on the key requirements and Use cases.
- Establish a standard data model
- Get everyone on the same page

Key take away - Perspective Matters



Final thoughts - Laying the tracks as we go

SKAO is currently in a state of continuous development

We are striving to make quality a major driver for all actions and decisions during this phase

Gif credit : The Wrong Trousers - Wallace and Gromit by Aardman Animations

Questions?

Thank you

We recognise and acknowledge the Indigenous peoples and cultures that have traditionally lived on the lands on which our facilities are located.

SKAO

www.skao.int