

Observatory Control and Data Acquisition Systems

Project Support:

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WBS 1.8.1 (Management)

- Over the lifetime of the construction project for both sites...
- LOE support for:
 - One (1) Level 2 Manager
 - Two (2) Level 3 managers
 - Systems engineering
- Organize and fund:
 - Project organized (internal) reviews.
 - Required funding agency reviews.
- Centralized travel costs

WBS 1.8.2 Observatory Control System

- Facility at each site managing the control and data taking of each site's Telescope Systems.
 - Conduct site operations center for distribution/coordination of each telescope's observation schedule,
 - Provide configuration, and monitoring databases.
 - Provide Operator's console and support computers.
 - Provide Telescope Systems housekeeping data monitoring, alarms and limits, and display.
 - Execution of experiment's observation plan.
 - Aggregate Telescope Systems science data streams,
 - Convert science data-streams from "native" format to "commodity" format, and pass to DM.
 - Provide Real time quality monitoring of science data.

WBS 1.8.3 Telescope Systems – LAT and SAT

- DAQ & control activities appropriate for each type of telescope at each site.
 - Assumes implementers of these systems provide a regularized interface that meets the framework requirements established in 8.2.
 - Support for lowest level of execution/sequencing of the observation plan
 - Provide telescope control systems,
 - Provide low level aggregation of telescope data streams
 - Monitor telescope and any other subsystem protection systems.
- Emulation support for both telemetry & science streams
 - Actual data emulations assumed to be provided by the subsystems

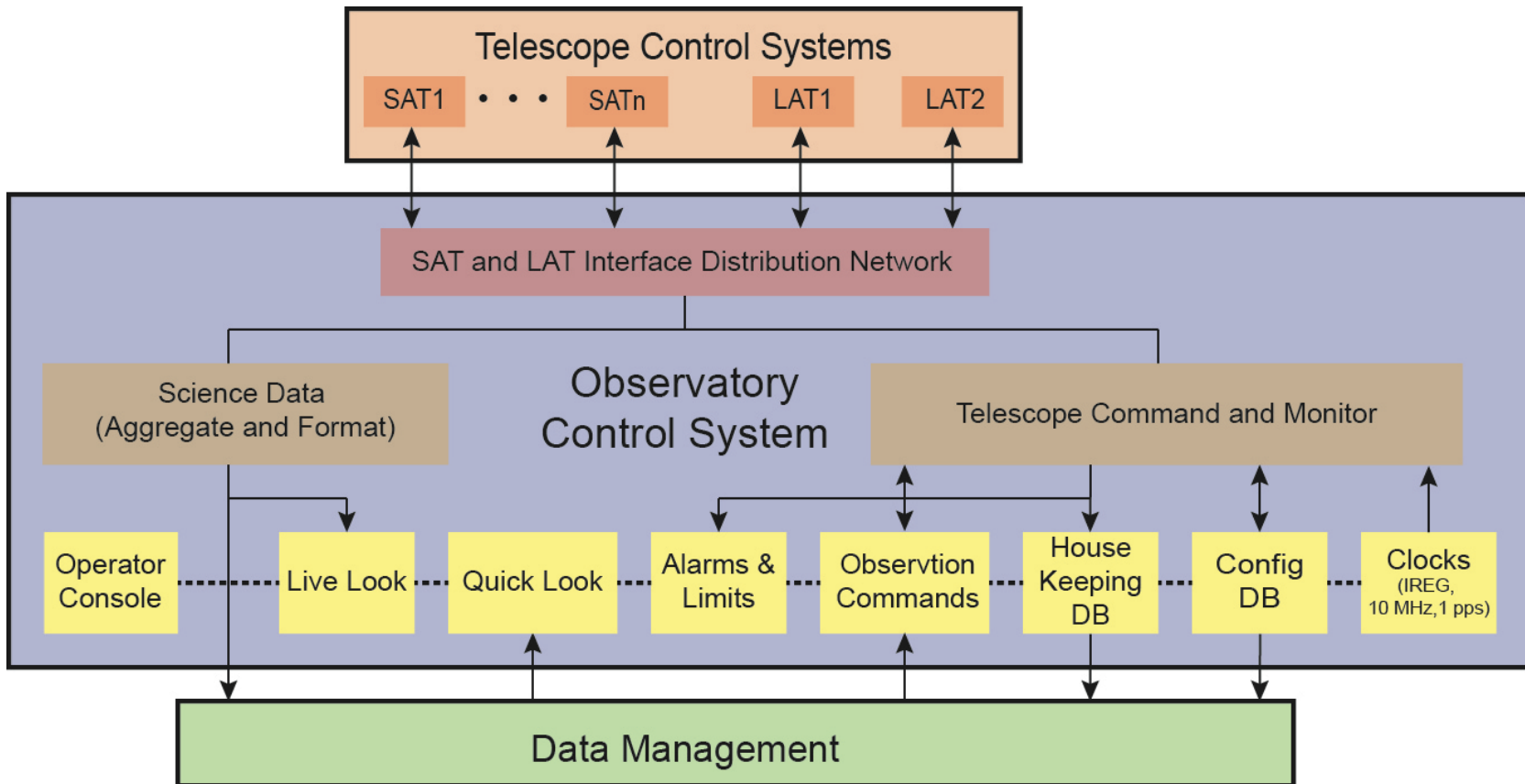
WBS 1.8.4 Subsystem development support

- Provide hardware and technical support to subsystem developers
 - Early deployment of Observatory and Telescope software to other sub-systems
- Subsystem's can serve as “alpha” customers for this software
- Reduces integration risk (explores and develops interfaces)

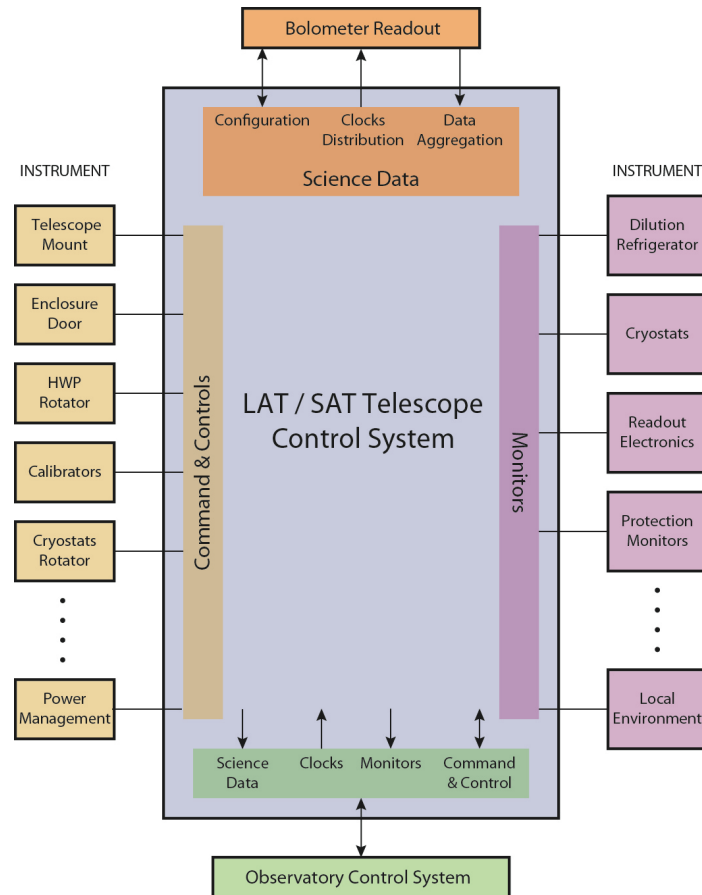
WBS 1.8.5 Shipping

- Chile
- South Pole

WBS 1.8.2 Observatory Control System



WBS 1.8.2 Telescope Systems – SATs and LATs



Key Interfaces

- Data Management
 - Data buffering / storage
 - Data quality monitoring (Quick-Look)
- Facilities
 - Power
 - Civil structures
 - Weather station
- Telescope hardware
 - Mount drive
 - Dome door
 - Calibrators
- Cryostats
 - Half wave plate
 - Cryostat rotator
 - Refrigerators
 - Cryostat monitors
- Electronics
 - Global clocks distribution
 - Readout electronics configuration
 - Readout science data collection
 - Local environment monitoring
 - Hardware protection monitoring

Interface Questions

- Facilities
 - Trenching and cables
 - Electronics room
- Telescope hardware
 - Cryostat rotator on all telescopes
 - HWP on all telescopes
 - Refrigerator per focal plane
 - Hardware protection monitoring
 - Number of mounts vs number of telescope cameras
- DAQ – Readout board software (not firmware) split
- Shipping cost assumption
- Installation
 - What is assumed about how telescopes are delivered
 - Who pays for on-site activities

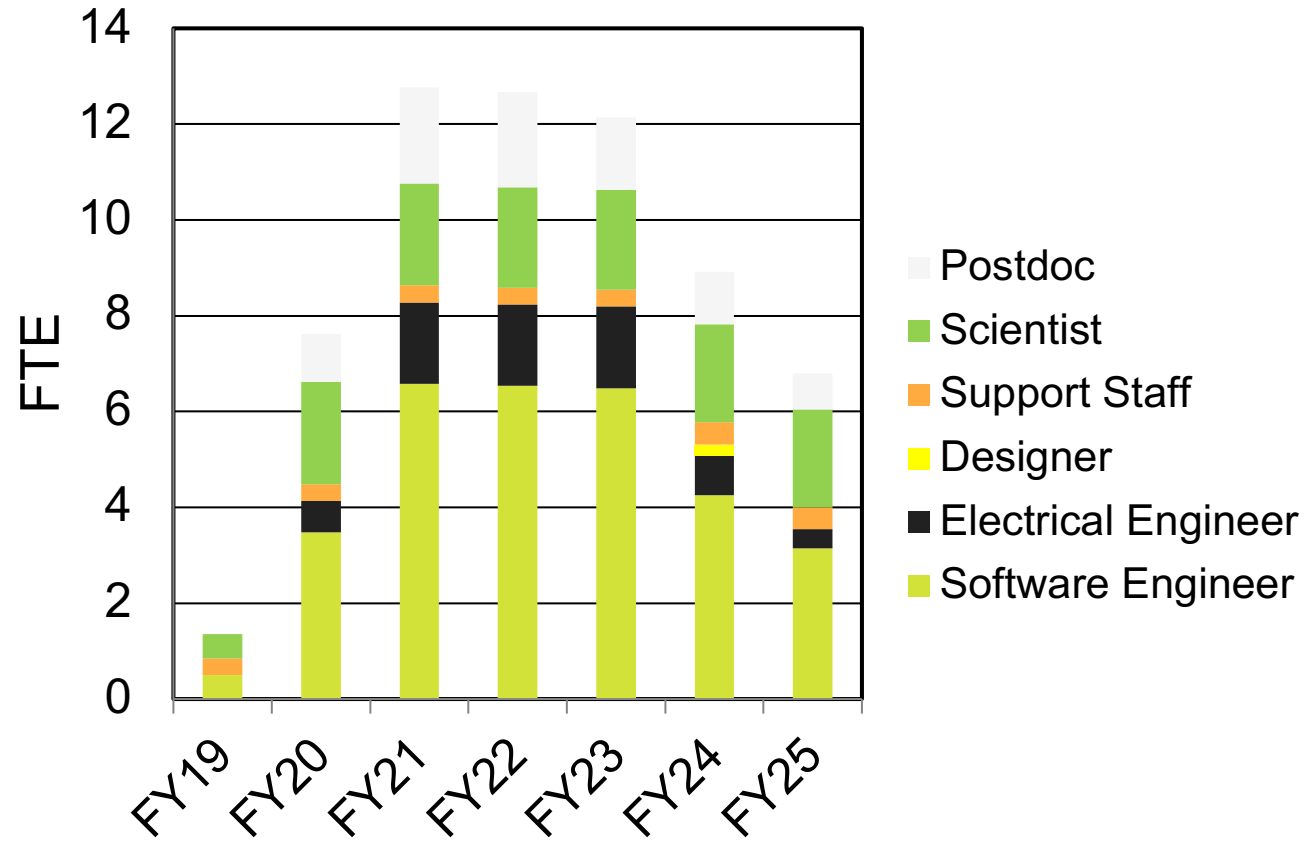
Cost Summary

		LABOR	NON-LABOR	TOTALS	
	WBS/Activity	TOTALS	TOTALS	Labor + Non-Labor	Labor + Non-Labor + Estimate Uncertainty
1.07	Observation Control and Data Acquisition Systems	\$17,473,288.03	\$972,080.00	\$18,445,368.03	\$21,849,003.24
1.07.01	Management	\$10,007,424.00	\$174,000.00	\$10,181,424.00	\$11,733,957.60
	L2 Management	\$2,606,976.00	\$0.00	\$2,606,976.00	\$2,998,022.40
	L3 Management	\$3,654,604.80	\$0.00	\$3,654,604.80	\$4,202,795.52
	System Engineering	\$3,264,307.20	\$0.00	\$3,264,307.20	\$3,753,953.28
	Reviews	\$481,536.00	\$0.00	\$481,536.00	\$553,766.40
	Travel	\$0.00	\$174,000.00	\$174,000.00	\$225,420.00
1.07.02	Observatory Control System	\$3,894,773.76	\$589,280.00	\$4,484,053.76	\$5,133,170.22
	Science Data Acquisition	\$2,019,916.80	\$0.00	\$2,019,916.80	\$2,322,904.32
	Housekeeping Control and Monitoring	\$1,874,856.96	\$0.00	\$1,874,856.96	\$2,156,085.50
	Hardware Procurements	\$0.00	\$438,480.00	\$438,480.00	\$503,900.40
1.07.03	Telescope Systems - LAT and SAT	\$2,905,637.47	\$116,000.00	\$3,021,637.47	\$3,457,083.09
	Science Data Acquisition	\$996,017.76	\$116,000.00	\$1,112,017.76	\$1,261,020.42
	Command and Control	\$636,539.90	\$0.00	\$636,539.90	\$732,020.89
	Housekeeping Interfaces	\$636,539.90	\$0.00	\$636,539.90	\$732,020.89
	Personnel and Equipment Protection Interfaces	\$636,539.90	\$0.00	\$636,539.90	\$732,020.89
1.07.04	Subsystems Development Support	\$587,980.80	\$34,800.00	\$622,780.80	\$1,344,042.72
	Subsystem Development Support	\$587,980.80	\$34,800.00	\$622,780.80	\$721,261.92
1.07.05	Shipping Costs	\$77,472.00	\$58,000.00	\$135,472.00	\$180,749.60
	Atacama Shipping	\$38,736.00	\$34,800.00	\$73,536.00	\$97,888.80
	South Pole Shipping	\$38,736.00	\$23,200.00	\$61,936.00	\$82,860.80

Issues to be resolved

- ~~Relative responsibilities of WBS 1.8 and Data Management~~
- Do we understand all the interfaces?
- Do we have sufficient understanding of the requirements?
 - From both a functional & performance perspective?
- Are there observatory and/or telescope requirements which are site specific?
- Do we adequately understand how the two observatories are to be:
 - integrated, tested and commissioned?

FTE phasing



FTE-years

	FTE-years
Software Engineer	31.0
Electrical Engineer	7.0
Designer	0.2
Support Staff	2.7
Scientist	13.0
Postdoc	8.4