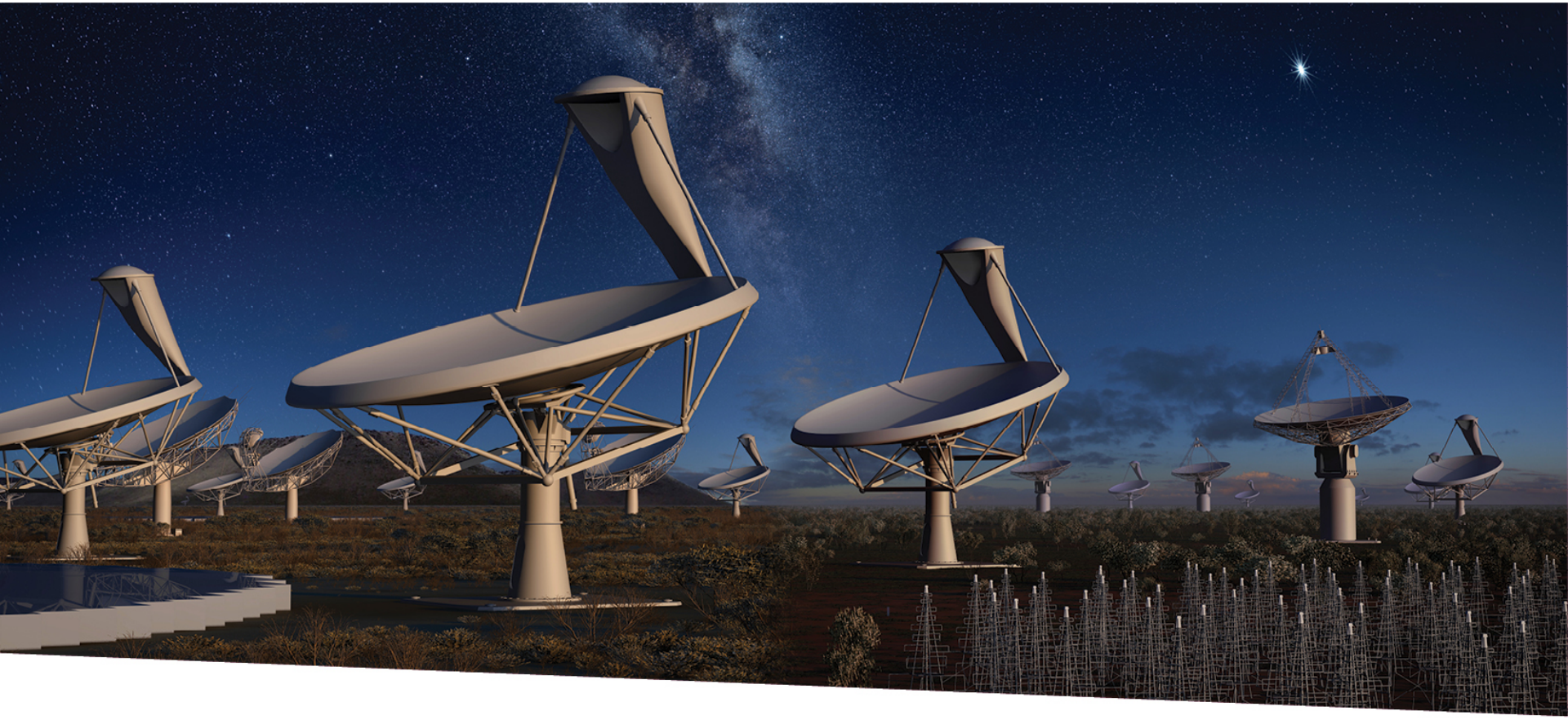
SKA (2)

“not SKA1, not only SKA2 but something in the middle”



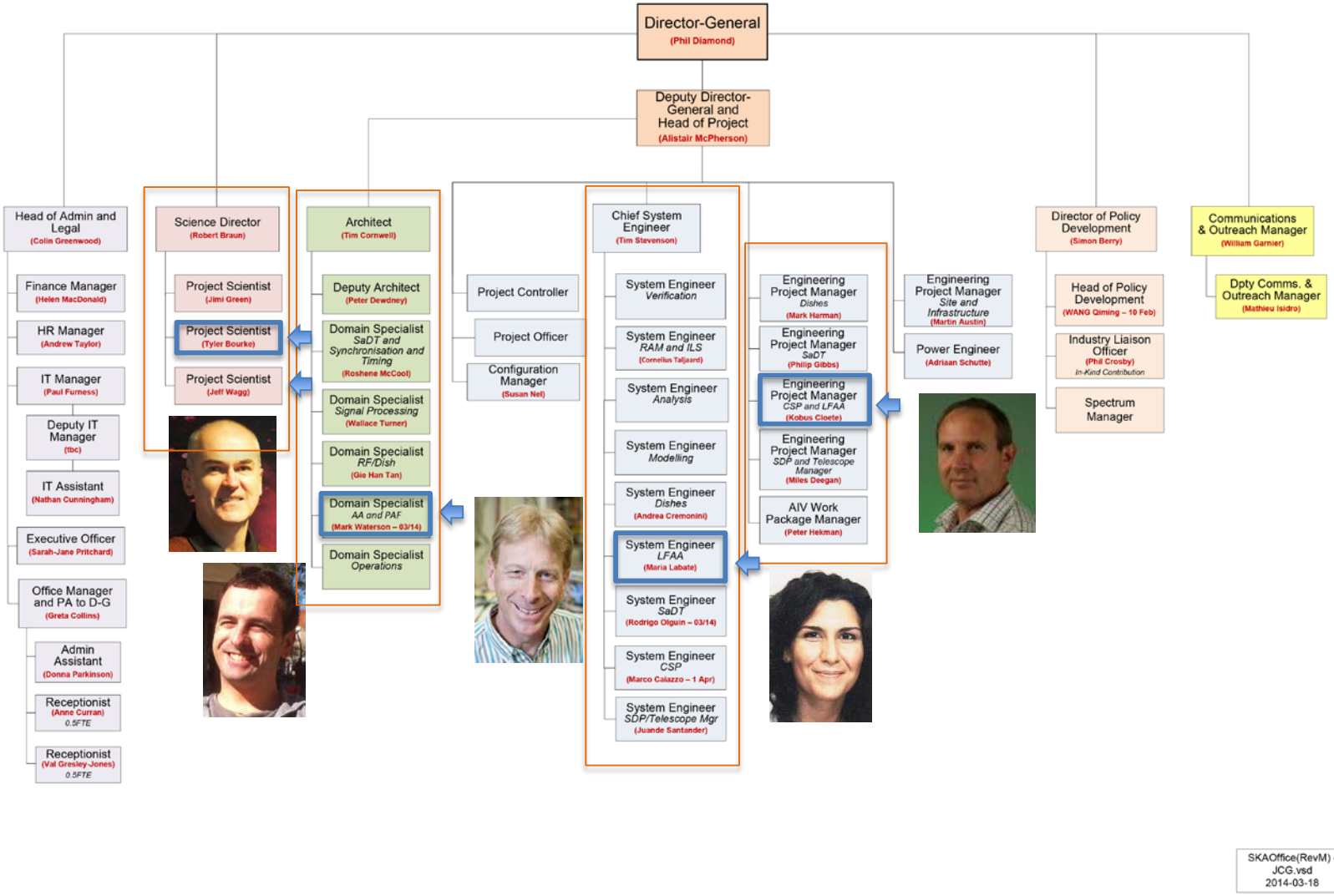
SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

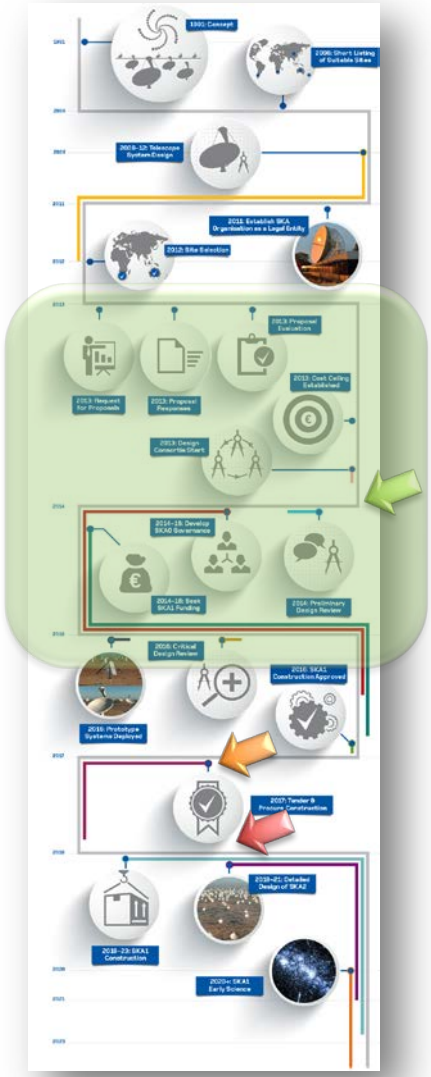
Maria Grazia Labate
SKAO AA System Engineer

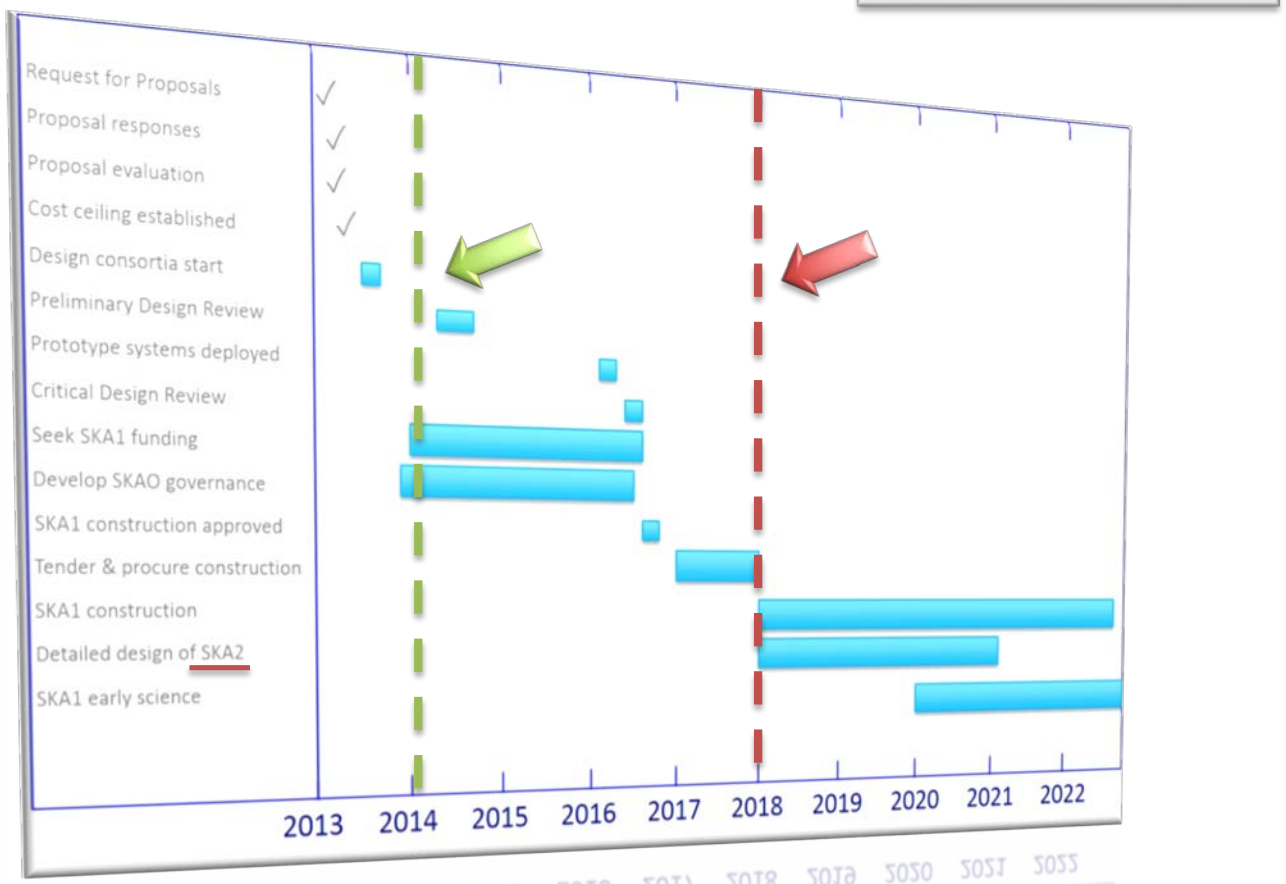
April 1st, 2014 Dwingeloo

SKAO support

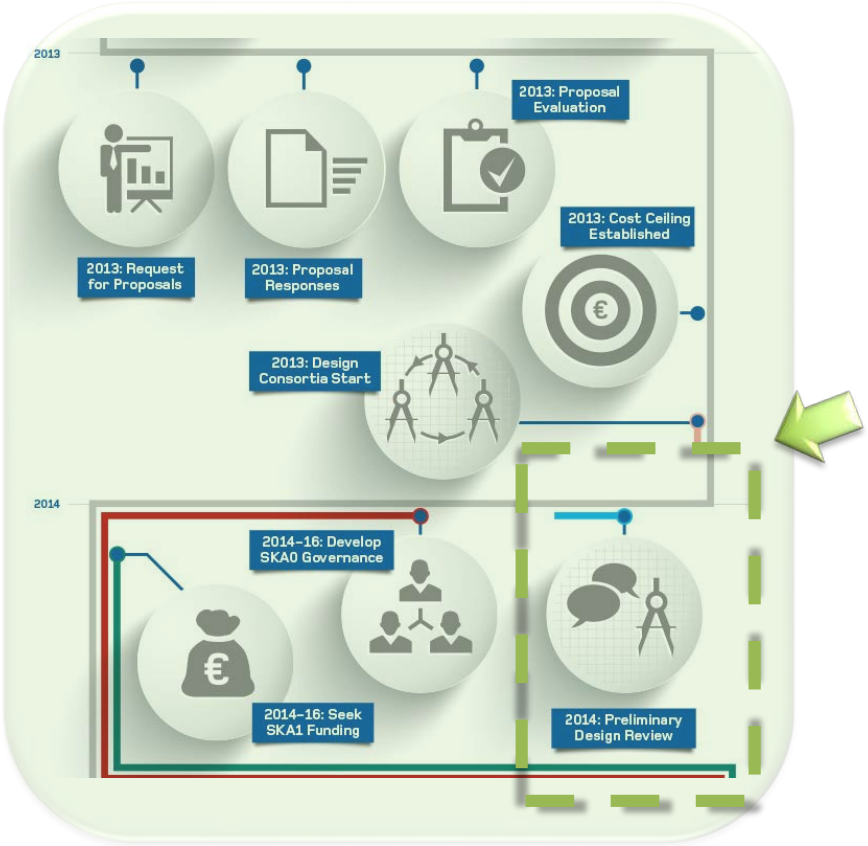


The Project Timeline





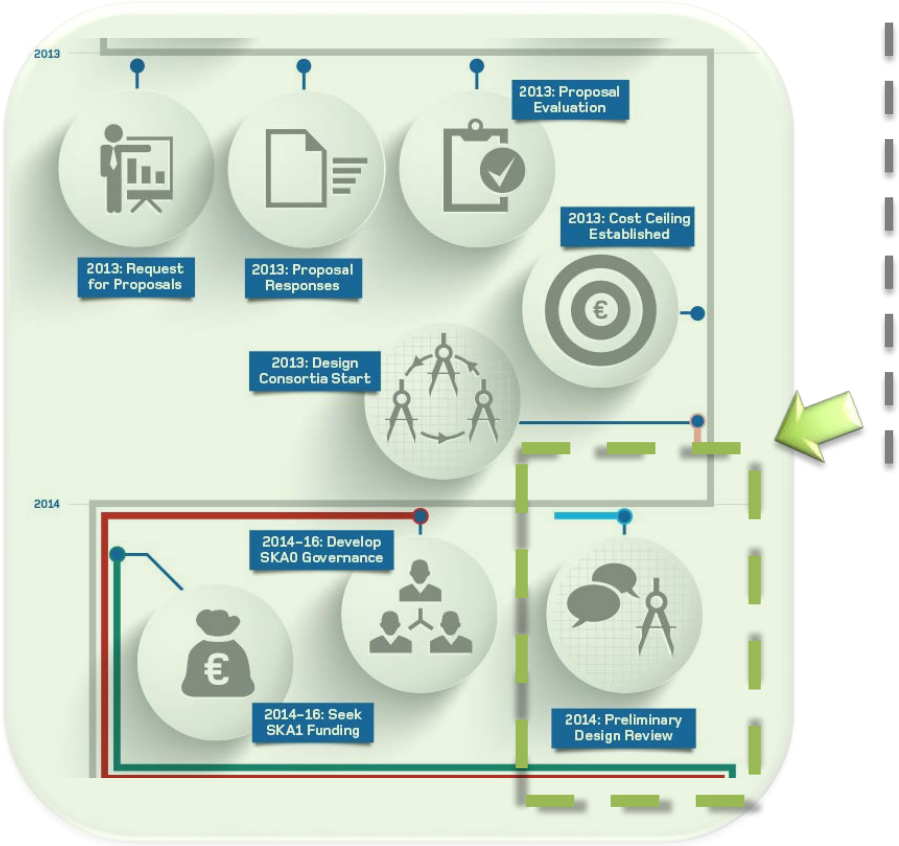
What is going on …



✓ SKA Engineering Meeting

---- Done

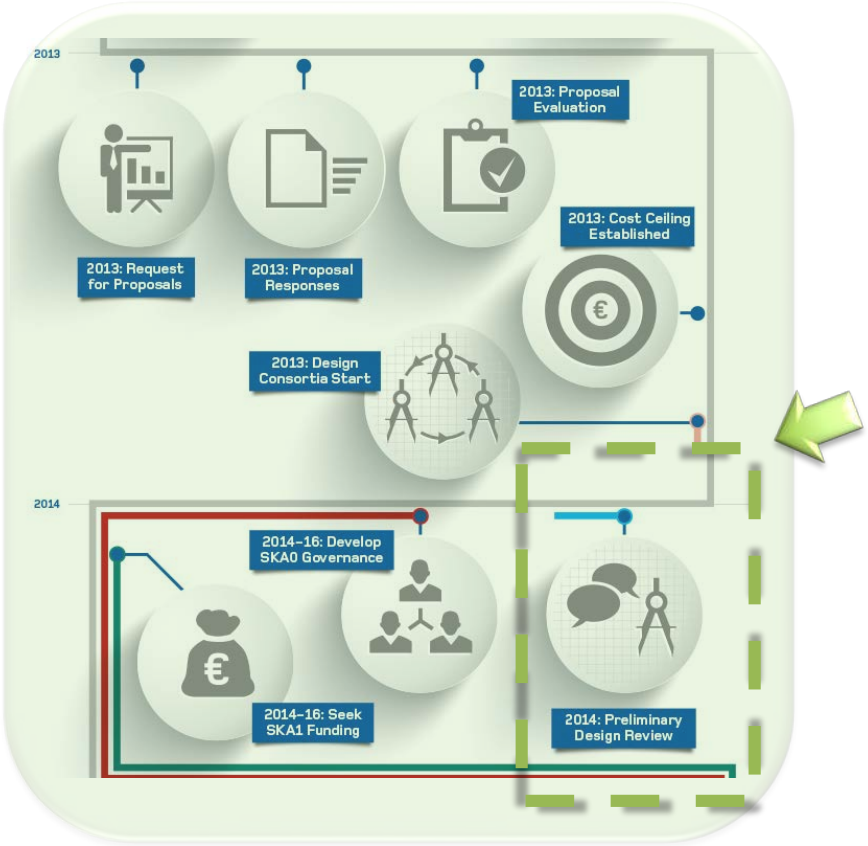
What is going on ...



Done

- ✓ SKA Engineering Meeting
- ✓ Kickoff (T0)

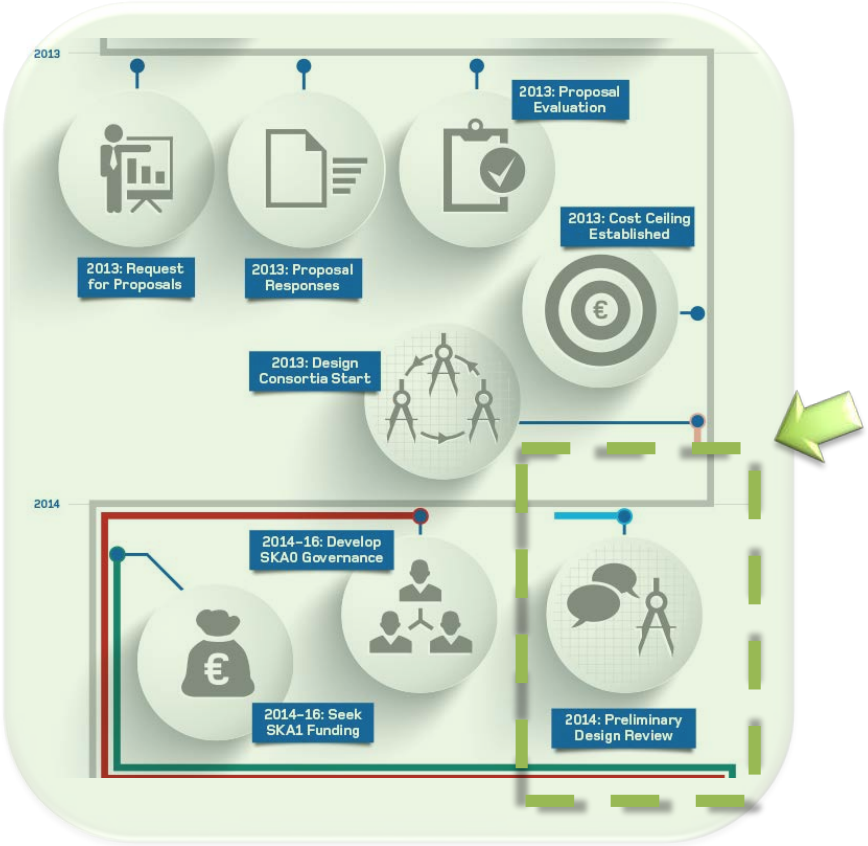
What is going on …



Done

- ✓ SKA Engineering Meeting
- ✓ Kickoff (T0)
- ✓ (SKA1) Level 1 Requirements and T0+12w documentation

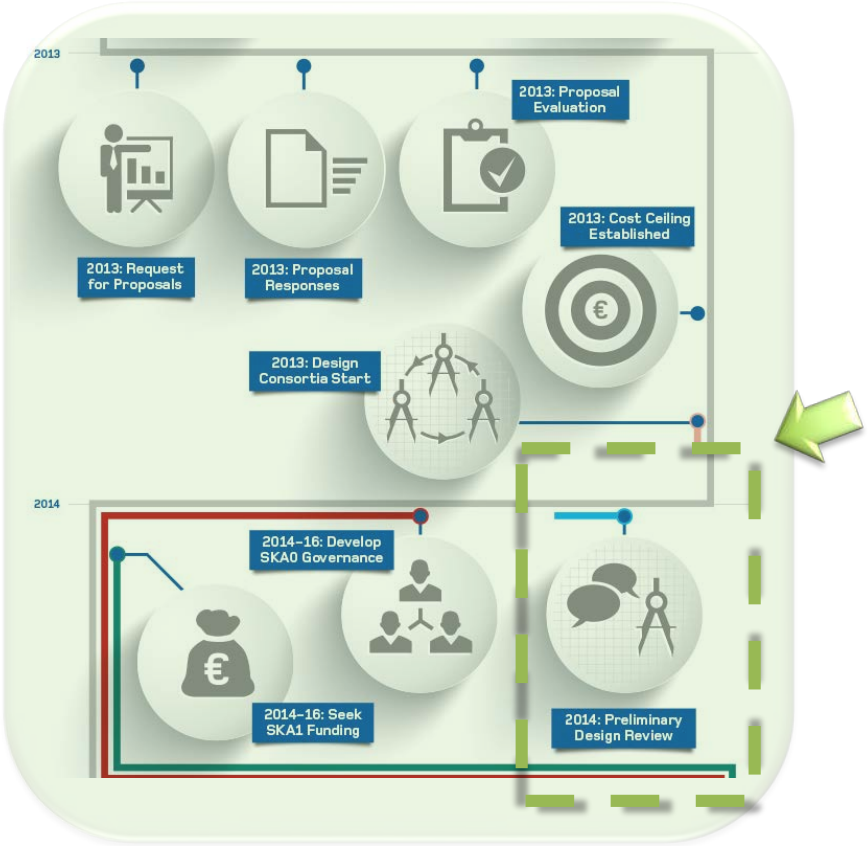
What is going on …



Done
In progress
Near future

- ✓ SKA Engineering Meeting
- ✓ Kickoff (T0)
- ✓ (SKA1) Level 1 Requirements and T0+12w documentation
- ✓ MoU signature
- ✓ ICDs
- ✓ ECP submissions

What is going on …



Done
In progress
Near future

- ✓ SKA Engineering Meeting
- ✓ Kickoff (T0)
- ✓ (SKA1) Level 1 Requirements and T0+12w documentation
- ✓ MoU signature
- ✓ ICDs
- ✓ ECP submissions
- ✓ Milestones
- ✓ PDR

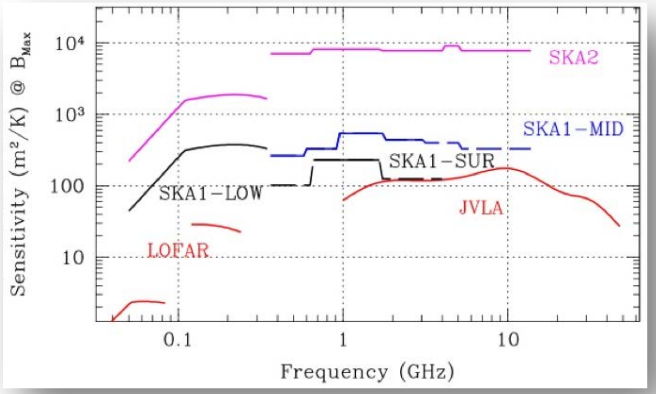
MFAA: Milestones and Deliverables

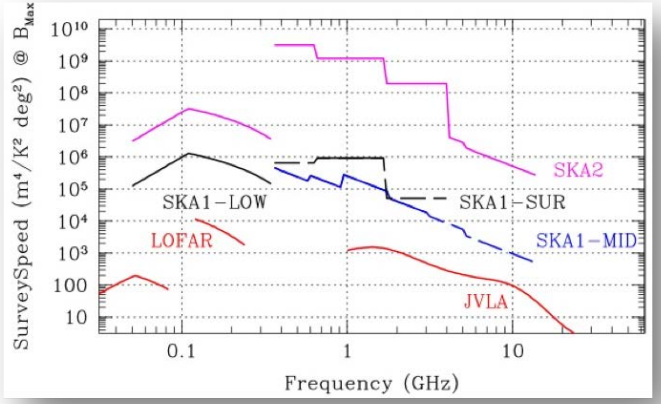
Date	Nominal Date	Deliverable	Earned Value
T0	1st Nov 2013	Bid preparation and OSKAO delivery of (SKA1) Level 1 requirements	€0,5M
T0 + 2 years	1st Nov 2015	System Requirements Review and associated documents (see SEP)	€4,0M
T0 + 3 years	1st Nov 2016	Preliminary Design Review and associated documents (see SEP)	€1,9M
Continues	Monthly	Monthly Progress meetings (36 in total)	€3,6M
			= €10M

1st AAMID Monthly Progress Meeting – April 3rd 2014

Progression to SKA2

SKA2: much larger and more sensitive





This progression can be visualized either from the perspective of the **introduction of new technologies currently being investigated** or from the perspective of how the individual telescopes might be expanded or enhanced (*)

ID (**)	Requirement
SYS_REQ-2433	Design for **Extensibility**. Design trade studies for SKA1 shall include scenarios where design features are included which will allow 1. Increases in the number of receptors for SKA2 over SKA1 by a factor of 10 whilst re-using more than 90% of SKA1 hardware 2. The introduction of AIP technologies at SKA2 scales whilst re-using more than 90% of SKA1 hardware Such trade studies shall yield the incremental cost of such scenarios over those which do not include such design features.

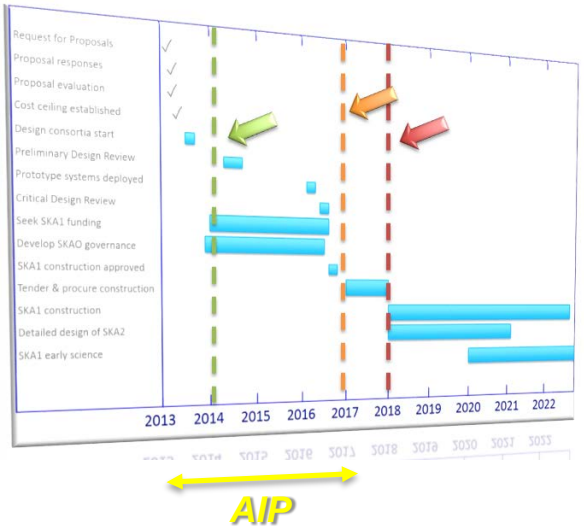
(*) Baseline Design (**) SKA PHASE 1 SYSTEM (LEVEL 1) REQUIREMENTS SPECIFICATION

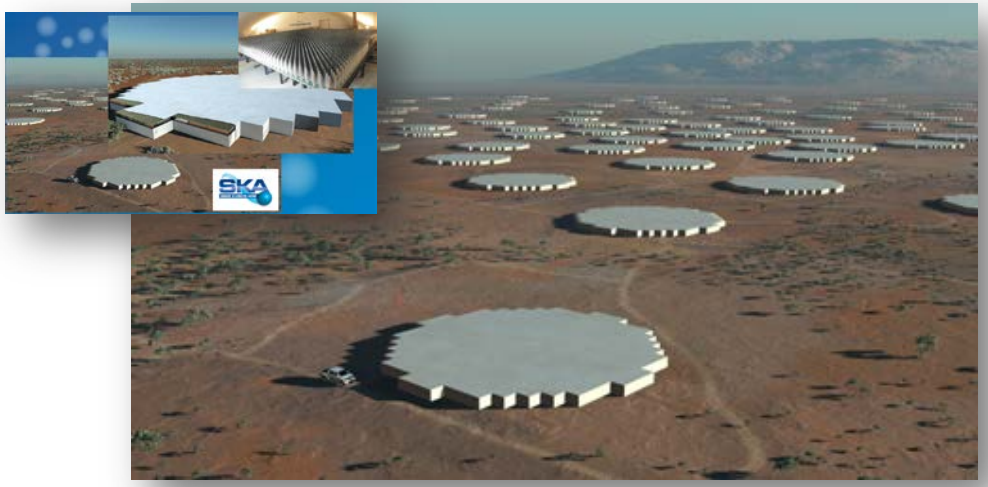
Advanced Instrumentation Programme

The SKA programme will involve the development of **immature technologies**, some of which have been already identified and catered for in the Advanced Instrumentation Programme (AIP) (*)

- ✓ In conjunction with the detailed design and pre-construction work on the SKA1 system, an AIP will be executed to further **develop** the new technologies.

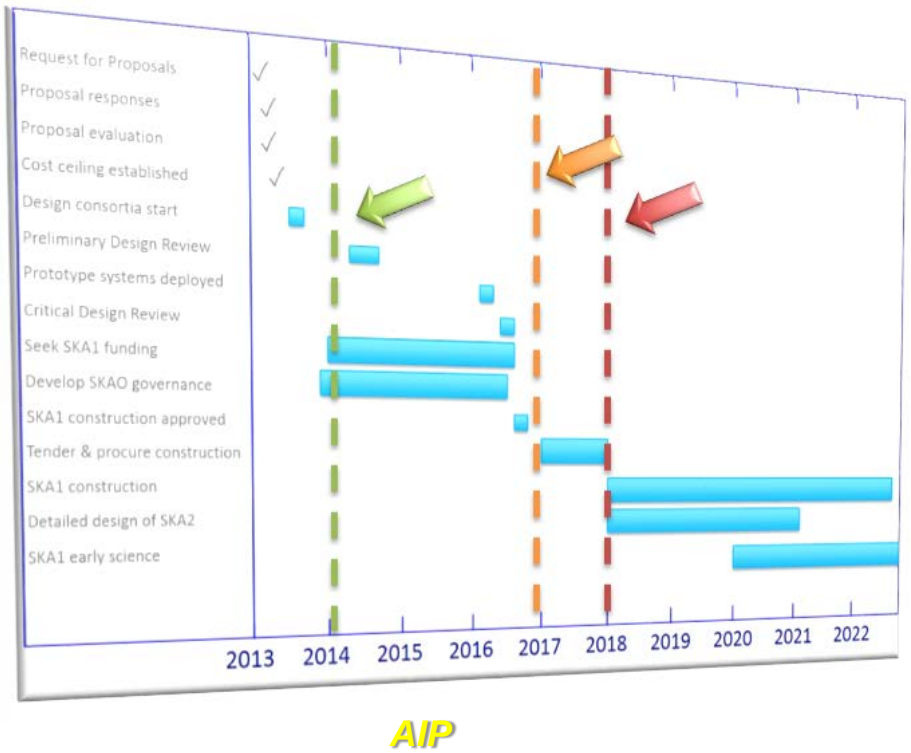
- ✓ These technologies will be **assessed** in terms of science impact, cost and technical readiness, and deployed in SKA2 if shown to be feasible and cost-effective.





(*) MGT-001.005.005-MP-001_K

AIP & SKA Phase 2



AIP

- **Assessment** of the AIP technologies to determine whether its **level of maturity** is sufficient to be included in the SKA2 system. (*)

- Decision on **selection of the technologies** to be deployed in SKA2 will be made.

- Analyse the SKA requirements to maximise the potential of the new technology to enhance system performance, achieve more of the initial system requirements and/or reduce cost.

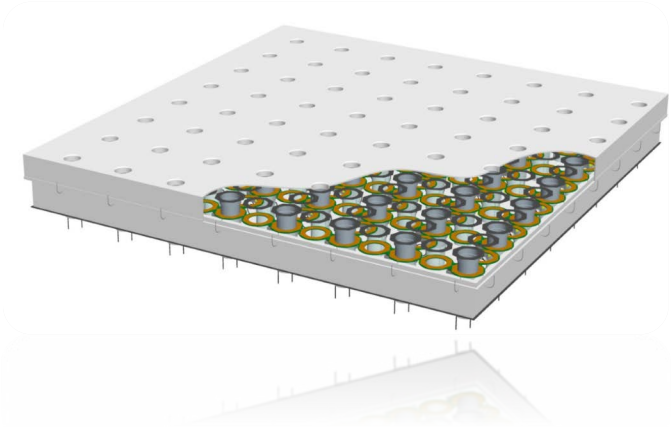
- The SKA2 Preliminary Design will consider all the **mature technology options** in a system design in which the use of the technologies is fully optimised.

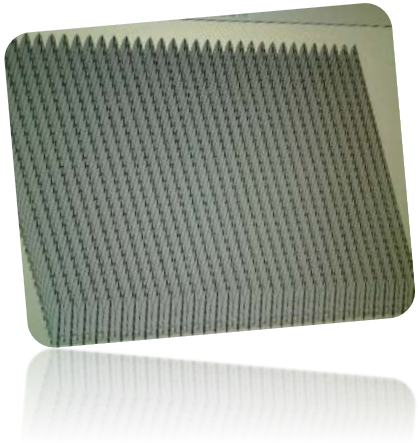
(*) MGT-001.005.005-MP-001_K

AIP: Objectives

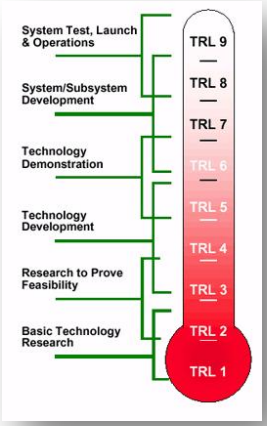
It will be necessary to make technology choices at the appropriate stage to develop the selected technologies to a maturity level commensurate with the aims and deliverables of the development (*)

- ✓ Evaluate different **concepts** of front-end technology that can serve to assist in the preliminary design of the MFAA.





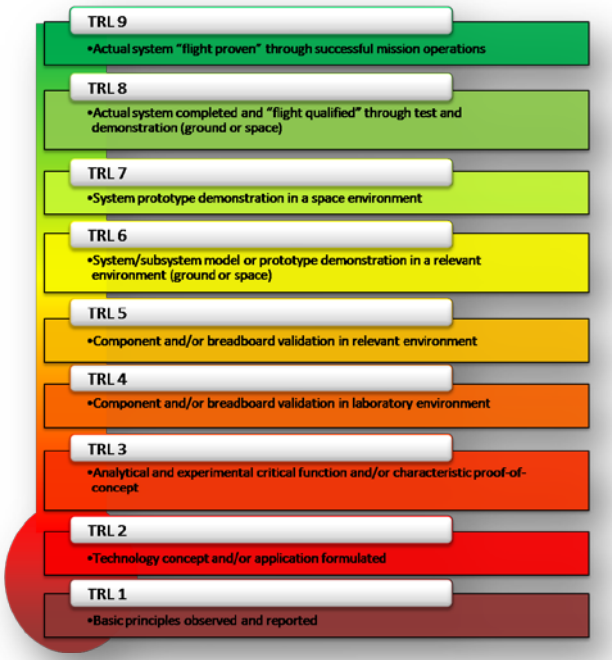
- ✓ Demonstrate the **technological maturity** of the MFAA technology



(*) SKA.TEL.SE-SKAO-MP-001-1_SEMP

(**) MGT-001.005.005-MP-001_K

Technology Readiness Assessment



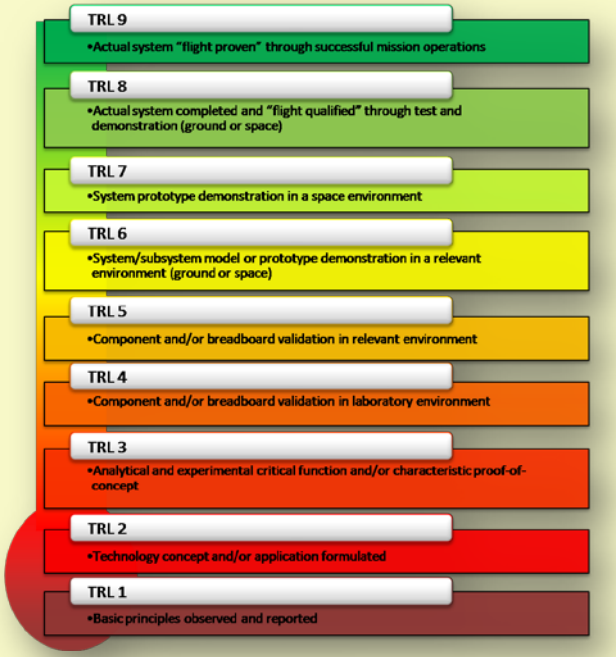
(**)

Technology Readiness Level - (TRL)	Definition	Explanation (*)
9	Actual system proven through successful observatory operations	The system incorporating the new technology in its final form has been used under actual mission conditions.
8	Actual system completed and qualified through test and demonstration (housed or exposed)	In an actual system, the technology has been proven to work in its final form and under expected conditions.
7	System prototype demonstration in a real environment	A prototype system that is near, or at, the planned operational system.
6	System/subsystem model or prototype demonstration in a relevant environment (housed or exposed)	A representative model or prototype system is tested in a relevant environment.
5	Component and/or breadboard validation in relevant environment	The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment.
4	Component and/or breadboard validation in laboratory environment	Basic technological components are integrated to establish that they will work together.
3	Analytical and experimental critical function and/or characteristic proof-of- concept	Active research and development is initiated, including analytical / laboratory studies to validate predictions regarding the technology
2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be invented and R&D started. Applications are speculative and may be unproven.
1	Basic principles observed and reported	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development.

- ✓ The details of an appropriate technology readiness assessment process depend on the specifics of the prospective system applications and programme requirements
- ✓ SKA assessment for **risk identification** and **mitigation**

(*) **SKA.TEL.SE-SKAO-MP-001-1_SEMP**
(**) **Further information on NASA's definitions of TRLs can be found in NPR 7120.8**

SKA (2)

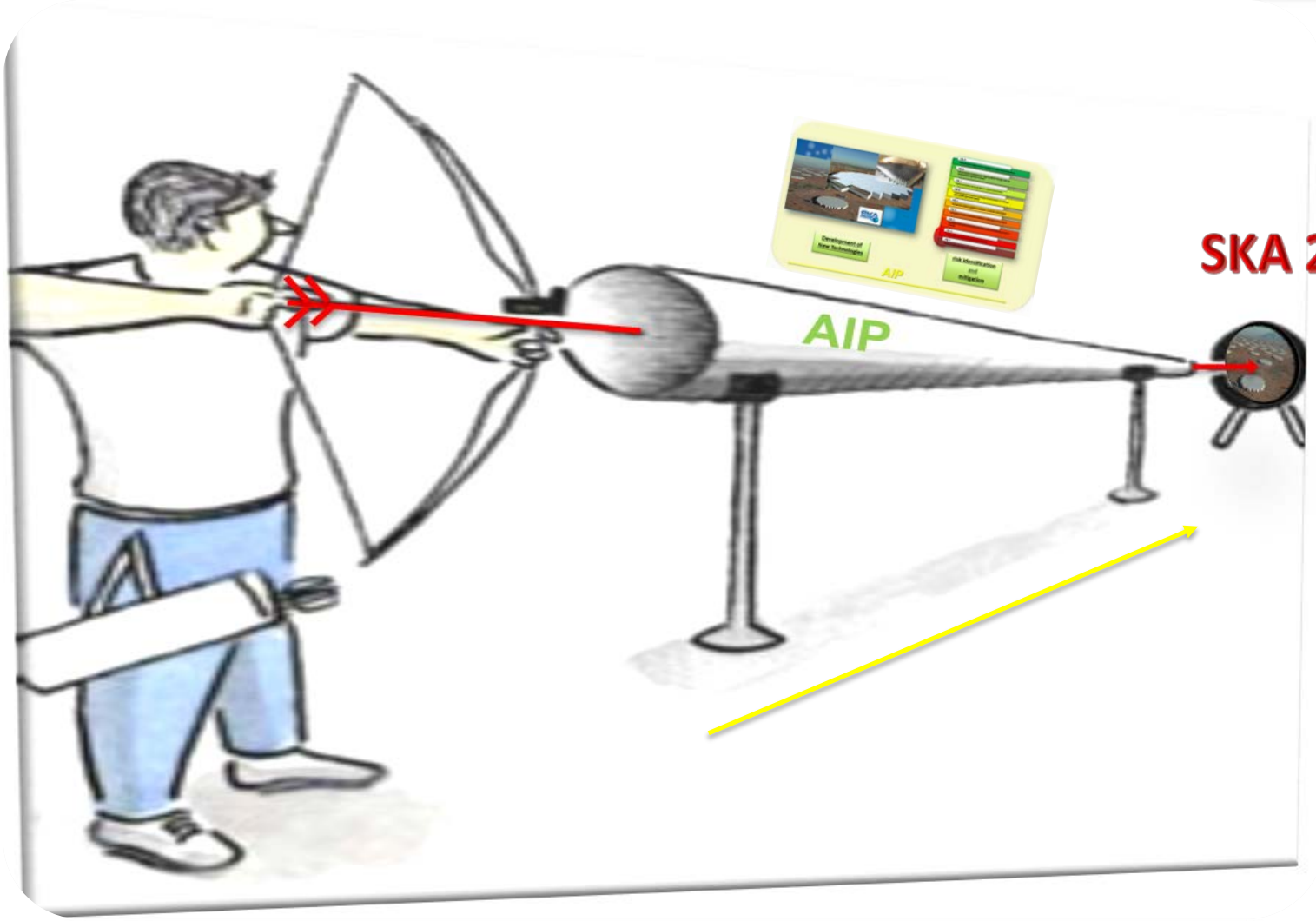


Development of New Technologies

risk identification and mitigation

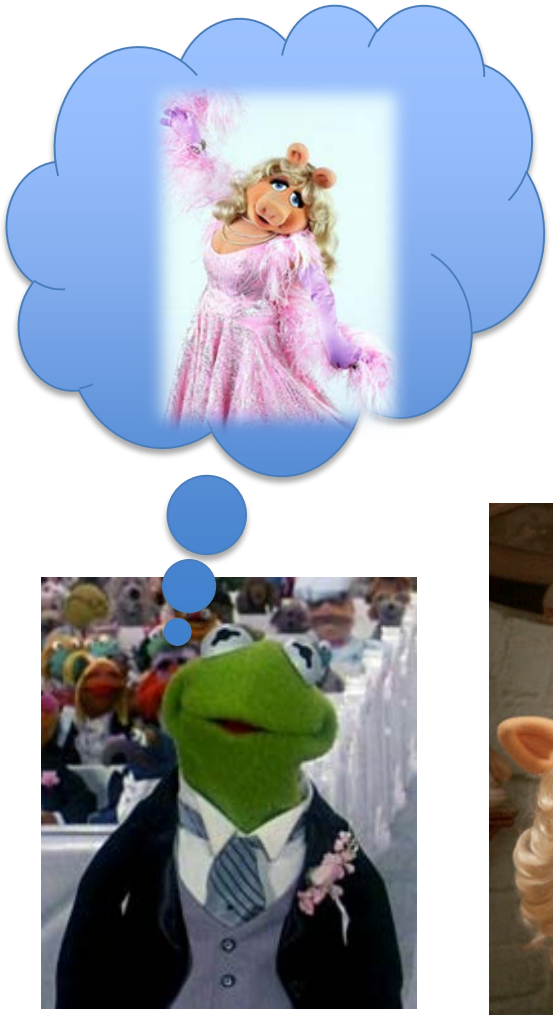
AIP

Objective: SKA2



Conclusions

Conclusions



Conclusions

Conclusions

Risk Mitigation

SQUARE KILOMETRE ARRAY

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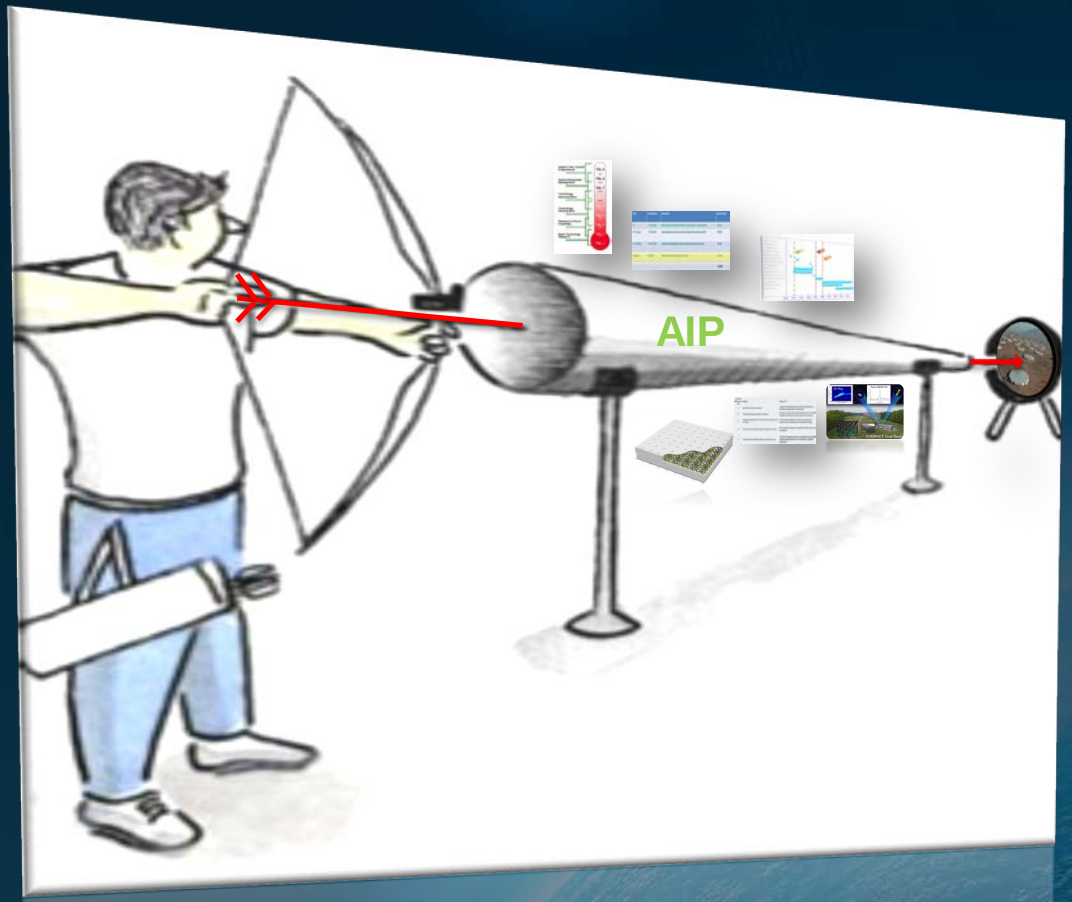

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