Title: SRDP RVTM	Authors: Kern, Treacy	Date: 4/16/2018
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Originating Requirement ID	Requirement ID	Sub-system Allocation	Requirement	Metrics (MOE/MOP/TPM)	Validation/ Verification Method (Demosntration, test, analysis, inspection, certification)	Validation/Verification Status Report (Report on compliance status)	Comments
The Unique identifier of the stakeholder, system or sub-system requirement that originates requirement being tracked in this row	A Unique identifier	Indicate sub-system allocation.	~5 line description and rationale for including the requirement	Metrics (MOE/MOP/TPM) shall specify criteria for which the requirement will be confirmed	This column shall indicate the method to find out the previous column information.	This column shall convey compliance status	Valuable references or comments about the requirement.
AD3 2.4.2 para 1	ON01-001		Proprietary Period The proprietary period shall be tied to the underlying data products.	confirmation of proprietary data policies in place at time of data delivery	I		
AD3 2.4.3 para 2	ON01-002		Archive Contents Policy Products generated through the SRDP processes shall have undergone a standard process and shall be designated with a QA approval, as appropriate.	Confirmation of QA approval designations assigned to the data records	I		
AD3 2.4.3 para 3	ON01-003		Archive Contents Policy Large projects going through the NRAO submission process shall submit a data management plan as part of the observing proposal.	Confirm that Large project proposal submissions include a QA plan, a data management plan which identifies data products targeted for archiving, and estimates on data product size	I		
AD3 2.4.3 para 3	ON01-004		Archive Contents Policy The QA approval flag shall cite the project as the authority for the quality assurance.	Demonstrate QA approval flag is set when criteria is met and QA flag is not set for invalid criteria	D/T		
AD3 2.4.3 para 4	ON01-005		Archive Contents Policy User generated products shall only be ingested into the archive if compliant with provisions in the large projects use case.				
AD3 2.5 para 3	ON02-001		Computing Resource Management For any usage of the SRDP system, the user shall have a valid NRAO account, and to be properly authenticated through the myNRAO portal. download of existing products from the archive		D		
AD3 2.5 para 3	ON02-002		Computing Resource Management The SRDP systems shall develop metrics to provide an accurate picture of usage patterns, with a provision to enforce storage quota and other processing constraints.		D/I		
	ON02-003		The requirement set ON02-003.1- ON02-003.6 shall be considered as deemed necessary to provide sufficient flexibility to balance resources.				
AD3 2.5 para 6	ON02-003.1		Pipeline Processing The pipeline processing model shall incorporate a special overflow queue on the existing clusters where jobs routed to this queue shall trigger remote processing.	Confirmation that overflow queue has been implemented and triggers remote processing upon receipt of an overflow job	D/T		
AD3 2.5 para 8	ON02-003.2		Special requirement processing For imaging cases outside of the resource profiles supported by the NRAO cluster environment, alternate processing and temporary storage shall be provided and automatically triggered by SRDP compliant projects.				
AD3 2.5 para 9	ON02-003.3		Large project processing Large project shall be processed on AWS when speed of processing is necessary and automatically triggered by SRDP compliant projects.				
AD3 2.5 para 10	ON02-003.4		Charged User Processing When processing load levels exceed the NRAO computing capacity, charges incurred shall be passed back to the requesting user, where the SRDP workflows can quantify the use of external resources and make associations with unique users for the purpose of assigning those charges.		T		
AD3 2.5 para 11	ON02-003.5		Product Storage The SRDP design shall allow for the automatic trigger of temporary storage on external resources to manage fluctuations in resource demand when a predefined threshold is reached,	Test for redirection of storage if threshold (TBD) is exceeded	D/T		
AD3 2.5 para 12	ON02-003.6		Data Archive DMS shall continue to evaluate convenient and cost effective alternatives for the storage of the ALMA and JVLA data archive, where data transport could be simplified if the external storage facility is also a processing facility.	Confirm by			
AD3 2.2.1 para 2	ON03-001		Telescope Users The SRDP proposal submission process shall capture an estimation of storage needed for data products as well as an estimate of computational requirements provided by telescope users.	Confirm by evaluation of the PST and associated processes	D/T		
AD3 2.2.1 para 3	ON03-002		Archive users SRDP shall provide archive users well-defined anonymous access to the archive. Archive users requesting additional computational resources shall register with myNRAO.	Confirm by evaluation of the PST and associated processes	D/T		

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AD3 2.2.1 para 4	ON03-003		Large Projects The SRDP project shall seek to maximize the return on investment for large projects.				
AD3 2.2.1 para 5	ON03-004		Operations Staff The system shall provide the tools for members of the NRAO staff, data analysts and scientific staff members, shall operate the SRDP processes, through the execution of workflows and quality assurance.				
AD3 2.2.1 para 6	ON03-005		General Public The SRDP shall support the amateur astronomer, educator, or other member of the public interested in astronomy by providing the produced images in familiar formats (TBD), which will be available for anonymous download.	Test anonymous access to archive and demonstrate availability of specified formats	D/T		
AD3 2.2.1 para 6	ON03-006		Casual/Novice SRDP shall allow for download of a pre-existing image, to produce an image from previously obtained data, or desire a simple path to obtaining new data from which an image can be built using the archive interface.	Test image processes established (TBD) for this level of user	D/T		
AD3 2.2.1 para 7	ON03-007		Future Power Users SRDP shall provide support for a continuum of expertise, not just novice and expert modes.	Demonstrate required flexibility in access to archive at various levels of complexity	D/T		
AD3 2.2.1 para 1	ON03-008		Experienced Radio Astronomers The SRDP project shall seek to provide interfaces to engage these experts in the generation and quality assessment of science-ready products.	Demonstrate the interface provides tools and quality to satisfy the most discriminating users	D/T		
AD3 2.2.2 para 1	ON04-001		Workflow Management System This non-human actor shall perform the automatic and autonomous functions necessary to support the operation of the SRDP. It shall also interface with all subsystems necessary to perform these functions.	Inspect architecture and test functionality	I/T		
AD3 2.3.1 para 1/2	ON05-001		Proposal Submission and Observation Planning. SRDP shall provide requirements for the PST and OT interfaces, which shall capture the scientific intent of the user, ensuring the intent is preserved in all downstream processing so that correct products are generated.	Inspect requirements provided to ALMA and VLA and validate results.	I/T		
AD3 2.3.2 para 1	ON06-001		Archive Interface. SRDP shall provide an archive interface to serve as a user's primary means of finding, creating and accessing science-ready products. The archive interface shall provide data and product discovery capabilities, product inspection facilities, and an interface through which custom products may requested.	Demonstrate the breadth and usefulness of archive access, testing for accurate delivery of requested products.	D/T		
AD3 2.3.3 para 1	ON07-001		Weblog The Weblog interface shall be refined and augmented by the SRDP project to provide utility and usability.	Demonstrate and test weblog for stated utility and usability (Metric TBD)	D/T		
AD3 2.3.4 para 1	ON08-001		Helpdesk The Helpdesk shall be updated to allow for automatic updating and simplification of SRDP workflows.	Create help desk tickets which exercise all of the triggers and branches required by the SRDP workflows	T		
AD3 2.3.5 para 1	ON09-001		Workflow Management Interface The workflow management interface shall be used by operations staff to monitor and control the flow of SRDP generation throughout the workflow lifecycle.	Demonstrate all associated interfaces and triggers with the workflow manager, assuring all the logic in all paths is robust and workflows complete as designated	D/I/T		
AD3 2.6 para 3	ON10-001		Quality Assurance The SRDP Project shall determine the [scientific quality] limits of the product and ensure that unwanted artifacts are not present. In cases where the user is working directly with the operations staff on a particular product, the user shall be involved in the QA process to determine if the product is suitable for their needs.	Review the QA product criteria and process definition to ensure that communication with the user is incorporated	D/I		
Use case 1 3.1 para 1 2.4.1 para 1	UC01-0001		Standard Calibration The SRDP shall provide standard science-quality calibration only for observations that conform to SRDP validated proposals submitted to NRAO telescopes.		D		
Use case 1 3.1 para 1	UC01-0002		Standard Calibration The SRDP project shall have, through representatives at the NAASC, the ability to insert requirements to the ALMA process.		I		
Use case 1 2.4.1 para 2 3.1 para 2	UC01-0003		Standard Calibration The SRDP Proposal process shall allow the user to "opt out" of the standard calibration process, with documentation to justify the decision. Such proposals shall inhibit automatic trigger of the Standard calibration pipeline.				
Use case 1 3.1 2.4.1 para 2	UC01-0004		Standard Calibration SRDP compliant proposals shall include adequate information for creation of scheduling blocks and observing scripts.	SRDP Proposals are to be screened for adequate information to create scheduling blocks and observing scripts.	I		
Use case 1 3.1 para 1	UC01-0005		Standard Calibration Data processing effort managed by the SRPD project shall continue to meet the NAASC commitments for quality assurance of the ALMA products.		D		

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Use case 1 3.1 para 2	UC01-0006		Standard Calibration When a conforming observation is complete, and necessary meta-data for successful calibration is available, the observation shall be automatically triggered for calibration (as opposed to waiting for a request from the user).		D/T		
Use case 1 3.1 para 2	UC01-0007		Standard Calibration Auxiliary data such as calibrator fluxes, antenna positions, and known defective equipment shall be automatically considered as part of the calibration and should not require any additional effort on the part of the telescope user.		D		
Use Case 1 3.1 para 3	UC01-0008		Standard Calibration Calibrations shall represent observatory recommended best practices at the time of execution (and thus will evolve over time).		D		
Use Case 1 3.1 para 3	UC01-0009		Standard Calibration SRDP Calibrations shall be congruent to calibrations which could be performed by an individual user.		D		
Use Case 1 3.1 para 3	UC01-0010		Standard Calibration Every calibration shall be assessed for quality, and those projects for which the initial calibration are not judged to be of science quality should be identified for further intervention.		D/T		
Use Case 1 3.1 para 3	UC01-0011		Standard Calibration Any flags applied shall be captured in such a manner that the flags can be re-used by subsequent recalibrations (see section 3.6).		D/T		
Use Case 1 3.1 para 3	UC01-0012		Standard Calibration The system shall maximize the utility of interventions in recalibration by facilitating the reuse of manually generated information.		D/T		
Use Case 1 3.1 para 4	UC01-0013		Standard Calibration Once a science-quality calibration has been generated for a particular observation, the calibration products, flagging information, and logs shall be ingested to the archive and the telescope user notified via help desk.		D/T		
Use Case 1 3.1 para 4	UC01-0014		Standard Calibration The archive shall store sufficient meta-data to provide provenance for the calibrated products, and to promote identification of suspect products based on defects found at later times.		D		
Use Case 1 3.1 para 4	UC01-0015		Standard Calibration Products for which a science quality calibration is not possible shall be designated as such in the archive to prevent repeated attempts to calibrate such observations.		D		
Use Case 1 3.1 para 4	UC01-0016		Standard Calibration Categories for failure shall be identified and metrics derived in order to allow the Observatory to address common failure modes.		I		
Use Case 1 3.1 para 4	UC01-0017		Standard Calibration The latency between the completion of the observation and the delivery of products shall be measured.		D/T		
Use Case 1 3.1 para 5	UC01-0018		Standard Calibration The user shall be able to access the calibration and quality assessment results through the archive interface.		D		
Use Case 1 3.1 para 5	UC01-0019		Standard Calibration The calibration record shall be hierarchical in nature to support both summary and detailed views in order to support a wide range of expertise in the user community.		I		
Use Case 1 3.1 para 5	UC01-0020		Standard Calibration To facilitate remote exploration of data within the archive interface, the calibration record shall make use of "Data Driven Documents" or other similar visualization technology where possible.		D		
Use Case 1 3.1 para 5	UC01-0021		Standard Calibration Quality metrics shall be clearly identified and scores derived to simplify comprehension.		D/I		
Use Case 1 3.1 para 5	UC01-0022		Standard Calibration Where possible, physical quantities shall be displayed in the Weblog as well as the normalized scores.		D/I		
Use Case 1 3.1 para 6	UC01-0023		Standard Calibration The helpdesk interface shall allow the PI to provide feedback on the calibration for a particular observation and request an improved calibration be performed.		D/T		
Use Case 1 3.1 para 6	UC01-0024		Standard Calibration Processes to simplify improved calibration when required, both for the PI and the Observatory shall be in place, as well as a mechanism for designating the resulting calibration as the primary calibration for the observation.		D/T		
Use Case 2 3.2 para 1	UC02-0001		Standard Imaging The standard imaging process shall automatically be triggered for observations supported by SRDP once the standard calibration has passed quality assurance.		D/T		
Use Case 2 3.2 para 1	UC02-0002		Standard Imaging The observing proposal shall define specifically the product desired.		I		

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Use Case 2 3.2 para 1	UC02-0003		Standard Imaging Combined imaging of multiple executions of the same scheduling block in the same configuration shall be supported, provided that the desire for this product is identified as part of the observing proposal.		D/T		
Use Case 2 3.2 para 1	UC02-0004		Standard Imaging When combined imaging of multiple executions is requested the SRDP project shall provide the capability to omit the imaging of the individual executions.ee		I		
Use Case 2 3.2 para 2	UC02-0005		Standard Imaging The standard imaging use case shall be designed to populate the archive with consistent high-quality images that can be used for science research.		I		
Use Case 2 3.2 para 2	UC02-0006		Standard Imaging For the telescope user, standard imaging products shall provide at a minimum a quick check of the calibration quality and default image.		D/I		
Use Case 2 3.2 para 3	UC02-0007		Standard Imaging To support Archive users, the standard products shall be quality assured, with a well understood flux scale and enough information to determine if an optimized image generated from the same data would be useful for their application.		D/I		
Use Case 2 3.2 para 4	UC02-0008		Standard Imaging The definition of standard image products shall balance the requirements of the telescope use, the desire for a rich and homogenous archive, and resource constraints both in the generation and storage of products.		D		
Use Case 2 3.2 para 4	UC02-0009		Standard Imaging For all projects, a full bandwidth Stokes I continuum image shall be produced per receiver band, combining multiple pointings in a mosaic, when specified by the project.		D		
Use Case 2 3.2 para 4	UC02-0010		Standard Imaging For fractional bandwidths greater than a threshold value, spectral index maps shall be generated.		D/T		
Use Case 2 3.2 para 4	UC02-0011		Standard Imaging For spectral imaging projects, cubes shall be generated and archived at the spectral resolution specified by the telescope user, provided that the products do not exceed reasonable limits on size and computation resources.		D/T		
Use Case 2 3.2 para 5	UC02-0012		Standard Imaging Projects that cannot conform to the SRDP requirements, shall be able to opt out of SRDP Imaging at the proposal submission stage with a brief description of why SRDP imaging is not appropriate for the project.		D		
Use Case 2 3.2 para 5	UC02-0013		Standard Imaging For proposals conforming to SRDP criteria, sufficient information shall be provided at the proposal stage to capture the proposers' desired imaging product.		I		
Use Case 2 3.2 para 5	UC02-0014		Standard Imaging Parameters for SRDP observations shall specify image characteristics (as opposed to processing instructions) and shall include the desired spatial and spectral resolution (for non-continuum projects), as well as if multiple phase centers are to be imaged separately or are intended to be mosaicked.		I		
Use Case 2 3.2 para 6	UC02-0015		Standard Imaging Operations staff shall perform quality assurance on the products, and communicate with the telescope user through the helpdesk interface. The goal shall be to make standard SRDP images available to the telescope user within 30 days of the required data being acquired at the telescope.				
Use Case 3 3.3 para 1	UC03-0001		Optimized Imaging The Archive interface shall clearly identify data sets for which at least one validated calibration is available, and thus the data is available for generation of an optimized image.				
Use Case 3 3.3 para 1	UC03-0002		Optimized Imaging Generation of calibration for data sets lacking prior calibration shall be easily requested through Archive Interface and trigger the recalibration use case.		D		
Use Case 3 3.3 para 1	UC03-0003		Optimized Imaging The workflow for optimized imaging shall start with validated, calibrated data located in a temporary area.		D		
Use Case 3 3.3 para 2	UC03-0004		Optimized Imaging The archive interface shall allow the user to specify the desired scientific properties of the image (field of view, spectral extent, spectral and spatial resolution, and polarization). Reasonable defaults shall be presented to the user and invalid options hidden. In addition, imaging pipeline parameters shall be optionally specified through this interface.		D/I		
Use Case 3 3.3 para 2	UC03-0005		Optimized Imaging Parameters shall be scientific in nature and not tied to a specific implementation of the imaging process		I		

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Use Case 3 3.3 para 3	UC03-0006		Optimized Imaging Validation on requests for optimized imaging shall be via an automatic validation process, including a check that the data is available, the request is well formed, and user has permission to access the data. In case of error a helpdesk ticket shall be generated and marked for manual follow-up, and the process will wait for manual resolution by operations staff.		D/T		
Use Case 3 3.3 para 3	UC03-0007		Optimized Imaging The workflow management system shall initiate a check for identical reductions to ensure that duplicate images are not produced. If for any reason the request is deemed invalid, the reason shall be displayed clearly through the interface and the user shall be provided the opportunity to either modify the request or automatically transfer the issue to the associated helpdesk ticket.		D/T		
Use Case 3 3.3 para 4	UC03-0008		Optimized Imaging Once the optimized imaging request has been submitted, a NRAO helpdesk ticket shall be automatically created to provide tracking and communication between the SRDP operations staff and the user. This ticket shall be automatically populated with the relevant request information.		D/T		
Use Case 3 3.3 para 5	UC03-0009		Optimized Imaging The workflow process for optimized imaging shall begin by restoring the data (see section 3.5) to the calibrated state, using the appropriate version of CASA and pipeline.		D/T		
Use Case 3 3.3 para 5	UC03-0010		Optimized Imaging The workflow shall allow for optimized imaging to use a custom calibration created through the recalibration workflow (section 3.6), where the associated image product shall be ingested only if a validated calibration is in the archive.		D		
Use Case 3 3.3 para 5	UC03-0011		Optimized Imaging The automated pipeline shall be used to produce optimized images and auxiliary meta-data (such as quality assurance plots and the weblog). When complete, an operations staff member shall be notified via helpdesk that the products are ready for quality assurance		D/T		
Use Case 3 3.3 para 6	UC03-0012		Optimized Imaging Quality assurance processes for optimized images shall maintain the same minimum level of quality as the standard automated products. Any issues with the quality of the product images shall be corrected by the operations staff member, in communications with the requesting, user as necessary.		D		
Use Case 3 3.3 para 6	UC03-0013		Optimized Imaging When the requested image has passed quality assurance, the user shall be notified via helpdesk and the image as well as web-log shall be made available for inspection and download.		D/T/I		
Use Case 3 3.3 para 7	UC03-0014		Optimized Imaging If the user is not satisfied with the product (for whatever reason), they shall have the ability to return to their request or helpdesk ticket through a provided link, modify as necessary and resubmit. A simple mechanism shall be provided to request more assistance through a linked helpdesk ticket mechanism.		D/T		
Use Case 3 3.3 para 7	UC03-0015		Optimized Imaging Strategies shall be provided to limit, or curtail the use of observatory facilities as an open-ended resource commitment for the observatory, both in computing and staffing resources.		D		
Use Case 3 3.3 para 7	UC03-0016		Optimized Imaging If the user determines that a suitable image cannot be produced, this shall be noted in the helpdesk ticket and the request canceled, removing it from the list of pending projects		D		
Use Case 3 3.3 para 8	UC03-0017		Optimized Imaging When the user is satisfied with the image a "validation button" shall be provided to trigger the ingest of the products to the archive (and optional creation of a DOI see 3.10), and the request closed.		D/T		
Use Case 3 3.3 para 8	UC03-0018		Optimized Imaging Ingestion of products shall be subject to the same practical size and resource limits as standard products described in 3.2		D/T		
Use Case 4 3.4 para 1	UC04-0001		Archive Use The Archive shall present a unified interface that supports all requirements pertaining to Use Case 4				
Use Case 4 3.4 para 2	UC04-0002		Archive Use The archive interface shall present an interested user a dynamic form with fields that may be used to search and filter contents of the archive.		D/I		
Use Case 4 3.4 para 2	UC04-0003		Archive Use – Data Discovery Archive search results shall be returned in a table with an initial view of default fields, The fields shall be user configurable to a custom view for registered users that shall persist across searches. The interface shall also support sorting of results one each column.		D/T		

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Use Case 4 3.4 para 2	UC04-0004		Archive Use – Data Discovery The archive interface shall provide a scriptable interface to registered users to execute multiple searches with exportable search results to a CSV file or other file format.		D/T		
Use Case 4 3.4 para 3	UC04-0005		Archive Use – Data Product Visualization The archive interface shall provide: 1. Image thumbnails displayed in context with other catalogs and survey results. 2.Provenance of the data product including links to the original data, other versions of the product as well as information on how the products were created, (processing job information, pipeline version, weblogs, etc.) 3.Related publications, abstract for the project, etc. 4.Online exploration of the data through a web enabled viewer (Such as CARTA or Aladin Lite).		D/I		
Use Case 4 3.4 para 4	UC04-0006		Archive Use – Data Product Visualization The interface shall allow the user to explore data without needing to download large quantities of data, though scientific analysis through this interface may be considered depending on user feedback.		D		
Use Case 4 3.4 para 5	UC04-0007		Archive Use – Data Selection The archive interface shall allow registered users to create a personal list of products that they want to investigate. These lists shall be persisted across login sessions and multiple lists shall be supported. Persistence shall either be specified at the level of the query (in which case the result may change each time the query is executed) or at the level of the results (in which case the result is fixed).		D/T		
Use Case 4 3.4 para 5	UC04-0008		Archive Use – Data Selection Lists of data sets generated within the archive shall be references to permanent objects already stored in the archive, and shall not point to temporary objects on disk.				
Use Case 4 3.4 para 6	UC04-0009		Archive Use – Data Selection The archive shall support annotation and tags assignments on data products. In general, the tags shall be free form, and only visible to the user that creates them.		D/T		
Use Case 4 3.4 para 7	UC04-0010		Archive Use – Data Processing For each selected data product, a set of relevant processing options shall be presented. There shall be options to begin other workflows described here (restore, re-calibration, optimized imaging).		D/T		
Use Case 4 3.4 para 7	UC04-0011		Archive Use – Data Processing The archive shall provide a second class of lightweight product manipulation tasks such as generating a spatial or spectral cutout or providing a moment image, to be applied "on the fly" as part of the export process.		D/T		
Use Case 4 3.4 para 8	UC04-0012		Archive Use – Data Processing Once a job is created on archived data, the archive interface shall provide the user an option to modify the input parameters and review the job prior to submission to the processing queue.		D/T		
Use Case 4 3.4 para 8	UC04-0013		Archive Use – Data Processing The archive interface shall provide status information for the user on each job, links to completed jobs, as well as the weblog for the job.		D/I		
Use Case 4 3.4 para 9	UC04-0014		Archive Use Quality assurance on archive jobs and data products shall be performed by an operations staff member. Additional user review of the products shall be accommodated either through download of the data products or a temporary staging to the NRAO cluster.		D/T		
Use Case 4 3.4 para 9	UC04-0015		Archive Use – Data Processing Once accepted, reprocessed data products meeting the requirements for archiving shall be ingested to the archive. Ingestion of products shall be subject to the same practical size and resource limits as standard products described in 3.2. To ensure the integrity of the product a checksum or other mechanism shall be used to ensure that the archived product matches the one produced by the processing both on ingest and on export		D/T		
Use Case 4 3.4 para 10	UC04-0016		Archive Use – Data Processing Results of data processing on archive jobs shall be temporarily cached, such as caching the results of a custom re-calibration prior to imaging the data.		D/I		
Use Case 4 3.4 para 10	UC04-0017		Archive Use – Data Processing To prevent resource exhaustion, results from reprocessing archive data must be temporary and the automated system shall have the ability to automatically enforce the data retention policy. Warnings shall be issued to the user three days prior to data removal.		D/T		

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Use Case 4 3.4 para 11	UC04-0018		Archive Use – Data Delivery Data products either generated by the data processing or otherwise selected through the interface shall be bound together for delivery. Similar to the shopping cart on most web pages, SRDP shall have the ability for one or more products can be added to the delivery "basket."		D/I		
Use Case 4 3.4 para 12	UC04-0019		Archive Use – Data Delivery Several options shall be made available for delivery of archive data products: 1.A password protected URL that can be directly accessed A download manager capable of starting, pausing, and resuming download 2.Delivery via media shipping 3. Automated staging of data to the users work area either in Socorro or Charlottesville.		D/T		
Use Case 4 3.4 para 13	UC04-0020		Archive Use – Data Delivery Additional modes of data product delivery such as insertion into Amazon S3, or through the XSEDE frameworks shall be considered as experience and user demand dictate.		D/T		
Use Case 4 3.4 para 13	UC04-0021		Archive Use – Data Delivery The data product delivery process shall provide mechanisms to ensure that data corruption through the delivery process is detected.		D/T		
Use Case 5 3.5 para 1	UC05-0001		Restoration The restoration process shall use the appropriate version of the pipeline (as defined by configuration control), retrieve raw data from the archive, restore the flagging state, and apply calibration tables based on the instruction stored with the calibration results.		D/I		
Use Case 5 3.5 para 2	UC05-0002		Restoration The restoration process shall support an option for the stand-alone case to only apply the flags and not apply the calibration.		D/I		
Use Case 5 3.5 para 2	UC05-0003		Restoration In most cases, the stand-alone restore process shall be able to proceed without staff intervention (no quality assurance step is necessary), so no helpdesk ticket will be generated.		D/I		
Use Case 5 3.5 para 2	UC05-0004		Restoration If an error occurs during the restoration case processing, a helpdesk ticket with the relevant information shall be generated for staff troubleshooting and follow-up.		D/T		
Use Case 5 3.5 para 2	UC05-0005		Restoration Calibrated data from the restoration process shall be delivered to the user through the standard data delivery use case.		D/I		
Use Case 5 3.5 para 3	UC05-0006		Restoration When the restoration process is used as the initial step of other processing use cases, helpdesk tickets shall be generated based on the parent use case and used for reporting of any erroneous conditions that occur during the restore process.		D/T		
Use Case 6 3.6 para 3	UC06-0001		Recalibration The workflow for recalibration shall always starts with a user initiated request.		D/T		
Use Case 6 3.6 para 4	UC06-0002		Recalibration A mechanism for the triggering of a recalibration based on search results shall be provided. For each request, the user shall specify: 1 Sufficient identifying information for the data to be located in the archive. 2. The pipeline version (including CASA versions if applicable) to be used. 3.The desired calibrated products (i.e. calibration tables, calibrated measurement set, flagging information) 4.Optional: Additional flagging specification 5.Optional: Calibration strategy modifications 6.Optional: Parameter modifications for the pipeline		D/T		
Use Case 6 3.6 para 5	UC06-0003		Recalibration When none of the optional parameters for recalibration are specified, a check shall be performed to determine if a valid calibration is already available in the archive. If so, jump to the restore use case instead.		D/T		
Use Case 6 3.6 para 6	UC06-0004		Recalibration Once a recalibration request has been submitted, a NRAO helpdesk ticket shall be automatically created to provide tracking and communication between the SRDP operations staff and the user. This ticket shall be automatically populated with relevant the request information.		D/T		
Use Case 6 3.6 para 6	UC06-0005		Recalibration The recalibration request shall be automatically validated, including a check that the data is available, request is well formed, and user has permission to access the data.		D/T		
Use Case 6 3.6 para 6	UC06-0006		Recalibration If for any reason the recalibration request is deemed invalid, the reason shall be specified on the associated helpdesk ticket, helpdesk ticket marked for manual follow-up, and the process should wait for manual resolution by operations staff.		D/I		
Use Case 6 3.6 para 6	UC06-0007		Recalibration If the recalibration job is large (either in number of data sets to be processed, or implied processing time), the request shall be flagged for manual review by the SRDP operations staff.		D/I		

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Use Case 6 3.6 para 7	UC06-0008		Recalibration When manual intervention for recalibration is required, the process shall be executed by the operations staff. The staff member shall work with the user to identify and resolve the issue and then resubmits the job for the user. At this point the process will re-enter the standard workflow.		D/I		
Use Case 6 3.6 para 8	UC06-0009		Recalibration Recalibration requests shall be scheduled for processing and status on the tracking ticket updated to reflect that the job is in the processing queue.		D/T		
Use Case 6 3.6 para 8	UC06-0010		Recalibration Once the recalibration processing workflow completes, the request shall be routed to operations staff for quality assurance. If no errors occurred during processing and no problems are detected in QA, the products shall be made available to the user through the delivery use case.		D/T		
Use Case 6 3.6 para 8	UC06-0011		Recalibration The workflow for recalibration shall provide a feedback mechanism through the helpdesk ticket for users to provide additional feedback, request additional changes, or accept the delivered results. The helpdesk ticket shall not be closed until the products are accepted by the user, or it is determined that satisfactory calibrations are not possible with the data set. At this point, if the products are accepted by the user, then they shall be stored in the archive.		D/T		
Use Case 6 3.6 para 9	UC06-0012		Recalibration Results from recalibration shall only be placed in the archive and made available to other users if only default parameters were specified, or if additional flags were specified to correct an issue not found during initial quality assurance.		D/I		
Use Case 6 3.6 para 9	UC06-0013		Recalibration The calibration product from the recalibration process shall be made available to the user that created it as the basis for a subsequent imaging or other processing step, although again the subsequent products shall not be ingested into the archive.		D/I		
Use Case 6 3.6 para 9	UC06-0014		Recalibration The interface shall provide a mechanism for the user to easily reproduce the same calibration result at a later date.		D/T		
Use Case 6 3.6 para 10	UC06-0015		Recalibration If errors occur during the recalibration process, or problems are detected by operations staff as part of the QA process, operations staff shall assess the issue and in consultation with the user where appropriate either cancel the request, or resubmit it after resolving the issue		D/T		
Use Case 6 3.6 para 11	UC06-0016		Recalibration – Batch Recalibration As with Standard Calibration, batch recalibration is an observatory function. Since no external user-trigger is involved, a helpdesk ticket is shall not be created.				
Use Case 6 3.6 para 11	UC06-0017		Recalibration – Batch Recalibration Staff members shall be able to identify datasets affected by pipeline errors for batch recalibration with an updated pipeline when a problem is identified.		D/I		
Use Case 6 3.6 para 11	UC06-0018		Recalibration – Batch Recalibration The batch recalibration process shall be managed through the workflow system, tracking all affected observations and managed submission of jobs to prevent overwhelming processing resources.		D/I		
Use Case 6 3.6 para 11	UC06-0019		Recalibration – Batch Recalibration Erroneous archival calibrations shall be identified as no longer valid to prevent use of erroneous calibration .		D/I		
Use Case 7 3.7 para 1/2	UC07-0001		Combined Imaging Combined Imaging shall combine data from different array configurations (VLA, ALMA), also including Total Power (possibly) for the final ALMA images.		D/I		
Use Case 7 3.7 para 3	UC07-0002		Combined Imaging – Case 1 When a telescope user proposes Combined Imaging for a project that includes multiple configurations (VLA and ALMA) as well as possibly total power (ALMA). The proposal tool shall automatically group the observations together and ensure that the spatial and spectral coordinates of the observation are consistent between the different epochs of observation. Total integration times for each configuration shall be set according to observatory determined ratios.		D/T		
Use Case 7 3.7 para 4	UC07-0003		Combined Imaging – Case 1 As each configuration is completed the data for the Combined Imaging process shall be calibrated and imaged independently using the resolution and pixel size most appropriate for the configuration, but with phase-center, field of view, and spectral axis of the common objective.		D/I		

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Use Case 7 3.7 para 4	UC07-0004		Combined Imaging – Case 1 This Combined Imaging process shall follow the standard and optimized imaging use cases discussed above.		D/I		
Use Case 7 3.7 para 5	UC07-0005		Combined Imaging – Case 1 When the single epoch calibration and imaging for all configurations are complete, the data from all configurations shall be imaged jointly to create the combined Image, using the same spatial and spectral axes as for the individual configurations.		D/I		
Use Case 7 3.7 para 5	UC07-0006		Combined Imaging – Case 1 The Combined Imaging process shall allow the PI to specify an additional recalibration step to normalize flux scales, correct weighting issues, or otherwise normalize the data. The PI shall be able to specify the same imaging parameters as in the standard and optimized imaging cases specified above.		D/I		
Use Case 7 3.7 para 6	UC07-0007		Combined Imaging – Case 1 For standard products, the Combined Imaging process shall incorporate current best practices for combining ALMA interferometric and total power data shall be used (currently feather), while multiple options may be presented for optimized imaging cases..		D/I		
Use Case 7 3.7 para 6	UC07-0008		Combined Imaging – Case 1 Diagnostic plots for the combined imaging shall be produced and included in the weblog		D/I		
Use Case 7 3.7 para 7	UC07-0009		Combined Imaging – Case 2 The Combined Imaging process shall be able to input calibrated data sets both from the user's cache space and from data currently in the archive.		D/I		
Use Case 7 3.7 para 9	UC07-0010		Combined Imaging – Case 2 The Combined Imaging process shall image calibrated data sets together using the imaging parameters specified by user. Unlike Combined Imaging Use Case 1, the spatial and spectral co-ordinates of the product cannot be deduced from the parent project and shall be explicitly set by the user.		D/I		
Use Case 7 3.7 para 9	UC07-0011		Combined Imaging – Case 2 Parameters selected for Combined Imaging shall be suitable for all data sets, and should be validated both for applicability and to ensure that the implied requested re-gridding is within tolerance. For example, the channel width shall not be smaller than that of the coarsest spectral resolution data.		D/I		
Use Case 7 3.7 para 10	UC07-0012		Combined Imaging In both Combined Imaging use cases the resulting image shall be ingested into the archive provided that the calibration used on the input data sets is available from the archive.		D/I		
Use Case 8 3.8 para 1-4	UC08-0001		Time Critical Observations The proposal submission tool shall flag Time Critical use cases, as indicated by the telescope using during proposal submission. The Time Critical flag shall persist throughout the lifecycle of the project and be made available to the data processing subsystems. The proposal submission tool shall allow the telescope user to specify which data products should be treated as time critical: calibrated visibilities, quick-look images, or science-ready images. As with the standard calibration and imaging use cases, for SRDP products to be generated the user shall conform to standard observing templates, and specify the characteristics of the desired imaging products.		D/T		
Use Case 8 3.8 para 4	UC08-0002		Time Critical Observations The Time Critical process shall permit application of a lightly cleaning process optimized for speed rather than maximum quality, to create Quick-look images.		D/I		
Use Case 8 3.8 para 5	UC08-0003		Time Critical Observations Processing Time Critical proposals shall begin as soon as data is available. The standard calibration and imaging use cases shall be invoked for Time Critical projects as well. In the Time Critical case, both the clearly identified rapid reduction, and the later improved reduction shall be archived.		D/T		
Use Case 8 3.8 para 6	UC08-0004		Time Critical Observations The workflow manager shall notify the PI immediately when calibration or imaging products are available, with specific notice that the products have not been quality assured.		D/T		
Use Case 8 3.8 para 6	UC08-0005		Time Critical Observations In cases of reduction failure, a high priority notification to operations shall be made so that appropriate manual mitigation can be done. Note that this may occur outside of normal business hours.		D/T		
Use Case 8 3.8 para 7	UC08-0006		Time Critical Observations As for the data delivery use case, The interface shall allow data assessment through the weblog, and remote viewing or transfer of image subsets.		D/T		

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Use Case 9 3.9 para 1-3	UC09-0001		Large Projects The Large Projects process shall submit a data management plan and data release policy for data products generated during execution of the project in the observing proposal. Description of the data products and approximate size shall be included in all future proposals. Large projects shall be encouraged to work with the SRDP project to maximize the scientific return to the community. The solicitation for large proposals and supporting documentation shall be updated to provide supporting information.		D/I		
Use Case 9 3.9 para 4	UC09-0002		Large Projects – Data Acquisition and Workflow The SRDP Operations group shall evaluate each approved Large Project to capture and support specialized structures needed within the archive to make provenance of the eventual products more traceable.		D/I		
Use Case 9 3.9 para 4	UC09-0003		Large Projects – Data Acquisition and Workflow Any Specialized Structures created to support Large Projects shall incorporate additional layers or views on the existing project structures to ensure that data remains discoverable through the non-specialized archive interfaces as well.		D/I		
Use Case 9 3.9 para 5-6	UC09-0004		Large Projects – Data Processing and Quality Assurance Large Project processing shall allow use of use the standard calibration pipeline for the calibration of the data, where the standard calibration workflow (Section 3.1) shall be followed. Large Project processing shall allow use of custom or modified pipelines to process the data and the project team shall be directly involved in the quality assurance process.		D/I		
Use Case 9 3.9 para 7	UC09-0005		Large Projects – Data Processing and Quality Assurance The SRDP system shall allow use of NRAO computing resources for the processing of the large project data provided that required computing resources does not exceed the available resources (including prior commitments).		D		
Use Case 9 3.9 para 8	UC09-0006		Large Projects – Data Release SRDP shall host reasonable volumes of data products for large projects. The large project shall deliver a set of data products with at least meta-data conforming to a standard set defined by the SRDP project.		D		
Use Case 9 3.9 para 8	UC09-0007		Large Projects – Data Release Meta-data specific to the large project, as agreed with the user (but in addition to the standard set defined for SRDP) shall also be stored in the archive.		D		
Use Case 9 3.9 para 8	UC09-0008		Large Projects – Data Release Large project data in the archive shall be marked as having received QA from the project team.				
Use Case 9 3.9 para 8	UC09-0009		Large Projects – Data Release The archive interface shall provide a dedicated search interface that allows searching on the project meta-data as well as on the standard meta-data. This service may also be used by the project to describe the data, link to relevant publications, or otherwise provide branding and context for the results.		D		
Use Case 9 3.9 para 9	UC09-0010		Large Projects – Data Release Data sets produced by a large project may include standard types of products such as images and catalogs, and may also include other products. Archive support for non-standard data products shall be decided on a case by case basis.		D		
Use Case 9 3.9 para 10	UC09-0011		Large Projects – Commensal Projects (Future) Commensal projects shall identify the products and the release process as part of the negotiations with NRAO as the project is initiated.		D		
Use Case 9 3.9 para 10	UC09-0012		Large Projects – Commensal Projects For existing projects the SRDP project will work with the project to identify and ingest appropriate products.		D		
Use Case 10 3.10 para 1	UC010-0001		Curation and Reproducibility The SRDP shall be structured to provide the means that the observatory has the full history of the processing done in producing a particular product and the means to reproduce the result if necessary.		D		
Use Case 10 3.10 para 2-3	UC010-0002		Curation and Reproducibility Processing performed by CASA and the pipeline shall be described in a publically accessible, and preferably referenceable location.		D		
Use Case 10 3.10 para 2-3	UC010-0003		Curation and Reproducibility Individual data products, and the processing history, shall have permanent data locators to allow citation in publications.		D		

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Use Case 10 3.10 para 3	UC010-0004		Curation and Reproducibility Standards for the use of Digital Object Identifiers (DOIs) as persistent identifiers for astronomical data sets are still being developed in the community, and the SRDP project shall conform to best practices as they emerge.		D		
Use Case 11 3.10 para 1	UC011-0001		Commissioning and Validation Throughout the SRDP project, the heuristics and operations teams shall be able to test, commission, and validate portions or the entire system prior to release for general use.		D		
Use Case 11 3.10 para 2	UC011-0002		Commissioning and Validation The primary method of assuring the testability shall be the development of a written test plan as part of the development of each L1 functional requirement. However, there are several systemic capabilities that are required in support of commissioning.		D		
Use Case 11 3.10 para 2.1	UC011-0003		Commissioning and Validation SRDP workflows shall be executable with candidate versions of the software. The products generated by this software shall not be exposed as SRDP products in the standard data discovery interfaces. Note: If a duplicate or test system is used to fulfill some or all of these requirements (UC011-0003-0007) the test system shall be identical in order to avoid unanticipated deployment issues.		D		
Use Case 11 3.10 para 4	UC011-0004		Commissioning and Validation Some additional meta-data such as the paths to data and working area shall be captured to allow complete scripts to be produced and not require manual editing by the user before execution.				
Use Case 11 3.10 para 2.2	UC011-0005		Commissioning and Validation SRDP workflows shall be executable in fragments to optimize testing.		D		
Use Case 11 3.10 para 2.3	UC011-0006		Commissioning and Validation It shall be possible to modify the system without losing the current execution state, or in such a way that the state information can be recaptured.		D		
Use Case 11 3.10 para 2.4	UC011-0007		Commissioning and Validation The execution environment shall need to be modified to accommodate testing.	Probably needs clarification beyond only one example	D		
Use Case 11 3.10 para 5	UC011-008		Commissioning and Validation SRDP processes shall allow for users to download test scripts.		D		