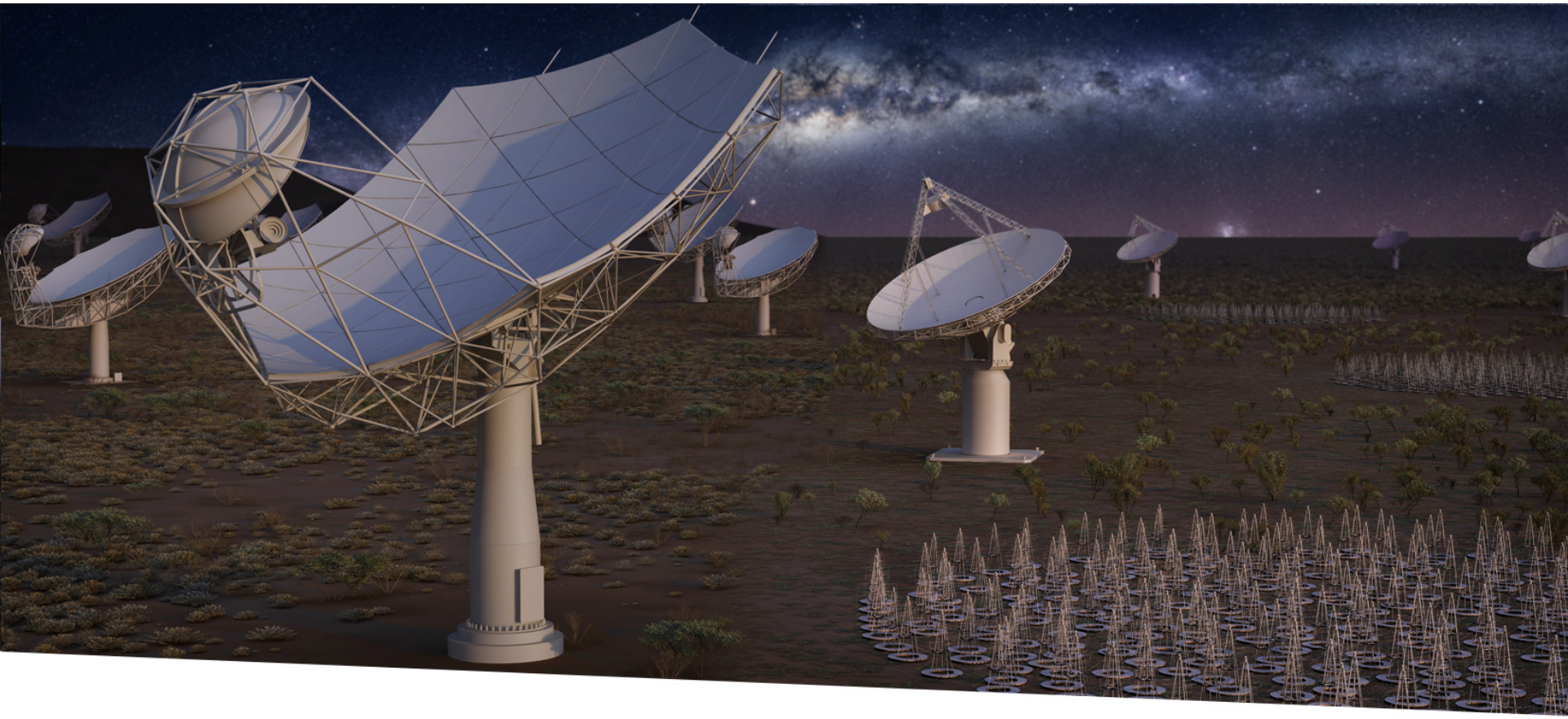
Operations Planning

SKA Engineering Meeting 2016



SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

Prof. Gary Davis

2nd October 2016

Outline

1. Introduction
2. Science Operations
3. Engineering Operations
4. Operations Management
5. Miscellany

Introduction

- The objective of this project is not to build two telescopes

- It is to do transformational science with the telescopes we will build
  - over a 50-year operational lifetime
  - design & construction is only the first step

What Is Operations Planning?

- How we will operate the telescopes to do science
  - proposal and time allocation process
  - submission and execution of observations
  - generation of science data products
  - provision of data to users

Science Operations

- How we will maintain the telescopes
  - preventive and corrective maintenance
  - inventory of working spare parts
  - managing and responding to faults

Engineering Operations

- How we will run the organisation
  - globally-distributed project

Operations Management

The Operations Planning Team

Corrie Taljaard
Engineering Operations

Gary Davis
Director

Antonio Chrysostomou
Science Operations

Outline

1. Introduction
2. Science Operations
3. Engineering Operations
4. Operations Management
5. Other Topics

Access

- Access Policy is one of the documents being negotiated through the IGO process
- Main points:
  - allocated time to each Member proportional to share in the project
  - proportional across the entire programme – KSPs and PI projects
  - a small amount of access for Non-Members on basis of merit
  - data to be made openly available following a proprietary period

Operational Model

- Mission of the SKA is to deliver transformational science
  - metrics: productivity, impact, efficiency, cost-effectiveness
- Conventional features:
  - periodic proposal cycles
  - service observing
  - automated, flexible observing queue
  - 24-hour operation
- Unique features for SKA:
  - subarrays and commensality

Operational Concept Document

- Two purposes:
  - describe the operational model
  - define operational requirements
- Key Document
- Focus is on requirements, not on implementation
  - implementation will be in the Operations Plan →

SKA1 OPERATIONAL CONCEPT DOCUMENT

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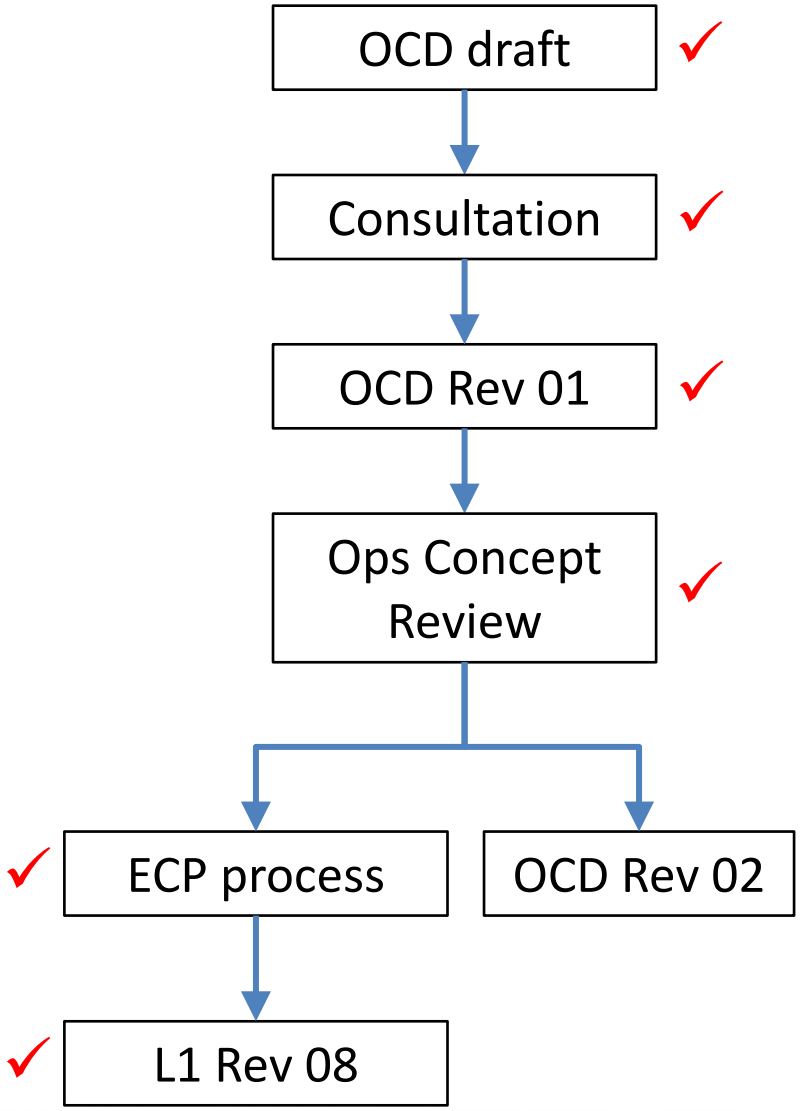
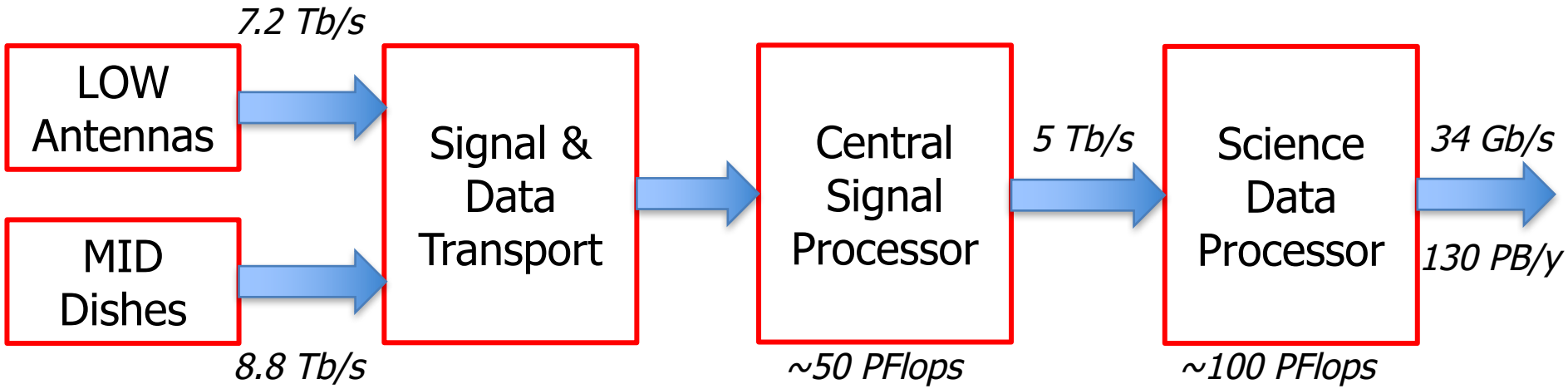
Released by:			
P.J. Diamond	Director General	SKA Organisation	 Date: Feb 11, 2016

Operational Requirements

- OCD Rev 02 to be issued imminently
  - based on input from consortium consultation, external review, and ECP CRB
  - but no change to requirements – only to the text



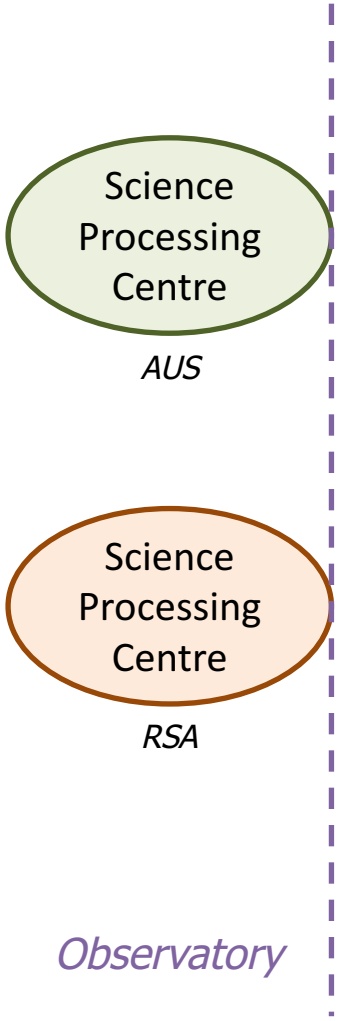
Data Flow



SKA data rate exceeds global internet traffic

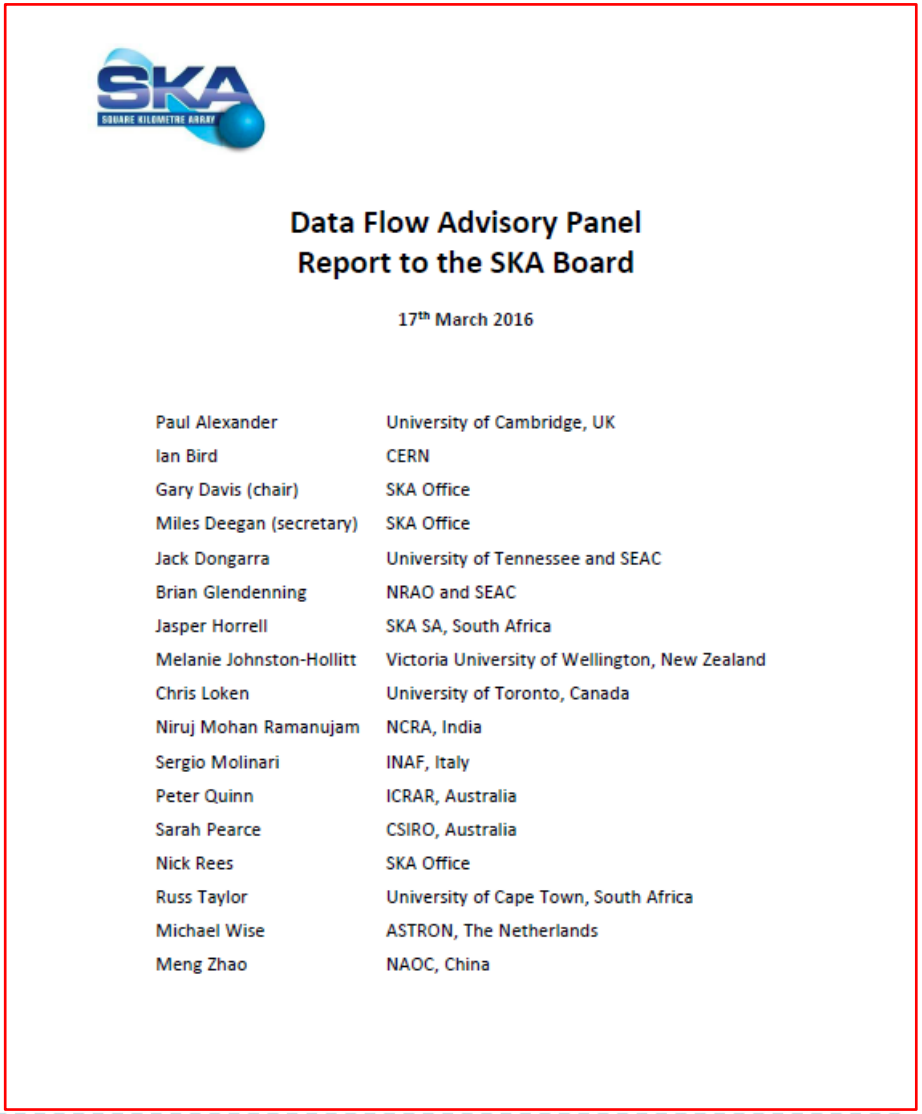
Sunway-TaihuLight: world's fastest supercomputer

Data Flow Concept



Data Flow Advisory Panel

- Created by Board July 2015
- Final report prepared March 2016
  - 10 recommendations
- Accepted by Board April 2016

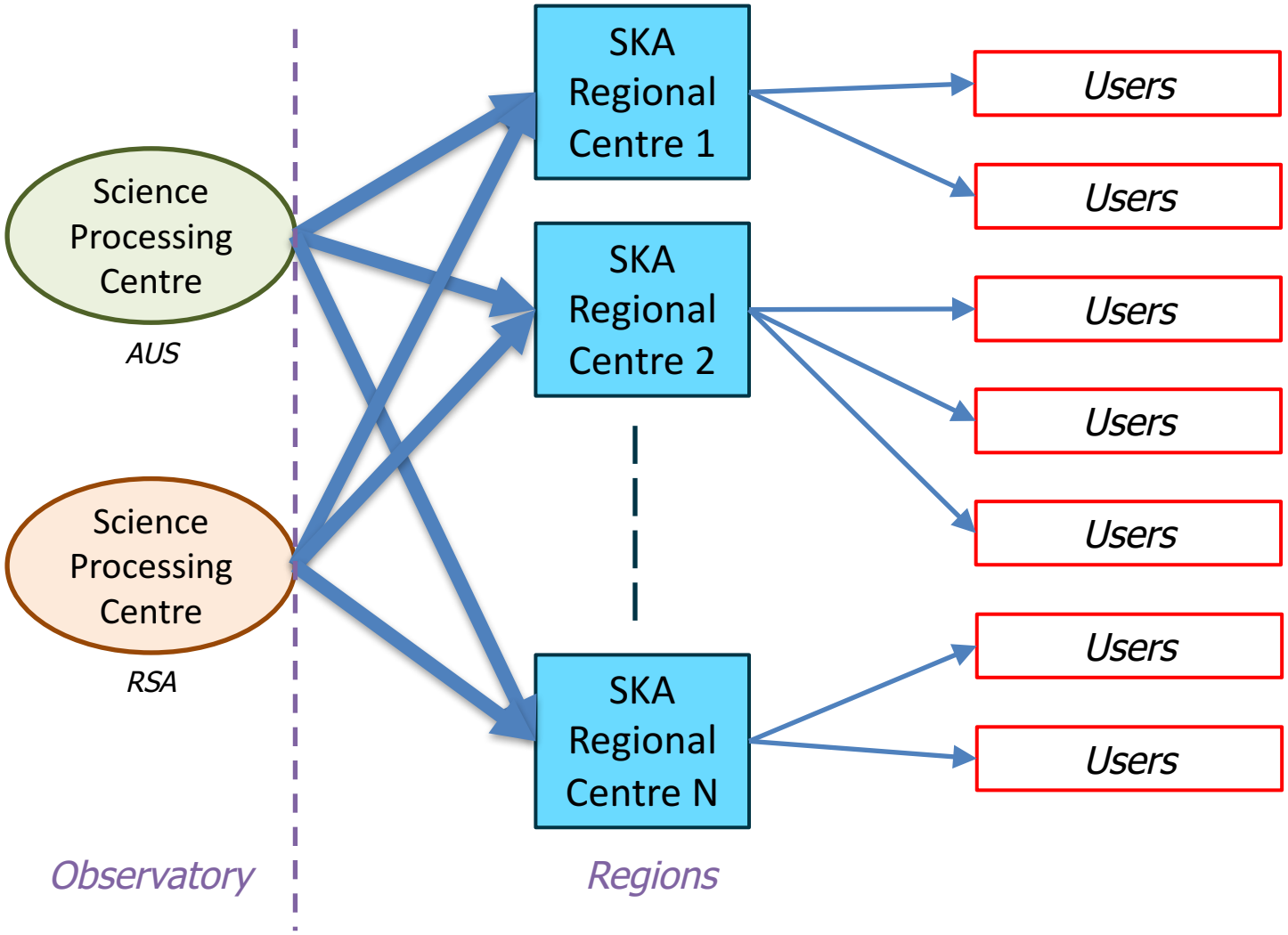


Data Flow Advisory Panel
Report to the SKA Board

17th March 2016

Paul Alexander	University of Cambridge, UK
Ian Bird	CERN
Gary Davis (chair)	SKA Office
Miles Deegan (secretary)	SKA Office
Jack Dongarra	University of Tennessee and SEAC
Brian Glendenning	NRAO and SEAC
Jasper Horrell	SKA SA, South Africa
Melanie Johnston-Hollitt	Victoria University of Wellington, New Zealand
Chris Loken	University of Toronto, Canada
Niruj Mohan Ramanujam	NCRA, India
Sergio Molinari	INAF, Italy
Peter Quinn	ICRAR, Australia
Sarah Pearce	CSIRO, Australia
Nick Rees	SKA Office
Russ Taylor	University of Cape Town, South Africa
Michael Wise	ASTRON, The Netherlands
Meng Zhao	NAOC, China

Data Flow Concept



Data Flow Next Steps

- SKA Regional Centre Coordination Group (SRCCG)
  - Terms of Reference established
  - membership established
  - Chair: Antonio Chrysostomou, Head of Science Operations Planning
  - kick-off meeting 23rd September
  - monthly meetings through pre-construction

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Availability

- An SKA telescope is defined to be operationally capable when it can perform astronomical observations with at least 95% of its collecting area.
- Operational availability is the probability that the system is operationally capable at any point in time when used in a realistic supporting environment.
- Each telescope is required to have an operational availability of at least 95%.

Engineering Operations

- Availability requirement
  - Inherent Availability allocated to elements
  - RAM Allocation document currently being revised
- Very ambitious – can it be met?
  - we think so, with good design/fabrication/installation
  - especially for LOW – high volume
  - but we need to see FMECAs to be sure – iterative process
  - if availability requirement drives the design or the cost, we need to know
- Definition is not uniformly applicable
  - needs to tailored to specific situations
  - if in doubt, ask

Engineering Operations

- CDR deliverables: RAM Report, Logistics Engineering Report
  - Tables of Contents provided in Integrated Logistics Support Plan; template spreadsheet available
  - we would like to see drafts 6 months before CDR submission
  - most Consortia already working on this

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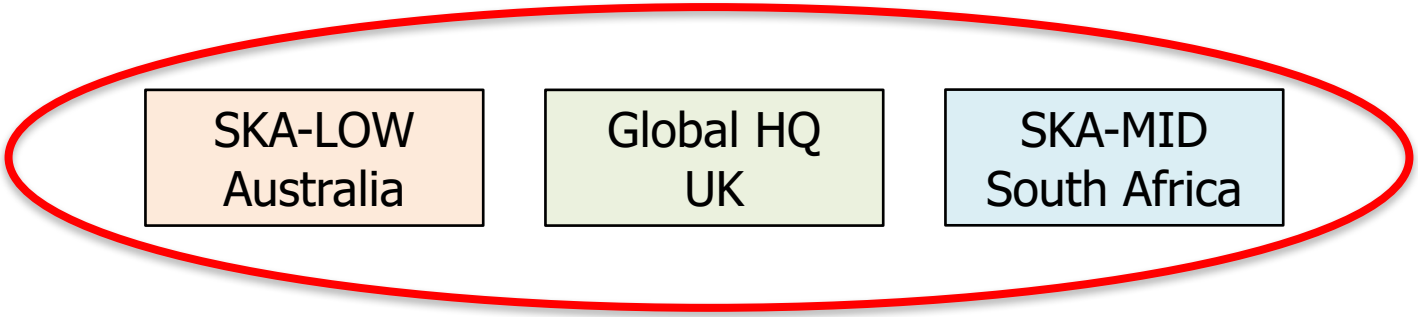
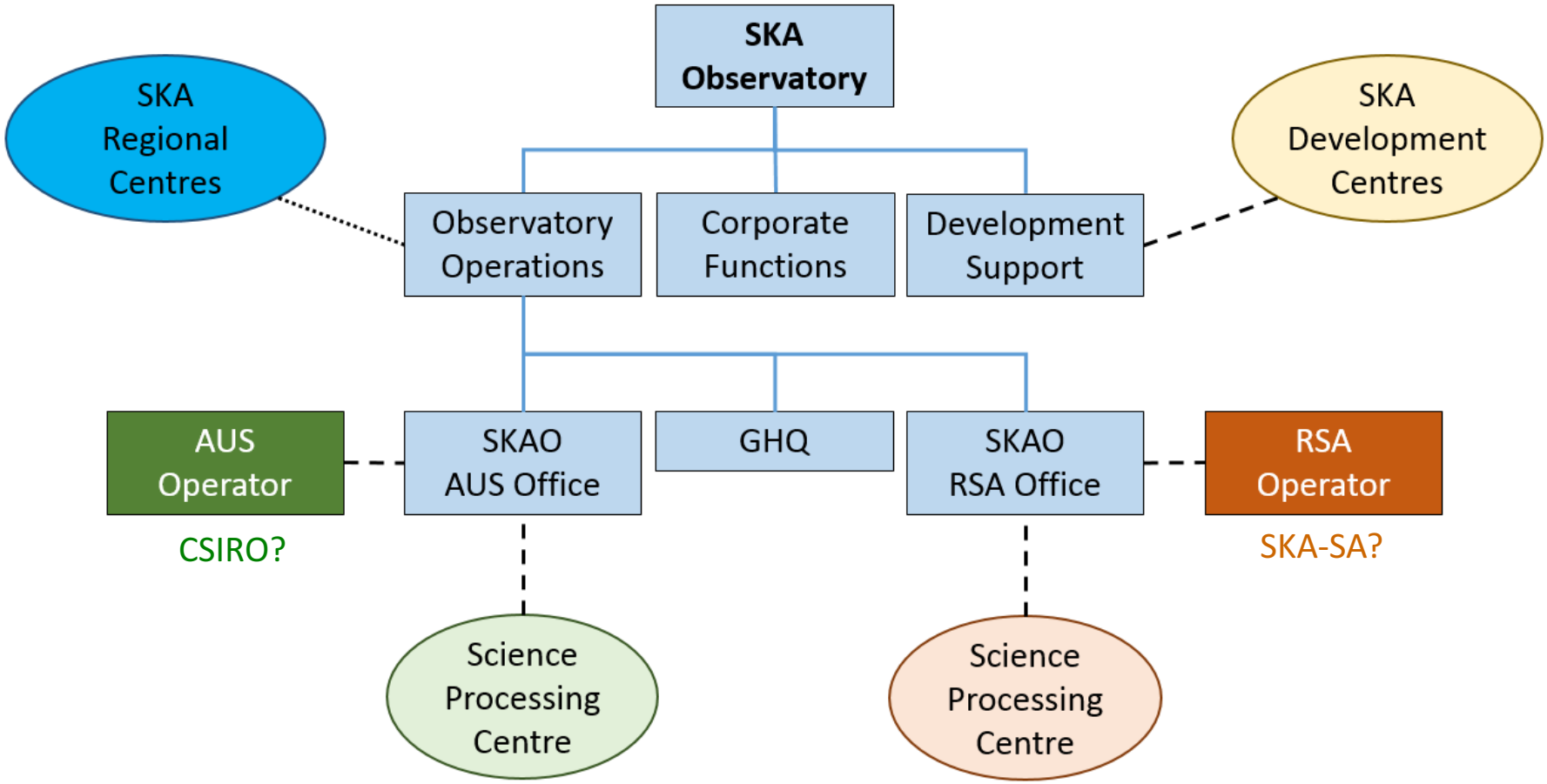
The Observatory Organisation



One Observatory

- Rationale:
  - Two quite different telescopes
  - Up to 50% of the telescope time will be spent on science projects that require data from both telescopes

The Observatory Organisation



Opex: Strategy

- Opex has not been capped by the Board
  - so we have developed a bottom-up estimate
  - what will it cost to operate the telescopes currently being designed?
- Operations Plan will provide input for Construction Proposal
  - for external review & approval by SKA Council
  - nominally July 2018
  - updates to every Board meeting until then
- Also required for IGO negotiations

Outcome

- Routine operations annual budget (€M):

SKAO GHQ	32
SKAO AUS	5
SKAO RSA	5
AUS Operator	19
RSA Operator	21
AUS SPC	4
RSA SPC	4
Subtotal	90
Contingency @ 25%	22
Development	20
TOTAL	**132**

Future Work

- Continual detailed development/review as technical design matures towards CDR
- Comparison against comparable facilities
- Full, external review
- Submission of Construction Proposal to SKAO Council for review and approval

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Custom Experiments

- CEs are observations that require some functionality not included in current design
  - e.g.: cosmic ray studies using additional detectors
- A standard set of custom interfaces is being developed for this purpose
  - e.g.: switchable pipelines; visibilities; cosmic ray triggers
- Subject to resource limit
- Policy under development

Learning Lessons

- Visits:
  - LOFAR in September 2015
  - JVLA in September 2016
  - ALMA in January 2017
- Engagement with Precursors:
  - MeerKAT (SKA–MeerKAT Programmatic Working Group)
  - ASKAP

Safety

- Hosting Agreements with AUS & RSA require compliance with applicable domestic legislation
- In addition:
  - telescope sites are remote
  - working conditions are hazardous
- SKAO operational practices will go well beyond regulatory requirements
- Safe and healthy working environment is paramount

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