Data products for SKA and SKA-Low

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Overview of science flow

SKA science realm
- Science proposal
- Observation definition

Cloud based science analysis and visualisation

SKA operations realm
- TOS data store
- Telescope Operating System

SKA telescope realm
- Collectors
- Data excision
- Correlator
- Data excision
- Data routing
- Visibility processing
- Time series processing
- Pulsar search, timing, transient detection
- Image processing
- Science product archive
- Sky models, calibration, pulsar data, visibility data, etc.
- Local science analysis and visualisation
Observatory boundary

- SKA observatory responsible for all data products up to and including level 6
  - Assume in baseline
- Regional Science Centres responsible for level 7
  - Assume not in baseline
- SKA Observatory responsible for data distribution system
Who does what and where?

- **Evolving model**
  - Common and large processing centralised on SKA computers
  - Specific and small processing centralised on RSEC computers
- **Note that this model does not cut costs, it just redistributes them.**
- **Same software (or more) has to be written**
- **Does this work for EOR?**
• EOR is an experiment
  – We don’t know how to do it (at SKA1 sensitivity)
• No point in freezing processing prematurely
  – Find out how to do it and then make it efficient
  – Likely to take years
• Direction dependent calibration and imaging vital
Data products and transformations

<table>
<thead>
<tr>
<th>Level</th>
<th>Definition</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Enhanced data products e.g. Source identification and association</td>
<td>ST</td>
</tr>
<tr>
<td>6</td>
<td>Validated science data products (released by Science Teams)</td>
<td>ST</td>
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<tr>
<td>5</td>
<td>Calibrated data, images and catalogues</td>
<td>SKA</td>
</tr>
<tr>
<td>4</td>
<td>Visibility data</td>
<td>SKA</td>
</tr>
<tr>
<td>3</td>
<td>Correlator output</td>
<td>SKA</td>
</tr>
<tr>
<td>2</td>
<td>Beam-former output</td>
<td>SKA</td>
</tr>
<tr>
<td>1</td>
<td>ADC outputs</td>
<td>SKA</td>
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This transformation is hard for EOR

Exploring the Universe with the world's largest radio telescope
What should SKA provide?

- Standard framework for ingesting, editing data
- Tools for EOR processing
  - Flexible DDE framework, including imager and solver
    - AW Snapshots or better
  - Capable of handling SKA data volumes
- Embed EOR scientists in SKA computing
  - Contra ASKAP “tell us the algorithm”
  - Contra LOFAR “send us the calibrated data”