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National Radio Astronomy Observatory

Quarterly Status Update 2 FY2016

January – March 2016

PREPARED BY	ORGANIZATION	DATE
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NRAO Quarterly Status Update
(QSU2 FY2016)
January - March 2016

				Q1 Performance Assessment			Q2 Performance Assessment		
POP Section Number	POP Milestone	Milestone	Completion Date	Cost	Schedule	Scope	Cost	Schedule	Scope
2.6		**Atacama Large Millimeter/submillimeter Array (ALMA)**							
		Operations							
	1	Cycle 3 observing & operations begin Q1, ongoing through Q4	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
	2	Cycle 3 JAO Support: AoD support shifts at the OSF	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
	3	Support Extension of Capability efforts at the JAO	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
	4	Cycle 4: Participate in the Obsmode go / no-go meeting	12/31/2015						
	5	Cycle 4: s/w tests, documentation, CfP	3/31/2016						
	6	Offer data reduction workshop in Charlottesville	12/31/2015						
	7	Cycle 4: CDEs, User Support, Proposal Deadline Supp.	3/31/2016						
		Development							
	16	NA ALMA Development Projects for FY2014/2015 will be completed	3/31/2016						
		NRAO-Chile Office							
	18	Completion of the succession and management plan 2015-2016 including the incorporation of a new Business Manager	12/31/2015						
	19	Implementation and monitoring of the new Collective Contract signed with the AUI Union as a result of the negotiations conducted in 2015	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
	20	Renewal of the NRAO/AUI Office of Chilean Affairs lease for a new period of three years	12/31/2015						
3.4		**New Mexico Operations**							
		VLA Science Operations							
	1	Define VLA capabilities to be offered for semester 2016B	12/31/2015						
	3	Update VLA documentation to support 2016B Call for Proposals, perform proposal technical reviews	3/31/2016						
	5	Determine baselines and pointing for antennas moving into their D configuration locations	12/31/2015						
	6	Determine baselines and pointing for antennas moving into their DnC and C configuration locations	3/31/2016						
		VLA Array Operations							
	8	Complete reconfiguring array to D configuration	12/31/2015						
	9	Reconfigure array to DnC, then C configuration	3/31/2016						
	11	Release Operations GSA vehicle(s)	12/31/2015						
		VLA Antenna Maintenance							
	14	Perform preventive maintenance on each of two transporters prior to array reconfiguration	12/31/2015						
		VLA Site Infrastructure Maintenance							
	18	Perform preventive maintenance on VLA site hatch gear	12/31/2015						
		VLA Technical Upgrades and Enhancements							
	20	L-Band solar upgrade, 2 additional receivers with full RF upgrade installed	3/31/2016						
	25	FE card cage upgrades, 35 units installed	3/31/2016						
		VLA Operational Enhancements							
	31	Implement continuous slew tipping scans	3/31/2016						
		VLBA Science Operations							
	34	Define VLBA capabilities to be offered for semester 2016B	12/31/2015						
	36	Update VLBA documentation to support 2016B Call for Proposals, perform proposal technical reviews	3/31/2016						
		Site Operations							
	41	Renew lease for Pie Town (PT)	12/31/2015						
5.3		**Central Development Laboratory**							
		Repair, Maintenance, Production, Support							
	2	Define and finalize Band-2 prototype cartridge configuration for final evaluation	12/31/2015						
	3	Complete evaluating Band-2 prototype in the ALMA test cryostat	3/31/2016						
	4	Pending success of foundry run, CRAL evaluation of new MMIC wafer complete	3/31/2016						
	7	Complete RF characterization of a HERA 14 meter dish equipped with modified PAPER dipole feed. This include development of an electromagnetic model, reflection coefficient measurements, and beam maps	12/31/2015						
	8	Complete the refurbishment of 24 PAPER dipole active baluns for use with new HERA antennas	12/31/2015						
	9	Begin development of a new broadband feed for the HERA 14m dish, with electromagnetic simulations and basic construction details	3/31/2016						
	12	Further tests of cross-polarization contributions to Band 2 optics	12/31/2015						
		Research and Development							
	13	Design prototype 35-50 GHz feed horn and phase-shifter for new VLA receiver	12/31/2015				Cancelled		
	16	Resolve suspected packaging/heat sink issues with BAE MHEMT MMICs and conduct further cryogenic tests to see if noise temperature can be improved	3/31/2016						
	25	If new 35nm CRAL wafer run produces competitive Band 2 MMIC chips, another Band 2 MMIC LNA module will be built and cryogenically tested	3/31/2016						
	26	Design and prototype 65-90 GHz amplifier with 2 mil substrate thickness (compare to current 3 mil). Goal is improved reliability and performance reproducibility	12/31/2015						
	28	Implement advanced topologies and miniaturized packaging of reflectionless filters	3/31/2016						
6.5		**Science Support & Research**							
		Telescope Time Allocation (TTA)							
	1	CfP for semester 2016B	3/31/2016						
	3	SRP and tech review process, semester 2016B	3/31/2016						

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POP Section Number	**POP Milestone**	**Milestone**	**Completion Date**	**Cost**	**Schedule**	**Scope**	**Cost**	**Schedule**	**Scope**
	5	TAC meeting for semester 2016A	12/31/2015						
	7	Update SW tools requirements for TAC support 2016A	12/31/2015						
	8	Update SW tools requirements for PST 2016B	3/31/2016						
	11	Update documentation for CfP and tools 2016B	3/31/2016						
		Science User Support (SUS)							
	15	NAASC sponsored science workshop	12/31/2015						
	16	Testing of version 2 of PPI and NRAO archive	3/31/2016						
	18	Summer student selection	3/31/2016						
	19	Summer student offers	3/31/2016						
	23	Update CASAGUIDES	12/31/2015						
	24	Review ALMA user documents	3/31/2016						
		SSR Support							
	26	Library contracts negotiated	3/31/2016						
7.4		**Data Management & Software**							
		ALMA System Software							
	3	ALMA Fall 2015 Release	12/31/2015						
		VLA/VLBA System Software							
	5	Deploy software to support Semester 2015B observing	3/31/2016						
	6	Deploy software to support Semester 2016A commissioning	3/31/2016						
		GBT System Software							
	11	Vegas Pulsar Modes	3/31/2016						
	12	NRQZ Software	3/31/2016				cancelled		
		Software Development							
	17	Leverage NGAS for Green Bank data archive	12/31/2015						
	18	Storage upgrade review	3/31/2016						
	19	New NRAO Archive software	3/31/2016						
	21	ALMA Cycle 3 Pipeline Release	12/31/2015						
	22	Pipeline Reference Imaging	3/31/2016						
	23	CASA reliability initiative	12/31/2015						
	24	Release CASA version 4.5	12/31/2015						
	26	Implement PST updates for Semester 2016B Call for Proposals	12/31/2015						
	28	Implement PHT updates for Semester 2016B TAC Meeting	3/31/2016						
	30	Implement OPT updates for Semester 2016A VLA Observing	12/31/2015						
	32	Tool redesign – deliver design	3/31/2016						
	34	Deliver iOS App for Public Outreach	3/31/2016						
8.5		**Program Management Department**							
		Headquarters							
	1	Quarterly Status Updates	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
		New Mexico							
	5	Finalize NM Ops and DMS Training Plan (2nd Phase)	3/31/2016						
	7	DMS Group Practices Assessment	12/31/2015						
	9	Host learning session	12/31/2015						
	10	Host learning session	3/31/2016						
		CDL/ALMA							
	13	PM/SE Training development	12/31/2015						
	14	PM/SE Training development	3/31/2016						
	19	Facilitate gate review	12/31/2015						
		Green Bank							
	22	Host learning session	12/31/2015						
	23	Host learning session	3/31/2016						
10.3		**Education & Public Outreach**							
		STEM Education and Outreach							
	1	Translation of SJS curriculum to 4H project books complete	3/31/2016						
	2	SJS instructional videos complete	3/31/2016						
	3	Final round of SJS professional development meetings for educators	12/31/2015						
			3/31/2016						
			6/30/2016						
	6	VLA Visitor/Education Center Education and Interpretive Plan completed	12/31/2015						
	7	VLA Visitor/Education Center architectural schematic designs completed	3/31/2016						
	11	Pocahontas County Science Fair	12/31/2015						
	12	Hour of Code Event	3/31/2016						
	16	Recruit additional SPOT undergraduate ambassadors	12/31/2015						
	17	Additional training for SPOT ambassadors	3/31/2016						
		News & Public Information							
	19	WordPress site specified	12/31/2015						
	20	WordPress site design elements completed	3/31/2016						
	21	Orion videos specification and scripts completed	12/31/2015						
	23	ALMA Explorer filming	3/31/2016						
	25	Beta version iOS "RadioSky" app ready for testing	12/31/2015						
	26	RadioSky" app locked, ready for distribution	3/31/2016						
11.4		**Computing & Information Services**							
	1	Business software review and strategic alignment	3/31/2016						
	3	RHEL 7 Unix OS upgrade	3/31/2016						
	5	Selection of Green Bank phone system	12/31/2015						
	9	Business services capacity review	3/31/2016						
	10	Review and consolidation of backup solutions	12/31/2015						
12.3		**Diversity**							
		Diversity Council							
	1	Diversity Council Meeting	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						

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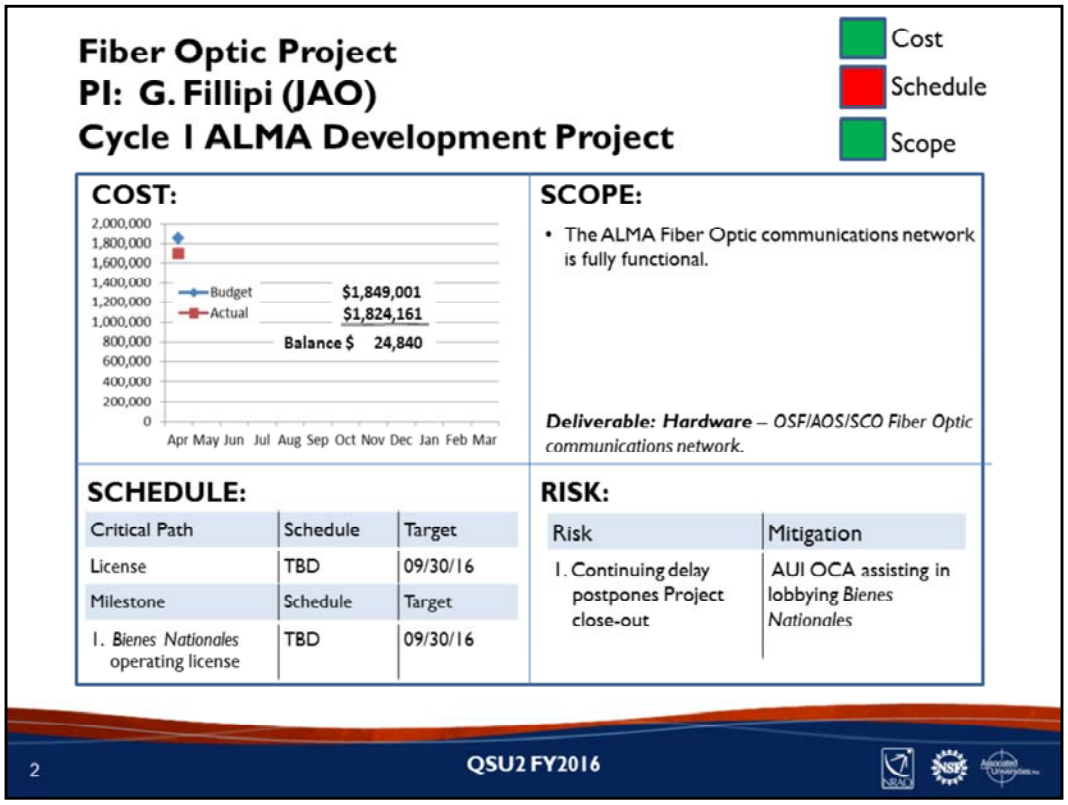
		National/Domestic Outreach							
	2	SEDUIP & PING Program Plan complete	12/31/2015						
	3	SEDUIP Expansion Plan complete	3/31/2016						
	4	LSAMP, AATF, & SYEP Program Plans in place	3/31/2016						
	5	Initiate recruitment activities	12/31/2015						
	6	Summer Program Orientations	3/31/2016						
		International Outreach							
	9	NINE Program Plan (existing partners) complete	12/31/2015						
	10	NINE Program Plan draft (new partners) complete	3/31/2016						
	12	NINE conference held	9/30/2016						
	13	NINE Virtual Classrooms/Learning Venues Program Plan developed and implemented	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
		Diversity and Cultural Awareness							
	14	DCA Program Plan developed and implemented	12/31/2015						
			3/31/2016						
			6/30/2016						
			9/30/2016						
13.7		**Human Resources**							
		Training & Development							
	1	Deliver two new Management/Supervisor development courses: 1. Performance Management, and 2. Comp 101	3/31/2016						
		Compensation							
	3	Annual Performance Review Process	12/31/2015						
	4	All preparations complete and salary review worksheets are open to pay decision managers for final merit review decisions	3/31/2016						
	5	FLSA regulation changes anticipated and analyzed	3/31/2016						
		Benefits							
	7	HR prepares and distributes all open enrollment materials to employees and makes enrollment changes into JDE and with vendors	12/31/2015						
	8	Benefits programs for critical illness, accident and LT care voluntary benefits	12/31/2015						
	9	Assistance program for NRAO employees and retirees for hardship or catastrophic events	3/31/2016						
		Recruitment and Employment							
	11	Design and implement a comprehensive recruitment toolkit for hiring managers	12/31/2015						
	12	Assess current applicant tracking system and determine need and/or feasibility for improved system	3/31/2016						
	13	Implement an Observatory-wide On-Boarding program	3/31/2016						
		Human Resources							
14.1		**Communications**							
		Science Communications							
	1	Update Research Facilities brochure	12/31/2015						
15.7		**Administration**							
		CAP							
	5	Update manual. Review and approval by Assoc. Director of Administration. Training	3/31/2016						
		ES&S							
	7	Determine technical solution to Safety Recordkeeping requirements	12/31/2015						
		MIS							
	10	Prepare list of possible improvements, upgrades and additions Calculate effort, cost, and benefit of each change.	3/31/2016						
		TTO							
16.5		**Spectrum Management**							
		Spectrum Management							
	1	ITU-RWRC-15	12/31/2015						
		WV Radio Quiet Zone							
	2	WV Radio Quiet Zones	3/31/2016						
17.1		**Director's Office**							
		ALMA							
	1	ALMA Board Meeting	12/31/2015						
			3/30/2016						
			6/30/2016						
			9/30/2016						
	2	ALMA Director's Council	12/31/2015						
			3/30/2016						
			6/30/2016						
			9/30/2016						
		Corporate Meetings							
	3	AUI Board of Trustees meetings	12/31/2015						
			3/30/2016						
			6/30/2016						
	4	AUI Executive Committee meetings	12/31/2015						
			6/30/2016						
			9/30/2016						
		Science Community							
	6	Appoint new Users Committee members	12/31/2015						
		Management Review							
	8	NSF Annual Program Review	12/31/2015						
	9	All Hands presentation	12/31/2015						
			6/30/2016						

QSU2 FY2016 Report

January – March 2016



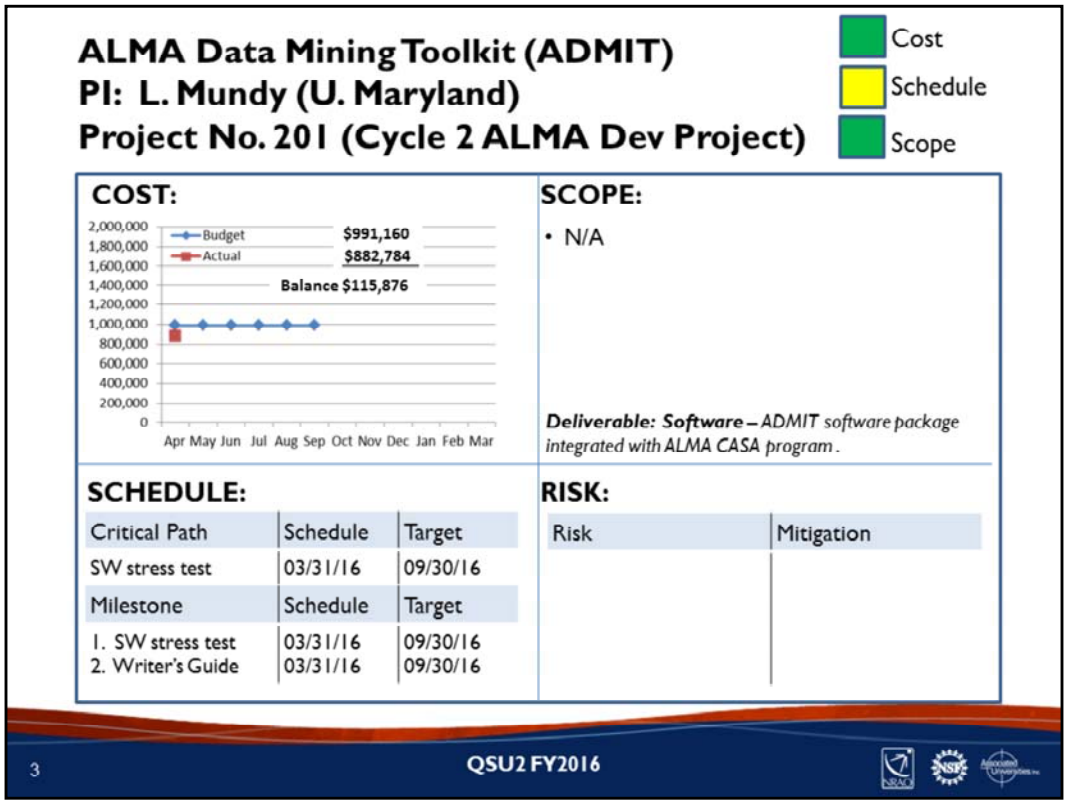
COST: $24K underrun being held in reserve against potential close-out costs. None identified at this time.

SCHEDULE: All legal requirements fulfilled. Waiting on issuance of Operating License from *Bienes Nationales*.

SCOPE: N/A

RISK & MITIGATION:

- Microwave link (100Mbps) will be maintained by Silica – at no cost to ALMA – through the end of CY2016. This includes use of the fiber and DWDM equipment.
- Silica bank guarantees are valid through June 2016
- AUI has agreed to suspend performance penalties so long as the FO link is available and the bank guarantees are valid.

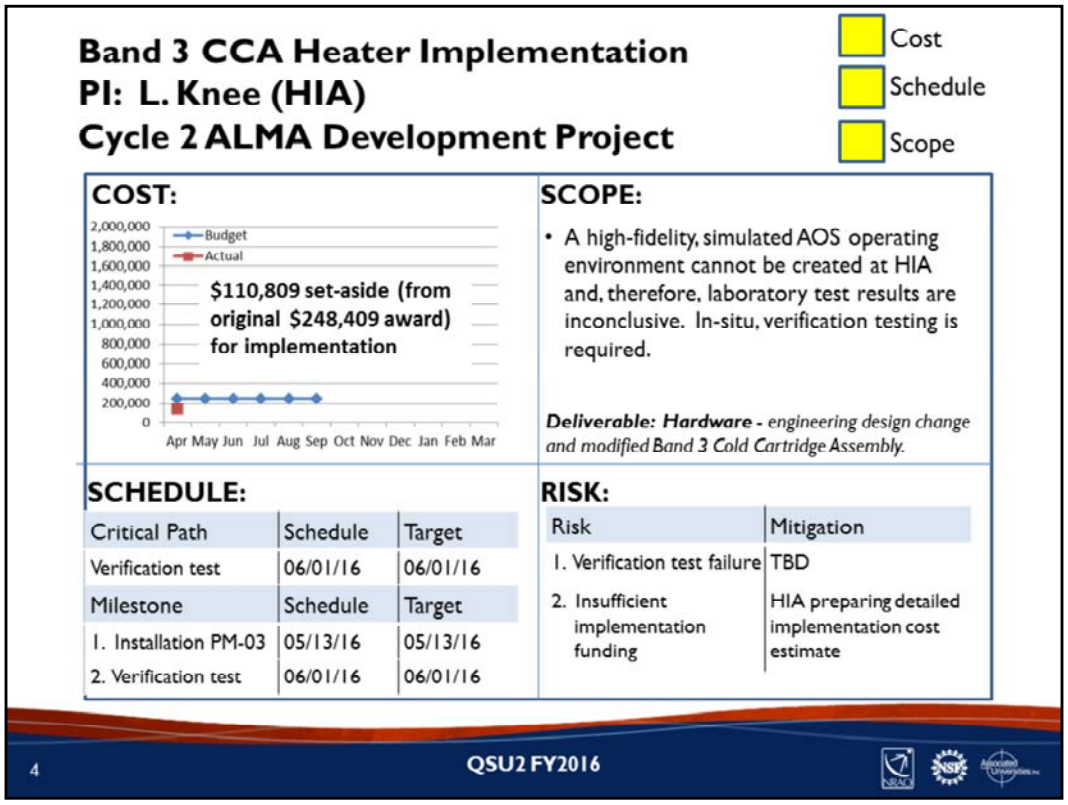


COST: Final payment ($115K) will be released upon receipt of the field-tested Tool Writer's Guide.

SCHEDULE: Software module is written; integration work sub-awarded to NRAO by U. Maryland is late. Request for a No-cost Extension is in work.

SCOPE: N/A

RISK & MITIGATION: Late delivery has no impact to near-term ALMA Science Operations as there are no extant data sets compatible with ADMIT.



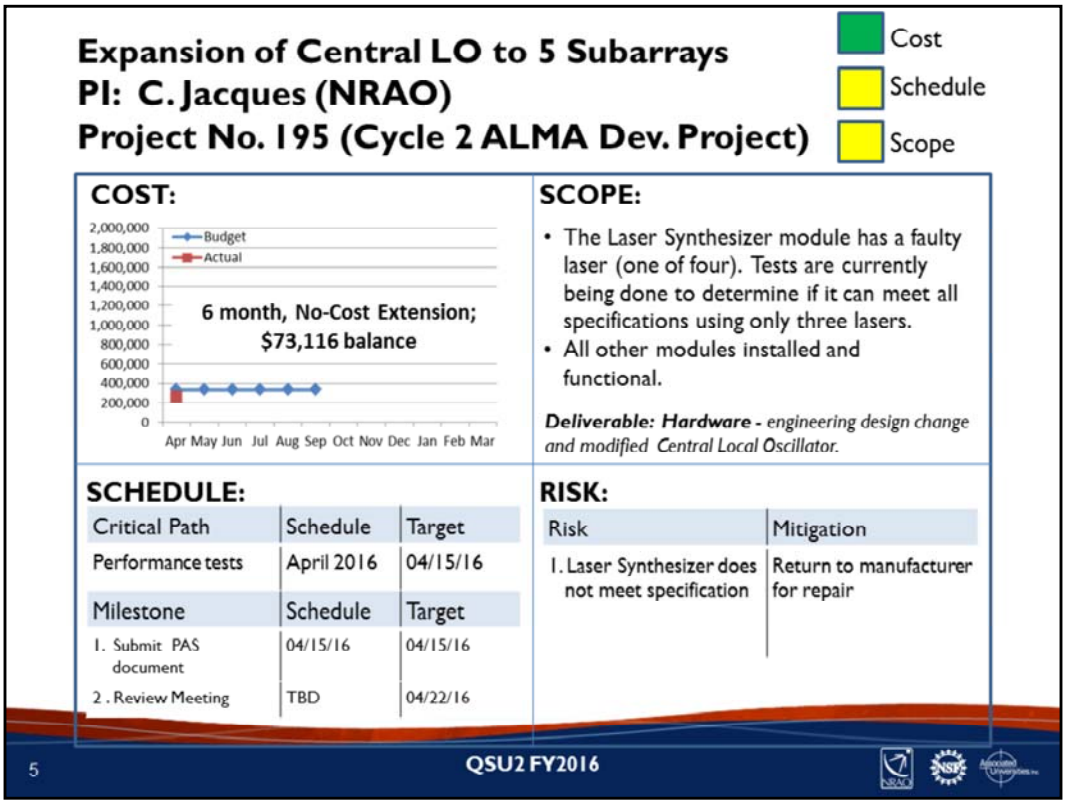
COST: Sufficient funds are available to support verification testing. TBD if parts procurement and modification of 72 CCAs (by JAO personnel) can be accomplished with remaining funds.

SCHEDULE: B3 CCA Unit No. 33 has been modified and installed into FE 43. FE 43 will be installed into antenna PM-03 for verification testing.

SCOPE: HIA highly confident that the heater will remedy the accumulated flux problem. Uncertain about heater efficacy in solving the total power variation (as a function of azimuth) problem since they are unable to simulate AOS magnetic field variations in their laboratory. (Allen Variance specification)

RISK & MITIGATION:

- Verification test failure – TBD
- Insufficient implementation funding – detailed cost estimate forthcoming from HIA

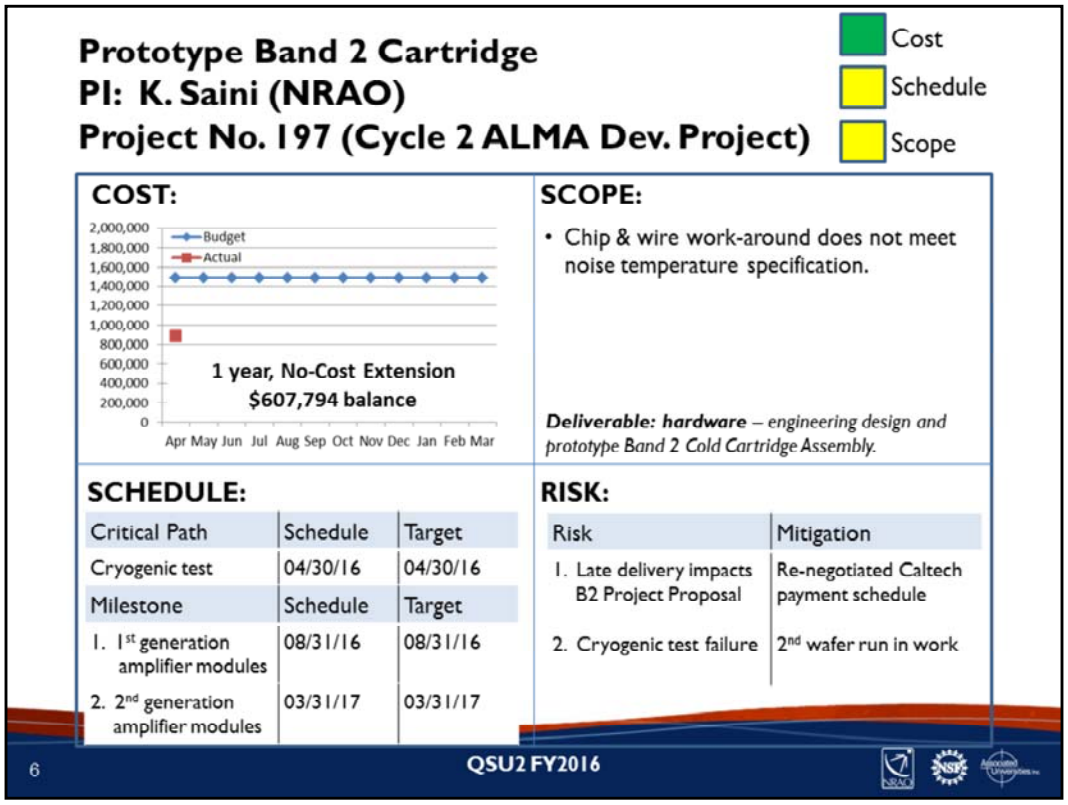


COST: Estimated cost to return and repair is less than $10K.

SCHEDULE: No impact within the extended period of performance.

SCOPE: Desirable to have all four lasers fully functional. Engineering analysis indicates that the Synthesizer will meet specification with three lasers without compromising operating safety margin. Verification tests in progress. Returning the Synthesizer to the manufacturer for repair (to Canada and return to Chile) may cause additional damage.

RISK & MITIGATION: No impact to Cycle 3 Observing Campaign.



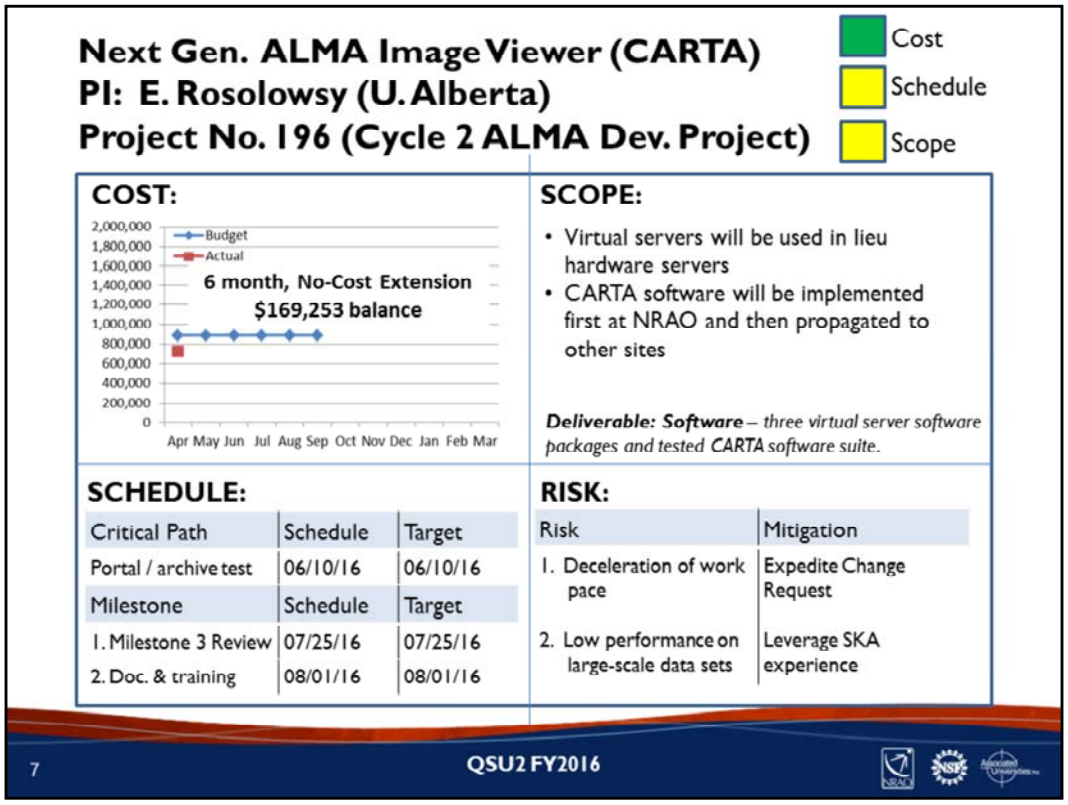
COST: N/A

SCHEDULE: Caltech/CRAL significantly behind schedule due to wafer production problems. CDL developed a "chip & wire" (versus printed circuit) work-around to enable development of other aspect of the Band 2 CCA design.

SCOPE: Chip and wire alternative does not meet noise temperature specification. Room temperature performance of CRAL's MMIC is acceptable; cryogenic performance TBD

RISK & MITIGATION:

- Late delivery of amplifier modules jeopardizes submittal of CDL's ALMA Development Cycle 4 Project proposal. Re-negotiated final payment terms with Caltech. 50% of final payment (originally due in January 2016) will be paid during April, and 50% will be paid upon delivery of the 1st generation MMICs.
- A second wafer run is in progress and should be ready for test during Q1 FY2017.



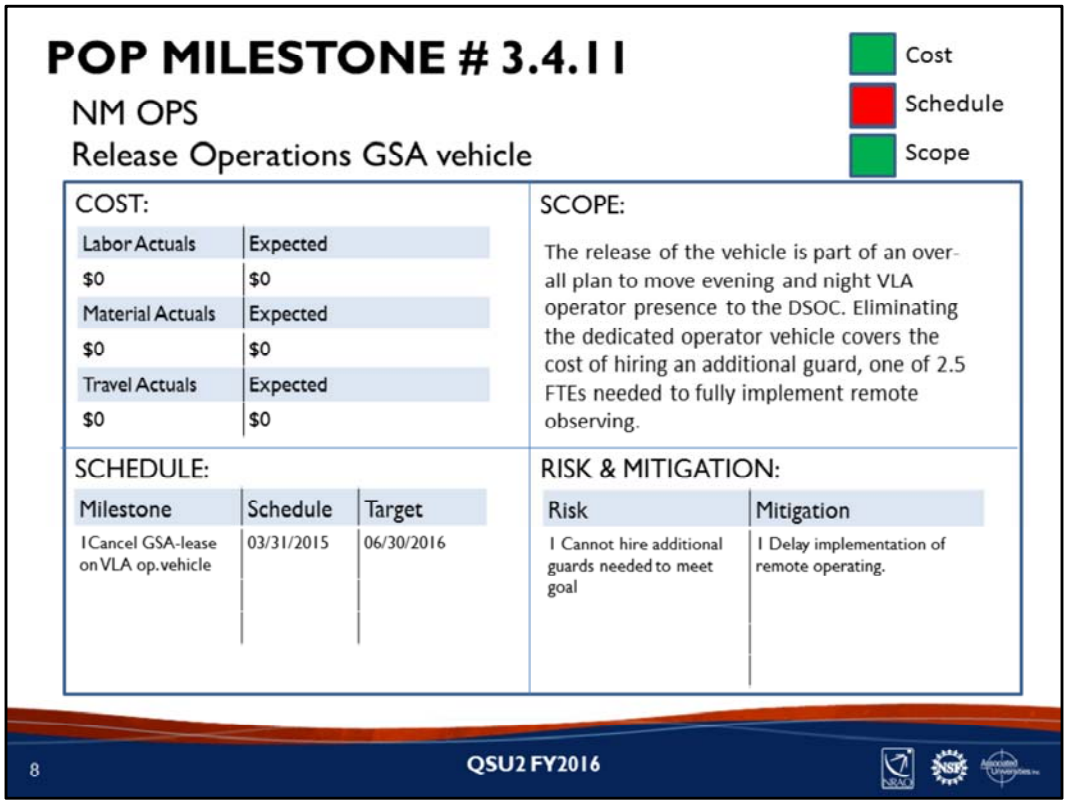
COST: N/A

SCHEDULE: Delay due to underestimation of effort required to interface new code with existing CASA code.

SCOPE: changes authorized per NRAO CR 192.2

- Virtual servers will be used in lieu hardware servers (technically superior solution). This also facilitates implementation of CARTA software package at the other two ARCs (ESO and JAO).
- Software will be delivered first to the NRAO archive and then propagated to other sites. Original plan was to implement at the JAO ALMA archive.

RISK & MITIGATION: No impact to Cycle 3 Observing Campaign.

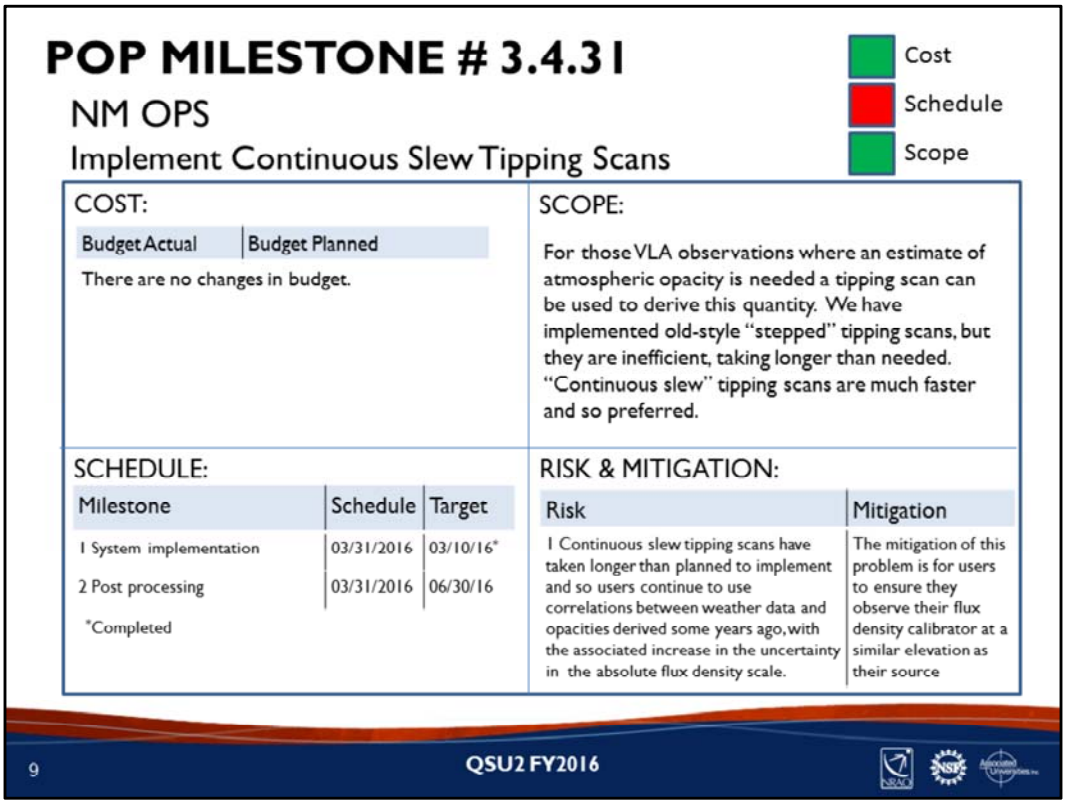


COST: The release of the vehicle will enable NM Ops to pass the cost savings on the GSA-rental to hire an additional guard/custodian for the VLA. The goal to achieve remote telescope operations for the evening and midnight shifts needs to comply with the two-man rule for those time periods, and requires the hiring of additional guards. The release of the GSA rental of a dedicated Operator vehicle will cover the cost of one full-time (40 hours) guard.

SCOPE: Remote operation of the VLA is desirable for a number of reasons. It will enable cross-training of VLA and VLBA operators; it will provide a proof of concept for remote operations of the ngVLA; it may create some small cost savings that will be used to create additional support to the guard/custodial staff at the VLA; it will also offer flexibility to the operator staff to avoid dangerous driving conditions.

SCHEDULE: For safety reasons, we require two persons on site at all times. Turn-over in the guard/custodial staff has left that group short-handed, so the operator continues to serve as the second person on site.

RISK & MITIGATION: The risk of not meeting this goal delays the transition of the evening and night shifts of the VLA operators to the DSOC. Although desirable, remote operations can be implemented at a later date, when resources are available, or if there are continued difficulties in hiring guards.

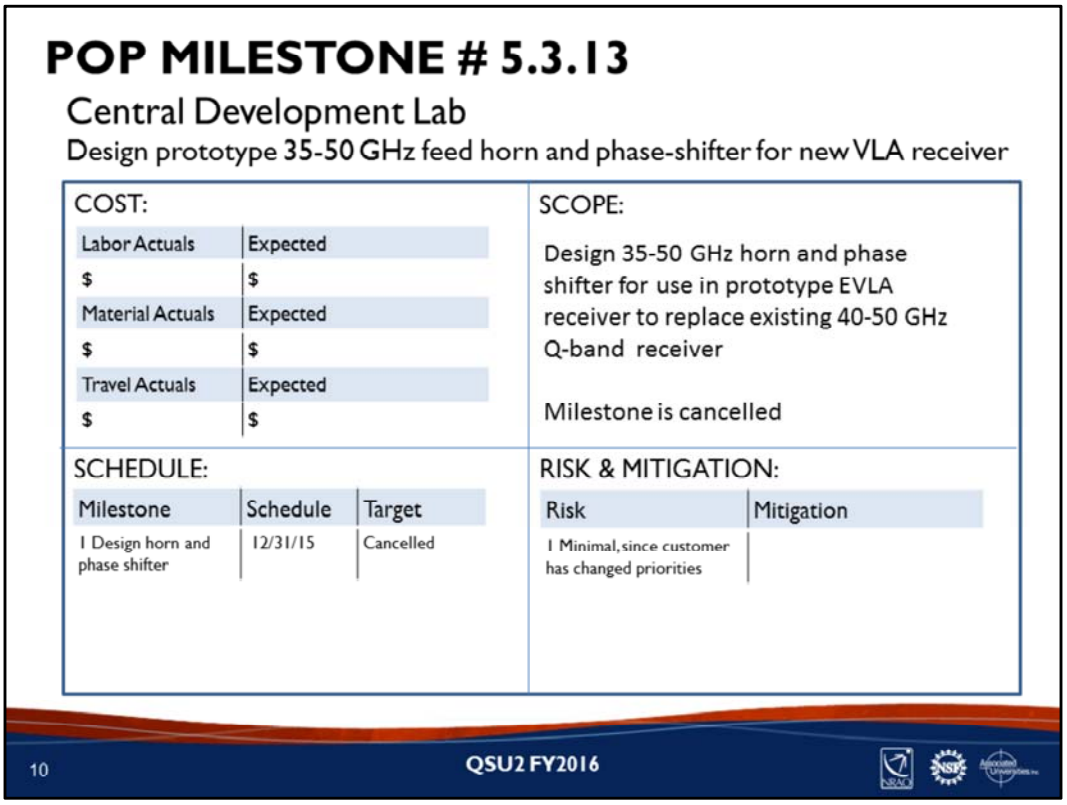


COST: No changes in budget

SCOPE: No changes in scope

SCHEDULE: Stepped tips are supported in the OPT, and data is properly written into the SDM. Continuous slew tips are properly supported in the low-level online software, and data is properly written into the SDM, but it is not possible to set them up in the OPT. Requirements have been written for the necessary changes, but the SSA group has higher priorities right now (namely AAT phase 2 implementation). Until we can get SSA group support to implement the needed changes in the OPT, it will not be possible for users to observe continuous slew tips. In neither case (stepped or continuous slew) is the necessary post-processing software in place. We believe that both of these will be solved and the work will be completed in Q3 FY2016.

RISK & MITIGATION: Continuous slew tipping scans take longer than planned to fully implement. This will mean the users will continue to use the correlations between weather data and opacities derived some years ago for the old VLA, with the associated increase in the uncertainty in the absolute flux density scale. The mitigation of this problem is for users to ensure they observe their flux density calibrator at a similar elevation as their source. Advice for observers is incorporated in the "calibration" section of the online "Guide to Observing with the VLA"



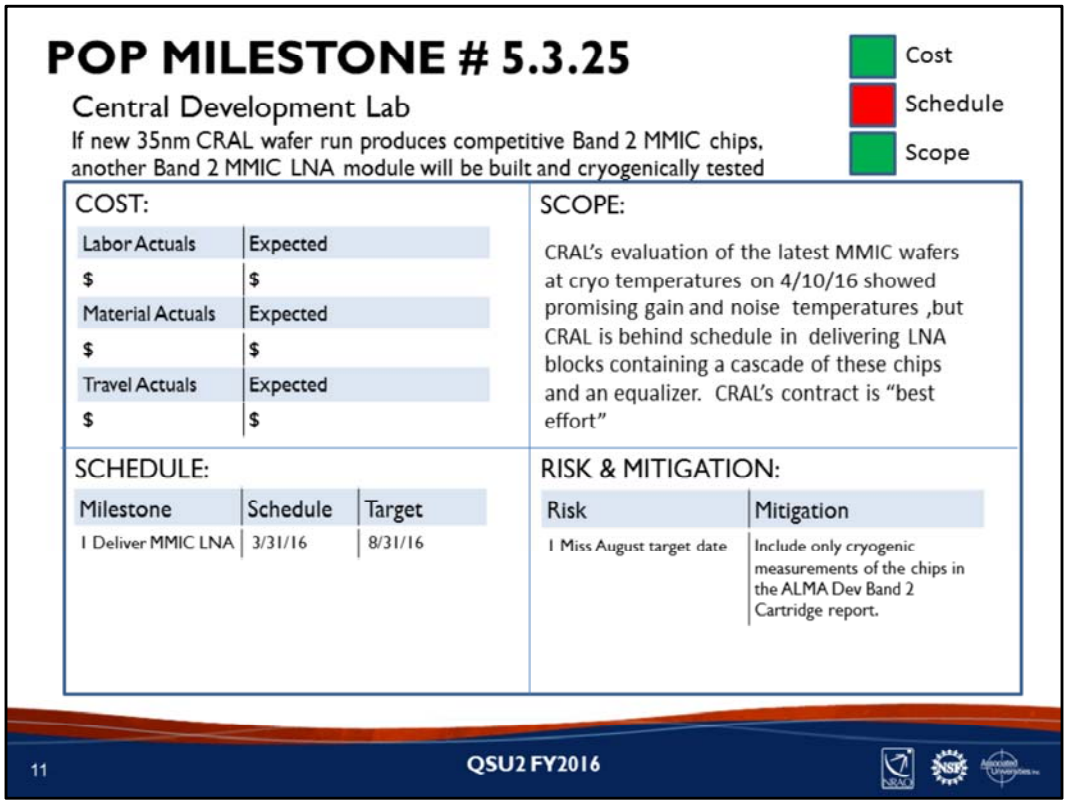
COST: No separate project for this, but included in the CDL budget.

SCOPE: Designs were completed and drawings for these components were sent to Socorro before the due date, but no hardware was actually built.
This task was to prototype a retrofitted EVLA Q-band receiver to replace existing 40-50 GHz Q-band designs in the VLA:
improve bandwidth and noise performance.

- use existing OMT design (already built and tested for Q-band)
- design Q-band phase shifter (frequency-scaled from the EVLA Ku/K/Ka band type)
- design feed horn for 35-50 GHz to replace existing 40-50 GHz design.

SCHEDULE: Cancelled – Higher priorities at Socorro have resulted in this task being delayed, although it is a longer-term priority as the existing Q-band receivers continue to age.

RISK & MITIGATION: Risks are minimal since Socorro considers this a long-term project and they now have higher priorities (such as the VLBA Ka-Band upgrade).

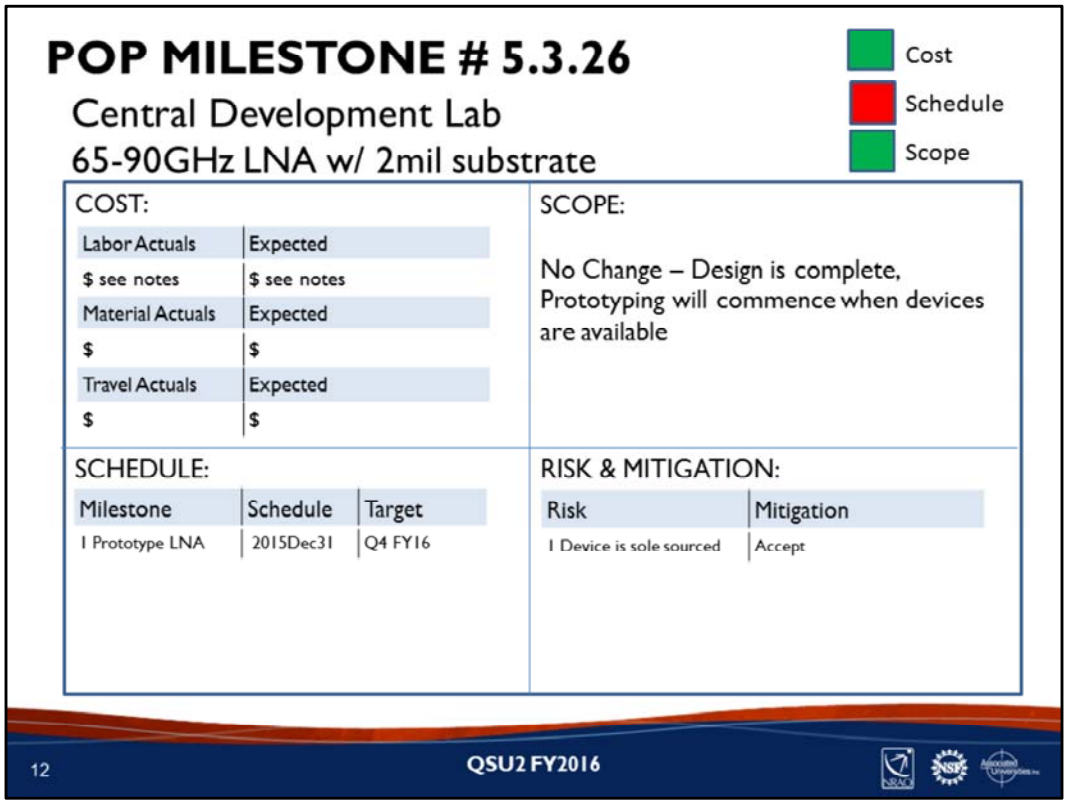


COST: A no-cost extension was filed by CRAL (NRAO change request NRAO-115-4) to deliver production quantities of MMICs by 3/31/17. Half of the final milestone payment was withheld to encourage CRAL to ultimately deliver the MMICs.

SCOPE: There are no scope changes associated with this milestone.

SCHEDULE: The delivery of an LNA block that includes CRAL's latest MMIC chips is expected by Aug 2016, and that date allows sufficient time to test the Band 2 cartridge with these LNAs and include the results in the ALMA development project that we intend to submit in Oct 2016.

RISK & MITIGATION: If CRAL is late delivering this LNA block, then we will include only the cryogenic measurements to date in the Band 2 Cartridge report.

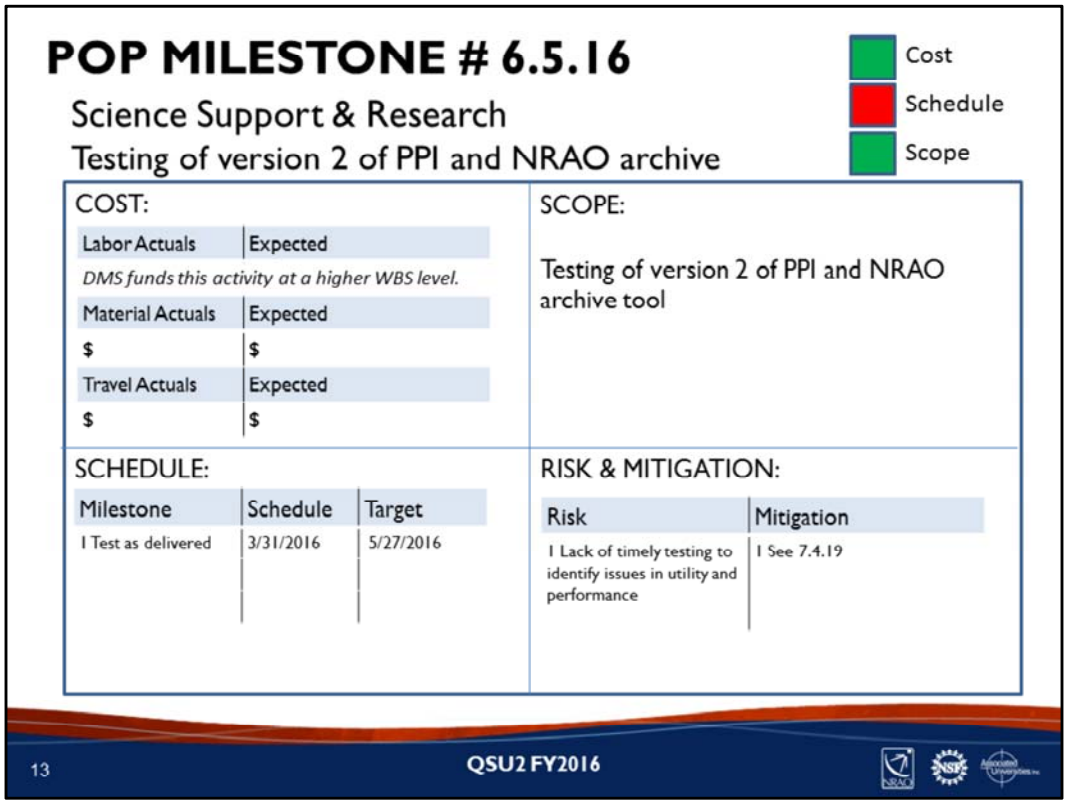


COST: Effort is funded from CDL research account.

SCOPE: No Change - Design and prototype 65-90 GHz amplifier with 2 mil substrate thickness (compare to current 3 mil). Goal is improved reliability and performance reproducibility.

SCHEDULE: Negotiations for these sole source devices are in progress. Experience has shown that these negotiations do not always conclude in a predetermined time frame.

RISK & MITIGATION: These devices have a sole source, available only from JPL. We can only accept this risk as JPL has been our sole source for similar devices for decades. A secondary risk is identified as field failures that require the same device, which would compete with the prototype in the event of field failures. In the interest of supporting components in the field, prototyping this amplifier has been delayed until an adequate supply of devices is available.

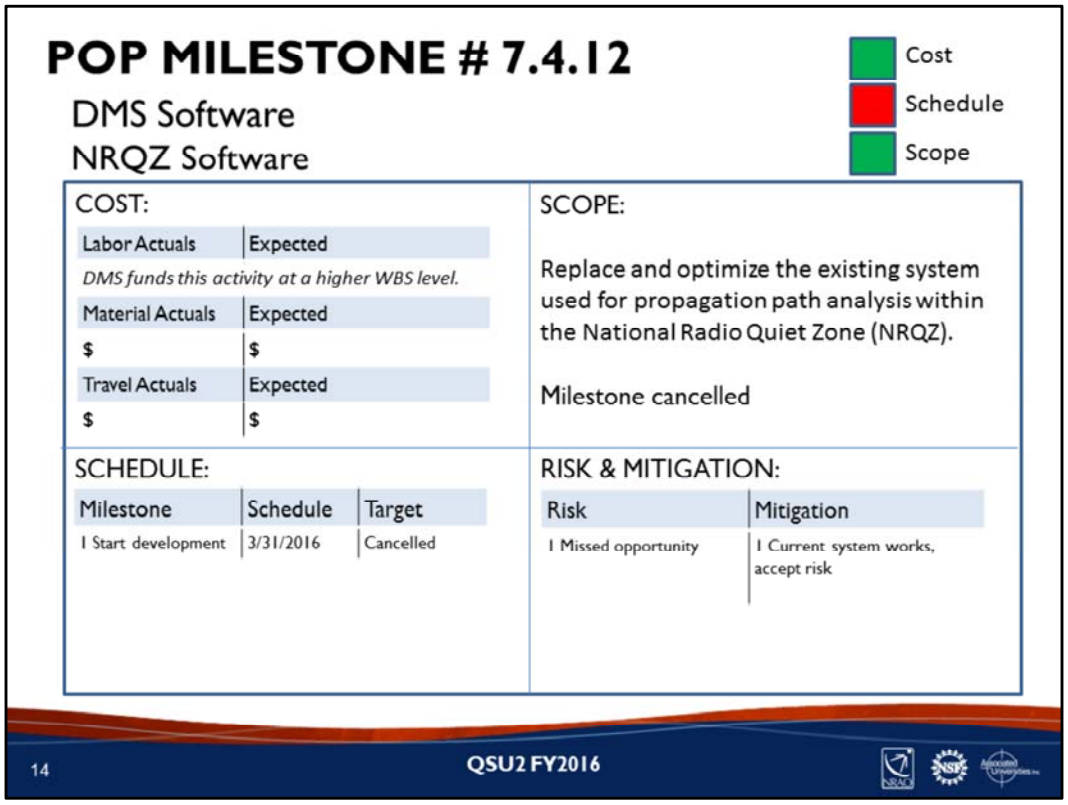


COST: no cost implications.

SCHEDULE: Delivery of the archive was delayed due to lack of requirement clarity and due to resources being diverted to other urgent issues. Work was completed to clarify requirements. Additional resources have been drawn from the team to make Archive/RPI delivery the teams #1 priority for delivery, after service outages (see Milestone 7.4.19).

SCOPE: no change in scope.

RISK: lack of timeline testing to identify issues in utility and performance.



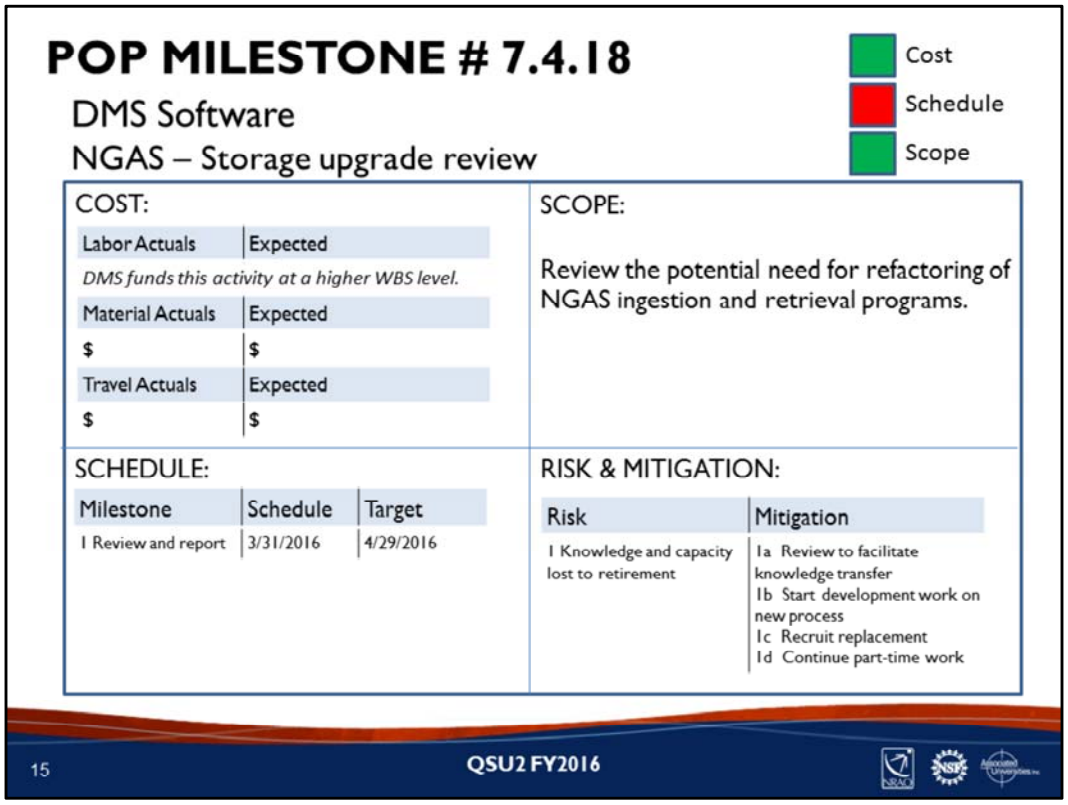
COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCHEDULE: Cancelled – This requires a science resource (project scientist) to provide requirements and ongoing assistance with development, in addition to effort from DMS to do the work. No resource availability is anticipated to address this.

SCOPE: Replace and optimize the existing system used for propagation path analysis within the National Radio Quiet Zone (NRQZ) and West Virginia Radio Astronomy Zone (WVRAZ).

RISK & MITIGATION: This is an opportunity to re-design the NRQZ approval process which would streamline it and reduce current staff effort. However, the effort gain would not cover the cost of additional scientific staff. An additional engineer was offered a position in anticipation of restarting this project in FY16, but the offer was not accepted.

The existing system, while not optimal, will continue to meet the need for NRQZ request review.

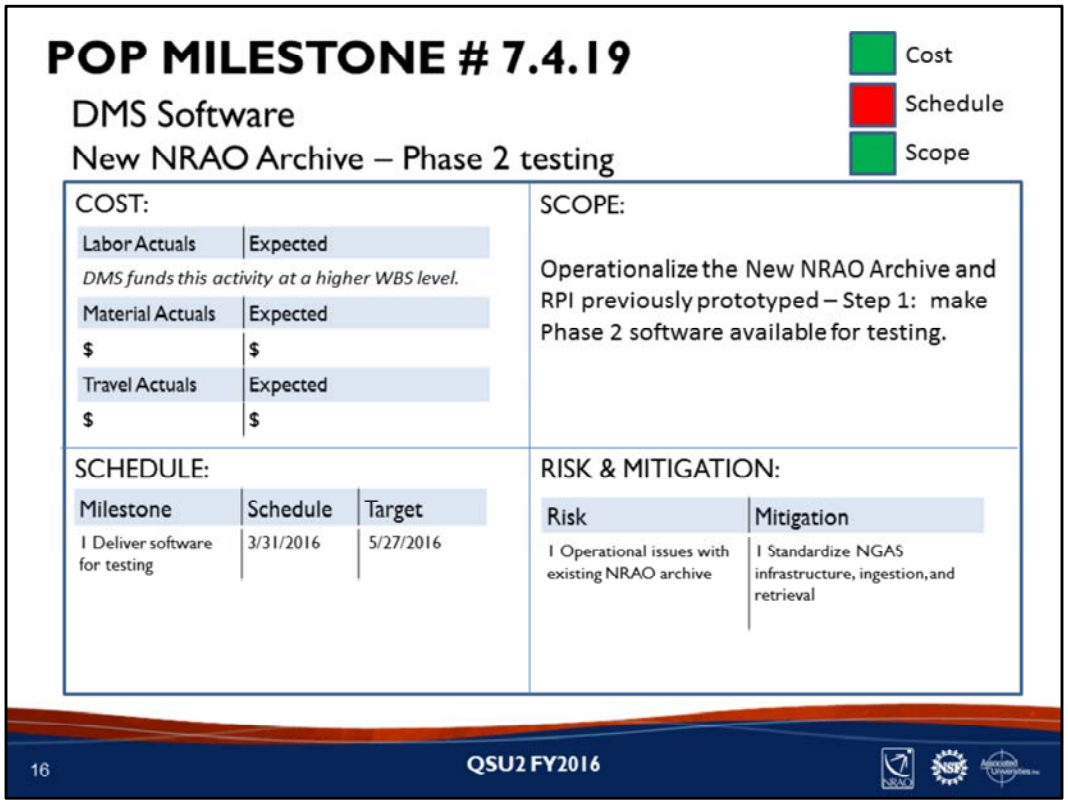


COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCHEDULE: The NGAS software and supporting processes have been reviewed. Work has started on a more organized and robust ingestion processes for the archive, and as part of the New Archive work, on an improved retrieval process. The report and plan was not completed by the due date, however, the milestone has now been completed.

SCOPE: Review the potential need for refactoring of NGAS ingestion and retrieval programs.

RISK & MITIGATION: The current primary NGAS support resource (John Benson) retires at the end of April. He will continue to work ¼-time until a replacement is found. The review, along with development work on ingestion and retrieval, has spread much of the knowledge to others on the team. Recruiting for a replacement is actively underway.



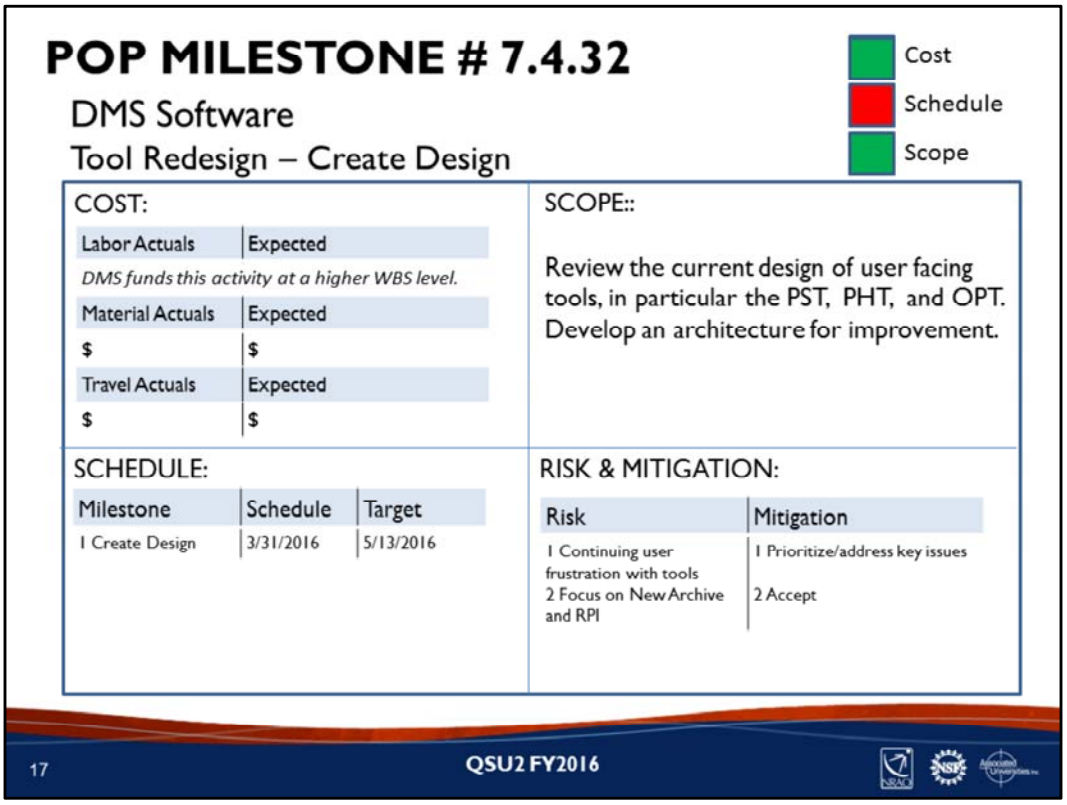
COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCHEDULE: Delivery of the archive was delayed due to lack of requirement clarity and due to resources being diverted to other urgent issues. Work was completed to clarify requirements. Additional resources have been drawn from the team to make Archive/RPI delivery the teams #1 priority for delivery, after service outages (see Milestone 6.5.16).

SCOPE: Operationalize the New NRAO Archive and RPI previously prototyped – Step 1: make Phase 2 software available for testing.

RISK & MITIGATION: Operational issues with the existing NRAO archive may divert attention from this effort and delay the schedule. To the extent possible, this risk will be mitigated by a separate effort to standardize the NGAS infrastructure and to simplify the ingestion and retrieval processes.

Risk to the revised delivery date has been mitigated by applying additional resources mentioned above, and by clarifying delivery requirements with stakeholders.



COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCHEDULE: Schedule was initially delayed due to lack of clear input on requirements. In the intervening period more discussions have taken place and work has been done on a roadmap for development and potential restructuring. Other priorities (VLASS, New NRAO Archive/RPI) have been higher and compete for resources with this. With the anticipated delivery of the Archive/RPI Phase 2 and the end of design work for VLASS, more resources will be available to address this work.

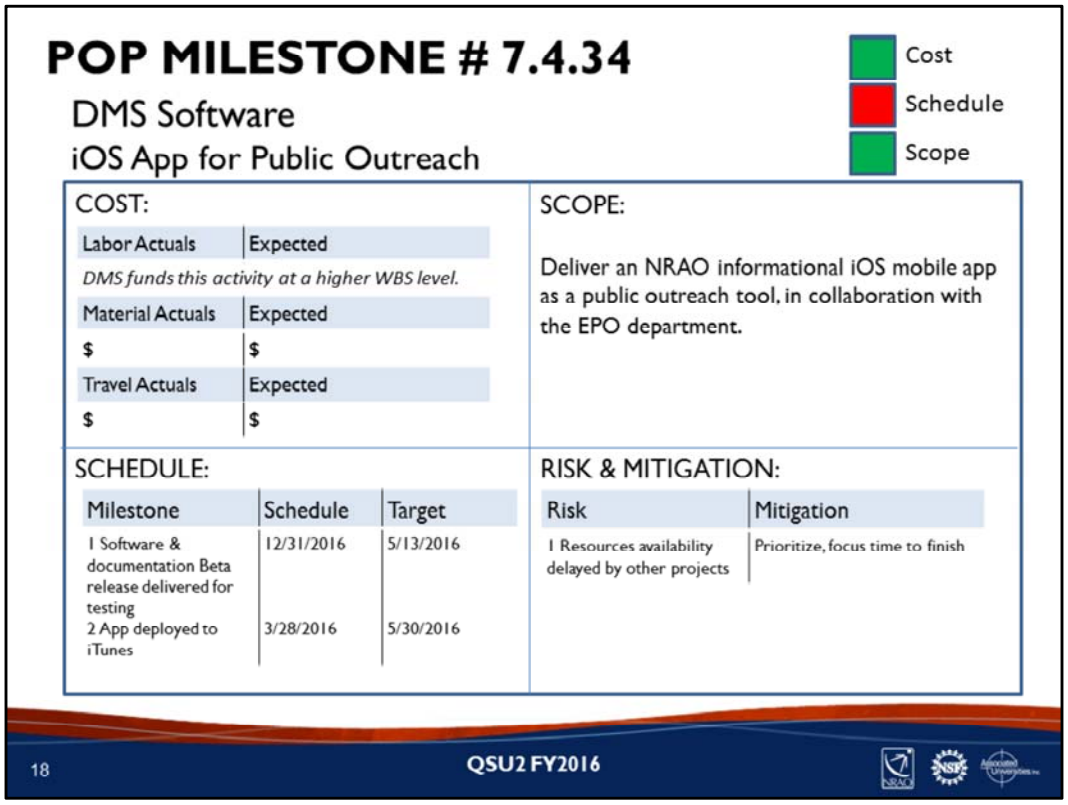
SCOPE: Review the current design of user facing tools, in particular the PST, PHT, and OPT. Develop an architecture for improvement.
No scope issues.

RISK & MITIGATION: The Users Committee and other similar groups have pointed out deficiencies in the toolset. These have been prioritized by the Committee and evaluated by the development team. High priority/low effort items will be implemented in the current software.

Focus on New Archive and RPI will continue to delay this, as the resources required for development and testing are for the most part the same people needed for providing input to and developing the architecture/direction for this toolset. However, the creation and filling of the DMS architect role last year will help alleviate the design workload, and the

reduction of archive work in 4QFY16 will free resources to start on tool refactoring and development when the design is completed.

Note that the Users Committee prioritized delivery of the AAT/RPI ahead of this work, though they would like both to happen as soon as possible.

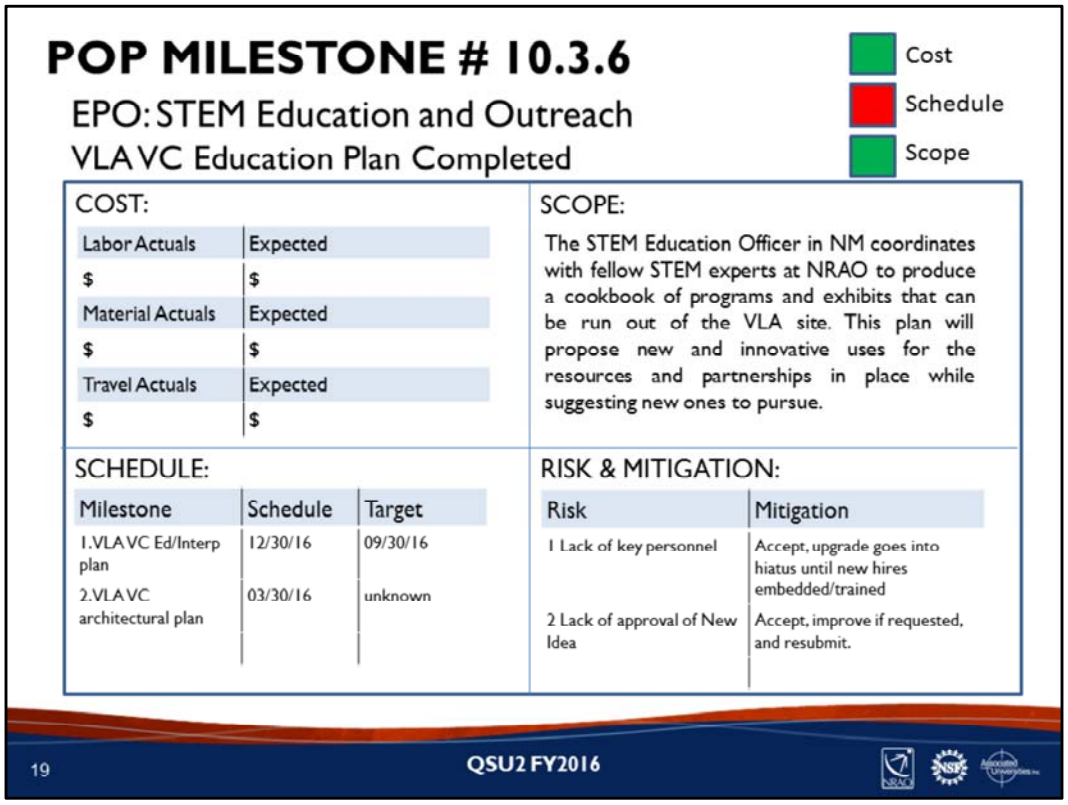


COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Deliver an NRAO informational iOS mobile app (RadioSky) as a public outreach tool, in collaboration with the EPO department.

SCHEDULE: This is a collaborative project with both DMS and EPO resources. Resources to complete the DMS work were delayed by other higher priority projects (GBT and VLA pipelines). Taking advantage of a break in that work, DMS has focused resources on this in April to drive it to completion.

RISK & MITIGATION: Resources could be delayed by other projects, as has happened previously. EPO and DMS are working together to prioritize this project in order to finish it in the anticipated new timeframe.

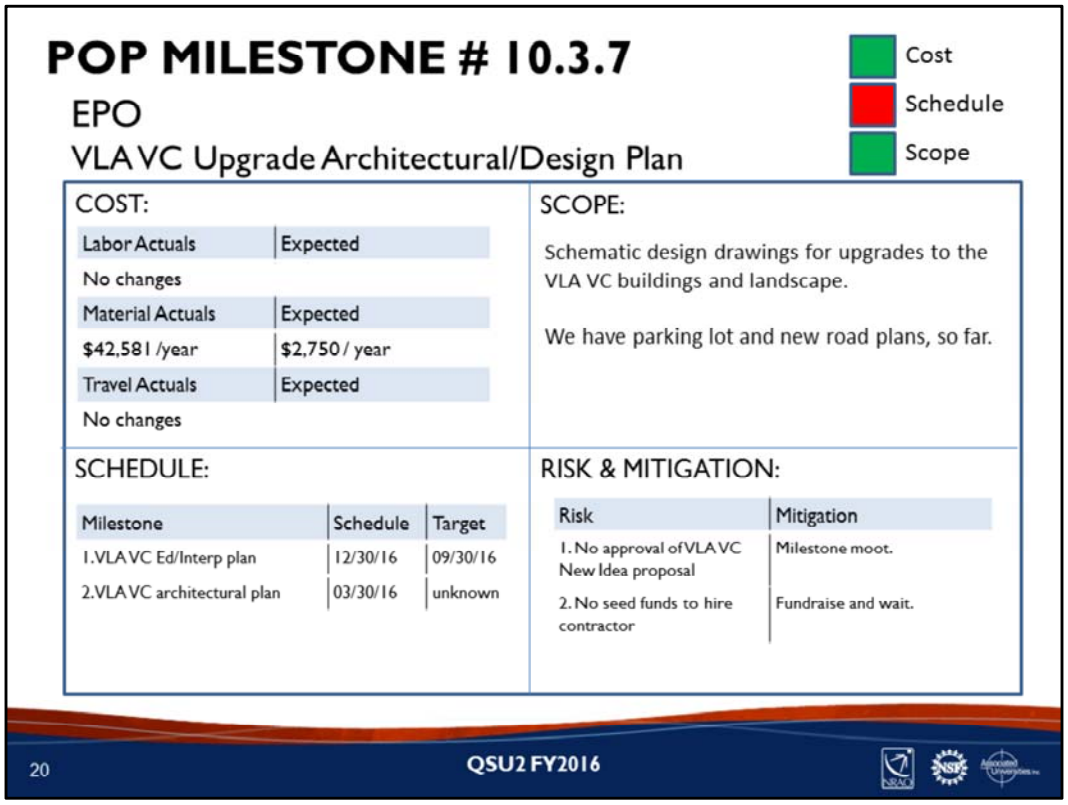


COST: EPO funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: The STEM Education Officer in NM coordinates with fellow STEM experts at NRAO to produce a cookbook of programs and exhibits that can be run out of the VLA site. This plan will propose new and innovative uses for the resources and partnerships in place while suggesting new ones to pursue.

SCHEDULE: The NM STEM Education Officer is also the Gift Shop supervisor, and is delivering all tours, school programs, and Open Houses. The draft plan is already underway, and we will pick it back up if the New Idea is approved.

RISK & MITIGATION: Lack of key personnel is always a risk, and so we accept this, knowing that it puts this aspect of the project into hiatus until we can hire/train talented staff. Recruitment for an experienced STEM Dev officer is underway, and this position will contribute to this milestone. If the New Idea is not approved, then we follow desist or resubmit instructions for our next move from upper management.

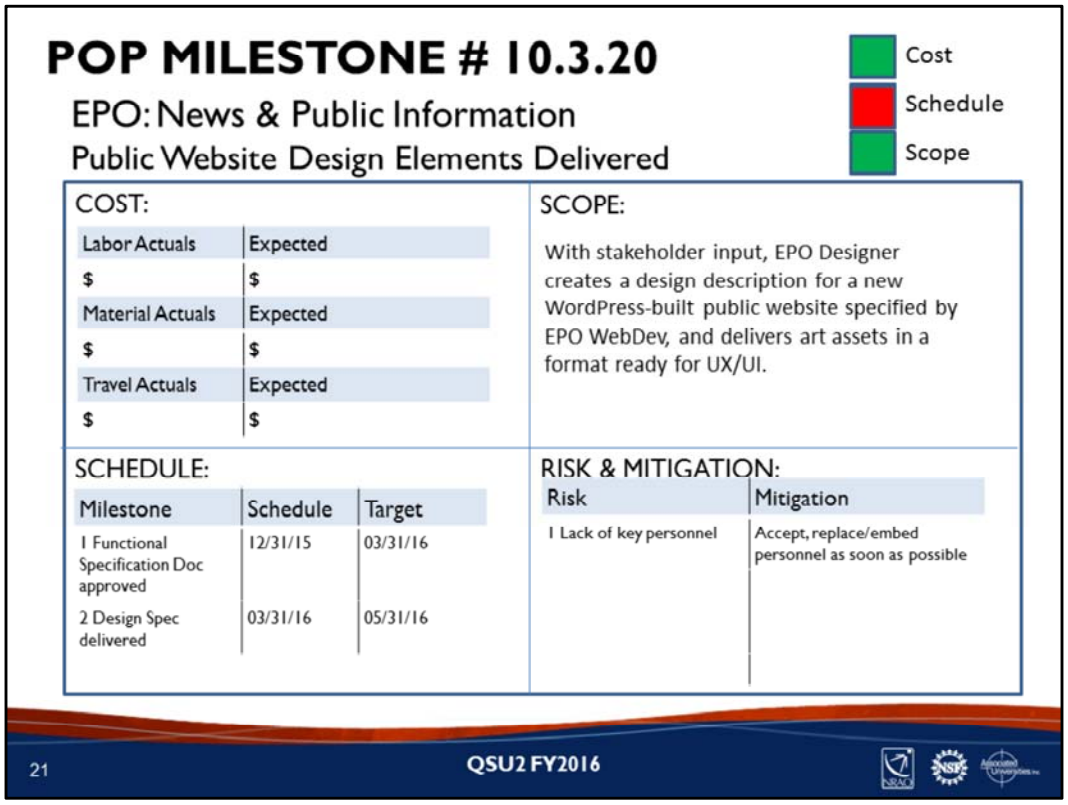


COST: EPO funds this activity at a higher WBS level unless outside funding is acquired for it.

SCOPE: An architect or general contractor is required to survey the site and prepare a detailed building plan for the proposed upgrades to both indoor and outdoor features. We have such a plan for the new roads and parking lot construction aspects of the upgrade, but not the VC and classroom upgrades, or the landscaping. We have made preliminary contacts for initial walkthroughs, but lack of funding restricts further action.

SCHEDULE: This is an interdepartmental new idea that has not yet received approval from the Director, due to delays in stakeholder participation and lack of funding.

RISK & MITIGATION: If the New Idea proposal for the VLA VC is not approved, then we accept that this milestone disappears with the project. If no seed funds are available to hire the architect, then we pursue other means of raising funds for the hire, and wait until we can afford the service.

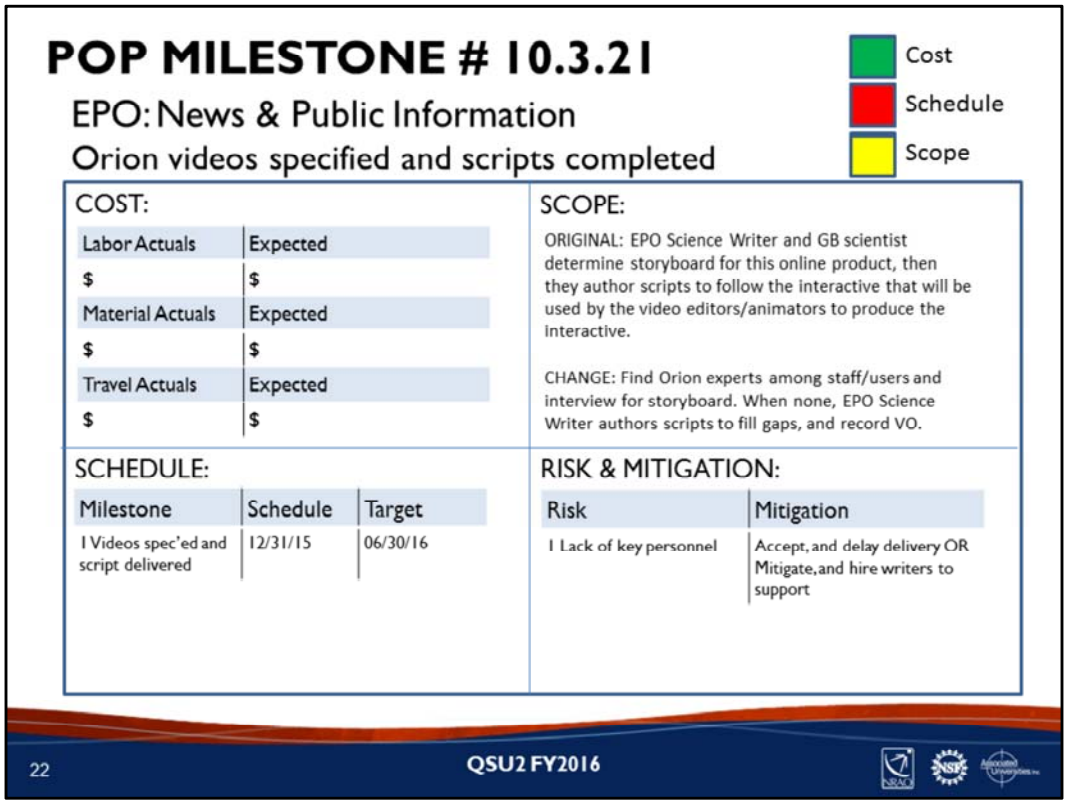


COST: EPO funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: With stakeholder input, EPO Designer creates a design description for a new WordPress-built public website specified by EPO WebDev, and delivers art assets in a format ready for UX/UI.

SCHEDULE: The Web Dev for EPO did not come on board until the end of October, so Specification schedule is shifted from originally set. Spec was delivered in March, so draft design is in midflight, expected mid-May.

RISK & MITIGATION: With only one web developer as our resource, the loss of this resource is our greatest risk. We accept this, and hire/train as effectively as possible. Also, the Joomla site is being maintained, but retains incompatibilities with search engines and mobile platforms. We have to accept this, because we do not have access to developers who can code the fixes, but we mitigate with the help of CIS staff who are keeping it updated and security-tight.

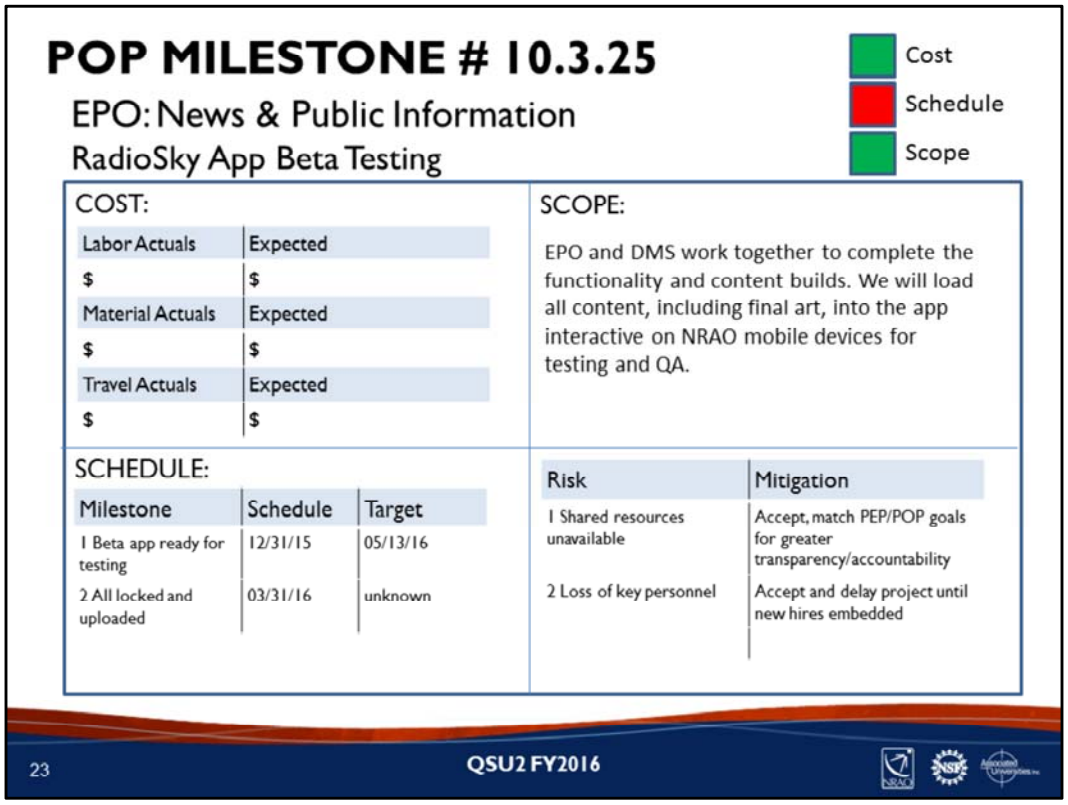


COST: EPO funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Originally, EPO Science Writer works with GB scientist to determine storyboard for this online product, then authors the scripts to follow the interactive that will be used by the video editors to develop the interactive. New scope is to find actual scientists to tell us about these facets of Orion, and when there none suitable, Science Writer will author scripts and EPO will record VO for them.

SCHEDULE: EPO Science Writer is also the Interim AD for EPO and interim project lead on VLA VC Upgrade Project. These demanding and critical administrative duties have taken priority over her Science Writer duties for longer than expected. In addition, the degree of writing partnership with a colleague in GB is no longer possible due to his reduced hours. That said, with return of video editor from leave, videos have been specified.

RISK & MITIGATION: Lack of key personnel is the issue here, and we accept that it will delay this milestone until the staffing situation in EPO settles down.

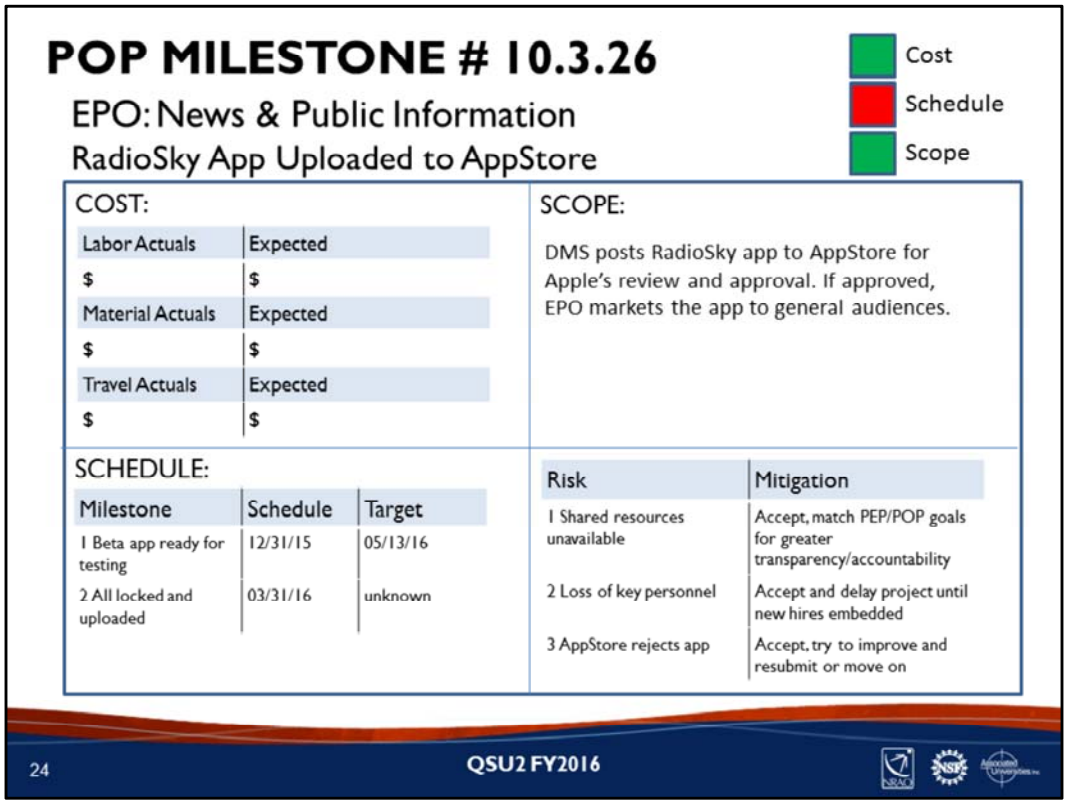


COST: EPO and DMS fund this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: Load all content, including final art, into the wireframe app interactive for testing and QA.

SCHEDULE: The milestone is typically reached by coordinated effort between EPO and DMS; GBT and VLA pipelines, transition planning, plus VEGAS spectrometer real time data display projects have been given higher priority by supervisors of the developers assigned to this project, but they were able to ringfence time in Q2 to allow concentrated dev efforts on this app.

RISK & MITIGATION: Sharing resources across two busy departments is fraught with compromise. We accept that the data pipeline takes precedence over our fledgling app activities. In future, we will think more carefully about milestones that require shared resources. Loss of key personnel is a common threat to our projects, and we accept that we cannot afford to hire contractors for this work at this time.

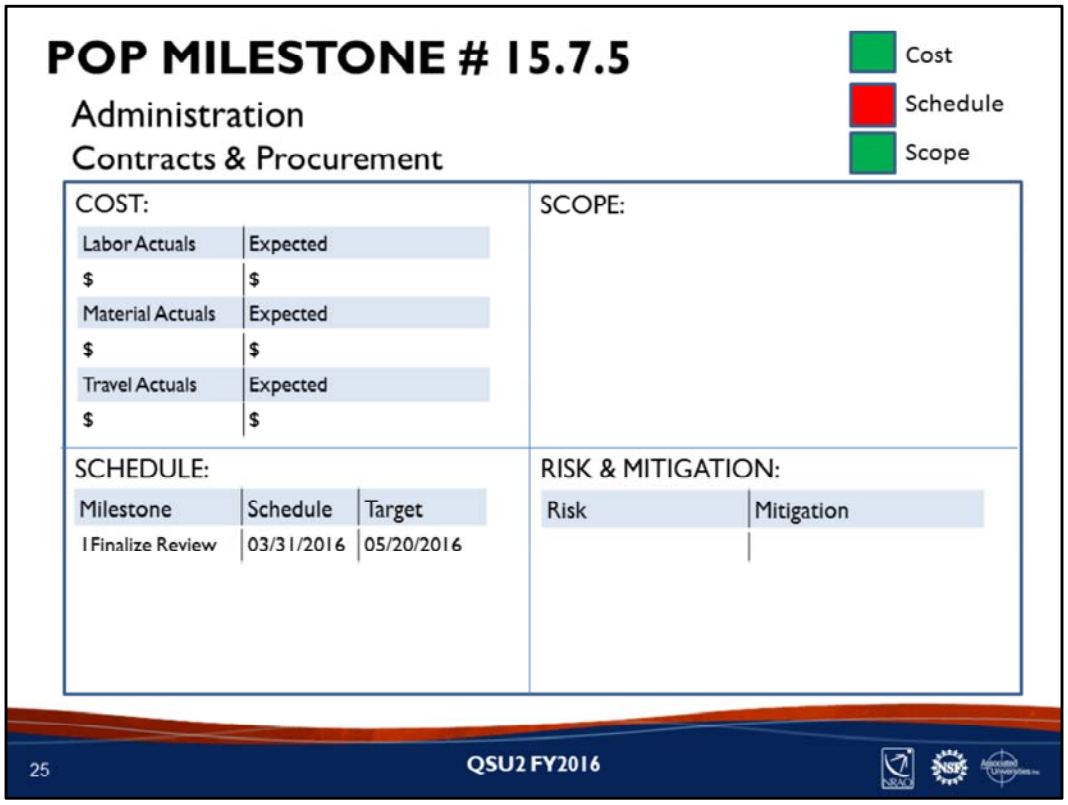


COST: EPO and DMS fund this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: DMS posts RadioSky app to AppStore for Apple's review and approval. If approved, EPO markets the app to general audiences.

SCHEDULE: The milestone is typically reached by coordinated effort between EPO and DMS; GBT and VLA pipelines, transition planning, plus VEGAS spectrometer real time data display projects have been given higher priority by supervisors of the developers assigned to this project, but they were able to ringfence time in Q2 to allow concentrated dev efforts on this app.

RISK & MITIGATION: Sharing resources across two busy departments is fraught with compromise. We accept that the data pipeline takes precedence over our fledgling app activities. In future, we will think more carefully about milestones that require shared resources. Loss of key personnel is a common threat to our projects, and we accept that we cannot afford to hire contractors for this work at this time. The biggest risk is if Apple declines to offer our app in their AppStore, in which case, we can do our best to improve and resubmit, but it's out of our control to avoid this risk.



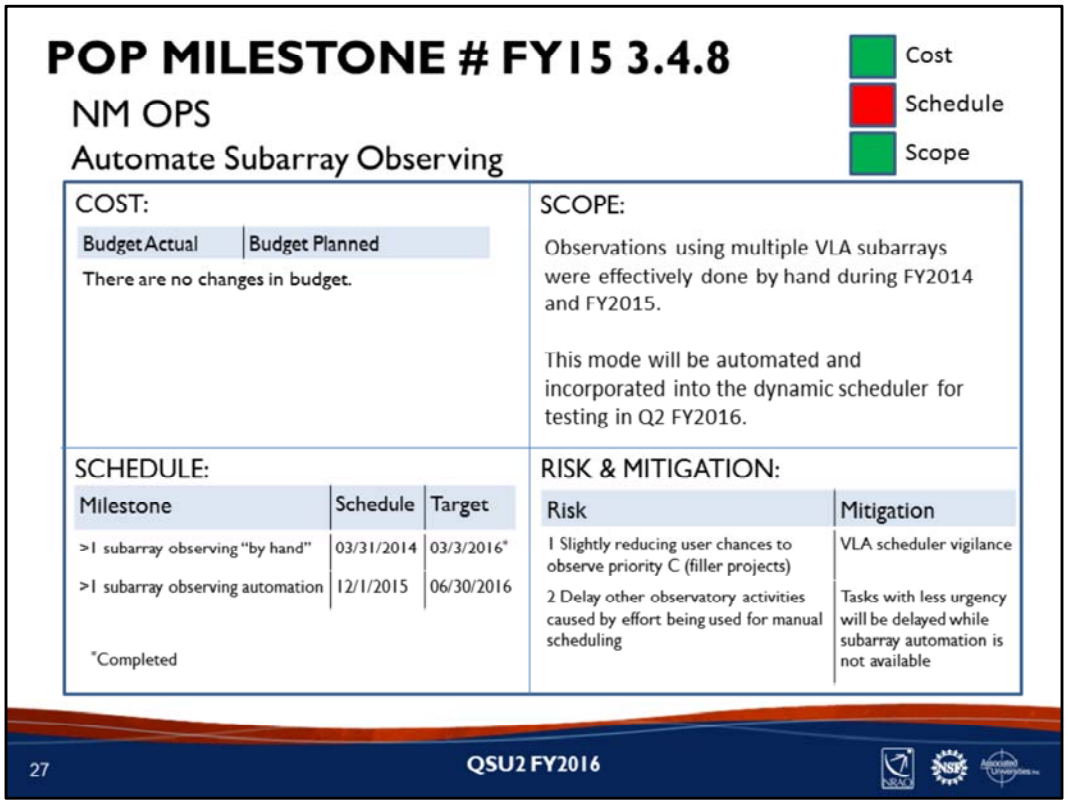
COST: Admin funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCOPE: There are no scope changes associated with this milestone.

SCHEDULE: Review by Associate Director of Administration is complete. Submitted to AUI and comments from AUI are being incorporated. Expected to complete the project on or before May 20, 2016.

RISK & MITIGATION: There are no risk associated with this milestone.


FY15 POP Milestones



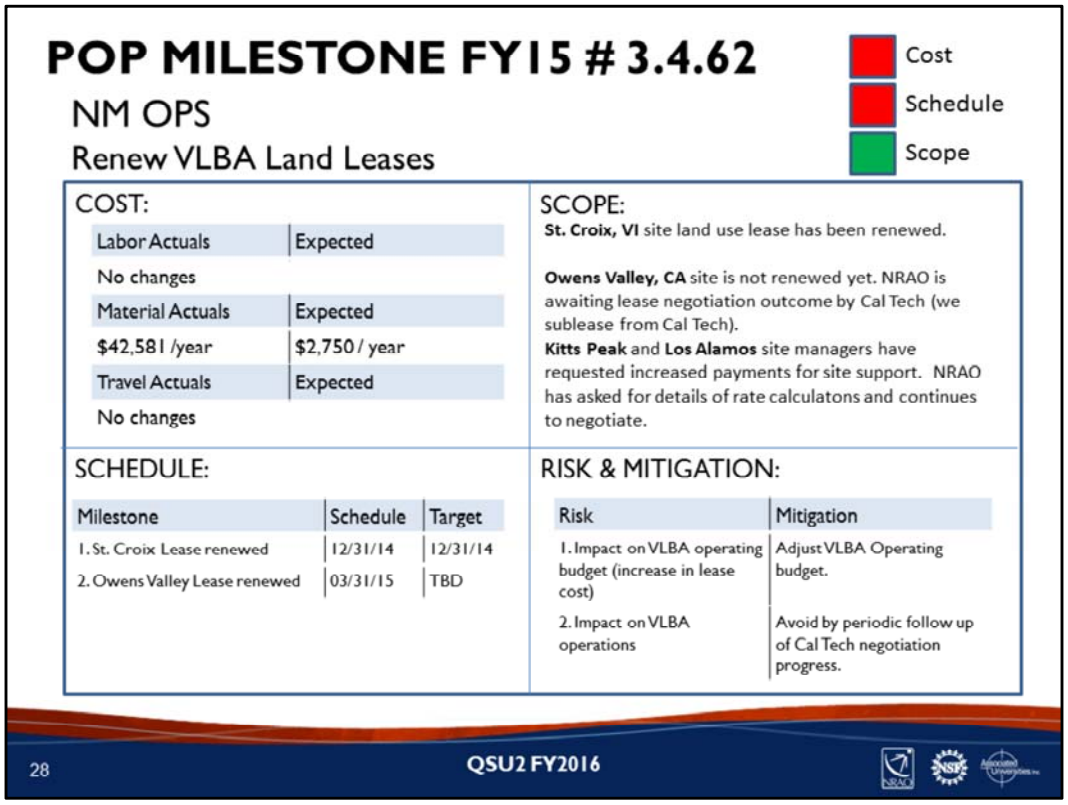
COST: No changes in budget

SCOPE: The VLA can be split up in subarrays. That is, some of the 27 antennas and corresponding baselines can be ordered to do a completely different and independent program than other antennas. This may be the case when an observer has asked to divide up the array for a single project to observe a source simultaneously in multiple bands or to observe multiple different sources simultaneously that do not need the full array, or when one antenna is split off from the main array for inclusion in a VLBI array by another user (though this last option, also called "Y1", is not currently offered for general observing).

SCHEDULE: Observations using multiple subarrays were stabilized during FY2014, but scripts must be made by hand, and they have had to be scheduled by hand and cannot go through the dynamic scheduler as well. Work on automating subarrays has been slower than planned, mostly because of staffing issues in the SSA software group, but we continue to schedule multiple subarray observing by hand quite effectively. Some progress has been made in the software recently, though, and the OPT portion of subarrays is mostly done now (some validation is missing, and some interface cleanup is needed, but those are minor issues). Continued progress is focused mostly on the OST now; recent progress indicates that we will finish this milestone by the end of Q3 FY2016.

RISK & MITIGATION:

1. The risk to users of not having subarray observing automated is a slightly reduced chance of observing for priority C (filler) subarray projects. Mitigation is increased VLA scheduler vigilance, to avoid this happening.
2. The impact on the observatory is that effort is used for manual scheduling that could be used on more important (but less urgent) tasks, while we don't have automation we will continue giving priority to manual scheduling.



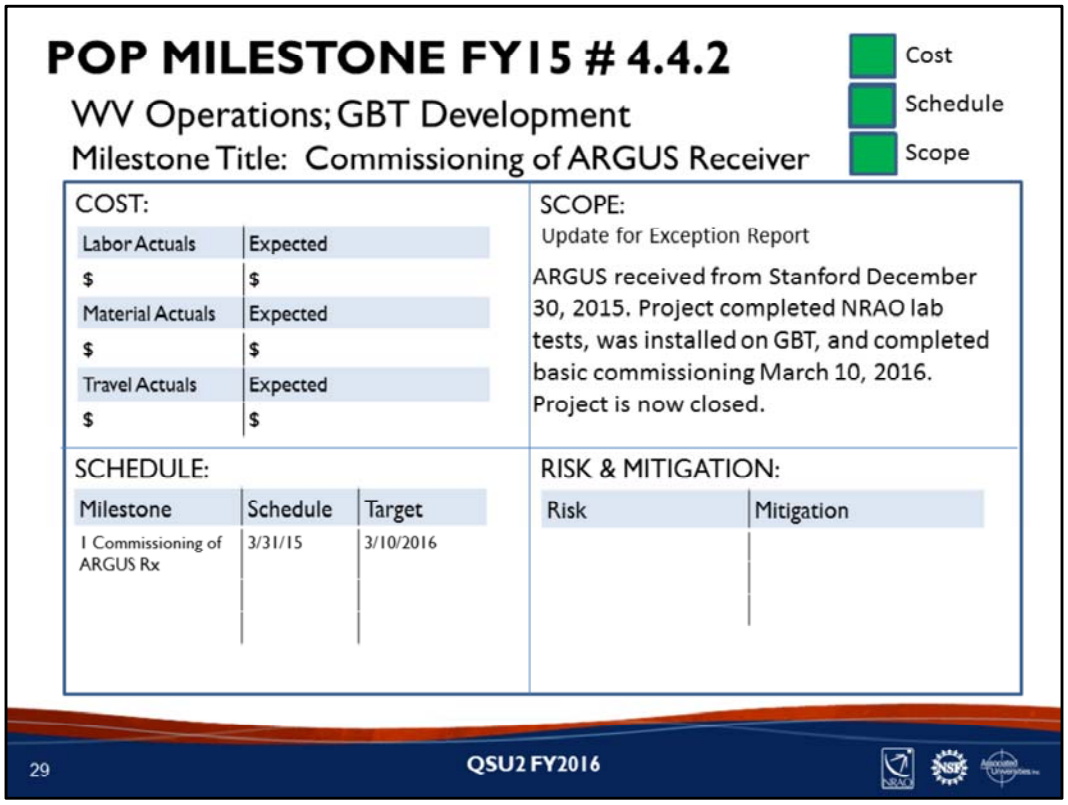
COST: Information incomplete on KP and LA. KP presented an out-of-the-blue invoice for $25,935 which we believe is based on collecting area. Additionally LA is considering bundling some their services in to an annual fee that at present has not been determined. Best estimate is additional bill is $11,200.

St Croix Lease: The lease has been signed by all parties. The lease is for 10 years with two 5 year options. Its cost increased from $2,750/yr to $42,581/yr.

Owens Valley Lease: Cal Tech negotiates this lease and it has been expired for 2 3/4 years. Los Angeles Water and Power is the lease holder. NRAO sub leases from Cal Tech. Progress has been marginal in the last quarter, according to the Cal Tech Owens Valley Radio Observatory Executive Director. The target date is shown as TBD for now, due to the uncertainty regarding when the lease will be signed.

RISK & MITIGATION:

1. Cal Tech has leased Owens Valley, CA for a low yearly fee. The probability of a cost increase is low, but a budget adjustment would be needed if a cost increase occurs.
2. Impacts on other aspects of VLBA Operations are not likely to occur.

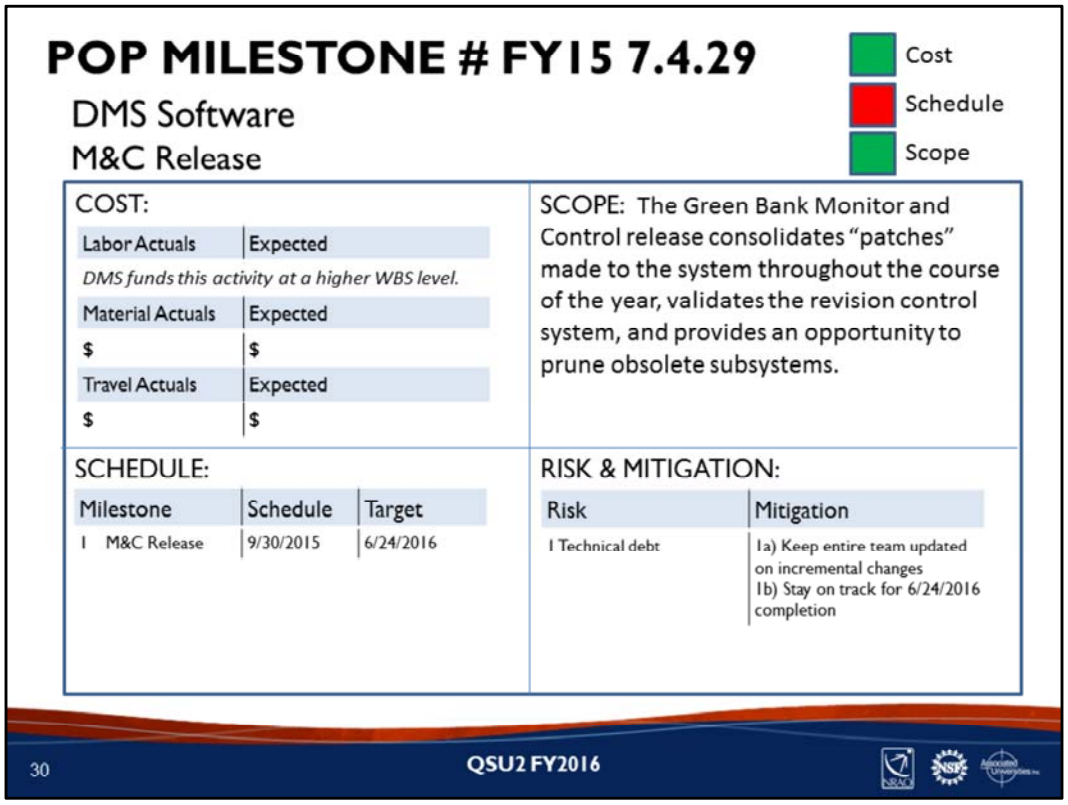


COST: No Change

SCOPE: No Change

SCHEDULE: The project executed a Change Request in October 2015 for schedule extension because the Stanford led collaboration was late in their integration process. They encountered technical problems that made the integration take longer than originally planned, delaying the delivery of the receiver to NRAO. Project successfully concluded 3/10/2016.

RISK & MITIGATION:

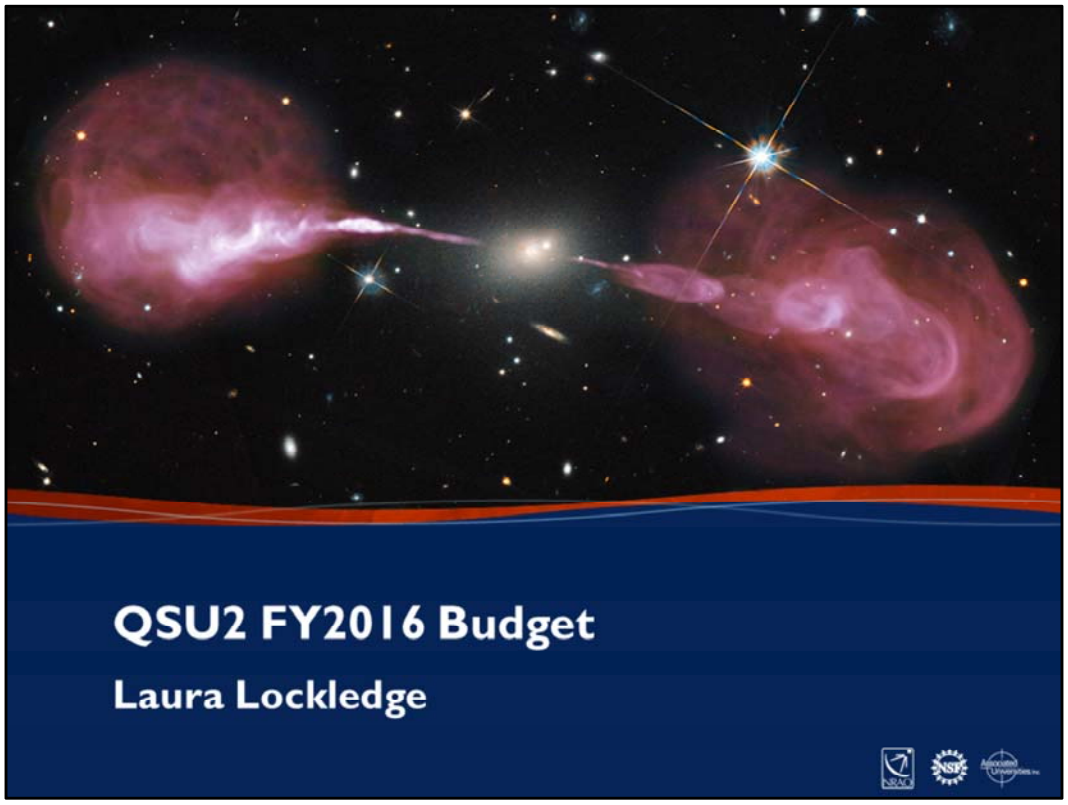


COST: DMS funds this activity at a higher WBS level. Costs are not tracked for this milestone.

SCHEDULE: Schedule was delayed due to the higher priority of cross-training and updating an operationally critical system in anticipation of one of the staff leaving NRAO. An additional delay of one quarter was incurred due to the need to move the schedule for the Servo Replacement Project ahead to prepare for a retirement outside of the software group.

SCOPE: Update the Green Bank Monitor and Control system: The Monitor and Control release consolidates "patches" made to the system throughout the course of the year, validates the revision control system, and provides an opportunity to prune obsolete subsystems. No scope issues.

RISK & MITIGATION: Delaying the release does not have an immediate effect, but it does have an effect over time, in that further changes become more difficult and take longer. All the members of the team will be updated on each other's incremental changes via regular weekly meetings, and the release will be rescheduled for completion by 6/24/2016. Note that the cumulative changes for this M&C release will be combined with those anticipated for the release due in 4QFY16 (POP milestone 7.4.13), so both will be completed at the same time.



QSU2 FY2016 Budget

Laura Lockledge

Overall Issues

- Benefits – Running ahead of budget for current fiscal year, effect of y/e accrual + Q1 is 4th quarter of the benefits year ($622K – as of 3/31).
- Raises implemented effective in January/February.
- Preparing for contract closeout – managing year end expenses.
- Due to late date, assuming no change to ICC from NSF in FY16.

FY16 YTD by Major WBS Category NRAO Ops – Q2

	FY16 POP Budget	FY16 Rev. Budget	FY16 YTD Expenses	YTD % Rev Budget
NSF	41,730	41,730	31,295	75.0%
Telescope Time Sale	3,596	3,596	1,503	41.8%
Carryforward/Other	3,138	4,509	4,153	92.1%
Total CSA-I Revenues	**48,464**	**49,835**	**36,952**	74.1%
Telescope Ops	18,723	19,729	8,469	42.9%
Development	3,535	3,618	1,441	39.8%
Science Ops	5,860	6,287	2,406	38.3%
Admin Services	15,168	14,927	7,248	48.6%
Director's Office	3,677	3,773	1,898	50.3%
FY16, Total	**46,964**	**48,335**	**21,461**	**44.4%**
FY16 CSA-I Net	**1,500**	**1,500**	**15,491**	

- Plurality of telescope time sale revenue is associated with Breakthrough Foundation, time did not begin until January – on schedule.
- Difference between Carryforward Budget & Revised is open commitments.
- Director's Office includes fund source adjustments of $318K.

FY16 YTD by Major WBS Category ALMA Ops – Q2

	FY16 POP Budget	FY16 Rev. Budget	FY16 YTD Expenses	YTD % Rev Budget
Telescope Ops	22,851	23,424	8,963	38.3%
Development	5,478	9,915	724	7.3%
Science Ops	7,204	8,172	2,950	36.1%
Admin Services	5,013	5,029	2166.6	43.1%
Director's Office	3,447	3,503	1427.4	40.7%
FY16, Total	**43,993**	**50,043**	**16,232**	32.4%
Development Reserve	4,073			
Open Commits	3,521		3,981	
C/F for FY16 Fuel	1,800	1,215		
C/F for Future Years	281	1,115		
PPS Budget Adjustment	(714)			
JAO	(581)			
ALL ALMA Resources	**52,373**	**52,373**	**20,213**	38.6%

- Development awarded $1.1M in studies, Q1
- Telescope Ops rec'd $2.1M credit from NAOJ for FY16 activity.
- Below the line changes result of NSF changes in funding timing vis a vis JAO and designation of use of Canadian funds.

- The original POP included expected CAD funds of 1.7M, which offset the fuel reserve.
- NSF pulled back 1.3M (714+581) and then used the Canadian contribution as the required reserve for the JAO work.
- We recognize that the remaining 575k from CAD is not coming in FY16 (rev budget).
- The fuel reserve was decreased by the difference in order to balance.

FY16 YTD by Major WBS Category ICC– Q2

	FY16 POP Budget	FY16 Rev. Budget	FY16 YTD Expenses	YTD % Rev Budget
Telescope Ops	101	102	37	36.5%
Development	713	726	304	41.9%
Science Ops	1,924	1,951	866	44.4%
Admin Services	11,004	11,315	5,106	45.1%
Director's Office	1,514	1,563	838	53.6%
FY16, Total	**15,256**	**15,656**	**7,152**	45.7%
Admin Recoveries	**13,938**	**14,338**	**6,369**	44.4%
External Recoveries	**1,318**	**1,318**	**485**	36.8%
FY16 ICC Net	**0**	**0**	**298**	

- ICC currently under-recovered by $298K due to lagging spending in the CSA's & low external recoveries. $50K improvement over Q1.
- Fund source adjustments shown in Director's Office.

QSU2 FY2016 Report

ODI-NINE/Lyndele von Schill

Office of Diversity and Inclusion

NINE Spring 2016 Program

- National and International Non-Traditional Exchange Program objectives:
  - Project Management Institute project management certification training and exam
  - Complete one or more projects
  - Build and test a decametric radio receiver and dipole antennas
  - Complete science observations with the radio receiver, antennas, and software
- Seven applicants for this session
  - Three Participants Chosen
    - James Chibueze, Department of Physics & Astronomy, University of Nigeria
    - Mananjara Randriakoto, Department of Astronomy and Astrophysics University of Antananarivo, Madagascar
    - Roxana Trujillo, Department of Art & Philosophy, University of Virginia

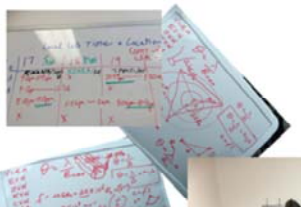
Learning













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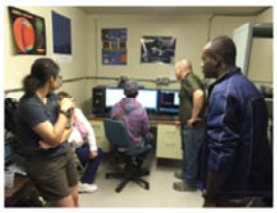
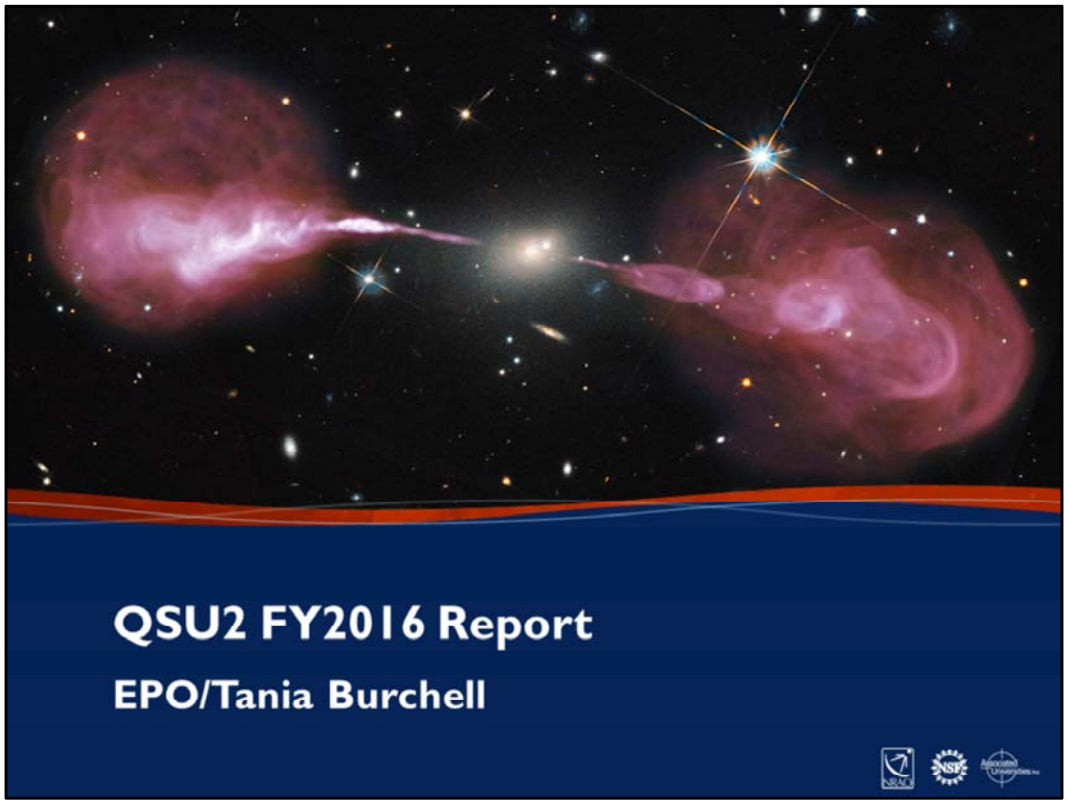
NINE

Visits to VLA, VLBA (Pie Town), GBT



QSU2 FY2016 Report

EPO/Tania Burchell

Education and Public Outreach

STEM Formal Education

- Renovation of N^2I^2: New Mexico Tech and NRAO Instructional Interferometer underway with PMD/NINE collaboration
- STEM-ID (New PSC) online workshop, 82 students
- 16 unique overnight student groups at 40ft for observations
- 1394 obs using 20m telescope
- 20m radio astronomy training, 37 educators
- Starlab lessons in Saracino, 85 students
- 6th GTTP workshop with Faculty of Education and Institute of Astrophysics from Pontificia Universidad Católica de Chile

Education and Public Outreach

STEM Formal Education

Campus News The Yellow Jacket 03

WV SPOT MISSON

By Bridgett Dadding

West Virginia SPOT is a program funded by NASA and NRAO that is dedicated to the enrichment of science in public school systems. This program sends college students as student ambassadors to local schools to give presentations on topics relating to astronomy and do fun STEM-based activities with children.

Roberts is hoping to expand this program and get other yellow jackets involved in it as well. WV SPOT is open for anyone interested regardless of his or her major, and also pays for students to go to the schools. These college volunteers go through a weekend of training at National Radio Astronomy Observatory in Green Bank, where

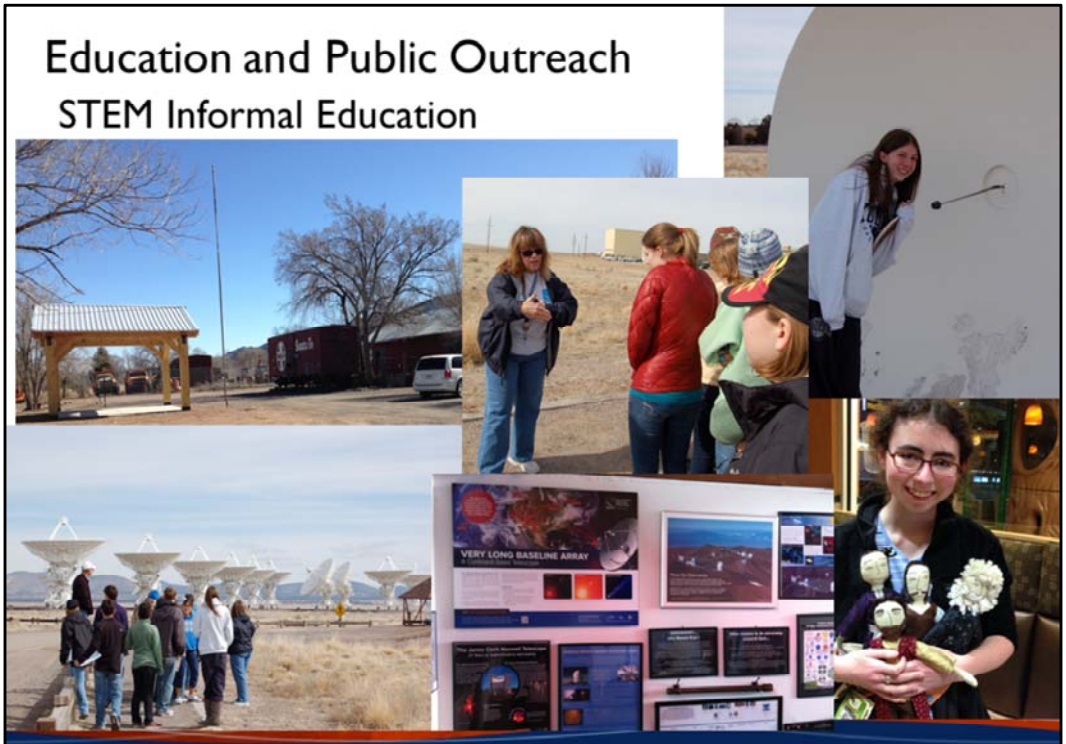
Education and Public Outreach

STEM Informal Education

- 3846 visitors to GB
- 4255 visitors to VLA
- AAS EPO Live Events, 150 students
- Radio broadcasts on Wake-Up Call, 94.7 FM Charlottesville
- First Saturday Tours at VLA
- Exhibit Panel about VLBA in Mauna Kea Visitor Center
- Pocahontas County Social Studies Fair, 102 students
- WV Regional Math Field Day, 98 students
- Science Club Connection Skype chat with Dale Frail, 15 students
- Breakthrough Listen tour under development at Green Bank, WV
- Cosmic Park begins construction in Magdalena, NM

Education and Public Outreach

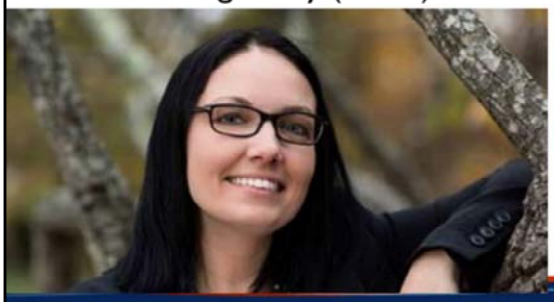
STEM Informal Education



Education and Public Outreach

Media and Online Engagement

- 19 press releases and announcements
  - 5 ALMA, 5 People and Events, 4 VLA, 3 GBT, 3 VLBA
- ~1200 unique visitors to public website every day
- ~1100 reached via social media every day, 71,800 total followers
- TV feature about Green Bank, WV on the Today Show
- Great Big Story (CNN) feature on ALMA



Today Show: http://www.today.com/video/in-green-bank-w-va-wi-fi-and-cellphones-are-illegal-and-life-goes-on-611469379592

Great Big Story: A Telescope So Powerful, It Can See Into the Past
https://www.youtube.com/watch?v=5mIiMXdEaLs

Education and Public Outreach

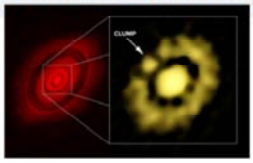
Media and Online Engagement

Peter Edmonds @PeterDEdmonds 3/17/16

Wow: the @TheNRAO's VLA gives an even better image than ALMA of HL Tau's disk.

Corey S. Powell @coreyspowell

I grew up with fanciful drawings of how planets might be born. Now we're seeing it for real! public.nrao.edu/news/pressrele...



NRAO
@TheNRAO

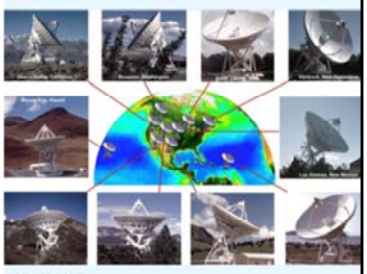
Achievement unlocked!

Karen Masters @KarenLMasters

Work life balance = controlling the world's largest steerable telescope while helping my kids to have their baths? @IamGBT

Dr. Andreas Faisst
@astrofaisst

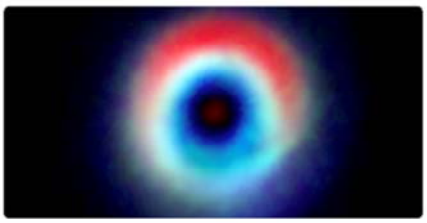
The insane resolution of the Very Large Baseline Array (#VLBA): 1000AU at 1Mpc and 5pc at 1Gpc! @TheNRAO #carnegie



3/31/16 1:02 PM

NSF Math & Phys Sci @NSF_MPS 3/19/16

ICYMI @almaobs reveals planet-forming potential of protoplanetary disk @TheNRAO #NSFfunded



www.nrao.edu
science.nrao.edu

The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.