



Software - SSS

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Major Subsystems



- *High Level Architecture (HLA)*
- Portal (user authentication, and gateway)
- Proposal preparation, submission, handling (PST)
- *Observation preparation (OPT)*
- *Array Scheduling (OST)*
- Archive access (AAT)



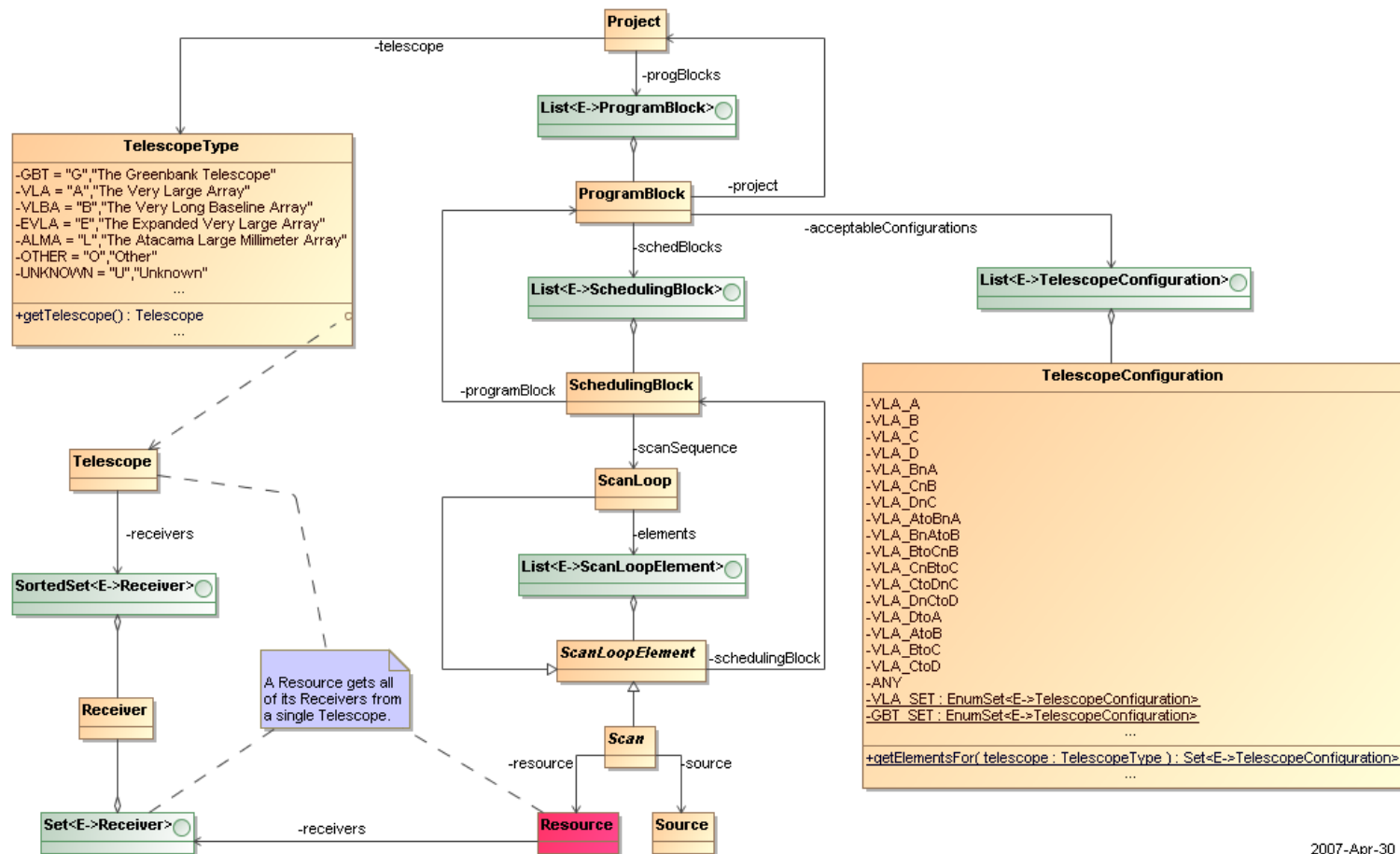
High Level Architecture



- The major subsystems are known (and have been for several years)
- The main task is now in defining the interfaces - we define these as "models" (they are really objects) used within, and passed between, subsystems
- Significant progress has been made in the last 18 months in developing these models, which are common throughout the system as much as they can be, so reused by multiple subsystems
- A caveat is that with distributed development (EVLA, ALMA, EOD), use of "common" models means something different than one might think or hope

Example - Project Model

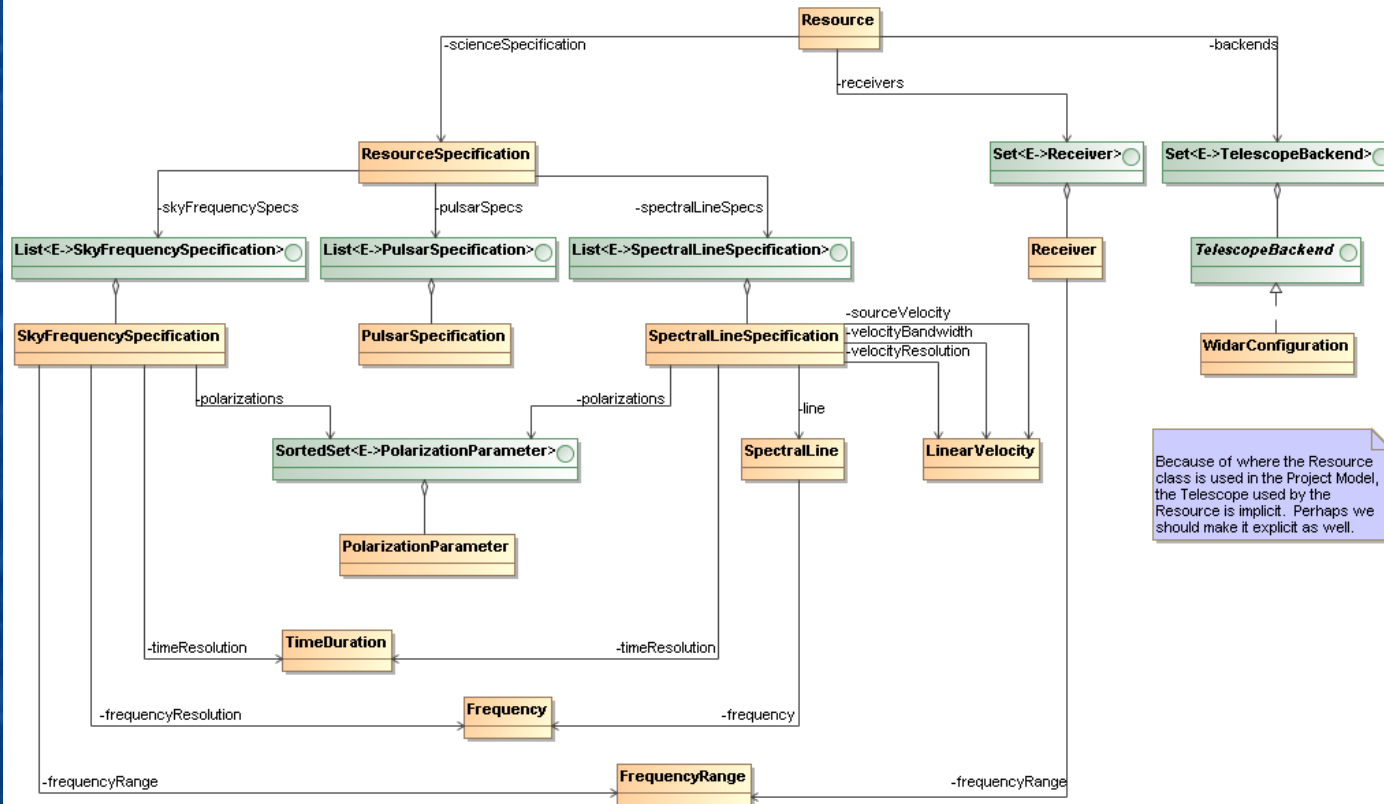
Location of Resource in Project Model



2007-Apr-30

Example - Resource Model

Resource Package: Overview



The Resource class represents the selection and configuration of the hardware used to make an observation. The hardware is represented above by the Receiver and TelescopeBackend classes. The ResourceSpecification class represents a science (ie, hardware-neutral) view of the Resource. This specification is optional. When present it can be used by intelligent classes (ResourceSelector, BackendSelector (neither shown here)) to select hardware and (WidarConfiguration) to configure hardware.

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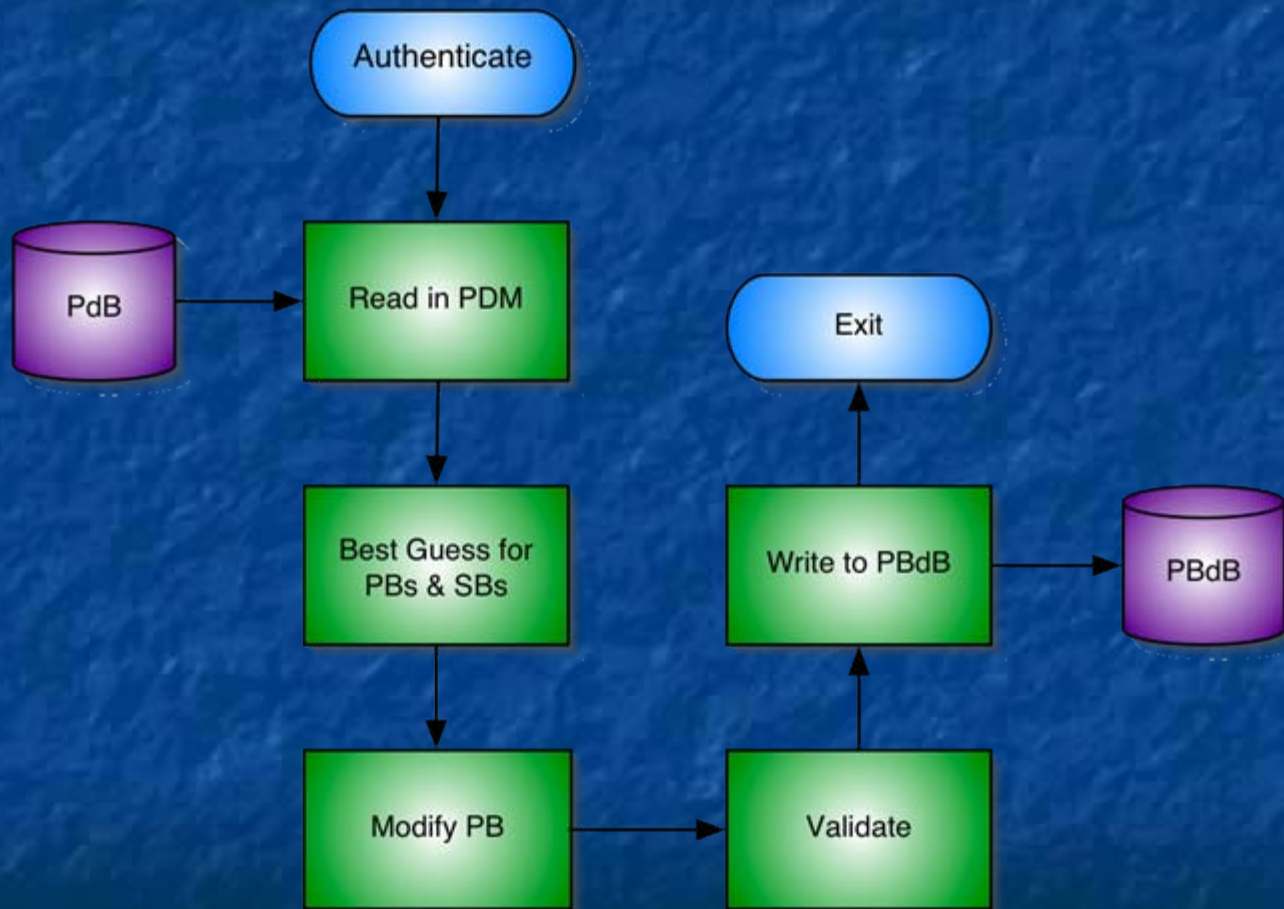
Observation Preparation (OPT)



- Converts Project into Program Blocks (PB is a collection of Scheduling Blocks)
- Needs detailed telescope knowledge
- Needs to support 3 "levels" of user:
 - Novice (automatic generation of PBs for "standard modes")
 - Intermediate (graphical setting of observing parameters)
 - Expert (allow for script level editing)



OPT - Components

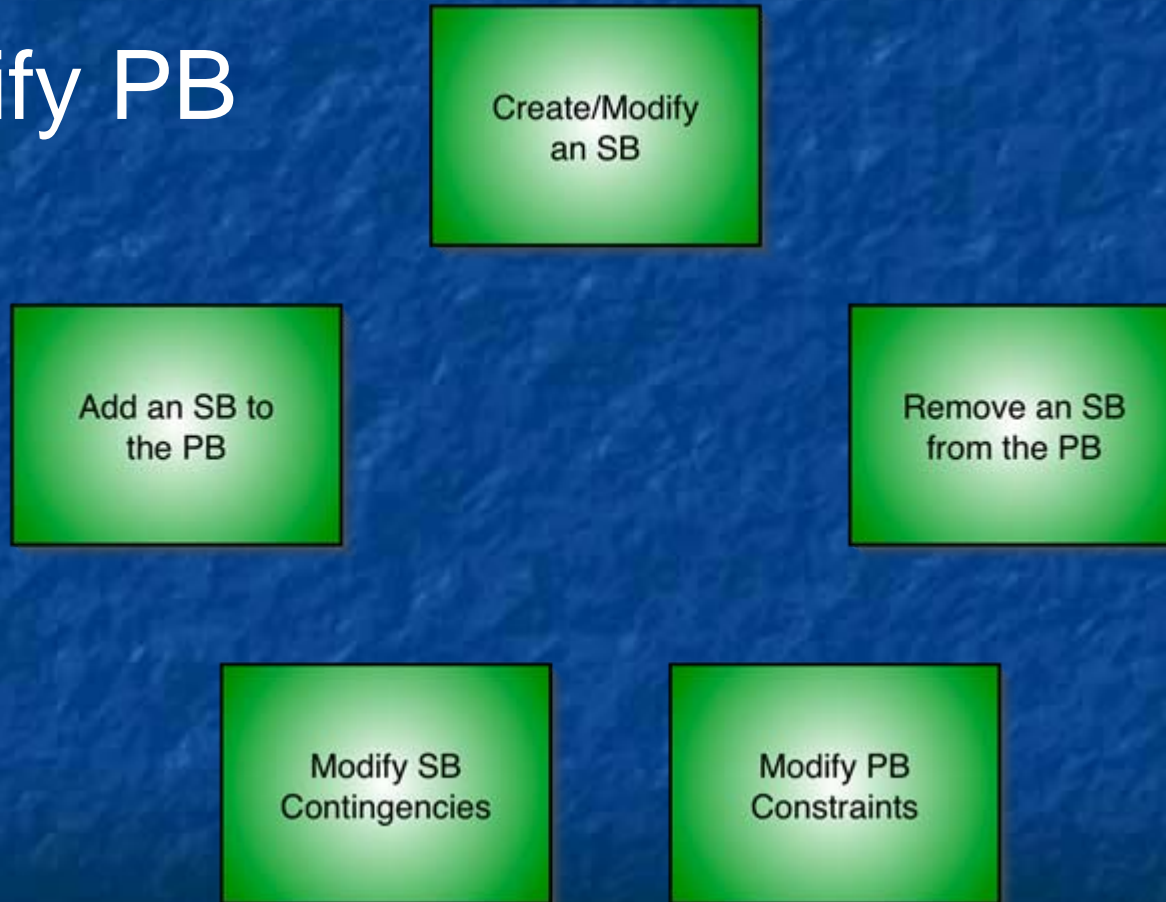




OPT - Components



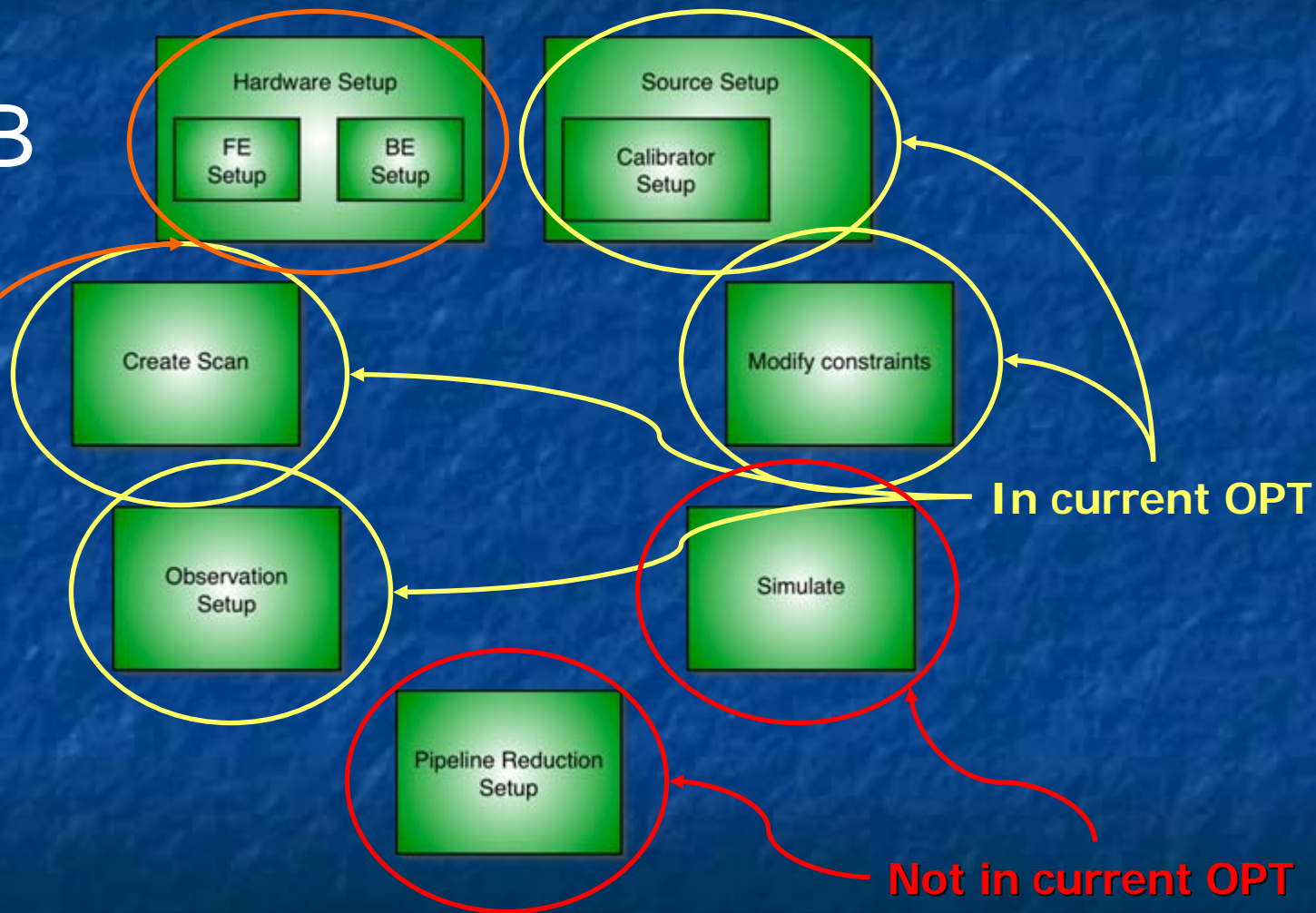
Modify PB



OPT - Components

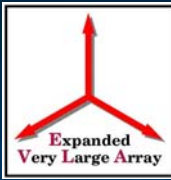
Modify SB

In current OPT,
but minimal





OPT - Demo



NRAO > User Portal > Observation Preparation Tool

Save All

Exit

> Source Catalog Tool

> Resource Catalog Tool



AH942

[AH942](#) > [Uranus](#) > Uranus - K-band

Update

Source Catalog:

VLA

Source Group:

RA 22

Sources:

- ☐ J2200+1030
- ☐ J2200+2137
- ☐ J2201+0312
- ☐ J2201+5048
- ☐ J2202+4216
- ☐ J2203+3145
- ☐ J2203+6240

Update

Resource Catalog:

Resource Group:

Resources:

[Return to Uranus](#)

Scheduling Block Details

Name	Uranus - K-band	Status	Not Yet Scheduled
Count	0	Total Time	0.0 HOUR
Num. Times Completed	0	Time Per Execution	0.0 HOUR
Num. Times Aborted	0	Monitoring Interval	0.0 HOUR
Consecutive Iterations?	<input type="checkbox"/>		

Scans

Scan Creation Wizard



Select: All | None

- ☐ Loop, Iterations: 10 Max: 1.0 in Hour Comment:
- ☐ Standard Observing on 'J2246-1206' for 1.0 MINUTE v
- ☐ Standard Observing on 'Uranus' for 5.0 MINUTE v



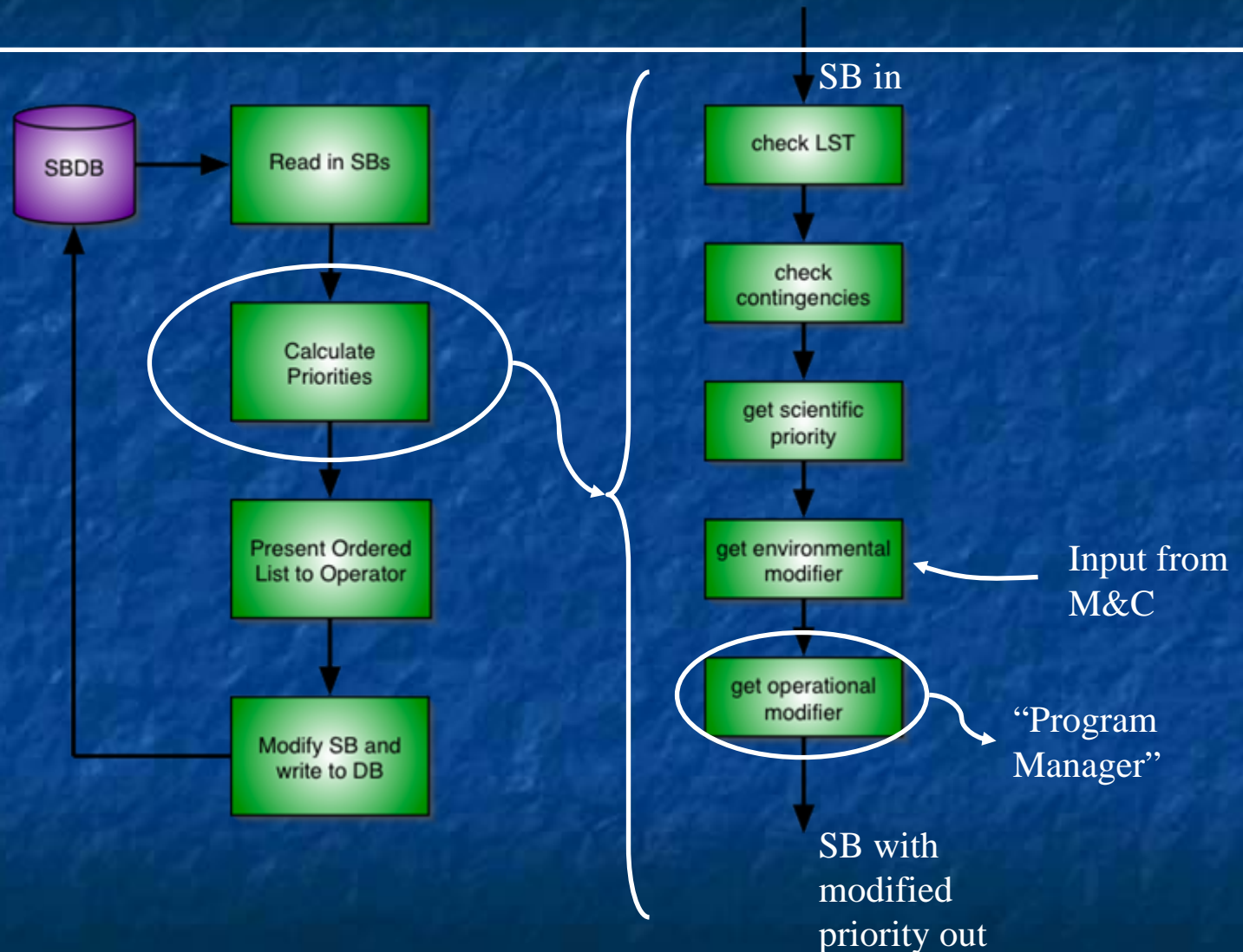
Observation Scheduling (OST)



- Takes pool of available Scheduling Blocks and chooses what should be observed next on the telescope
- Must take into account scientific priority, current observing conditions, and other priority modifiers (project completion pressure, for example)
- Must be able to run autonomously, eventually



OST - Components





OST - Tests on VLA



- Prototype system tested on the VLA – in current regular use (ancestor used successfully for VLBA for several years)
- Observers send in modified OBSERVE files (extra “header” information included in comments at the top)
- OBSERVE files wrangled by NRAO staff
- Prototype OST system presents operator with prioritized list of what to observe next
- All command line tools
- Providing us with invaluable information on the practical aspects of dynamic scheduling of a many-element radio interferometer



OST VLA Tests - Lessons Learned



- It works! Fundamentally, the VLA can be dynamically scheduled, with Scheduling Blocks drawn from a pool and subsequently observed.
- The system is inordinately fond of short SBs - it works well for them, but medium to long length SBs ($> \sim 2$ hours) have not been well tested.
- Popular LSTs are efficiently used - those LSTs that are not so oversubscribed are not so efficiently used.
- Currently effort-intensive (but getting better)



OST – new GUI tool



- New tool which fits in to the HLA was developed during late 2006 to mid 2007
- GUI – much easier to use than old CLI
- Provides framework for testing many different heuristic schemes
- Intent was to deploy for testing at VLA summer 2007, but primary developer has left NRAO, slowing this down (replacement employee starts Sept. 10)



OST – new GUI tool



File Edit View Screens Windows File Edit View Screens Windows Help .000000 MJD

SCHEDULER SCHEDULER SCHEDULER

Schedule

QUERY DATA
512 scheduling

SchedulingType
☒ General Preference
☐ Fixed Date
☐ Monitoring
☐ Periodic Phenomenon
☐ Unknown

Scheduling Status
☒ Not Yet Scheduled
☐ Scheduled But Not Yet
☐ In Progress
☐ Under Way
☐ Completed
☐ On Hold
☐ Canceled

Telescope Configuration
☐ VLA A
☐ VLA B
☐ VLA C
☐ VLA D
☐ VLA B/A Hybrid
☐ VLA C/B Hybrid
☐ VLA D/C Hybrid
☐ VLA A to B/A Hybrid
☐ VLA B/A Hybrid
☐ VLA B to C/B Hybrid
☐ VLA C/B Hybrid
☐ VLA C to D/C Hybrid
☐ VLA D/C Hybrid
☐ VLA D to A
☐ VLA A to B
☐ VLA B to C
☐ VLA C to D
☐ Any Configuration

LST Specified: ☐

Schedule Configuration Scheduling Blocks Metrics

DYNAMIC SCHEDULING OPERATION MODE
Dynamic Scheduler Operating Mode: **Dynamic Scheduling**
Lead Time for Send (min): 5.0
Save

FILTERS
☒ Atmospheric Phase Interference: -1.0
☒ Scheduling Block Status: [Not Yet Scheduled]
☒ Wind Speed (km/s): 0.0
☒ Telescope Configuration: Any Configuration
Save

EVL A ANTENNAS
☐ ea11 ☒ ea13 ☒ ea14 ☒ ea16 ☒ ea17
☒ ea18 ☐ ea19 ☒ ea21 ☒ ea23 ☒ ea24
☒ ea26
Select All Clear All
Save

PRINTER
Print Observe Files: ☒
Printer Name: cb224
Printer Site: Aoc
Copy Count: 1
Save

SCHEDULING BLOCK CONFIGURATION
Scheduling Block Implementation: Evla
Save

SCHEDULING ALGORITHM CONFIGURATION

ALGORITHM
Name: [Unnamed Algorithm]
Type: Barry Clarks Strategy

PRIORITIES
Priority Measure: Weighted Sum Of Priorities
Priority Gap: 1.7976931348623157E308

Priority	Weight
Mean Referee Priority	1.0
Proposal Selection Committee Priority	1.0
Comp Software Priority	1.0
Sp Scheduler Priority	1.0

RANKS
Rank Import... Ranker Name: Priority
Print... Save
Save Delete