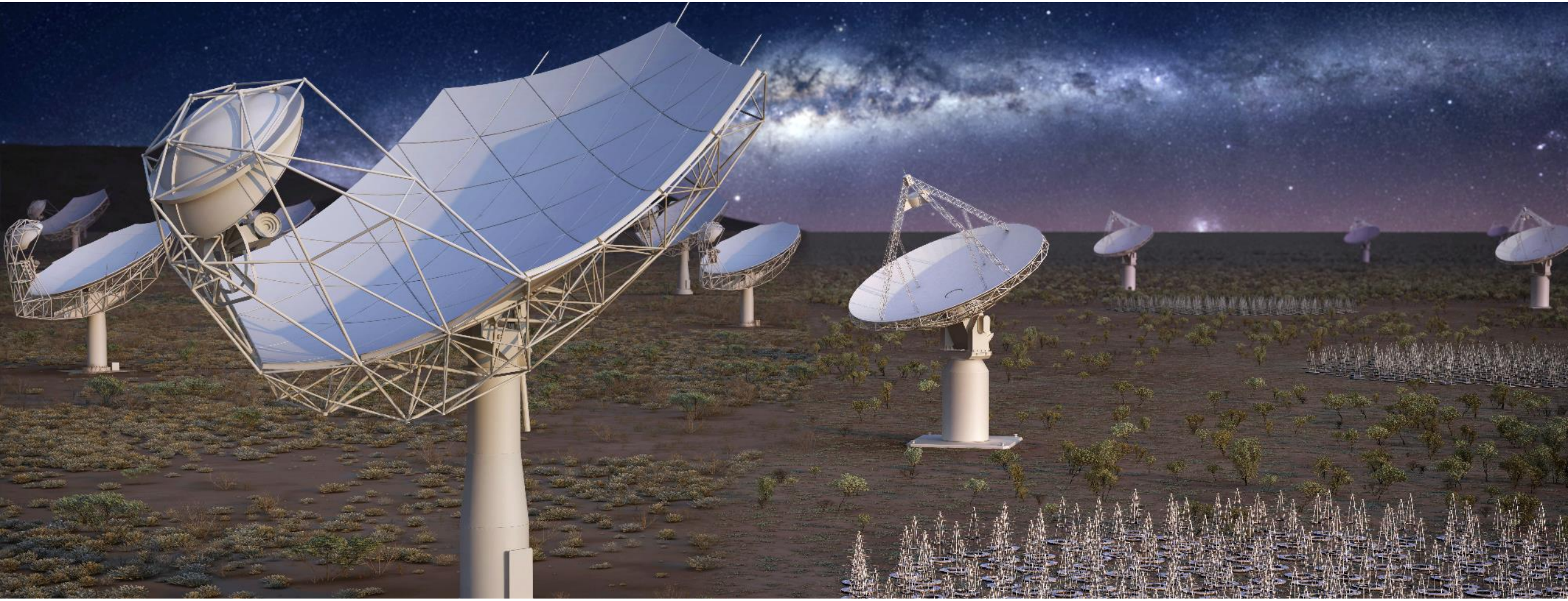
DBD overview



SQUARE KILOMETRE ARRAY

L. Stringhetti (SKA1 Project Engineer)

25th November 2019

Summary

- Part 1)
  - Introduction of the Design Baseline Document
    - Table of content
    - Key drivers (a personal selection) for the Design Baseline
- Part 2)
  - …transition to next talks

The top Four SKA1 S-CDR Documents

Document Number	Document Title	Notes
SKA-TEL-SKO-0001100	Project Execution File	The purpose of this document is to provide an overview of the SKA1 Project Execution Plan, a succinct description of the realization of the Project Management Plan and the processes by which we will deliver the project scope within budget and schedule.
SKA-TEL-SKO-0001075	Design Baseline Document	The main goal for this version of the Design Baseline Document (DBD) is to reflect the actual design of the two SKA1 telescopes.
SKA-TEL-SKO-0001020	SKA1 System Design Compliance Report	The purpose of the present document is to illustrate the status of compliance of the system design against the system requirements rev 11 and also to provide reference for the proof of the compliance.
SKA-TEL-SKO-0001069	Design Adoption Review Report	The purpose of this document is to report the outcome of the SKA1 System Design Adoption work culminating in the Adoption Design Review (ADR). It presents the outcome of the work, providing links to the adopted SKA System Design, the significant Gaps, Issues and Risks; and result of the ADR Meeting itself. This document reports the status of the SKA1 System Design Baseline as an input to the System Critical Design Review (CDR).

This and next three talks

Design Baseline Document

SKA1: DESIGN BASELINE DESCRIPTION

Document number SKA-TEL-SKO-0001075
Document Type ..... REP
Revision 01
Author ..... P. Dewdney et al.
Date 2019-10-21
Document Classification ..... FOR PROJECT USE ONLY
Status ..... Released

Name	Designation	Affiliation	Signature
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P. Dewdney	SKA Architect	SKAO	Date: Oct 21, 2019
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L. Stringhetti	SKA Project Engineer	SKAO	Date: Oct 21, 2019
Released by:			
J. McMullin	SKA Project Director	SKAO	Date: Oct 22, 2019

DBD in a nutshell

- This document describes the overall **System** Design of the SKA Observatory and its telescopes (e.g MID and LOW).
- Although originally written for the System Critical Design Review (CDR), it is also meant to be a unified technical narrative that can be understood by a diverse readership.
- The document has been written with the help of the whole engineering community.

SKA 1,2,3… 7,16,631,1500,3600…

1 Observatory

2 Telescopes

3 Host countries

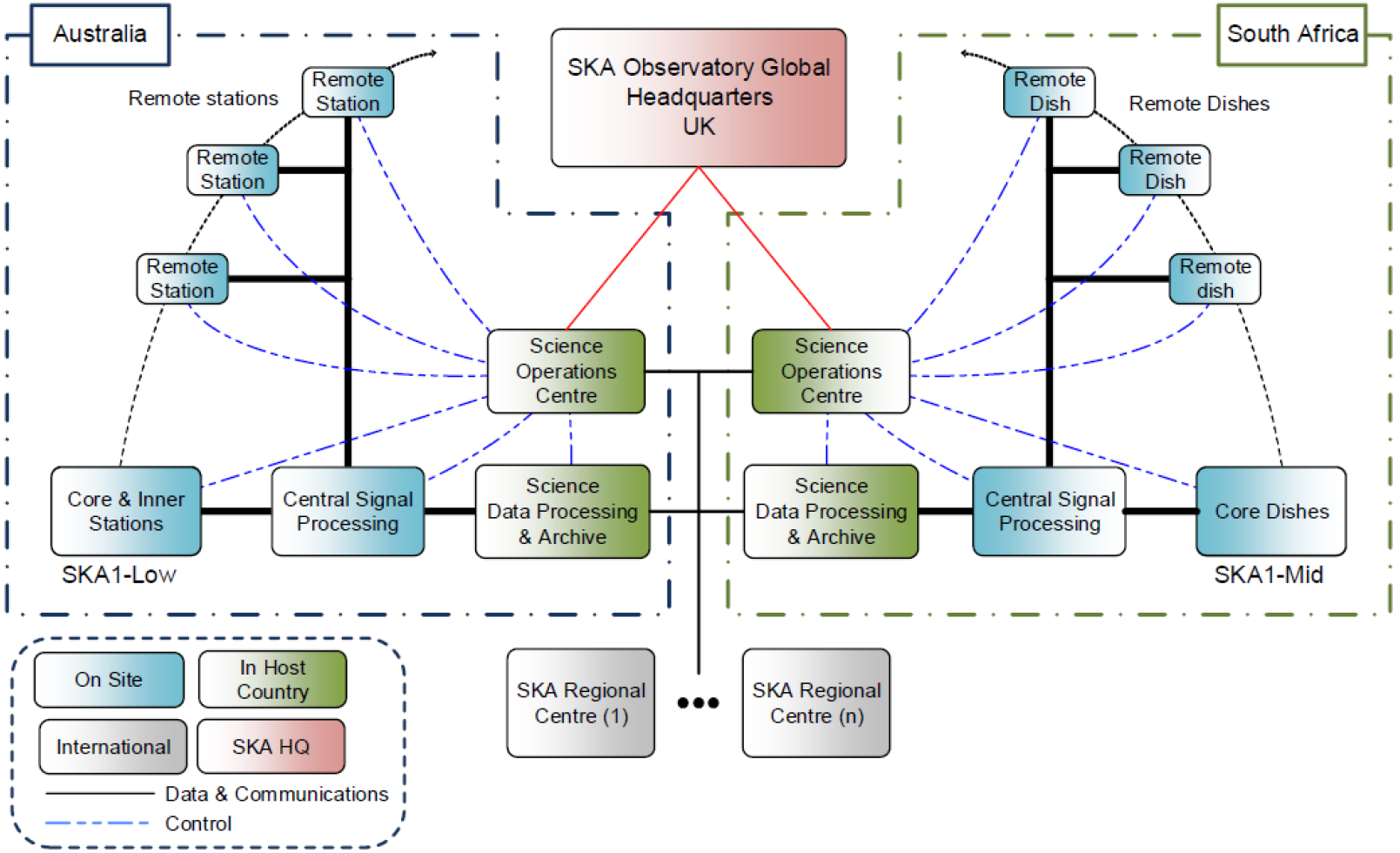
7 Countries signed the convention

16 Different nations are participating

631 pages in the DBD

1500 people are working for SKA

3600 pages in System doc for System CDR



DBD table of content

Observatory Design Strategy (examples)

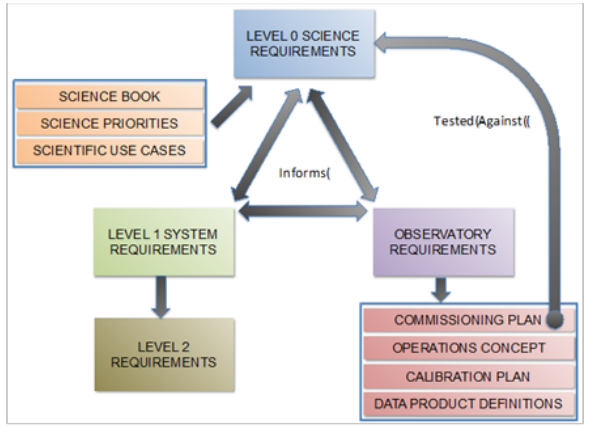
A list (but incomplete) of challenges for SKA that drive the design choices

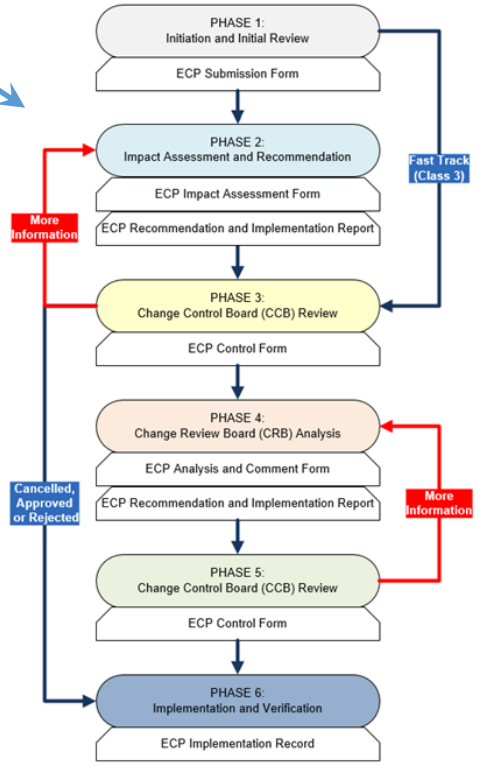
Because of all these (and sometime opposite) forces for SKA Quality is a paramount.

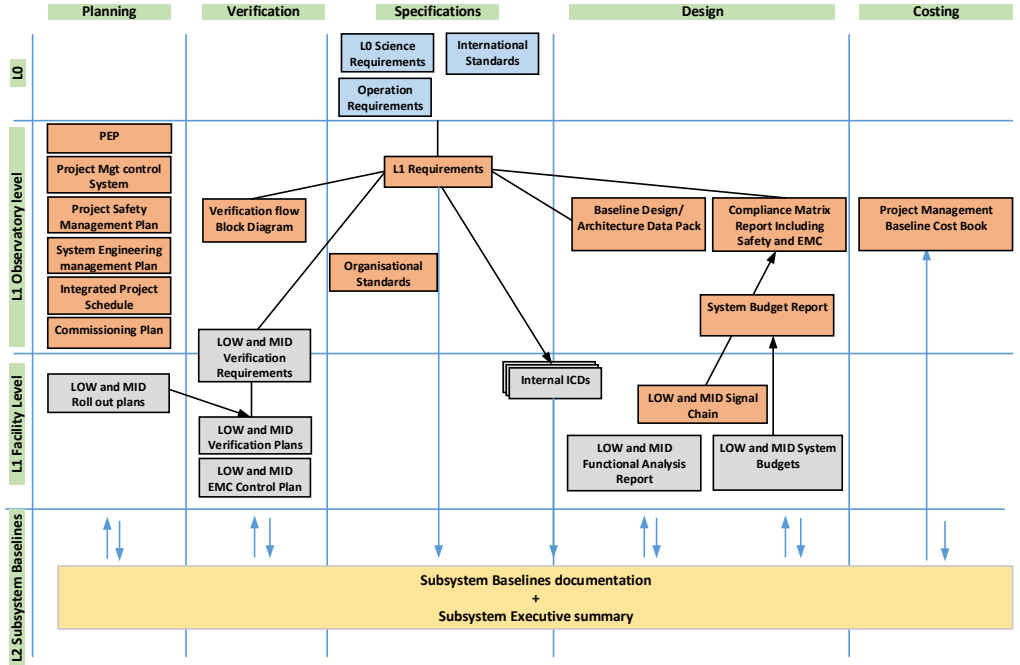
Title	Description
Observatory	SKA is not an experiment but an observatory therefore a certain degree of modularity drives the design in order to allow updates or technology refresh.
Array Configuration	The array configuration is a design choice with different drivers from the science to the cost in infrastructure. The central area and three spiral arms is the configuration chose to balance those factors. Also the availability of land and geological status are important drivers
Antenna Choice	Cost, performance but also maintainability and accessibility are the driver for the Gregorian offset antenna.
	Cost, performance especially the 7:1 band are the design driver for the LOW antenna.
	Station diameter and sparse-dense transition are driven by science performance.
Environment	RFI environment is another driver for the choice of the site and the driver for the signal chain to mitigate effect and enhance scientific results. Extreme weather (e.g. wind) and dry weather
Quality attributes (-ilities)	Maintainability, Reliability, Availability (resilience), Modifiability, Operability, of a remote site are strong driver for the design (SW and HW). Indeed, this includes the real time processing capability and the high scalability of SDP processing.
Life span	The life cycle of the SKA is 50 years.

Observatory Design Strategy (examples)

- System Engineering
  - Requirements management and flow-down.
  - Document tree, including ICDs.
  - Engineering Change Procedure.







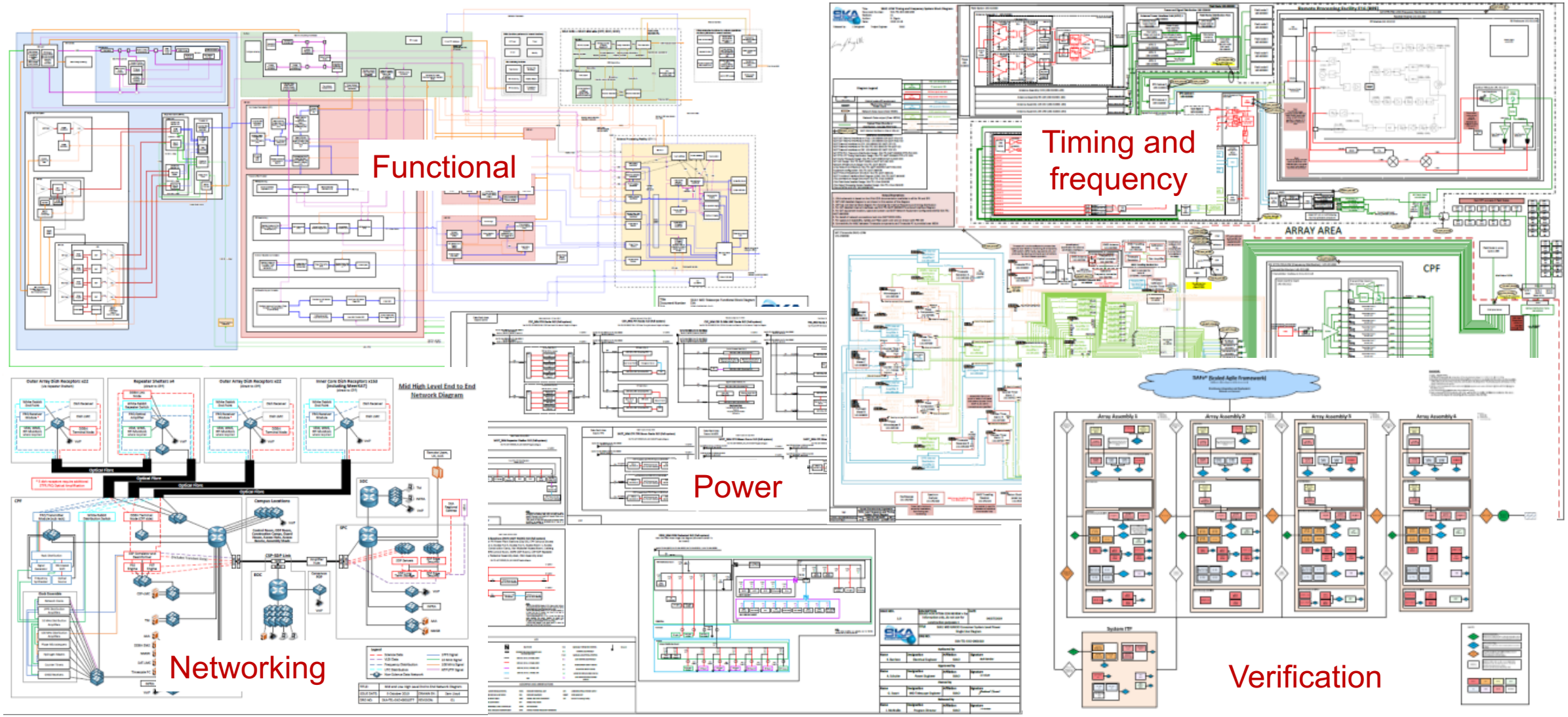
Conclusion (Part 1)

- SKA is a complex system and it cannot be divided in smaller “manageable” simple parts, therefore a holistic approach is needed.
  - The DBD is indeed presenting the observatory and the full system with references to the detailed work done at Consortium Level.
  - **This is the only document where the entire telescope is described**.

- Systems Engineering is a must in the SKA telescope.
  - The DBD is the narrative of the “as design telescope that fulfil the requirement space described in the L1 System Requirement document.
  - The systems approach will continue through the Construction Phase in the next stages, construction and manufacturing/coding, and integration and test.

- (HW and SW) Quality is a paramount.
  - The DBD introduces the concept of quality (Referring to the SKA quality plan). Because of the high request from the “–bilities” (quality attributes), quality is essential for the success of the next phase of SKA1.

The DBD is based on fantastic engineering work



How many TEs do we need to build a telescope?

Only two!
Enjoy Maria Grazia and Gerhard's talks!

SKA1 Multinational Project

SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

Design Baseline

ASNI/EIA Configuration Management Standard

BASELINE: An agreed-to description of the attributes of a product at a point in time, which serves as a basis for defining changes.

SQUARE KILOMETRE ARRAY

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