LOFAR Observing Modes

LOFAR Technical Status Meeting
18 May 2009

Michael Wise

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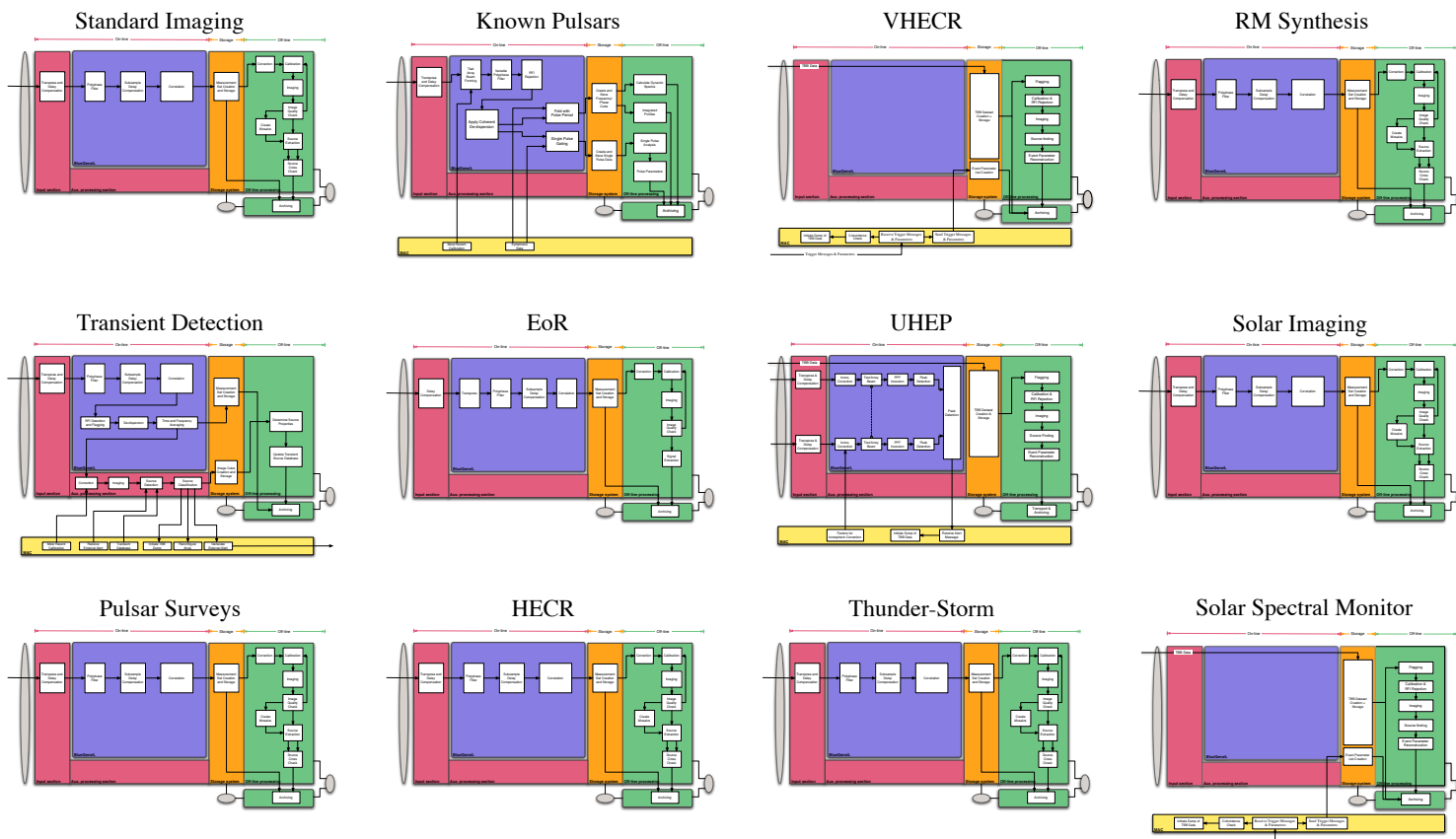*LOFAR Technical Status Meeting*
18 May 2009

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LOFAR Technical Status Meeting
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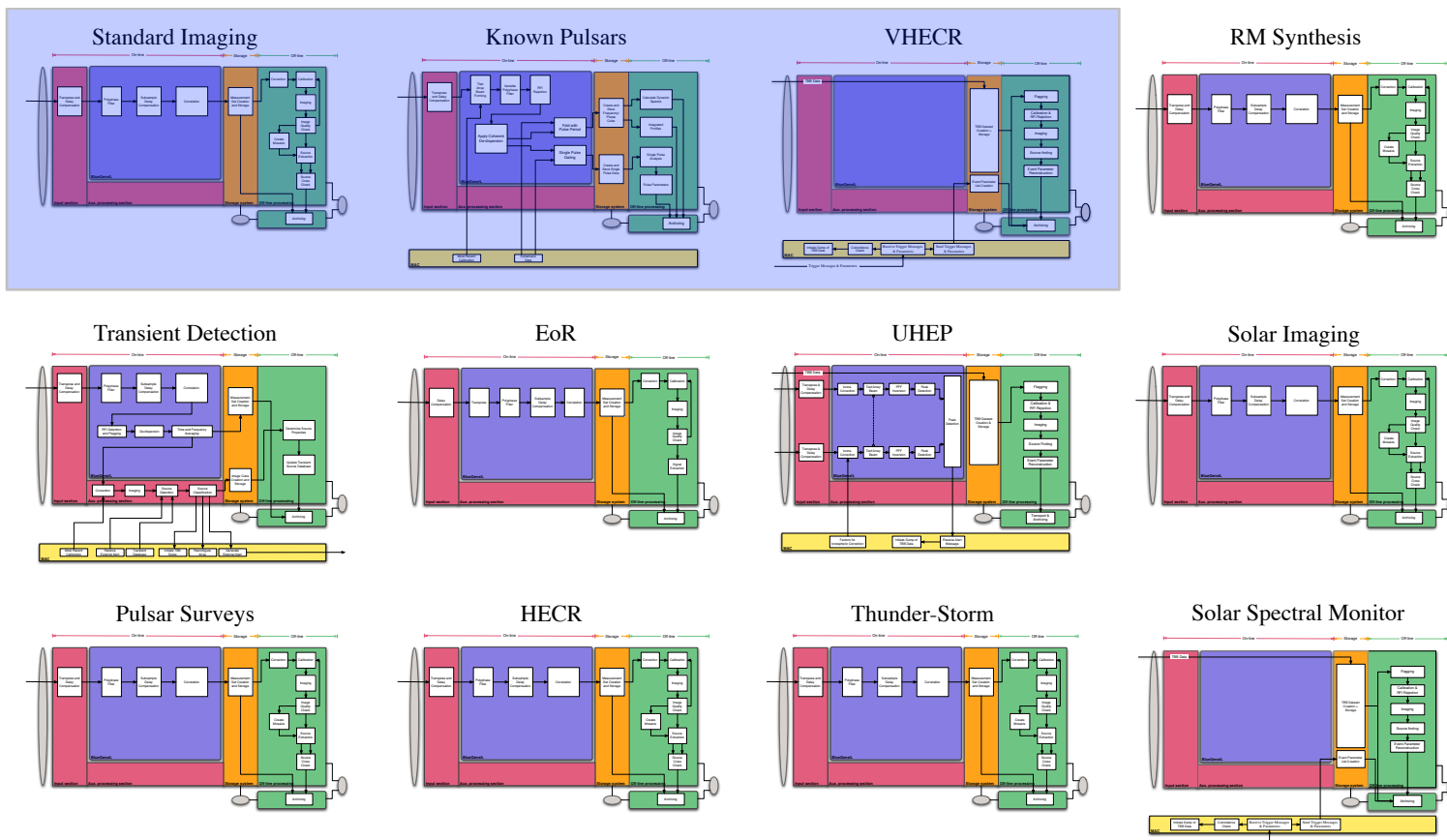**Michael Wise**

Observing Modes

What do we mean by an "observing mode" ?

- Specific array configuration   Full or sub-array

- Observation control mechanism   Central or local

- Observational configuration   Piggyback or parallel

- Associated processing pipeline   Imaging, beam-formed, etc.

- Processing configuration   SIP, EoR, Solar, etc.

- Execution priority   High to low, interrupt, etc.

- Storage mechanism   CEP or direct

Processing Pipelines

Standard Imaging

Known Pulsars

VHECR

RM Synthesis

Transient Detection

EoR

UHEP

Solar Imaging

Pulsar Surveys

HECR

Thunder-Storm

Solar Spectral Monitor

⇒ *Derived from combined KSP science*

Processing Pipelines

Available in 2009

Standard Imaging   Known Pulsars   VHECR   RM Synthesis

Transient Detection   EoR   UHEP   Solar Imaging

Pulsar Surveys   HECR   Thunder-Storm   Solar Spectral Monitor
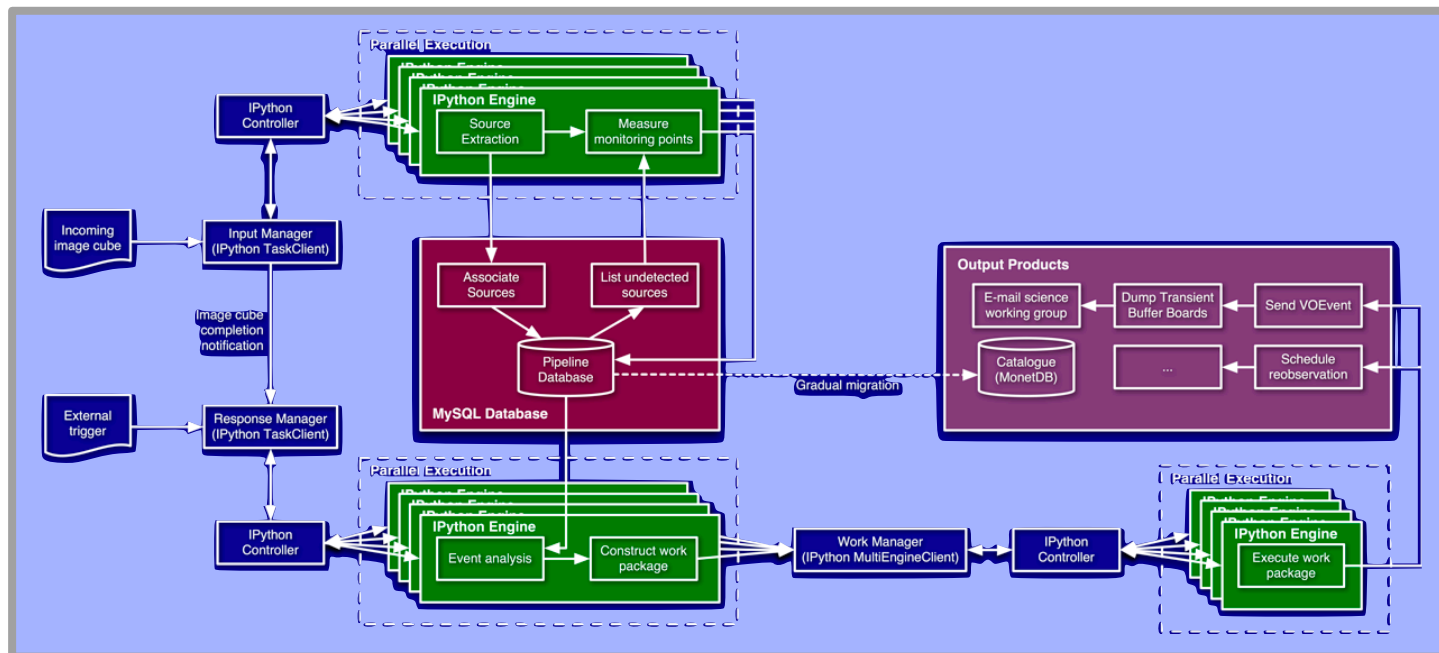
⇒ *Derived from combined KSP science*

Dedicated Observations

- Default observation mode for most projects
- Primary observation during execution
- Sets observational and processing parameters
- Configuration and execution scheduled in advance

Example ⇒ Standard Imaging Observation

Piggyback Observations
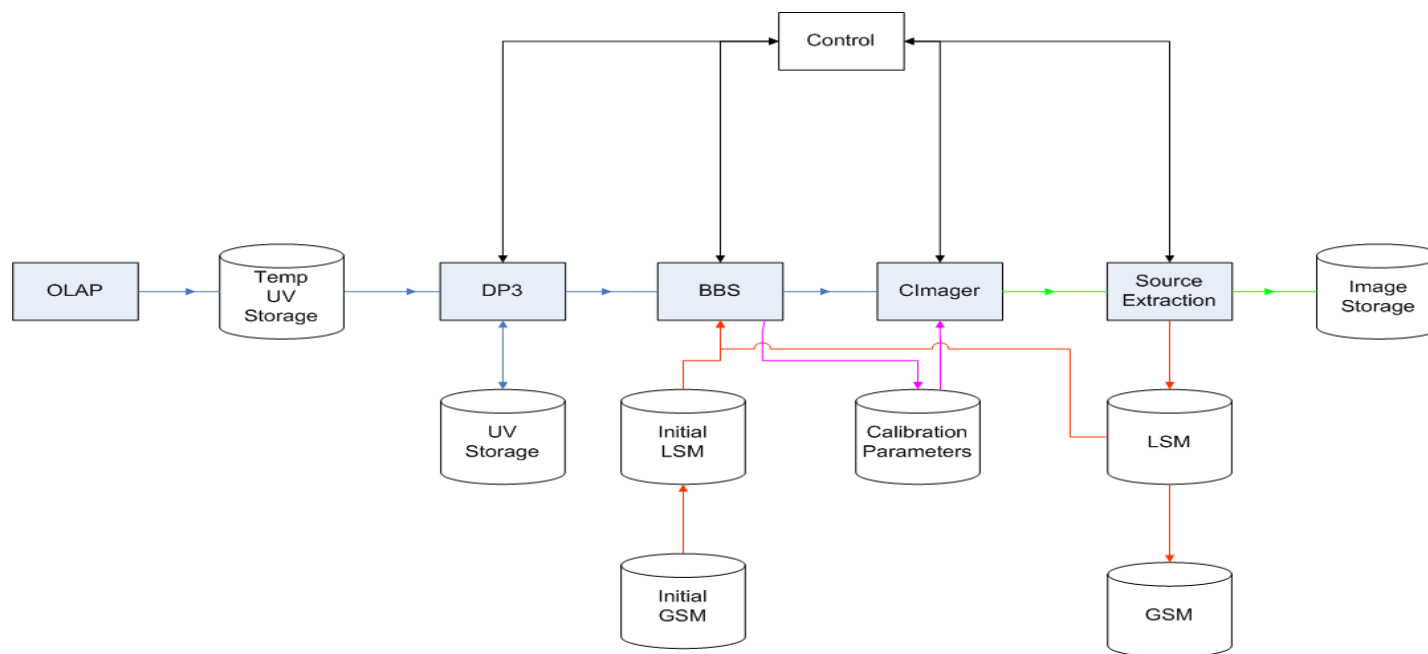
Example ⇒ Transient Detection (online or offline)

- Utilizes data stream from ongoing dedicated observation
- Not primary observation during execution
- Inherits observational configuration, sets processing parameters
- Support limited by offline processing resources

Parallel Observations

- Multiple simultaneous processing of one or more data streams
- May or may not consist of multiple dedicated observations
- Sets or inherits observational configuration, sets processing parameters
- Support potentially limited by BG/P processing and I/O resources
- Support potentially limited by offline processing resources

Example ⇒ Concurrent Imaging and Pulsar Observations

First experiments during Phase II?

Direct Storage Modes
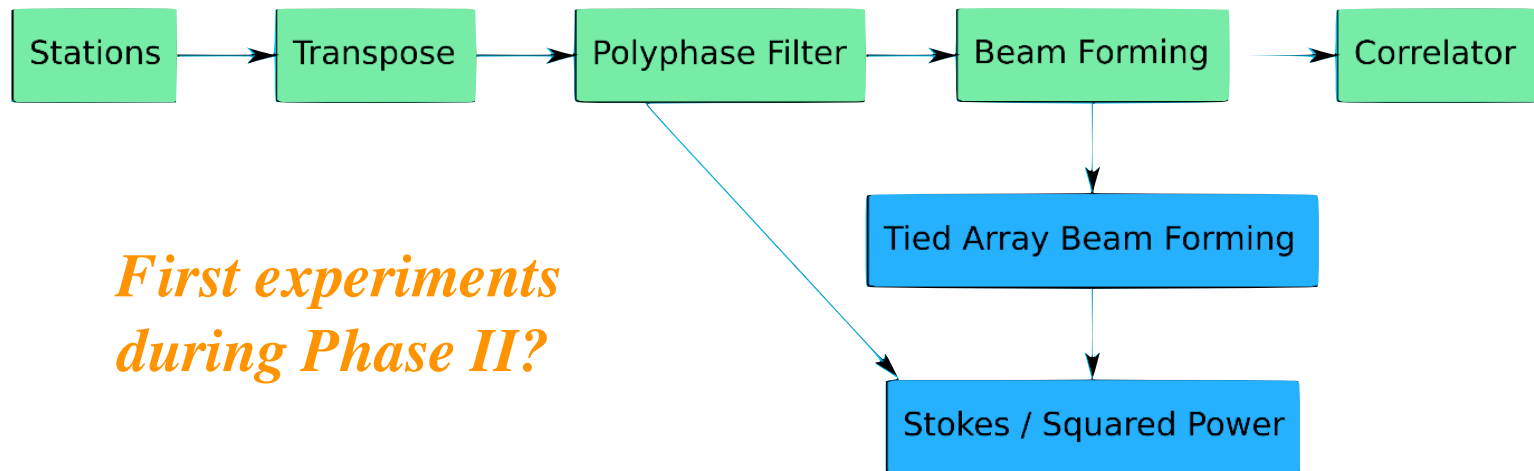
- Data from one or more stations streamed directly to storage
- Storage may or may not be located at CEP
- Bypasses default BG/P data routing
- Can be dedicated, piggyback, or parallel
- Potentially limited by bandwidth and offline processing resources
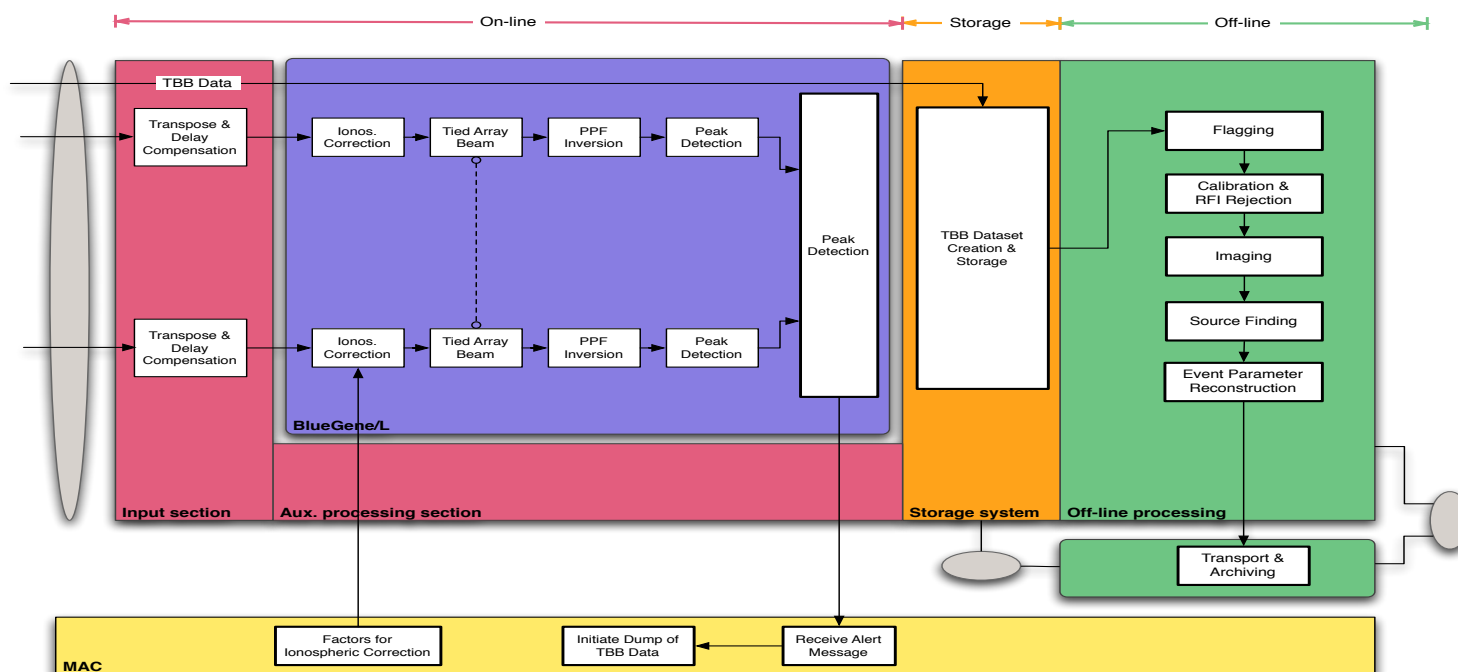
Examples ⇒ Solar Spectral mode or VHECR mode
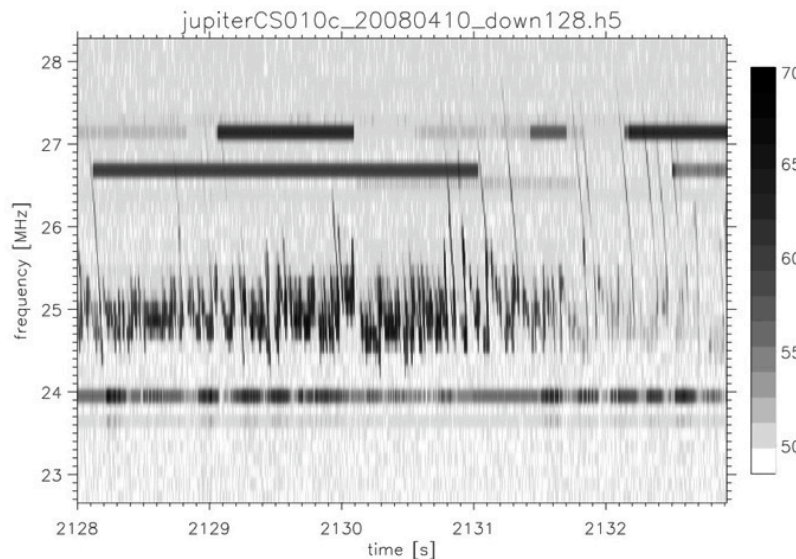
Jupiter bursts (courtesy J.-M. Grießmeier)

TBB Dynamic spectrum

Real-time vs. Offline Modes
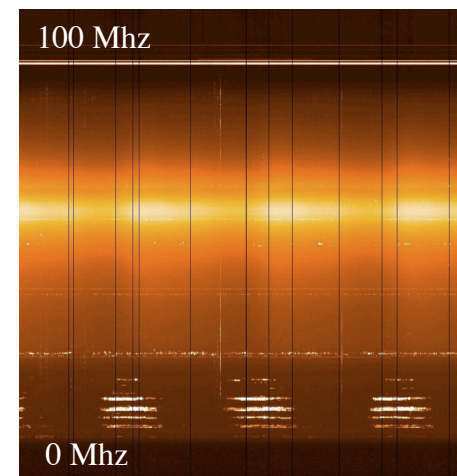
- Responds to events observed in the current data stream
- Generates and responds to internal or external triggers
- Can be dedicated, piggyback, or parallel
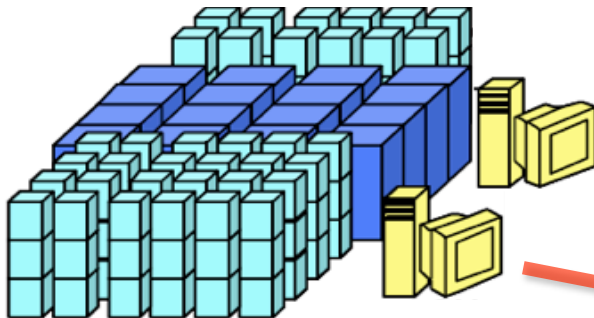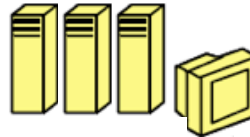- Limited by system latencies

Examples ⇒ CR modes, Transient detection, etc.

Local Control Modes

- One or more LOFAR stations commanded from remote location
- Stations under local control disconnected from rest of array
- Presumably scheduled, but will incur overheads in reconnecting
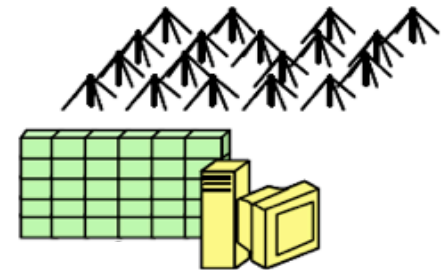- IWG suggested model uses local scheduling and central control

International Control Room

Example ⇒ Student Observations
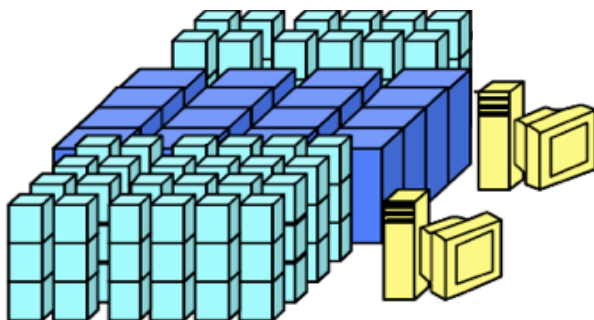
LOFAR Central Processing

Observatory Control

International LOFAR Station

Local Control Modes

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Example ⇒ Student Observations

Local Control

LOFAR Central Processing

International LOFAR Station

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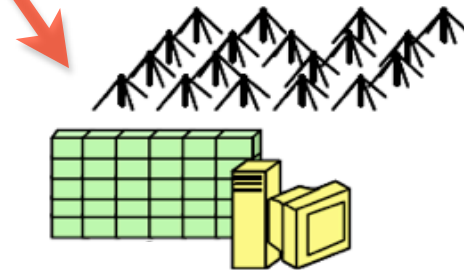- IWG suggested model uses local scheduling and central control

International Control Room

Example ⇒ Student Observations

Local Scheduling

LOFAR Central Processing

Observatory Control

International LOFAR Station