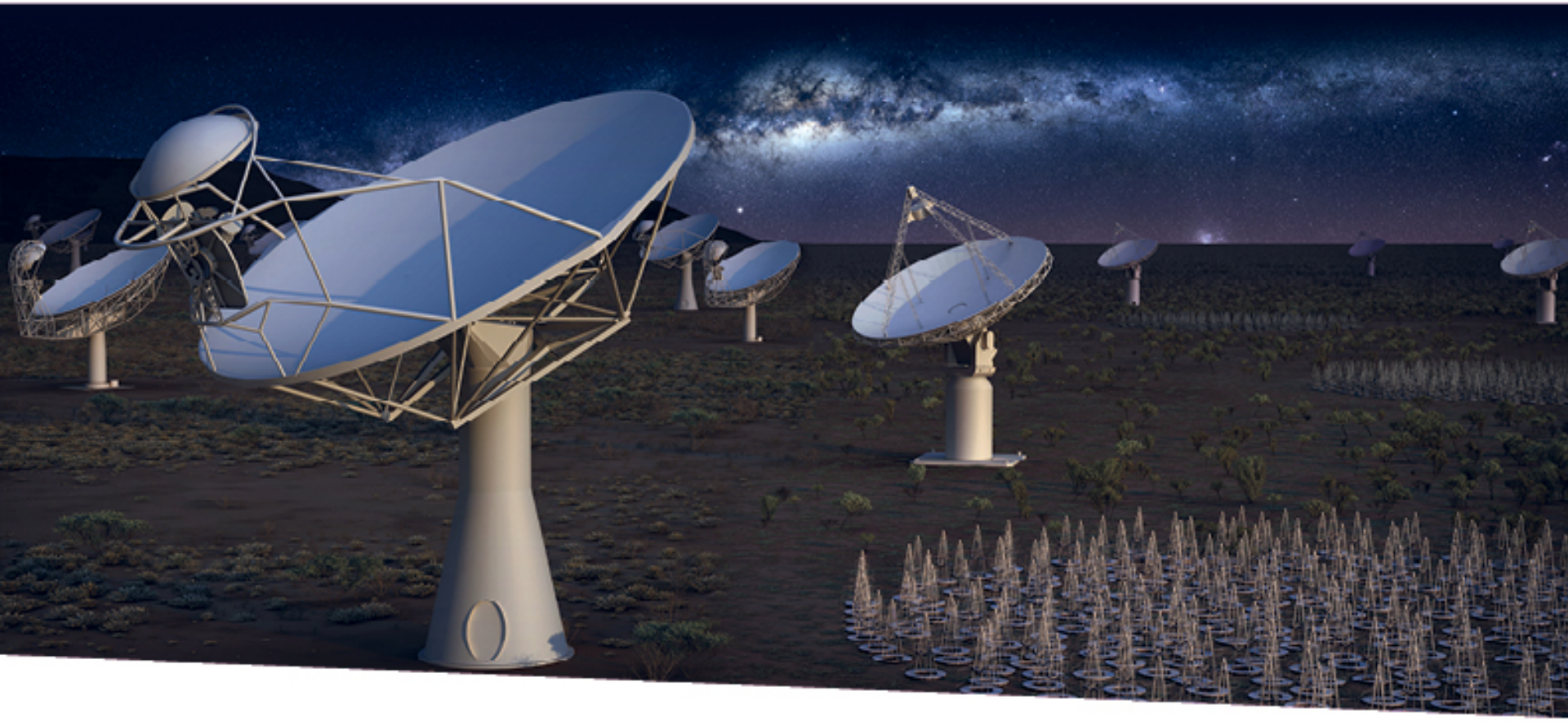
SKA-Ways of Working



SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

Andrea Casson & Alistair McPherson

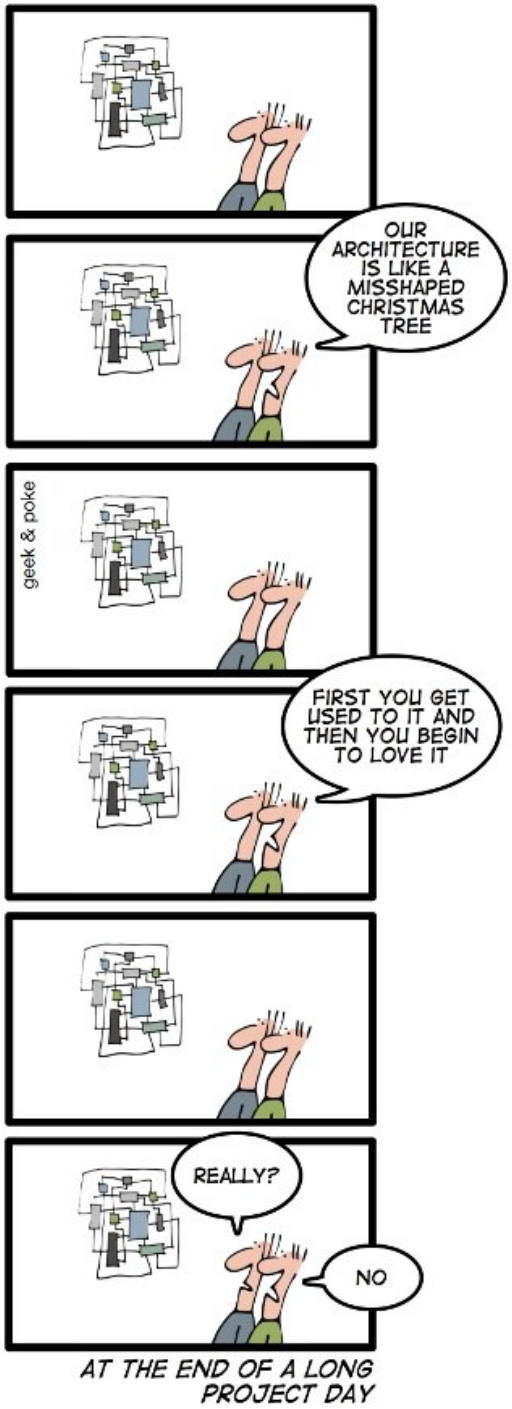
13 June 2017

I think we need a good Project Manager to coordinate our efforts...

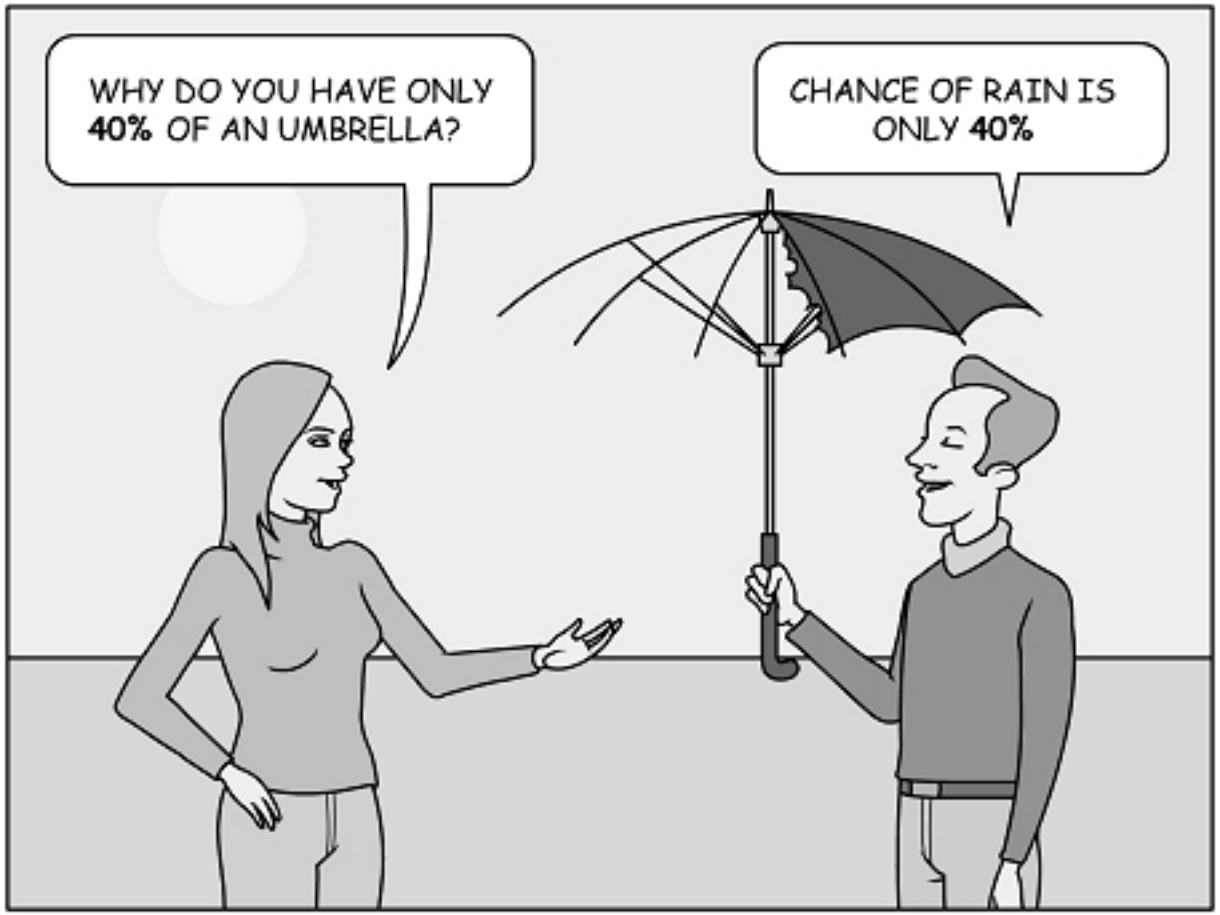
Issues

- Designing Observatory through Design Consortia – distributed design
- Small central Design Authority
- Difference in experience and culture
  - Project Management
  - Systems Engineering
- Problem with Time Zones
- Communications

Common Architecture



Setting Requirements

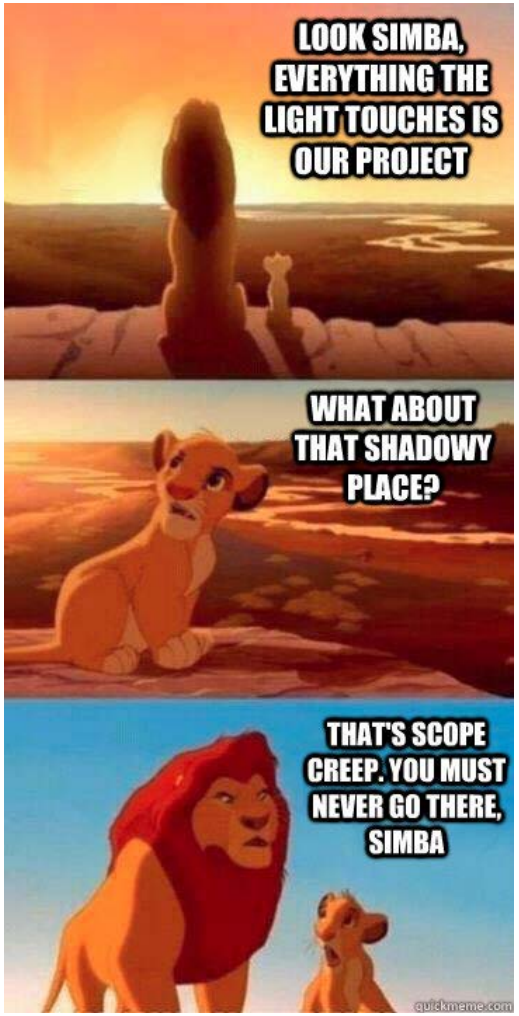


Project Management processes

Scope management

Why	• Ensure completeness • Avoid scope creep
How	• Statements of Work • Work Breakdown Structure, Product Breakdown Structure, Organisation Breakdown Structure, Roles and Responsibilities • Change control
Who	• Board of Directors • Change Control Board • Consortia Boards • Project Managers, Configuration Managers
Key docs	• Re-baselining outcome • ECP Register (→ MA slides) • Baseline Design, L1 System Requirements Specification (→ SE slides)
More	• https://confluence.skatelescope.org/display/CMI/Configuration+and+Document+Management+for+SKA • https://confluence.skatelescope.org/display/PPM/Construction+WBS

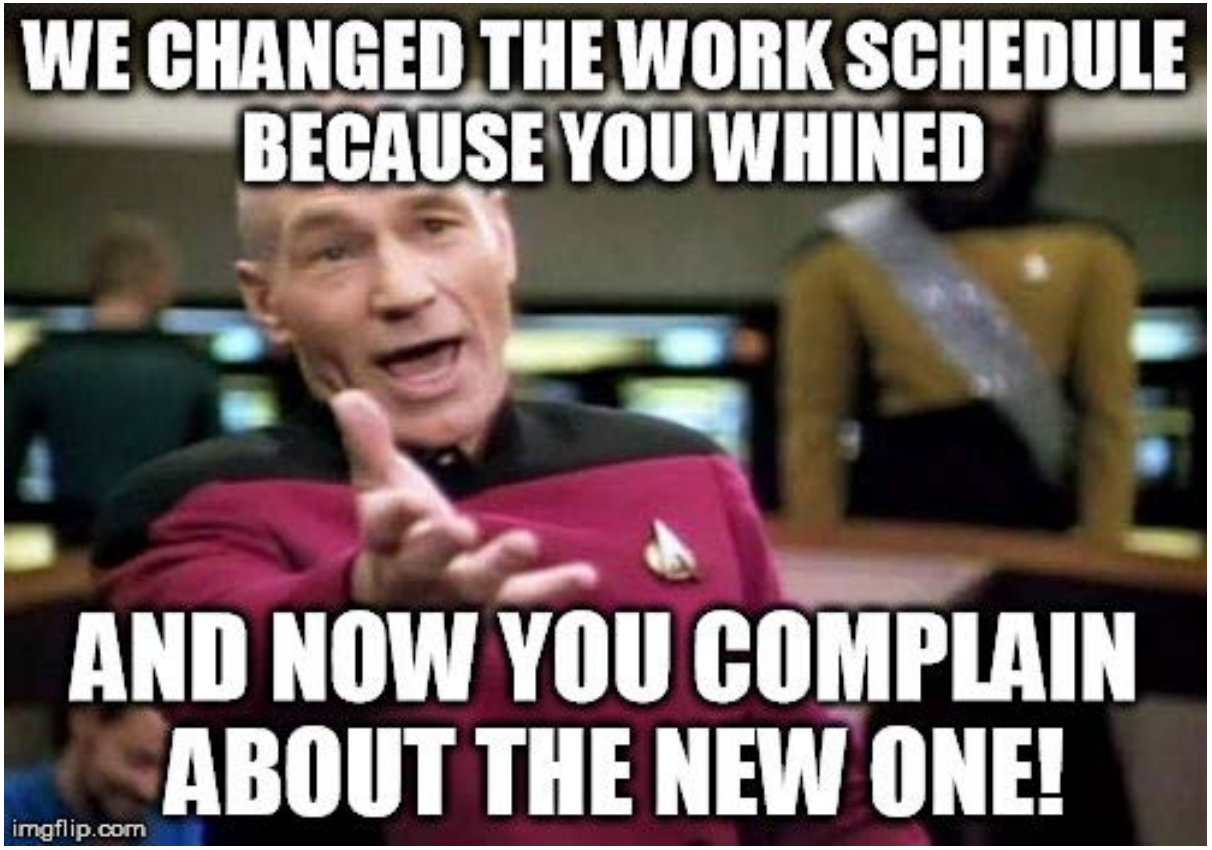
Scope management



Schedule management

Why	• Plan effective delivery sequence • Manage interdependencies & resources • Allow management of stakeholder expectations
How	• Pre-Construction: consortia “payment” milestones & Office review milestones • Construction: AIV Rollout Plans, WBS inputs and outputs, consortia schedules estimates, constraints, contingencies
Who	• Project Managers • Project Analyst • AIV team
Key docs	• Pre-C Milestone Chart • Rollout Plan for SKA1-Low: SKA-TEL-AIV-4410001 revision 05 • Rollout Plan for SKA1-Mid: SKA-TEL-AIV-2410001 revision 05 • Construction schedule
More	• https://confluence.skatelescope.org/display/PPM/Stage+2+Schedule • https://confluence.skatelescope.org/display/PPM/Construction+Schedule+Development

Schedule management



Cost estimation

Why	• Determine likely cost of construction & operations • Allow management of scope within cost cap for SKA1 Construction
How	• Consortia estimates against WBS & L1 requirements • Cost guidelines on estimating methodologies, contingency, exchange rates, schedule, array configurations, RAMS allocations etc • Cost reviews
Who	• Project managers and engineers • Industry partners and potential suppliers
Key docs	• Consortia Construction and Operations Cost estimates • Consortia Basis of Estimate documents • Board Cost Update Reports
More	• https://confluence.skatelescope.org/display/PPM/Costing+home+page (restricted access)

Cost estimation

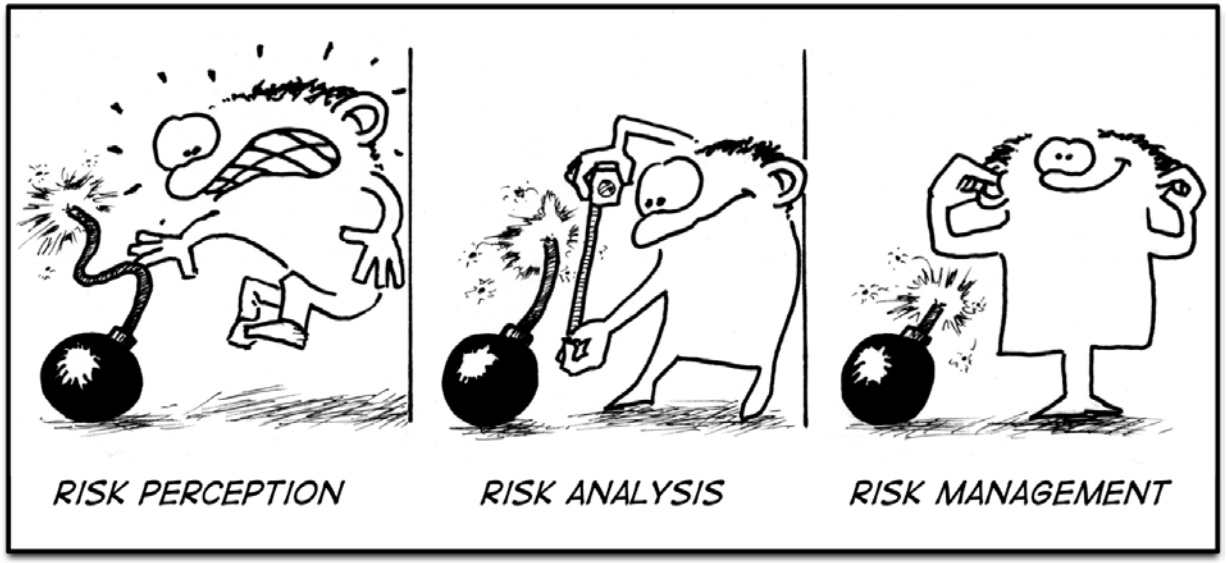
Issue resolution

Why	• Keep project on track • Remove blockages, minimise impacts
How	• Hierarchy of issue identification, assessment, actioning, tracking and reporting: consortia issue logs, IETs, Project Dashboard, PB Issue Log, Board Engineering Report • Red Flags
Who	• Project managers, engineers • Programme Board • Consortia Boards, Board of Directors as appropriate
Key docs	• Consortia monthly reports • Dashboard • PB Issue Log • Board Engineering Report
More	• https://confluence.skatelescope.org/display/PPM/Published+Dashboard

Risk management

Why	• Anticipate threats and opportunities • Ensure best outcome for the project
How	• Hierarchy of risk identification, assessment, mitigation action tracking and reporting: consortia risk registers, Project Risk Register, Board Risk Report, risk assessments by SEAC, Finance Committee, StratCom, Review Committees, Internal Audit • Risk Review
Who	• Project Managers • Risk Owners • Project Analyst • Review bodies as above
Key docs	• Consortia Risk Registers • Project Risk Register • Board Risk Reports
More	• https://confluence.skatelescope.org/display/PPM/Risk+Register

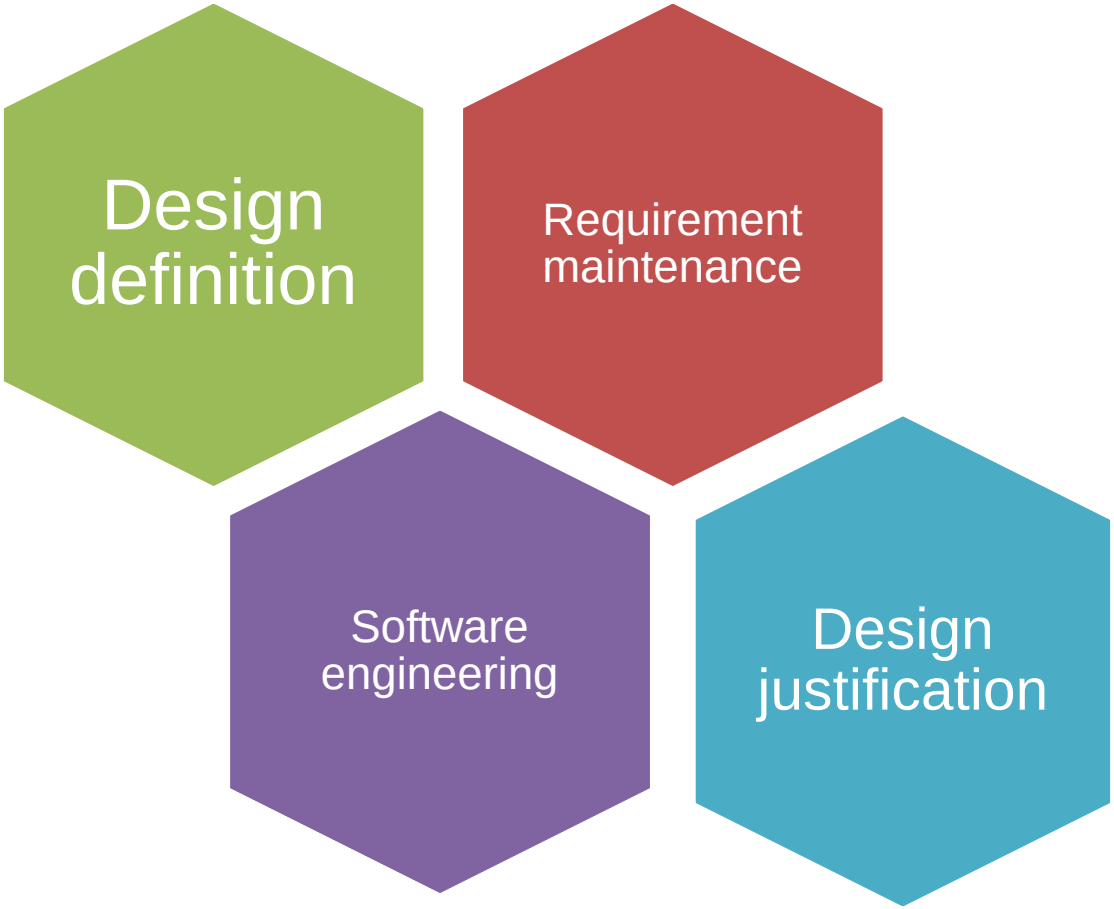
Risk management



Monitoring & control

Why	• Track and report progress against plans • Allows for corrective actions • Keep stakeholders informed
How	• Milestone Chart – ECPs for consortia schedule changes • Consortia monthly reports and Office-Consortia progress meetings • Milestone acceptance reviews & certificates • Reviews – PDRs, CDRs etc
Who	• Programme Board • Consortia Leads • Project Managers • Project Analyst, Project Officer
Key docs	• Milestone Chart • Consortia monthly reports • Project Dashboard • Board Engineering Reports
More	• https://confluence.skatelescope.org/display/PPM/Published+Dashboard

(Systems) Engineering processes



Design definition

Why	• Provide enough information about the system and its elements to enable implementation
How	• Design and architecture • Resolution teams (as needed) • Defining internal and external ICDs and review with Consortia • Describing the block diagrams and context diagrams
Who	• Project Managers • SKA Architect • Project Engineers • Mission Assurance
Key docs	• Baseline Design: SKA-TEL-SKO-0000002 revision 03 • PBS & ICDs • System block diagrams: 300-000000-106 & 100-000000-106 • System Engineering management plan: SKA-TEL-SKO-0000024 rev 02
More	• https://skaoffice.atlassian.net/wiki/spaces/IMS • Baseline docs in eB

Design definition

Design justification

Why	• Provide quantitative assessments and estimations based on system analysis
How	• Providing system analysis (from different disciplines) • Resolution teams (as needed)
Who	• Project Managers • Project Engineers • SKA Architect • Operations
Key docs	• System Budgets • Signal chain analysis • FMECA analysis • Functional analysis
More	• https://confluence.skatelescope.org/display/SB/System+Budgets • https://confluence.skatelescope.org/display/SMS/System+Modelling+Home

Requirement management

Why	• To maintain System level requirements • To maintain L2 requirements • To produce Tech Requirement specifications for construction preparation
How	• ECPs (As needed) • Requirement Forum • Requirement and compliance matrices reviews with Consortia
Who	• Project Engineers • Project managers • SKA architect • Mission Assurance
Key docs	• Technical Specifications • L0, L1 and L2 requirement specifications: SKA-TEL-SKO-0000007, SKA-TEL-SKO-0000008 • System and elements compliance and traceability matrices
More	• https://confluence.skatelescope.org/display/RF/Requirements+Forum+Home

Requirement management

Software engineering

Why	• To ensure software designs are of high quality • To harmonise developments across consortia • To allow for changes as technology and requirements develop • To provide a coherent system-level software architecture
How	• Use existing PM and Engineering processes wherever possible • Use best practices based on Software Engineering Institute methods • Provide system-level guidance through Software Decision Log • Conduct harmonisation processes in key areas
Who	• SKA Office computing and software team • SKA Software Architecture Team (includes consortia representatives) • Project Engineers • Project Managers
Key docs	• SKA Software and Hardware Definition Language Standards • SKA1 Control System Guidelines • Software Engineering Management Plan (in progress)
More	• https://confluence.skatelescope.org/display/SE/Software+Engineering • Active Work in Progress – will develop significantly for construction

Software engineering

Mission Assurance processes

Safety management

Why	• Legal and moral duty and responsibility
How	• Clearly defining and understanding individual and corporate roles and responsibilities • Engaging competent, adequately resourced, personnel and organisations (appointed early enough for the work they will perform)
Who	• Everyone! (in particular Senior Leaders, Managers and Supervisors)
Key docs	• SKA Project Safety Management Plan (SKA-TEL-0000740) • SKA Hazard Analysis Implementation Requirements (SKA-TEL-0000619)
More	• https://confluence.skatelescope.org/display/PPM/Safety

Configuration management

Why	• To unify the management of descriptors of the Project • Allows for rational change management • Create common reference for all stakeholders
How	• Establish a database of project artefacts and assets • Formalise the process of considering change • Regular interchanges of information with Consortia
Who	• SKA Configuration Manager • Consortia CMs • Systems Engineers
Key docs	• Configuration Management Plan: SKA-TEL-SKO-0000120 • Change Management Plan • System Engineering Management Plan • Product Assurance Plan
More	• https://confluence.skatelescope.org/display/CMI/Configuration+and+Document+Management+for+SKA

Change management

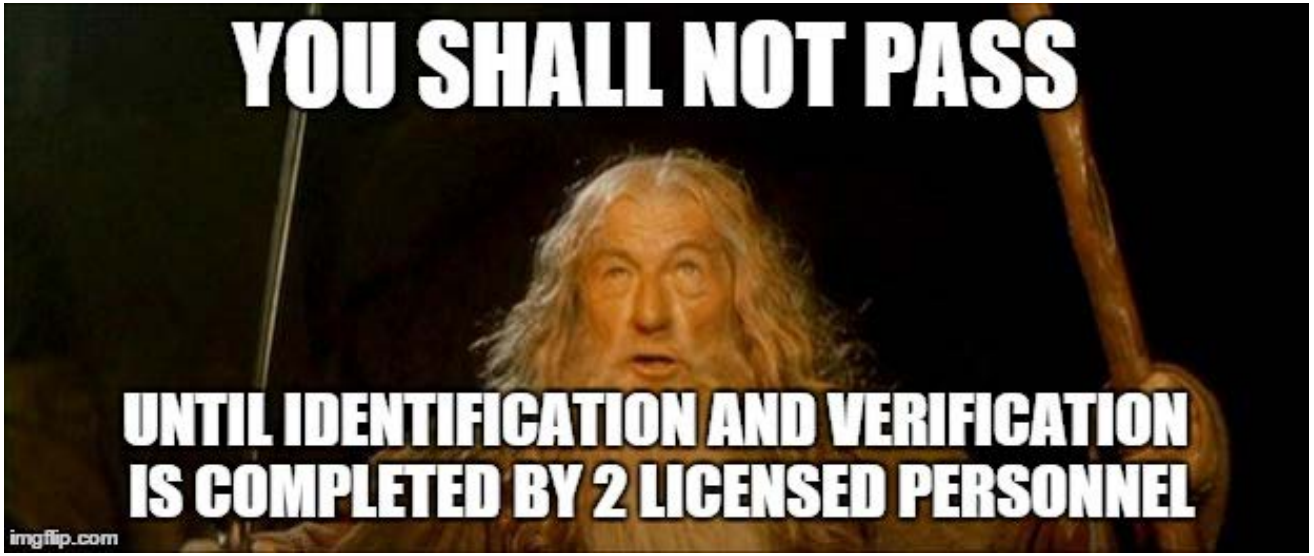
Why	• To ensure changes are considered rationally • To ensure changes are implemented effectively
How	• Using the Configuration management system • Stepwise approach • Appropriate consultation and analysis
Who	• SKA Configuration Manager • Change Control Board • Consortia CMs • Change Review Boards
Key docs	• Configuration Management Plan • Change Management Plan • System Engineering Management Plan
More	• https://confluence.skatelescope.org/pages/viewpage.action?pageId=5767262

Change management

Verification

Why	• To ensure the design conforms to the Requirements • Allows models to be validated • Allows release and handover of deliverables
How	• Every requirement has one or more verification methods • Requirements are verified partially and then completely • Requirements are verified hierarchically as system is built up
Who	• System Engineers • Verification Managers • Product Assurance Managers
Key docs	• Systems Engineering Management Plan • Verification Plans: SKA-TEL-AIV-2430001, SKA-TEL-AIV-4430001 (drafts) • Verification Requirements • Product Assurance Plan
More	• https://confluence.skatelescope.org/display/AP

Verification



Product assurance

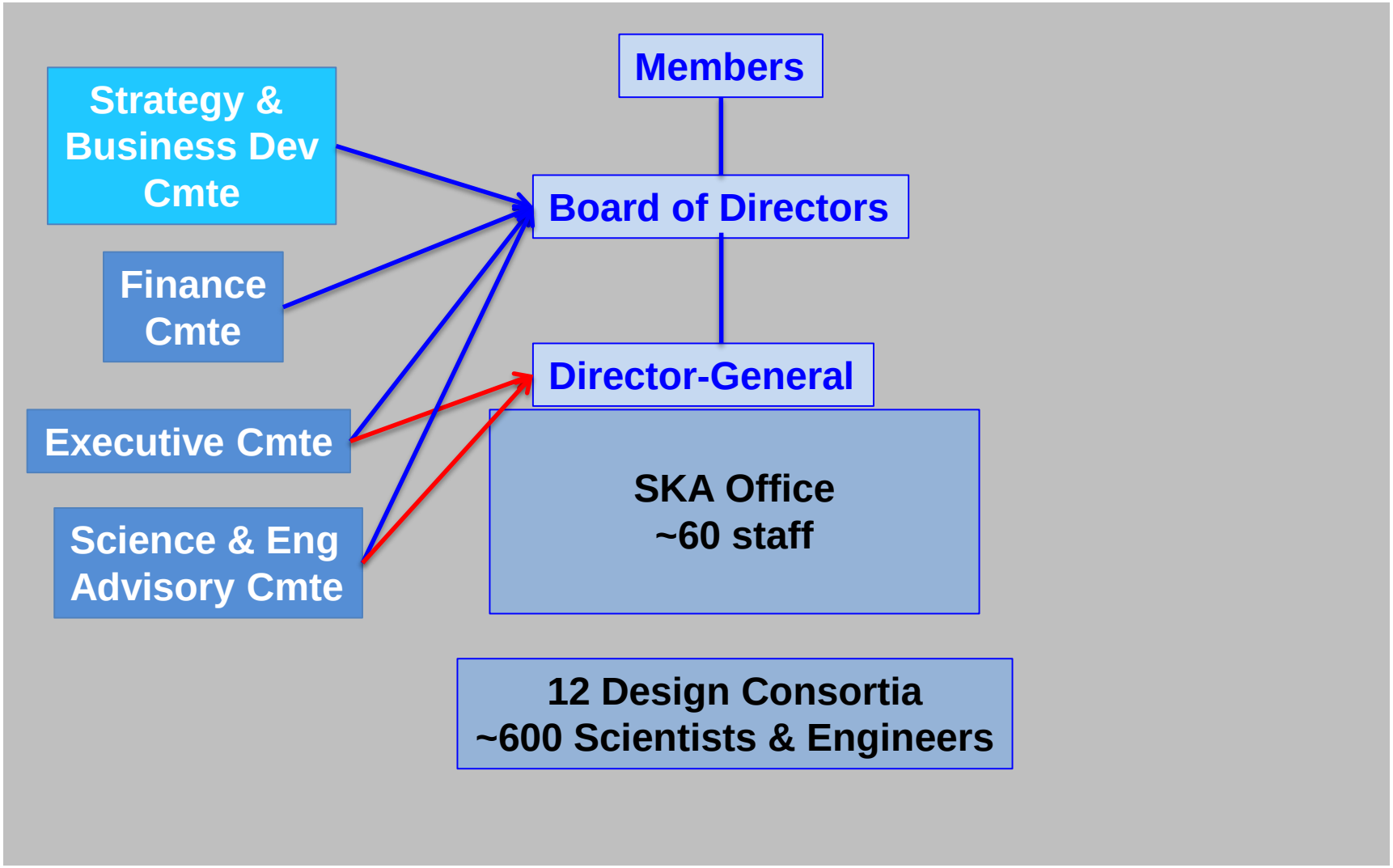
Why	• To ensure the Construction H/W and S/W deliverables are of acceptable quality • Allows guarantees to be issued • Creates confidence in supportability of telescopes
How	• Standards • Intervention (Key Inspection Points, Mandatory Inspection Points) • Evidence based decision making
Who	• System Engineers • Verification Managers • Product Assurance Managers
Key docs	•Product Assurance Plan •Systems Engineering Management Plan •Verification Plans
More	• Baseline docs in eB

Quality assurance

Why	• To ensure efficiency and consistency of business processes • To ensure compliance with obligations
How	• Establish a Quality Framework for the Observatory • Bring all existing processes under framework • Ensure future processes and procedures conform to QF
Who	• Everyone
Key docs	• Quality Strategy • Quality Framework • Quality Policies • Processes and Procedures
More	• Will develop significantly towards IGO and Construction

Organisation

SKA Governance



Office Management & Governance

- Senior Leadership Team
- Programme Board
- Groups
  - Administration
  - Science
  - Project Management
  - Engineering
  - Mission Assurance
  - Strategy
  - Outreach

- Integrated Element Teams

Senior Leadership Team

- Director General
- Head of Project/Deputy DG
- Director of Science
- Director of Operations Planning
- Director of Policy
- Director of Outreach
- Head of Administration
- Head of Mission Assurance

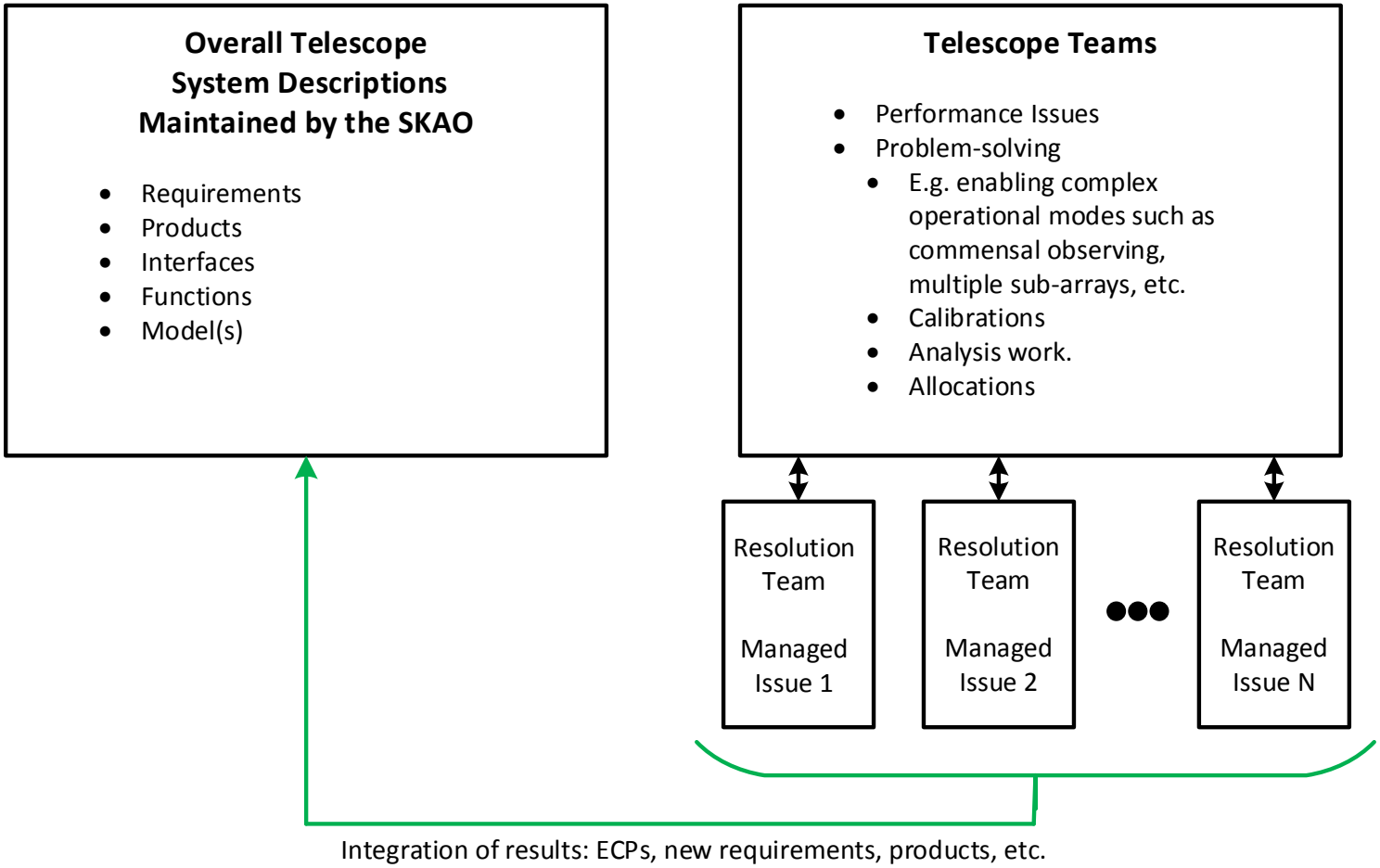
Programme Board

Standing agenda for fortnightly meetings:

1. Senior Leadership Team (SLT) update by Head of Project (or another SLT member in case of absence)
2. Status update by Head of Project Management (or Project Engineer in case of absence)
   - once per month via Progress Report to be made available in advance (will include KPIs)
   - other meetings via the EIT Dashboard and key milestone chart
3. Schedule update by Head of Project Management (or Project Engineer in case of absence)
4. Resourcing - discussion to resolve any issues
5. Issues and Risks
   - via Issue Log - high level issues only at monthly Programme Board; all issues at other meetings - issue owners to report
   - via Risk Register - top 5 risks only at monthly PB (does not replace the Risk Review) - risk owners to report
6. AOB
7. Summary by Head of Project or Secretary

Role	Name
Head of Project	Alistair McPherson
Director of Science	Robert Braun
Director of Operations Planning	Gary Davis
Project Engineer	Luca Stringhetti
Project Architect	Peter Dewdney
Head of Mission Assurance	Tim Stevenson
Head of Project Management	Andrea Casson
Head of Computing & Software	Nick Rees
Head of Procurement	Ian Hastings
Secretary	Altomese Stevenson
Director General in attendance	Philip Diamond

Telescope Teams



Telescope Teams Composition

	TT – LOW	TT-MID
Chair*	Mark Waterson (SKAO)	Mark Bowen (SKAO)
Co-Chair*	Jan Geralt bij de Vaate (Astron)	Thomas Kusel (SKA-ZA)
PM*	Andre van Es (SKAO)	Martin Austin (SKAO)
SE*	Maria Grazia Labate (SKAO)	Andrea Cremonini (SKAO)
PS*	Jeff Wagg (SKAO)	Tyler Bourke (SKAO)
LFAA	Andrew Faulkner (UoC)	Not applicable
DSH	Not applicable	Adriaan Peens-Hough (SKA-ZA)
SDP	Rosie Bolton (UoC)	Rosie Bolton (UoC)
CSP	Ben Stappers (UoM)/Grant Hampson(CSIRO)	Ben Stappers(UoM)/Michael Rupen (NRC)
TM	Alan Bridger (UKATC)	Lize van den Heever (SKA-ZA)
SaDT	Richard Oberland (UoM)	Richard Oberland (UoM)
INFRA AUS	Shandip Abeywickrema (Aurecon)	Not applicable
INFRA SA	Not applicable	TBC
AIV	Michael Hayes (CSIRO) /Adam MacLeod (CSIRO)	Donald Gammon (SKA-ZA)
Operations	Corrie Taljaard (SKAO)	Antonio Chrysostomou (SKAO)

Integrated Element Teams

Work Package Element	Project Scientist	Project Manager	System Engineer	Domain Engineer	Operations Planning
AIV	Tyler Bourke	Peter Hekman	(Verification Engineer)	Andrea Cremonini & LOW SE	Antonio Chrysostomou
CSP	Evan Keane	Philip Gibbs	Wallace Turner	Wallace Turner	Corrie Taljaard
DSH	Tyler Bourke	Mark Harman	Andrea Cremonini	Mark Bowen	Corrie Taljaard
Infra AUS Infra SA	Evan Keane (Aus) Tyler Bourke (SA)	Martin Austin	Martin Austin	Adriaan Schutte & Harry Smith	Gary Davis
LFAA	Jeff Wagg	Philp Gibbs	(Maria Grazia Labate) LOW SE	Mark Waterson	Gary Davis
MFAA (AIP)	Jeff Wagg	Andre van Es	Maria Grazia Labate	Mark Waterson	-
PAF (AIP) TBC	Evan Keane	Mark Harman	Andrea Cremonini	Mark Bowen	-
SaDT	Anna Bonaldi	Andre van Es	Rodrigo Olguin	Rodrigo Olguin	Corrie Taljaard
SDP	Anna Bonaldi	Peter Shephard	Juande Santander	Miles Deegan	Antonio Chrysostomou
TM	Jeff Wagg	Peter Shephard	Juande Santander	Lorenzo Pivetta	Antonio Chrysostomou
WBSPF (AIP)	Tyler Bourke	Mark Harman	Andrea Cremonini	Mark Bowen	-

Change Control Board

- Alistair McPherson - Head of Project (Chair)
- Peter Dewdney - Chief Architect
- Tim Stevenson - Mission Assurance
- Luca Stringhetti - Project Engineer
- Robert Braun - Science Director
- Andrea Casson - Head of Project Management
- Gary Davis - Head of Operations
- Nick Rees - Head of Computing
- Susan Nel - Configuration Manager (Non-Voting)

Key interactions: Office & Consortia

Who	What	When	Why	How
Each consortium CL/CPM/SE with IET	Progress meeting (supported by consortium report)	Monthly per consortium	SoW formal reporting of status and issues	Usually Vidyo; F2F when possible
All CLs with Eng. Mgt. team	Meeting	Monthly	Briefing items from HoP; issues raised by CLs	Vidyo and 3-4 times pa F2F
All Consortia and Office engineering staff	Engineering Meeting	Annually	Sharing status and solving issues with focussed workshops	F2F
TT reps	TT-Mid and TT-Low Execs and RTs	Monthly/as needed	Solving telescope level technical problems	Vidyo, Confluence
CRB reps	Meeting	As needed	ECP assessment	Vidyo, Confluence
All CL/CPMs	PM Dashboard, Risk Register, Schedule, WBS, Costs	Various	Sharing of latest status and collaborating on working documents	Confluence
EPM-CPM (some consortia)	PM catch-up	Weekly-fortnightly	Keeping in touch	Vidyo
All CPMs and EPMs	PM Forum	Monthly	Sharing updates (CCP, schedule, costs) & planning	Usually Vidyo; F2F when possible
All Consortia staff & beyond	E-news, Bulletin	3-6 times per year	Briefing status and achievements	Email, website
Science Community	Science Meeting	Annually	Briefing & Workshops	F2F
Science Working Groups	Interaction Meeting	Monthly	Discuss issues with key science	Vidyo or F2F

SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

www.skatelescope.org