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|---------------------------|-----------------------------|-------------------------|
| <b>Title:</b> QSU3 FY2018 | <b>Author:</b> Thisdell/ADs | <b>Date:</b> 08/13/2018 |
| NRAO Doc. #:              |                             | <b>Version:</b> Final   |

## National Radio Astronomy Observatory

### Quarterly Status Update 3 FY2018

April – June 2018

| PREPARED BY  | ORGANIZATION      | DATE       |
|--------------|-------------------|------------|
| Thisdell/ADs | Director's Office | 08/13/2018 |

| APPROVALS (Name and Signature) | ORGANIZATION |
|--------------------------------|--------------|
| Nicole Thisdell                | NRAO         |
| Tony Beasley                   | NRAO         |
| Dave Curren                    | AUI          |

**NRAO Quarterly Status Update**  
**QSU3 FY2018**

| POP<br>Section | POP<br>Milestone | Milestone  | Completion<br>Date | Q1 Performance Assessment |          |       | Q2 Performance Assessment |          |       | Q3 Performance Assessment |          |       |
|----------------|------------------|--|--------------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|                |                  |  |                    | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
| 2.5            |                  | <b>Atacama Large Millimeter/submillimeter Array (ALMA)</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Operations</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | AODs in support of telescope operations in Chile   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Diagnostic support for troubleshooting issues and problems found during array operations   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 3                | Technical secretary(s) will attend the ALMA Proposal Review and Time Allocation Committee meeting  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 4                | PhIm Cognizant lead will attend the ALMA Proposal Review and Time Allocation Committee meeting   | 6/30/2018          |                           |          |       |                           |          |       | Cancelled                 |          |       |
|                | 5                | Review all the Phase 2 Scheduling Blocks submitted by PIs for ALMA Cycle 5   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 6                | Participate in CPM7  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 7                | Participate in ObsMode 7   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 8                | Participate in the planning and coordination meetings in preparation for ALMA Cycle 6 scheduled for 2018 October                                       | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 9                | SWST supporting calibration and imaging heuristic development  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 10               | Assemble the Cycle 6 Release 1 (C6R1) requirements providing support for running the Cycle 5 Pipeline on PI data                                       | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 11               | Provide Support for Running Cycle 5 Pipeline   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 12               | Testing the Cycle 6 candidate pipeline   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 13               | Lead role in testing the Cycle 6 ALMA Archive access   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 14               | Data services team will deliver on average between 20–25 datasets per week   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 15               | Phase 3 testing of the AAT/PPI   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 16               | Preparation of the Cycle 6 Call for Proposals and user documentation including all updates and edits to the ALMA science portal                        | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 17               | Act as CSs and liaisons to the NA ALMA PI observing programs   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 18               | Initiate the ALMA Ambassadors program and train the scientific community to run outreach events  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 19               | Host data reduction visitors over the FY with the goal of hosting a minimum of 12 visits   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 20               | Hold the 11th NAAASC workshop, in coordination with Taiwanese colleagues   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 21               | Sponsor a topical meeting on star and planet formation with a focus on disks to be held at the Biosphere 2 Center, Oracle, AZ.                         | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 22               | Supporting role in the organization, presentation, and development of tutorials for the 16th Synthesis Imaging Summer School to be held in Socorro, NM | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 23               | Topical meeting on galaxies and AGN to be held at the JAO in Santiago, Chile   | 6/30/2018          |                           |          |       |                           |          |       | Cancelled                 |          |       |
|                | 24               | Major corporate sponsor of the International Symposium on Molecular Spectroscopy, 18–22 June, 2018 in Champaign, IL, including the LGBTQIA reception.  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Development</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 25               | FY2018 (Cycle 5) Study Proposal Awards   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 26               | FY2018 (Cycle 5) Project Proposal Awards   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 27               | FY2017 (Cycle 4) Studies Complete  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |

**NRAO Quarterly Status Update**  
**QSU3 FY2018**

| POP Section | POP Milestone | Milestone  | Completion Date | Q1 Performance Assessment |          |       | Q2 Performance Assessment |          |       | Q3 Performance Assessment |          |       |
|-------------|---------------|--|-----------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|             |               |  |                 | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
|             |               | <b>Maintenance, Renewal, and Warranty Claims</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 28            | NA Antenna Surface Accuracy Improvement Critical Design Review   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 29            | NA Antenna Surface Accuracy Installation (25 antennas)   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 30            | Completion of Antenna Nutators Root Cause Analysis Definition of Mirror Cracking   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 31            | Antenna Nutators – Reword Cost/Benefit Analysis  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 32            | Deliver FEHVs 1 & 2 to JAO   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 33            | Deliver FEHVs 3 & 4 to JAO   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>NRAO–Chile Office</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 34            | Collective Bargaining Preparation and Negotiation  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 36            | Multicancha Project  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 37            | Key Performance Indicators   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 38            | OCA Office Move to SCO or Other Location   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 39            | Risk Register  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 40            | Environmental Work Plan  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 41            | Broadening participation of URM in STEM  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| <b>3.4</b>  |               | <b>Very Large Array</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Science Operations</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Define VLA general and shared risk capabilities to be offered for semester 2018B   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Define VLA general and shared risk capabilities to be offered for semester 2019A   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | Update VLA documentation to support 2018B Call for Proposals, perform proposal technical reviews   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | Determine baselines and pointing for antennas moving into their BnA and A configuration locations  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | Determine baselines and pointing for antennas moving into their D configuration locations  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Antenna Maintenance</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | Perform preventive maintenance on each of two transporters prior to array reconfiguration to A   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 11            | Perform preventive maintenance on each of two transporters prior to array reconfiguration to D   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Site Infrastructure Maintenance</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 15            | Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to A                          | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 16            | Perform preventive maintenance on the next configuration VLA antenna transformers prior to array reconfiguration to D                          | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Development</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 20            | Deliver Quick Look images for VLASS 1.1  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 22            | ngVLA special session at AAS   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 25            | Issue RIP for ngVLA antenna design study   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 26            | Deliver ngVLA design and development proposal  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Technical Upgrades and Enhancements</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 28            | L-band solar upgrade, install 11 additional receivers (#15 –#25) with full RF upgrade  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 30            | Ku-band solar upgrade, install five additional receivers (#14 –#18) with 20 dB switched attenuators on outputs only, no solar Tcals. Two in Q2 | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 32            | C-band thermal gap retrofits, install five additional (#21 –#25)   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 35            | Install four upgraded SCR cards in three antennas  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 36            | Build eight Servo hardware Bearing Change Kits   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Array Operations</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 37            | Develop Array Operations Succession Plan   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Observing Capability Enhancements</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 38            | Solar observing promoted from RSRO to SRO  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 39            | Solar observing promoted from SRO to GO  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 40            | Frequency averaging promoted from RSRO to SRO  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 42            | Y1 software requirements written   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 43            | P-band spectroscopy from RSRO to SRO   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |

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|----------------|------------------|---|--------------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|                |                  |   |                    | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
| 4.3            |                  | <b>Central Development Laboratory</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Repair, Maintenance, Production, Support</b>                                       |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Build and test Band 1 amplifiers  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                |                  |   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  |   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Delivery of Band 1 Local Oscillators  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Research and Development</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 3                | Band 2+ Project Closeout  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 4                | Band 2 components   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 5                | Build W-Band IRD front-end and test set   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 6                | Demonstrate reflectionless filter with active synthetic elements                      | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 7                | Revise W-band MMIC mixer and module   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
| 5.6            |                  | <b>Science Support and Research</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Telescope Time Allocation</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | CIP for Semester 2018B  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | SRP & Tech Review Process, Semester 2018B   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 5                | TAC Meeting, Semester 2018A   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 6                | TAC Meeting, Semester 2018B   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 7                | Update SW Tools Requirements for TAC Support 2018B                                    | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 8                | Update SW Tools Requirements for PST 2019A  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 9                | Update SW Tools Requirements for TAC support 2019A                                    | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 11               | Update Documentation for CIP and Tools 2018B  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 13               | SRP/TAC Process Change Decision   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 14               | TTA SW Tool Suite Requirements  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Science Ready Data Products</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 15               | SRDP Project Scientist Identified   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 16               | End of Project Initiation Phase   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 18               | SRDP Project Scope Established  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 19               | SRDP Implementation Cycle I Defined   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Scientific User Support &amp; Student Programs</b>                                 |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 20               | New DAs for VLASS Started   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 21               | Community Day Event Program Finalized   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 22               | NM Symposium  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 23               | VLA Data Reduction Workshop   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 24               | Synthesis Imaging Workshop  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 25               | CASA Validation   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 26               | CASA Guides   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 27               | CASA Validation   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 28               | CASA Guides   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 29               | Summer Student Selection and Offers   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 31               | Student Observing Support Selection (VLA)   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 32               | Student Observing Support Selection (VLA)   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 34               | Reber Predoc Selection  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Reference Services</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 36               | BiblioMetrix Implementation Decision  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 37               | Metrics Analyst Handover Complete   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 38               | PEMP and Performance Report Reviewed and Revised                                      | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                |                  | <b>Scientific Staff &amp; Jansky Fellows</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 39               | SciStaff Performance Reviews Completed  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 40               | SciStaff Promotions Reviews Completed   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 41               | Post Tenure Reviews Completed   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 42               | Jansky Lectureship Awarded  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 43               | Jansky Fellows Selection Completed  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 44               | Jansky Fellows Appointments Completed   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 45               | Review take up of engagement in observatory activities and broader skills development | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |

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|-------------|---------------|---|-----------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|             |               |   |                 | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
| 6.5         |               | <b>Data Management &amp; Software</b>                                     |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Scientific Information Services</b>                                    |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Red Hat Enterprise Linux Migration testing on workstations                | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Red Hat Enterprise Linux Migration testing on cluster nodes               | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | Installation of a CASA Parallel Test Cluster                              | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 4             | NAASC Luster replacement  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | NGAS storage migration testing  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 7             | NM Lustre software upgrade  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | Lustre storage quotas   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 9             | VLASS and SRDP support  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | External Computing Capacity Engagement                                    | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 11            | Lustre Backup   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 12            | Moab Cluster Scheduler  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>ALMA System Software</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 14            | Cycle 6 Software Release  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA System Software</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 16            | Support 2017B Observing   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 18            | Support 2018A Commissioning   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>CASA</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 20            | CASA v5.1 public release  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 21            | CASA v5.3 public release  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>CASA Pipeline</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 22            | CASA ALMA Cycle 5 pipeline release  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 23            | CASA ALMA Cycle 5 pipeline update   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>SSA</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 24            | Archive Access Tool release 3.0   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 26            | 2018B PST and 2018A OPT release   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 27            | 2018B PHT release   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 28            | 2019A PST and 2018B OPT release   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Testing</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 30            | AAT test coverage and test strategy                                       | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>ARDG</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 32            | Algorithm R&D group implementation plan                                   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 33            | Algorithm R&D Roadmap v.1   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| 7.5         |               | <b>Program Management Department</b>                                      |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>New Mexico Operations</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | NM Documentation Support  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | NM PM/SE Learning Opportunities   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | NM Proposal Development Leadership  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 4             | NM PM/SE Project Leadership   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | ngVLA PM/SE Support for Design Proposal                                   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | ngVLA PM/SE Support for ngVLA Design and Costing Antenna Concept Contract | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>LBO</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | LBO Documentation Support   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | LBO PM/SE Project Leadership  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |

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| POP Section | POP Milestone | Milestone  | Completion Date | Q1 Performance Assessment |          |       | Q2 Performance Assessment |          |       | Q3 Performance Assessment |          |       |
|-------------|---------------|--|-----------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|             |               |  |                 | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
|             |               | <b>CDL</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 11            | CDL Documentation Support  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 12            | CDL PM/SE Learning Opportunities   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 13            | CDL Proposal Development Leadership                                      | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 14            | CDL PM/SE Project Leadership   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 15            | CDL Band I CLNA Quarterly Reports  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 16            | CDL Band I CLNA Annual Report  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>ALMA Development</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 17            | ALMA-D Cycle 5 Studies Commence  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 18            | ALMA-D Cycle 5 Awarded Project Notifications                             | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 19            | ALMA-D Cycle 4 Close Out Reports Published                               | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>SRDP</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 20            | SRDP Complete Project Planning Documents                                 | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 21            | SRDP Complete Document Package for Conceptual Design Review              | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Headquarters</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 22            | PMHQ Observatory-wide Documentation Support                              | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 24            | PM/SE Training/Workshop  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 25            | PMHQ PM/SE Project Leadership  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Sport Facility at ALMA OSF</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 26            | Sport Facility at ALMA OSF Construction Contract Awarded                 | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 27            | Sport Facility at ALMA OSF JAO Design Review                             | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Mark 6 Development</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 29            | VLBA Mark 6 Development Deliver First Two Units                          | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>VLA Electrical Infrastructure Upgrade</b>                             |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 30            | VLA Electrical Infrastructure Upgrade Project Planning                   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 31            | VLA Electrical Infrastructure Upgrade Execution and M&C                  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 32            | VLA Electrical Infrastructure Upgrade Closeout                           | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| 8.5         |               | <b>Education and Public Outreach</b>                                     |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>STEAM</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Assessment of opportunities to grow the program beyond cultural exchange | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Individual learning plans for all participants                           | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | Review evaluation of 2017 RAP/NM workshop                                | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | Recruit participants for 2018 RAP/NM                                     | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 7             | Develop and administer survey about current outreach                     | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | Survey community (CV and SO) for outreach opportunities                  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 9             | Survey stakeholders to set community outreach themes                     | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | Collect published activities based on survey                             | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>News and Media Relations</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 12            | Review of other science news websites to define types of content         | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 13            | Develop new look and feel for home page                                  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 14            | Build out of new home page in WordPress                                  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 16            | Establish social media calendar  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 17            | Review of available assets   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 18            | Create blog template for NRAO blogs                                      | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 19            | Establish pool of contributors to NRAO blog                              | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |

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|-------------|---------------|---|-----------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|             |               |   |                 | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
|             |               | <b>Multimedia Engagement</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 20            | Define framework for new webpage  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 21            | Create additional ngVLA content   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 22            | Define framework for CDL virtual tour                                   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 23            | Curate archived CDL content   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 24            | Create new CDL content  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 26            | Define the framework of "the Basics"                                    | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 29            | Establishing priorities for cataloging process                          | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Visitor Center Operations</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 30            | Audit current brochures and handouts                                    | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 31            | Redesign and edit brochures for consistent look and feel                | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| <b>9.4</b>  |               | <b>Computing and Information Services</b>                               |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Migration to Microsoft Windows 10                                       | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Unix OS moved to RHEL 7   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | Service availability reports  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | Employee onboarding   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | Bi-annual network perimeter scan  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 7             | Automation of perimeter scan  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | Securing the Human and cyber security training                          | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | Tape backup replaced in NM  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 12            | Implement "Enhanced Computing Support"                                  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 13            | Computer Hardware Standards review                                      | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| <b>10.3</b> |               | <b>Office of Diversity &amp; Inclusion</b>                              |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Diversity Council</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Diversity Council Meeting   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Local and National Programs</b>                                      |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | SEDLE, LSAMP, NAC   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | RAMP-UP   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>International Programs</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | ODI Chile Undergraduate Recruiting                                      | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 7             | ODI Chile Undergrad Research Experience Initiated                       | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | NINE Program  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 9             | Diversity and Cultural Awareness Program Plan Developed and Implemented | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| <b>11.7</b> |               | <b>Human Resources</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Workforce Management</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Staff Renewal/Transition  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Training &amp; Development</b>                                       |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Observatory Leadership Cohort Training                                  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | Observatory-wide Ethics Training  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Benefits</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | Voluntary Benefits Offering   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | Electronic Enrollment (Non-Open Enrollment)                             | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Recruitment/Employment</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 7             | Review, evaluate, and report recruitment/employment metrics             | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | Development of on-line diversity resource matrix for Hiring Managers    | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 9             | Hiring Manager Training   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Human Resources</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | JAO Collective Bargaining   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>JAO Process Improvement/Employee Communications</b>                  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 11            | Review and enhance ISM On-boarding & Off-boarding process               | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 12            | Update ISM webpage and review Expatriate Allowances                     | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| <b>12.2</b> |               | <b>Science Communications</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Update NRAO Research Facilities brochure                                | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Submit 2018 AAAS science symposium proposal                             | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |

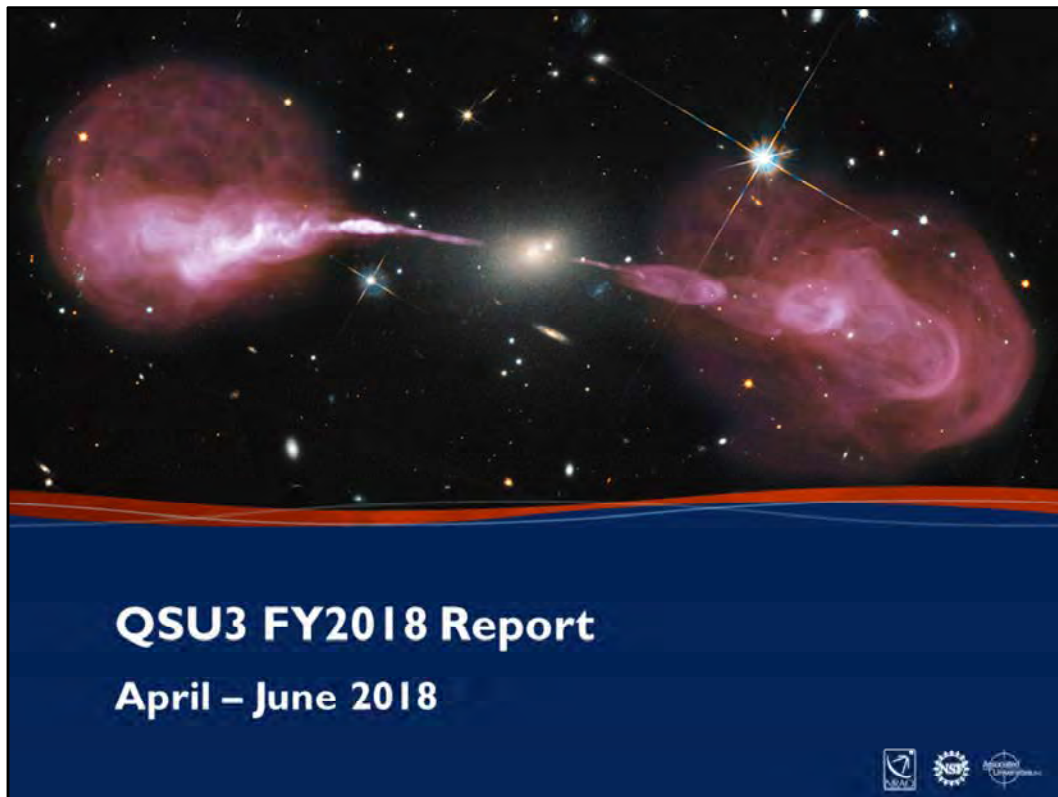
**NRAO Quarterly Status Update**  
**QSU3 FY2018**

| POP Section | POP Milestone | Milestone   | Completion Date | Q1 Performance Assessment |          |       | Q2 Performance Assessment |          |       | Q3 Performance Assessment |          |       |
|-------------|---------------|---|-----------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|             |               |   |                 | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
| 13.7        |               | <b>Administration</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Budget</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | Define scope of project and desired outcomes of budget planning tool project  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | Develop and test tool for use in budget planning  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | Develop cost estimator position requirements, job description and advertise position. Form a search committee.                      | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 4             | Cost estimator Interviews, finalist identified, offer made.   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Environmental, Safety and Security</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | Training workers on fall and equipment hazards  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | Inspection and certification of permanent building anchorages   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | Modification of policies to prohibit discouraging workers from reporting an injury or illness. Supervising training on new policies | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 9             | Procurement of new OSHA Posters   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Management Information Services</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 10            | Prepare Project Plan and Schedule for upgrade to 9.2 and order Upgrade Equipment  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 11            | Installation and preparation of new hardware and software upgrade loaded  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 12            | Testing plan prepared and used for testing and validation by users  | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 13            | JDE upgrade Go-live   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Technology Transfer Office</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 14            | Submit policies to Intellectual Property attorney for review and if required, updates   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 15            | If there are changes to the IP policies, submit them for approval to AUI Operations and Administration Committee                    | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| 14.3        |               | <b>Spectrum Management</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | WP 7D meeting   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | WP 7D meeting   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | WP 1A,1B,5A,5B,5C meetings  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 4             | CORF meeting  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
| 15.2        |               | <b>Director's Office</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>ALMA</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 1             | ALMA Board Meeting  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 2             | ALMA Director's Council   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Corporate Meetings</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 3             | AUI Board of Trustees Meetings  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 3/31/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 4             | AUI Executive Committee Meetings  | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             |               |   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             | 5             | AUI Visiting Committee Meeting  | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Science Community</b>  |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 6             | Appoint new Users Committee members   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 7             | Users Committee meeting   | 6/30/2018       |                           |          |       |                           |          |       |                           |          |       |
|             |               | <b>Management Reviews</b>   |                 |                           |          |       |                           |          |       |                           |          |       |
|             | 8             | NSF Annual Program Review   | 12/31/2017      |                           |          |       |                           |          |       |                           |          |       |
|             | 9             | All-Hands Presentations   | 3/31/2017       |                           |          |       |                           |          |       |                           |          |       |



**NRAO Quarterly Status Update**  
**QSU3 FY2018**

| POP<br>Section | POP<br>Milestone | Milestone  | Completion<br>Date | Q1 Performance Assessment |          |       | Q2 Performance Assessment |          |       | Q3 Performance Assessment |          |       |
|----------------|------------------|--|--------------------|---------------------------|----------|-------|---------------------------|----------|-------|---------------------------|----------|-------|
|                |                  |  |                    | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope | Cost                      | Schedule | Scope |
|                |                  | <b>ngVLA</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
| <b>2</b>       |                  | <b>Antenna Reference Design</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Initiate contract for the ngVLA Costed Antenna Reference Design                        | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Receipt and review of preliminary results of Costed Antenna Reference Design           | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
| <b>3</b>       |                  | <b>Education and Public Outreach</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Launch second round of ngVLA community studies   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | First draft of ngVLA Science Book complete   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 3                | Discuss ngVLA concept with local community stakeholders                                | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 4                | Conduct ngVLA science meeting  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 5                | Create new ngVLA website incorporating artwork   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
| <b>4</b>       |                  | <b>Conceptual Design &amp; Development</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Release Science Requirements document  | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Release Operations & Maintenance Concept document                                      | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 3                | Release updated System Requirements document   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 4                | Release System Architecture  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 7                | Preliminary Antenna Optical Design released  | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 8                | Receiver Noise Model released  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 9                | Receiver & Cryo Thermal Model released   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 10               | Correlator Architectural Study released  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 14               | RFI Environment projections released   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 17               | Release RFP for cryogenic development  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 18               | ASIC contract released   | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
| <b>5</b>       |                  | <b>Administration and Management</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
| <b>5.1</b>     |                  | <b>Project Office</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Complete recruitment and hiring process for open ngVLA positions                       | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Hand-over responsibilities from interim personnel to new hires                         | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
| <b>5.3</b>     |                  | <b>Project Processes and Software Tools</b>  |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Conduct a review of software solution options and determine best-fit solutions         | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
| <b>5.4</b>     |                  | <b>Cost Estimation</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Recruit Cost Estimator   | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Develop initial version of cost estimation plan and processes                          | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
| <b>5.5</b>     |                  | <b>Systems Engineering</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Provide initial versions of systems engineering process planning and documentation     | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
| <b>5.6</b>     |                  | <b>Requirements Management</b>   |                    |                           |          |       |                           |          |       |                           |          |       |
|                | 1                | Provide initial versions of Requirements Management process planning and documentation | 12/31/2017         |                           |          |       |                           |          |       |                           |          |       |
|                | 2                | Conduct Stakeholder Requirements Review (StRR)   | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 3                | Develop initial lifecycle and concept description                                      | 3/31/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 5                | Develop initial version of RVTH  | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 6                | Conduct gap analysis of stakeholder and system requirements                            | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |
|                | 7                | Draft quality processes for verification and validation plan                           | 6/30/2018          |                           |          |       |                           |          |       |                           |          |       |



## POP MILESTONE # 2.5.4

### NAASC

#### PhIm Cognizant Lead attend the APRC meeting

|   |                 |               |  |                       |
|---|-----------------|---------------|--|-----------------------|
| <b>COST:</b>                                  |                 |               | <b>SCOPE:</b>  |                       |
| Labor Actuals                                 | Expected        |               | PhIm Cognizant lead will attend the ALMA Proposal Review and Time Allocation Committee meeting in support of the ALMA/JAO proposal submission process. |                       |
| \$0   | \$0             |               |  |                       |
| Material Actuals                              | Expected        |               |  |                       |
| \$0   | \$0             |               | Milestone is cancelled   |                       |
| Travel Actuals                                | Expected        |               |  |                       |
| \$0   | \$0             |               |  |                       |
| <b>SCHEDULE:</b>                              |                 |               | <b>RISK &amp; MITIGATION:</b>  |                       |
| <b>Milestone</b>                              | <b>Schedule</b> | <b>Target</b> | <b>Risk</b>  | <b>Mitigation</b>     |
| I PhIm Cognizant Lead attend the APRC meeting | 06/31/2018      | Canceled      | I Cannot complete this milestone in Q3   | No mitigation needed. |

**COST:** There is no cost associated with the milestone except for travel expenses of the staff member.

**SCOPE:** The PhIm Cognizant Lead (CL) at the North American ARC is an expert in the tools and workflow necessary to run the ALMA proposal review process. Every year, the PhIm CL attends the review meeting to support ALMA and the JAO in the process.

**SCHEDULE:** The ALMA proposal review took place in FY18 Q3 but the CL could not attend because they were on medical leave from NRAO during that time. Milestone is being cancelled

**RISK & MITIGATION:** There is no risk associated with missing this milestone but the JAO did have to find additional support to assist in running the meeting.

## POP MILESTONE # 2.5.23

### NAASC

#### Support a topical meeting on Galaxies and AGN

|                                       |            |           |  |                                      |
|---------------------------------------|------------|-----------|--|--------------------------------------|
| <b>COST:</b>                          |            |           | <b>SCOPE:</b>  |                                      |
| Labor Actuals                         | Expected   |           | The North American ARC has always helped support scientific conferences in NA and in Chile. This would be a NAASC-supported topical meeting on the subject of galaxies and AGN to be held at the JAO in Santiago, Chile. |                                      |
| \$0                                   | \$0        |           |  |                                      |
| Material Actuals                      | Expected   |           |  |                                      |
| \$0                                   | \$0        |           | Milestone is cancelled and rescheduled in FY2019 POP.  |                                      |
| Travel Actuals                        | Expected   |           |  |                                      |
| \$0                                   | \$0        |           |  |                                      |
| <b>SCHEDULE:</b>                      |            |           | <b>RISK &amp; MITIGATION:</b>  |                                      |
| Milestone                             | Schedule   | Target    | Risk   | Mitigation                           |
| I Topical Meeting on Galaxies and AGN | 06/31/2018 | Cancelled | I Cannot complete this milestone in Q3   | Support the meeting in Q1 of FY2019. |

3

QSU 3 FY2018



**COST:** There is no net cost savings because support of the meeting will transfer to FY2019.

**SCOPE:** The North American ARC has always helped support scientific conferences in NA and in Chile. This would be a NAASC-supported topical meeting on the subject of galaxies and AGN to be held at the JAO in Santiago, Chile.

**SCHEDULE:** The meeting date has changed from Q3 FY2018 to Q1 FY2019.

**RISK & MITIGATION:** There is no risk associated with missing this milestone as the date of the meeting has been rescheduled for Q1 FY2019. This is included in the FY2019 POP.

## POP MILESTONE # 2.5.27

### ALMA Development

FY2017 (Cycle 4) Studies Complete



|                     |           |           |   |            |
|---------------------|-----------|-----------|---|------------|
| <b>COST:</b>        |           |           | <b>SCOPE:</b>   |            |
| Labor Actuals       | Expected  |           | No change to scope. All ongoing Cycle 4 Studies are operating under approved change requests. |            |
| \$                  | \$        |           |   |            |
| Material Actuals    | Expected  |           |   |            |
| \$                  | \$        |           |   |            |
| Travel Actuals      | Expected  |           | <b>RISK &amp; MITIGATION:</b>   |            |
| \$                  | \$        |           |   |            |
| <b>SCHEDULE:</b>    |           |           |   |            |
| Milestone           | Schedule  | Target    | Risk  | Mitigation |
| I Reports Published | 3/31/2018 | 9/30/2018 | I No impact   |            |

4

QSU 3 FY2018



COST: No impact.

SCOPE: No impact.

SCHEDULE: Prototype of a Complete Dual-Linear 2SB Block and Single-Polarization Balanced 2 SB Block: 9/30/2018

Diversifying the Scientific Applications of the ALMA Phasing System: 9/30/2018

RISK & MITIGATION: No impact.

| POP MILESTONE # 2.5.28                    |            |   |  | <div>Cost</div> <div>Schedule</div> <div>Scope</div>  |  |
|---|------------|---|--|---|--|
| Maintenance, Renewal, and Warranty Claims |            |   |  |   |  |
| Antenna Surface Accuracy Improvement CDR  |            |   |  |   |  |
| <b>COST:</b>                              |            | <b>SCOPE:</b>   |  |   |  |
| Labor Actuals                             | Expected   | Conduct a CDR for the proposed Receiver Cabin Wall Heater System to confirm satisfactory performance for resolving the Antenna surface thermal dependence issue. The CDR should also address impacts on existing antenna systems, any heater system design/hardware changes prior to installation on all NA antennas, and proposed schedule for installation on the remaining antennas. |  |   |  |
| \$0                                       | \$0        |   |  |   |  |
| Material Actuals                          | Expected   |   |  |   |  |
| \$0                                       | \$0        |   |  |   |  |
| Travel Actuals                            | Expected   |   |  |   |  |
| \$0                                       | \$0        |   |  |   |  |
| <b>SCHEDULE:</b>                          |            | <b>RISK &amp; MITIGATION:</b>   |  |   |  |
| Milestone                                 | Schedule   | Target  | Risk                                   | Mitigation  |  |
| I Conduct Wall Heater System CDR          | 12/31/2017 | 9/27/2018   | I Cannot complete this milestone in Q4 | Correct heater system design deficiencies and test corrective actions prior to proceeding to CDR. |  |

**COST:** The vendor is responsible for resolving this issue.

**SCOPE:** The root cause of the surface accuracy behavior has been traced to local temperature variations in the antenna receiver cabin wall that generate mechanical strain (due to thermal expansion/contraction) which is transferred through the antenna back-up structure (BUS) and imprinted on the reflecting surface of the dish. The antenna contractor, Vertex Antennentechnik, GmbH, has developed a mitigation system consisting of thermostatically controlled wall heaters that may be adjusted to maintain more uniform wall temperature and a corresponding stable surface rms versus ambient temperature. This concept was tested via astro-holography and thermocouple readings during FY2017 on four antennas (DV06, DV09, DVI4, and DV25). The planned CDR is meant to confirm the heater system's ability to improve the overall antenna surface thermal performance, identify any impacts to other antenna systems, and identify any design and/or hardware changes prior to installation on the remaining NA antennas.

**SCHEDULE:** The installation of thermal sensor upgrades was completed in mid-March 2018 and a HVAC system operational verification, which included replacement of the failed wall heater pad on DVI4, was completed in early April 2018. Subsequent analysis and verification of performance data on the three fully operational wall heater systems (DV09, DVI4, & DV25) appears to indicate more uniform and stabilized (in terms of diurnal variations) Receiver Cabin wall temperatures. However, when the wall heaters were powered off, analysis and evaluation of the cold wall thermal data indicated inconsistencies with the previously collected wall temperature data which indicated potential temperature mixing with the cabin air temperature. As a result, Vertex opted to apply additional insulation over the wall sensor locations. Unfortunately, this proposed insulation installation could not be coordinated prior to the planned mid-Q3 (23 May) Delta CDR. Sensor insulation application was completed on 11 July and we are now trying to coordinate with ALMA JAO to conduct an additional series of winter-weather holography surface accuracy measurements in order to conclude the assessment of the wall heater and thermal sensor operation. It is likely that it will take JAO 4-6 weeks to coordinate this holography with normal Science Observations; as a result we will move the planned date for the Delta CDR to 27 September 2018.

**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 # 2.5.29   |           |  |  | Cost  |
|--|-----------|--|--|---|
| Maintenance, Renewal, and Warranty Claims                        |           |  |  | Schedule  |
| Antenna Surface Accuracy Installation (25 antennas)              |           |  |  | Scope   |
| <b>COST:</b>   |           | <b>SCOPE:</b>  |  |   |
| Labor Actuals  | Expected  | Following the successful completion of the Antenna Surface Accuracy Improvement CDR (POP Milestone #28), Vertex to schedule and conduct Wall Heater System installation on all 25 NA antennas which will resolve the thermally induced surface accuracy issue on each antenna. |  |   |
| \$0  | \$0       |  |  |   |
| Material Actuals   | Expected  |  |  |   |
| \$0  | \$0       |  |  |   |
| Travel Actuals   | Expected  | <b>RISK &amp; MITIGATION:</b>  |  |   |
| \$0  | \$0       |  |  |   |
| <b>SCHEDULE:</b>   |           |  |  |   |
| Milestone  | Schedule  | Target   | Risk   | Mitigation  |
| I Complete Wall Heater System Upgrade Installation (25 Antennas) | 3/31/2018 | 4/4/2019   | I Cannot complete this milestone in Q3 FY2019. | Work with Vertex to resolve Antenna installation scheduling issues. |

**COST:** The vendor is responsible for resolving this issue.

**SCOPE:** The root cause of the surface accuracy behavior has been traced to local temperature variations in the antenna receiver cabin wall that generate mechanical strain (due to thermal expansion/contraction) which is transferred through the antenna back-up structure (BUS) and imprinted on the reflecting surface of the dish. The antenna contractor, Vertex Antennentechnik, GmbH, has developed a mitigation system consisting of thermostatically-controlled wall heaters that may be adjusted to maintain more uniform wall temperature and a corresponding stable surface rms versus ambient temperature. This concept was tested via astrophotography and thermocouple readings during FY2017 on four antennas (DV06, DV09, DV14, and DV25). The planned CDR is meant to confirm the heater system's ability to improve the overall antenna surface thermal performance, identify any impacts to other antenna systems, and identify any design and/or hardware changes prior to installation on the remaining N.A. antennas.

**SCHEDULE:** Scheduling of the installation of the proposed wall heater system to correct the identified thermally induced surface accuracy issue on the 25 NA antennas is dependent on the successful completion of the Wall Heater System (Delta) CDR now scheduled for late Q4 (27 September) which would then be followed by the establishing the system installation schedule for the remaining N.A. antennas. Wall Heater System installation, including hardware procurement, spares development, and antenna documentation (associated drawings and maintenance manuals) revisions, is expected to require roughly seven months with a projected completion date of 04 April 2019; noting that this schedule is contingent on ALMA JAO providing unlimited access to the antennas during this period.

**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 # 2.5.32                    |            |  |   | <div>Cost</div> <div>Schedule</div> <div>Scope</div>                                 |  |
|---|------------|--|---|--|--|
| Maintenance, Renewal, and Warranty Claims |            |  |   |  |  |
| Deliver FEHVs 1 & 2 to JAO                |            |  |   |  |  |
| COST:                                     |            | SCOPE:   |   |  |  |
| Labor Actuals                             | Expected   | Execute FEHV Part mass reduction changes; reassemble Units; verify and test assembled Units; conduct delta-PAS; and deliver Units to ALMA JAO. |   |  |  |
| \$0                                       | \$0        |  |   |  |  |
| Material Actuals                          | Expected   |  |   |  |  |
| \$0                                       | \$0        |  |   |  |  |
| Travel Actuals                            | Expected   |  |   |  |  |
| \$0                                       | \$0        |  |   |  |  |
| SCHEDULE:                                 |            | RISK & MITIGATION:   |   |  |  |
| Milestone                                 | Schedule   | Target   | Risk  | Mitigation   |  |
| 1 Deliver FEHVs 1 & 2 to JAO              | 03/31/2018 | 1/12/2019  | 1 Mass of the FEV cannot be reduced to acceptable value | Review parts for additional mass reductions; request waiver from JAO if unsuccessful |  |
|   |            |  | 2 Cannot complete this milestone in Q2-FY2019           | Work with Contractor to resolve FEHV scheduling issues                               |  |

COST: No impact.

SCOPE: No impact.

SCHEDULE: Measurement of the total mass of Unit #1 at PAS revealed that the upgraded unit was ~35kg over the mass limit of the FEHV Technical Specification (and would exceed weight limit of FESV Access Ramps). Suitable Part weight reductions have been identified (~38kg) and incorporated into FEHV Drawings. Evaluation of the necessary Part changes is currently underway by Chilean FEHV Contractor (evaluation was delayed by the death of the Owner of the Company) with some implementations completed. Expected that part changes and re-assembly to proceed in sequence (serially) for each FEHV.

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 # 2.5.33                    |            |  |   | <div>Cost</div> <div>Schedule</div> <div>Scope</div>                                 |  |
|---|------------|--|---|--|--|
| Maintenance, Renewal, and Warranty Claims |            |  |   |  |  |
| Deliver FEHVs 3 & 4 to JAO                |            |  |   |  |  |
| COST:                                     |            | SCOPE:   |   |  |  |
| Labor Actuals                             | Expected   | Execute FEHV Part mass reduction changes; reassemble Units; verify and test assembled Units; conduct delta-PAS; and deliver Units to ALMA JAO. |   |  |  |
| \$0                                       | \$0        |  |   |  |  |
| Material Actuals                          | Expected   |  |   |  |  |
| \$0                                       | \$0        |  |   |  |  |
| Travel Actuals                            | Expected   |  |   |  |  |
| \$0                                       | \$0        |  |   |  |  |
| SCHEDULE:                                 |            | RISK & MITIGATION:   |   |  |  |
| Milestone                                 | Schedule   | Target   | Risk  | Mitigation   |  |
| 1 Deliver FEHVs 3 & 4 to JAO              | 06/23/2018 | 7/31/2019  | 1 Mass of the FEV cannot be reduced to acceptable value | Review parts for additional mass reductions; request waiver from JAO if unsuccessful |  |
|   |            |  | 2 Cannot complete this milestone in Q4-FY2019           | Work with Contractor to resolve FEHV scheduling issues.                              |  |

COST: No impact.

SCOPE: No impact.

SCHEDULE: Measurement of the total mass of Unit #1 at PAS revealed that the upgraded unit was ~35kg over the mass limit of the FEHV Technical Specification (and would exceed weight limit of FESV Access Ramps). Suitable Part weight reductions have been identified (~38kg) and incorporated into FEHV Drawings. Evaluation of the necessary Part changes is currently underway by Chilean FEHV Contractor (evaluation was delayed by the death of the Owner of the Company) with some implementations completed. Expected that part changes and re-assembly to proceed in sequence (serially) for each FEHV.

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 # 3.4.36

### VLA Technical Upgrades and Enhancements

Build eight Servo hardware bearing change kits

Cost

Schedule

Scope

|   |          |         |   |  |
|---|----------|---------|---|--|
| COST:                                   |          |         | SCOPE:  |  |
| Labor Actuals                           | Expected |         | Fabricate and kit all equipment needed by VLA Servo/Fiber group to support antenna bearing changes during future overhauls. |  |
| \$                                      | \$       |         |   |  |
| Material Actuals                        | Expected |         |   |  |
| \$                                      | \$       |         |   |  |
| Travel Actuals                          | Expected |         |   |  |
| \$                                      | \$       |         |   |  |
| SCHEDULE:                               |          |         | RISK & MITIGATION:  |  |
| Milestone                               | Schedule | Target  | Risk  | Mitigation   |
| I Build eight Servo bearing change kits | 06/30/18 | 9/30/18 | I Delayed installation of hardware on antennas during bearing changes.  | Build kits well ahead of schedule. These are not needed for over a year. |

9

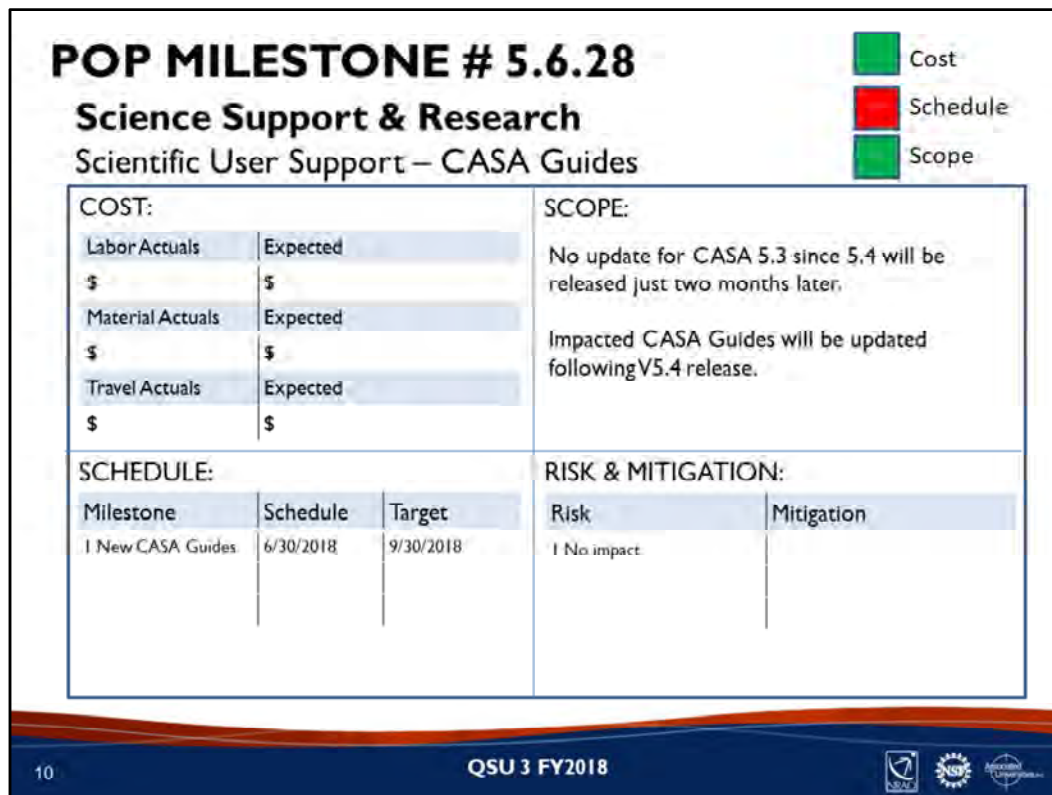
QSU 3 FY2018

COST: No impact.

SCOPE: Fabricate and kit all equipment such as cabling, junction boxes, and interconnects needed by VLA Servo/Fiber group to replace items removed or cut during antenna bearing changes

SCHEDULE: Staff shortage due to injury and focus on ACU overhauls led to this work beginning too late to meet original target of June 2018. Kits will be created and done by end of September 2018.

RISK & MITIGATION: There is little risk to this effort as these kits will be used to support the bearing changes on the final eight antennas. Kits for the next two years' worth of changes were already made and delivered.



**COST:** No impact.

**SCOPE:** Plan was to update CASA Guides following release of V5.3, but that release was delayed and now V5.4 is expected to be released just two months later. Guides will not be updated for V5.3, but will be updated for V5.4.

**SCHEDULE:** Slip by approximately two months, provided V5.4 is released as planned in September 2018.

**RISK & MITIGATION:** No impact.

## POP MILESTONE # 6.5.23

### DMS

#### CASA Pipeline update (CASA 5.2)

Cost

Schedule

Scope

| <b>COST:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td colspan="2" style="padding: 2px;"><i>DMS funds this activity at a higher WBS level.</i></td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table> |            |           | Labor Actuals | Expected | <i>DMS funds this activity at a higher WBS level.</i> |                                   | Material Actuals | Expected | \$  | \$        | Travel Actuals | Expected   | \$ | \$   | <b>SCOPE:</b><br>Provide parallelized imaging in the pipeline to further increase throughput. |             |  |
|--|------------|-----------|---------------|----------|---|-----------------------------------|------------------|----------|---|-----------|----------------|--|----|------|---|-------------|--|
| Labor Actuals  | Expected   |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| <i>DMS funds this activity at a higher WBS level.</i>  |            |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| Material Actuals   | Expected   |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| \$   | \$         |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| Travel Actuals   | Expected   |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| \$   | \$         |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| <b>SCHEDULE:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;">Milestone</th> <th style="width: 20%;">Schedule</th> <th style="width: 10%;">Target</th> </tr> <tr> <td>1 Software delivered and verified</td> <td>Q2 FY2018</td> <td>Complete</td> </tr> <tr> <td>2 Software validated and delivered to ALMA Operations</td> <td>Q2 FY2018</td> <td>9/30/2018</td> </tr> </table>  |            |           | Milestone     | Schedule | Target  | 1 Software delivered and verified | Q2 FY2018        | Complete | 2 Software validated and delivered to ALMA Operations | Q2 FY2018 | 9/30/2018      | <b>RISK &amp; MITIGATION:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Risk</th> <th style="width: 50%;">Mitigation</th> </tr> <tr> <td>1 No impact</td> <td></td> </tr> </table> |    | Risk | Mitigation  | 1 No impact |  |
| Milestone  | Schedule   | Target    |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| 1 Software delivered and verified  | Q2 FY2018  | Complete  |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| 2 Software validated and delivered to ALMA Operations  | Q2 FY2018  | 9/30/2018 |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| Risk   | Mitigation |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |
| 1 No impact  |            |           |               |          |   |                                   |                  |          |   |           |                |  |    |      |   |             |  |

11
QSU 3 FY2018

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

**SCOPE:** Provide parallelized imaging in the pipeline to further increase throughput.

**SCHEDULE:** The pipeline update with improved performance through parallelization was delivered on schedule. The Pipeline Working Group (PLWG) along with ALMA Operations determined that the update wasn't critical given that the computer execution time is <10% of the delivery time, so it will be validated as part of the V5.4 release in September.

**RISK & MITIGATION:** No impact.

## POP MILESTONE # 6.5.33

### DMS

#### ARDG Roadmap v I

Cost

Schedule

Scope

| <b>COST:</b><br><table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Labor Actuals</td> <td style="width: 70%;">Expected</td> </tr> <tr> <td colspan="2"><i>DMS funds this activity at a higher WBS level.</i></td> </tr> <tr> <td>Material Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> <tr> <td>Travel Actuals</td> <td>Expected</td> </tr> <tr> <td>\$</td> <td>\$</td> </tr> </table> |            |           | Labor Actuals | Expected | <i>DMS funds this activity at a higher WBS level.</i> |                 | Material Actuals | Expected  | \$       | \$ | Travel Actuals | Expected  | \$ | \$   | <b>SCOPE:</b><br>Develop the first version of a long-term roadmap for ARDG. |             |  |
|---|------------|-----------|---------------|----------|---|-----------------|------------------|-----------|----------|----|----------------|---|----|------|---|-------------|--|
| Labor Actuals   | Expected   |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| <i>DMS funds this activity at a higher WBS level.</i>   |            |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| Material Actuals  | Expected   |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| \$  | \$         |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| Travel Actuals  | Expected   |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| \$  | \$         |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| <b>SCHEDULE:</b><br><table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;">Milestone</th> <th style="width: 20%;">Schedule</th> <th style="width: 50%;">Target</th> </tr> <tr> <td>1 Draft Roadmap</td> <td>Q3</td> <td>Completed</td> </tr> <tr> <td>2 Review</td> <td>Q3</td> <td>9/30/2018</td> </tr> </table>  |            |           | Milestone     | Schedule | Target  | 1 Draft Roadmap | Q3               | Completed | 2 Review | Q3 | 9/30/2018      | <b>RISK &amp; MITIGATION:</b><br><table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Risk</th> <th style="width: 50%;">Mitigation</th> </tr> <tr> <td>1 No impact</td> <td></td> </tr> </table> |    | Risk | Mitigation  | 1 No impact |  |
| Milestone   | Schedule   | Target    |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| 1 Draft Roadmap   | Q3         | Completed |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| 2 Review  | Q3         | 9/30/2018 |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| Risk  | Mitigation |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |
| 1 No impact   |            |           |               |          |   |                 |                  |           |          |    |                |   |    |      |   |             |  |

12
QSU 3 FY2018

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

**SCOPE:** ARDG Roadmap VI

**SCHEDULE:** A draft roadmap has been created and is awaiting review. B. Glendenning, consulting with SSR, NM Ops, and ALMA ADs, will appoint a committee to review this document, and annually thereafter.

**RISK & MITIGATION:** No impact.

## POP MILESTONE # 7.5.19

### Program Management Department

#### ALMA-D Cycle 4 Close Out Reports Published



|                     |                 |               |   |                   |
|---------------------|-----------------|---------------|---|-------------------|
| <b>COST:</b>        |                 |               | <b>SCOPE:</b>   |                   |
| Labor Actuals       | Expected        |               | No change to scope. All ongoing Cycle 4 Studies are operating under approved change requests. |                   |
| \$                  | \$              |               |   |                   |
| Material Actuals    | Expected        |               |   |                   |
| \$                  | \$              |               |   |                   |
| Travel Actuals      | Expected        |               | <b>RISK &amp; MITIGATION:</b>   |                   |
| \$                  | \$              |               |   |                   |
| <b>SCHEDULE:</b>    |                 |               |   |                   |
| <b>Milestone</b>    | <b>Schedule</b> | <b>Target</b> | <b>Risk</b>   | <b>Mitigation</b> |
| I Reports published | 3/31/2018       | 9/30/2018     | I No impact   |                   |

13

QSU 3 FY2018



COST: No impact.

SCOPE: No impact.

SCHEDULE:

Prototype of a Complete Dual-Linear 2SB Block and Single-Polarization Balanced 2 SB Block:  
9/30/2018

Diversifying the Scientific Applications of the ALMA Phasing System: 9/30/2018

RISK & MITIGATION: No impact.

## POP MILESTONE # 7.5.32

### Program Management Department

#### VLA Electrical Infrastructure Upgrade Closeout

Cost

Schedule

Scope

| <b>COST:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 2px;">Labor Actuals</td> <td style="padding: 2px;">Expected</td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$</td> </tr> <tr> <td style="padding: 2px;">Material Actuals</td> <td style="padding: 2px;">Expected</td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$</td> </tr> <tr> <td style="padding: 2px;">Travel Actuals</td> <td style="padding: 2px;">Expected</td> </tr> <tr> <td style="padding: 2px;">\$</td> <td style="padding: 2px;">\$</td> </tr> </table> |            |          | Labor Actuals | Expected | \$     | \$                          | Material Actuals | Expected | \$   | \$ | Travel Actuals | Expected   | \$          | \$ | <b>SCOPE:</b><br>No impact |  |
|---|------------|----------|---------------|----------|--------|-----------------------------|------------------|----------|--|----|----------------|------------|-------------|----|----------------------------|--|
| Labor Actuals   | Expected   |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| \$  | \$         |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| Material Actuals  | Expected   |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| \$  | \$         |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| Travel Actuals  | Expected   |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| \$  | \$         |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| <b>SCHEDULE:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; padding: 2px;">Milestone</th> <th style="width: 20%; padding: 2px;">Schedule</th> <th style="width: 20%; padding: 2px;">Target</th> </tr> <tr> <td style="padding: 2px;">I Complete Project Closeout</td> <td style="padding: 2px;">06/30/18</td> <td style="padding: 2px;">09/30/18</td> </tr> </table>  |            |          | Milestone     | Schedule | Target | I Complete Project Closeout | 06/30/18         | 09/30/18 | <b>RISK &amp; MITIGATION:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; padding: 2px;">Risk</th> <th style="width: 50%; padding: 2px;">Mitigation</th> </tr> <tr> <td style="padding: 2px;">I No impact</td> <td></td> </tr> </table> |    | Risk           | Mitigation | I No impact |    |                            |  |
| Milestone   | Schedule   | Target   |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| I Complete Project Closeout   | 06/30/18   | 09/30/18 |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| Risk  | Mitigation |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |
| I No impact   |            |          |               |          |        |                             |                  |          |  |    |                |            |             |    |                            |  |

14
QSU 3 FY2018

COST: No impact.

SCOPE: No impact.

SCHEDULE: Delays in production and shipping of major equipment have impacted the installation schedule. The new ETA for receipt of the Switchgear is 07/13/18, with installation happening soon thereafter and handover from contractor GTI to VLA Operations on 07/18/18. Additional site work will continue after restoration of site power, with the expected end of the project in late August 2018. Procurement and Project closeout are planned for mid-late September.

RISK & MITIGATION: No impact.



## POP MILESTONE # 8.5.24

### EPO

Create new CDL content

Cost
  Schedule
  Scope

| <b>COST:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table>  |            |           | Labor Actuals | Expected | \$     | \$                    | Material Actuals | Expected  | \$                                    | \$ | Travel Actuals | Expected                   | \$ | \$        | <b>SCOPE:</b><br>No impact   |  |      |            |             |  |
|--|------------|-----------|---------------|----------|--------|-----------------------|------------------|-----------|---------------------------------------|----|----------------|----------------------------|----|-----------|--|--|------|------------|-------------|--|
| Labor Actuals  | Expected   |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| \$   | \$         |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| Material Actuals   | Expected   |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| \$   | \$         |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| Travel Actuals   | Expected   |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| \$   | \$         |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| <b>SCHEDULE:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 20%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 20%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Hire new Sci Writer</td> <td style="border-bottom: 1px solid black;"></td> <td style="border-bottom: 1px solid black;">9/30/2018</td> </tr> <tr> <td style="border-bottom: 1px solid black;">2 Write new scripts for the framework</td> <td style="border-bottom: 1px solid black;"></td> <td style="border-bottom: 1px solid black;">1/31/2019</td> </tr> <tr> <td style="border-bottom: 1px solid black;">3 Create new video content</td> <td style="border-bottom: 1px solid black;"></td> <td style="border-bottom: 1px solid black;">Q3 FY2019</td> </tr> </table> |            |           | Milestone     | Schedule | Target | 1 Hire new Sci Writer |                  | 9/30/2018 | 2 Write new scripts for the framework |    | 1/31/2019      | 3 Create new video content |    | Q3 FY2019 | <b>RISK &amp; MITIGATION:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 No impact</td> <td style="border-bottom: 1px solid black;"></td> </tr> </table> |  | Risk | Mitigation | 1 No impact |  |
| Milestone  | Schedule   | Target    |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| 1 Hire new Sci Writer  |            | 9/30/2018 |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| 2 Write new scripts for the framework  |            | 1/31/2019 |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| 3 Create new video content   |            | Q3 FY2019 |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| Risk   | Mitigation |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |
| 1 No impact  |            |           |               |          |        |                       |                  |           |                                       |    |                |                            |    |           |  |  |      |            |             |  |

15
QSU 3 FY2018

COST: No impact.

SCOPE: No impact.

SCHEDULE: This was intended to be video content for a CDL Explorer on the public website, however the scripts were inadequate, so this project is on hold until a new science writer can be hired. It will put a full year delay on the project.

RISK & MITIGATION: No impact.



# POP MILESTONE # 11.7.6

## Human Resources

Partner with Benefits and MIS to create electronic process for new hire benefit enrollment

|                              |                 |               |                               |                   |
|------------------------------|-----------------|---------------|-------------------------------|-------------------|
| <b>COST:</b>                 |                 |               | <b>SCOPE:</b>                 |                   |
| Labor Actuals                | Expected        |               | Milestone cancelled           |                   |
| \$                           | \$              |               |                               |                   |
| Material Actuals             | Expected        |               |                               |                   |
| \$                           | \$              |               |                               |                   |
| Travel Actuals               | Expected        |               |                               |                   |
| \$                           | \$              |               |                               |                   |
| <b>SCHEDULE:</b>             |                 |               | <b>RISK &amp; MITIGATION:</b> |                   |
| <b>Milestone</b>             | <b>Schedule</b> | <b>Target</b> | <b>Risk</b>                   | <b>Mitigation</b> |
| I Benefit enrollment process | 6/30/2018       | none          | I No impact                   |                   |

16

QSU 3 FY2018



COST: No impact.

SCOPE: No impact.

SCHEDULE: HR included this goal in FY2017 and FY2018. The completion of this goal is contingent on the availability of MIS staff and their multiple priorities. Due to staff retirement and a departure of the replacement, there were very limited resources to work on this goal. Milestone is being cancelled at this time.

RISK & MITIGATION: No impact.

## POP MILESTONE # 13.7.2

### Budget & Administration

Develop and test tool for use in budget planning

Cost

Schedule

Scope

| <b>COST:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table> |   |           | Labor Actuals | Expected | \$     | \$                    | Material Actuals | Expected  | \$   | \$ | Travel Actuals | Expected   | \$                               | \$  | <b>SCOPE:</b><br>Build out budget tool combining JDE info and assumptions for use in forecasting, long range budget planning, and budget development. |  |  |
|---|---|-----------|---------------|----------|--------|-----------------------|------------------|-----------|--|----|----------------|------------|----------------------------------|---|---|--|--|
| Labor Actuals   | Expected  |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| \$  | \$  |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| Material Actuals  | Expected  |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| \$  | \$  |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| Travel Actuals  | Expected  |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| \$  | \$  |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| <b>SCHEDULE:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 30%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 40%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Develop &amp; test tool</td> <td style="border-bottom: 1px solid black;">6/30/2018</td> <td style="border-bottom: 1px solid black;">2/28/2019</td> </tr> </table>  |   |           | Milestone     | Schedule | Target | 1 Develop & test tool | 6/30/2018        | 2/28/2019 | <b>RISK &amp; MITIGATION:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Availability of staff resource</td> <td style="border-bottom: 1px solid black;">Manage work assignments/adjust deliverable date</td> </tr> </table> |    | Risk           | Mitigation | 1 Availability of staff resource | Manage work assignments/adjust deliverable date |   |  |  |
| Milestone   | Schedule  | Target    |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| 1 Develop & test tool   | 6/30/2018                                       | 2/28/2019 |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| Risk  | Mitigation                                      |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |
| 1 Availability of staff resource  | Manage work assignments/adjust deliverable date |           |               |          |        |                       |                  |           |  |    |                |            |                                  |   |   |  |  |

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QSU 3 FY2018

COST: No Impact.

SCOPE: No Impact.

**SCHEDULE:** This project is vulnerable to the availability of the Sr. Business Systems Analyst. During the key work period for this project, that resource was diverted into responding to various audit requests from USNO and NSF in addition to having some unforeseen other commitments.

**RISK & MITIGATION:** Continued risk of resource diversion. Need to be aggressive with making progress when time is available. Upcoming ALMA audit materials are well organized and should enable quick access if/when those requests materialize, limiting the potential disruption from that source.

## POP MILESTONE #13.7.13

### Administration - MIS

#### JDE Upgrade Go-Live

Cost

Schedule

Scope

| <b>COST:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table> |   |                       | Labor Actuals | Expected | \$     | \$                          | Material Actuals | Expected              | \$   | \$ | Travel Actuals | Expected   | \$                                       | \$  | <b>SCOPE:</b><br>JDE Version 9.2 installed and functioning |  |  |
|---|---|-----------------------|---------------|----------|--------|-----------------------------|------------------|-----------------------|--|----|----------------|------------|--|---|--|--|--|
| Labor Actuals   | Expected  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| \$  | \$  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| Material Actuals  | Expected  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| \$  | \$  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| Travel Actuals  | Expected  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| \$  | \$  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| <b>SCHEDULE:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;">Milestone</th> <th style="width: 20%;">Schedule</th> <th style="width: 20%;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I Installed and Functioning</td> <td style="border-bottom: 1px solid black;">June Q3</td> <td style="border-bottom: 1px solid black;">Go-Live July 27, 2018</td> </tr> </table>  |   |                       | Milestone     | Schedule | Target | I Installed and Functioning | June Q3          | Go-Live July 27, 2018 | <b>RISK &amp; MITIGATION:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Risk</th> <th style="width: 50%;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">I Go-Live delay if testing not completed</td> <td style="border-bottom: 1px solid black;">Testing task progress follow-up and alternate go-live date of August 10, 2018</td> </tr> </table> |    | Risk           | Mitigation | I Go-Live delay if testing not completed | Testing task progress follow-up and alternate go-live date of August 10, 2018 |  |  |  |
| Milestone   | Schedule  | Target                |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| I Installed and Functioning   | June Q3   | Go-Live July 27, 2018 |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| Risk  | Mitigation  |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |
| I Go-Live delay if testing not completed  | Testing task progress follow-up and alternate go-live date of August 10, 2018 |                       |               |          |        |                             |                  |                       |  |    |                |            |  |   |  |  |  |

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**COST:** No impact.

**SCOPE:** JDE Version 9.2 installed and functioning.

**SCHEDULE:** Although the JDE Version 9.2 was installed and functioning on schedule in Q3, this was only for development and testing environments. Production go-live is scheduled for the weekend of July 27, 2018.

**RISK & MITIGATION:** Backup go-live date is August 10, 2018. Go-live dates are in coordination with payroll schedules.

## POP MILESTONE # 3.5

### ngVLA Education & Public Outreach

Create new ngVLA website incorporating artwork



|  |                 |                |  |                               |
|--|-----------------|----------------|--|-------------------------------|
| <b>COST:</b>                                     |                 |                | <b>SCOPE:</b>  |                               |
| Labor Actuals                                    | Expected        |                | A new public ngVLA website, which updates project messaging and incorporates the artwork created by visiting artists during the July 2017 workshop in Socorro, is scheduled to be launched in Q3 18. |                               |
| \$   | \$              |                |  |                               |
| Material Actuals                                 | Expected        |                |  |                               |
| \$   | \$              |                |  |                               |
| Travel Actuals                                   | Expected        |                | <b>RISK &amp; MITIGATION:</b>  |                               |
| \$   | \$              |                |  |                               |
| <b>SCHEDULE:</b>                                 |                 |                | <b>Risk</b>  | <b>Mitigation</b>             |
| <b>Milestone</b>                                 | <b>Schedule</b> | <b>Target</b>  |  |                               |
| I Create new ngVLA website incorporating artwork | 6/30/2018       | Launch 7/24/18 | I Stagnant communications provided to the public.  | Launch website when approved. |

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QSU 3 FY2018

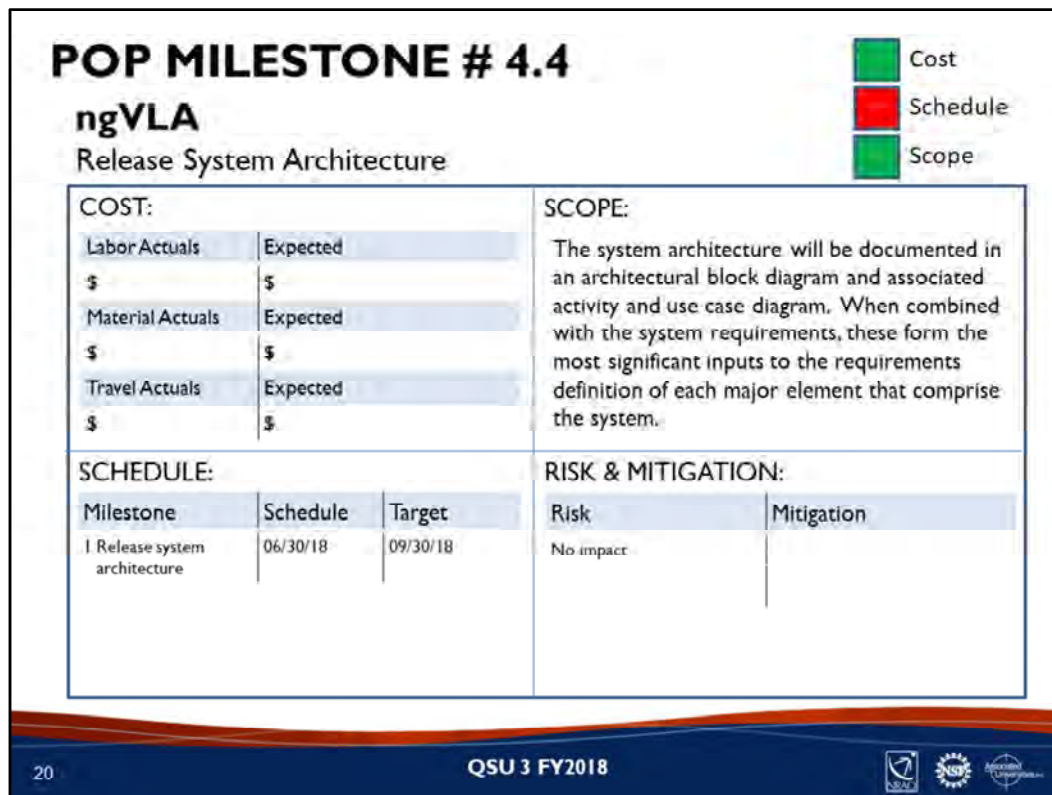


**COST:** No impact.

**SCOPE:** No impact.

**SCHEDULE:** The new ngVLA website launch is imminent. The ngVLA Project Scientist, Eric Murphy, has signed off on the final wording. The EPO IPT Lead, Suzy G., is reviewing the material one final time prior to go-live (7/24/2018).

**RISK & MITIGATION:** No impact.



COST: No impact.

SCOPE: No impact.

SCHEDULE: Significant progress has been made on the system architecture, with block definition diagrams for all subsystems and detailed internal block diagrams for major elements such as the antenna electronics. However, the architecture is not yet integrated into a single model, and behavior and use case diagrams have not been prepared. This deliverable will be carried forward to Q4.

RISK & MITIGATION: No impact.

## POP MILESTONE # 5.6.5

### ngVLA

Develop initial version of Requirements Verification Traceability Matrix

Cost
  Schedule
  Scope

| <b>COST:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td style="border-bottom: 1px solid black;">\$</td> <td style="border-bottom: 1px solid black;">\$</td> </tr> </table> |  |          | Labor Actuals | Expected | \$     | \$                     | Material Actuals | Expected | \$  | \$ | Travel Actuals | Expected   | \$  | \$   | <b>SCOPE:</b><br>Requirements will be managed in the RVTM, providing parent-child relationships between requirement levels to assure bidirectional traceability and reduce the potential for gaps in requirements. |  |  |
|---|--|----------|---------------|----------|--------|------------------------|------------------|----------|---|----|----------------|------------|---|--|--|--|--|
| Labor Actuals   | Expected   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| \$  | \$   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| Material Actuals  | Expected   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| \$  | \$   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| Travel Actuals  | Expected   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| \$  | \$   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| <b>SCHEDULE:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 30%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 40%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Develop initial RVTM</td> <td style="border-bottom: 1px solid black;">06/30/18</td> <td style="border-bottom: 1px solid black;">09/30/18</td> </tr> </table>   |  |          | Milestone     | Schedule | Target | 1 Develop initial RVTM | 06/30/18         | 09/30/18 | <b>RISK &amp; MITIGATION:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Lack of bidirectional requirement traceability<br/>2 Potential gaps in design requirements</td> <td style="border-bottom: 1px solid black;">1 &amp; 2 Complete the software requirement tool benchmarking effort and purchase/implement requirements management to include a RVTM.</td> </tr> </table> |    | Risk           | Mitigation | 1 Lack of bidirectional requirement traceability<br>2 Potential gaps in design requirements | 1 & 2 Complete the software requirement tool benchmarking effort and purchase/implement requirements management to include a RVTM. |  |  |  |
| Milestone   | Schedule   | Target   |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| 1 Develop initial RVTM  | 06/30/18   | 09/30/18 |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| Risk  | Mitigation   |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |
| 1 Lack of bidirectional requirement traceability<br>2 Potential gaps in design requirements   | 1 & 2 Complete the software requirement tool benchmarking effort and purchase/implement requirements management to include a RVTM. |          |               |          |        |                        |                  |          |   |    |                |            |   |  |  |  |  |

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COST: No impact.

SCOPE: No impact.

SCHEDULE: A Requirements Verification Traceability Matrix (RVTM) template has been created by the ngVLA project Systems Engineer, Cristina Simon. Cristina is currently conducting a benchmarking effort between multiple potential requirements tracking tools. A tool selection and purchase is expected by the end of August 2018 with the initial version of the RVTM released by the end of Q4 FY2018.

RISK & MITIGATION: No impact.

## POP MILESTONE # 5.6.6

### ngVLA

Conduct gap analysis of stakeholder and system requirements



|                        |          |         |  |            |
|------------------------|----------|---------|--|------------|
| <b>COST:</b>           |          |         | <b>SCOPE:</b>  |            |
| Labor Actuals          | Expected |         | Requirement gaps were identified during the recent Stakeholders Requirements Review conducted on June 19, 2018, and additional requirement gaps will be identified during the upcoming Reference Design Workshop scheduled for July 25-26, 2018. All identified requirement gaps will be captured. |            |
| \$                     | \$       |         |  |            |
| Material Actuals       | Expected |         |  |            |
| \$                     | \$       |         |  |            |
| Travel Actuals         | Expected |         | <b>RISK &amp; MITIGATION:</b>  |            |
| \$                     | \$       |         |  |            |
| <b>SCHEDULE:</b>       |          |         |  |            |
| Milestone              | Schedule | Target  | Risk   | Mitigation |
| 1 Conduct gap analysis | 06/30/18 | 9/30/18 | No impact  |            |

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QSU 3 FY2018



COST: No impact.

SCOPE: No impact.

SCHEDULE: Science, Technical, Stakeholder, “ility” requirements are being identified for the project. Reviews such as the recently conducted Stakeholders Requirements Review and Reference Design Workshop are highlighting gaps between requirements (e.g. Science – Technical solution gaps). These gaps will be gathered and documented by the end of Q4.

RISK & MITIGATION: No impact.



## POP MILESTONE # 5.6.7

### ngVLA

Draft quality process for verification and validation (V&V) plan

 Cost  
 Schedule  
 Scope

|                                 |                 |               |                               |                   |
|---------------------------------|-----------------|---------------|-------------------------------|-------------------|
| <b>COST:</b>                    |                 |               | <b>SCOPE:</b>                 |                   |
| Labor Actuals                   | Expected        |               | No impact                     |                   |
| \$                              | \$              |               |                               |                   |
| Material Actuals                | Expected        |               |                               |                   |
| \$                              | \$              |               |                               |                   |
| Travel Actuals                  | Expected        |               |                               |                   |
| \$                              | \$              |               |                               |                   |
| <b>SCHEDULE:</b>                |                 |               | <b>RISK &amp; MITIGATION:</b> |                   |
| <b>Milestone</b>                | <b>Schedule</b> | <b>Target</b> | <b>Risk</b>                   | <b>Mitigation</b> |
| I Draft quality process for V&V | 06/30/18        | 9/30/18       | I No impact                   |                   |

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QSU 3 FY2018



COST: No impact.

SCOPE: No impact.

SCHEDULE: Draft quality process for verification and validation plan is in-work. Draft is anticipated to be released in early August 2018.

RISK & MITIGATION: No impact.





## Scorecard – FY2017 POP Milestone Carryovers

| Milestone Carryovers |               |   |               |                     |           |
|----------------------|---------------|---|---------------|---------------------|-----------|
| POP Section Number   | POP Milestone | Milestone   | FY17 Due Date | New Completion Date | Status    |
| 3.5                  |               | Very Large Array  |               |                     |           |
|                      |               | VLA Track Maintenance   |               |                     |           |
|                      | 30            | Identify and replace 5000 aging or damaged cross-ties during the course of the year | 9/30/2017     | 12/31/2017          | Completed |
| 6.4                  |               | Data Management & Software  |               |                     |           |
|                      |               | VLA System Software   |               |                     |           |
|                      | 18            | Implement currently used solar modes  | 6/30/2017     | 12/22/2017          | Completed |
| 7.4                  |               | Program Management Departments  |               |                     |           |
|                      |               | New Mexico Operations   |               |                     |           |
|                      | 2             | NM PM/SE Learning Opportunities   | 9/30/2017     | 10/10/2017          | Completed |
|                      |               | Headquarters  |               |                     |           |
|                      | 30            | Incorporate Changes and Feedback into SOPs  | 9/30/2017     | 10/30/2017          | Completed |
| 8.5                  |               | Education & Public Outreach   |               |                     |           |
|                      |               | Visitor Center Operations   |               |                     |           |
|                      | 17            | VLA Visitor Center Education and Interpretive Plan completed                        | 6/30/2017     | 12/31/2017          | Completed |
|                      | 18            | VLA Visitor/Education Center architectural schematic designs completed              | 6/30/2017     | 6/15/2018           | Completed |
| 11.7                 |               | Human Resources   |               |                     |           |
|                      |               | Employment  |               |                     |           |
|                      | 14            | Workforce Management Plan   | 3/31/2017     | 6/30/2018           | Completed |
| 12.1                 |               | Communications  |               |                     |           |
|                      | 4             | Publish 2016 NRAO Annual Report   | 9/30/2017     | 2/9/2018            | Completed |

## POP MILESTONE FY15 # 3.4.62

### Admin (from NM Ops)

#### Renew VLBA lease for Owens Valley

Cost
  Schedule
  Scope

| <b>COST:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Labor Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td>No changes</td> <td></td> </tr> <tr> <td style="border-bottom: 1px solid black;">Material Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td>No Changes</td> <td></td> </tr> <tr> <td style="border-bottom: 1px solid black;">Travel Actuals</td> <td style="border-bottom: 1px solid black;">Expected</td> </tr> <tr> <td>No changes</td> <td></td> </tr> </table> |   |          | Labor Actuals | Expected | No changes |                              | Material Actuals | Expected | No Changes   |  | Travel Actuals | Expected | No changes |  | <b>SCOPE:</b><br>Owens Valley, CA site sublease with Owens Valley Radio Observatory (OVRO) is not renewed. A draft sublease was received and reviewed by WBriskin, MMcKinnon, SLagoyda, SGeiger and RSakshaug and returned to CalTech with comments. WBriskin met F2F with Tony Readhead of CalTech the week of 25 June. LBO has requested for review a copy of the draft master lease between Caltech and the LA Water and Power on the OVRO. |                            |   |
|---|---|----------|---------------|----------|------------|------------------------------|------------------|----------|--|--|----------------|----------|------------|--|--|----------------------------|---|
| Labor Actuals   | Expected  |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| No changes  |   |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| Material Actuals  | Expected  |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| No Changes  |   |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| Travel Actuals  | Expected  |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| No changes  |   |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| <b>SCHEDULE:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Milestone</th> <th style="width: 20%; border-bottom: 1px solid black;">Schedule</th> <th style="width: 50%; border-bottom: 1px solid black;">Target</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Owens Valley Lease renewed</td> <td style="border-bottom: 1px solid black;">03/31/2015</td> <td style="border-bottom: 1px solid black;">EOY 2018</td> </tr> </table>   |   |          | Milestone     | Schedule | Target     | 1 Owens Valley Lease renewed | 03/31/2015       | EOY 2018 | <b>RISK &amp; MITIGATION:</b><br><table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; border-bottom: 1px solid black;">Risk</th> <th style="width: 50%; border-bottom: 1px solid black;">Mitigation</th> </tr> <tr> <td style="border-bottom: 1px solid black;">1 Impact on VLBA operating budget (increase in lease cost – but early indications are for a modest increase)</td> <td style="border-bottom: 1px solid black;">1 Adjust VLBA Operating budget, if necessary.</td> </tr> <tr> <td style="border-bottom: 1px solid black;">2 Impact on VLBA operation</td> <td style="border-bottom: 1px solid black;">2 Avoid by periodic follow up of Caltech negotiation progress</td> </tr> </table> |  |                | 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 |
| Milestone   | Schedule  | Target   |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| 1 Owens Valley Lease renewed  | 03/31/2015  | EOY 2018 |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |
| 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 |          |               |          |            |                              |                  |          |  |  |                |          |            |  |  |                            |   |

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QSU 3 FY2018

**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 changes.

**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 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 propose to cancel this milestone for FY2015 since its ultimate resolution is beyond our control. 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.

## VLA Reconfiguration

Reconfigurations of the VLA were inadvertently left out of the Array Operations section of the FY2018 POP and will be documented here as an exception report.

- One VLA reconfiguration was completed in Q3 FY2018
  - From A to D, completed June 2018

## Q3 Milestone completion

Total number of 2018 POP Milestones: 352 with 465 quarterly deadlines

Total Q3 2018 milestone deadlines: 112

Total completed on time: 88

Percent of total completed on time: 78.6

Total Q2 2018 milestone deadlines: 118

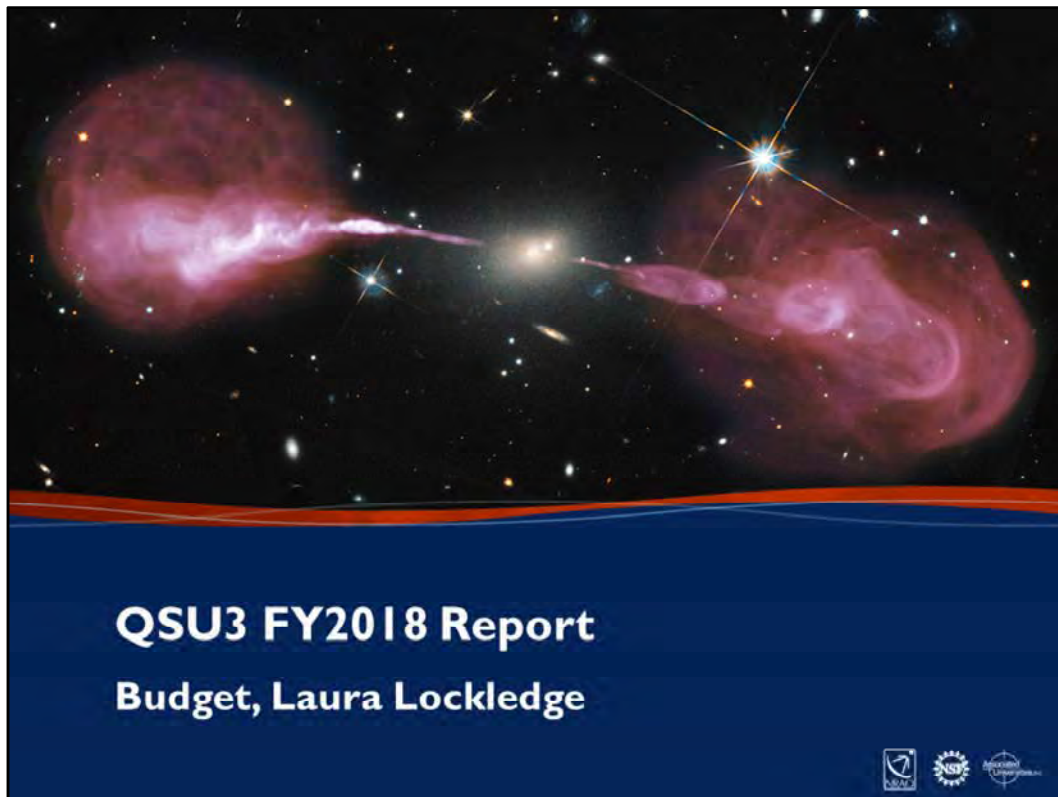
Total completed on time: 92

Percent of total completed on time: 78

Total Q1 2018 milestone deadlines: 107

Total completed on time: 89

Percent of total completed on time: 83.2



## Overall Comments

- ICC/IDC rates recorded at FY17 provisional levels. FY18 rates pending approval with NSF.
  - Failure to approve rates results in budget underspend, distorted financial results and significant AUI cash flow issues.
- Benefits @ 34% vs. budget of 36%
  - Mgmt exploring 1x benefits enhancement to absorb part of surplus ~\$630K across all fund sources at Q3 end.

Benefits underage due to positive experience w/the health plan.  
ICC/IDC review now over 150 days at NSF.

## CSA-V Q3 Results

|   | FY18 POP<br>Budget | FY18 Rev.<br>Budget | FY18 YTD<br>Expenses | YTD %<br>Rev<br>Budget |
|---|--------------------|---------------------|----------------------|------------------------|
| NSF   | 32,860             | 38,960              | 38,960               | 100.0%                 |
| Carryforward/Other                                  | 405                | 1,308               | 1,306                | 0.0%                   |
| <b>Total CSA-V<br/>Revenues</b>                     | <b>33,265</b>      | <b>40,268</b>       | <b>40,266</b>        | 100.0%                 |
| Telescope Ops                                       | 11,476             | 11,637              | 8,302                | 71.3%                  |
| Development   | 3,506              | 2,569               | 1,687                | 65.7%                  |
| Science Ops   | 5,905              | 6,316               | 4,228                | 66.9%                  |
| Admin Services                                      | 9,464              | 9,891               | 5,661                | 57.2%                  |
| Director's Office<br>Education & Public<br>Outreach | 2,161              | 2,109               | 1,240                | 58.8%                  |
| ngVLA   | 753                | 820                 | 530                  | 64.6%                  |
| ngVLA   |                    | 6,921               | 2,765                | 40.0%                  |
| <b>FY18, Total</b>                                  | <b>33,265</b>      | <b>40,263</b>       | <b>24,413</b>        | 60.6%                  |
| <b>FY18 CSA-V Net</b>                               | <b>0</b>           | <b>5</b>            | <b>15,853</b>        |                        |

- ngVLA ramp-up delayed spending.
- Admin services includes FY2018 reserves.
- Director's Office includes fund source adjustments of \$215K.



## CSA-A Q3 Results

|                             | FY18<br>POP<br>Budget | FY18<br>Rev.<br>Budget | FY18 YTD<br>Expenses | YTD %<br>Rev<br>Budget |
|-----------------------------|-----------------------|------------------------|----------------------|------------------------|
| NSF                         | 43,480                | 38,550                 | 38,550               | 100.0%                 |
| Carryforward                | 13,700                | 16,291                 | 16,291               | 100.0%                 |
| Canadian Contribution       | 1,500                 |                        |                      | 0.0%                   |
| Other                       | 400                   | 754                    | 678                  | 89.9%                  |
| <b>Total CSA-A Revenues</b> | <b>59,080</b>         | <b>55,595</b>          | <b>55,519</b>        | <b>99.9%</b>           |
| Telescope Ops               | 22,521                | 23,798                 | 17,605               | 74.0%                  |
| Development                 | 5,585                 | 9,894                  | 1,659                | 16.8%                  |
| Science Ops                 | 6,869                 | 7,215                  | 4,275                | 59.3%                  |
| Admin Services              | 7,759                 | 9,653                  | 6,165                | 63.9%                  |
| Director's Office           | 2,894                 | 3,620                  | 2,178                | 60.2%                  |
| Education & Public Outreach | 679                   | 662                    | 412                  | 63.3%                  |
| <b>FY18, Total</b>          | <b>46,307</b>         | <b>54,842</b>          | <b>32,301</b>        | <b>58.9%</b>           |
| <b>FY18 CSA-A Net</b>       | <b>12,773</b>         | <b>753</b>             | <b>23,218</b>        |                        |

- Development budget line is inclusive of carryforward.
- Science ops low due to multiyear/cross year student commitments and time allocated to telescope ops.
- Director's office includes \$139K in fund source adjustments.

## ICC Q3 Results

|                           | FY18 POP<br>Budget | FY18 Rev.<br>Budget | FY18 YTD<br>Expenses | YTD %<br>Rev<br>Budget |
|---------------------------|--------------------|---------------------|----------------------|------------------------|
| NRAO Recoveries           | 12,828             | 12,865              | 8,514                | 66.2%                  |
| External Recoveries       | 3,381              | 3,381               | 2,799                | 82.8%                  |
| <b>Total ICC Revenues</b> | <b>16,209</b>      | <b>16,246</b>       | <b>11,313</b>        | <b>69.6%</b>           |
| Telescope Ops             | 105                | 106                 | 107                  | 100.9%                 |
| Development               | 429                | 444                 | 299                  | 67.3%                  |
| Science Ops               | 2,379              | 2,463               | 1,630                | 66.2%                  |
| Admin Services            | 11,244             | 11,162              | 7,682                | 68.8%                  |
| Director's Office         | 2,052              | 2,071               | 1,222                | 59.0%                  |
| <b>FY18, Total</b>        | <b>16,209</b>      | <b>16,246</b>       | <b>10,940</b>        | <b>67.3%</b>           |
| <b>FY18 ICC Net</b>       | <b>0</b>           | <b>0</b>            | <b>373</b>           |                        |

Shows over-recovery. Status indeterminate due to recovery via FY2017 rate structure and expenses are in FY2018 rate structure.



## VLA Visitor Center Open House



Just as we had a special book signing at the October Open house that also celebrated the 20<sup>th</sup> Anniversary of *Contact*, in April our open house celebrated the publication of *Four Pillars of Radio Astronomy* with several of the authors present. With *Contact*, we'd had a public talk in Socorro afterwards. For this event, we thought it was of more interest to the academic community, so we advertised it up and down the I-25 corridor to our colleagues in NM Tech, UNM, and NM State and had 70 people attend the book launch in the DSOC on Friday and 816 total visitors attended the open house at the site where we also gave 17 tours and another book signing with short talks about the early history of radio astronomy and of course, featured the Bracewell Sundial.

## VLA Visitor Center

### Bonus book signing

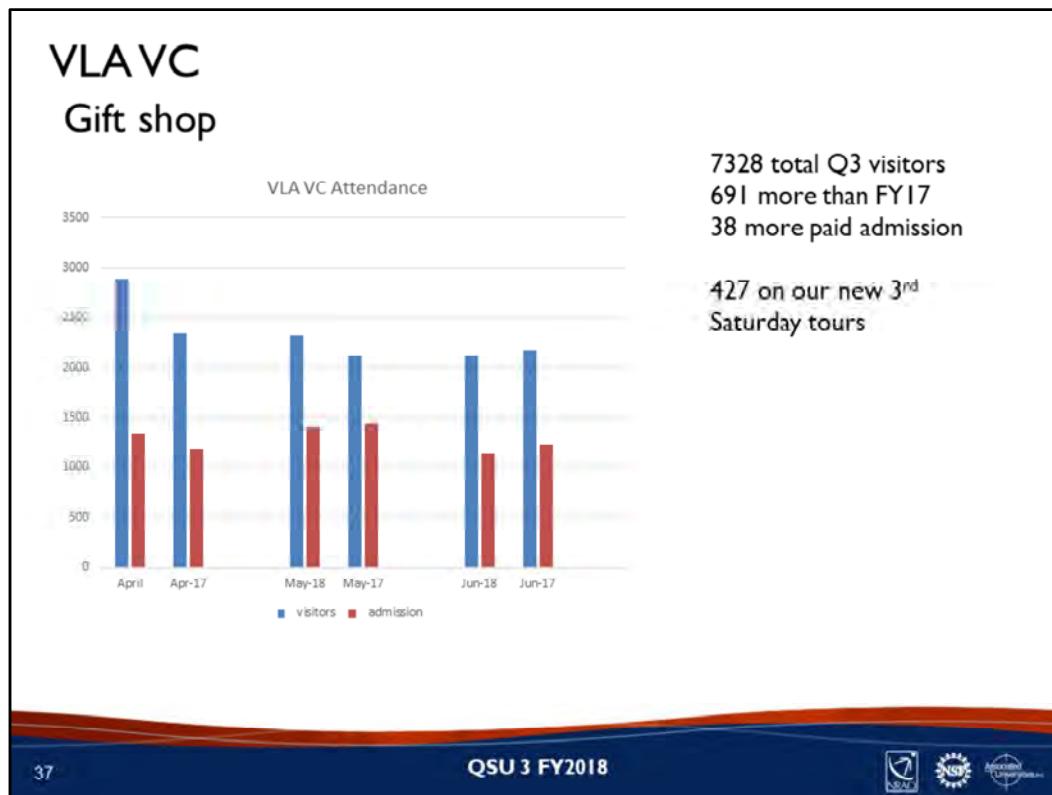


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QSU 3 FY2018



4/8/18 MIT tour 24 total (Tyler) / Sarah Scoles talk and book signing, total 28. One of 18 additional tours offered by reservation for other groups. We took advantage of the fact Sarah Scoles was in attendance at the book signing to invite her out to the site to sign additional copies of her book for our Sunday visitors.



Spring is a busy time for us.

Good attendance and sales, for the most part better than last year with the exception of June. That drop correlates with a rise in gas prices. Of course, since they didn't come to the VC we have no way of asking them why, so that's just an observation.

Also, note that while sales for the quarter are \$100k, remember that at least half that, depending on the margin goes to the cost of the merchandise sold. We are just trying to make sure we cover all our costs (merchandise, supplies and people).

# VLA VC

## Donation

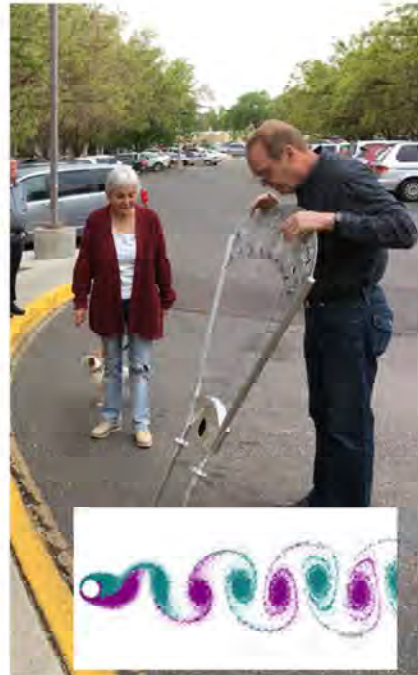
### Aeolian harp

From Wikipedia, the free encyclopedia

An **Aeolian harp** (also **wind harp**) is a [musical instrument](#) that is played by the wind. Named for [Aeolus](#), the ancient [Greek](#) god of the wind...

Besides being the only strung instrument played solely by the wind, the Aeolian harp is the only stringed instrument that plays solely harmonic frequencies.

The harp is driven by the [von Kármán vortex street](#) effect. The motion of the wind across a string causes periodic vortices downstream, and this alternating vortex causes the string to vibrate. [Lord Rayleigh](#) first solved the mystery of the aeolian harp in a paper published in the *Philosophical Magazine* in 1915.



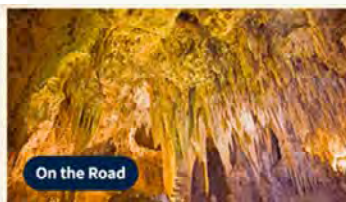
Von Karman vortex visualization By Cesareo de La Rosa Siqueira -  
<http://www.mcef.ep.usp.br/staff/jmeneg/cesareo/vort2.gif>,  
Attribution, <https://commons.wikimedia.org/w/index.php?curid=87351>



## VLA Visitor Center Tours



青少年国际竞赛与交流中心  
International Teenager Competition and Communication Center



On the Road

Albuquerque

### On the Road in Southern New Mexico: Rugged Beauty and the Final Frontier

New Mexico is known for both natural beauty and its unique role in the history of space exploration. Explore both on this journey to Carlsbad Caverns, the Very Large Array and more!

Activity Level

8 days

Program No.  
22614

Length

8 days

Rating (5)

★★★★★

Starts at

\$1,499



Served 7328 visitors at the VC, 2238 visitors on tours at the VLA this quarter including an international Chinese Robotics team that visits us each year, 3 Road Scholars groups, the International Pulsar Timing Association (65), and folks from the Synthesis Imaging Workshop tour (155). (Amy Mioduszewski)



## STEAM outreach Community Outreach



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QSU 3 FY2018



5/19/2018 ABQ Science Fiesta (Faith) Outreach events 2,500 estimated attendance

6/12/2018 Tech Trek visit to the AOC total 75 Middle School Girls. NRAO women talked about their career path and Faith gave a VLA tour Power Point.

## VLA Visitor Center A New Concept



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QSU 3 FY2018



It was a tough charge, but the new concept design was unveiled in Socorro on June 15<sup>th</sup>. We've had a positive response from most who have seen it, but there is concern about the length of the wavy path. The good news is that it's early in the process, we have some inspirational pictures to inspire so we can begin our fund raising process and as we move forward, we'll build in triggers to further refine the plan when certain fundraising goals are met.

## STEAM Outreach Community Outreach



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QSU 3 FY2018



### **USA Science and Engineering Festival**

Nine of NRAO's staff participated in this year's 5<sup>th</sup> USA Science and Engineering Festival at the Walter E. Washington Convention Center in Washington, DC on Friday, April 5<sup>th</sup> – Sunday, April 8<sup>th</sup>. NRAO's booth was themed "Revealing the Invisible Universe." Visitors to the booth explored the invisible universe and learned about the VLA and ALMA. Over the four days of the camp with 370K+ attendees, an estimated 5,000 attendees visited our booth. Attendees were given our trading cards (total of 5,000) and our Crab Nebula postcards (total of 3000).

### **Black Girls Code Tech Event**

NRAO's STEAM Education Program Development Officer was a guest speaker at a special STEM Tech event in Brooklyn, NY on Saturday, April 14<sup>th</sup>. This event was hosted by Black Girls Code in partnership with NASA's Chandra X-Ray Observatory. Jessica spoke about her career journey in STEM and her new role at NRAO. This event was attended by about 40 students.

### **Astronomy Festival on the Mall**

Four of NRAO's staff participated in the 9<sup>th</sup> Annual Astronomy Festival on the National Mall. This event due to weather was held at the rain location, School Without Walls High School, in Washington, D.C. This is a free event organized by Dr. Donald Lubowich, Coordinator of Astronomy Outreach at Hofstra University. The event was attended by approximately 1000 guests and about 150 guests visited NRAO's booth.

**(No Picture)** but we were also at the summer AAS meeting in June assisting with the booth and giving presentations for the EPO day.

## Multimedia

### Web support



PHOTO: Outreach Programs & Events

#### Outreach Programs & Events

The NRAO Education and Public Outreach Department is developing Science, Technology, Engineering, Arts, and Mathematics (STEAM) programs for our local and national outreach efforts. Our initiatives focus on designing and delivering engaging radio astronomy programs and products for the general public, K-12 students, and formal and informal educators. We are also developing innovative methods to explore the intersection of art and science. NRAO has opportunities for undergraduate and graduate students through the Office of Diversity and Inclusion and the Research Experiences for Undergraduates (REU). Learn more about the ODI programs: the National Astronomy Consortium (NAC), the National and International Non-Traditional Exchange (NITE) program, and Hampton University NITE Hub.

#### Featured Programs



#### Radio Astronomy and Physics Residential Camp in New Mexico (RAP-NM)

RAP-NM will introduce to inspire and excite using the greatest by providing a seven-day intensive summer camp experience. Through simulation research experiences, educational talks from working scientists and mentors, visits and whole group interactive investigations, and enrichment activities RAP-NM will provide the young 10th grader and above with the scientific world of research and discovery.

→ RAP 2018 Riser

We've designed a new STEAM education page to highlight our programs. We've also improved the search functionality of new releases to include filters for "news type" as well as displaying search terms at the top of results.

## Multimedia ngVLA support

Given all that is achievable by the VLA and ALMA today, imagine the discoveries of tomorrow with the next generation Very Large Array.



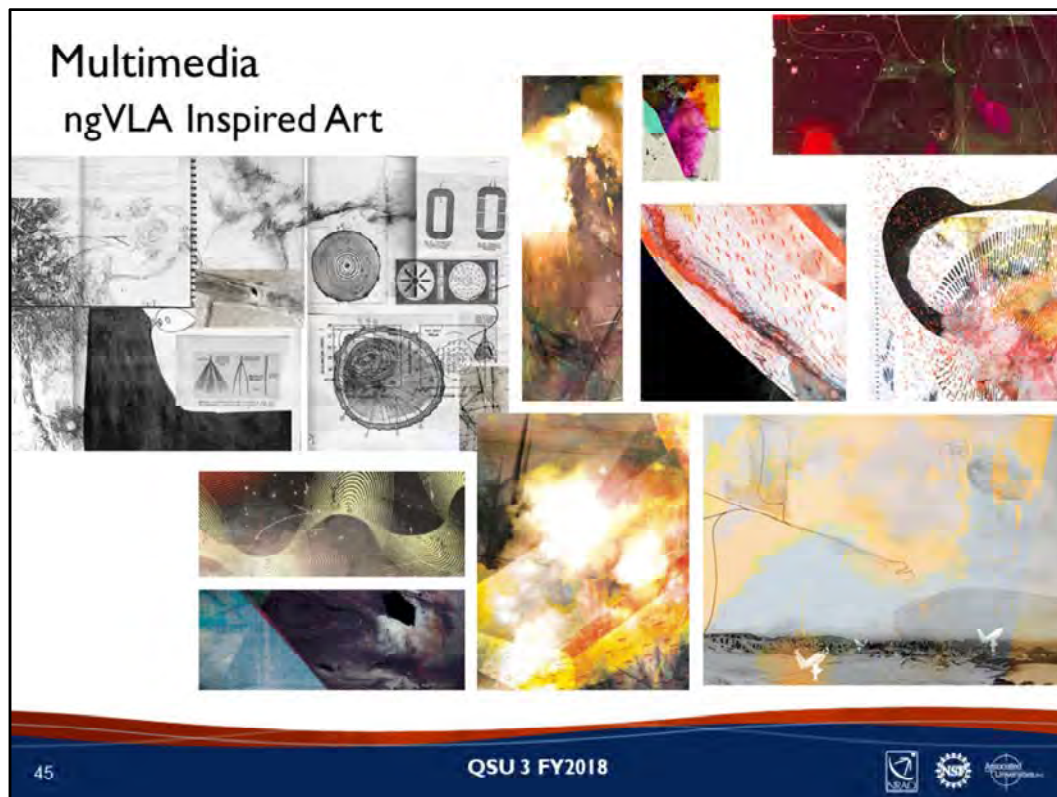
44

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American Physical Society reached out to us to create a video for their March meeting in Chicago, so I should have mentioned this in Q2, but want to emphasize that Mark Adams and the ngVLA team did the hard work of showing up and talking about the project, we simply provided visuals for it. Besides being broadcast throughout a meeting with 9000 attendees, we got all the new footage and are repurposing it for ngVLA. We also created our ngVLA brochures which are now being distributed at the VC and at the additional events that I'll mention next.





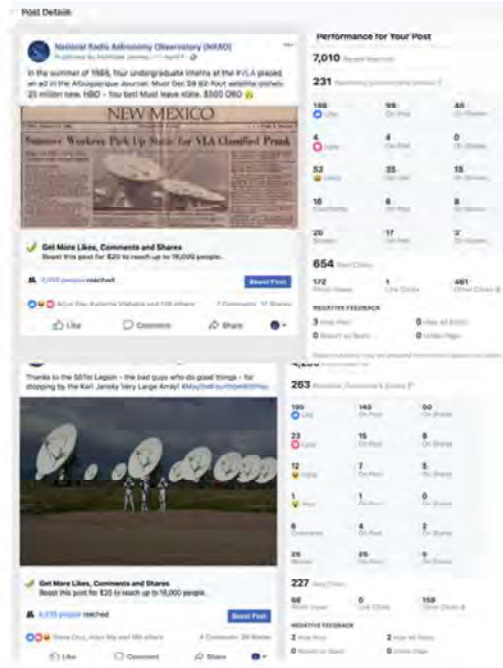
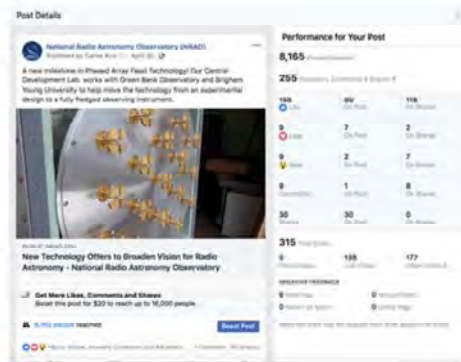
The ngVLA inspired art was shared at the Portland Astrophysics Frontiers meeting at the end of June.



Throughout the month of June, an immersive animation by Eddie Edwards was featured at the Santa Fe Currents New Media Art show. Attendance at the opening was estimated at 3000, which was a record for the event and an estimated 10,000 for the run of the show.

## Multimedia Social Media

- **Facebook**
- 63,430 followers

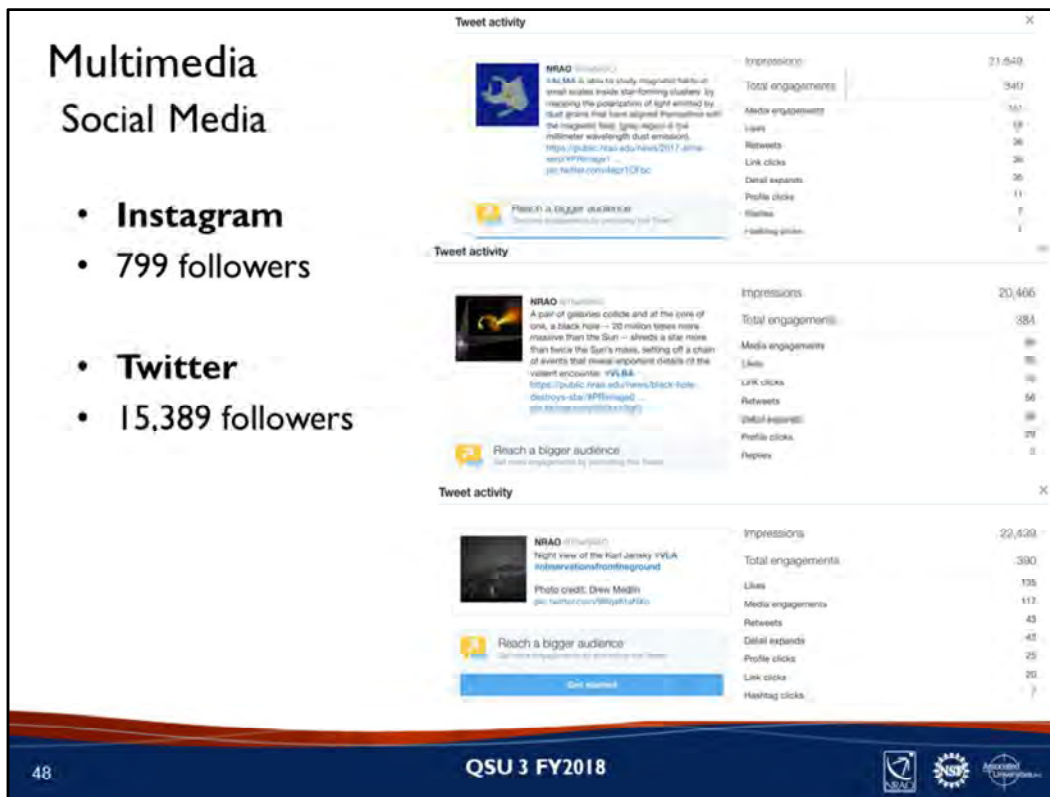


We had fun on Facebook, with Facebook live broadcasts from our CV TUNA talks and from the Portland meeting, May the 4<sup>th</sup> be with you posts, and an April Fools post, but science and innovation prevailed and our post on the phased array feed got over 8000 views.



## Multimedia Social Media

- **Instagram**
- 799 followers
- **Twitter**
- 15,389 followers



### Twitter

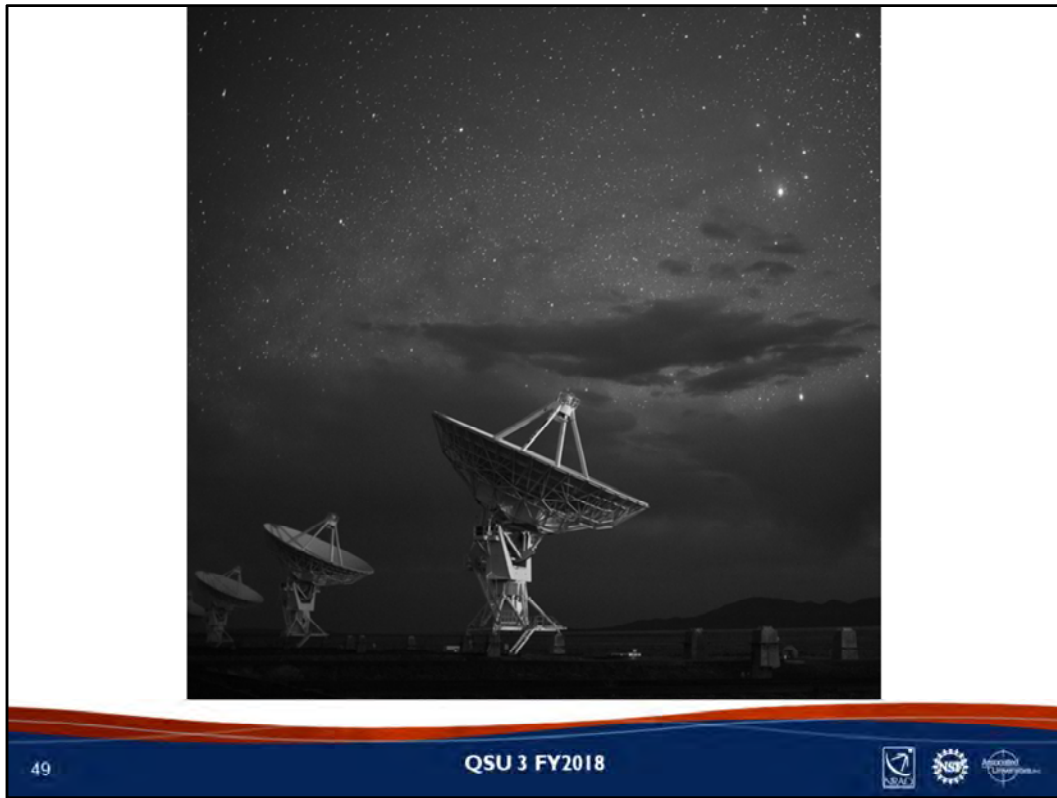
15,389 followers

Surprisingly, on Twitter we had the opposite response. News was beat out by a simple, yet beautiful black and white image of the VLA with over 22,000 impressions. The big win for us last quarter, though, was the NSF Takeover on April 6. NSF takeovers are when they reach out to those that they fund for brief period of concentrated posts from that facility. Ours was about the neutron star merger and because of their following, our content reached over 26 million people through the NSF account!

### Instagram

799 followers

We're adding followers! We're starting an Instagram campaign in 4th quarter focusing on our summer student programs and NINE program highlighting students as the future of astronomy. This quarter we will be doing a similar partnership with NSF on their Instagram account featuring the ACEAP program.



Drew Medlin is a Data Analyst working with the VLA CASA Calibration Pipeline.

## News

ALMA Discoveries + 1000 Published Papers



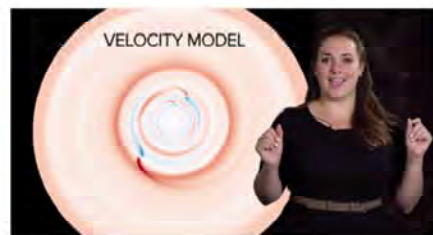
50

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## News

Multimedia support: <https://vimeo.com/277515054>



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The triple planet release was an interesting opportunity to experiment with a new format. This hosted video features our science and graphics, but with an engaging on screen personality. We chose Melissa Hoffman for this based on her volunteer work in the NRAO booth at the USA Sci and Engineering festival.

So far, our news distribution service, Newswise, reports that the news release received over 600 hits and the video received over 1600.

Some nice evidence that it's a good return on the investment. Based on this experiment, we'll be working on a formal workflow to see if our small team can produce these regularly.

## News CDL



### **New Technology Offers to Broaden Vision for Radio Astronomy**

*April 30, 2018 at 10:00 am | News Release*

NRAO's CDL led the development of a new and improved version of a Phased Array Feed.



### **Breakthrough in Detection Technology at Axion Dark Matter Experiment**

*April 9, 2018 at 12:00 pm | Announcement*

NRAO/CDL technology part of the hunt for the dark matter particle at the Axion Dark Matter Experiment.



### **Stanford Astronomer Honored as Jansky Lecturer by AUI, NRAO**

*May 7, 2018 at 9:53 am | News Release*

Professor Roger Blandford of Stanford receives the 2018 Jansky Lectureship in recognition of his numerous contributions to the advancement of radio astronomy. He will deliver a series of public lectures in Charlottesville, Virginia; Socorro, New Mexico; and Green Bank, West Virginia.

## News

### VLBA & GBO



#### Press Release

**Diamond Dust Shimmering around Distant Stars:  
Nanoscale gemstones source of mysterious cosmic microwave light**

For Immediate Release: 11 June 2018; 11:00 EDT



#### Astronomers See Distant Eruption as Black Hole Destroys Star

June 14, 2018 at 2:00 pm | News Release

Years-long observation program surprises astronomers with evidence of a star's violent death near the core of a distant galaxy.



[www.nrao.edu](http://www.nrao.edu)  
[science.nrao.edu](http://science.nrao.edu)

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