STaN in the context of PrepSKA WP2 & the PEP

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2011-06-28

SKA Phases

- Preparatory phase (current phase)
- Pre-construction phase
- SKA1 construction, verification, commissioning, acceptance, integration & first science
- SKA2 construction, commissioning, acceptance, integration & first science
- SKA Operations

PrepSKA Work Packages

- Within current phase the work has been divided into seven work packages (WP). They are:
  - WP1 – Management of PrepSKA, Coordinator University of Manchester
  - WP2 – SKA System Design, SPDO
  - WP3 – Site Characterisation, SPDO
  - WP4 – Governance, Netherlands Organisation for Scientific Research
  - WP5 – Procurement and Industry Relations, Italian National Institute for Astrophysics
  - WP6 – Funding options, UK Science and Technology Facilities Council
  - WP7 – Socio-economic benefits and Implementation Plan

PrepSKA WP2

- WP2 Objectives:
  - to produce a deployment plan for the full SKA, and a detailed costed system design for SKA1,
  - to integrate all of the activities, reports and outputs of the various working groups to form an SKA implementation plan.

WP2 Management Process

- There have been a structure and process defined at the start of PrepSKA.
- During WP2 meeting in November 2008 a document '**Guiding Principles, Activities and Targets for PrepSKA Work Package 2**' set out roles and responsibilities more clearly.
- During October 2009 the Description of Work (DoW) was reviewed and updated to adopt the SEMP approach of reviews and deliverables, management structure remained the unchanged.

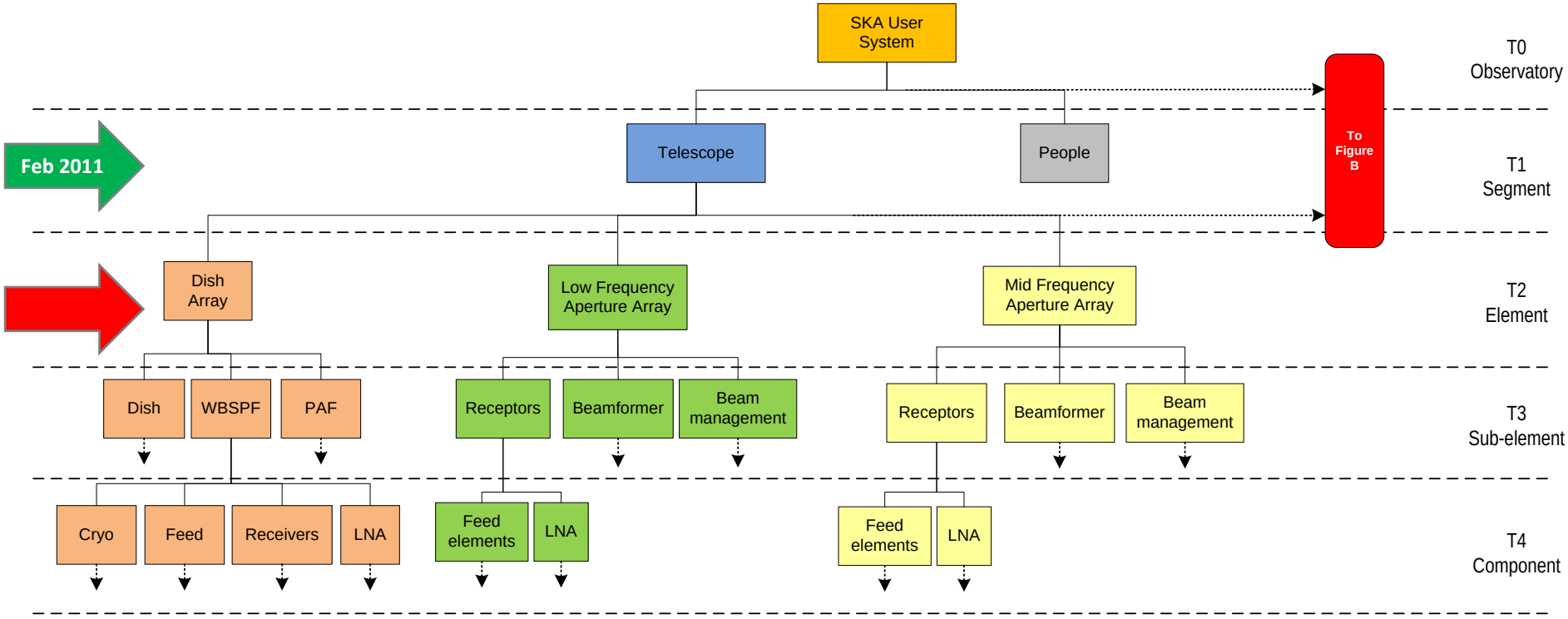
WP2 Project Plan

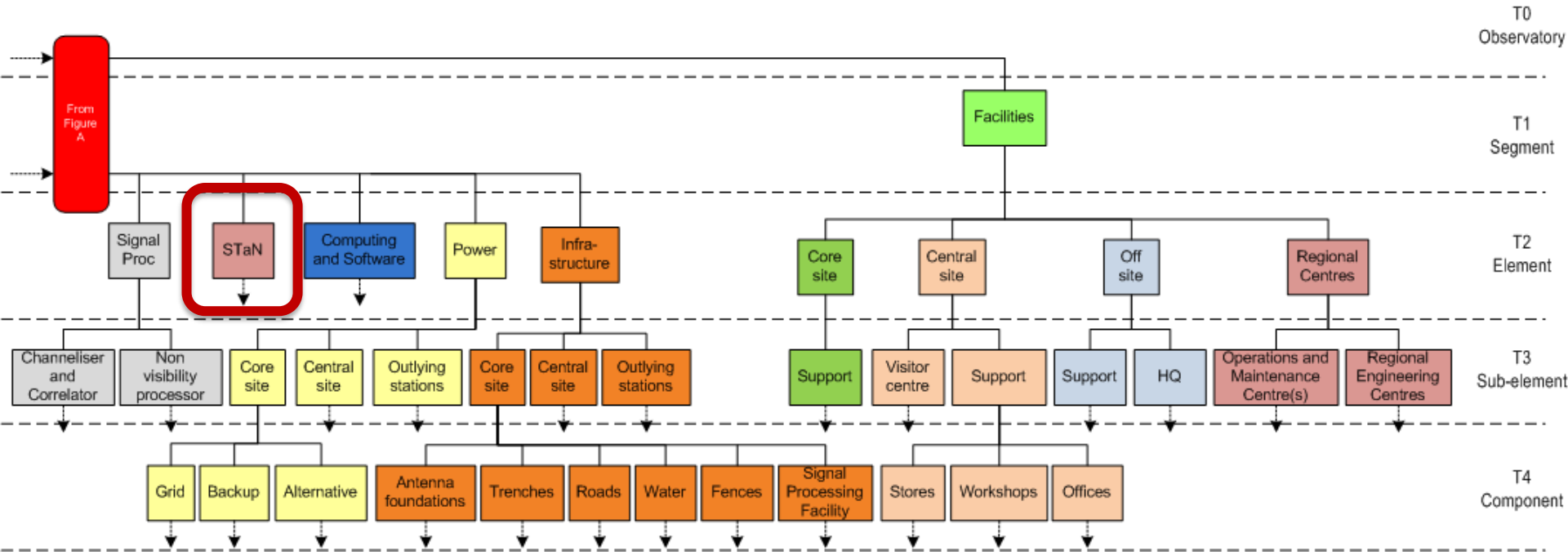
- Developed during Q4 2010 – Q1 2011
  - Management Strategies and Philosophies for WP2
  - Description Of Work
  - Review Process
  - Gaps
  - Management of the Programme
  - Risk Strategy and Risk Management

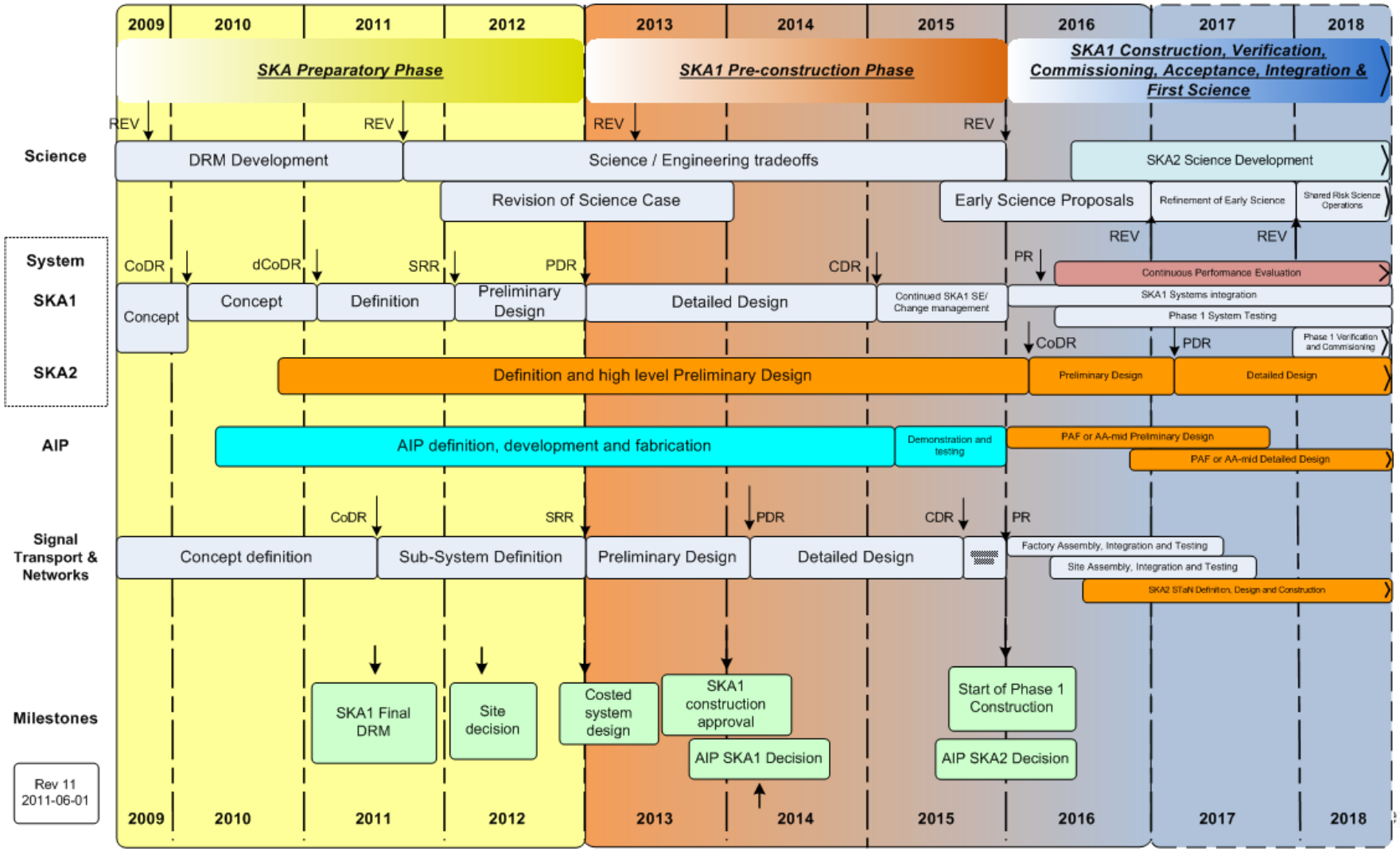
		WP2.X.1	WP2.X.2	WP2.X.3	WP2.X.4	WP2.X.5	WP2.X.6	WP2.X.7	WP2.X.8
WP2.1	SKA System	SKA definition and design	SKA life cycle studies and analysis	SKA Science operations	SKA Support operations	SKA Monitoring and control	SKA Electromagnetic compatibility (EMC)	SKA Cost analysis	SKA Power consumption
		SPDO	SPDO	ASTRON	SPDO	UK (UCAM, UOXF, UMAN)	OPAR and ASTRON	SPDO	SPDO
WP2.2	Dish Verification Program	Antenna Design	Wide Band Single Pixel Feed and RF Design	Phased Array Feed Design					
		SPDO, Cornell (TDP)	2.2.2.1 Cornell (TDP) 2.2.2.2 Cornell (TDP) 2.2.2.3 CSIRO 2.2.2.4 Cornell (TDP)	CSIRO					
WP2.3	Aperture Array Verification Program	Wide Field of View Aperture Array Tiles	AA Signal Processing						
		AAVP Management Team (UK and ASTRON)	AAVP Management Team (UK and ASTRON)						
WP2.4	Signal transport and Networks	Dish cable systems	Central Facilities Fibre Networks	Digital Data Backhaul	LO and Timing				
		SPDO	SPDO	SPDO	UK (UCAM, UOXF, UMAN)				
WP2.5	Digital Signal Processing	Correlator and Central Beamformer	Digital Beamformers	Non-imaging processor					
		NRC-HIA	2.5.2.1 CSIRO 2.5.2.2 UK (UCAM, UOXF, UMAN) 2.5.2.3 UK (UCAM, UOXF, UMAN)	UK (UCAM, UOXF, UMAN)					
WP2.6	Software and Computing	Software Engineering and Architecture Development	Computing Hardware Architecture Development	Calibration and Imaging	Non-Imaging Data Processing	Data Products, Data Storage and Data Distribution	Interfaces for Users and Operators	Exascale Computing and Hardware	
		ASTRON	SPDO	2.6.3.1 Cornell (TDP) 2.6.3.2 CSIRO 2.6.3.3 ASTRON	CSIRO (ASKAP)	UK (UCAM, UOXF, UMAN)	SPDO	Cornell (TDP)	
WP2.7	WP2 design study management	SPDO project management							
		SPDO							

Lead Organisations:

1. SPDO
2. ASTRON
3. CSIRO
4. DRAO
5. OPAR
6. TDP
7. UK


SKA User System
T0 Observatory
To Figure B
Feb 2011
Telescope
People
T1 Segment
Dish Array
Low Frequency Aperture Array
Mid Frequency Aperture Array
T2 Element
Dish
WBSPF
PAF
Receptors
Beamformer
Beam management
Receptors
Beamformer
Beam management
T3 Sub-element
Cryo
Feed
Receivers
LNA
Feed elements
LNA
Feed elements
LNA
T4 Component


T0
Observatory
T1
Segment
T2
Element
T3
Sub-element
T4
Component
From Figure A
Facilities
Signal Proc
STaN
Computing and Software
Power
Infra-structure
Core site
Central site
Off site
Regional Centres
Channeliser and Correlator
Non visibility processor
Core site
Central site
Outlying stations
Core site
Central site
Outlying stations
Support
Visitor centre
Support
Support
HQ
Operations and Maintenance Centre(s)
Regional Engineering Centres
Grid
Backup
Alternative
Antenna foundations
Trenches
Roads
Water
Fences
Signal Processing Facility
Stores
Workshops
Offices


2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
SKA Preparatory Phase
SKA1 Pre-construction Phase
SKA1 Construction, Verification, Commissioning, Acceptance, Integration & First Science
REV
REV
REV
REV
Science
DRM Development
Science / Engineering tradeoffs
SKA2 Science Development
Revision of Science Case
Early Science Proposals
Refinement of Early Science
Shared Risk Science Operations
REV
REV
System
SKA1
SKA2
CoDR
dCoDR
SRR
PDR
CDR
PR
Continuous Performance Evaluation
Concept
Concept
Definition
Preliminary Design
Detailed Design
Continued SKA1 SE/ Change management
SKA1 Systems integration
Phase 1 System Testing
CoDR
PDR
Phase 1 Verification and Commissioning
Definition and high level Preliminary Design
Preliminary Design
Detailed Design
AIP
AIP definition, development and fabrication
Demonstration and testing
PAF or AA-mid Preliminary Design
PAF or AA-mid Detailed Design
Signal Transport & Networks
CoDR
SRR
PDR
CDR
PR
Concept definition
Sub-System Definition
Preliminary Design
Detailed Design
Factory Assembly, Integration and Testing
Site Assembly, Integration and Testing
SKA2 STaN Definition, Design and Construction
Milestones
SKA1 Final DRM
Site decision
Costed system design
SKA1 construction approval
AIP SKA1 Decision
Start of Phase 1 Construction
AIP SKA2 Decision
Rev 11
2011-06-01
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

CoDR Dates

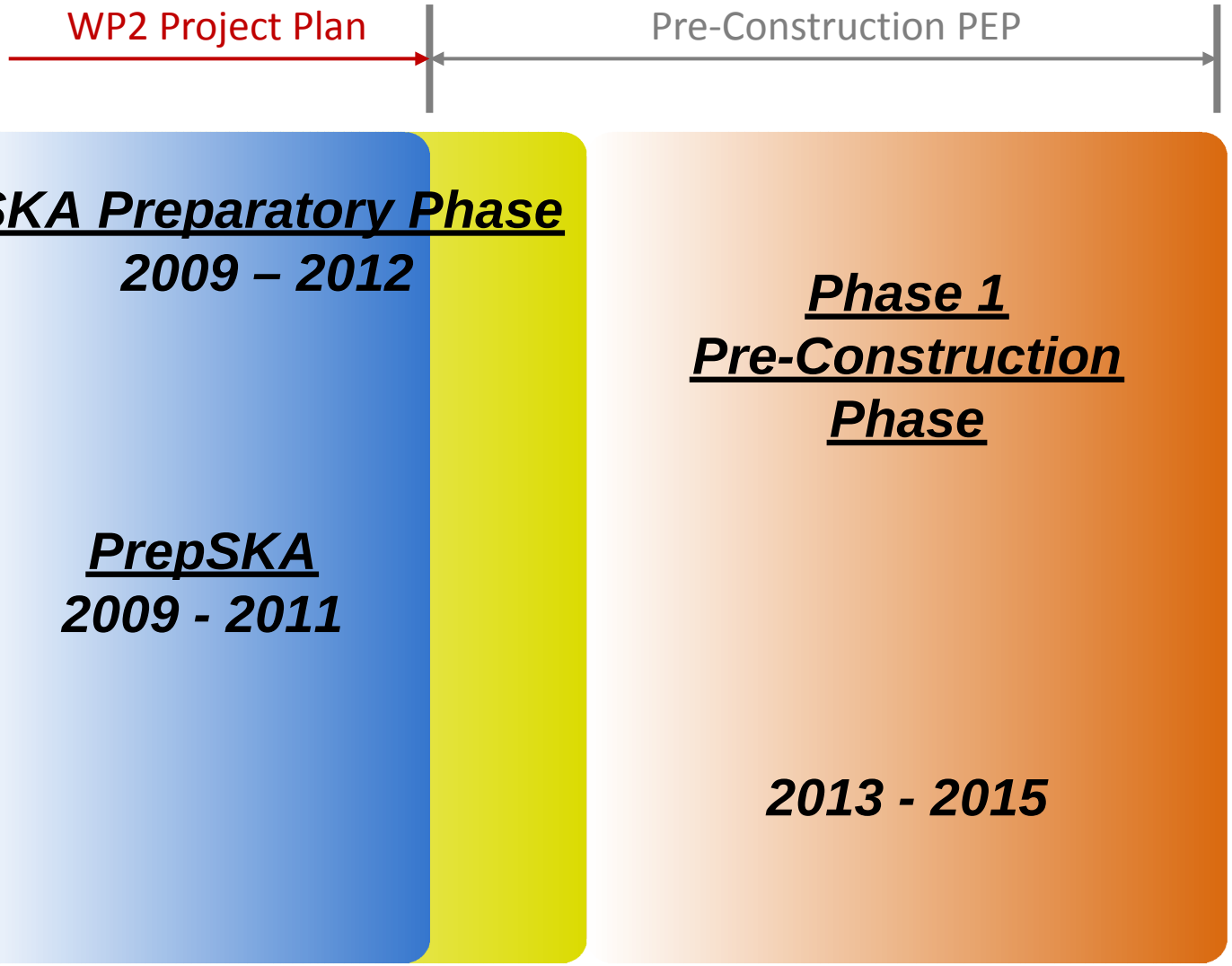
Review	Date	Location
Digital Signal Processing CoDR	**14-15 April 2011**	University of Manchester, UK
Aperture Arrays CoDR	**19-20 April 2011**	Schiphol, NL
Signal Transport & Networks CoDR	**28-30 June 2011**	Jodrell Bank Observatory, UK
Dish Array CoDR	**13-15 July 2011**	Penticton, CA
Software & Computing CoDR	**12-14 October 2011**	University of Manchester, UK
Monitor and Control CoDR	**November 2011**	Pune, India

WP2 Milestones and Deliverables

Milestone no.	Deliverable No.	Milestone name	Original Delivery date	Revised delivery date
WP2.1 SKA System				
MS7		System Concept Design review (CoDR)	T+22	T+22 (Feb 2010)
	D2.1	System CoDR Report	T+23	T+23 (Mar 2010)
MS7		System delta Concept Design review (CoDR)	None	T+34 (Feb 2011) **(23 -25 Feb 2011)**
	D2.1	System delta CoDR Report	None	T+35 (Mar 2011)
MS8		System Requirements review (SRR)	T+36	T+46 (Feb 2012)
	D2.2	System SRR Report	T+37	T+47 (Mar 2012)
MS9		System Preliminary Design	T+45	T+57 (Jan 2013)
	D2.3	System Preliminary Design Report	T+45	T+58 (Feb 2013)
WP2.2 Dish Verification Programme				
MS35		Dish and Dish Array CoDR	T+26	T+39 (Jul 2011) **(13-15 July 2011)**
	D2.4	Dish and Dish Array CoDR Report	T+27	T+40 (Aug 2011)
MS36		Dish and Dish Array SRR	T+36	T+59 (Mar 2013)
	D2.5	Dish and Dish Array SRR Report	T+36	T+60 (Apr 2013)
		Final Dish Array PrepSKA Wrap up report	None	T+48 (Apr 2012)

Milestone no.	Deliverable No.	Milestone name	Original Delivery date	Revised delivery date
WP2.3 Aperture Array Verification Program				
MS59		Aperture Arrays CoDR	T+30	T+36 (Apr 2011) **(19-20 Apr 2011)**
	D2.6	Aperture Array CoDR Report	T+31	T+37 (May 2011)
MS60		Aperture Array SRR	T+45	T+49 (May 2012)
	D2.7	Aperture Array SRR Report	T+46	T+50 (Jun 2012)
		Final Aperture Array PrepSKA Wrap up report	None	T+48 (Apr 2012)
WP2.4 Signal Transport and Networks				
MS73		Signal Transport & Networks CoDR	T+26	T+39 (Jul 2011) **(28-30 Jun 2011)**
	D2.8	Signal Transport & Networks CoDR Report	T+27	T+40 (Aug 2011)
MS74		Signal Transport & Networks SRR	T+42	T+55 (Nov 2012)
	D2.9	Signal Transport & Networks SRR Report	T+43	T+56 (Dec 2012)
MS75	D2.10	Final STaN PrepSKA wrap up Report	T+48	T+48 (Apr 2012)
WP2.5 Digital Signal Processing				
MS90		Digital Signal Processing CoDR	T+26	T+36 (Apr 2011) **(14-15 Apr 2011)**
	D2.11	Digital Signal Processing CoDR Report	T+27	T+37 (May 2011)
MS91	D2.12	Final Digital Signal Processing PrepSKA Wrap up report	T+48	T+48 (Apr 2012)
WP2.6 Software and Computing				
MS104		Software & Computing CoDR	T+33	T+42 (Oct 2011) **(12-14 Oct 2011)**
	D2.13	Software & Computing CoDR Report	T+34	T+43 (Nov 2011)
MS105	D2.14	Final Software & Computing PrepSKA wrap up report	T+48	T+48 (Apr 2012)

WP2 Project Plan and PEP



PEP

- Was commissioned by the SSEC and ASG
- Develop a plan for the work to be done during the Phase 1 pre-construction phase
- Team was assembled to develop the plan
- Completed during 2010
- Reviewed by external review panel during March 2011

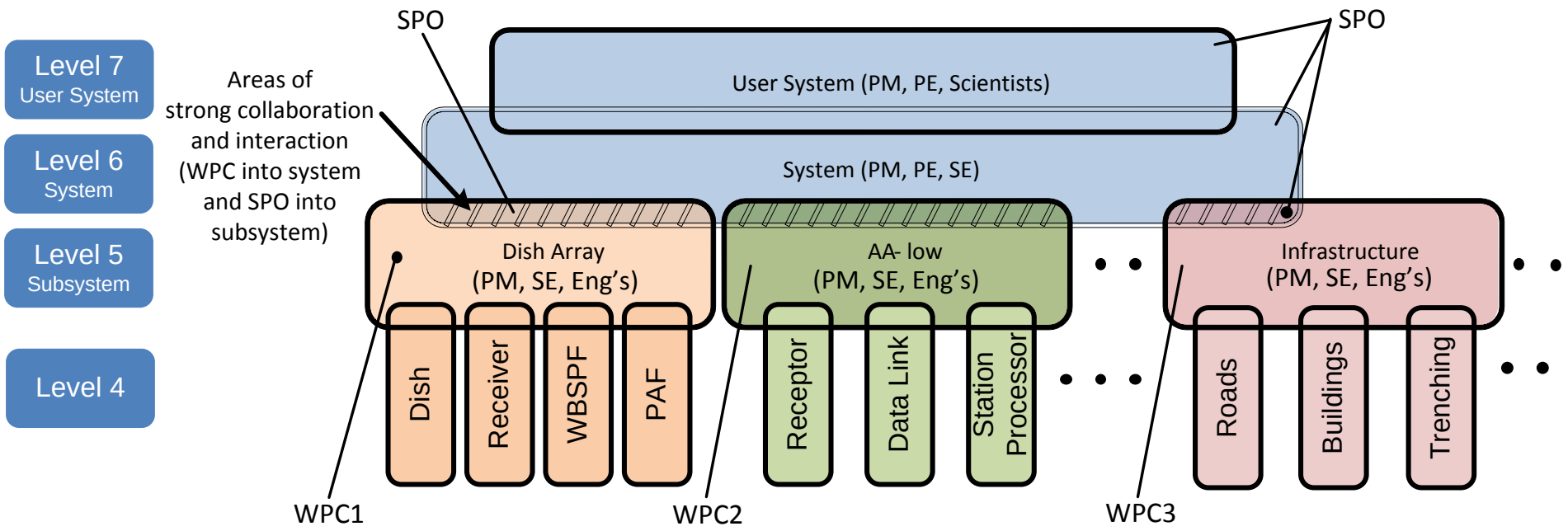
Goals of the pre-construction phase

1. Progress the SKA design to Production Readiness Review stage and let contracts for construction of major sub-systems

2. Progress infrastructure roll-out on selected site to allow sub-systems to be deployed

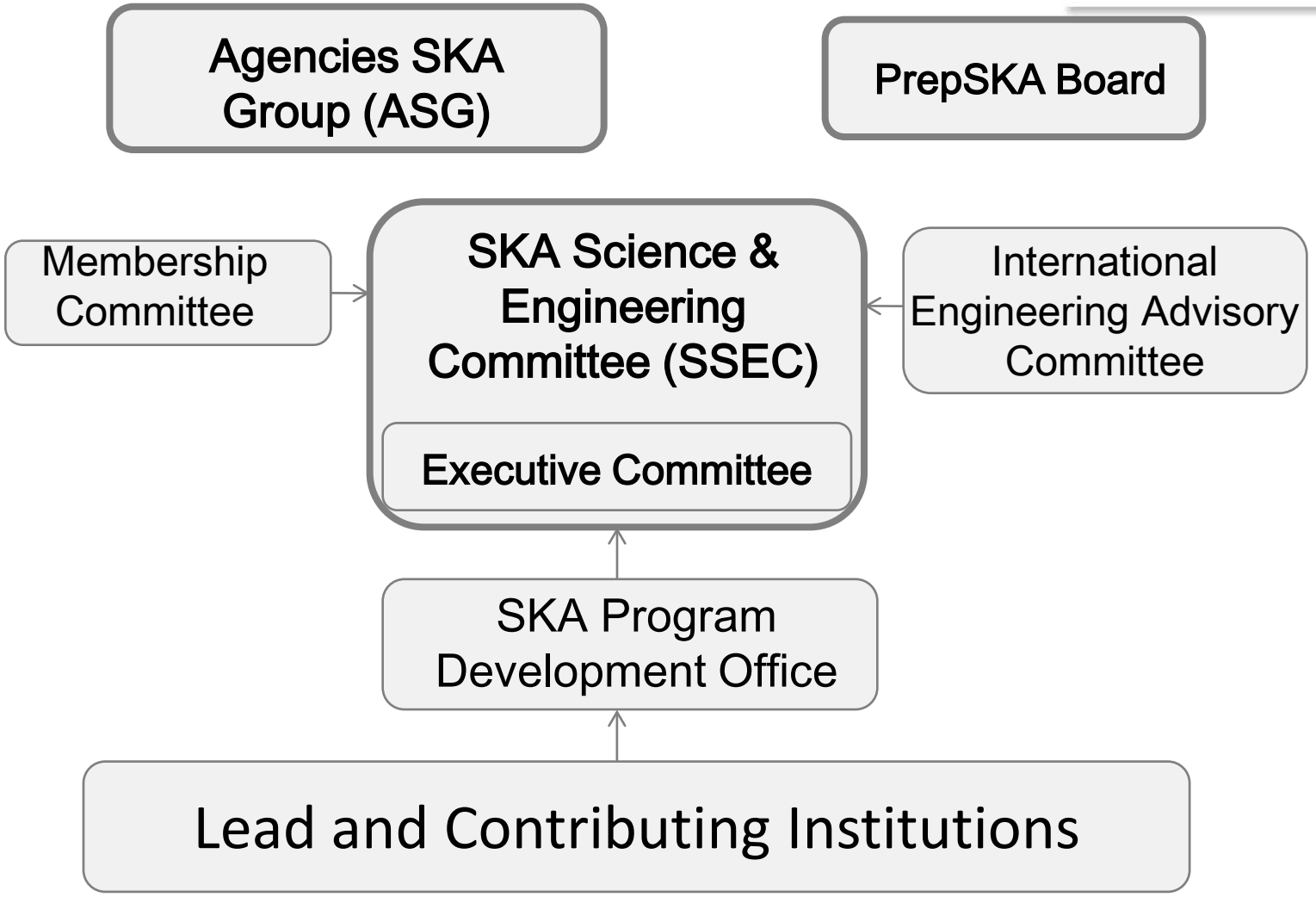
3. Mature the SKA legal entity into an organisation capable of carrying out the construction, verification, and operation of the telescope

SKA Project Structure

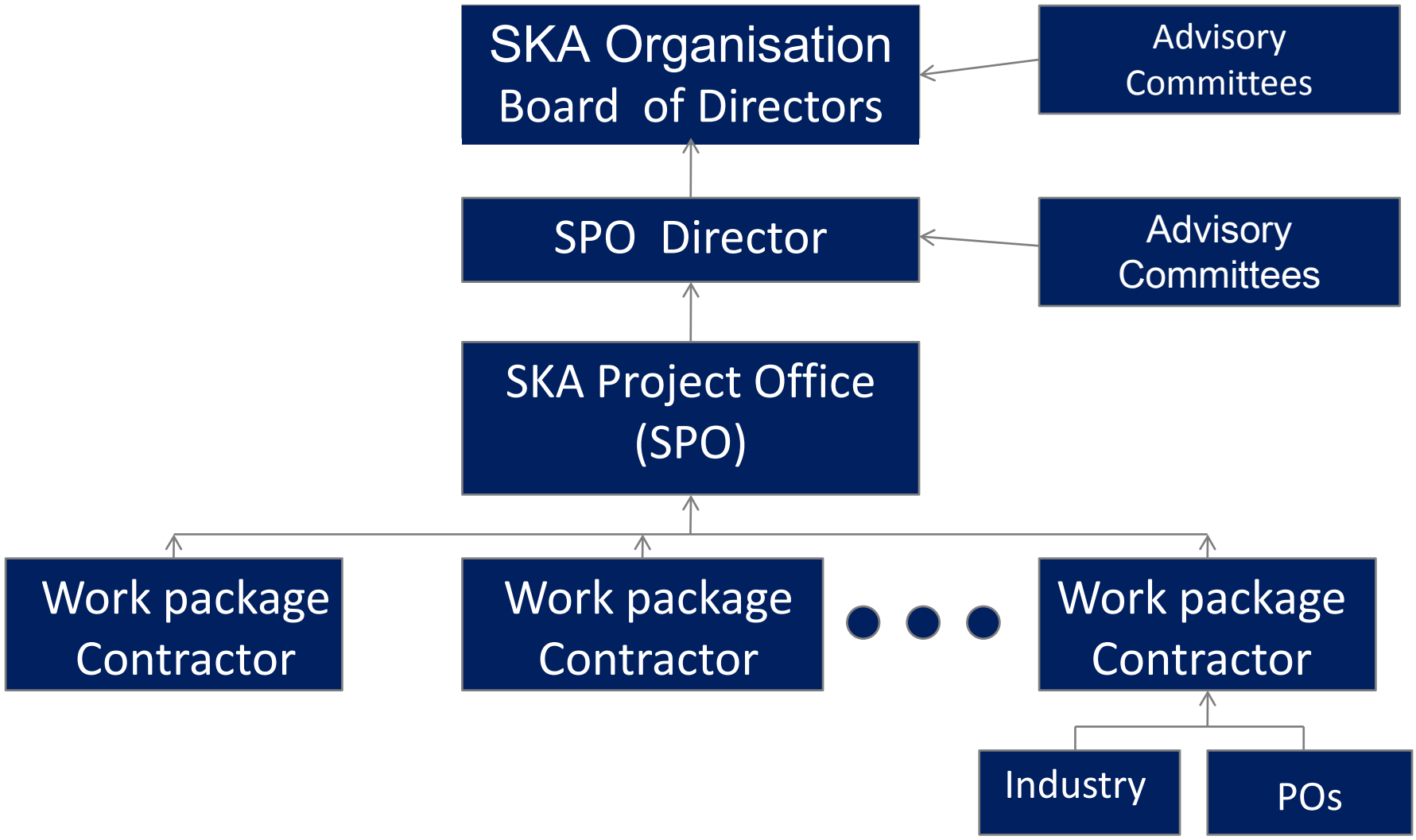


- **PEP Figure 2:** The relationships and interactions between system level activities, carried out at the SPO and the subsystem activities contracted to WPCs.

Former governance structure: April 2008 – March 2011



Governance: January 2012 →



Contractual Relationship: SPO ⇔ WPC

- Contractual foundation:
  - Reporting
  - Reviews
  - Deliverables
- Lines of communication:
  - Transparency
  - Who can talk to whom? How formal? Who pays for time used?
  - Cross-WPC communication (e.g. Infrastructure with everything else)
- Agreed change procedures
- Risk allocation
- Procedures on handling shortcomings in deliverables
  - Cost increases
  - Schedule overruns
  - Deliverables below spec

Work Packages in PEP

- SPO
  1. Management
  2. System
  3. Science
  4. Maintenance & Support, Operations
- WPCs
  1. Dish Array
  2. Aperture arrays
  3. Signal Transport & Networks
  4. Central Signal Processing
  5. Software and Computing
  6. Power
  7. Site preparation

Draft Process (still being finalised)

- Development of WBSs under the leadership of the SPDO/SPO
- Identification of Work Packages (WPs)
- Assembly of WPC Consortia and submission of tenders against WPs
- SPDO/SPO analysis of compliance and suitability of tenders and WPCs
- Board of Directors evaluation and assignment of contracts
- Drawing up of contracts
- Contract finalisation and signature
- Kick-off meetings

Summary

- STaN integral element of the SKA with many challenges ahead
- CoDR will provide the base for continuation of the work in PrepSKA and the transition into the next phase
- Structure and approach of the project will change but the opportunities in the various subsystems of the STaN are still there

Thank You