Title: QSU1 FY2019	***Author:*** Thisdell/ADs	***Date:*** 02/07/2019
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National Radio Astronomy Observatory

Quarterly Status Update (QSU) 1 FY2019

October – December 2018

PREPARED BY	ORGANIZATION	DATE
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APPROVALS (Name and Signature)	ORGANIZATION
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NRAO Quarterly Status Update
October - December 2018
QSU1 FY2019

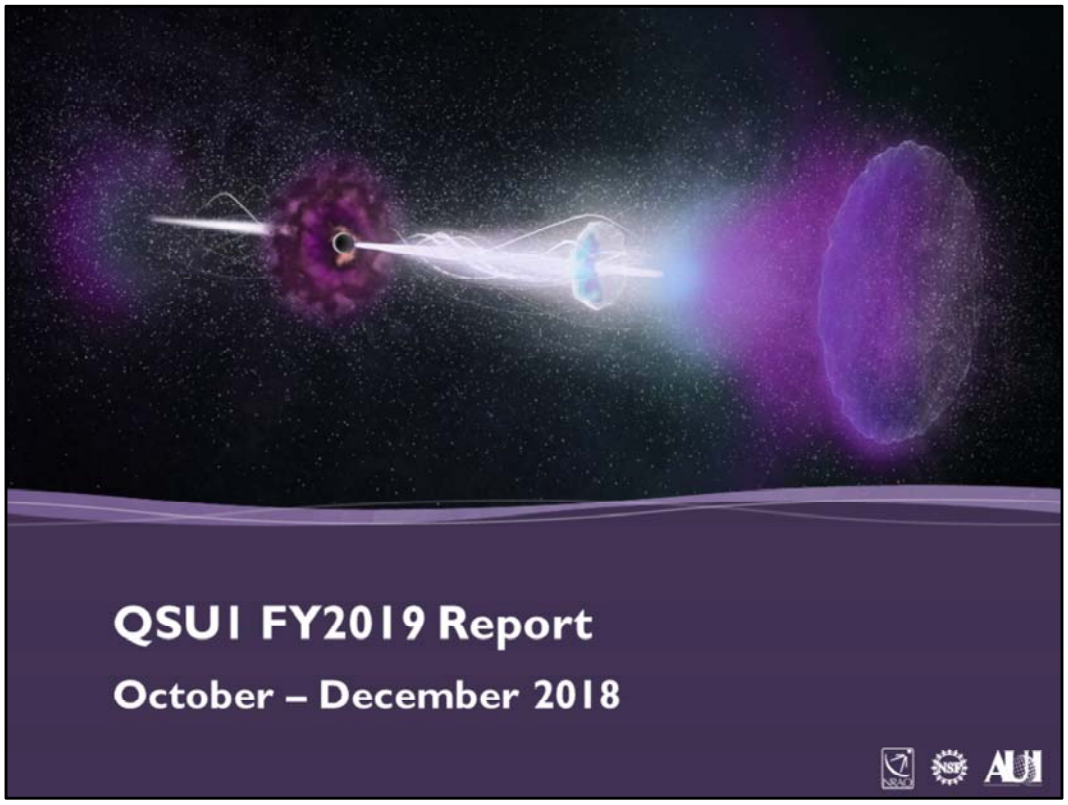
POP Milestone	Milestone	Completion Date	Q1 Performance Assessment: Cost	Schedule	Scope
2.5	**NA ALMA Operations**				
	NAASC				
1	Create Position of Deputy Division Head within the NAASC	12/31/2018			
2	Finalize the NAASC Reorganization	12/31/2018			
3	ALMA Ambassador applications will be advertised to the community	12/31/2018			
5	TORUS 2018: The Many Faces of AGN Obscuration meeting	12/31/2018			
9	Cycle 7 Call for Proposal and user documentation and ALMA Science portal updates/edits	12/31/2018			
10	Preparation of the ALMA Cycle 7.5 Call for Proposals	12/31/2018			
12	Conduct an investigation into the apparent fall off in publication rate of NA ALMA users	12/31/2018			
14	Pipeline initial requirements	12/31/2018			
18	NAASC staff will develop and implement the raw data pilot program	12/31/2018			
19	Venue for ALMA APRC7 finalized	12/31/2018			
21	P2G prepared and review all NA Phase 2 SBs	12/31/2018			
	Development				
26	Band 6 Upgrade project Proposal	12/31/2018	Cancelled		
	Maintenance, Renewal, and Warranty Claims				
27	Begin cabin temp control project (all 25 antennas)	12/31/2018			
29	Deliver reworked FEHV 1 to JAO	12/31/2018			
	NRAO-Chile Office				
31	Renewal of office lease	12/31/2018			
33	Accounting tool Blackline	12/31/2018			
35	Survey and assessment of NA infrastructure	12/31/2018			
36	Study on provision of power to non-ALMA projects	12/31/2018			
37	Introduction of new ETK	12/31/2018			
38	Streamlining of HRIS	12/31/2018			
39	Lessons learned from 2018 collective bargaining	12/31/2018			
42	Sister Cities and Observatories: strengthening of STEAM	12/31/2018			
43	Galileo Teachers Training Program: global meeting in Chile	12/31/2018			
44	Kick off role model series/campaign	12/31/2018			
45	Hour of Code sessions (2)	12/31/2018			
3.3	**New Mexico Operations**				
	Very Large Array				
	Operations				
1	Define VLA GO and SRO capabilities to be offered for semester 2019B	12/31/2018			
5	Determine baselines and pointing for antennas moving into their C configuration locations	12/31/2018			
9	Reconfigure from D to C array	12/31/2018			
	Development				
14	VLASS1.1 Single epoch continuum imaging complete	12/31/2018			
19	VLASS/CIRADA definition complete	12/31/2018			
	Maintenance and Renewal				
22	Perform preventive maintenance on each of two transporters prior to array reconfiguration to B	12/31/2018			
27	Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to B	12/31/2018			
	Technical Upgrades and Enhancements				
48	Wind prediction software requirements	12/31/2018			
	Very Long Baseline Array				
	Operations				
52	Define VLBA general and shared risk capabilities to be offered for semester 2019B	12/31/2018			
4.6	**Next Generation Very Large Array**				
	Astro2020 Preparations				
2	Receipt and review of final results of Costed Antenna Reference Design	12/31/2018			
	Community Engagement				
4	Publication of findings for second round Community Studies	12/31/2018			
5	Formal Publication of ngVLA Science Book through ASP	12/31/2018			
9	Develop ngVLA flyover animation	12/31/2018			
	Conceptual Design and Development				
25	Composite Antenna Structures PDR	12/31/2018			
	Project Administration and Management				
34	Develop initial draft of Project Execution Plan	12/31/2018			
36	Conduct a review of software solution options and determine best-fit solutions	12/31/2018			
38	Internal Project Office review of the ngVLA cost model.	12/31/2018			

NRAO Quarterly Status Update
October - December 2018
QSU1 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment: Cost	Schedule	Scope
39	Prepare a risk-adjusted, fully costed and documented cost estimate for the reference design; formatted for Decadal Survey Astro2020 submission.	12/31/2018			
5.3	**Central Development Laboratory**				
	Repair, Maintenance, Production, and Support				
1	Build and test Band 1 amplifiers	12/31/2018			
		3/30/2019			
		6/30/2019			
		9/30/2019			
2	Build and test Band 1 Local Oscillators	12/31/2018			
3	VLA/VLBA multi-chip module support	12/31/2018			
	Research and Development				
8	Wide flare angle horn prototype(s) for ngVLA	12/31/2018			
11	Design of the ngVLA Central Signal Processor	12/31/2018			
6.7	**Science Support and Research**				
	Telescope Time Allocation				
5	TAC Meeting, Semester 2019A	12/31/2018			
7	Update SW Tools Requirements for TAC 2019A	12/31/2018			
13	TTA SW Tool Suite Requirements	12/31/2018			
14	eXtra-Large Proposals	12/31/2018			
	Scientific User Support				
19	NM Symposium	12/31/2018			
	Reference Services				
26	NRAO Papers requirements	12/31/2018			
28	Development of U.S. Radio Astronomy	12/31/2018			
	Scientific Staff and Jansky Fellows				
29	SciStaff Performance Reviews Completed	12/31/2018			
33	Jansky Fellows Selection Completed	12/31/2018			
	Student Programs				
36	Student Observing Support Selection (VLA)	12/31/2018			
7.5	**Data Management and Software**				
	SIS				
6	Moab cluster scheduler optimization	12/31/2018			
	CASA Pipeline				
24	Pipeline Cycle 6 release	12/31/2018			
	SSA				
27	PST/OPT Proposal/Observing Update	12/31/2018			
8.5	**Program Management Department**				
	Headquarters				
1	HQ PM/SE Project Leadership	12/31/2018			
2	HQ Proposal Development	12/31/2018			
3	HQ Documentation Support	12/31/2018			
4	HQ Continuing Education	12/31/2018			
5	Program Management Software Requirements Collection and Analysis	12/31/2018			
7	Multicancha Mass Concrete Works Complete	12/31/2018			
8	Multicancha Beams Erection Complete	12/31/2018			
	New Mexico Operations				
14	NM PM/SE Project Leadership	12/31/2018			
15	NM Proposal Development	12/31/2018			
16	NM Documentation Support	12/31/2018			
17	NM Continuing Education	12/31/2018			
21	VLBA St. Croix Repairs - Develop RfP for Steel Repairs and Antenna Painting	12/31/2018			
	Central Development Lab				
25	CDL PM/SE Project Leadership	12/31/2018			
26	CDL Proposal Development	12/31/2018			
27	CDL Documentation Support	12/31/2018			
29	ALMA Band 1 LNA Quarterly Report	12/31/2018			
	ALMA Development				
31	ALMA Correlator Upgrade ASIC Vendor Contract Award	12/31/2018			
33	ALMA Band 6v2 Receiver Upgrade Project Kickoff	12/31/2018			
9.5	**Education and Public Outreach**				
	News and Public Information				
1	Full editorial guidelines for new news homepage	12/31/2018			
	Multimedia Engagement				

NRAO Quarterly Status Update
October - December 2018
QSU1 FY2019

POP Milestone	Milestone	Completion Date	Q1 Performance Assessment: Cost	Schedule	Scope
3	Plan for workflow for VLASS Quick Look	12/31/2018			
5	Developing and testing first Data2Dome feed	12/31/2018			
9	Develop ngVLA flyover animation and science case visuals	12/31/2018			
10	Establish test site for launch of new NSF logo guidelines	9/30/2019			
11	Create VLBA webpage	12/31/2018			
	STEAM				
12	San Pedro participants travel to NM	12/31/2018			
16	Survey of Charlottesville and Socorro for community needs	12/31/2018			
10.4	**Computing and Information Services**				
	Observatory-Wide Support				
1	Completion of Windows 10 rollout	12/31/2018			
	Site Specific Facilities Infrastructure				
14	Replacement of filer storage system in NM	12/31/2018			
11.3	**Office of Diversity and Inclusion**				
	Local and National Programs				
1	Diversity Council Meeting and Diversity and Cultural Awareness (DCA) activities	12/31/2018			
3	RAMP-UP	12/31/2018	Cancelled		
	International Partnerships				
6	ODI Chile Undergraduate Recruiting	12/31/2018			
12.7	**Human Resources**				
	Training and Development				
1	Observatory Leadership Cohort Pilot	12/31/2018			
	Compensation				
3	JDE Comp Management Module Implementation	12/31/2018			
4	Total Rewards Benchmark Study Debrief	12/31/2018			
	Benefits				
7	New Medical Carrier Implementation.	12/31/2018			
13.2	**Science Communications**				
1	Redesign science community exhibits	12/31/2018			
14.6	**Administration**				
	CAP				
2	Install Recordkeeping Software	12/31/2018			
	ESS				
4	Hire EMS Specialist for VLA	12/31/2018			
15.1	**Budget**				
1	Worker's Comp Vendor Visit to GBO	12/31/2018			
2	Position Control Definition	12/31/2018			
4	Implement FY2019 Budget	12/31/2018			
17.2	**Director's Office**				
	ALMA				
1	ALMA Board Meeting	12/31/2018			
	Corporate Meetings				
3	AUI Board of Trustee Meeting	12/31/2018			
4	AUI Executive Committee Meeting	12/31/2018			
	Science Community				
6	Appoint new Users Committee Members	12/31/2018			
	Management Reviews				
8	NSF Annual Program Review	12/31/2018			


QSU1 FY2019 Report
October – December 2018

POP MILESTONE #2.5.26

NA ALMA Operations – Development

Band 6 Upgrade Project Proposal

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

No change

SCHEDULE:

Milestone	Schedule	Target
1 Submit Proposal	11/1/2018	2/1/2020

RISK & MITIGATION:

Risk	Mitigation
1 ALMA Board does not approve	1 Re-submit for following meeting

2 QSU1 FY2019

COST: N/A for a proposal.

SCOPE: Project scope will be fully defined in the proposal.

SCHEDULE: A successful Conceptual Design Review (CoDR) was held on Sep 25th 2018. Although the original intention was to submit a preliminary design proposal for the Nov 2018 ALMA Board meeting, NRAO now intends to down-select design options through a series of development studies during FY2019, and submit a preliminary design study leading to a prototype cartridge in FY2020. This approach also will allow the development team to fill needed roles in the technical team before proceeding with an ALMA project commitment. We will, thus, cancel the preliminary design POP milestone for the remainder of this year, and reintroduce it in the next POP.

RISK & MITIGATION: If the ALMA Board does not approve the project, the team will implement any necessary recommendations and re-submit the proposal for the following Board meeting.

POP MILESTONE #2.5.29

NA ALMA Operations - Maintenance, Renewal, and Warranty Claims

Deliver reworked FEHV 1 to JAO

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$0	$0
Material Actuals	**Expected**
$0	$0
Travel Actuals	**Expected**
$0	$0

SCOPE:

Execute FEHV part mass reduction changes; reassemble units; verify and test assembled units; conduct delta-PAS; and deliver unit #1 to ALMA JAO.

SCHEDULE:

Milestone	Schedule	Target
1 Deliver reworked FEHV 1 to JAO	12/31/2018	07/31/2019

RISK & MITIGATION:

Risk	Mitigation
1 Cannot complete this milestone in Q1 FY2019	1 Work with Contractor to resolve FEHV scheduling issues

3 QSU1 FY2019

COST: No impact.

SCOPE: No change in scope; delivered FEHV to incorporate welding improvements and mass reductions.

SCHEDULE: Reduction of total assembled vehicle total mass for the FEHV was successfully completed (total vehicle mass now ~5kg below mass limit). An on-site (in Valdivia) PAS was conducted with JAO Staff in early November 2018 and the vehicle was determined to be in satisfactory operating condition; however, there were a few minor "defects" that need to be corrected (paint flecks, loose wiring, etc.) prior to delivery. In early December, a follow-up meeting in Valdivia between the contractor and NRAO in early-December 2018, concluded that it would be of mutual benefit to keep the working first unit at the shop in Valdivia to ensure satisfactory implementation of the reassembly of the remaining three vehicles (primarily because as-built drawings are lagging the hardware completion).

RISK & MITIGATION: Until the installations are completed, observationally verified, and all units are working reliably, risk will remain. This risk is primarily borne by the vendor, and is being mitigated by close observational and engineering verification of the work.

POP MILESTONE #2.5.35

NA ALMA Operations - NRAO-Chile Office

Survey and Assessment of NA Infrastructure

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$130	$130

SCOPE:

To maintain a long term record of the buildings, infrastructure, and equipment condition, particularly those exposed to inclement weather. Measure qualitatively the deterioration over time and predict or demand major interventions.

SCHEDULE:

Milestone	Schedule	Target
1 Follow up inspection at the site	12/31/2018	February 2019

RISK & MITIGATION:

Risk	Mitigation
1 There are no risks associated to this task	N/A

4 QSU1 FY2019

COST: There are no costs associated to this task other than domestic travel to the Observatory.

SCOPE: There are no changes in project scope.

SCHEDULE: The inspection at the site was delayed to make it coincide with the Observatory yearly shutdown in February, time during which the access to electrical equipment normally powered at 23K Volts is safer and easier. Additionally, maintenance tasks and/or repairs to the assets to be inspected are carried out at the same time, which may constitute important information for the record keeping.

RISK & MITIGATION: There are no risks identified for this task, therefore no mitigations. In fact, it could be argued that this activity is a risk mitigation on the wear and tear of NA assets at the observatory.

POP MILESTONE #3.3.14

New Mexico Operations

VLASS1.1 Single epoch continuum imaging complete

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

The scope of this milestone is to deliver the high quality Single Epoch wideband Stokes I continuum images to the community for VLASS1.1. A technical problem with the data was discovered, however, and a means of correcting them needs to be developed before imaging can begin. The scope of this milestone has been modified to cover this development and the start of SE continuum imaging.

SCHEDULE:

Milestone	Schedule	Target
1 Begin VLASS1.1 SE continuum imaging	12/31/2018	7/31/2019

RISK & MITIGATION:

Risk	Mitigation
1 Resource conflict when VLASS1.2 observing begins	
2 Not enough compute resources for SE imaging	

5 QSU1 FY2019

COST: Not tracked at this level.

SCOPE: A problem with VLASS1.1 data associated with the pointing of two-thirds of the VLA antennas was discovered after the FY2019 Program Operating Plan was written, and a means of correcting those data needs to be developed before Single Epoch imaging can begin. In addition, it has been determined that w-term corrections (corrections for direction-dependent correlation geometry errors) are needed to provide accurate source positions, flux densities, and spectral indices; these algorithms require significantly larger compute resources than the QuickLook images. Given these issues, the scope of this milestone has been modified to cover the development of the data correction algorithms and methods for managing external computing resources, through to the start of SE continuum imaging.

SCHEDULE: The imaging algorithms including pointing corrections are expected to be delivered in CASA 5.5.0 or a 5.5.1 patch. These will then be incorporated into the imaging pipeline, with a goal of starting the SE wideband continuum imaging for VLASS1.1 by the end of July.

RISK & MITIGATION: The delay in starting the SE imaging for VLASS1.1 will cause a potential resource conflict after VLASS1.2 observing begins. The computing requirements for the SE imaging algorithms will add additional resource pressure. Both these problems will be mitigated by a combination of using external computing resources, and extending the overall delivery schedule of VLASS images to the community.

POP MILESTONE #4.6.39

Cost
Schedule
Scope

ngVLA

Prepare cost estimate for the reference design

COST:

Labor Actuals	Expected
$	$
Material Actuals	Expected
$	$
Travel Actuals	Expected
$	$

SCOPE:

Prepare a risk-adjusted, fully costed, and documented estimate for the reference design; formatted for Decadal Survey Astro2020 submission

SCHEDULE:

Milestone	Schedule	Target
1 Astro2020 cost estimate	12/31/2018	6/30/2019

RISK & MITIGATION:

Risk	Mitigation
1 ngVLA submission to the Astro2020 Decadal Survey is inadequately documented	1 Upon receipt of the Astro2020 Decadal Survey Call for Submission, the reference design cost documents will be prepared accordingly.

6 QSU1 FY2019

Owner Alex Walter

COST: No impact.

SCOPE: No impact.

SCHEDULE: The scheduled completion date for this milestone was predicated on an anticipated Astro2020 Decadal Survey submission in the first quarter of FY2019. The Astro2020 DS timeline has slipped and it is now anticipated that the submission of the ngVLA's reference design will be mid-to-late FY2019 (Q3). An internal review of the existing cost estimate has been conducted and the cost model/cost estimate will continue to be refined. At such time as we receive the Astro2020 DS Call for Submissions, the proper cost documentation will be finalized and prepared.

RISK & MITIGATION: An important element of the ngVLA's Astro2020 DS submission package is a rationally costed design. An internal review of the current cost estimate has been completed and the cost model/cost estimate will continue to be refined. Upon receipt of the Astro2020 Decadal Survey Call for Submission, the reference design cost documentation will be finalized and prepared accordingly.

POP MILESTONE #5.3.1

Central Development Laboratory

Build and test Band 1 amplifiers

Cost
Schedule
Scope

COST:

Labor Actuals to-date	Expected to-date (total-budget)
$ 775 k	$ 635 k ($ 834 k)
Material Actuals to-date	**Expected to-date (total-budget)**
$ 95 k	$ 215 k ($ 215 k)
Travel Actuals to-date	**Expected to-date (total-budget)**
$ 0	$ 0

SCOPE:

Remaining (first stage) devices on hand from the Cryo-3 wafer produced compliant but poorer noise temperatures. Consequently, significant rework was necessary to continue delivering amplifiers with performance similar to earlier delivered units. Investigations were undertaken to evaluate devices from another field on the same Cryo-3 wafer as well as devices from another commercial source. The former approach yielded good results and is being pursued.

SCHEDULE:

Milestone	Schedule	Target
1 Build and test Band 1 amplifiers (12 articles/qtr)	12/31/2018	6/30/2019
2 Same as above	3/30/2019	9/30/2019
3 Same as above	6/30/2019	12/31/2019
4 Same as above	9/30/2019	3/30/2020

RISK & MITIGATION:

Risk	Mitigation
1 Remaining Cryo-3 devices were poorer	1 New batch of devices obtained from a different field on the same Cryo-3 wafer from JPL seem to resolve the problem.
2 Additional tasks (see notes) absorbed resources	2 Most of these tasks are completed or nearing completion.

7 QSU1 FY2019

COST: Although we still expect to complete the project within the originally allocated budget, labor costs have been running over original estimates due to escalation of machining and chemical plating, effort to improve technical performance at NAOJ/ASIAA request, and time allocation of senior personnel on project. Costs will be carefully monitored each month to ensure assigned budget is not exceeded.

SCOPE: Remaining (first stage) devices on hand from the Cryo-3 wafer were poorer producing compliant but poorer noise temperatures. Consequently, significantly rework was necessary to continue delivering amplifiers with performance similar to earlier delivered units. Investigations were undertaken to evaluate devices from another field on the same Cryo-3 wafer as well as devices from another commercial source. The former approach yielded good results and is being pursued. Also:

- The amplifier group was engaged in repairing NRAO amplifiers and producing a small number of amplifiers for other projects and that absorbed some resources. Those tasks are now almost complete.
- Some amplifier group time/resources were absorbed in supporting the JPL/DSN team visits to the CDL (part of the NRAO/JPL MoU under which Cryo-3 devices were obtained)

SCHEDULE: Production schedule is approximately four months behind and should remain on a steady pace through project completion. Both NAOJ and ASIAA were intimated of the three to four month production delay in the face-to-face meeting in meeting in late October 2018 and have indicated that this schedule slip does not impact their (now delayed for other reasons) cartridge production schedule.

RISK & MITIGATION: A new batch of devices obtained from a different Cryo-3 wafer from JPL seemed to resolve the problem. Repair and production of amplifiers for another project (which absorbed amplifier group resources are completed/almost complete). We expect to be able to produce Band 1 CLNAs at the prior established rate (which was sufficient). We do not plan to catch up to the original SoW schedule, and are considering filing a schedule CRE to modify the formal delivery schedule.

POP MILESTONE #6.7.13

Science Support & Research
TTA SW Tool Suite Requirements

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Internal working group to develop draft software requirements for new NRAO Telescope Time Allocation tool suite to meet the needs of VLA and VLBA, and possibly GBT.

SCHEDULE:

Milestone	Schedule	Target
1 Draft requirements complete	12/31/2018	01/31/2019

RISK & MITIGATION:

Risk	Mitigation
1 Low	1 No mitigation required at present

8 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: Working group has completed its work but final collation of draft requirements document is still underway.

RISK & MITIGATION: Risk is low. No specific mitigation required at present.

POP MILESTONE #6.7.26

Science Support & Research
NRAO Papers Requirements

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Establish (internal) committee to identify requirements for NRAOPapers software suite functionality.
Timeline reassessed. (Existing software has been updated and is functional.)

SCHEDULE:

Milestone	Schedule	Target
1 Establish requirements committee	12/31/2018	6/30/2019

RISK & MITIGATION:

Risk	Mitigation
Low	No mitigation

9 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: Currently targeting 30 June 2019 for establishment of requirements committee.

RISK & MITIGATION: Risk is low. No specific mitigation required at present.

POP MILESTONE #6.7.28

Science Support & Research
Development of US Radio Astronomy

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Book on the history of the Development of US Radio Astronomy is progressing well, but more slowly than planned.
Completion is now anticipated by 30 June 2019.

SCHEDULE:

Milestone	Schedule	Target
1 Draft complete	12/31/2018	6/30/2019

RISK & MITIGATION:

Risk	Mitigation
Low	No mtigation

10 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: Good progress is being made and completion is now anticipated by end Q3.

RISK & MITIGATION: Low risk. No mitigation required.

POP MILESTONE #6.7.36

Science Support & Research

Student Obs. Support Selection (VLA)

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Selection Committee met 4 Jan 2019

Milestone completed four days late.

SCHEDULE:

Milestone	Schedule	Target
1 Selection completed for Semester 19A	12/31/2018	1/4/2019 DONE

RISK & MITIGATION:

Risk	Mitigation
N/A	N/A

11 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: Minor schedule slip. Completed four days late.

RISK & MITIGATION: Not applicable.

POP MILESTONE #8.5.7

Program Management Department

Multicancha Mass Concrete Works Complete

Cost
Schedule
Scope

COST: No change in cost

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

No change in scope

SCHEDULE:

Milestone	Schedule	Target
1 Mass Concrete works complete	12/31/2018	2/15/2019

RISK & MITIGATION:

Risk	Mitigation
1 Risk to schedule caused by delays	1 Call on project contingency

12 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: The contractor is behind on pouring the concrete for the walls. Strategies to regain schedule have not been effective to date. This is on the critical path for the contractor's delivery date, however the project team had anticipated delays and had programmed in some schedule contingency. We are still within the projected project schedule.

RISK & MITIGATION: Further delay may cause a call on project schedule contingency.

POP MILESTONE #8.5.8

Program Management Department

Multicancha Beams Erection Complete

Cost
Schedule
Scope

COST: No change in cost

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

No change in scope

SCHEDULE:

Milestone	Schedule	Target
1 Beam Erection Complete	12/31/2018	3/15/2019

RISK & MITIGATION:

Risk	Mitigation
1 Risk to schedule caused by delays	1 Call on project contingency.

13 QSU1 FY2019

COST: No impact.

SCOPE: : No impact.

SCHEDULE: The contractor is behind on pouring the concrete for the walls. Wooden beams are in storage in Santiago awaiting completion of the walls. Just in time delivery of the beams is required to avoid exposure damage to the wooden beams. Strategies to regain contractor schedule have not been effective to date. This is on the critical path for the contractor's delivery date, however the project team had anticipated delays and had programmed in some schedule contingency. We are still within the projected project schedule.

RISK & MITIGATION: Further delays would cause a call on project schedule contingency.

POP MILESTONE #8.5.21

Program Management Department

VLBA St Croix Repairs – Develop RfP for Steel Repairs and Antenna Painting

Cost
Schedule
Scope

COST:

No impact

SCOPE:

The scope of work for the St Croix Repairs project requires an RFP for the steel work and an RFP for painting the antenna.

SCHEDULE:

Milestone	Schedule	Target
1 Develop RFPs	12/31/2018	3/31/2019

RISK & MITIGATION:

Risk	Mitigation
1 The RFPs are not developed by the end of Q2 FY2019	1 Avoid – The RFPs are currently being written and are expected to be released before the end of February 2019

14 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: The first draft of the RFPs will be available by the end of January 2019 with the goal of releasing the RFPs by the end of February 2019.

RISK & MITIGATION: Risk: The RFPs are not developed by the end of Q2 FY2019. Mitigation: Avoid – The RFPs are currently being written by Engineering Services and are expected to be released before the end of February 2019 after review by other groups within the Observatory.

POP MILESTONE #8.5.33

Program Management Department

ALMA Band 6v2 Receiver Upgrade Project Kickoff

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	Expected
$	$
Travel Actuals	Expected
$	$

SCOPE:

No change

SCHEDULE:

Milestone	Schedule	Target
1 Kickoff Meeting	12/1/2018	5/1/2019

RISK & MITIGATION:

Risk	Mitigation
1 Project not approved	Delay kickoff meeting

15 QSU1 FY2019

COST: N/A – still in proposal stage.

SCOPE: Project scope will be fully defined in the proposal.

SCHEDULE: A kickoff meeting will be held following the project being approved by the ALMA Board and funded by NSF through the NA ALMA Development program.

From POP Milestone 2.5.26: "A successful Conceptual Design Review (CoDR) was held on Sep 25th 2018. The project originally intended to complete the proposal following this review and submit in time for the Nov 2018 ALMA Board meeting. Based on the recommendations from the review panel, as well as additional time needed to gain community support for the project, the decision was made to delay the proposal submission until the next ALMA Board meeting in Apr 2019."

RISK & MITIGATION: If the project does not get approved either through the ALMA Board or NSF, the kickoff meeting will be delayed.

POP MILESTONE #9.5.10

Cost
Schedule
Scope

Education and Public Outreach

Implement new NSF logo guidelines

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Set up test site to work with new NSF logo guidelines.

SCHEDULE:

Milestone	Schedule	Target
1 NSF logo changes	Q4	Q1

RISK & MITIGATION:

Risk	Mitigation

16 QSU1 FY2019

COST: No impact.

SCOPE: When planning our POP goals, it was anticipated that the new NSF logo guidelines would be more challenging than they were. We were going to set up a test site for a variety of style changes.

SCHEDULE: We gave ourselves a year to complete the necessary changes, but they proved to be relatively simple, so are complete in Q1.

RISK & MITIGATION: No impact.

POP MILESTONE #9.5.16

Cost
Schedule
Scope

Education and Public Outreach

Survey of CV and SO for community needs

COST:

Labor Actuals	Expected
$	$
Material Actuals	Expected
$	$
Travel Actuals	Expected
$	$

SCOPE:

In FY2019, EPO will create a tool to survey the influencers in our local NM and VA communities to identify the needs of these communities.

SCHEDULE:

Milestone	Schedule	Target
1 Create survey	12/31/2018	6/30/2019

RISK & MITIGATION:

Risk	Mitigation

17 QSU1 FY2019

COST: No impact.

SCOPE: In FY2019, EPO will create a tool to survey the influencers in our local NM and VA communities to identify the needs of these communities. Prior to the survey launch, EPO will seek a meeting with influencers to inform them of NRAO STEAM programs (SCO and RAP) and how EPO could be in support of their local STEM programs. The meeting and survey will also help identify stakeholders who will be supporters and advocates of local STEAM programs.

SCHEDULE: Because of gap in staffing, this milestone has been moved to Q3 to allow for hiring process.

RISK & MITIGATION: Although survey results will inform future programming, the hiring of a new STEM educator must come first. This process will now serve two purposes, one to gather information from our program influencers and also to introduce the new educator to the community.

POP MILESTONE #11.3.3

ODI

RAMP-UP

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

RAMP-UP, a partnership between the NRAO, Hampton University, and the Hampton-City School system (HCSS), has stalled due to the loss of the faculty partner at Hampton University (HU). A revised plan, for a continued partnership, focusing on underrepresented middle/high-school students, will be discussed in Q2.

SCHEDULE:

Milestone	Schedule	Target
1 Draft plan	12/31/2018	N/A

RISK & MITIGATION:

Risk	Mitigation
1 Loss of RAMP-UP program	RAMP-UP cancelled, but continued discussions will take place with HCSS and HU, in an attempt to revive, or redesign, program.

18 QSU1 FY2019

COST: No impact, funds already expended.

SCOPE: Cancelled. The plan for RAMP-UP that was written and discussed is no longer on the table because we lost the Hampton PI to MSU. ODI will start from scratch to identify a new PI at Hampton, but there is no current candidate.

SCHEDULE: Plan drafted, milestone deliverable met.

RISK & MITIGATION: Loss of program; cancellation and attempt to develop similar program/partnership.

Carryover Milestones

FY2018 Carryovers (1)

						Q4 Performance Assessment		
POP Section Number	POP Milestone	Milestone	POP Completion Date	New Completion Date		Cost	Schedule	Scope
2.5		**Atacama Large Millimeter/submillimeter Array (ALMA)**						
		Maintenance, Renewal, and Warranty Claims						
	29	NA Antenna Surface Accuracy Installation (25 antennas)	3/31/2018	Q3				
	32	Deliver FEMs 1 & 2 to JAO	3/31/2018	Q2				
	33	Deliver FEMs 3 & 4 to JAO	6/30/2018	Q4				
3.4		**Very Large Array**						
		VLA Development						
	27	Realfast operational for limited observing modes	9/30/2018	Q1 (new completion proposed Q2)	4-Square			
4.3		**Central Development Laboratory**						
		Research and Development						
	8	Explore DOMT calibration using hot-cold-noise	9/30/2018	Q1 (new completion proposed Q3)	4-Square			
	9	Demonstrate high-bandwidth unformatted serial link with integrated FE	9/30/2018	Q1 (new completion proposed Q2)	4-Square			
	10	Balanced 4–12 GHz IF amplifier	9/30/2018	Q4				
5.6		**Science Support and Research**						
		Scientific User Support & Student Programs						
	28	CASA Guides	6/30/2018	Q1	Complete Q1			
	33	Student Observing Support Selection (ALMA)	9/30/2018	Q1	Complete Q1			
6.5		**Data Management & Software**						
		Scientific Information Services						
	6	NGAS storage replacement	9/30/2018	Q2				
		SSA						
	25	Archive Access Tool release 4.0	9/30/2018	Q3				
		ARDG						
	33	Algorithm R&D Roadmap v.1	6/30/2018	Q1	Complete Q1			

FY2018 Carryovers (2)

						Q4 Performance Assessment		
POP Section Number	POP Milestone	Milestone	POP Completion Date	New Completion Date		Cost	Schedule	Scope
7.5		**Program Management Department**						
		Headquarters						
	24	PM/SE Training/Workshop	9/30/2018	Q1	Complete Q1			
		Sport Facility at ALMA OSF						
	28	Sport facility at ALMA OSF Construction Complete	9/30/2018	Q3				
		VLA Electrical Infrastructure Upgrade						
	32	VLA Electrical Infrastructure Upgrade Closeout	6/30/2018	Q1 (new completion proposed Q2)	4-Square			
8.5		**Education and Public Outreach**						
		STEAM						
	3	NM participants travel to Chile	9/30/2018	Q3				
10.3		**Office of Diversity & Inclusion**						
		Local and National Programs						
	5	NAC Annual Workshop	9/30/2018	Q2				
13.7		**Administration**						
		Budget						
	2	Develop and test tool for use in budget planning	6/30/2018	Q2				

FY2018 Carryovers (3)

						Q4 Performance Assessment		
POP Section Number	POP Milestone	Milestone	POP Completion Date	New Completion Date		Cost	Schedule	Scope
		ngVLA						
2		*Antenna Reference Design*						
	3	Conduct formal documentation and design reviews of ngVLA Reference Design	9/30/2018	Q1	4-Square			
4		*Conceptual Design & Development*						
	5	Release first issue of Array Calibration document	9/30/2018	Q1 (new completion proposed Q2)	4-Square			
	12	Algorithmic Study released	9/30/2018	Q3				
	15	RFI Mitigation study released	9/30/2018	Q3				
	19	WVR Testing begins	9/30/2018	Q1 (new completion proposed Q2)	4-Square			
5		*Administration and Management*						
5.6		**Requirements Management**						
	6	Conduct gap analysis of stakeholder and system requirements	6/30/2018	Q2				
	8	Release concept documents, system requirements and updated RVTM	9/30/2018	Q1 (new completion proposed Q3 & Q4)	4-Square			
3.11		**Long Baseline Observatory**						
		Operational Activities						
	9	VME replacement program will be complete	9/30/2018	Q1 (new completion proposed Q2)	4-Square			
	10	Complete VLBA upgrade roadmap	9/30/2018	Q1	Complete Q1			

FY15 POP MILESTONE #3.4.62

Cost
Schedule
Scope

Admin (from NM Ops)

Renew VLBA lease for Owens Valley

COST:

Current VLBA lease rate:	$500 per year
Expected new lease rate:	OVRO hopes to negotiate a lease with LADWP such that the VLBA share is $3,000 a year.

Milestone	Schedule	Target
Owens Valley Lease renewed	03/31/2015	EOY 2019

SCOPE:

Owens Valley, CA site sublease with Owens Valley Radio Observatory (OVRO) is lapsed. Walter Brisken received an update from Anthony Readhead on 11/29/2018. "We have been making good progress and expect to get a draft lease from LA DWP soon--we think that means in a few weeks not a few months, since the progress has been good. We are keeping the pressure up because we need to have the new lease for the DSA110 and LWA 352--so this is a high priority for us too."

RISK & MITIGATION:

Risk	Mitigation
1 Impact on VLBA operating budget (increase in lease cost – but early indications are for a modest increase)	1 Adjust VLBA Operating budget, if necessary
2 Impact on VLBA operation	2 Avoid by periodic follow up of Caltech negotiation progress

23 QSU1 FY2019

Updated 01/10/2019
COST: Future lease costs are subject to the status of Caltech's re-negotiation of the lease with Los Angeles Water and Power.

SCOPE: No impact.

SCHEDULE: Owens Valley Lease: The master lease for the Owens Valley Radio Observatory is an agreement between Caltech and Los Angeles Water and Power (the lease holder). The master lease has been expired for since March 31, 2015, and renegotiating it does not appear to be a priority for LA W&P. NRAO has a sublease agreement for VLBA-OV with Caltech. We will continue to monitor the situation with the master lease, and propose a new milestone for the sublease at the appropriate time.

RISK & MITIGATION:
1. Caltech 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.
3. An interim agreement between Caltech and NRAO regarding the sublease during this interim period has been discussed and our continued occupancy is not an issue.

FY18 POP MILESTONE #3.4.27

Cost
Schedule
Scope

New Mexico Operations

Realfast operational for limited observing modes

COST:

Labor Actuals	Expected

There are no changes in budget.

SCOPE:

The scope of this milestone is to demonstrate limited (L- and S-band) operation of the *realfast* commensal fast transient detection system on VLA. There is no change to the scope.

SCHEDULE:

Milestone	Schedule	Target
1 *realfast* operational for limited observing modes	12/31/2018	3/31/2019

RISK & MITIGATION:

Risk	Mitigation
1 Further schedule slip, limiting potential FRB science opportunities	1 Accept. Since realfast is a commensal system, it does not impact the main science being done on the array

24 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: Detailed testing of the *realfast* exposed a serious flaw in the underlying software, which impacts the main observing program. Because of this, we could not make it part of the main observing system in this quarter. The rest of the software system is nearing readiness, but until this fundamental problem is solved we cannot begin the commensal observing.

RISK & MITIGATION: The risk is in further schedule slip, which limits the ability to capitalize on the potential science opportunity for detected FRBs. Since *realfast* is a commensal system and does not impact the main PI science being done with the VLA, we accept this ongoing risk.

FY18 POP MILESTONE #4.3.8

Central Development Laboratory

Explore DOMT calibration using hot-/cold-noise

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

W-Band IRD Front End (on which the DOMT calibration scheme will be evaluated) testing was previously slowed due to a number of technical issues (as explained the QSU4 FY2018 four square), All of those have been now resolved and testing has resumed.

Progress made, but task not yet complete. Can read data out of the FPGA successfully, but with some occasional glitches whose cause remains to be understood/resolved. (These are not related to the serial link; they occur even when it is bypassed.) A second W-band IRD FE has been built and is being debugged in parallel.

The W-Band IRD receiver(s) need to be commissioned first, and then used to try the new DOMT calibration scheme. Algorithm has already been formulated and can be programmed in. Extra schedule requested.

SCHEDULE:

Milestone	Schedule	Target
1 Experimental test data (frequency response)	9/30/2018 in POP FY2018	Was 3/29/2019 Now revised to 6/29/2019

RISK & MITIGATION:

Risk	Mitigation
1 Technical issues	No specific mitigation strategy is required, as explained above, this is normal work which needs more time. We expect this milestone to be completed by the new requested target date, after associated milestone 4.3.9 is met.

25 QSU1 FY2019

COST: No consequential change in cost performance.

SCOPE: No change in scope, originally proposed experimental test data (streaming spectra) is still proposed to be collected and delivered.

SCHEDULE: The DOMT tests utilize the W-band Front End and FPGA processor above as infrastructure, so we can't do this until that works. The test bed for the proposed work (W-Band IRD Front End) suffered damage, and needed to be first repaired and evaluated. We expected that to take about one quarter, but taking data and getting over the initial learning curve is taking a little longer. This milestone will require a second W-band Front End, which has been built and is being simultaneously undergoing troubleshooting and fixing as necessary. Consequently, we are requesting another quarter to complete this milestone.

RISK & MITIGATION: The W-Band IRD Front End previously suffered several technical issues:
- A damaged Back End board (which was out of warranty)
- An unexpected oscillation in the IF module
- And a damaged doubler in our test set (which has been discontinued by the vendor).

During the past quarter, each of the above have been resolved as follows:
- Back End board was repaired
- We did solve the oscillation, but it cost us some gain to do it.
- A suitable replacement for the broken doubler was identified, procured, and integrated into the system.
- This milestone will require a second W-band Front End, which has been built and is being simultaneously undergoing troubleshooting and fixing as necessary

At this point, we can read data out of the FPGA successfully, but with some occasional glitches whose cause remains to be understood/resolved. (These are not related to the serial link, they occur even when it is bypassed.) The remaining problems are associated with climbing the learning curve and getting familiar with new tools and their quirks. No blocker problem is noted at this point, it just needs a little more time. The W-Band IRD receiver needs to be commissioned first, and then used to try the new DOMT calibration scheme. Algorithm has already been formulated and can be programmed in.

FY18 POP MILESTONE #4.3.9

Central Development Laboratory

Demonstrate high-bandwidth unformatted serial link with integrated FE

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

W-Band IRD front-end testing was previously slowed due to a number of technical issues (as explained the QSU4 FY2018 four square). All of those have been now resolved and testing has resumed.

Progress made, but task not yet complete. Can read data out of the FPGA successfully, but with some occasional glitches whose cause remains to be understood/resolved. (These are not related to the serial link, as they occur even when it is bypassed.)

The remaining problems are associated with climbing the learning curve and getting familiar with new tools and their quirks. No blocker problem is noted at this point--it just needs a little more time.

SCHEDULE:

Milestone	Schedule	Target
1 Experimental test data (frequency response)	9/30/2018	Was 12/31/2018 Now revised to 3/29/2019

RISK & MITIGATION:

Risk	Mitigation
1 Delay in data collection	No specific mitigation strategy is required, as explained above, this is normal work which needs more time. We expect this milestone to be completed by the requested target date.

26 QSU1 FY2019

COST: No consequential change in cost performance.

SCOPE: No change in scope, originally proposed experimental test data (streaming spectra) is still proposed to be collected and delivered.

SCHEDULE: The test bed for the proposed work (W-Band IRD Front End) suffered damage, and needed to be first repaired and evaluated. We expected that to take about one quarter, but taking data and getting over the initial learning curve is taking a little longer. Consequently, we are requesting another quarter to complete this milestone.

RISK & MITIGATION: The W-Band IRD Front End previously suffered several technical issues:
- A damaged Back End board (which was out of warranty)
- An unexpected oscillation in the IF module
- And a damaged doubler in our test set (which has been discontinued by the vendor).

During the past quarter, each of the above have been resolved as follows:
- Back End board was repaired
- We did solve the oscillation, but it cost us some gain to do it.
- A suitable replacement for the broken doubler was identified, procured and integrated into the system.

At this point, we can read data out of the FPGA successfully, but with some occasional glitches whose cause remains to be understood/resolved. (These are not related to the serial link--they occur even when it is bypassed. Also, the data in the FPGA is correct, and this has been verified by slower offline reads, issue is only related to real time high speed read software, which is obviously required for a working system). The remaining problems are associated with climbing the learning curve and getting familiar with new tools and their quirks. No blocker problem is noted at this point, it just needs a little more time.

FY18 POP MILESTONE #7.5.32

Cost
Schedule
Scope

Program Management Department

VLA Electrical Infrastructure Upgrade Closeout

COST:

A change order was required to establish the web access for monitoring the new system. The cost of the Web Navigator Software license and installation is $13,085.77.

SCOPE:

The scope of the work involved updating the aging electrical infrastructure at the VLA.

SCHEDULE:

Milestone	Schedule	Target
Project Closeout	6/30/2018	3/31/2019

RISK & MITIGATION:

Risk	Mitigation
New system continues to produce warnings and errors.	Mitigate – NRAO is working closely with GTI, Siemens, and Wagner to adequately configure the new system.

27 QSU1 FY2019

COST: A change order was required to establish the web access for monitoring the new system. The cost of the Web Navigator Software license and installation is $13,085.77.

SCOPE: Overall scope is unchanged.

SCHEDULE: Project closeout is delayed due to the extended length of the power outage at the site. Additional delays are due to the need to reprogram the switchgear and troubleshoot errors seen in the monitoring system. When the system is fully functional and no longer producing errors, NRAO will close out the procurement contract with GTI and then PMD will complete the Closeout Report with the Project Director.

RISK & MITIGATION: The risk is that the new system will continue to produce warnings and errors with unknown reasons. NRAO is working closely with GTI, Siemens, and Wagner to resolve the issues

FY18 POP MILESTONE #2.3

Cost
Schedule
Scope

ngVLA

Conduct reference design documentation reviews

COST:

Labor Actuals	Expected
$	$
Material Actuals	Expected
$	$
Travel Actuals	Expected
$	$

SCOPE:

Conduct informal and formal documentation and design reviews for the ngVLA reference design.

SCHEDULE:

Milestone	Schedule	Target
1. Conduct documentation and design reviews for ngVLA reference design	9/30/2018	1. Internal Pre-Decadal Submission Review conducted Oct 23-24, 2018 2. External Pre-Decadal Submission Review to be conducted in early April 2019.

RISK & MITIGATION:

Risk	Mitigation
Deadline for document submission is missed and/or document quality is insufficient for Astro2020 DS.	Conduct internal and external reviews of the reference design documentation.

28 QSU1 FY2019

Owner: Kay Cosper

COST: No impact.

SCOPE: The deliverable for this milestone is an approved ngVLA reference design and associated documents. No impact.

SCHEDULE: The Astro2020 DS submission timeframe was anticipated to be in early FY19. An internal review of the reference design documentation was conducted in October 2018. Currently, the A2020 DS submission timeframe appears to be mid-FY19. A formal review by external panelists is being planned for early April 2019.

RISK & MITIGATION: An internal review of the reference design has been conducted. The ngVLA will utilize the additional time prior to the A2020 DS submission to conduct an external reference documentation and design review in early April 2019.

FY18 POP MILESTONE #4.5

Cost
Schedule
Scope

ngVLA

Release first issue of Array Calibration document

COST:

Labor Actuals	Expected
$	$
Material Actuals	Expected
$	$
Travel Actuals	Expected
$	$

SCOPE:

Release an Array Calibration document. The scope of the document is to study and describe the array calibration strategies and associated system requirements and architectural choices. Phase calibration, gain calibration, polarization calibration, and flux-scale calibration strategies will be evaluated.

SCHEDULE:

Milestone	Schedule	Target
Release first issue of Array Calibration document	9/30/2018	3/31/2019

RISK & MITIGATION:

Risk	Mitigation
Array calibration is insufficiently understood and inadequately documented for the Astro2020 Decadal Survey.	Increase priority of producing final document. If document is too late, utilize initial estimates to set requirements for design, as inputs into subsequent Astro2020 Decadal Survey submissions.

29 QSU1 FY2019

Owner: Bryan Butler

COST: No impact.

SCOPE: No impact.

SCHEDULE: The first issue of the Array Calibration document was delayed due to a delay in the hiring of the research associate (RA) tasked to do the bulk of the work. The RA is now in place, but it has taken him more time than expected to come up to speed on the issues. A draft document is in-hand, based on a similar document written for ALMA, and the final document is scheduled for release in March 2019.

RISK & MITIGATION: A delayed or incomplete array calibration document may result in the calibration requirements of the ngVLA being underestimated or inadequately understood, and would suggest an incomplete technical concept in the Astro2020 Decadal Survey review process. This risk will be mitigated by expediting the completion of the document. The RA is now in-place and working on the document for release by March 2019.

FY18 POP MILESTONE #4.19

Cost
Schedule
Scope

ngVLA
Water Vapor Radiometry (WVR) testing begins

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

A prototype WVR system consisting of four elements is to be deployed on the VLA, to gain experience with such a system, which is intended to be used on the ngVLA for phase calibration.

SCHEDULE:

Milestone	Schedule	Target
First WVR demonstration system installed at the VLA site.	9/30/2018	3/31/2019

RISK & MITIGATION:

Risk	Mitigation
The prototype WVR system is developed too late to provide input into the conceptual design of the ngVLA.	Use existing knowledge of WVR performance from other arrays for the input.

30 QSU1 FY2019

Owner: Bryan Butler

COST: No impact.

SCOPE: No impact.

SCHEDULE: Installation of the first WVR article was further delayed by two problems; parts delivery was slow for two critical parts, and design of thermal stability took longer than planned. The first article is now complete in the lab, and we are confident that we will meet the installation date of March 31, 2019, on a VLA antenna.

RISK & MITIGATION: The prototype WVR system may be developed, installed, and tested too late to provide meaningful input into the conceptual design of the ngVLA. Such systems have been used on other arrays, including BIMA, OVRO, PdBI, and most notably, ALMA, and results from those systems can be used if needed, scaled to the atmospheric conditions and configurations of the ngVLA.

FY18 POP MILESTONE #5.6.8

ngVLA - Release concept documents, systems requirements, and updated RVTM

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Release of concept documents, system requirements, and an updated requirements, verification, and traceability matrix (RVTM) in support of the Astro2020 submission and conceptual design development.

SCHEDULE:

Milestone	Schedule	Target
1. Release Operations, Maintenance, AIV and CSV concepts	9/30/2018	3/31/2019
2. Updated System & Stakeholder Requirements	9/30/2018	9/30/2019
3. Release RVTM	9/30/2018	9/30/2019

RISK & MITIGATION:

Risk	Mitigations
Hiring delays of the project's SE result in inadequate advance of lifecycle concepts and requirements definition.	1. Prioritize the backfill of the project's SE position. 2. Establish work groups for remaining lifecycle concepts and to advance stakeholder and system requirements definition.

31 QSU1 FY2019

Owner: Kay Cosper (ngVLA SE position currently open)

COST: No impact.

SCOPE: No impact.

SCHEDULE: The stakeholder requirements and system requirements have been updated and released to plan. The operations and maintenance concept was also released to plan. The release of the remaining concept documents and RVTM was delayed due to the delayed hiring of the ngVLA systems engineer (SE) followed by the departure of the hired individual. Working groups have been established to advance the assembly, integration and verification concept, commissioning and science validation concept, and transition (VLA -> ngVLA) concepts. All three will have preliminary releases by end of March in support of the Astro2020 submission. The stakeholder and system requirements will be updated to incorporate any new requirements identified in these concept documents and an RVTM will be prepared for the requirements review milestone scheduled for FY2019 Q4.

RISK & MITIGATION: Should the SE position remain vacant through the remainder of FY2019, delivering the RVTM will be at risk, along with a disposal concept for the facility. Mitigation strategies are already in effect to deliver the AIV and CSV concepts, along with updates to the stakeholder and system requirements.

FY18 POP MILESTONE #3.11.9

New Mexico Operations – VLBA

VME replacement program complete

Cost
Schedule
Scope

COST:

Labor Actuals	Expected
$	$
Material Actuals	**Expected**
$	$
Travel Actuals	**Expected**
$	$

SCOPE:

Migrate all VME functionality to VLBA control computers, including retirement and replacement of legacy operator screens and utility programs.

SCHEDULE:

Milestone	Schedule	Target
1 Complete VME replacement program	12/31/2018	3/31/2019

RISK & MITIGATION:

Risk	Mitigation
1 Increased exposure to failure of aging VME hardware	Used retired VME systems as spares, if needed

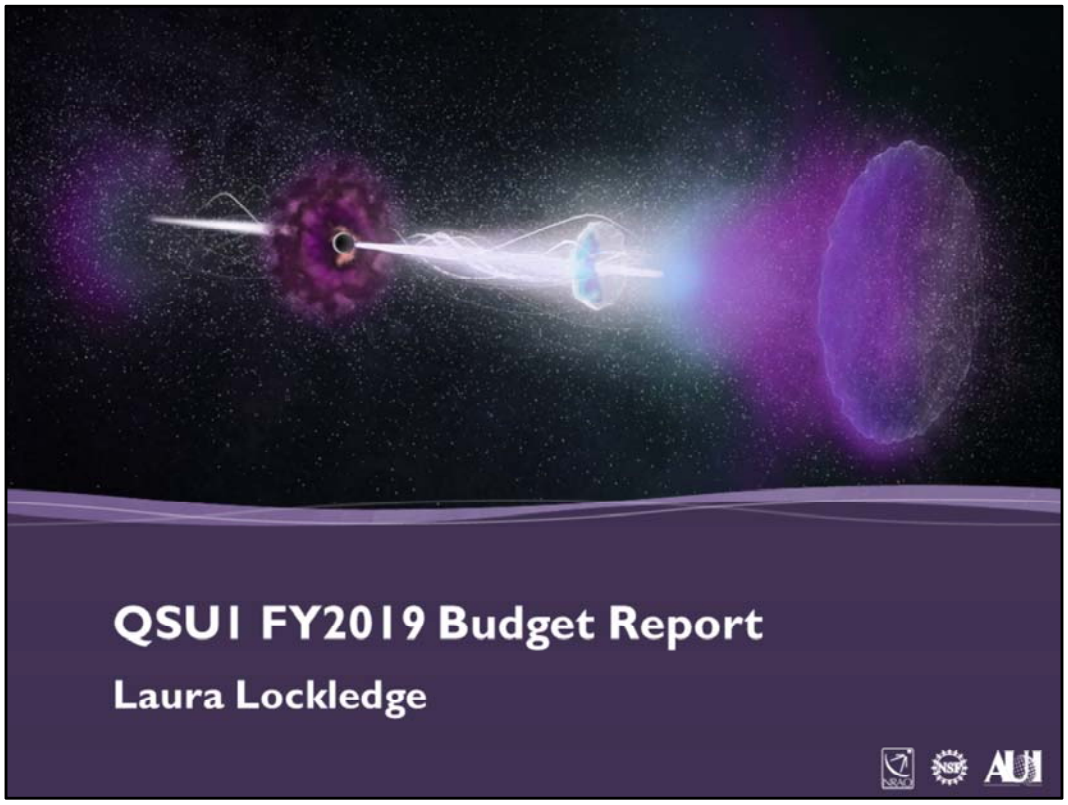
32 QSU1 FY2019

COST: No impact.

SCOPE: No impact.

SCHEDULE: The migration of all VME functionality to VLBA control computers was delayed by software development, testing and bug fixing. The last remaining utility programs to be migrated have been identified and development is in progress. At present, four stations have been moved to the VLBA control computers, with the remaining scheduled to be completed by the end of Q2.

RISK & MITIGATION: The risk of further delay is increased exposure to failure of aging VME hardware between now and the end of full deployment of the new system. Now that some of the stations have been moved to the control computers we have VME component spares available, if needed.


QSU1 FY2019 Budget Report
Laura Lockledge

Budget Overview: Q1 FY2019

- ICC/IDC reflect FY2018 approved rates
- Benefits @ 35.3% vs. budget of 36%
- Q1 typically underspent due to salary accruals in prior year

CSA-V Q1 Results

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NSF	38,850	38,850	8,028	20.7%
Carryforward/Other	1,165	5,230	5,230	0.0%
Total CSA-V Revenu	**40,015**	**44,080**	**13,258**	30.1%
Telescope Ops	11,003	12,071	1,973	16.3%
Development	3,575	3,405	501	14.7%
Science Ops	6,829	8,413	1,355	16.1%
Admin Services	10,249	10,173	1,705	16.8%
Director's Office	2,659	2,288	536	23.4%
Education & Public Out	782	783	160	20.4%
ngVLA	4,918	6,947	1,391	20.0%
FY19, Total	**40,015**	**44,080**	**7,621**	**17.3%**
FY19 CSA-V Net	**0**	**0**	**5,637**	

- Significant carryover allocated to DMS surge (Science Ops)
- $1M carryover for FY2018 track allocation shown in Telescope Ops.
- ngVLA revised includes carryover & reclass of ICC/IDC

CSA-A Q1 Results

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NSF	40,280	40,280	7,182	17.8%
Carryforward	9,363	10,790	10,790	100.0%
Canadian Contribution	2,809	2,809	0	0.0%
Other	848	848	265	100.0%
Total CSA-A Revenues	**53,300**	**54,727**	**18,237**	33.3%
Telescope Ops	24,149	26,175	4,940	18.9%
Development	6,249	7,800	506	6.5%
Science Ops	6,783	7,157	1,274	17.8%
Admin Services	9,994	9,670	2,133	22.1%
Director's Office	3,617	3,231	714	22.1%
Education & Public Outreach	698	694	114	16.4%
FY19, Total	**51,490**	**54,727**	**9,681**	**17.7%**
FY19 CSA-A Net	**1,810**	**0**	**8,556**	

CSA-L Q1 Results

	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NSF	3,430	3,430	1,540	44.9%
Telescope Time Sales	4,439	4,439	0	0.0%
Other	285	285	0	0.0%
Total CSA-L Revenues	**8,154**	**8,154**	**1,540**	18.9%
Telescope Ops	6,157	6,062	991	16.3%
Development	0	0	0	
Science Ops	1	1	0	0.0%
Admin Services	1,470	1,565	429	27.4%
Director's Office	526	526	22	4.2%
Education & Public Outreach	0	0	0	
FY19, Total	**8,154**	**8,154**	**1,442**	**17.7%**
FY19 CSA-L Net	**0**	**0**	**98**	

ICC Q1 Results

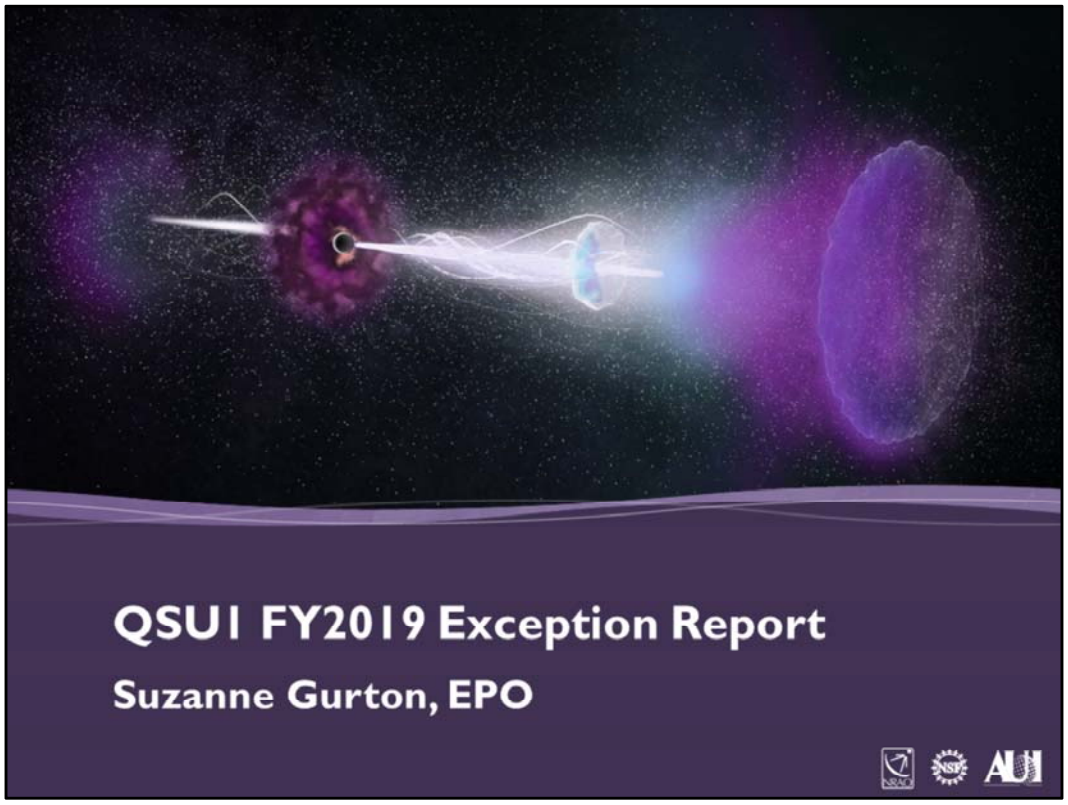
	FY19 POP Budget	FY19 Rev. Budget	FY19 YTD Expenses	YTD % Rev Budget
NRAO Recoveries	15,176	15,176	3,083	20.3%
External Recoveries	1,412	1,412	331	23.4%
Total ICC Revenues	**16,588**	**16,588**	**3,414**	20.6%
Telescope Ops	108	108	29	26.9%
Development	462	462	100	21.6%
Science Ops	2,567	2,567	534	20.8%
Admin Services	11,450	11,451	2,260	19.7%
Director's Office	2,001	1,994	310	15.5%
FY19, Total	**16,588**	**16,582**	**3,233**	**19.5%**
FY19 ICC Net	**0**	**6**	**181**	

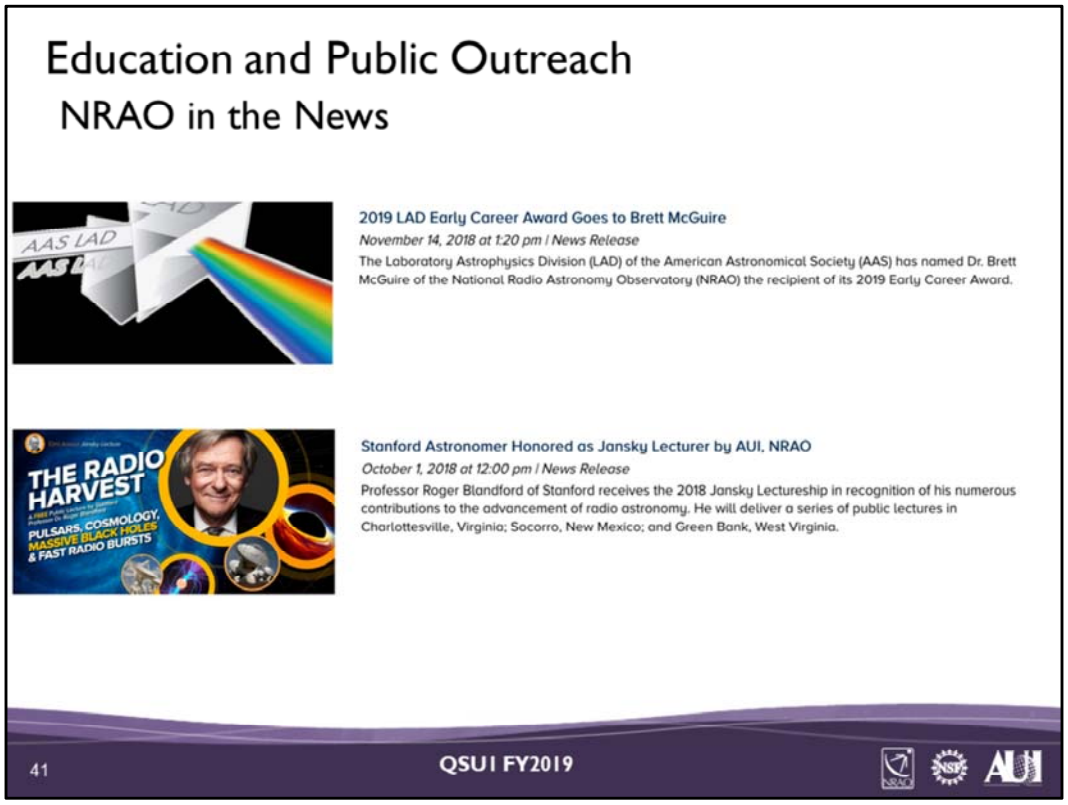
- $181K over-recovered.
- External recoveries on track.

CSA-H & CSA-F

	CSA H Budget	ITD Expenses	% Budget	CSA-F Budget	ITD Expenses	% Budget
NSF	2,000	510	25.5%	2,500	7	0.3%

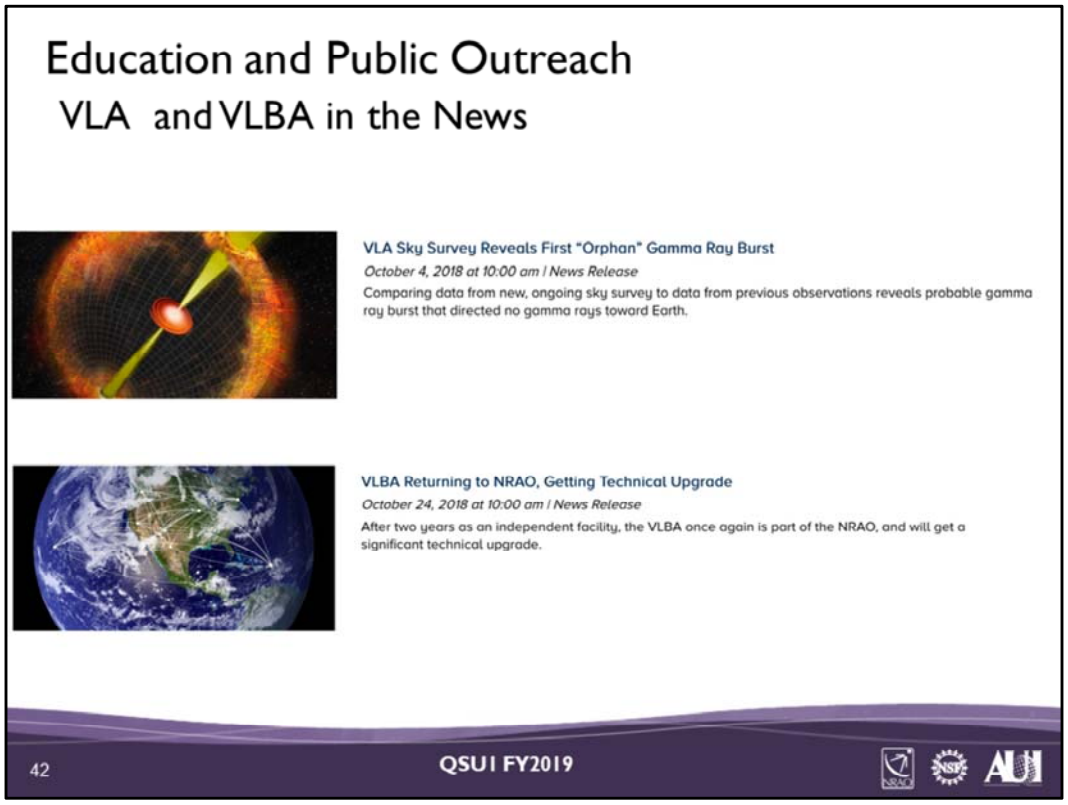
- CSA-F has significant open commitments ($270K).


QSU1 FY2019 Exception Report
Suzanne Gurton, EPO



Dr. Brett McGuire of the NRAO is the recipient of the Laboratory Astrophysics Division (LAD) of the American Astronomical Society (AAS) 2019 Early Career Award.

Associated Universities, Inc. (AUI), and the National Radio Astronomy Observatory (NRAO) have awarded the 2018 Karl G. Jansky Lectureship to Professor Roger D. Blandford of Stanford University. The Jansky Lectureship is an honor established by the trustees of AUI to recognize outstanding contributions to the advancement of radio astronomy.



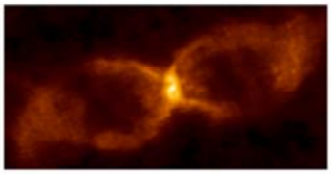
Astronomers comparing data from an ongoing major survey of the sky (VLASS) to data from earlier surveys likely have made the first discovery of the afterglow of a powerful gamma ray burst that produced no gamma rays detectable at Earth. The unprecedented discovery of this orphan gamma ray burst (GRB) offers key clues to understanding the aftermath of these highly energetic events. As our Public Information Officer, Dave Finley said, "I think the hottest scientific result from here in Q1 was the Orphan GRB. Not only was it the first example found of such a thing, but it also came out of VLASS. The Orphan GRB also was featured prominently on the NSF web page and got extensive news coverage."

We welcomed VLBA back into the NRAO family. The National Science Foundation's Very Long Baseline Array (VLBA), a continent-wide radio telescope system, will once again officially be a part of the National Radio Astronomy Observatory (NRAO) and will undergo a technical upgrade to significantly improve its capabilities.

No press releases for GBO this quarter.

Education and Public Outreach

ALMA in the News



When Is a Nova Not a 'Nova'? When a White Dwarf and a Brown Dwarf Collide

October 8, 2018 at 12:00 am | News Release

Using ALMA, an international team of astronomers found evidence that a white dwarf and a brown dwarf collided in a short-lived blaze of glory.

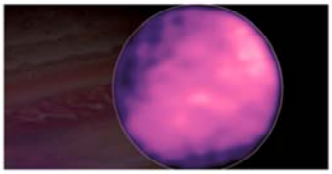


Image Release: ALMA Maps Europa's Temperature

October 23, 2018 at 10:00 am | News Release

New ALMA images show never-before-seen surface details on Europa, including an enigmatic "cold spot."

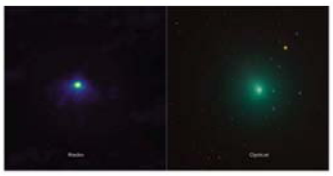


Image Release: ALMA Gives Passing Comet Its Close-up

December 20, 2018 at 9:00 am | News Release

As comet 46P/Wirtanen neared Earth on December 2, astronomers using ALMA took a remarkably close look at its innermost regions.

Seven press releases for ALMA this quarter from comets and moons and a collision between and brown and white dwarf.

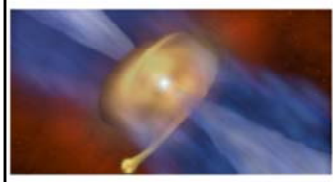
Education and Public Outreach

More ALMA in News

Trans-galactic Streamers Feeding Most Luminous Galaxy in the Universe

November 15, 2018 at 2:00 pm / News Release

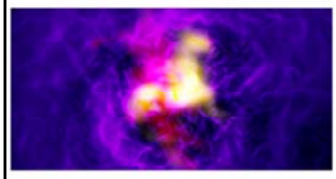
New ALMA data reveal distinct streamers of material being pulled from three smaller galaxies into the larger galaxy W2246-0526, the most luminous known galaxy in the universe.



Fragmenting Disk Gives Birth to Binary Star 'Odd Couple'

December 14, 2018 at 8:00 am / News Release

ALMA has detected a star in a binary system that may have formed like a planet.

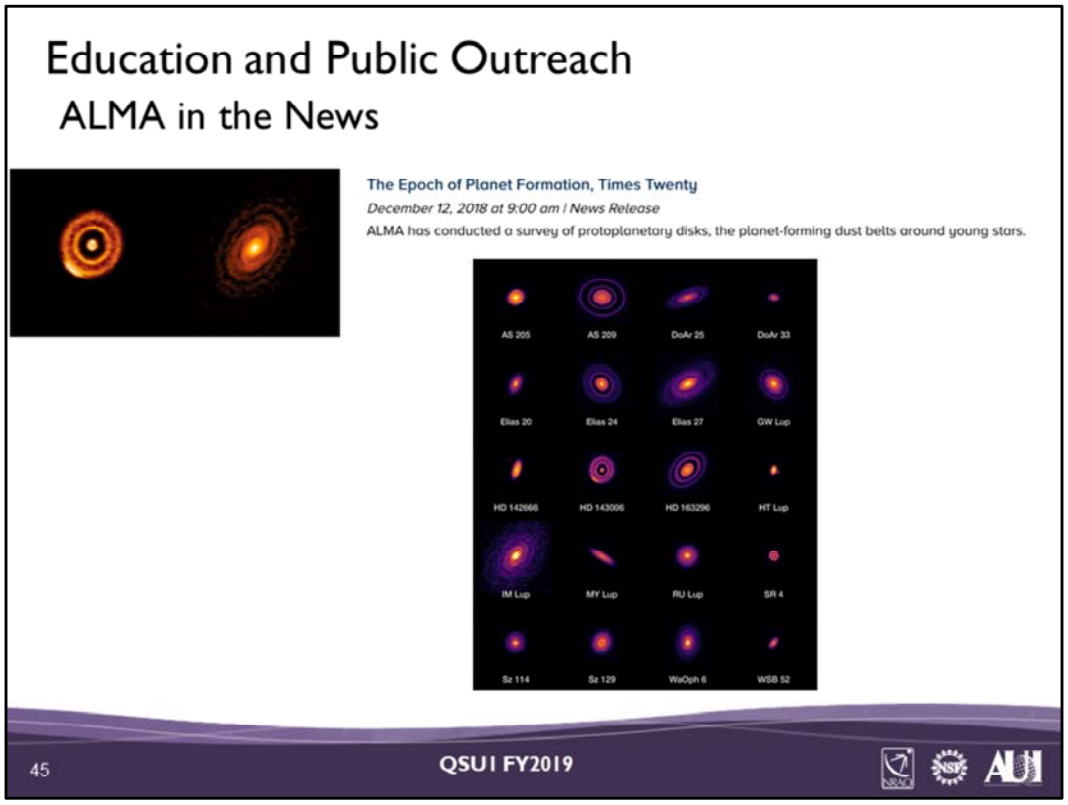


Galaxy-Scale Fountain Seen in Full Glory

November 6, 2018 at 10:00 am / News Release

A billion light-years from Earth lies one of the universe's most massive structures, a giant surrounded by a sprawling...

Fountains and streamers revealing fascinating galactic structure and binary stars being born.



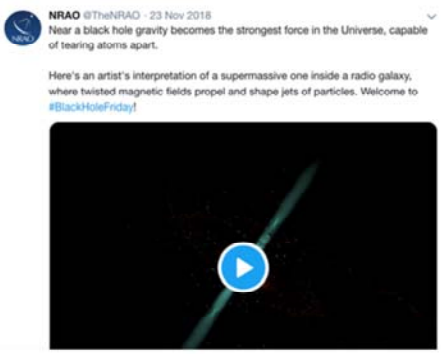
Known as the Disk Substructures at High Angular Resolution Project (DSHARP), this Large Program of the Atacama Large Millimeter/submillimeter Array (ALMA) has yielded stunning, high-resolution images of 20 nearby protoplanetary disks and given astronomers new insights into the variety of features they contain and the speed with which planets can emerge.

The results of this survey will appear in a special focus issue of the *Astrophysical Journal Letters*. From an EPO standpoint, we love releases like this DSHARP survey. It is visually stunning, but it allows the relatively naive participant to compare and contrast images, asking great questions about what the differences that they notice and participate in a simple sorting or classifying activity.

Education and Public Outreach

Social Media-Twitter

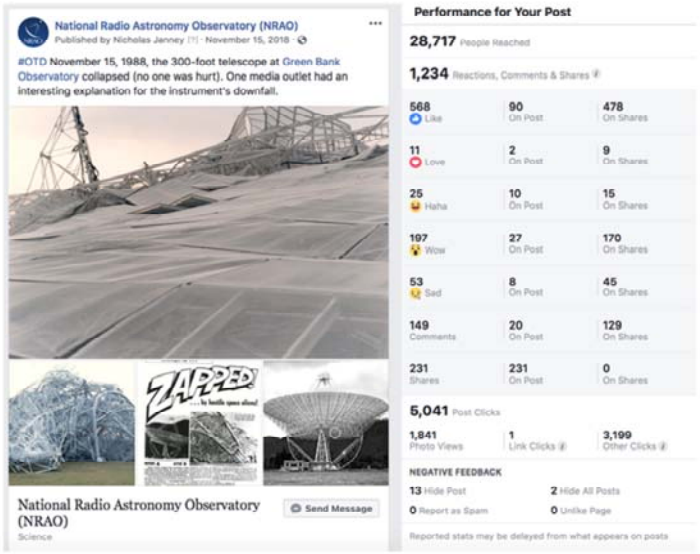
Facebook	Twitter	Instagram
64,111 Followers	17, 808 followers	1,541 Followers



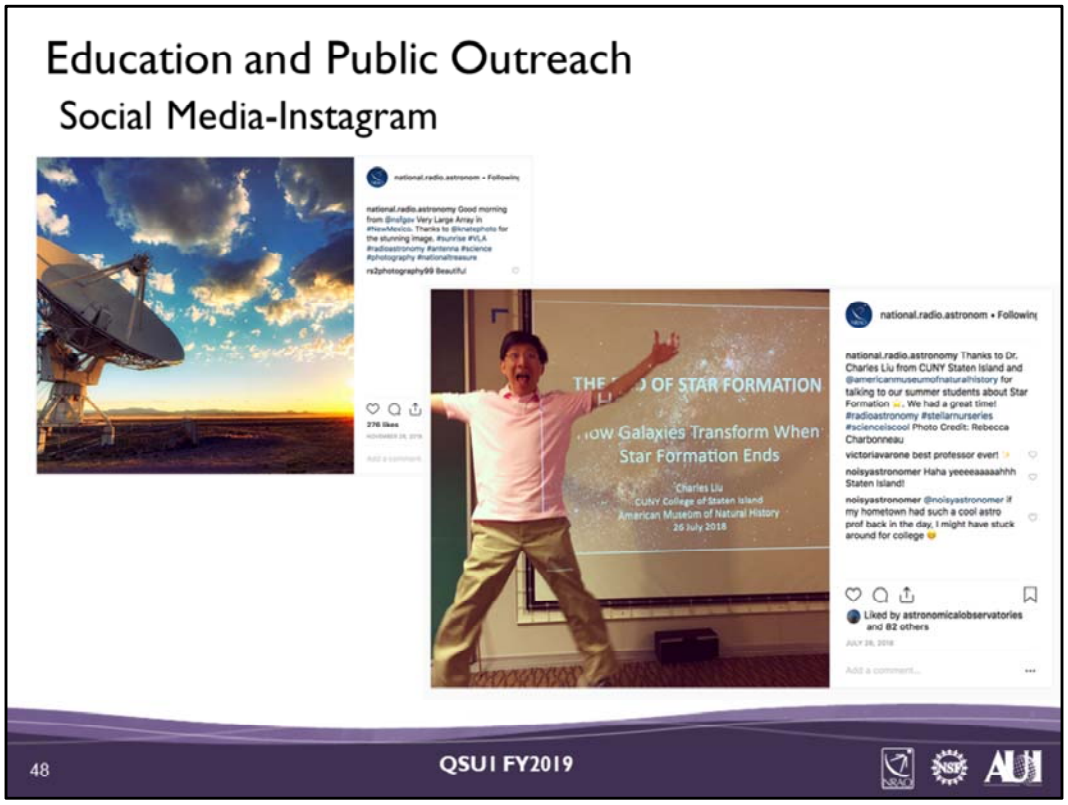
Our three social media channels continued to gain followers. We had some fun on Twitter with Black Friday during Q1, celebrating it as Black Hole Friday.

Education and Public Outreach

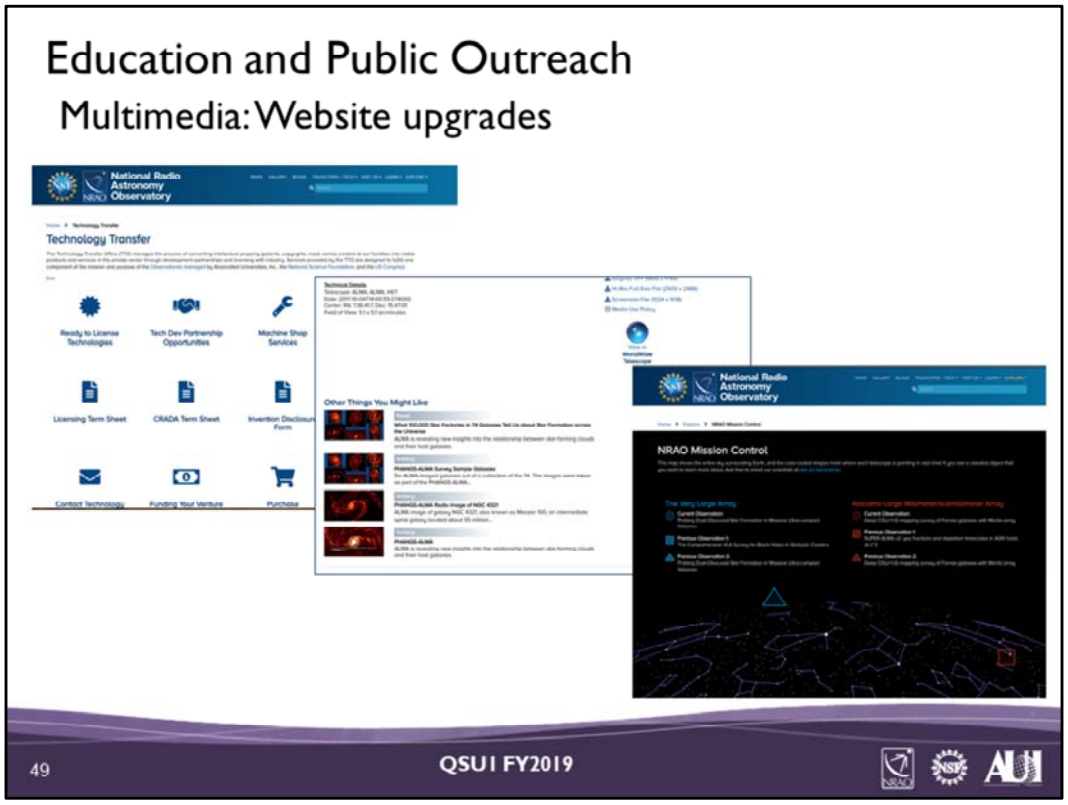
Social Media-Facebook



On Facebook we go longer form. You may remember TBT, Throwback Thursday? This is the more generic "On This Day" #OTD, we remembered the catastrophic collapse of the 300 foot at Green Bank and it got a lot of attention.



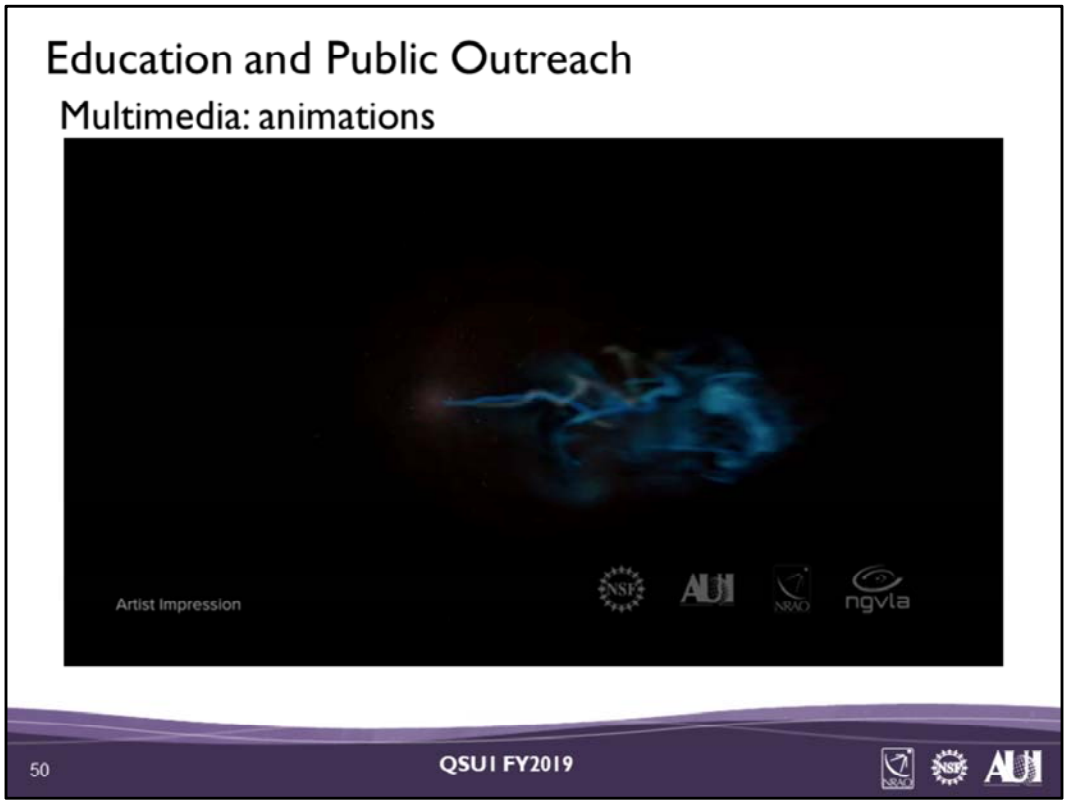
Our Instagram account continues to grow with posts that feature both beautiful photography of our facilities and events.



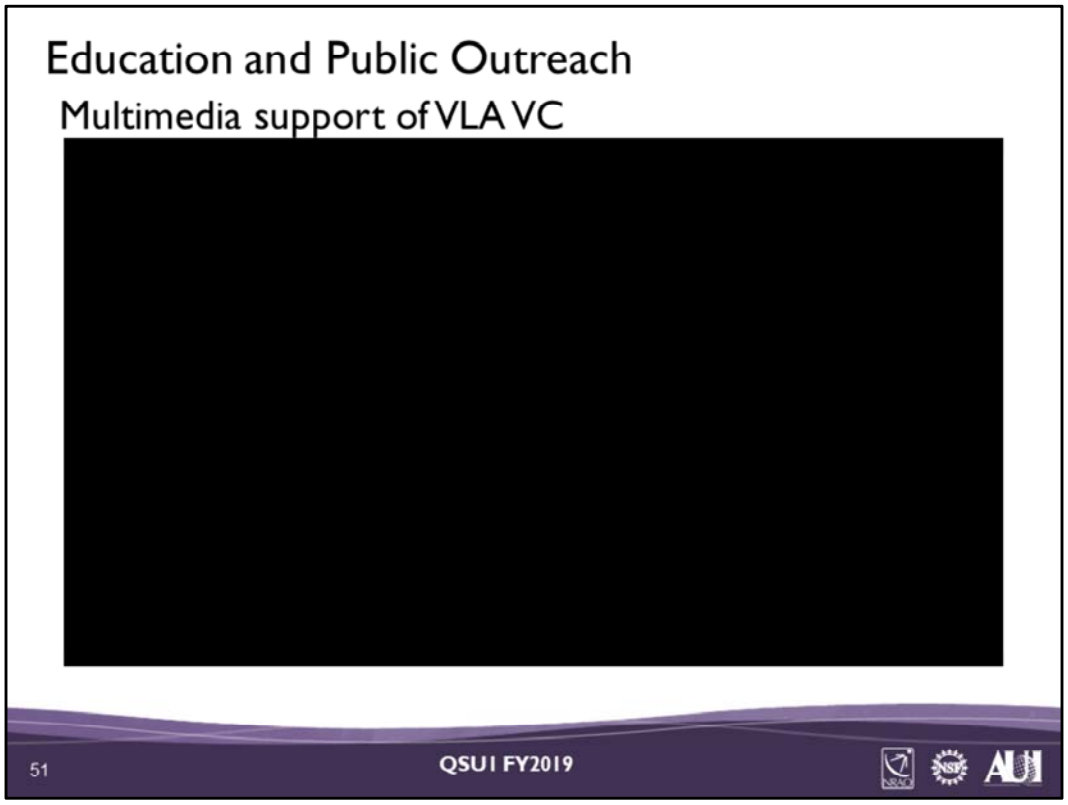
In addition to getting the NSF logo in the right place on the public NRAO website, we worked with Jeff Pixton to develop a tech transfer page. https://public.nrao.edu/tech-transfer/ with all the appropriate links for his work. In response to the goal for making our site more interlinked internally, we added an "Other things you might like" the Gallery pages (https://public.nrao.edu/gallery/phangs-alma-survey-sample-galaxies/), we updated the look of Mission Control (https://public.nrao.edu/explore/mission-control/), added the latest press releases to the page and featured Mission Control in a fun scrolling way on our telescopes page, https://public.nrao.edu/telescopes/

We also upgraded to Wordpress 5.0 for improved security and added editing tools.

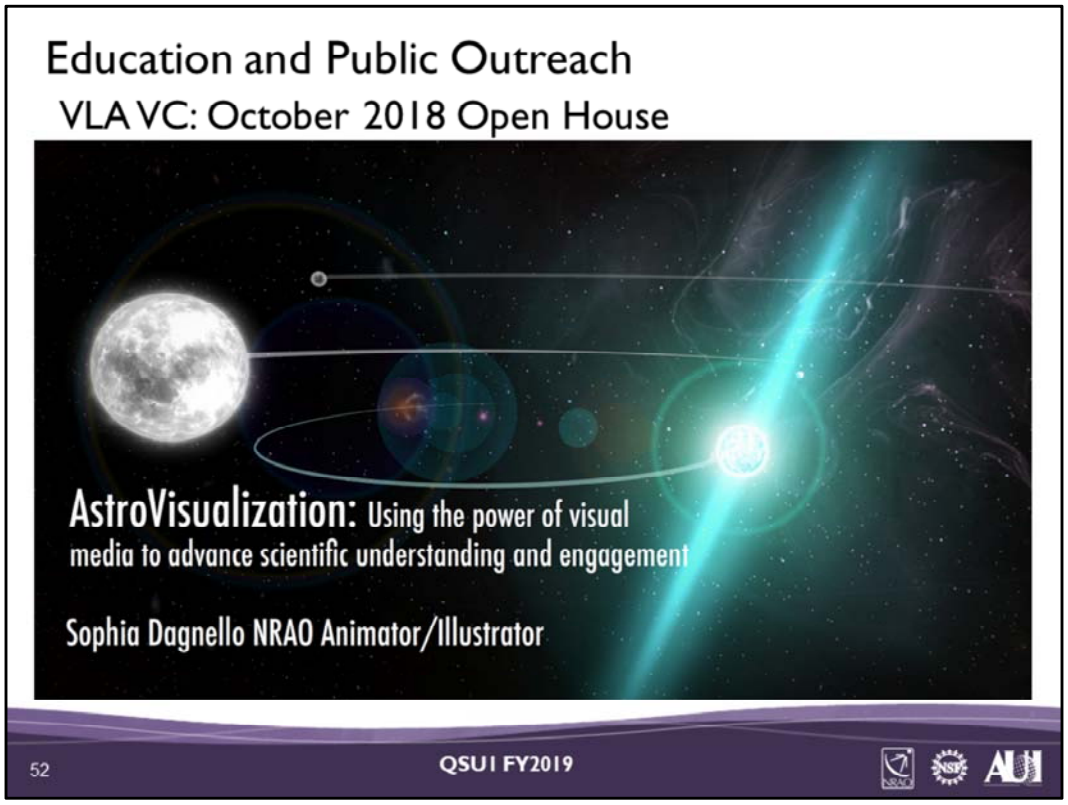
This is the first metrics report where we tweaked our Google Analytics to filter out internal traffic. It didn't make a big difference, the VLA Visit Us page is still our biggest hit.



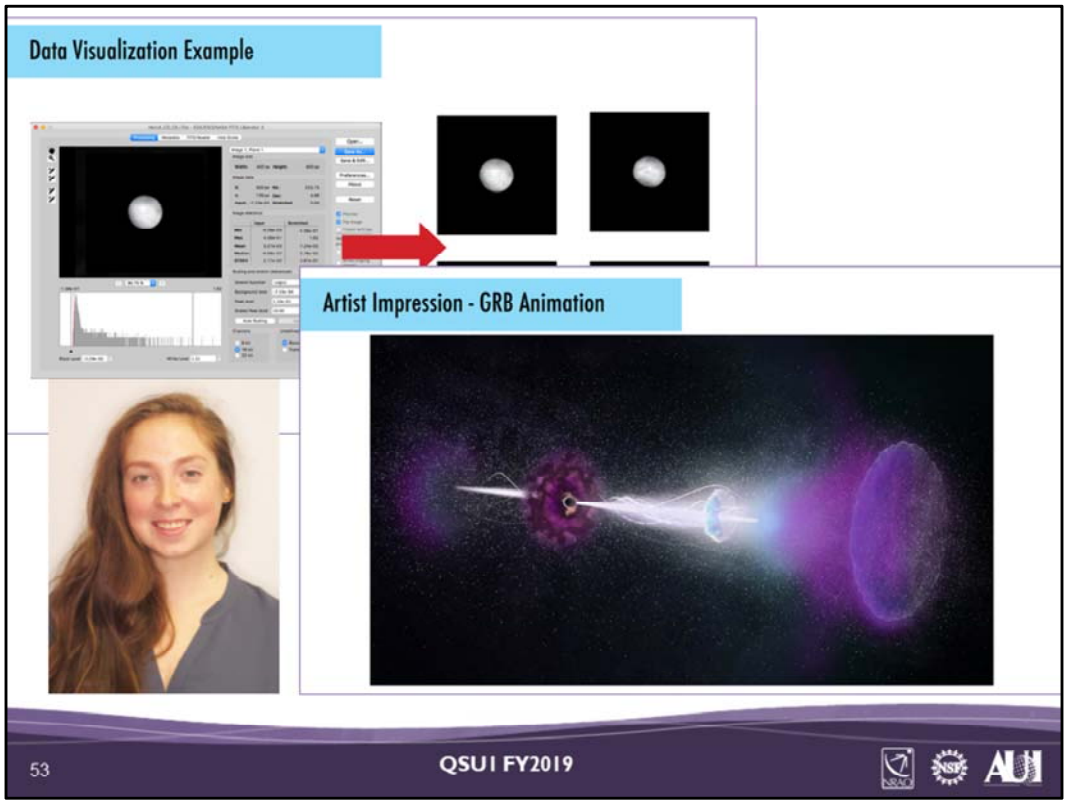
In addition to visual support for press releases, our team of artists worked with IT to upgrade our render farm in order to create 4k animations for the AAS. I'll report on the final products in my Q2 report, but I'll just put this here as a teaser. It is one of the five key science cases for ngVLA. In our POP, we promised two, but completed three, so I'll count this one for the exception report. In addition to this, they created a wonderful overview of the VLA sky survey: https://vimeo.com/310573421.



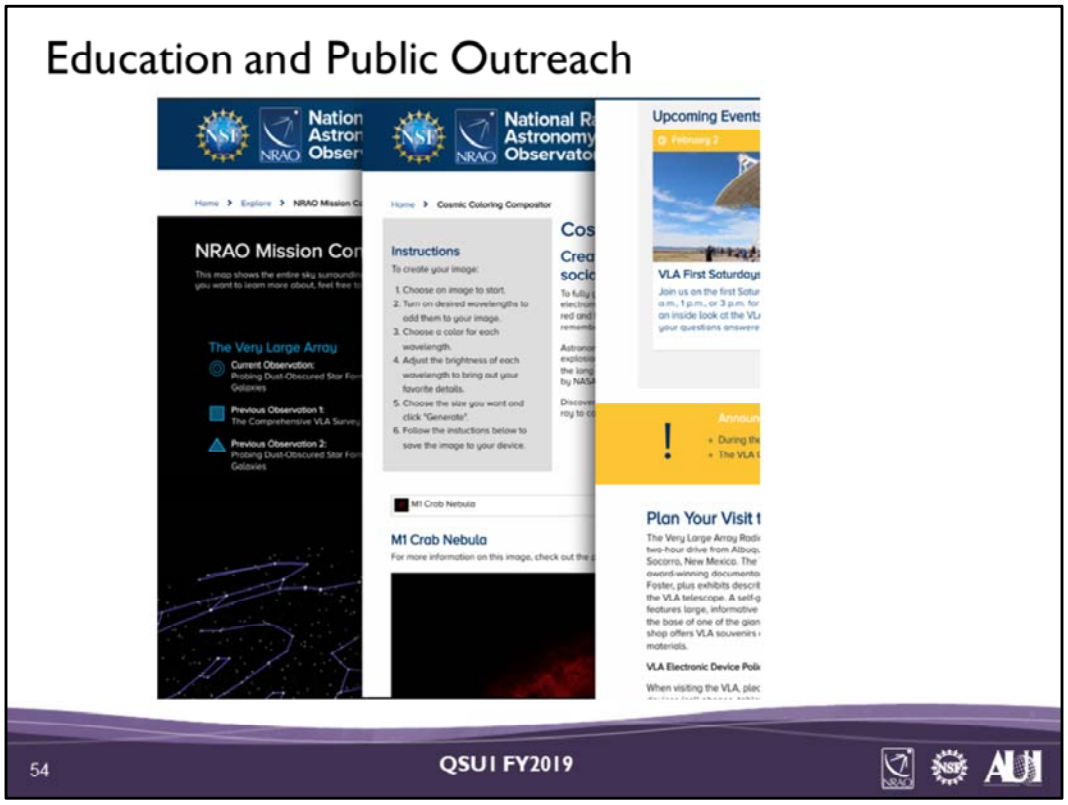
Although we've taken a few steps towards a capital campaign for a new visitor center, we are still taking time to make sure our visitors have a positive experience when they visit. This is a teaser for another Q2 update. This video was create as part of a solution to unclog the gift shop and upgrade one of the exhibits. The complete upgrade didn't happen until this quarter, but we've had trouble on busy days with gift shop clerks trying to both sell merchandise and give an overview that includes why it's important to turn off their phones. This is the little RFI video that was created, and it is now running in the exhibit hall. Next time I'll report on the complete exhibit upgrade that it is a part of. Now that we have this and other info available, gift shop clerks can focus on sales and admissions when it's busy.



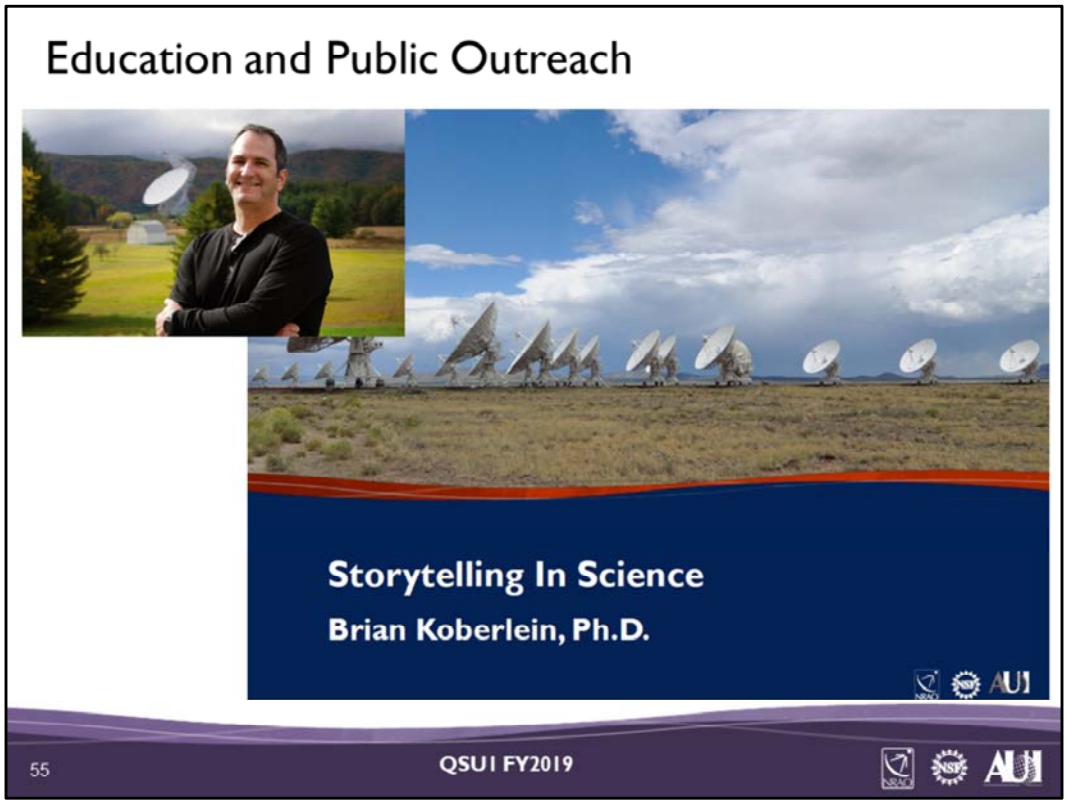
Our new artist, Sophia Dagnello was a featured speaker at the October Open House.



She pulled back the curtain and revealed some of the tools that she uses to work with science images/FITS files, and to create some of the animations that explain the phenomena that we observe.

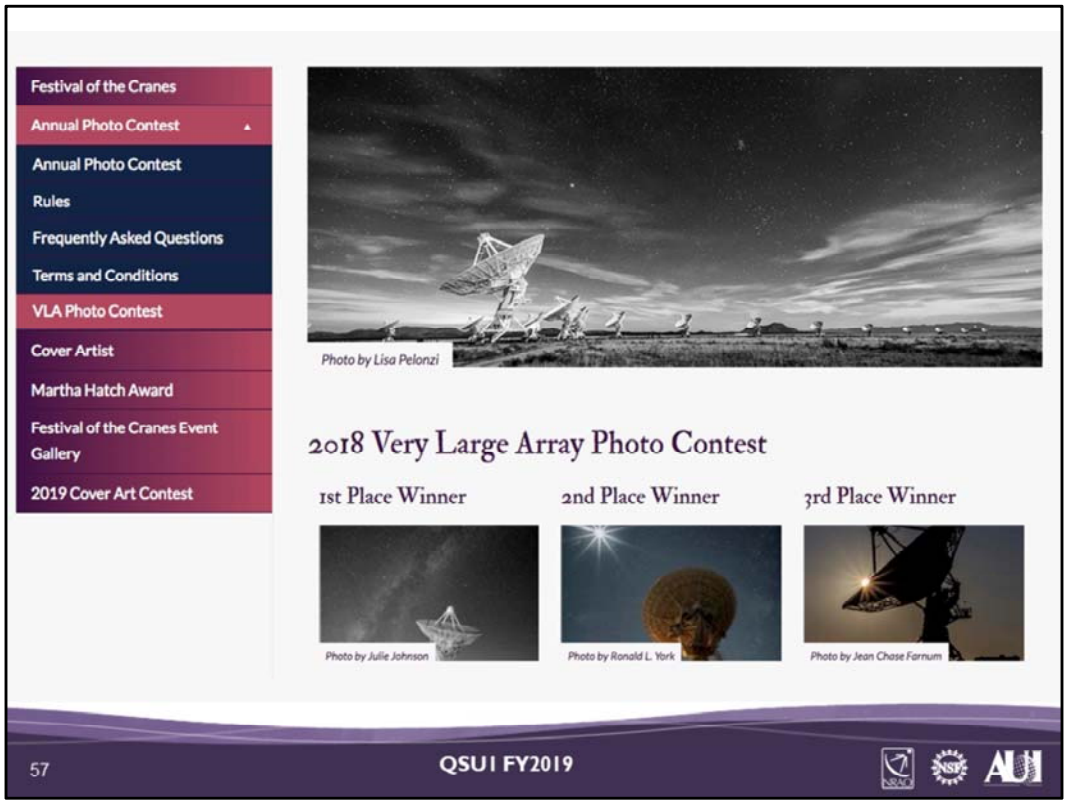


Our web master, Matt Chauta, gave a tour of some of the fun things you can find on our web site.



Our new Science Writer, Brian Koberlein, gave a talk on Storytelling in Science that was woven with beautiful analogies and very little jargon.

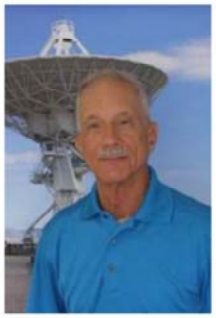
The October open house hosted 782 visitors. And we had another 786 visitors on other scheduled tours from groups that included the Arizona Porsche club, the MIT Club of NM, the Brookhaven College Senior Citizen group, and groups from the Enchanted Skies Star Party.



In November, we hosted three astrophotography workshops during the Festival of the Cranes conducted by the friends of the Bosque del Apache National Wildlife Refuge. By partnering with them each year, we receive the rights to use their award winning photographs.

Education and Public Outreach

STEAM Education



Socorro Composite Squadron Tours Very Large Array

By Lt. Col. David G. Finley CAP
Socorro Composite Squadron

SOCORRO, N.M. – On Oct. 27, 2018, as part of an aerospace education field trip, members of the Socorro Composite Squadron visited the Very Large Array (VLA) radio telescope, where they received an in-depth guided tour of one of the world's premier astronomical research facilities.

"The VLA is only 50 miles from Socorro, so this was a great opportunity to learn first-hand about this facility, how it works, the scientific research it does, and the career opportunities it offers," said Lt. Col. Dennis Hunter, squadron commander.

The VLA, dedicated in 1980, consists of 27 dish antennas, each weighing 230 tons, spread across the high desert of the Plains of San Agustin in west-central New Mexico. The naturally-emitted radio waves coming from celestial objects such as stars, galaxies, supernova explosions, and many others, are collected by all the antennas, then combined electronically to make the entire system work as a single, giant telescope.

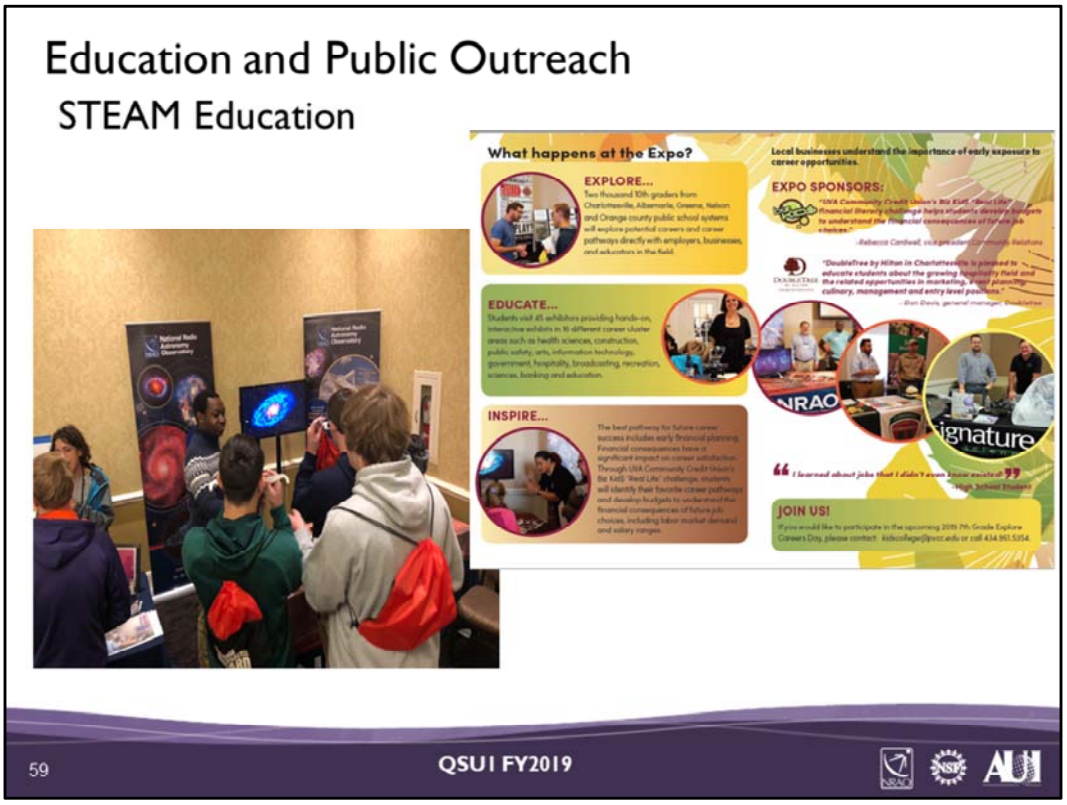
giant antennas, explanations of the electronics at the heart of the system, and a visit to the control room, where operators control the array. They learned how astronomers get to use the VLA and how they then process the data from the system to produce highly-detailed radio images of celestial objects.

"We felt it was particularly important for our cadets to learn more about this major research facility that's practically in our back yard. The staff and users of the VLA are making possible important scientific discoveries, and our cadets got to see that rewarding STEM careers can be found right here in New Mexico," Hunter said.

Also during the tour, members learned that the VLA employs not just scientists and engineers, but also technicians, mechanics, machinists, electricians, business and administrative specialists, educators, and numerous other personnel.

"This was a valuable experience for our cadets. They not only learned about astronomy and electronics, but found out that an advanced research facility like the VLA

In October, Dave Finley gave a tour to the Socorro Composite Squadron of the Civil Air Patrol and submitted this article which was published locally in the NM newsletter and in the Southwest Regional newsletter which serves six states. On 28 November, Dave Finley spoke to the NMT TC101 (Technical Communication) class about the role and function of a PIO. This was at the invitation of the professor who is head of the TC program at Tech.



Picture captions (left to right): Akeem is speaking to a group of students. NRAO is highlighted in the Expo brochure, included Bob Tracey, Akeem Wells, and Jessica Harris.

Our local STEAM crew wrangled some volunteers for the October career faire hosted by PVCC. And they featured photos of our past booths in their promotional materials. They've told us several times how much they appreciate our participation and how interactive we keep our display. I can't wait until next year when we'll have content developed for our new touch screen!

Akeem Wells and Jessica Harris participated in the annual Kids College@PVCC, 10th Grade Biz Kid$ Career Pathways Expo, on October 29th and 30th. This year's event was held at the DoubleTree by Hilton. 10th grade students from Albemarle, Charlottesville, Greene, Nelson and Orange county attended. Nearly 2,000 students from 9 high schools (Monticello, Albemarle, William Monroe, Charlottesville, Western Albemarle, Nelson County) had the opportunity to talk to over 40 employers and educators to learn about a wide range of careers and the skills and training needed to be successful. More photos from the Expo can be found on their Facebook page album:
https://www.facebook.com/pg/PVCCYouthPrograms/photos/?tab=album&album_id=2351696271524787

And last, but not least, I wanted to highlight an initiative that we have launched in partnership with ODI and the African American Teaching Fellows (AATF) to pilot "STEAM Ed. Think Tank" Program. The Think Tank will create a set of cross-curriculum scaffolded lesson plans to provide students from elementary to high school. The lesson plans will be tied to the Virginia Standards of Learning (SOLs) and Common Core standards. Pilot program is from October 15, 2018 – June 30, 2019. In October, 6 cohort members were selected.

4 are AATF fellow
1 Hampton City School Teacher
1 Boys and Girls Club STEM Specialist

NRAO

science.nrao.edu
public.nrao.edu
ngvla.nrao.edu

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