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SRDP

Acronyms and Lexicon

530-SRDP-028-MGMT

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Change Record

Version	Date	Author	Affected Section(s)	Reason
I			All	Initial Draft

Contents

1 Abbreviations & Acronyms

AAS	American Astronomical Society
AAT	Archive Access Tool
AD	Assistant Director
AIPS	Astronomical Image Processing Software
ALMA	Atacama Large Millimeter-Submillimeter Array
AOC	Array Operation Center
AOI	ALMA Optimized Imaging
ASDM	ALMA Science Data Model
AUDI	ALMA User Driven Imaging
AUI	Associated Universities Inc.
AWS	Amazon Web Services
BDF	Binary Data Format
BDP	Basic Data Product
BI	Broader Impact
CA	Cooperative Agreement
CAP	Contracts and Procurement
CATE	Cost and Technical Evaluation
CASA	Common Astronomy Software Applications
CBE	Correlator Backend
CCB	Change Control Board
CDL	Central Development Laboratory
CIRADA	Canadian Initiative for Radio Astronomy Data Analysis
CIS	Computing Information Services
CMIB	Correlator Monitor and Control Interface Bus
CoDR	Conceptual Design Review
CHTC	Center for High Throughput Computing
CSA	Continuing Support Agreement
CSP	Central Signal Processor
CSV	Comma Separated Value
CV	Charlottesville Site
DOI	Digital Object Identifier
DMS	Data Management and Software
DO	Director's Office
DSOC	Domenici Science Operations Center
DSS	Dynamic Scheduling System
EB	Execution Block

ECO	Engineering Change Order
EDP	Enhanced Data Products
EOC	Extension and Optimization of Capabilities
EPO	Education and Public Outreach
ESS	Environmental Safety and Security
EVM	Earned Value Management
FDR	Final Design Review
FITS	Flexible Image Transport System
FMECA	Failure Modes Effects and Criticality Analysis
FRB	Fast Radio Burst
FTE	Full Time Equivalent
GBO	Green Bank Observatory
GMVA	Global 3mm Millimeter VLBI Array
HPC	High Performance Computing
HR	Human Resources
HTC	High Throughput Computing
ICD	Interface Control Document
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
IMS	Integrated Master Schedule
INCOSE	International Council on Systems Engineering
IPT	Integrated Product Team
ISO	International Organization for Standards
JAO	Joint ALMA Observatory
KPP	Key Performance Parameter
L0	Concept, Use Case, and Stakeholder Level Requirement
L1	System Level Requirement
L2	Subsystem Level Requirement
LAST	Local Apparent Sidereal Time
LO	Local Oscillator
LOE	Level of Effort
LSP	Legacy Science Program
LST	Local Sidereal Time
M&C	Monitor & Control
M&S	Material and Services
MBSE	Model Based Systems Engineering
MFS	Multi Frequency Synthesis
MOE	Measure of Effectiveness

MOP	Measure of Performance
MOS	Measure of Suitability
MOU	Memorandum of Understanding
MOUS	Member Observation Unit Set (ALMA)
MREFC	Major Research Equipment and Facility Construction
MS	Measurement Set
MTMFS	Multi-Term MFS
MVP	Minimum Viable Product
NAASC	North American ALMA Science Center
NGAS	Next Generation Archive System
ngVLA	next generation VLA
NMASC	New Mexico Array Science Center
NRAO	National Radio Astronomy Observatory
NRC	National Research Council of Canada
NSF	National Science Foundation
NTC	NRAO Technology Center
ODI	Office of Diversity and Inclusion
OODT	Object Oriented Data Technology
OPT	Observation Preparation Tool
ORR	Operations Readiness Review
OST	Observer Support Tool
OT	Observing Tool
OUS	Observing Unit Set
OWG	Operations Working Group
PB	Primary Beam
PBT	Proposal Builder Tool
PDR	Preliminary Design Review
PEP	Project Execution Plan
PHT	Proposal Handling Tool
PI	Principal Investigator
PL	Project Leader
PM	Project Management/Manager
PMD	Program Management Department
PMBoK	Project Management Body of Knowledge
PMI	Project Management Institute
PMP	Project Management Plan
POC	Point of Contact
POP	Program Operating Plan

PPI	Post Processing Interface
PSF	Point Spread Function
PST	Proposal Submission Tool
QA	Quality Assurance
QC	Quality Control
QSU	Quarterly Status Update
R&D	Research and Development
RACI	Responsible Accountable Consulted Informed (matrix/chart)
RADIAL	Radio Astronomy Data Imaging and Analysis Lab
RADSCE	Radio Astronomy Data Science Center of Excellence
RAOC	Remote Array Operation Center
RF	Radio Frequency
RFI	Radio Frequency Interference
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Quotation
RID	Review Item Discrepancy
ROM	Rough Order of Magnitude
RVTM	Requirements and Verification Traceability Matrix
SAC	Science Advisory Council
SADC	Serial ADC
SB	Scheduling Blocks
SBA	Short Baseline Array
SCT	Source Catalog Tool
SDM	Science Data Model
SE	Systems Engineering/Engineer
SEMP	Systems Engineering Management Plan
SIS	Scientific Information Services
SIS	Semiconductor–Insulator–Semiconductor
SO	Socorro Site
SOP	Standard Operating Procedure
SOS	Small Operations Center
SOUS	Science Observation Unit Set (ALMA)
SOW	Statement of Work
SPI	Software Process Improvement
SQA	Software Quality Assurance
SRAO	Science Ready Archive and Operations
SRDP	Science Ready Data Products

SRP	Science Review Panel
SRR	System Requirements Review
SSA	Science Support & Archive
SSR	Science Support & Research
STEAM	Science Technology Engineering Arts Mathematics
STEM	Science Technology Engineering Mathematics
StRR	Stakeholder Requirements Review
SySML	Systems Engineering Extensions to UML
SWEBoK	Software Engineering Body of Knowledge
TAC	Time Allocation Committee
TPM	Technical Performance Measure
TTAT	Telescope Time Allocation Tools
TTO	Technology Transfer Office
UML	Universal Modeling Language
URSI	Union Radio-Scientifique Internationale
UVa	University of Virginia
VLA	Very Large Array
VLASS	VLA Sky Survey
VLBA	Very Long Baseline Array
VLBI	Very-Long-Baseline Interferometry
VO	Virtual Observatory
WBS	Work Breakdown Structure
XSEDE	Extreme Science and Engineering Discovery Environment

2 Lexicon

AAT/PPI Release

Archive Access Tool / Post Processing Interface Code base that is validated by an ORR and made available for general use

Agile

Methodology for adaptive development, typically used for software

Array Maintenance

Monitoring of performance, preventive maintenance, and reactive maintenance of the array by engineers and technicians.

Array Operations

Operations of the array on a day-to-day basis, describing the degree of general automation, the scheduling approach, and operational overheads.

Astro2020

Astronomy and Astrophysics (Astro2020) Decadal Survey that is conducted by the US National Academy of Sciences.

Capability

A set of collective features which provide functionality to a product, either defined in totality or as a subset

CASA Release

Common Astronomy Software Application Code base that is validated by an ORR and made available for general use

Delivery

Code that is ready for validation, multiple deliveries constitute a release

Deployment (Software)

Deployment is the task of releasing code for general use. This typically follows validation to be certain the capabilities function as intended and align with user requirements. Software releases may or may not be deployed. Involves updating the release history

Discovery Driven

A primary mechanism for developing requirements and defining work, typically in an adaptive environment, using rolling wave planning

Earned Value Management (EVM)

EVM is a system of programmatic metrics against project performance. Terminology and EVM Processes are defined in the NDIA EVMS Application Guide, which reflects the EIA-748-C_2013_Standard for an EVM System

SRDP Execution Phase

The SRDP Project lifecycle is defined in three phases; Initiation, Execution, and Transition. The Execution Phase begins with successful completion of CoDR with all open items resolved. The Execution Phase ends when project metrics can inform project leadership that the progressive software deliveries have

met project objectives and SRDP processes have matured to a point of routine operations and are able to sustain further release cycles without further support from the SRDP Project Office.

Feature
A set of collective stories that work together to realize a functional feature

Grooming the Backlog
Re-evaluation and prioritization of the requirements backlog at regular intervals, prior to the start of new work where requirements are then fixed for the duration of the work period

Iteration
A designated unit of time, typically sufficient to develop one or more features; requirements are fixed during an iteration

Key Performance Parameter
KPP – Critical to product performance, each has performance thresholds and objective value, inability to meet any KPP threatens viability and minimum usefulness of the deliverable

Measure Of Effectiveness
MOEs are developed for each of the L0 Requirements

Measure Of Performance
MOP – derived from MOE, a measure of system performance/capability against system level (L1) requirements

Measure Of Suitability
MOS – infrequently used, a measure of usefulness, capability, and operability within the given solution

Technical Performance Measure
TPM - - performance measure of system elements against

Metrics
Metrics can be defined for a number of purposes. Metrics against programmatic processes, requirements, and typically found in use at NRAO. defined for SRDP, for project performance use terminology and EVM Processes defined in the NDIA EVMS Application Guide, which reflects the EIA-748-C_2013_Standard for EVMS

Minimum Viable Product

The capability threshold necessary to enter into an ORR

Plan Driven

A primary mechanism for developing requirements and defining work, typically in a predictive environment, using waterfall planning, well suited to project management

Planning Horizon

The forward boundary in a planning wave where scope

Preliminary Baseline

Project primary constraints (scope, schedule, and budget) and secondary constraints (resources, risk, quality) as reflected in the Project Charter, continue under progressive elaboration until changes stabilize and the baseline is relatively mature. Prior to baseline approval, change control does not apply to the preliminary baseline.

Progressive Decomposition

Requirements are progressively decomposed from L0 to L1/L2 and aligned with the work packages and capability subset to be delivered during a particular planning wave

Progressive Elaboration

Planning packages are decomposed to work packages in alignment with the level of requirement decomposition provided during a particular planning wave.

Quality

SRDP defines Quality as a measure in three areas;
Project Quality Management

Requirements Backlog (progressive software development)

A requirements backlog is used in an adaptive development methodology where requirement management is flexible, unlike a strict waterfall approach. Requirements are queued in a backlog and prioritized for implementation in the ensuing development/deployment cycle. Frequently, not all the requirements can be implemented in the development cycle and lower priority requirements may be carried forward to the next cycle in order to satisfy a fixed release date.

Requirements Management and the Tracking Process

- L0 Requirements will be gathered and analyzed for the following:
    - Degree of overlap between science and use cases
    - Science and use cases that have unique and low priority needs

  - Science and use cases that present conflicting needs
- L0 requirements from science and use cases are rank prioritized and weighted.
- MOEs are developed for each of the L0 Requirements, typically ~ 6/system
- KPPs are identified from the MOEs
- L0 requirements are assigned to an owner who can validate against the MOE and declare the requirement as met
- L0 requirements are entered into the RVTM
- Requirements are analyzed and decomposed from L0 to L1
- MOPs are derived for each of the MOEs and aligned to the L1 Requirements
- L1 requirements are assigned to an owner who can verify/validate against the MOP and declare the requirement as met.
- L1 requirements are entered into the RVTM
- For adaptive software development, L1 Requirements are entered into a rank prioritized backlog
- Requirements are analyzed and decomposed from L1 to L2; and associated with architectural elements, sub systems and/or work packages as a function of system complexity.
- L2 requirements are entered into the RVTM

Rolling Wave Strategy

Strategy used to manage the uncertainty of long term requirements and work package definitions, where these can only be detailed in the short term. Progressive decomposition and elaboration are used to establish planning waves

Specification - In the quality control domain, a stated measurable value with upper and lower control limits

Science Ready Data Products

Metrics on failure rates of overall data traffic, weather, equipment, RFI, etc.

Metrics on Published uses, referenced images, etc.

Scientific Operations

The user-facing services provided by the telescope including observation preparation, scheduling, archive access, scientific performance of the array, and the delivered data products.

Specification

In the quality control domain, a is a stated measurable value with upper and lower control limits

Specification Document

A set of requirements, can be at any requirement level

SRDP Release
Code base that is validated by an ORR and made available for general use

SRDP Roadmap
The full set delivered SRDP capability, partitioned in subsets for the development phase under which each subset will be delivered

Stakeholder Requirements Specification
A set of stakeholder requirements (L0) gathered into a Specification Document

Sub-System Requirements Specification
A set of Sub-system requirements (L2) gathered into a Specification Document

System Requirements Specification
A set of system requirements (L1) gathered into a Specification Document

Story
The smallest unit of functional code, synonymous with a task

Technical Metrics for requirements
see MOE, MOP, KPP, TPM

Technical Specifications
Technical Specifications are derived from the System Requirements, within the functional limits established by the selection of a particular solution

Updated Baseline
Project primary constraints (scope, schedule, and budget) and secondary constraints (resources, risk, quality) as reflected in the Project Charter, continue under progressive elaboration until changes stabilize and the baseline is relatively mature. Prior to baseline approval, change control does not apply to the preliminary baseline.

Work Backlog
The prioritized rank ordered list of capabilities, features, and stories that are scheduled for completion within a given planning wave, delivery, or iteration

WBS
The WBS should drive the requirements

Each WBS work package shall have FTE estimates, which are rolled up to a high-level budget estimate

Traditional – Plan Driven - to capture all the project work and break it down to work packages, elaborated in the WBS Dictionary, costed, sequenced, and scheduled. This forms the PMB, the basis for EVM

WBS Planning Package

The WBS is first established at a high level for planning, before the full extent of detailed work is known. In order to compile a preliminary budget, costs are associated with each package that is defined at this high level. (See WBS Work Package)

WBS Work Package

I found the following typical fan out for metrics, the same fan out applies to Requirement levels.

Requirements Fan out

As requirements are typically structured in a hierarchy, it can be helpful to establish a consistent fan out across a system. This can help to ensure that requirements are being defined with the correct level of decomposition, the breakdown is consistent across different subsystems, and similar levels of complexity are encountered as the integration, verification, and validation processes are executed. A typical ratio is as follows for a system of moderate complexity:

- L0 / MOE 2-12 (~6 per system) these fan out to multiple L1 / MOP
- L1 / MOP 2-10 (~5 per L0 / MOE) these fan out to multiple L2 / TPM
- L2 / TPM 2-6 (~4 per L1 / MOP)

Appendix