

SCRAM PR/AM Appendix E

- ▶ Contains only
 - Purpose
 - Outcomes
 - Base Practices
 - Base Work Products

- ▶ Base Practices and Base Work Products are NOT mandatory but
 - Indicators of achieving
 - SCRAM Process Outcomes and Purpose

- ▶ Missing any of these practices could constitute a risk

- ▶ Recommendation to print Appendix E for reference

Course Outline

Participant Introductions

SCRAM History, Context

Overview of SCRAM Process

Overview of the Root Cause Analysis of Schedule Slippage (RCASS) Model

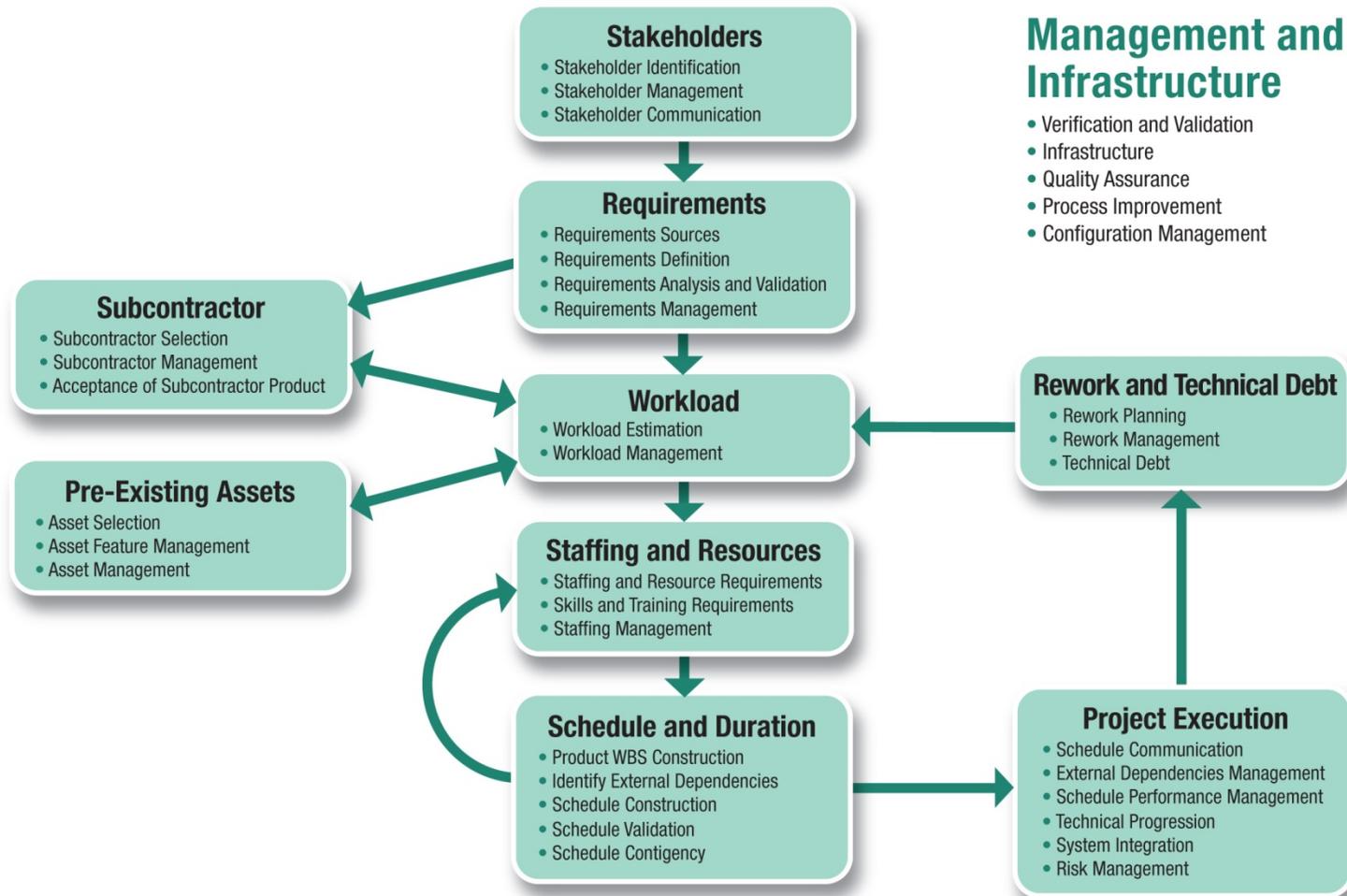
Overview of the SCRAM Process Reference/Assessment Model

RCASS Categories and Processes (with exercises)

Supporting Methods (SRA and Parametric Modelling)

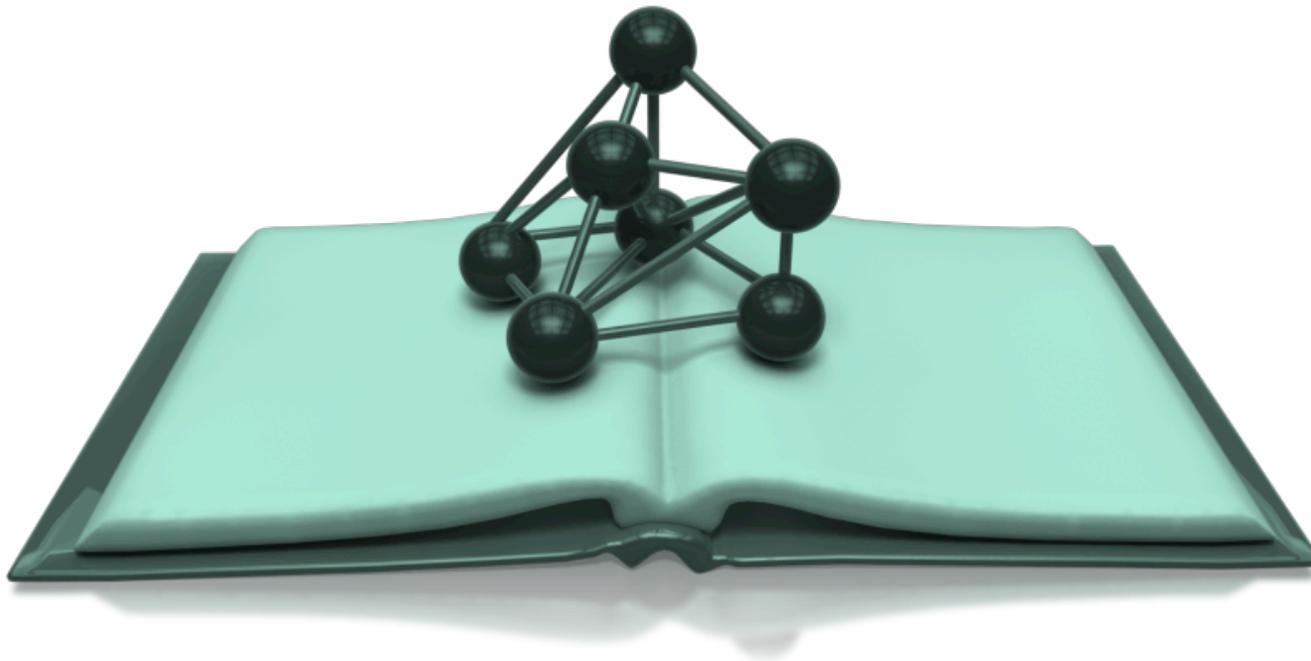
Wrap Up

SCRAM PR/AM Processes

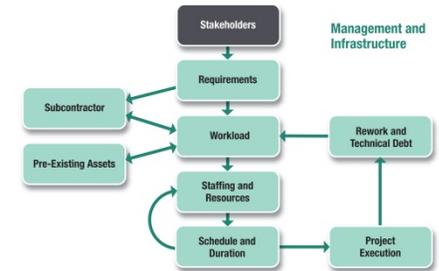


SCRAM Process Reference Model

- ▶ Processes
- ▶ Outcomes



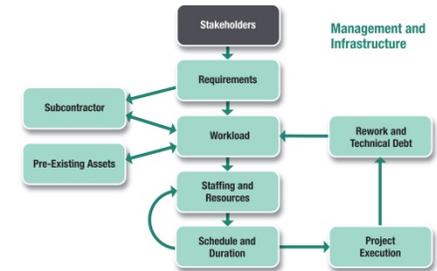
Stakeholders



- ▶ This category reflects project turbulence because of difficulties in synchronizing the project's stakeholders: users, customers, system engineers, developers, maintainers, others.
- ▶ Processes
 - Stakeholder Identification
 - Stakeholder Management
 - Stakeholder Communication



Stakeholder Identification



STK-ID – Stakeholder Identification

Purpose

The purpose of Stakeholder Identification is to identify, categorise and prioritise project stakeholders, understand stakeholder influence on the project and actively seek and communicate the information needs of the stakeholder community and needs of the project

Outcomes

STK-ID-1: Stakeholders are identified

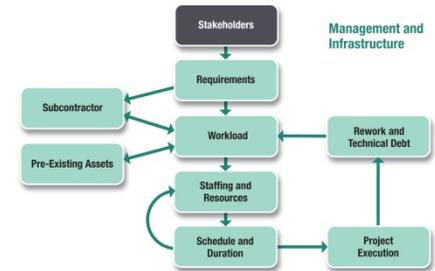
STK-ID-2: Stakeholders are Categorised and Prioritised

STK-ID-3: Stakeholder Relationships to The Project is Understood

STK-ID-4: Stakeholder Needs and Expectations are identified

STK-ID-5: Project Needs and Expectations are identified

Stakeholder Management



STK-MAN – Stakeholder Management

Purpose

The purpose of Stakeholder Management is to engage identified stakeholders, monitor their engagement, ensure the stakeholder community is current, address any issues, and ensure mutual obligation between the stakeholders and the project are identified and agreed.

Outcomes

STK-MAN-1: Stakeholders are engaged

STK-MAN-2: Stakeholder Engagement is monitored

STK-MAN-3: Stakeholder Engagement is reviewed to ensure Stakeholder Needs and Project Needs are met

STK-MAN-4: Stakeholder Issues are identified

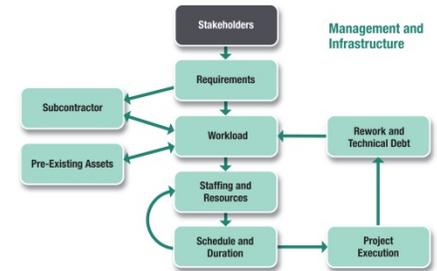
STK-MAN-5: Corrective Actions from Stakeholder Issues are identified, taken and tracked through to closure

STK-MAN-6: Stakeholder Lists are periodically reviewed to identify Changes / Additional Stakeholders

STK-MAN-7: Mutual Obligations between the stakeholders and the project are identified

STK-MAN-8: Mutual Obligations are agreed

Stakeholder Communication



STK-COM – Stakeholder Communication

Purpose

The purpose of Stakeholder Communication is to ensure that the project actively meets the communications needs of its stakeholders by determining who needs what information, when they will need it, how it will be given to them, and by whom.

Outcomes

As a result of successful implementation of this process:

STK-COM-1: Stakeholder Communication Needs are determined

STK-COM-2: Stakeholder Communication Strategies are determined

STK-COM-3: Stakeholder Communication is established

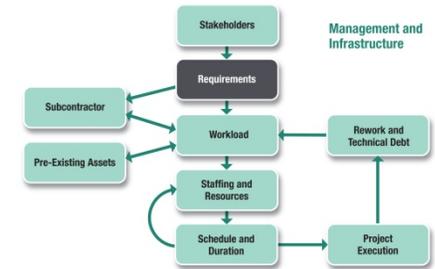
STK-COM-4: Stakeholder Needs and Expectations are communicated to The Project

STK-COM-5 Project Needs and Expectations are communicated to the Stakeholders

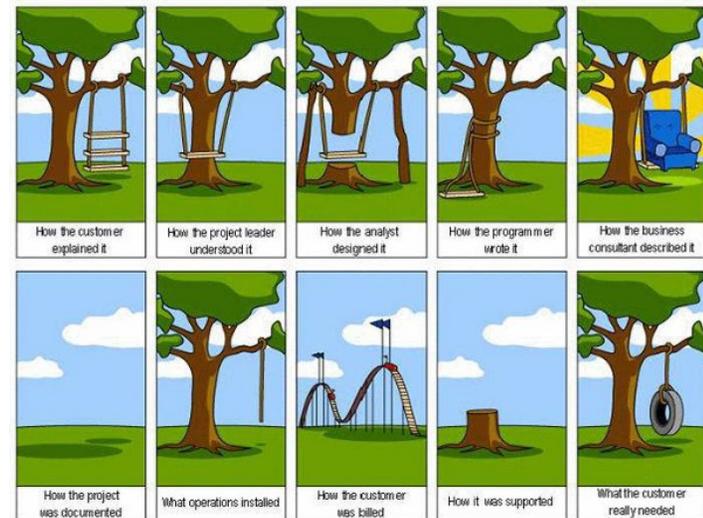
Stakeholder Exercise



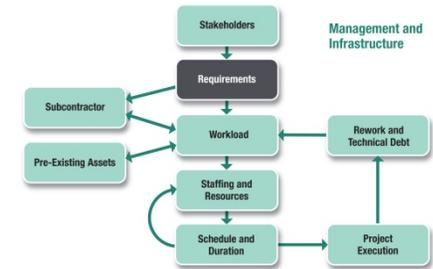
Requirements



- ▶ This category reflects understanding and stability of the functional requirements, performance requirements, system constraints, standards, etc. used to define and bound what is to be developed
- ▶ Processes
 - Requirements Sources
 - Requirements Definition
 - Requirements Analysis & Validation
 - Requirements Management



Requirements Sources



REQ-SRC – Requirements Sources

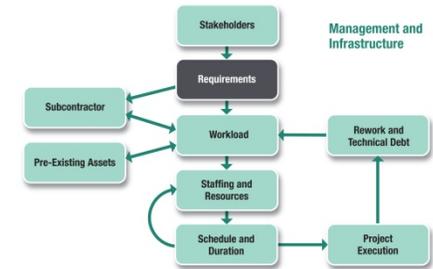
Purpose

The purpose of Requirement Sources is to ensure that all relevant sources of requirements are considered in eliciting and gathering requirements.

Outcomes

- REQ-SRC-1: Capability Definition including Operational Concepts and Environments are established
- REQ-SRC-2: Customer/Stakeholder Product Needs, Expectations and Constraints are elicited
- REQ-SRC-3: Customer/Stakeholder Requirements are established based on Customer/Stakeholder Product Needs, Expectations and Constraints
- REQ-SRC-4: Relevant Legislative and Regulatory Requirements are identified
- REQ-SRC-5: System Assurance Requirements are identified
- REQ-SRC-6: System Integration and Test Requirements are identified
- REQ-SRC-7: Support System Requirements are identified

Requirements Definition



REQ-DEF – Requirements Definition

Purpose

The purpose of Requirements Definition is to establish a baseline of product requirements that reflect the needs, expectations and constraints of customer/stakeholders.

Outcomes

- REQ-DEF-1: Product Requirements suitable for architecture, system and component design are established from Requirements Sources
- REQ-DEF-2: Non-functional Requirements (Quality Attributes) are established
- REQ-DEF-3: Interface Requirements, both internal and external are established
- REQ-DEF-4: Requirements are prioritised
- REQ-DEF-5: Derived Requirements are incorporated into Relevant Requirements Baseline/s
- REQ-DEF-6: Requirements associated with Product Technology Refresh during the product life cycle (including development phase) are considered
- REQ-DEF-7: Requirements Sources are periodically reviewed

Requirements Analysis and Validation

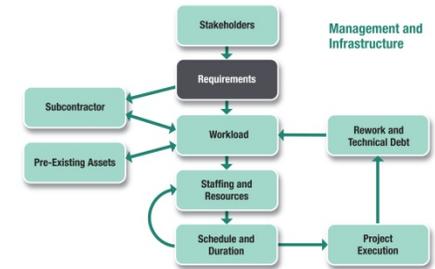
REQ-AV – Requirements Analysis and Validation

Purpose

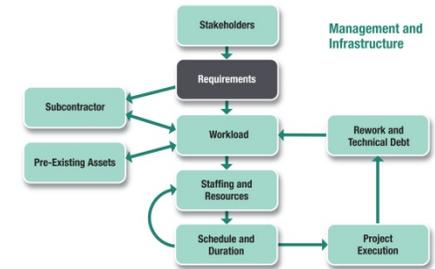
The purpose of Requirements Analysis and Validation is to ensure that the technical requirements are necessary and sufficient to deliver a product that will perform in its intended environment and the schedule impact of the requirements is fully understood.

Outcomes

- REQ-AV-1: Requirements are analysed against Requirements Evaluation and Acceptance Criteria
- REQ-AV-2: Requirements are analysed to trade-off cost and schedule against Customer/ Stakeholder Product Needs, Expectations and Constraints
- REQ-AV-3: Requirements are allocated to functions and product components
- REQ-AV-4: Requirements are validated against Capability Definitions to ensure the product will perform as intended in its target environment
- REQ-AV-5: Requirements that impact risks such as safety, security or performance are identified



Requirements Analysis and Validation



REQ-AV – Requirements Analysis and Validation

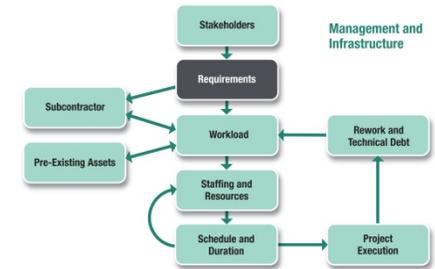
Purpose

The purpose of Requirements Analysis and Validation is to ensure that the technical requirements are necessary and sufficient to deliver a product that will perform in its intended environment and the schedule impact of the requirements is fully understood.

Outcomes

- REQ-AV-6: Requirements that significantly impact cost and schedule are identified
- REQ-AV-7: Technical Performance Measures to be tracked during development are identified
- REQ-AV-8: Changes to Requirements are assessed to determine their impact on the product architecture, design, project cost, schedule and commitments.
- REQ-AV-9: Changes to Requirements are analysed to determine their effect on system functionality, performance and quality

Requirements Management



REQ-AV – Requirements Management

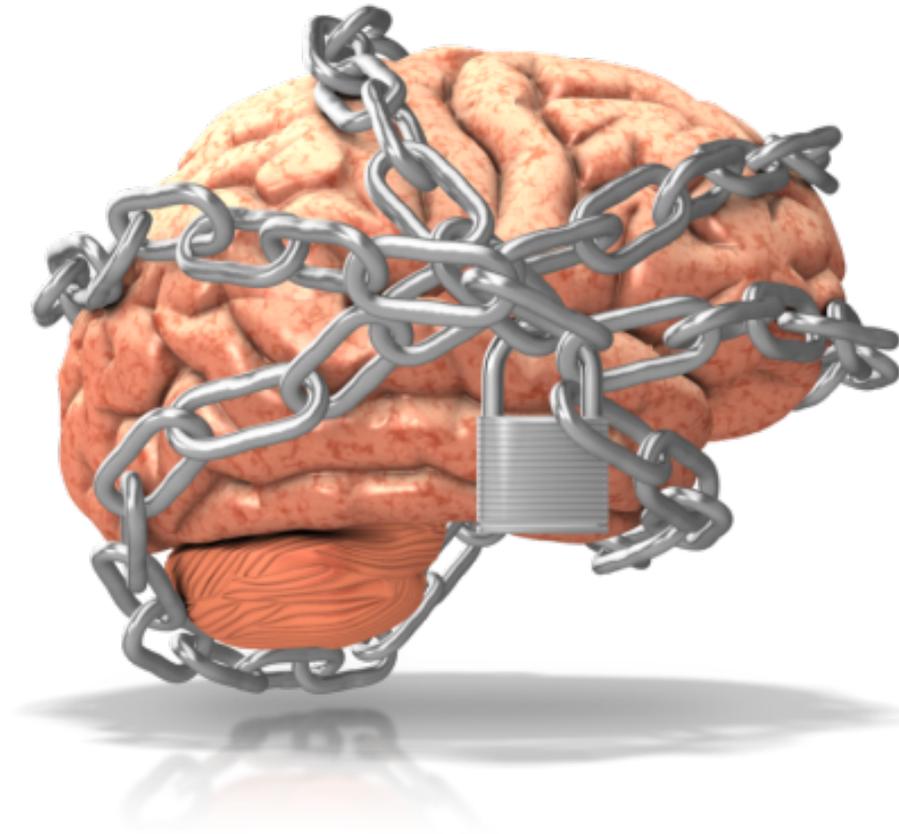
Purpose

The purpose of Requirements Management is to ensure appropriate controls are established to effectively manage the requirements baseline/s.

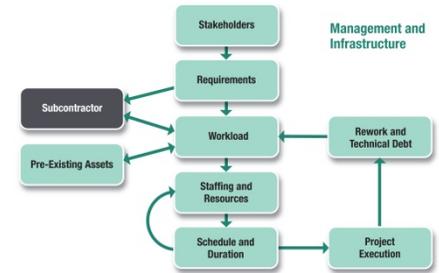
Outcomes

- REQ-MAN-1: A Requirements Change Process is established
- REQ-MAN-2: Requirements and Changes to Requirements are agreed, approved, placed under configuration management and communicated to Stakeholders
- REQ-MAN-3: Bi-directional traceability between requirements and their associated work products is established
- REQ-MAN-4: Project plans and schedules are updated to reflect approved changes to requirements
- REQ-MAN-5: Requirement Stability Measures are established and monitored
- REQ-MAN-6: Significant External and Internal Interfaces are recorded and maintained.

Requirements Exercise



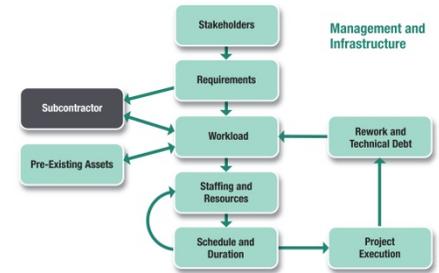
Subcontractor



- ▶ This category reflects subcontractor products or services that will be delivered as a part of the overall software system
- ▶ Processes
 - Subcontractor Selection
 - Subcontractor Management
 - Acceptance of Subcontractor Product



Subcontractor Selection



SUB-SEL – Subcontractor Selection

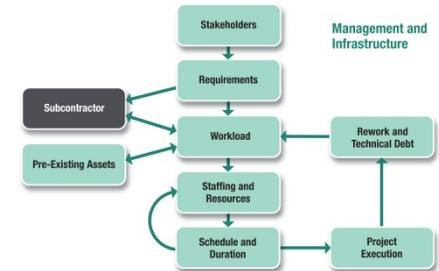
Purpose

The Subcontractor Category reflects subcontractor products or services that will be delivered as a part of the overall software system.

Outcomes

- SUB-SEL-1: A Statement of Work detailing specified Subcontractor Requirements is established
- SUB-SEL-2: Required Subcontractor Processes, Tools and Service Level Measures are established
- SUB-SEL-3: A Mutual Understanding of the Subcontractors Scope of Work is established
- SUB-SEL-4: Subcontractors are selected based on the Subcontractor Ability to satisfy the specified Subcontractor Requirements
- SUB-SEL-5: Subcontractor Agreements are established

Subcontractor Management



SUB-MAN – Subcontractor Management

Purpose

The purpose of Subcontractor Management is to ensure that the subcontractor performs activities, as agreed, to required cost, schedule and quality.

Outcomes

SUB-MAN-1: Subcontractor Agreement Activities are performed

SUB-MAN-2: Subcontractor Schedules are aligned with the Master Project Schedule

SUB-MAN-3: Management Progress Reviews are conducted with the Subcontractor addressing schedule, effort, and cost

SUB-MAN-4: Technical Progress Reviews are conducted with the Subcontractor

SUB-MAN-5: Required Subcontractor Processes, Tools and Service Level Measures are audited for compliance with Subcontractor Agreements

SUB-MAN-6: Subcontractor Risks and Issues are identified

SUB-MAN-7: Corrective Actions from Subcontractor Risks and Issues are identified, taken and tracked through to closure

Acceptance of Subcontractor Product

SUB-ASP – Acceptance of Subcontractor Product

Purpose

The purpose of Acceptance of Subcontractor Product is to ensure the subcontractor has developed and delivers the required product in accordance with the Subcontractor Agreement.

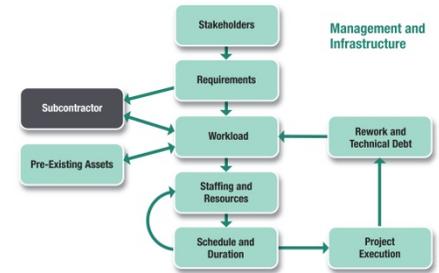
Outcomes

SUB-ASP-1: Product Acceptance Criteria are clearly defined

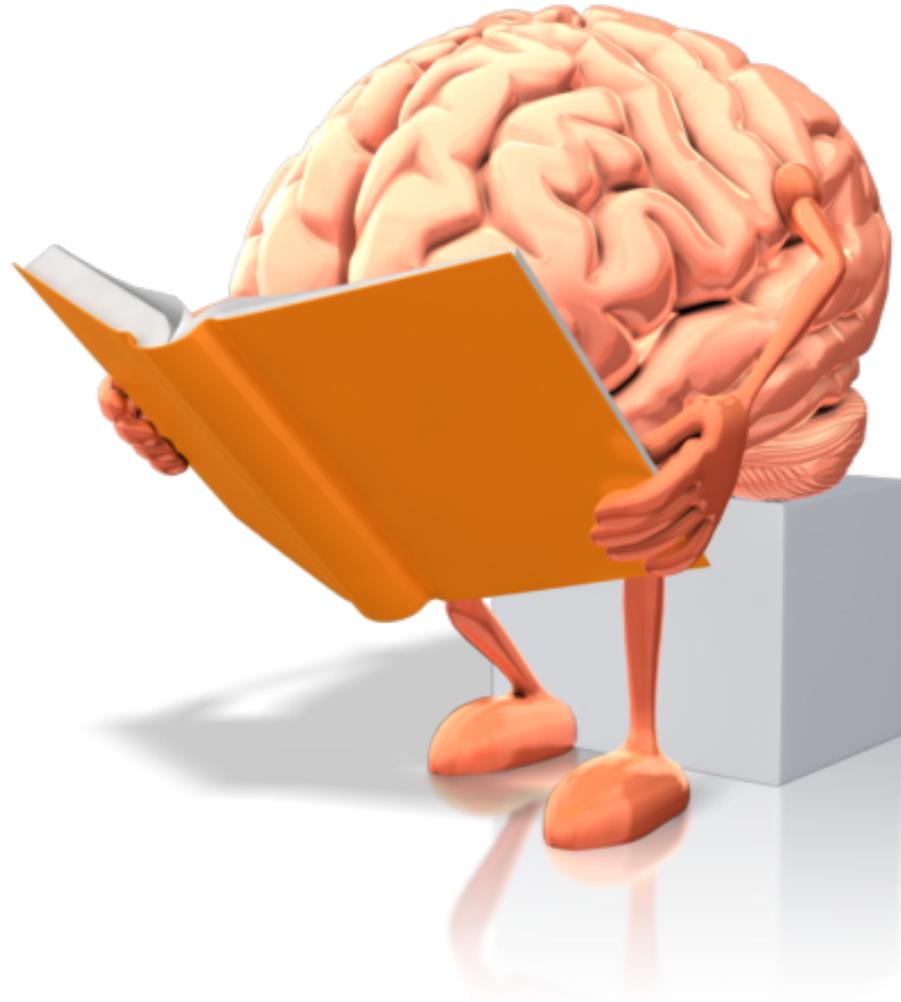
SUB-ASP-2: Subcontractor Verification and Validation Results for the Required Product are reviewed to determine Specification Compliance and to identify any Technical Issues

SUB-ASP-3: The Required Product is verified against the defined Product Acceptance Criteria

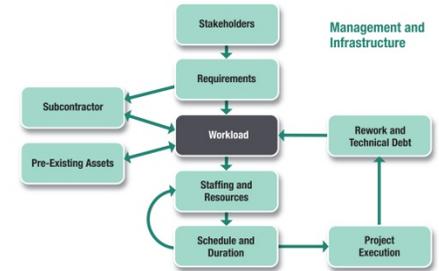
SUB-ASP-4: Required Product Delivery is communicated to Appropriate Stakeholders



Subcontractor Exercise



Workload



- ▶ This category reflects the quantity of work to be done and provides a basis for estimating effort/staffing and duration. Differs by life-cycle phase:
- ▶ Processes
 - Workload Estimation
 - Workload Management



Workload Estimation

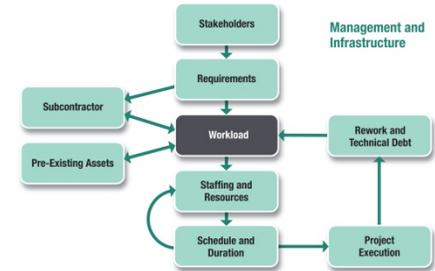
WRK-EST– Workload Estimation

Purpose

The purpose of the Workload Estimation Process is to quantify the amount of work to be done (work units) and provide a basis for estimating effort and duration and for monitoring progress.

Outcomes

- WRK-EST-1: Work Units are identified for each Major Activity
- WRK-EST-2: The Number of Work Units to be completed is estimated
- WRK-EST-3: Work Unit Estimates are decomposed by the Product Work Breakdown Structure
- WRK-EST-4: Work Unit Completion Criteria are defined
- WRK-EST-5: Work Unit Estimates are reviewed and updated on a periodic or event-driven basis



Workload Management

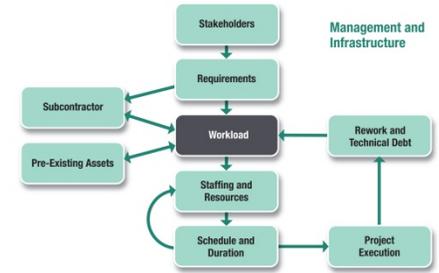
WRK-MAN– Workload Management

Purpose

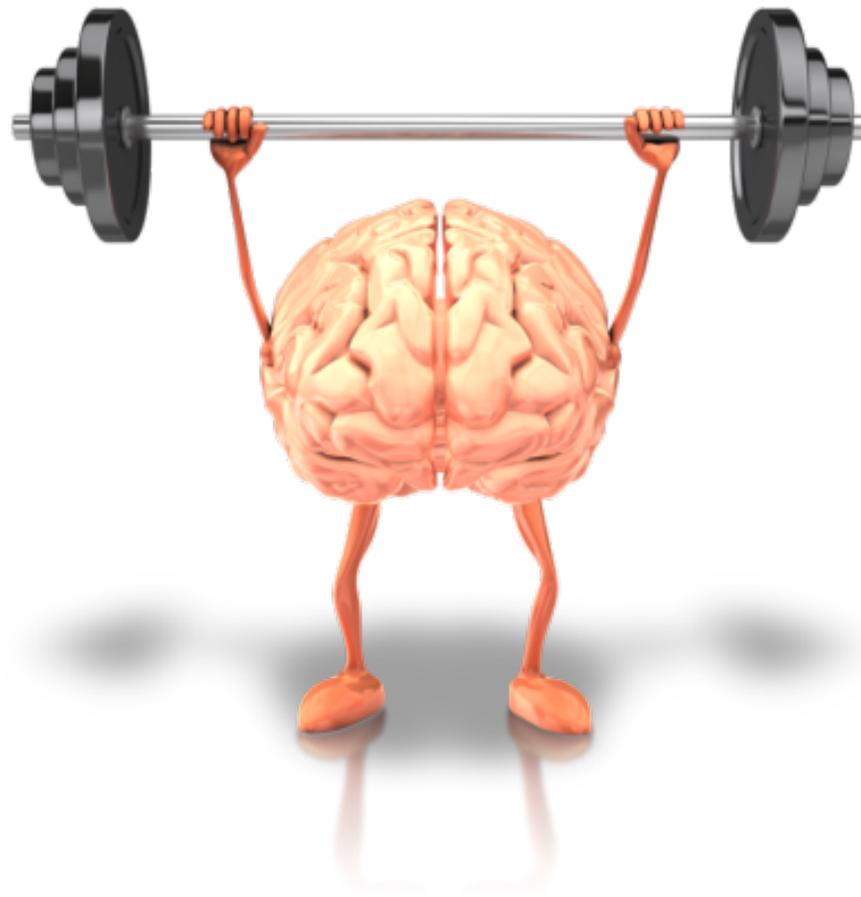
The purpose of Workload Management is to allocate, monitor, and control the work to be performed.

Outcomes

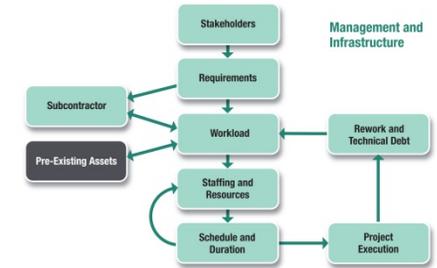
- WRK-MAN-1: Work Unit Productivity Ratios based on Historical Work Unit Productivity Data are established for each Major Activity
- WRK-MAN-2: Time Estimates to complete each Major Activity are produced based on Work Unit Estimates, Work Unit Productivity and Assigned Resources
- WRK-MAN-3: Work Unit Cumulative Construction Curves are developed showing Planned Completion Rate over time



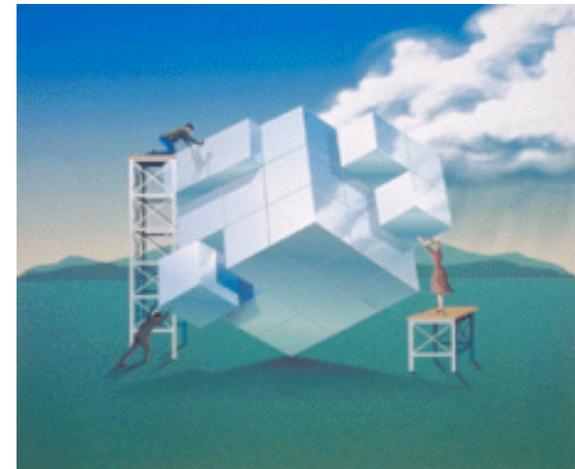
Workload Exercise



Pre-existing Assets



- ▶ This category reflects already developed or independently developed products that will be used in the final software product. If successfully integrated, an asset reduces the amount of new work that has to be done.
- ▶ Processes
 - Asset Selection
 - Asset Feature Management
 - Asset Management



Asset Selection

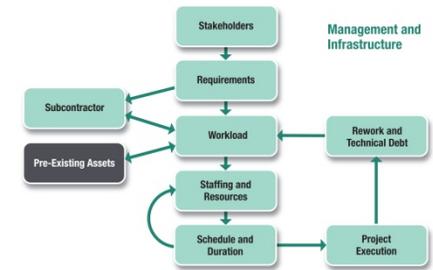
PEA-SEL – Asset Selection

Purpose

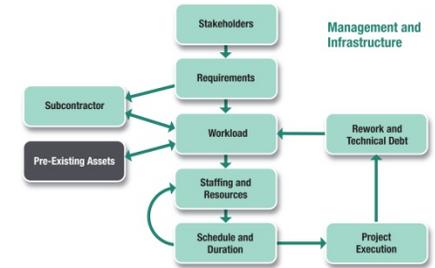
The purpose of Asset Selection is to evaluate pre-existing asset components as candidates for use in the product/system under construction.

Outcomes

- PEA-SEL-1: Candidate Asset Components are identified
- PEA-SEL-2: Candidate Asset Components are assessed to determine their Capability to meet allocated Performance, Functional and Non-Functional Requirements
- PEA-SEL-3: Candidate Asset Components are assessed to determine their Capability to operate in the Operational Platform and Environment
- PEA-SEL-4: Candidate Asset Components are assessed for compliance with Relevant Legislative and Regulatory Requirements
- PEA-SEL-5: Preferred Asset Components are selected
- PEA-SEL-6: Excess Component Functionality is identified and disabled, if necessary, to meet System Assurance Requirements



Asset Feature Management



PEA-AFM - Asset Feature Management

Purpose

The purpose of Asset Feature Management is to monitor the performance of components to meet quality attributes such as availability, reliability, usability, maintainability, adaptability, and composability.

Outcomes

- PEA-AFM-1: Specified Component Thresholds are established
- PEA-AFM-2: Relevant Component Quality Attributes are monitored against Specified Component Thresholds
- PEA-AFM-3: Component Threshold Breaches are identified
- PEA-AFM-4: Corrective Actions from Component Threshold Breaches are identified, taken and tracked through to closure

Asset Management

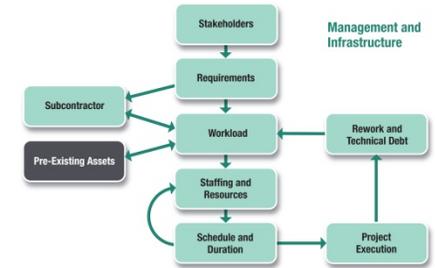
PEA-ASM – Asset Management

Purpose

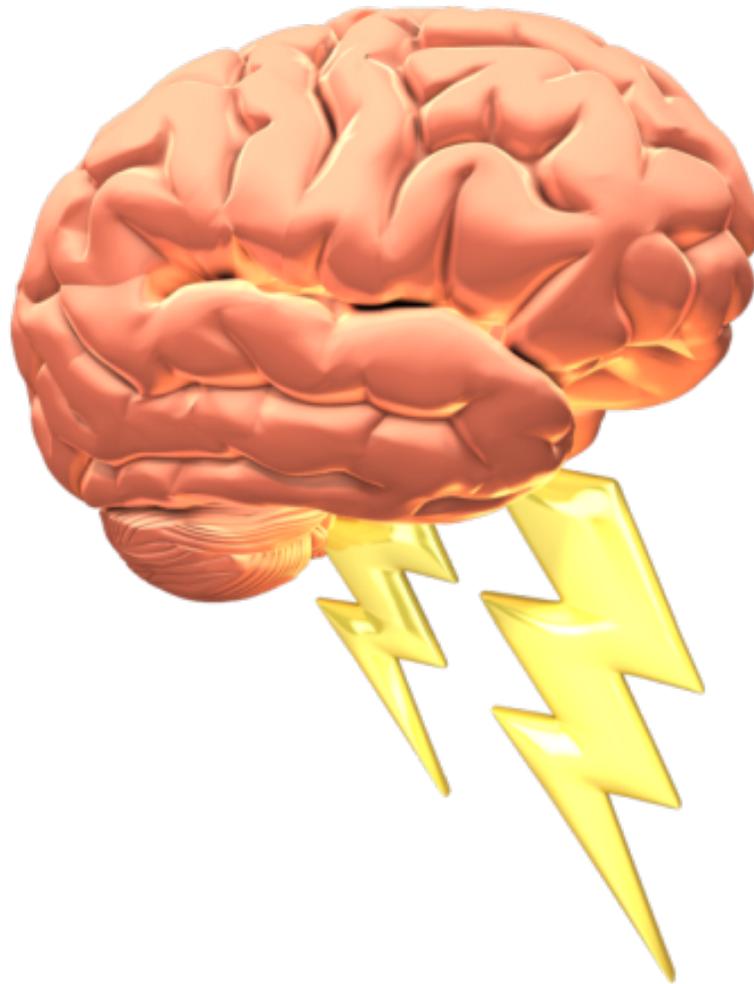
The purpose of Asset Management is to manage component licensing, vendor support, product upgrade and component obsolescence impact on the system.

Outcomes

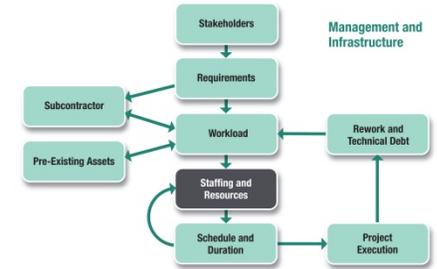
- PEA-ASM-1: A Component Management Strategy for managing Component Licenses is established
- PEA-ASM-2: Vendor Support to handle Component Upgrade and Component Problems is adequate and available
- PEA-ASM-3: Upgraded Components are evaluated for impact on The System
- PEA-ASM-4: Upgraded Components are reassessed to ensure they meet Requirements
- PEA-ASM-5: Component Obsolescence Management Strategy to address Product Technology Refresh is established
- PEA-ASM-6: Component Trade Studies, including Run Time Evaluations, are periodically conducted with a Prioritised Alternative Component List



Pre-existing Assets Exercise



Staffing & Resources



- ▶ This category reflects the availability, capability and experience of the staff necessary to do the work as well as the availability and capacity of other resources, such as test and integration labs.
- ▶ Processes
 - Staffing and Resource Requirements
 - Skills and Training Requirements
 - Staffing Management

**Staff Leaving
the Department**

Staffing & Resource Requirements

SAE-REQ – Staffing and Resource Requirements

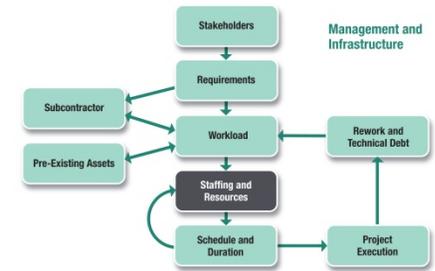
Purpose

The purpose of Staffing and Resource Requirements is to estimate the number of staff, the skills and the experience levels required over time and the System Integration and Test Resources required to develop, integrate, test and deliver the product and all associated artefacts.

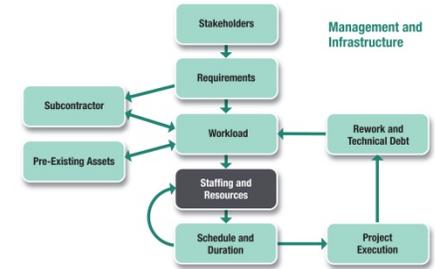
Outcomes

- SAE-REQ-1: Personnel Numbers for each Major Activity are estimated based on Work Unit Estimates
- SAE-REQ-2: Key/Experienced Personnel for each Major Activity are identified
- SAE-REQ-3: System Integration and Test Resources are estimated based on Work Unit Estimates

Note: The number of System Integration equipment strings (Labs) and System Integration Engineers needed to meet the contract delivery schedule is calculated. This calculation is based on software product size, expected defect density and the defect correction rate required to achieve delivery schedule.



Skills and Training Requirements



SAE-STR – Skills and Training Requirements

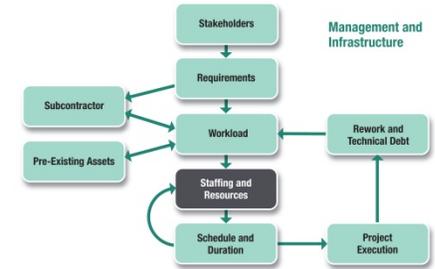
Purpose

The purpose of Skills and Training Requirements is to identify the gaps in skills between the human resource needs of the project and personnel currently available.

Outcomes

- SAE-STR-1: Needed Knowledge, Skills & Experience for each Major Activity is identified
- SAE-STR-2: Available Knowledge, Skills & Experience within the Organisation is assessed
- SAE-STR-3: Knowledge, Skills and Experience Gaps are identified
- SAE-STR-4: Training Needs are assessed and identified
- SAE-STR-5: Training Approaches for developing and/or delivering Training Needs are identified.
- SAE-STR-6: Training Resources to develop and/or deliver training are identified and allocated

Staffing Management



SAE-MAN– Staffing Management

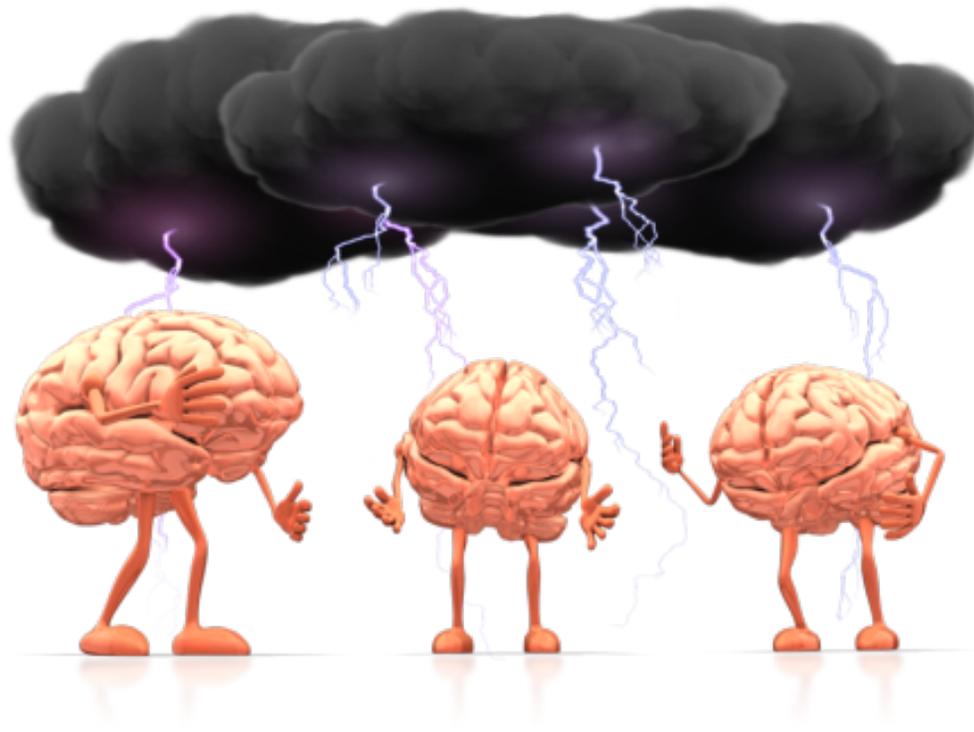
Purpose

The purpose of Staffing Management is to ensure the orderly ramp-up, allocation and ramp-down of personnel, minimise personnel turnover and provide for on-going training needs.

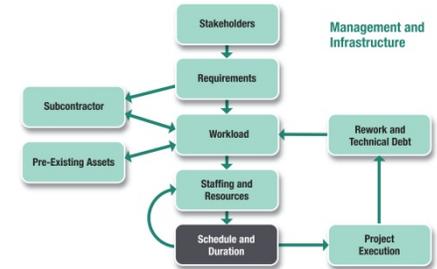
Outcomes

- SAE-MAN-1: Personnel Numbers for each Major Activity are monitored
- SAE-MAN-2: Actual Expended Effort for each Major Activity is monitored
- SAE-MAN-3: Personnel Turnover is monitored
- SAE-MAN-4: Voluntary Resignation Reasons (unplanned turnover) are investigated and addressed
- SAE-MAN-5: Staffing Ramp-up is based on Work Unit Estimates and occurs gradually
- SAE-MAN-6: Key/Experienced Personnel for each Major Activity are available / retained
- SAE-MAN-7: Work Assignments are managed across Organisational Units to ensure people are not over committed
- SAE-MAN-8: Training Needs (organisational, project and individual) are assessed and met on an on-going basis

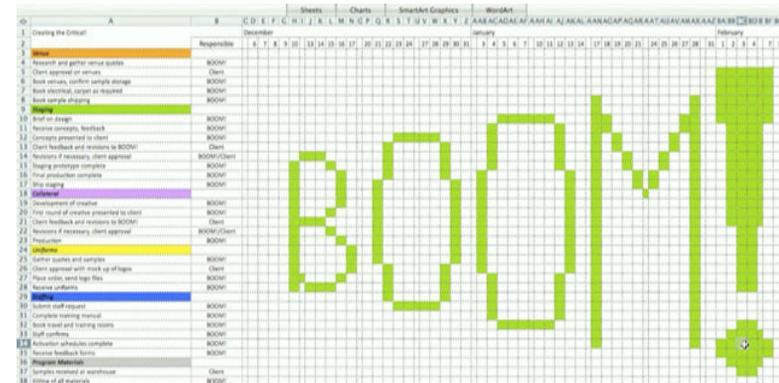
Staffing & Resources Exercise



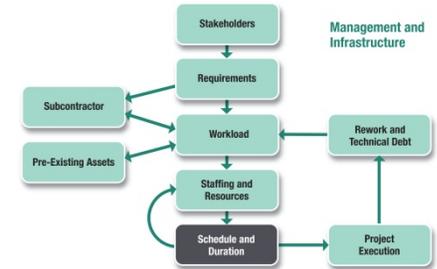
Schedule & Duration



- ▶ This category reflects the task sequencing and calendar time needed to execute the workload by available staff and other resources (e.g. test labs).
- ▶ Processes
 - Product Work Breakdown Structure Construction
 - Schedule Construction
 - Identify External Dependencies
 - Schedule Validation
 - Schedule Contingency



Product Work Breakdown Structure Construction



SAD-WBS – Product Work Breakdown Structure Construction

Purpose

The purpose of Product Work Breakdown Structure Construction is to decompose the project into manageable components of work in terms of size, duration and responsibility to facilitate planning, control of cost, schedule and technical content.

Outcomes

- SAD-WBS-1: A Product Work Breakdown Structure (PWBS) is developed that completely reflects the Project Scope of Work
- SAD-WBS-2: The Product Work Breakdown Structure (PWBS) is subdivided into Discrete Product-Oriented Elements
- SAD-WBS-3: PWBS Elements associated with High Risk Requirements are identified in the Product Work Breakdown Structure (PWBS)
- SAD-WBS-4: PWBS Elements are aligned with earned value management practices
- SAD-WBS-5: PWBS Elements are coded to allow sorting and/or extractions
- SAD-WBS-6: PWBS is periodically revised to incorporate agreed changes and reflect current Project Status, in accordance with the Project Control System

Identify External Dependencies

SAD-IED – Identify External Dependencies

Purpose

The purpose of Identify External Dependencies is to ensure that external dependencies are identified and are logically linked to associated project tasks.

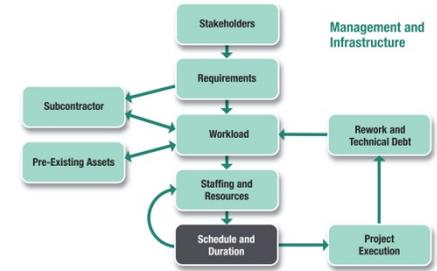
Outcomes

SAD-IED-1: External Dependencies are identified

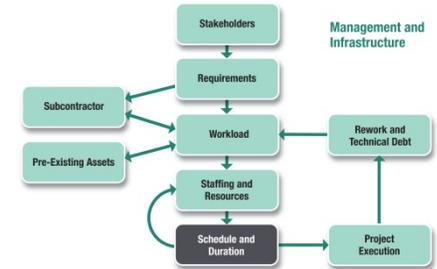
SAD-IED-2: External Dependencies Availability and Constraints are identified

SAD-IED-3: Project Tasks associated with External Dependencies are identified

Note: External dependencies may include but are not limited to external system interfaces, test or certification facilities, test assets, government/customer furnished materials (G/CFM) and other resources (e.g. personnel).



Schedule Construction



SAD-CON – Schedule Construction

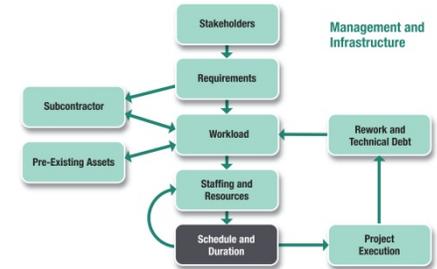
Purpose

The purpose of Schedule Construction is to ensure that the Master Project Schedule accurately reflects the scope of work described in the Product Work Breakdown Structure (PWBS), that tasks are logically sequenced, adequate resources have been allocated, and subordinate schedules align.

Outcomes

- SAD-CON-1: The Master Project Schedule is aligned with the Product Work Breakdown Structure
- SAD-CON-2: The Relationships between Schedule Tasks are identified
- SAD-CON-3: Tasks associated with Risk Mitigation, Rework and External Dependencies are incorporated into, aligned and logically linked with other Tasks in the Master Project Schedule
- SAD-CON-4: Early & Late Starts and Finishes are calculated for all Schedule Tasks
- SAD-CON-5: All Schedule Tasks, including Risk Mitigation and Rework are adequately resourced

Schedule Construction (continued)



SAD-CON – Schedule Construction

Purpose

The purpose of Schedule Construction is to ensure that the Master Project Schedule accurately reflects the scope of work described in the Product Work Breakdown Structure (PWBS), that tasks are logically sequenced, adequate resources have been allocated, and subordinate schedules align.

Outcomes

- SAD-CON-6: The Schedule for Planning, Construction and Qualification of System Integration and Test Resources is aligned with the Master Project Schedule
- SAD-CON-7: Subordinate Schedules and the Master Project Schedule are aligned
- SAD-CON-8: Schedule Compression is achievable

Schedule Validation

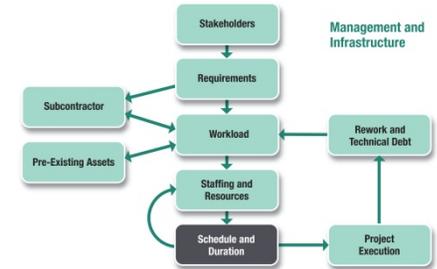
SAD-VAL – Schedule Validation

Purpose

The purpose of Schedule Validation is to provide independent assurance that all schedules incorporated into a Project Master Schedule (including the Project Master Schedule) are feasible, complete and logically correct.

Outcomes

- SAD-VAL-1: Schedule Health Checks meet defined criteria
- SAD-VAL-2: Probabilistic Task Values are estimated for Schedule Tasks
- SAD-VAL-3: Software Development Schedules are independently validated using parametric modelling and other techniques
- SAD-VAL-4: Delivery Schedules are established based on agreed-to confidence level/s using the results of Schedule Risk Simulation



Schedule Contingency

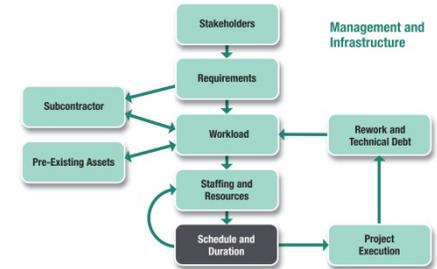
SAD-CTG – Schedule Contingency

Purpose

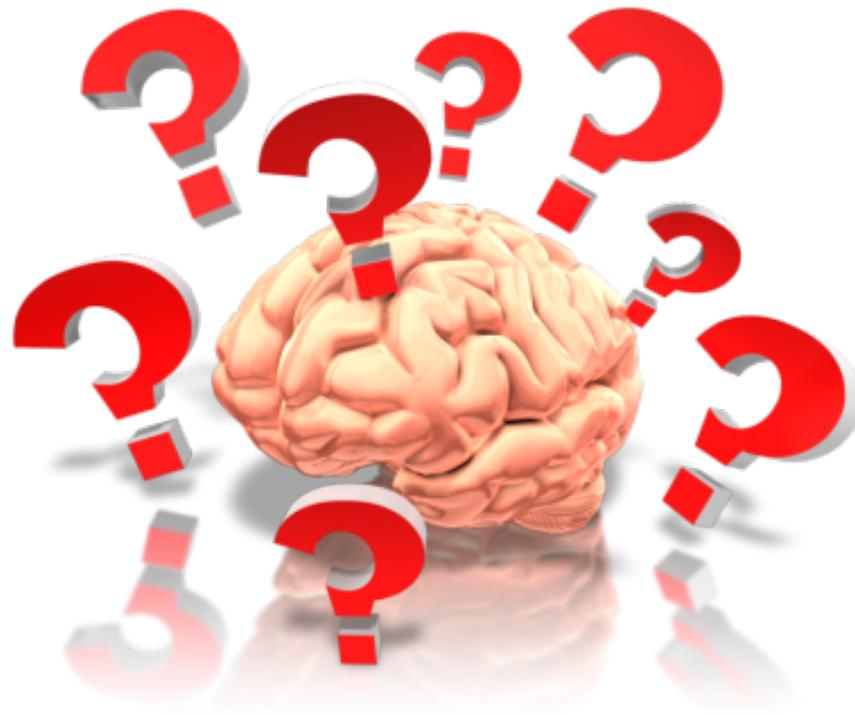
The purpose of Schedule Contingency is to ensure that schedule risk contingency is estimated and schedule contingency is incorporated at appropriate points in the schedule.

Outcomes

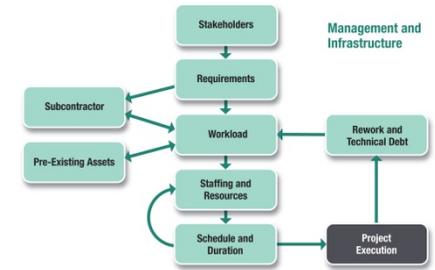
- SAD-CTG-1: Potential Schedule Slippage Activities are identified and considered
- SAD-CTG-2: Schedule Contingency for Significant Risk is estimated
- SAD-CTG-3: Schedule Contingency is incorporated into the Master Project Schedule



Schedule & Duration Exercise



Project Execution

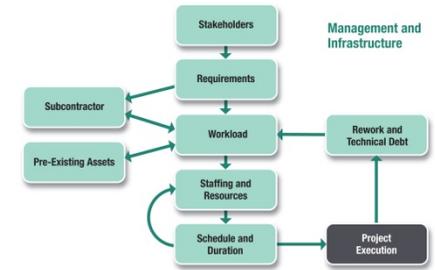


- ▶ This category focuses on monitoring and controlling the execution of the project in accordance with the project schedule
- ▶ Processes
 - Schedule Communication
 - External Dependencies Management
 - Schedule Performance Management
 - Technical Progression
 - System Integration
 - Risk Management



WORK IN PROGRESS

Schedule Communication



EXE-COM – Schedule Communication

Purpose

The purpose of Schedule Communication is to distribute and communicate the project schedule and current progress against schedule to stakeholders.

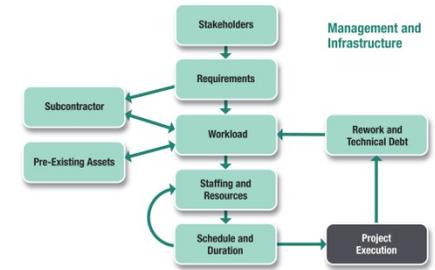
Outcomes

EXE-COM-1: Multi-Tier Project Schedule Views are generated

EXE-COM-2: The Project Schedule is distributed to Stakeholders

EXE-COM-3: Schedule Progress is regularly communicated to Stakeholders

External Dependencies Management



EXE-EXT – External Dependencies Management

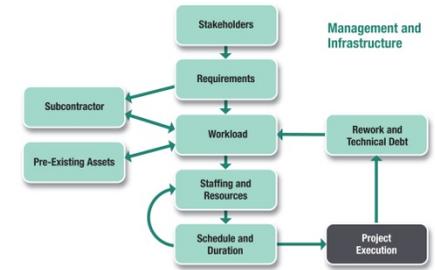
Purpose

The purpose of External Dependencies Management is to manage the availability, delivery and integration of external dependencies.

Outcomes

- EXE-EXT-1: External Dependencies are monitored
- EXE-EXT-2: Consequences of External Dependencies Delays are determined
- EXE-EXT-3: Corrective Actions to address External Dependencies Issues are identified, taken and tracked through to closure
- EXE-EXT-4: Resources to Integrate External Dependencies are made available
- EXE-EXT-5: External Dependencies are verified prior to integration to ensure they meet Requirements

Schedule Performance Management



EXE-SPM – Schedule Performance Management

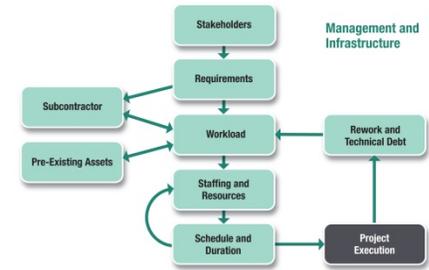
Purpose

The purpose of Schedule Performance Management is to monitor and control the project performance against the schedule and take corrective actions as necessary.

Outcomes

- EXE-SPM-1: Work Achieved vs Work Planned is measured and analysed
- EXE-SPM-2: Software Development Completion is periodically forecast based on parametric modelling
- EXE-SPM-3: Duration to Project Complete is periodically estimated based on objective data
- EXE-SPM-4: Root Causes of Schedule Slippage are identified, analysed and remediated
- EXE-SPM-5: Schedule Risk Assessments are periodically performed to assess the effectiveness of project performance management and risk mitigation

Technical Progression



EXE-TEP – Technical Progression

Purpose

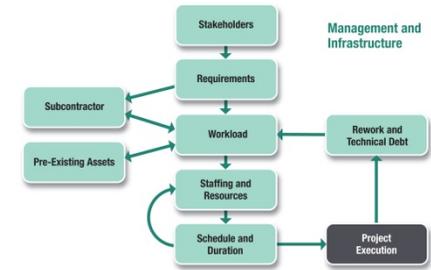
The purpose of Technical Progression, in a SCRAM context, is to assess and measure product technical progress towards planned completion and to ensure it is commensurate with expended schedule effort (i.e. technical growth is aligned with schedule execution)

Outcomes

- EXE-TEP-1 Technology Readiness Levels and Technical Risk associated with proposed solutions are identified
- EXE-TEP-2 Technical Performance Measures (TPMs) are specified and budgeted
- EXE-TEP-3: Systems and Software Engineering Progress Measures are identified
- EXE-TEP-4: System and Software architectural designs are independently evaluated and assessed
- EXE-TEP-5: Evidence Based Technical Design Reviews are performed using feasibility evidence provided by developers and validated by independent experts¹

¹Barry Boehm & Jo Ann Lane

Technical Progression (continued)



EXE-TEP – Technical Progression

Purpose

The purpose of Technical Progression, in a SCRAM context, is to assess and measure product technical progress towards planned completion and to ensure it is commensurate with expended schedule effort (i.e. technical growth is aligned with schedule execution)

Outcomes

EXE-TEP-6: Technical Progression and Technical Risk is periodically evaluated over the system development lifecycle

EXE-TEP-7: Root Cause/s of Unsatisfactory Technical Progress are investigated and remediated

System Integration

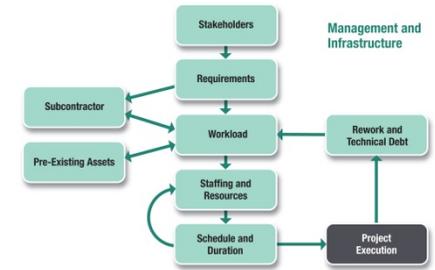
EXE-SI – System Integration

Purpose

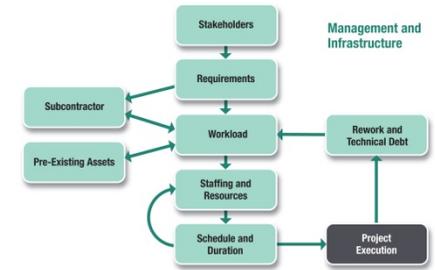
The purpose of System Integration is to ensure the system integration process is properly planned, formally documented, adequately resourced and implemented in accordance with the plan.

Note: While the SCRAM PR/AM is not intended to describe all the engineering development processes associated with System Engineering, the System Integration process has been made an exception here as experience and root cause analysis of schedule slippage has shown this activity to be a systemic contributor to project schedule slippage.

Note: The outcomes for System Integration listed in this process specifically relate to the outcomes to be achieved during execution of the project. System Integration requirements, workload estimation, resource requirements and scheduling need to be addressed much earlier in the life cycle and are covered in other categories.



System Integration (continued)



EXE-SI – System Integration

Purpose

The purpose of System Integration is to ensure the system integration process is properly planned, formally documented, adequately resourced and implemented in accordance with the plan.

Outcomes

- EXE-SI-1: System Integration is conducted in accordance with a documented System Integration Plan (SIIntP)
- EXE-SI-2: System Integration activities (system debug/grooming and design verification) and formal system acceptance testing are separated in the SIIntP
- EXE-SI-3: System Integration environments are subject to qualification testing prior to use in formal testing
- EXE-SI-4: System Integration performance, in conjunction with Technical Progression, is periodically assessed and tracked against plan

Risk Management

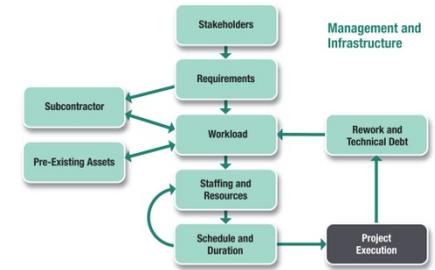
EXE-RSK – Risk Management

Purpose

The purpose of Risk Management is to identify, monitor and mitigate risks and be efficient in collecting, rating and communicating the risks to all stakeholders.

Outcomes

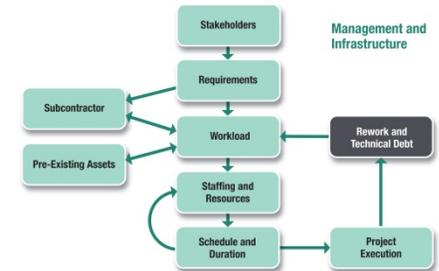
- EXE-RSK-1: A Risk Management Methodology that defines the approach, tools and data sources to perform risk management on a project is established
- EXE-RSK-2: Risk Management Tasks and Resources are estimated and allocated
- EXE-RSK-3: Risk Management Roles and Responsibilities are defined
- EXE-RSK-4: Risks and Risk Mitigation Activities are reviewed on a regular basis
- EXE-RSK-5: Risk Mitigation Plans to prevent Risks from becoming realised are developed, resourced and monitored



Project Execution Exercise



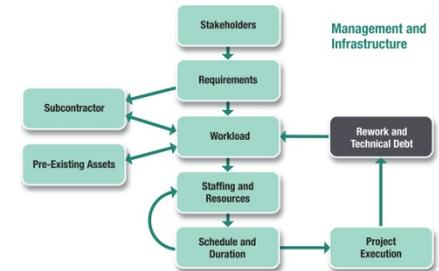
Rework and Technical Debt



- ▶ This category reflects additional work caused by the discovery of defects in the product and/or associated artefacts, work that is deferred for short-term expediency (Technical Debt) and their resolution.
- ▶ Processes
 - Rework Planning
 - Rework Management
 - Technical Debt



Rework Planning



RTD-PLN – Rework Planning

Purpose

The purpose of the Rework Planning is to provide a basis for scheduling and allocating resources required to correct estimated defects during all project phases or activities.

Outcomes

RTD-PLN-1: The Quantity of Rework (e.g. defects) is estimated using a Documented Method or Technique

RTD-PLN-2: Defect Correction Effort & Time are estimated

Note: Refer to Schedule Construction (SAD-CON) Process for incorporating and resourcing rework in the master project schedule.

Rework Management

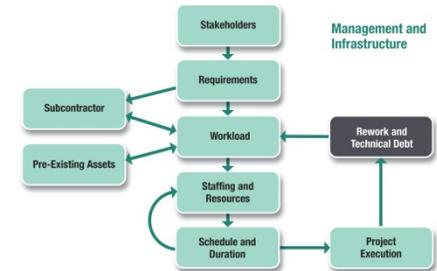
RTD-PLN – Rework Management

Purpose

The purpose of Rework Management is to avoid or minimise schedule delay by reducing the impact of defects while delivering acceptable product quality / maturity.

Outcomes

- RTD-MAN-1: Defects are categorised by the difference between their introduction and discovery phases (in-phase versus out-of-phase discovery)
- RTD-MAN-2: Improvements are implemented to maximise in-phase discoveries and minimise out-of-phase discoveries (i.e. minimise defect escapes)
- RTD-MAN-3: Rework is prioritised for defect resolution
- RTD-MAN-4: Rework Effort (labour hours) is monitored
- RTD-MAN-5: Defect Opening & Defect Closure Rates are monitored and evaluated over time
- RTD-MAN-6: Root causes of defects are identified
- RTD-MAN-7: Improvements are implemented to address root causes of defects



Technical Debt

RTD-TD – Technical Debt

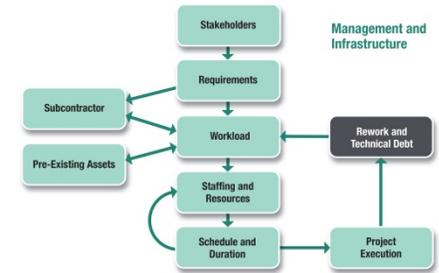
Purpose

The purpose of Technical Debt is to ensure both intentional and unintentional technical debt is understood, identified, measured and managed.

Note: Technical Debt is a concept that applies to both systems and software engineering.

Outcomes

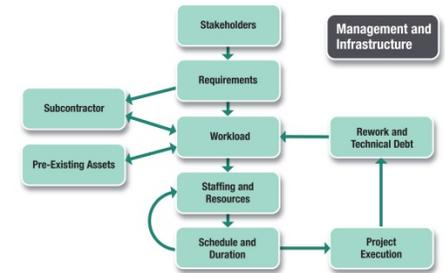
- RTD-TD-1: Decisions to incur Technical Debt are made fully cognizant of implications, impacts and risks (schedule, cost and technical)
- RTD-TD-2: Unintentional Technical Debt is identified and managed
- RTD-TD-3: Technical Debt Repayment is estimated, resourced and incorporated into the Project Schedule
- RTD-TD-4: Technical Debt is recorded and periodically reviewed



Rework & Technical Debt Exercise



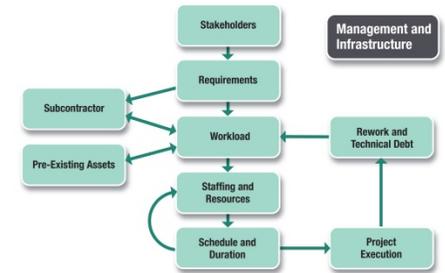
Management & Infrastructure



- ▶ This category addresses the factors that impact the efficiency and effectiveness of getting work done.
- ▶ Processes
 - Verification and Validation
 - Infrastructure
 - Quality Assurance
 - Process Improvement
 - Configuration Management



Verification and Validation



MAI-V&V – Verification and Validation

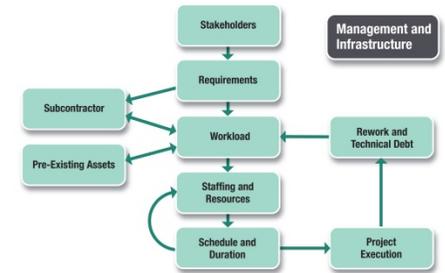
Purpose

The purpose of Verification and Validation is to determine if products meet their specified requirements and are operationally effective in the intended user environment.

Outcomes

- MAI-V&V-1: Verification and Validation Strategy is defined.
- MAI-V&V-2: Verification and Validation Requirements (scope, method) are identified
- MAI-V&V-3: Verification and Validation Tasks and Resources are estimated and allocated
- MAI-V&V-4: Verification and Validation Tools and Equipment are identified and available
- MAI-V&V-5: Verification and Validation Environments are qualified

Infrastructure



MAI-INF – Infrastructure

Purpose

The purpose of Infrastructure is to ensure that the project has a stable and reliable infrastructure that supports the performance of project work.

Outcomes

- MAI-INF-1: An Infrastructure is established that is consistent with project work requirements
- MAI-INF-2: The Work Environment and Resources to perform Assigned Work is identified and provided in a timely manner
- MAI-INF-3: Work Environments are monitored and improved, as necessary, to maintain or improve Work Performance

Quality Assurance

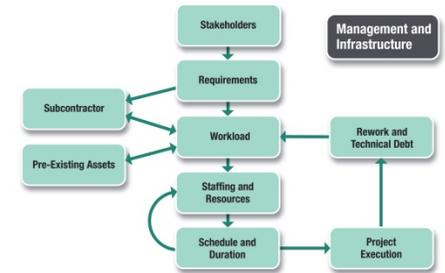
MAI-QA – Quality Assurance

Purpose

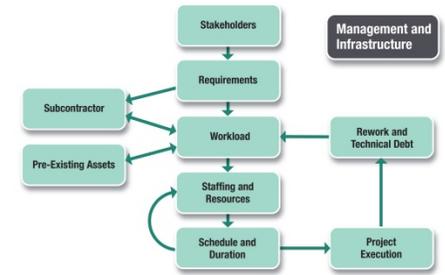
The purpose of Quality Assurance is to determine if the project has a quality management system and that it is used to improve management system, product and process quality.

Outcomes

- MAI-QA-1: A Quality Management System is established
- MAI-QA-2: System Product and Process Quality Assurance Audits are conducted
- MAI-QA-3: Corrective Actions from System Product and Process Quality Assurance Audits are identified, taken and tracked through to closure
- MAI-QA-4: Root Cause Analysis Methods & Techniques to address Systemic Problems are established



Process Improvement



MAI-PI – Process Improvement

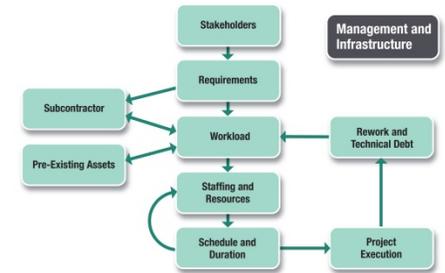
Purpose

The purpose of Process improvement is to ensure project processes are improved to improve product quality, reduce cost and increase productivity.

Outcomes

- MAI-PI-1: A Process Improvement Strategy for improving Project Processes is established
- MAI-PI-2: Best Practices are collected and incorporated in Project Processes
- MAI-PI-3: Project Processes are assessed for suitability, usability and effectiveness
- MAI-PI-4: Project Processes are updated to improve Quality and meet changing Project Needs
- MAI-PI-5: Process Measures are collected and used to improve Project Processes

Configuration Management



MAI-CM – Configuration Management

Purpose

The purpose of Configuration Management is to establish a configuration management system that identifies, controls and manages product requirements and product configurations.

Outcomes

- MAI-CM-1: A Configuration Management System is established
- MAI-CM-2: Product Configuration Baselines are established, controlled, managed and audited
- MAI-CM-3: Configuration Item Changes are managed using a Change Control Process
- MAI-CM-4: Branches for Software Configuration Items are managed as using a Change Control Process
- MAI-CM-5: Enhancements and Defect Fixes to Software Configuration Items across Branches are propagated using a Change Control Process
- MAI-CM-6: Updates to Software Configuration Items are controlled to prevent unintended overwriting
- MAI-CM-7: A Change Management Process and Development System Infrastructure is established that meets the Cycle Time needed to support System Integration and Test Phase activities

Management & Infrastructure Exercise



