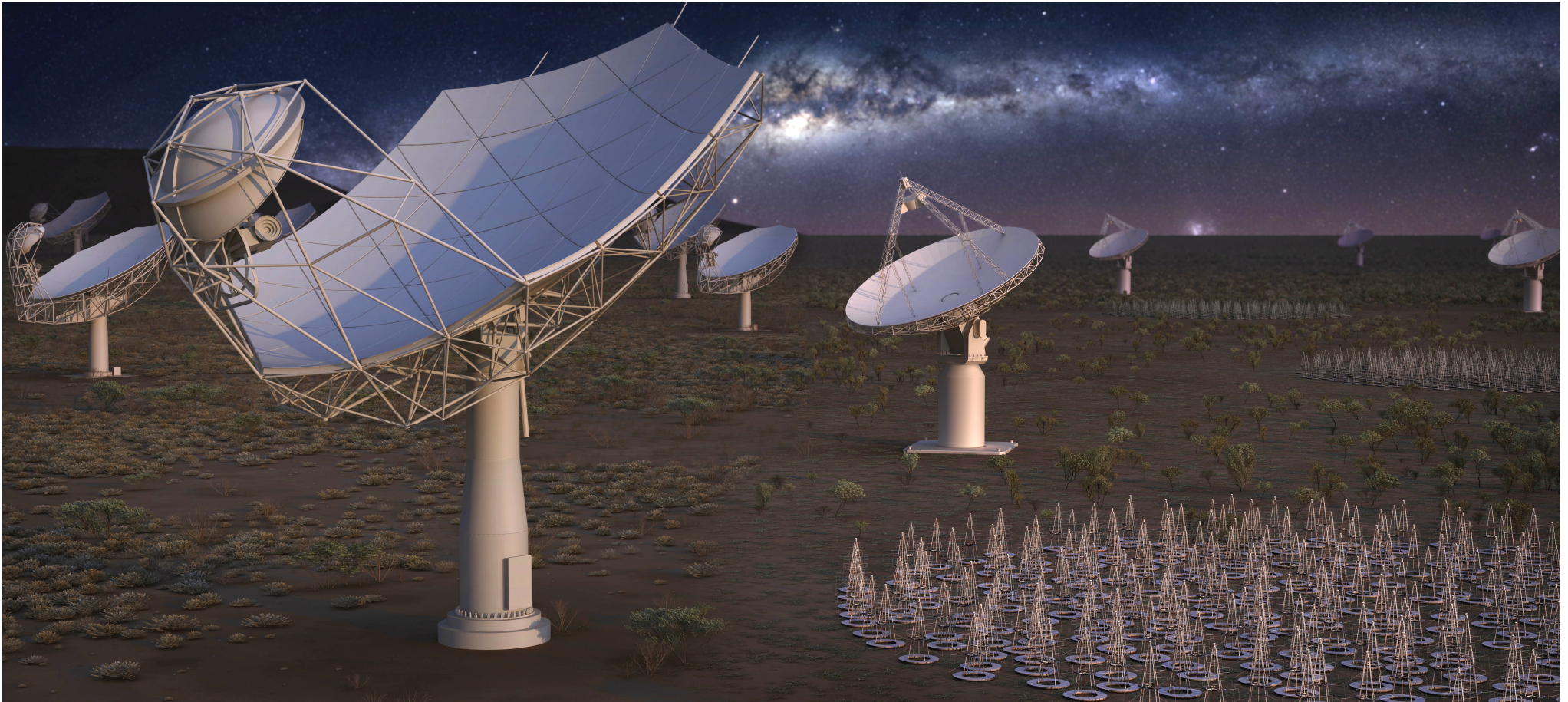


The Square Kilometre Array

Introduction to SKA Regional Centres



SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

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Head of Science Operations Planning



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Outline

The data flow that drives us to a model for SKA Regional Centres

Model for collaborative network of SRCs

The SKA Regional Centres Coordination Group

Why we are at CERN this week



Data flow

SKA1-LOW

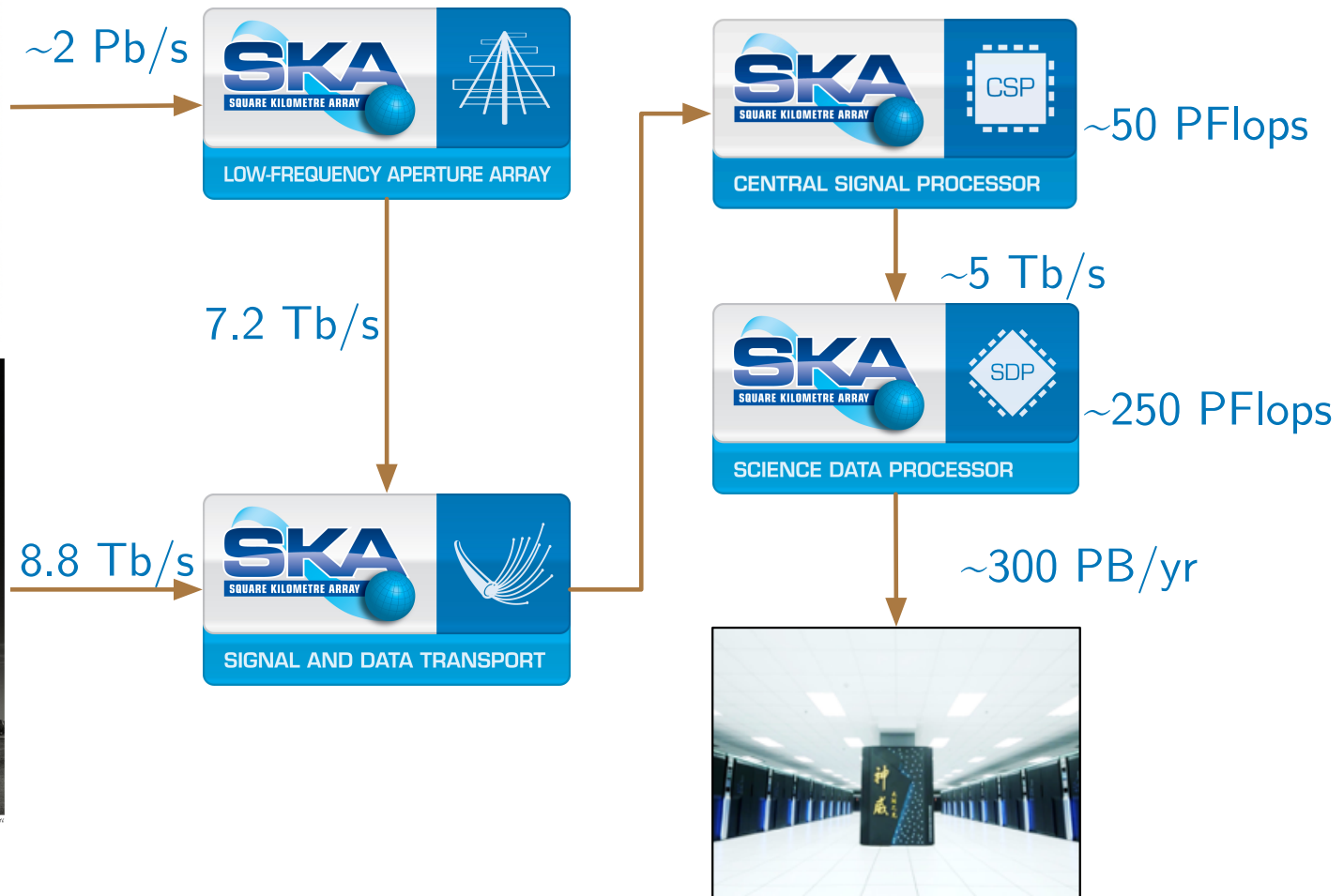


Adrian Cripps/CC BY 2.0



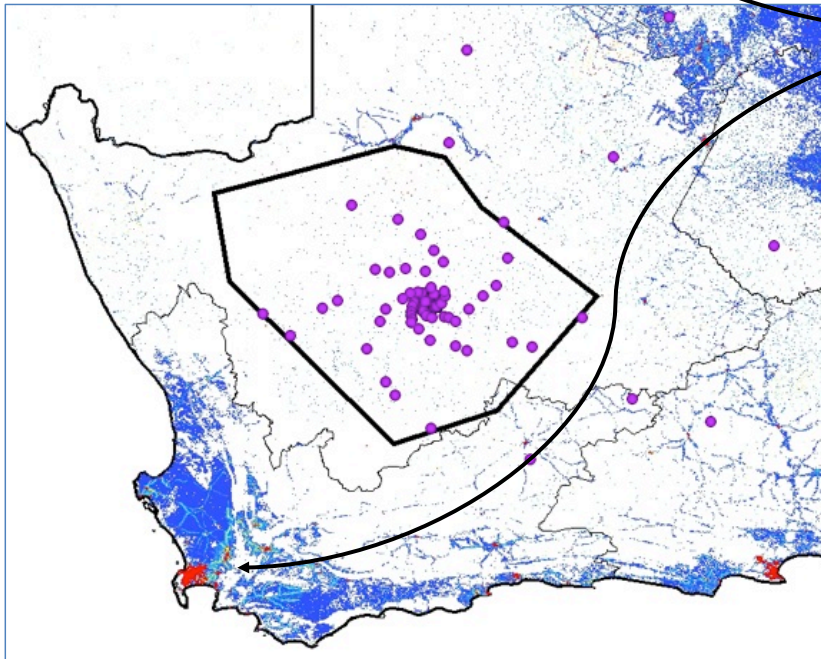
© Andrew Heywood 2014

SKA1-MID





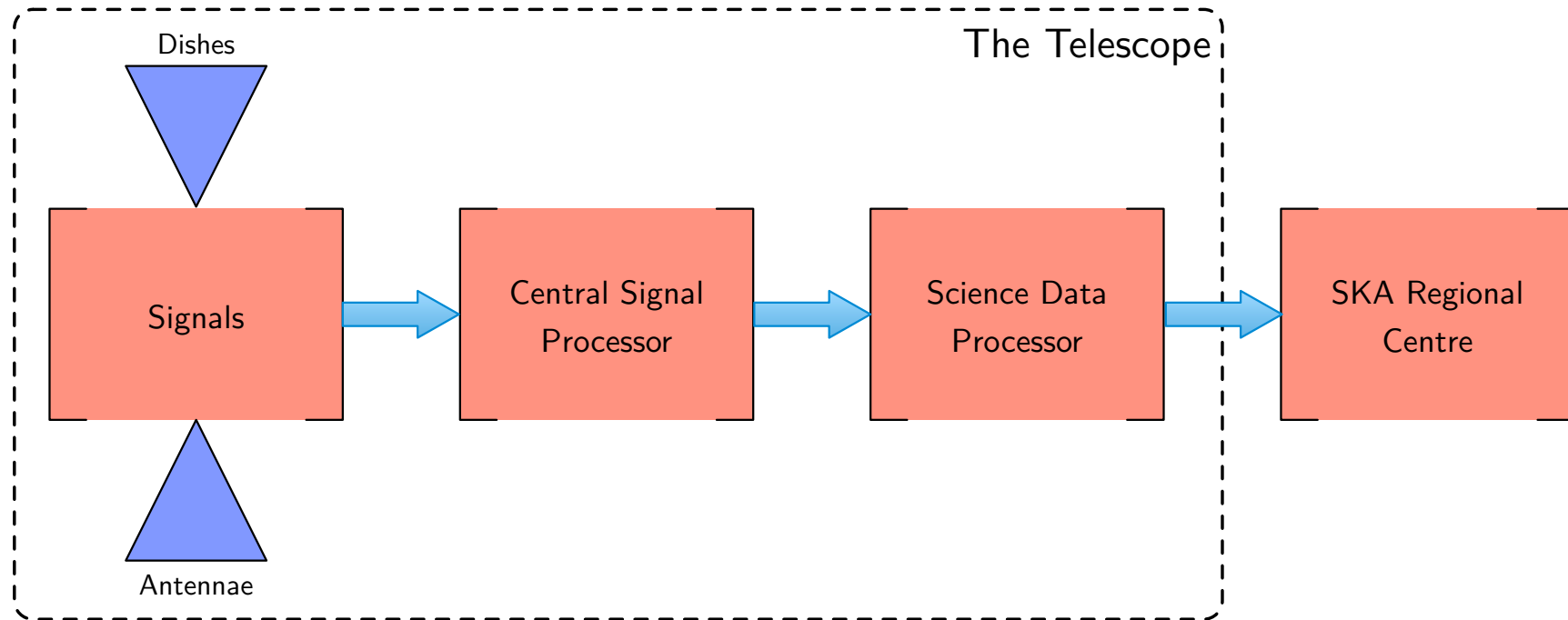
Science Data Processors are HPC facilities located in Perth and Cape Town.



Data is transferred 100s of km away from the desert observatory sites.



Data flow

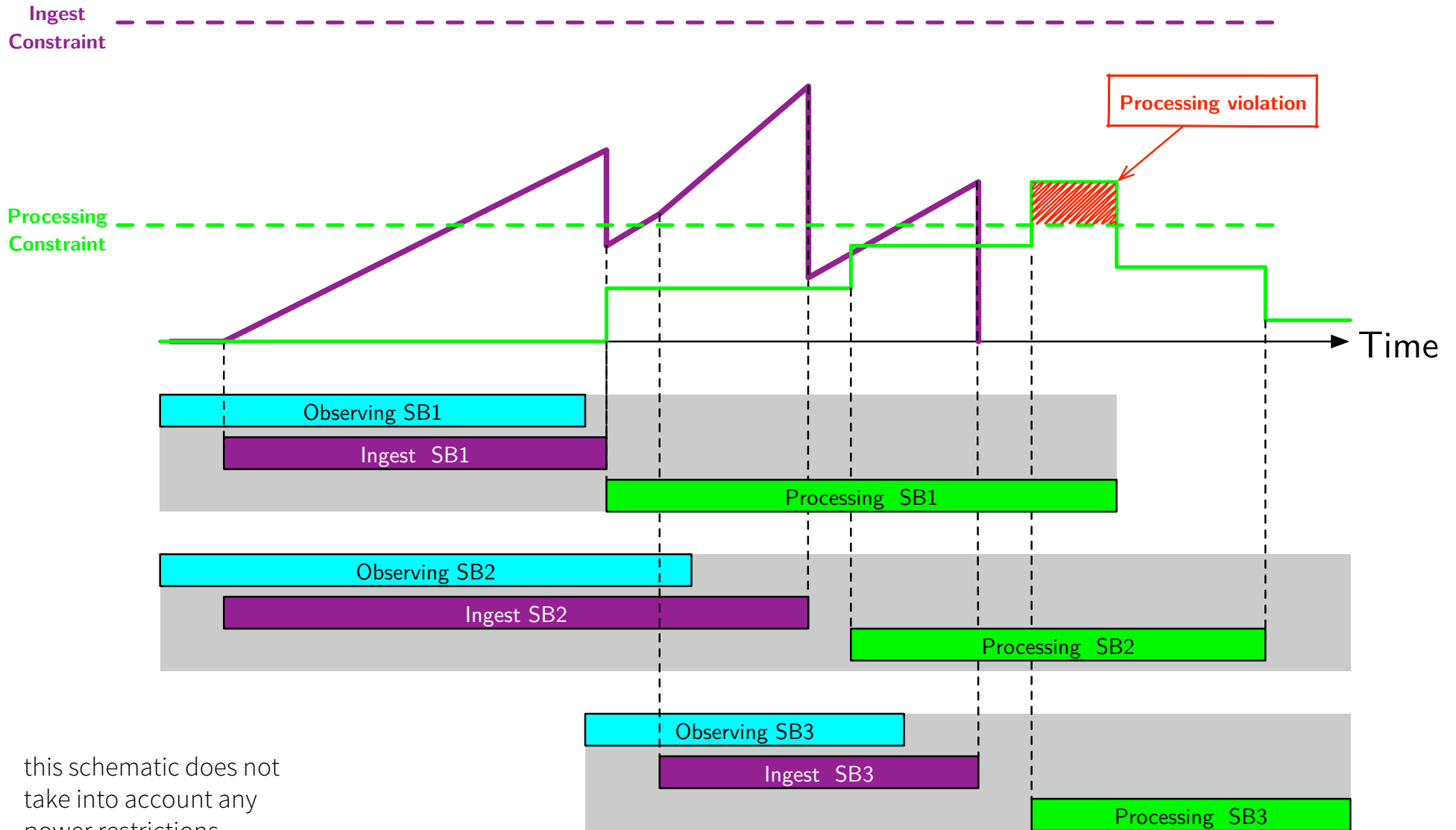


Ordinarily, the science data processor is not considered a part of the telescope

- data reduction should never interrupt data acquisition
- data rates and volumes emerging from central signal processor are so high that we will not be in a position to store the raw data from the CSP
- it will be cheaper to re-observe than store the raw data indefinitely

The science data processor becomes a schedulable resource of the telescope for observation planning

Data flow



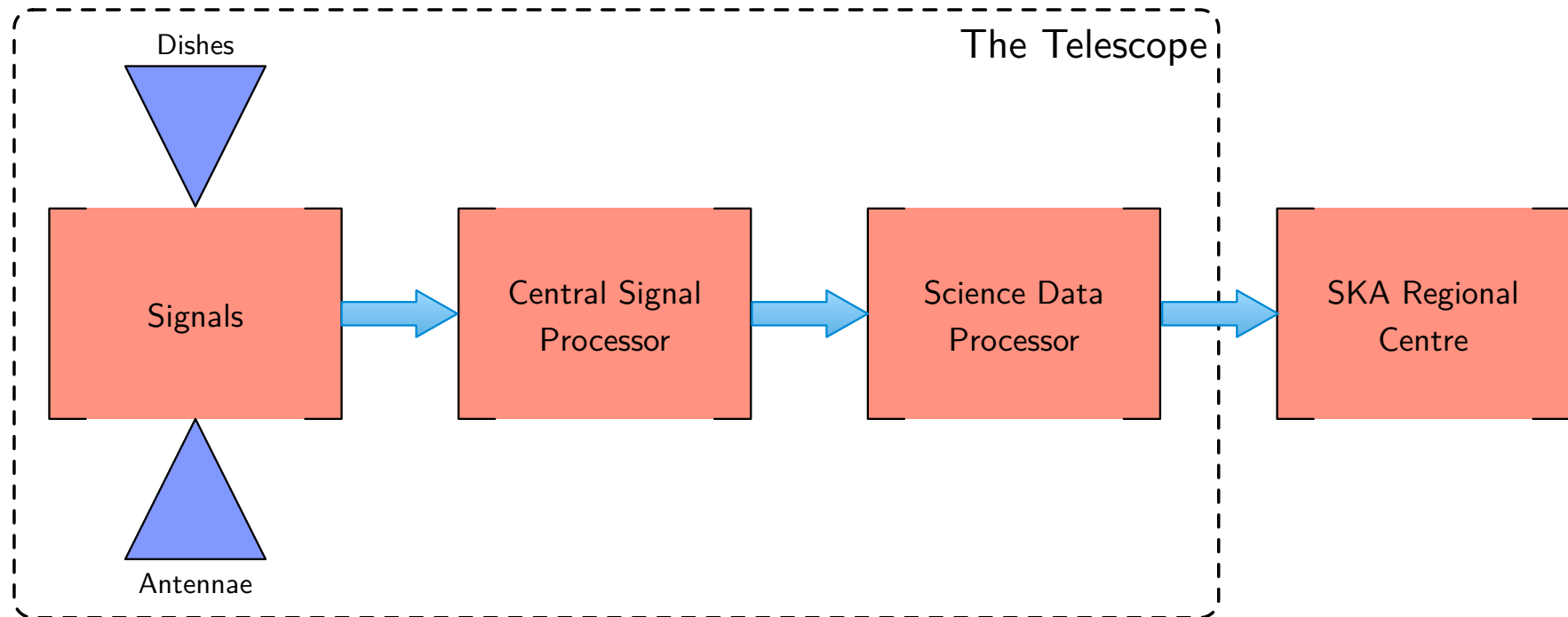
this schematic does not
take into account any
power restrictions

Data flow

The Science Data Processor faces the challenge of keeping up with the inflow of data generated by the science programme of the observatory

The observatory has a basic, high-level principle that it must provide calibrated science data products to the community

- cannot do this as well as enabling generation of advanced data products
- hence need to push this outside scope of the construction project of the observatory





A collaborative model for SKA Regional Centres

There are three main factors that lead to a model of a **collaborative** alliance of SKA Regional Centres (SRCs)

- (1) The science data products that emerge from the SKA observatory are not in the final state required for science analysis
- (2) The data volumes are so large that direct delivery to end users is unfeasible
- (3) The community of scientists working on SKA science data products will be geographically distributed



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- (1) The science data products that emerge from the SKA observatory are not in the final state required for science analysis

generation of advanced data products not in scope of project
SDP must maintain throughput matched to input data rate
combination & further analysis of data products outside of observatory boundaries

- (2) The data volumes are so large that direct delivery to end users is unfeasible
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does not account for possible future "discovery" archive
final data volume for each project will exceed that delivered by the observatory
downloading data to local machines/cluster expensive and unfeasible in long term
"take the processing to the data"

- (3) The community of scientists working on SKA science data products will be geographically distributed



A collaborative model for SKA Regional Centres

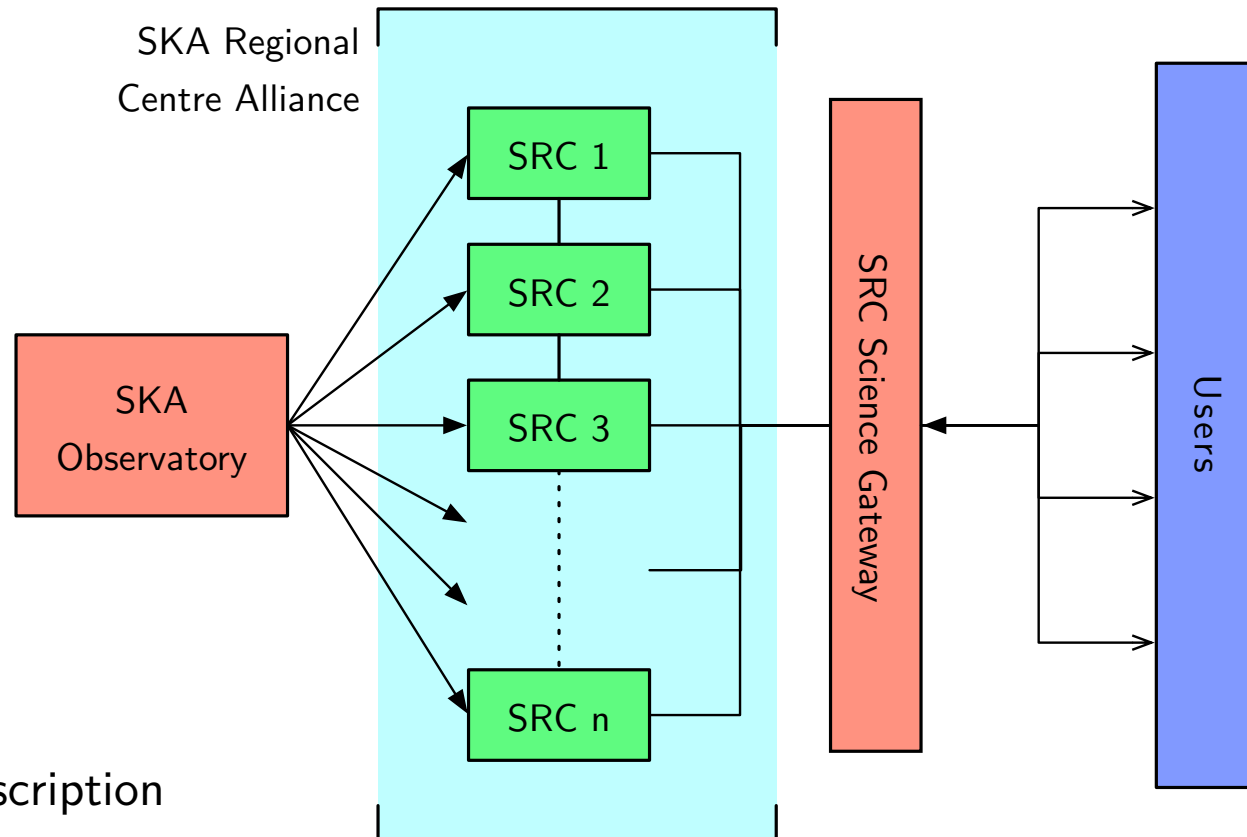
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KSPs with 1000s of hrs of observing time will dominate the science programme
large international teams drawn from across the membership
need new methods, algorithms and techniques
driven by the community so they need a platform on which to do this



A collaborative model for SKA Regional Centres



Simplified description

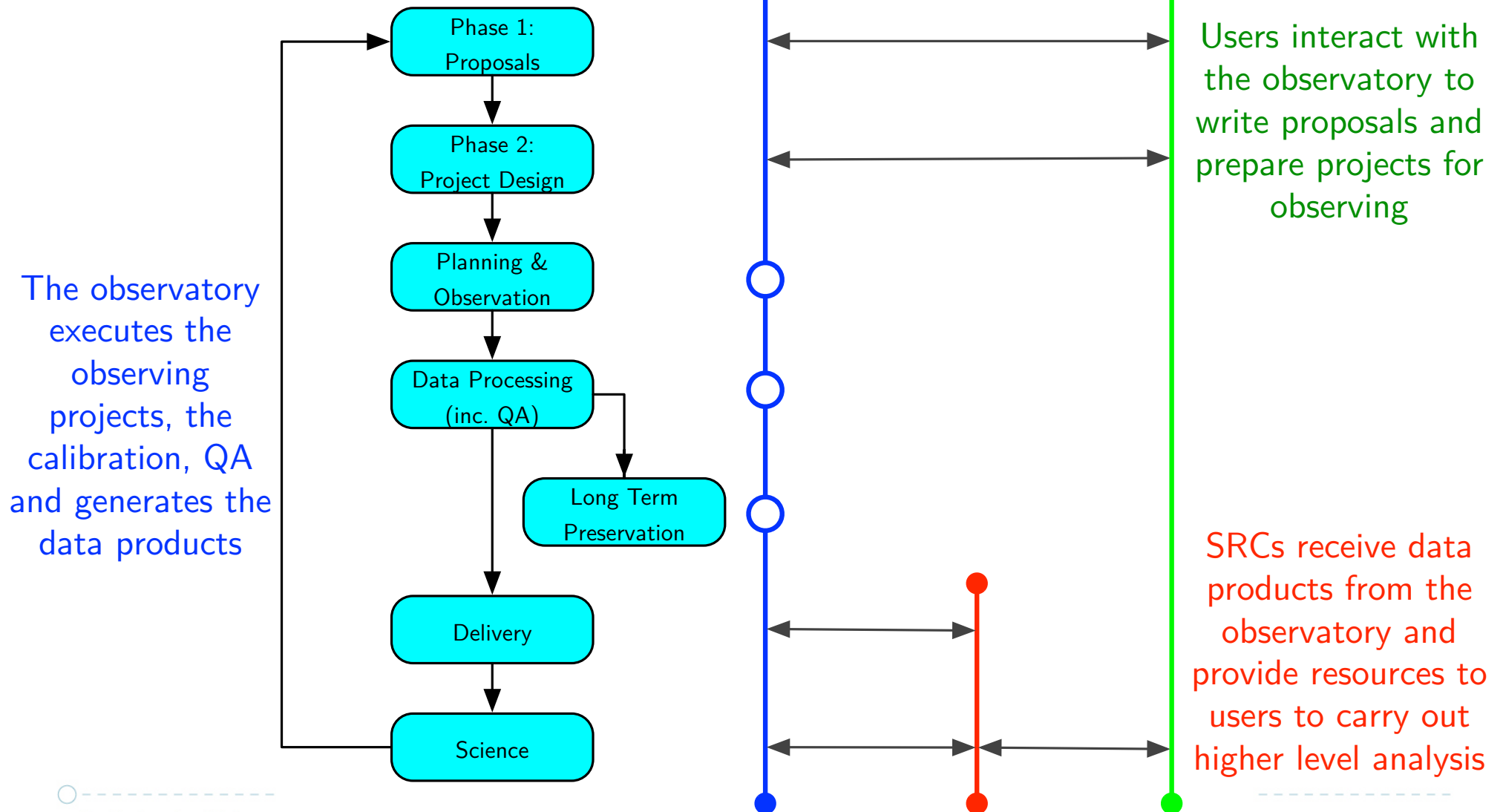
- a collaborative network
- transparent and location agnostic interface to SRCs for users
 - no SKA user should care where their data products are
 - all SKA users should be able to access their data products, irrespective of whether their country or region hosts a regional centre



SKA Observatory

SRCs

Users





SKA Regional Centres

Essential Functions of SRCs:

- provide transparent access to SKA science data products & user support
- provide computational resources for post processing (analysis & visualisation)
- provide platform for development of software tools
- provide long-term science archive

(Abridged) instructions:

- define minimum set of requirements for SRCs
 - individual and whole network, including links with SKA telescopes
- draft MoUs between SKAO and the SRCs, and an accreditation process
- ingestion and curation of science archive for user-generated data products
- data challenges

Also need to recognise that requirements of KSP and PI projects will differ



SKA Regional Centres Coordination Group

SKAO:

- Antonio Chrysostomou - Chair
- Rosie Bolton (SRC Project Scientist)
- Miles Deegan (HPC Domain Specialist)
- Nick Rees (Head of Software & Computing)

Members:

- Séverin Gaudet (NRC, Canada)
- Jasper Horrell (SKA-SA)
- Peter Quinn (ICRAR, AUS)
- Yogesh Wadadekar (NCRA, India)
- Michael Wise (ASTRON, NL)
- Shenghua Yu (BAO, China)

Externals:

- Ian Bird (CERN)
- Andy Connolly (LSST, UWash)
- Lourdes Verdes-Montenegro (IAA, Spain)

Note that this is a Coordination Group
and not a Working Group
subgroups will be formed to study and report
on specific issues



Why are we here this week?

Many similarities in challenges SKA faces and those CERN has, and will, face

- Data rates
- Data transfer and management
- Processing power
- User interaction and support

We want to learn from your experience

- Governance models
- Identify common aims
- Discuss and outline projects that would benefit from our collaborative approaches

Our DGs are enthusiastic...!

- Scope for future work (some of which may lead to MoUs)



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