



Signal Transport and Networks System Summary

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Summary of the material presented



- System engineering & system context of STaN
- Concept designs for:
 - Antenna networks
 - Data Transport, both COTs transmission & custom build
 - Timing and Synchronisation
 - Network Infrastructure
- Discussion of Interfaces
- Lessons learnt and review of existing
 - On site networks for precursors
 - M&C networks

In this presentation



- Technology Roadmap
- Impact of extensibility
- Overall Cost report
- Risks
- Strategy to proceed
- Questions



Technology Roadmap

Technology Roadmap



- Identified as important
- Some information under NDA need a great deal more ...
- Ongoing task
- Will attract a great deal more attention running up to Sub-System Requirements Review
- What we have now is a plan to proceed ...



Impact of Extensibility

Impact of extensibility



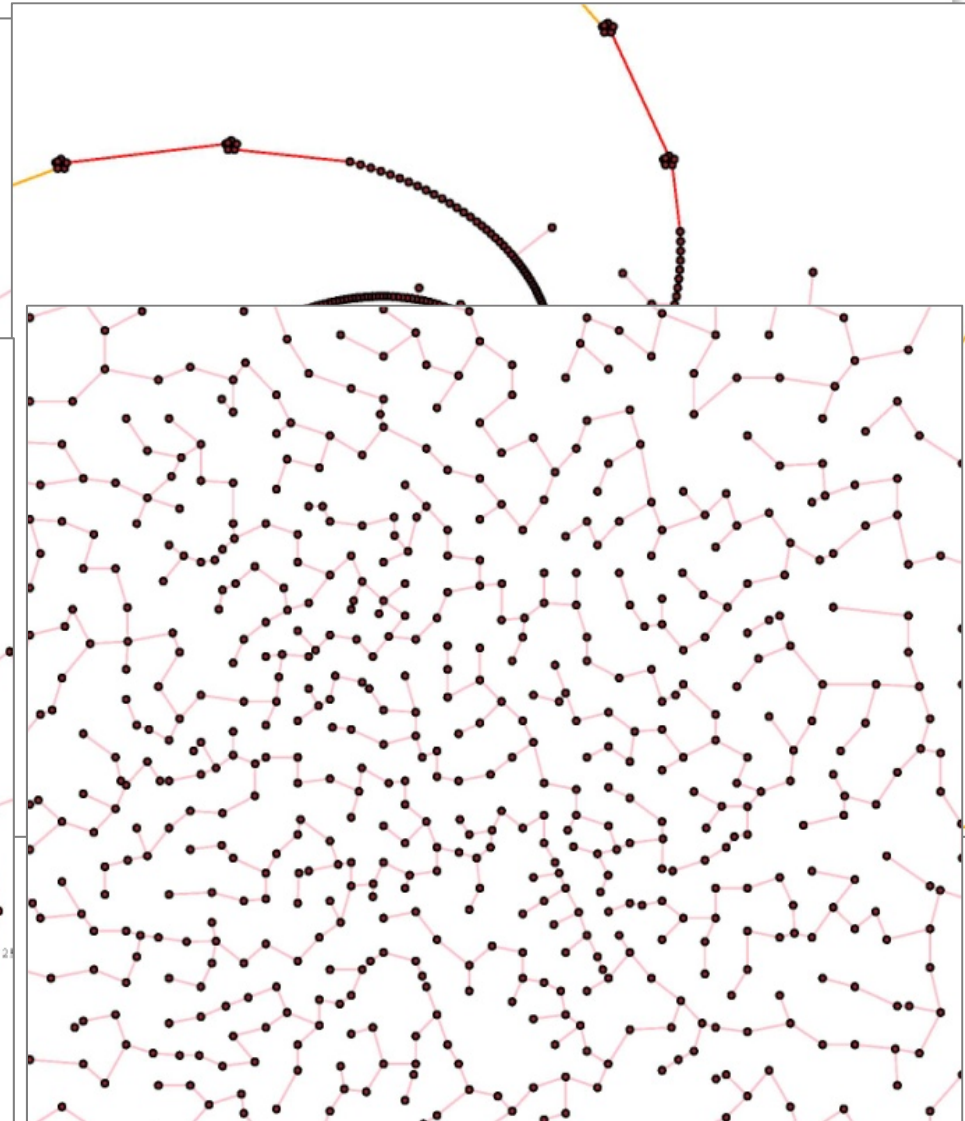
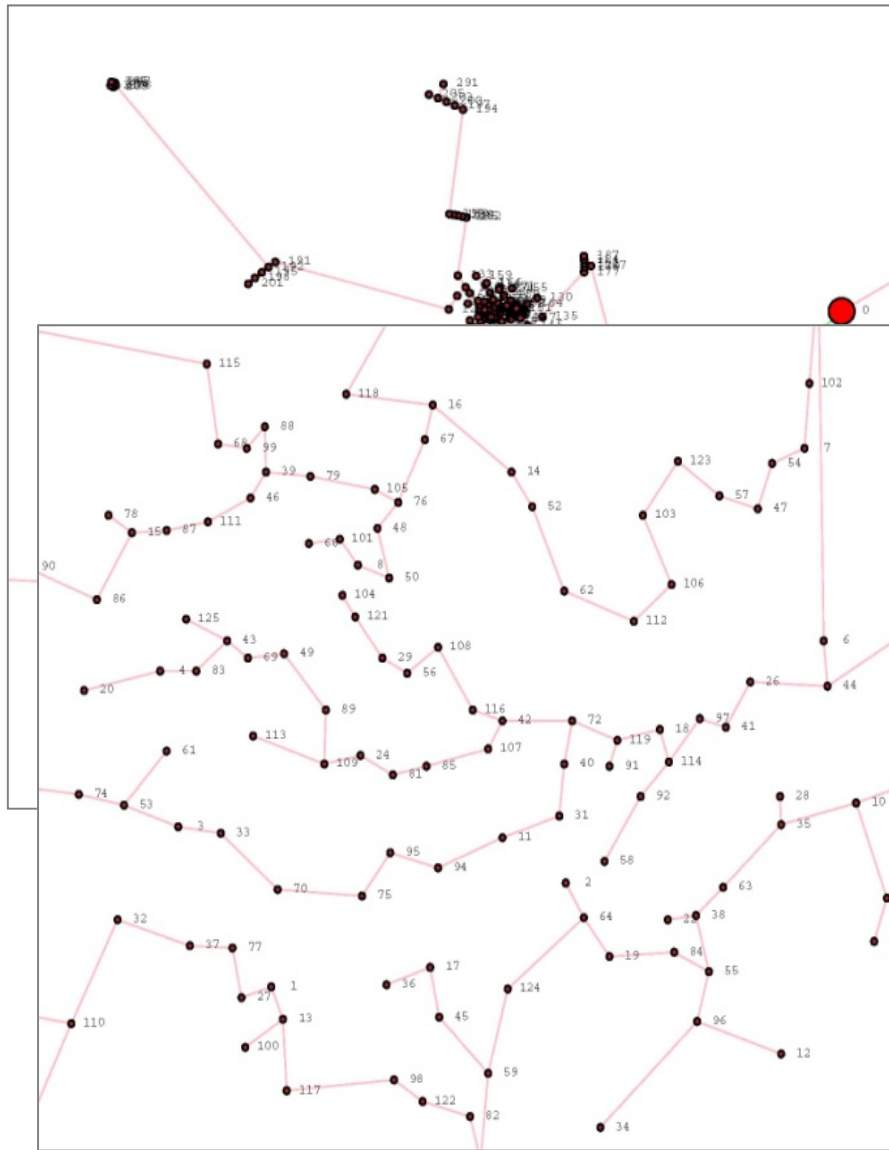
- Antenna networks
 - Frequency band changes, architecture changes, increase in collecting area and impact of dynamic range requirements.
 - May install now and change in SKA2
- DDBH
 - Designing a network that is future proof and can be upgraded in SKA2
 - M&C network that has capacity for SKA2

Impact of extensibility



- Timing & Synchronisation
 - Designing for SKA2 operating frequencies
 - Architectures that can be expanded
- Network Infrastructure
 - How to build an extensible network?
 - How to build an SKA1 network that can operate whilst SKA2 is constructed?
 - Systems processes and procedures to record passive infrastructure so that:
 - Extensibility can be used effectively
 - Changes in networks during SKA2 roll out can be captured

Impact of Extensibility





Costing

Costing Strategy



Cost estimation will be an on-going and iterative process

Confidence levels in cost estimates are predicated on

- Maturity of the SKA design
- Substantiating & Supporting Evidence

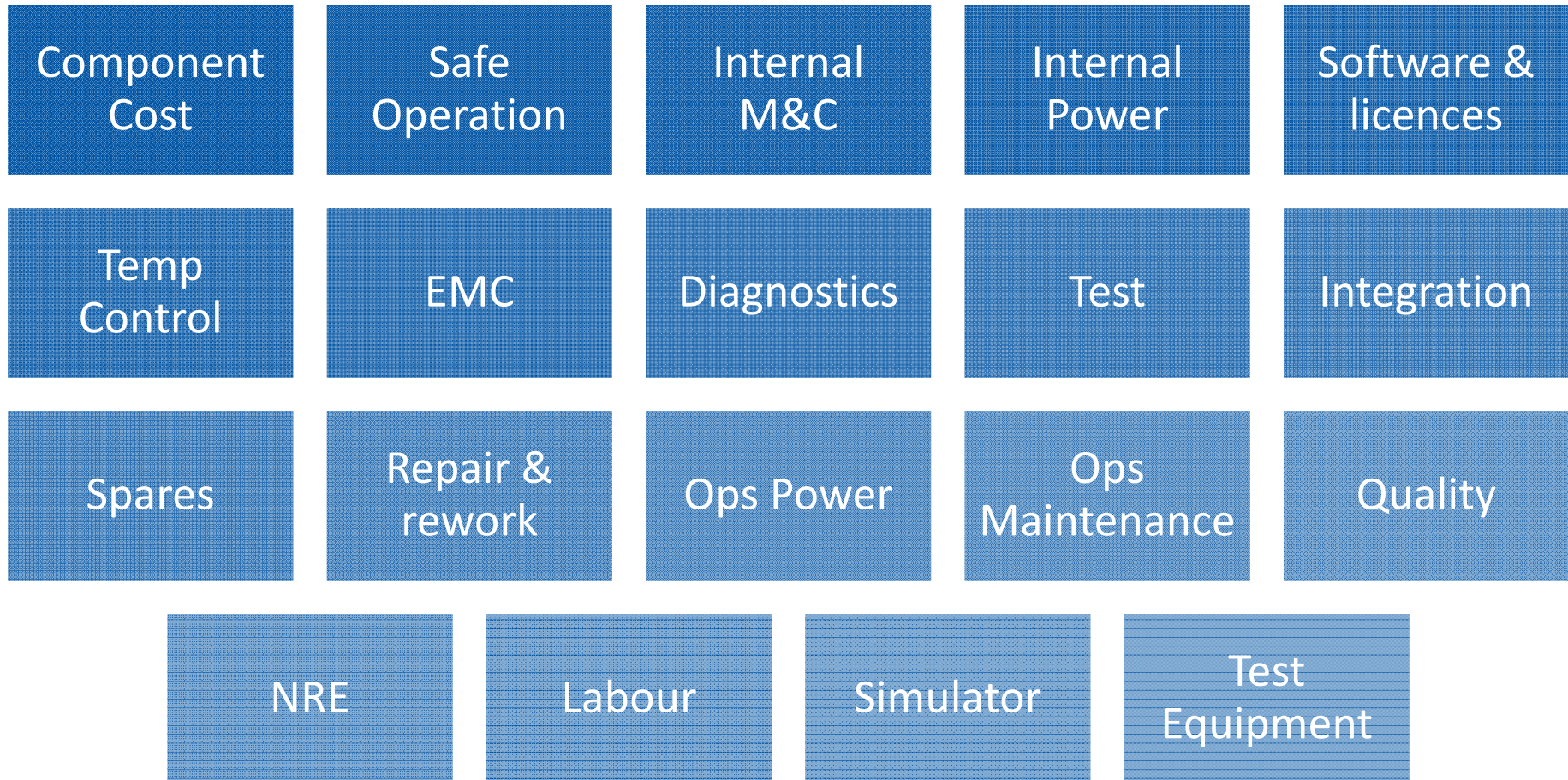
When estimating sub-system costs, data is provided for the lowest sub-assembly for which reliable cost information is available.

Basis of Estimate



BECL #	Description
5	Lowest BE rating. Costs based on anecdotal evidence and best guess scenarios. (CoDR) STaN CoDR BECL Level 5
4	Technical specifications in rough draft stage. Costs either anecdotal or best guess. Quantities reasonably well known. (SRR)
3	Technical specifications under peer review. Costs obtained from reliable sources and reiterated several times. Quantities known to high degree. (CDR)
2	Technical Specifications finalized. Schedule of delivery finalized. Quantities finalized. Contractual arrangements being concluded. Variations unlikely. (PR)
1	Highest BE rating. Meets all of the requirements for BE2. Corroborative evidence from actual costs incurred elsewhere (Precursor). Supply contract firm. (Contract)

Cost Components



Cost Estimate Coverage



Description of cost	SPF Analogue links - Cost component Included? YES/NO/NA	AA-lo Analogue links - Cost component Included? YES/NO/NA	PAF links - Cost component Included? YES/NO/NA	Fibre Infrastructure - Cost component Included? YES/NO/NA
Subsystem Hardware costs incl of:				
Component cost	Y	Y	Y	YES
Safe Operation	N	N	N	N
Internal M&C	N	N	N	N/A
Internal Power	Y	Y	Y	N/A
Internal Software & licences	n/a	n/a	n/a	NO
Localised or Internal Temp Control	Y	Y	Y	N/A
EMC (shielding and resilience)	N	N	N	N/A
Integrated diagnostics	N	N	N	NO
Test, Verification, Validation	N	N	N	YES
Internal Integration	N	N	N	N/A
Spares	N	N	N	NO
Repair and rework	N	N	N	YES
Quality control	N	N	N	YES
NRE development costs	N	N	N	N/A
Labour (manufacture & field installation)	N	N	N	YES
Simulators	N	N	N	N/A
Test Equipment	N	N	N	NO
Lightening protection	N	N	N	NO
Environmental protection	N	N	N	NO
Hardware Sub-system Operations costs incl:				
Maintenance	N	N	N	NO
Annual power costs	N	N	N	N/A
Upgrades	N	N	N	NO
Labour	N	N	N	NO

No costs for:
 DDBH Custom build
 Synch & Timing
 Facilities Interconnect
 M&C networks

Costs for:
 Antenna networks @ 10%
 coverage
 Network Infrastructure @
 50% coverage

Increased coverage by SRR
 Complete coverage by PDR



Risks

Headline Risks & Issues

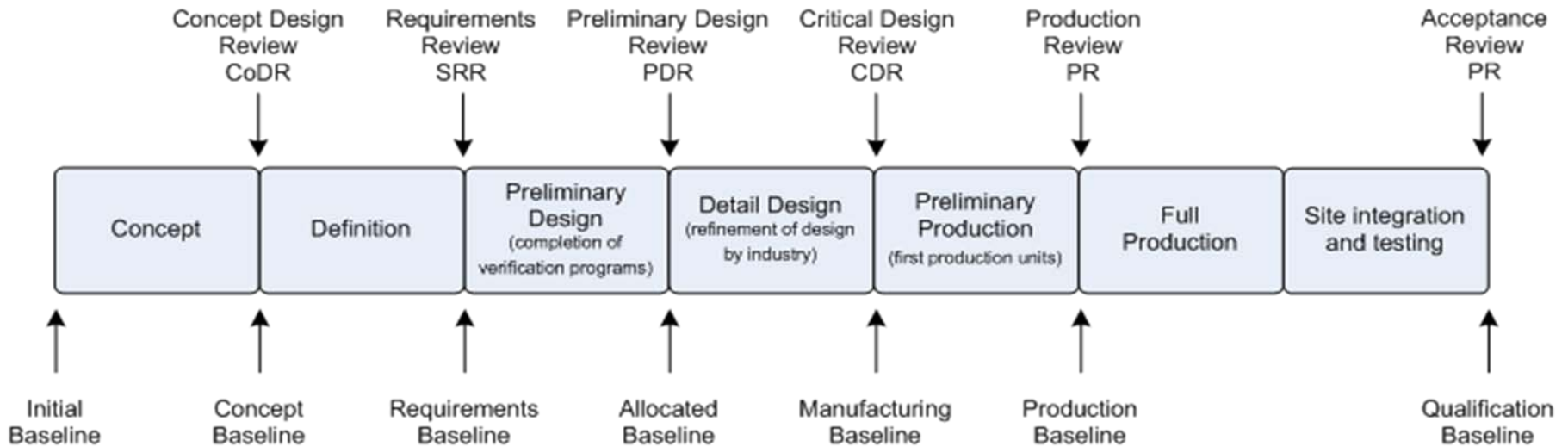


- Programmatic
 - Resource
 - Engagement
 - Schedule
- Requirements and Interfaces
 - Definition
- Infrastructure
 - Configuration, extensibility to SKA2, operations
- Technical
 - High Dynamic Range, Integration, EMC, Power
- Costs



Strategy to Proceed to the Next Phase

Strategy to Proceed



The next phase is the definition phase ...

Definition Phase



- Requirements analysis & validation
 - Outputs of the sub-system CoDRs
 - System SRR
- Technology Options
 - Analysis
 - Simulation
 - Prototyping & testing

SRR Target Document Set



- Finalised Requirements
- Risk Register
- Strategy to proceed & resourced schedule
- Architectural design description

SRR Target Document Set



- Sub-system block diagrams and descriptions
- Updated designs based on further work
- Updated cost, power, reliability estimates
- 1st Draft ICDs
 - physical & data exchange interfaces
- 1st Draft test plans
- 1st Draft Logistics plan
- 1st Draft Health & Safety analysis
- 1st Draft sub-system software

SRR Target Document Set



SKA System Reference Documents

SKA Science Case

Design Reference Mission Phase 1

Design Reference Mission Phase 2

System Requirements Specification

SKA Configurations Design

SKA System Engineering Management Plan

High Level SKA System Description

SKA Strategies and Philosophies document set

SKA Operations Plan

SKA Logistics Plan

SKA Risk Register

SKA Health & Safety Plan

SKA Element level documentation sets

STaN Domain Reference Documents

STaN Requirements Specification Document

STaN Physical Interface Control Documents

STaN Data Exchange Interface Control Documents

STaN Technology Roadmap

STaN Software and Firmware Strategy

STaN Health and Safety Plan

STaN Logistics Plan

STaN Technical Description Documents

STaN High Level Description Document

STaN Architecture description

STaN Concept Descriptions: Including design specifications and test plans

STaN Cost Summary

Project Management Documents

PREPSKA FP7 WP2 Project Plan

Project Execution Plan, Pre-production Phase for the SKA

STaN Work Breakdown Structure

SKA Strategy to proceed to the next Phase

STaN Strategy to Proceed to the next Phase

STaN Risk Register

Actions to mitigate risks



- Continue to foster good communication links
- Develop collaborative frameworks suitable for a large and international project
- Continue to foster a system engineering approach across the project
- Maintain schedule & continue to identify schedule risk
- Continue to work on domain risks with others
 - configurations & extensibility requirements

Actions to mitigate risks



- Work, with others, on requirements & interfaces, Sub-system integration
- Develop, with others, the configuration asset management; Inventory & maintenance
 - Requirements
 - Sub-System concepts
 - procedures
- Test procedures
- Budgets
- Fill Gaps

Gaps

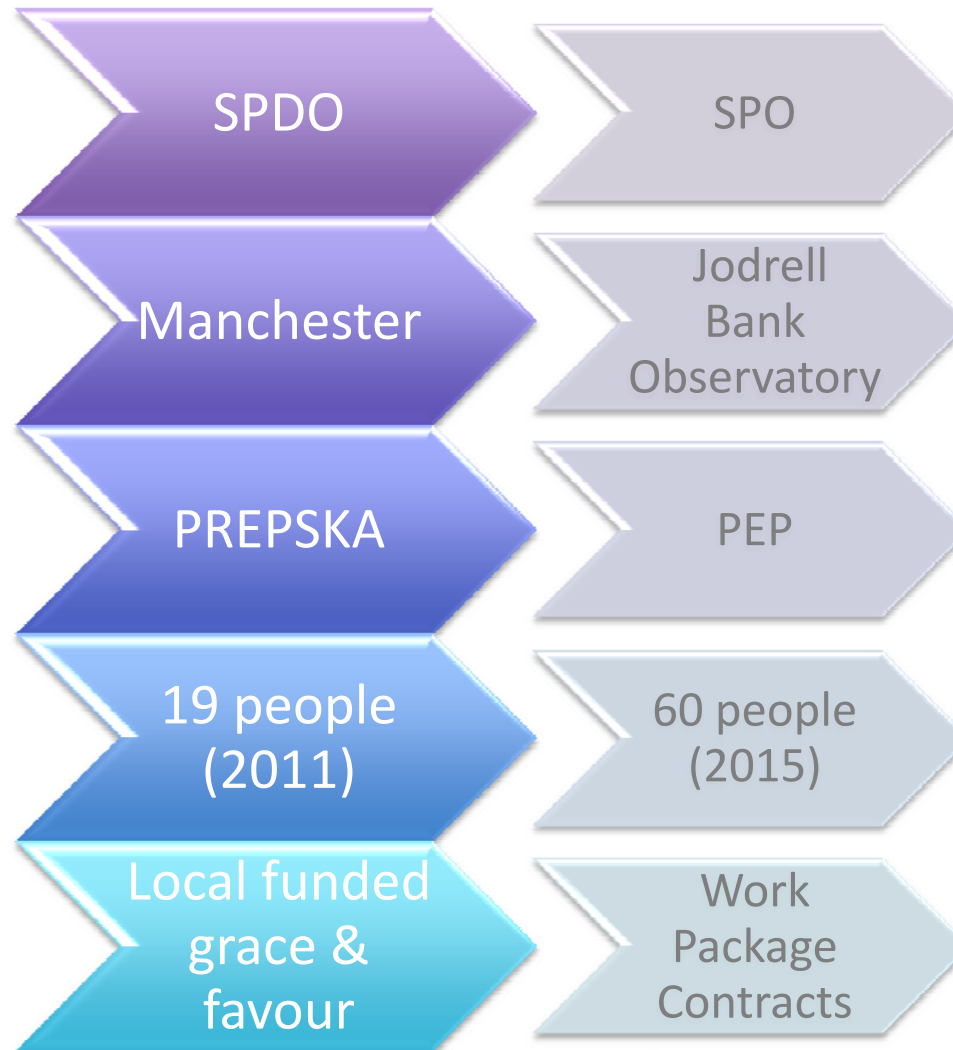


- M&C networks,
- the link between the CPF and the HPC,
- the HPC to the wider world and the SKA headquarters
- Network Infrastructure



Organisational Changes

Organisational Changes



Questions

