Observation Management In the SKA Observatory

Alan Bridger, UK ATC/STFC

SKA
Delivering the
Science

Outline

- The Observation Management Team
- Telescope Manager
- Brief Definition
- Some concepts & Key challenges
- Process outline
- Planning & Scheduling
- Commensality

Science & Technology Facilities Council

The Observation Management Team

Lead: UKATC, Edinburgh

- JAC (UKIRT/JCMT) Observing Systems (ORAC), > 10 years ALMA (ALMA-OT, Pipeline)

INAF (Trieste, Bologna)

- Virtual Observatory/databases/A&A

SCISYS UK Ltd (Bristol)

- Task planning & scheduling experience (Space, Oil)

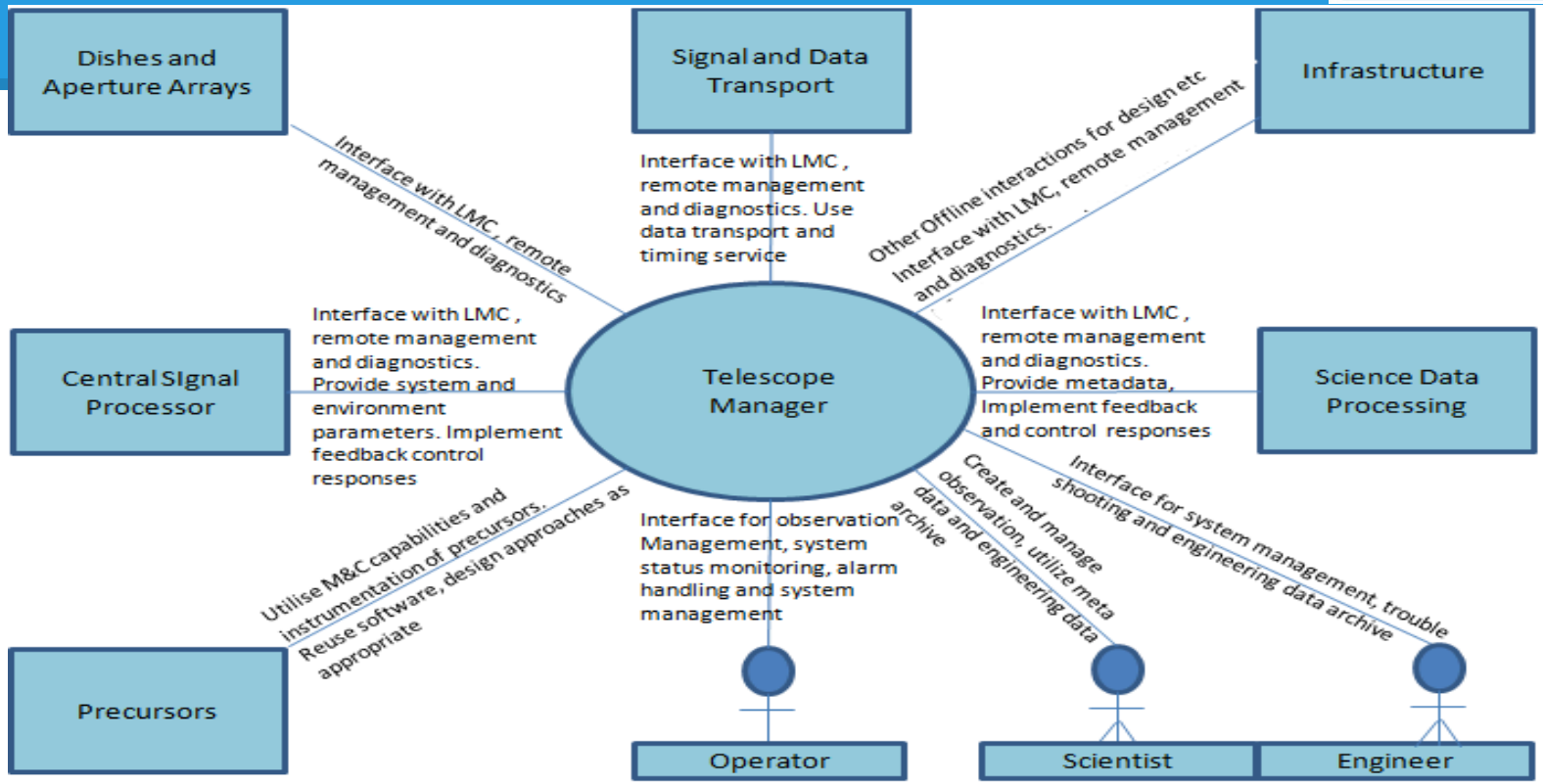
Persistent Systems Ltd (Pune, India)

- Proposal Handling tools for GMRT, Astrosat, (TMT?)

Part of the *Telescope Manager* consortium led by NCRA, India (Yashwant Gupta).

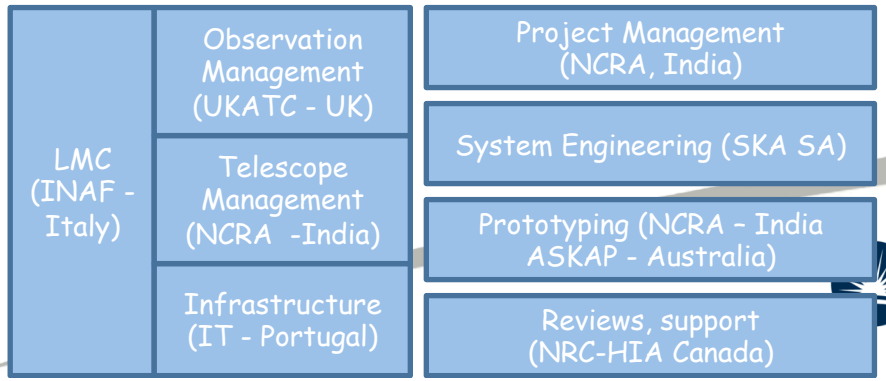
Science & Technology Facilities Council

Telescope Manager as Central Nervous System



Telescope Manager (TM) Consortium

- 7 countries + industry partners



Science & Technology Facilities Council

What is Observation Management?

Provides support for the observing process from proposal handling, through detailed planning and observation design to data acquisition…

...and beyond: project tracking, observing logs, partner time allocation.

In general, provide software support for the scientific users and the Observatory operations staff.

All the expected processes of a modern, large astronomical observatory.

So what's different?

Science & Technology Facilities Council

Operational Concepts

The Operational Concepts for the SKA outlines the idea of "One Observatory, Two Telescopes". Observation Management will be primarily at the Headquarters.

Key Requirements:

- PI proposals (including ToO)
- Large programmes (Key Science ~70%)
- Accessible to non-specialists
- Largely automatic operation
- Resource Planning (including SDP)
- Sub-arrays
- Commensal observing
- Response to transients
- Partner time tracking

Science & Technology Facilities Council

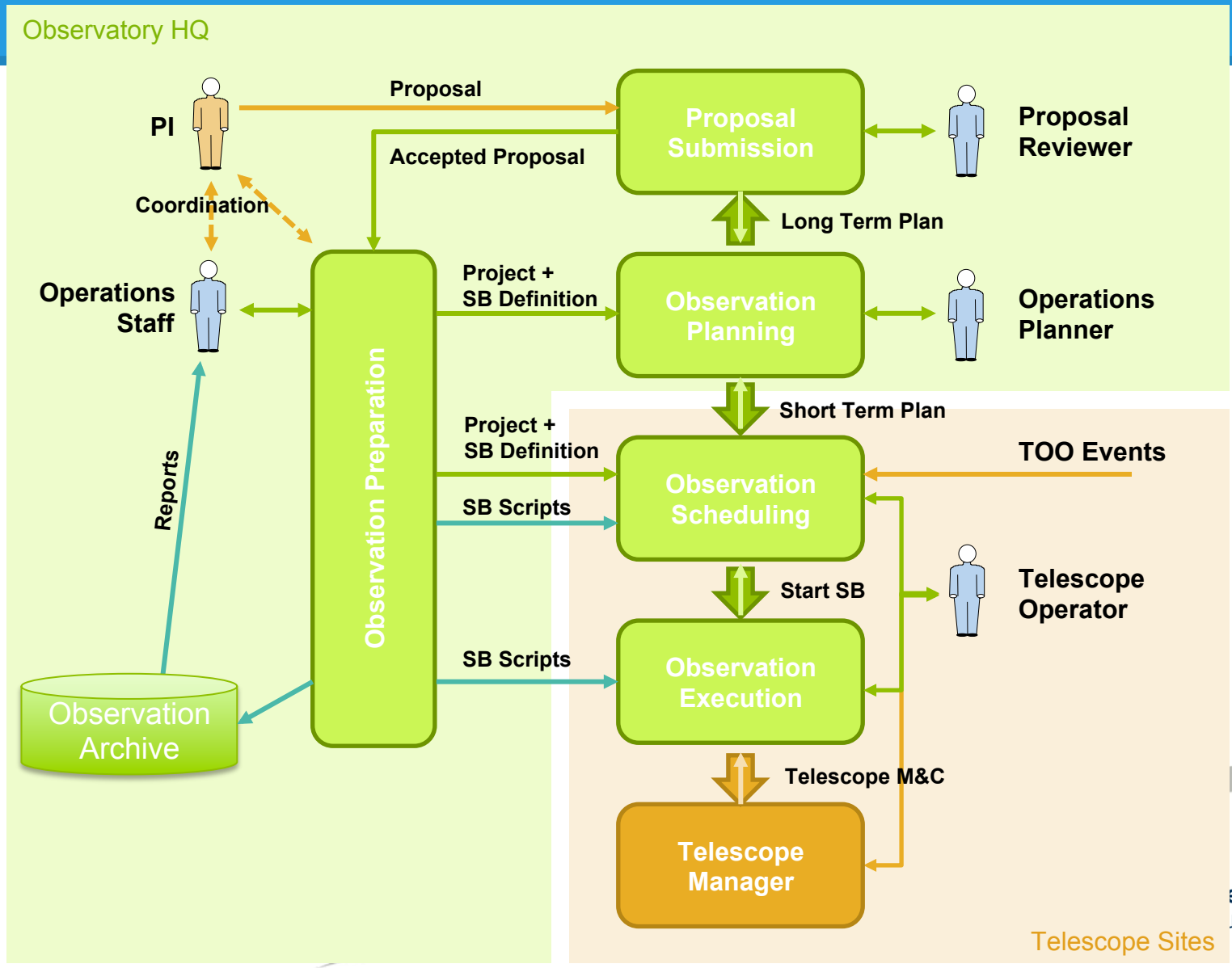
Operational Concepts

SKA Observing will be based on the idea of “Scheduling Blocks” or SBs (cf. ALMA, Gemini, VLT, UKIRT, JCMT):

- Self-contained units of observing (calibrations incl.)
  - Calibratable to a data product
- The “building blocks” of an observing plan (schedule)
- Proposals will outline “Science Goals”
- Detailed observation design creates SBs
- Planning creates long-, medium- and short-term plans
- The latter are executed at each telescope
- Rescheduled as required in case of ToO/VOEvents/ transients
- Data linked back to SBs and projects for provenance & tracking

Science & Technology Facilities Council

Observation Management Process



Proposals, Projects & SBs

Expected number/size of proposal submissions ->

- Some support for non-specialists
- Assistance with time calculations
- Ensure only valid proposals are submitted
- Support for large programme creation
- Support for operations staff
  - Reviewing, plan creation, project tracking
- Easy (at least semi-automatic) creation of scheduling blocks
  - Simulated execution
- ALMA (~1600 proposals last time) does all this…

Science & Technology Facilities Council

Planning and Scheduling

Key challenge is to construct (and execute) observing plans that:

- Maximise use of resources and science output
  - Including the sky, subarray use, commensality, receptors, CSP, SDP, environment
  - *And* ensuring the SDP resource is well exploited, but not over-committed
- Ensure completion of highest priority projects, and of course Key Science projects
- Ensure partner shares are kept in balance (commensality implies > 100% utilisation)

Also operate execution of a short-term plan that responds to transient discoveries as required (internal and external)

Science & Technology Facilities Council

Commensal Observing

Three types of commensality:

- data commensality: more than one project using same data product(s), different science goals;
- observing commensality: more than one project using same setup/field of sky, but different data products;
- multiplexed commensality: use of subarrays -
  - Same field of sky, different setups
  - Tied-beam arrays, different fields, different setups.

Software must:

- Identify SBs that may be observed commensally & join them
- Plan these observations (including the SDP resources)
- Ensure products are correctly linked to proposals

Science & Technology Facilities Council

Summary & Some Thoughts

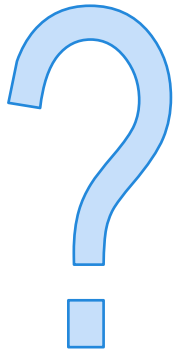
We've done this before, but the SKA presents some interesting new challenges (SDP, commensality)

And we have many questions yet:

- What are the science drivers for subarrays? (Beyond single project use)
- How many PI proposals do you think SKA1 will get?

Come and talk: Alan Bridger, Stewart Williams, Mark Nicol, Pamela Klaassen (or Antonio Chrysostomou, SKAO)

Questions/Comments?



Science & Technology Facilities Council