



Network Infrastructure Concept Description

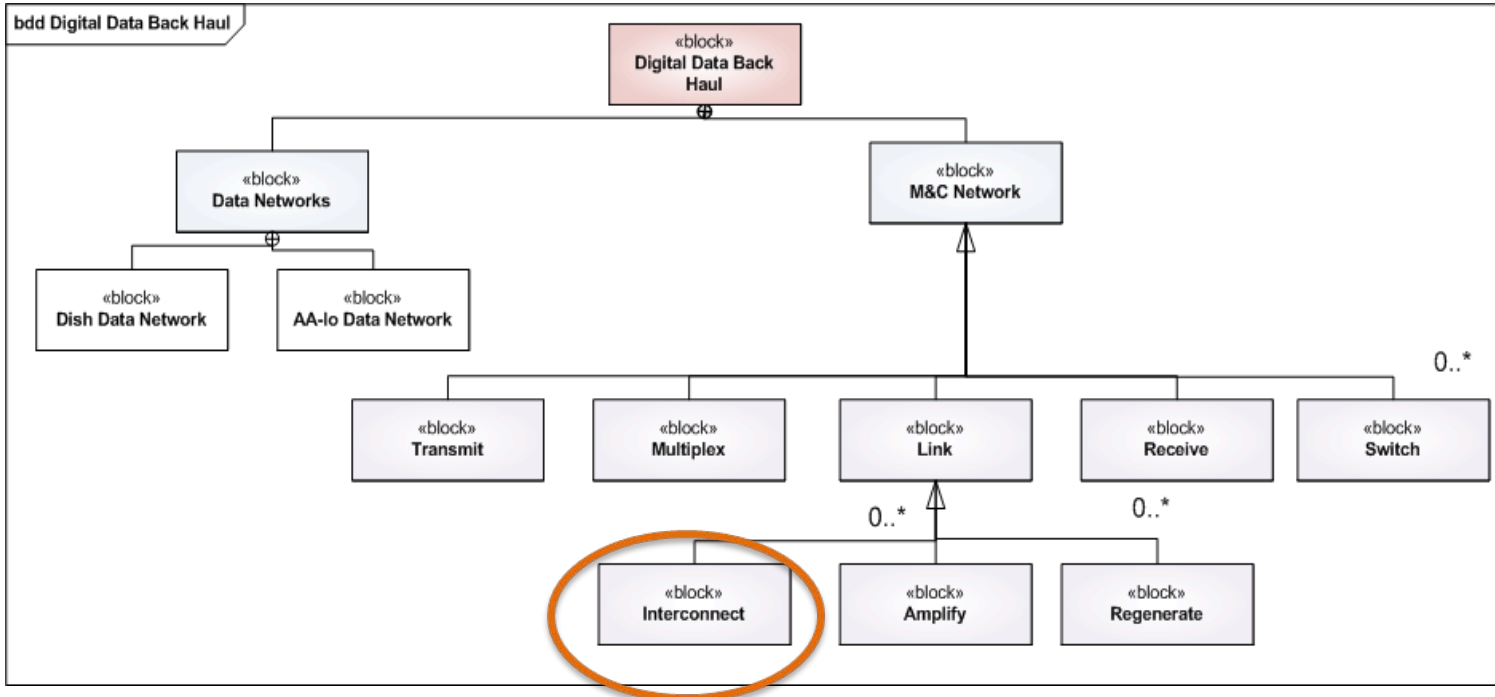
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Contents



- System Context
- Preliminary Design
- Extensibility
- Cost, Power, Reliability
- Risks
- Next Phase
- Questions

System Context – *Sub-Element hierarchy*

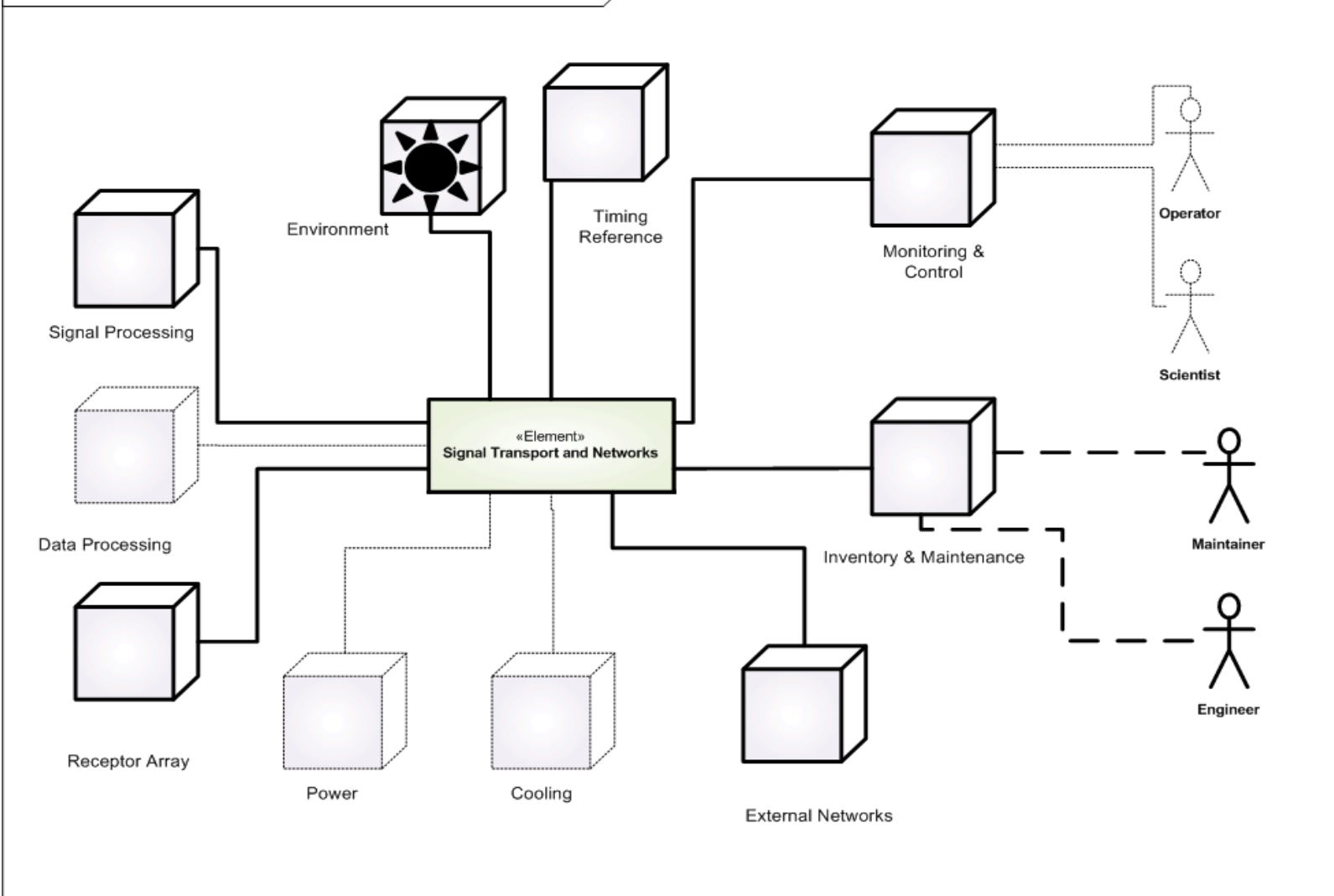


Interconnect function is a component of other sub-elements

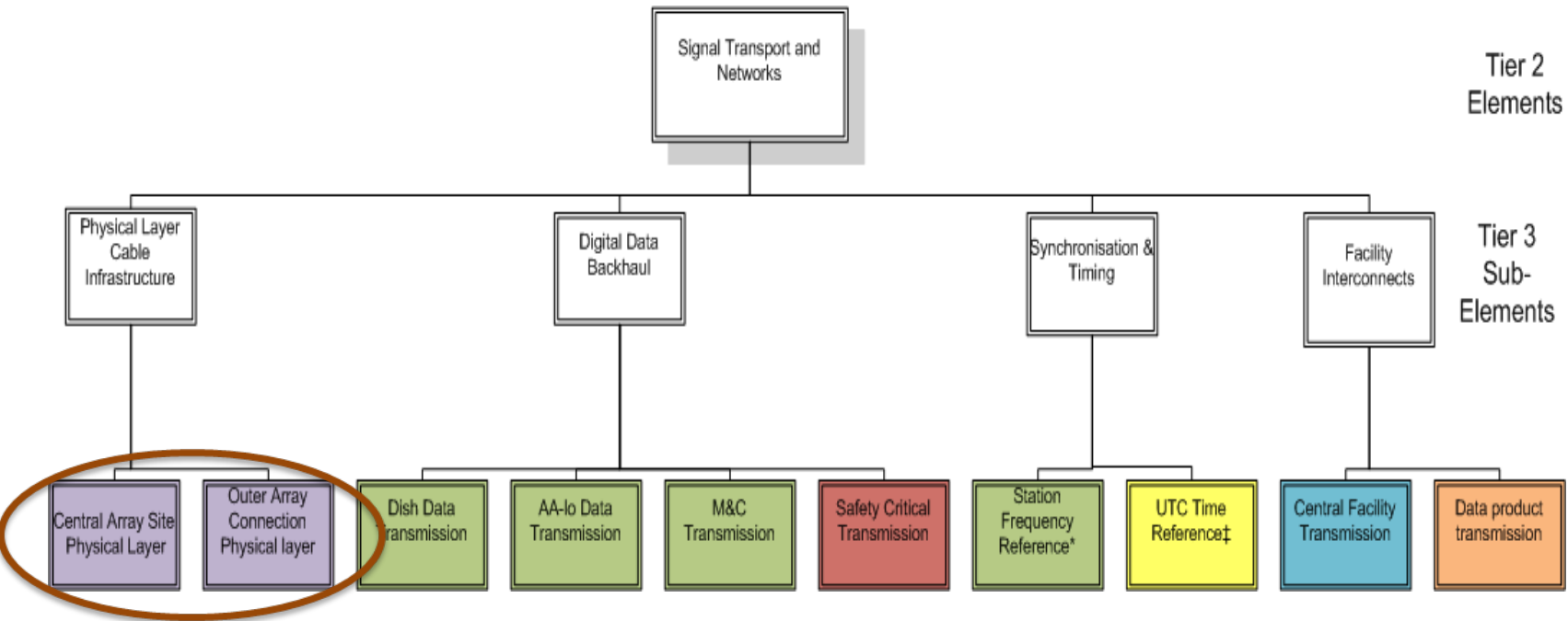
Network Infrastructure



bdd [SKA Sub-Element Level] Physical Layer Cable Infrastructure [External Interfaces]

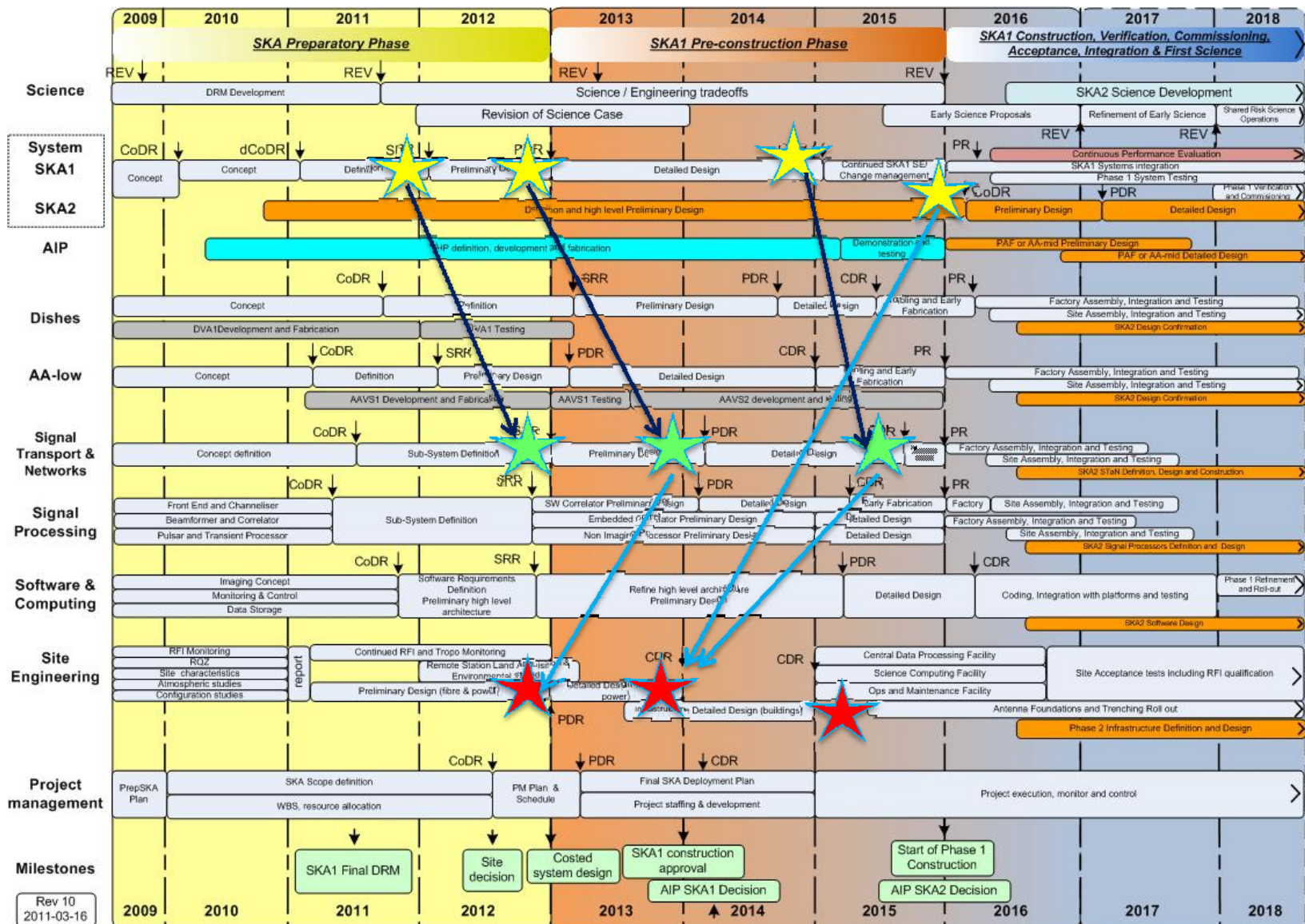


System Context – Product Tree



Infrastructure likely to be delivered as contracts partitioned on geographical basis

System Context – Schedule

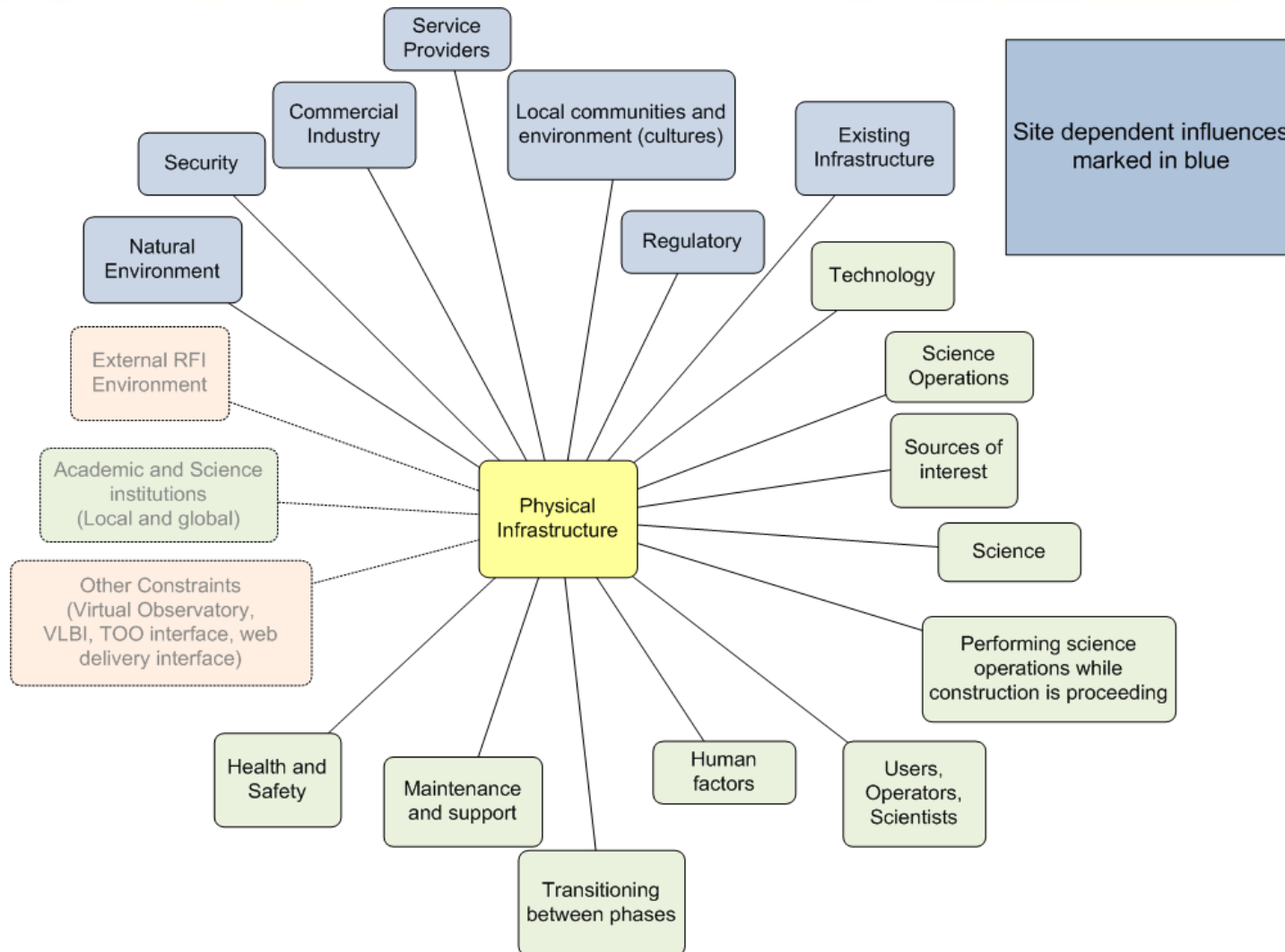


System Context – *Schedule*



- Network Infrastructure requirements later in definition
- First thing to be constructed on site
- Understanding SKA2 requirements essential for design of an extensible network
- Tension in the programme and need to be as prepared as possible

Many Influences on the infrastructure design

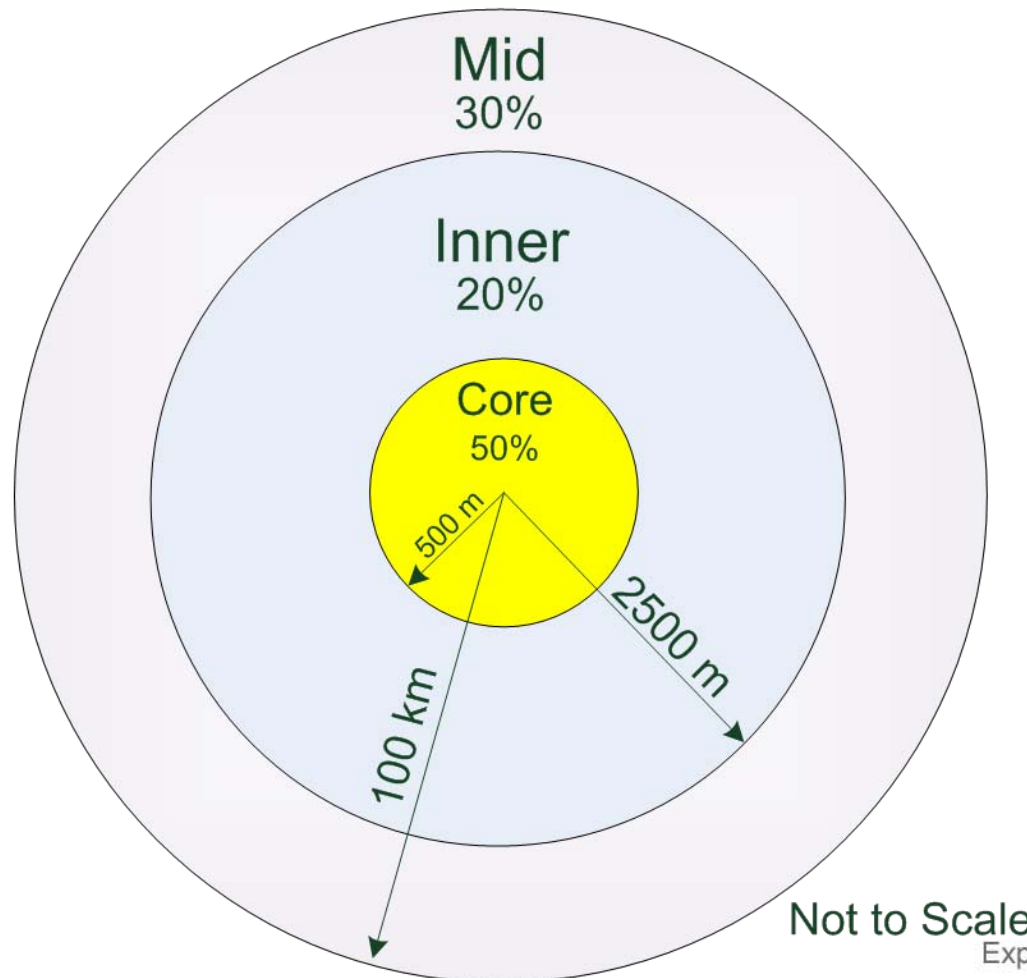


Network Infrastructure Requirements



1.

SKA₁ Array Distribution



SKA1:

2 cores

3 spiral arms

250 dishes

50 AA-lo stations

Extensible to

SKA2, potentially:

3 cores

3,000 km extent

5 spiral arms

3,000 dishes

500 AA stations

Network Infrastructure requirements 2.

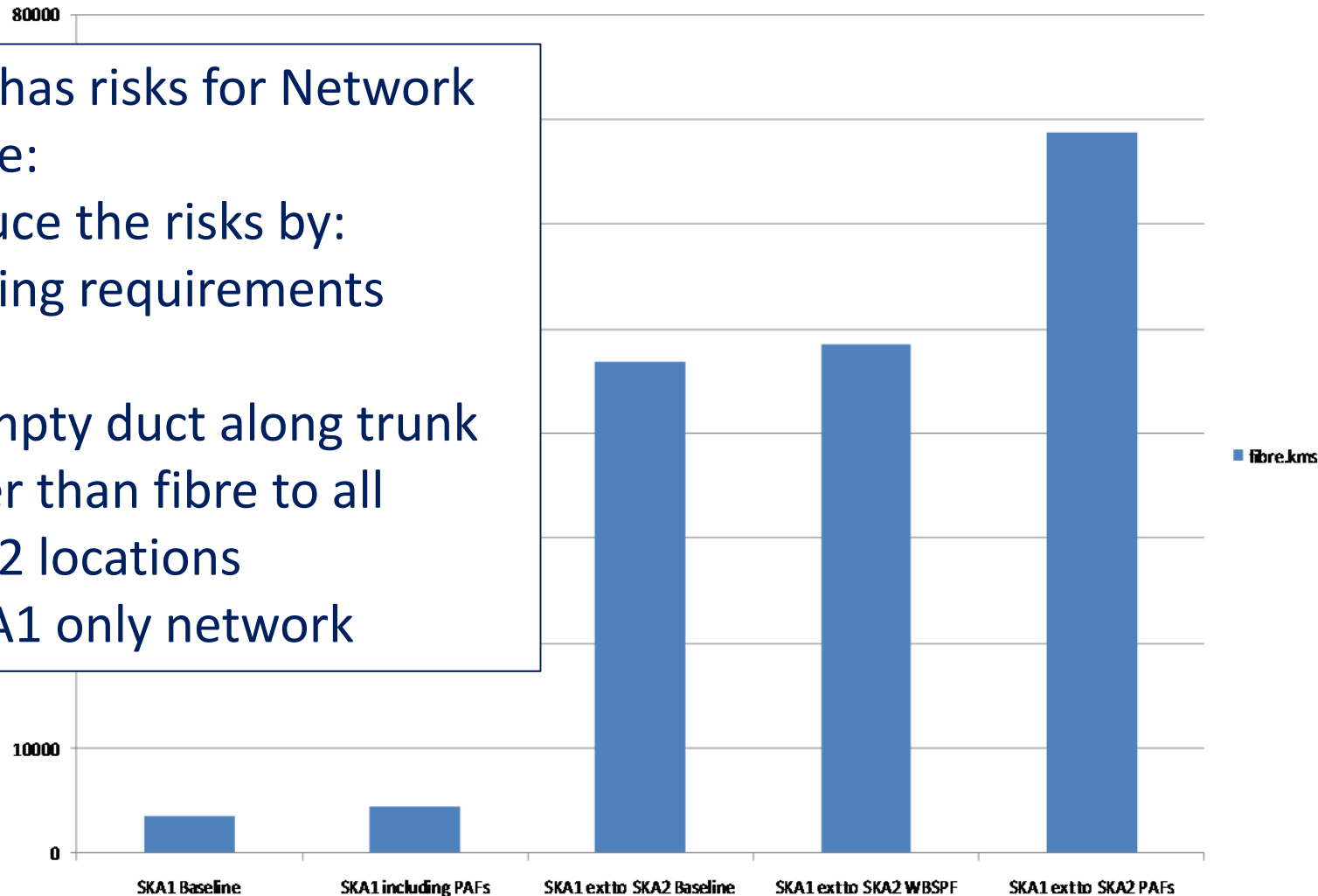


- Reliable
- Maintainable
- Safe
- Cost effective (within budget)
- Fulfil the functional requirements of:
 - M&C,
 - DDBH,
 - Synch & Timing
 - Facility interconnect systems

Impact of extensibility



fibre.kms for different extensibility options

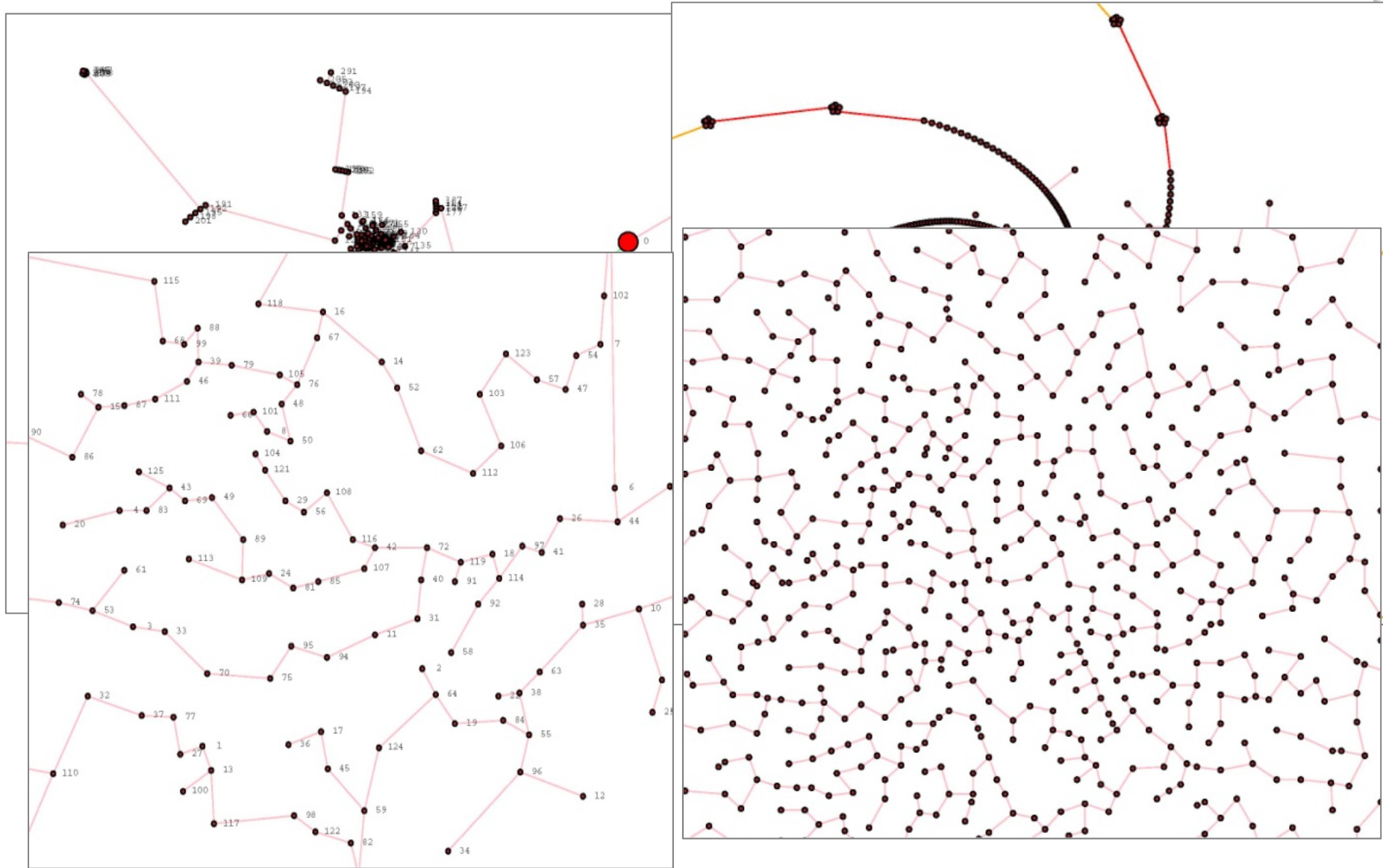


Extensibility has risks for Network Infrastructure:

Need to reduce the risks by:

- Understanding requirements better
- Installing empty duct along trunk routes, rather than fibre to all possible SKA2 locations
- Build an SKA1 only network

Modelling infrastructure connections



Modelling Infrastructure connections



- Modelling ‘ideal’, single point analysis
 - Modelling telescope design as it stands today
 - Configuration
 - Power network routing
 - Site specific aspects (location of the CPF)
- Develop modelling capability
- Look again at Telescope Configurations
- Include site specific aspects upon completion of site selection

Why is this important?



- Development of a ‘costed system design’
- Get ready for ‘walk the route’ surveys
- Splicing and connection schedules
- Development of tender documentation
 - Large scale
 - Interact with the system
 - Configuration Asset Management, Inventory & Maintenance
 - Set up systems, procedures and processes in advance
 - GIS, automatic discovery using active components on passive infrastructure

Cost

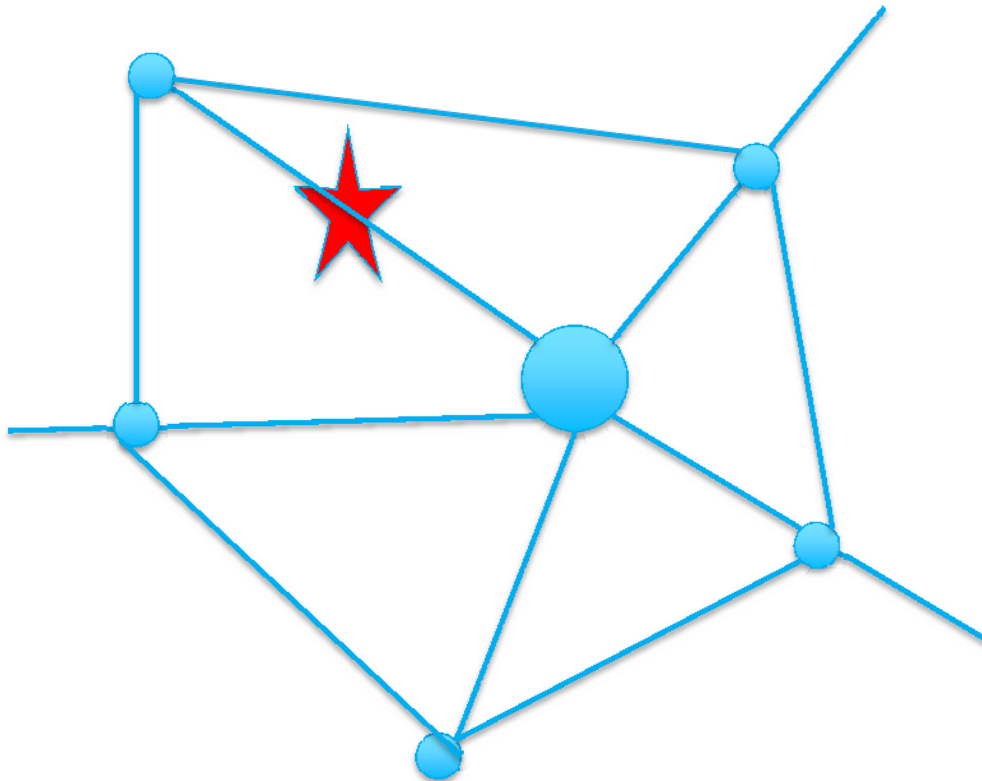


- ALMA cost estimates assume ~10€/metre and 25€ per end connection (in rack)
- More cost estimates
 - NSN estimates under NDA
 - From precursor & pathfinder instruments ‘as built’
 - ALMA ‘as built’
 - Cost pressure upwards
 - labour intensive LCI = 3.6% per annum



- Network infrastructure basically passive
 - Large connection junctions needing lighting
 - Active components for automatic discovery
 - Installation teams

Reliability



Introducing diverse routes will cost money and requires careful design.
Configuration dependent.

Next Phase of Work 1.



- Integrate efforts
 - Power network infrastructure
 - Co-location of routes
 - Modelling
 - Site specific network aspects
 - RFI returns
 - Configuration studies
- Develop requirements
 - SKA1 Sub-Elements
 - Extensibility

Next Phase of work 2.



- Configuration Asset management
 - Look at options for GIS & active components
 - Initiate work on requirements of systems, process & procedures required before constructing tender documents.
- Highlight schedule risks
 - Advertise interdependencies and incorporate them in the schedule
 - Assign responsibilities

Questions

