CAUSAL ANALYSIS AND RESOLUTION — SUPPORT (ML5)

The purpose of Causal Analysis and Resolution (CAR) is to identify causes of selected outcomes and take action to improve process performance.

SG 1 Root causes of selected outcomes are systematically determined.

- SP 1.1 Select outcomes for analysis.
- SP 1.2 Perform causal analysis of selected outcomes and propose actions to address them.

SG 2 Root causes of selected outcomes are systematically addressed.

- SP 2.1 Implement selected action proposals developed in causal analysis.
- SP 2.2 Evaluate the effect of implemented actions on process performance.
- SP 2.3 Record causal analysis and resolution data for use across projects and the organization.

CONFIGURATION MANAGEMENT — SUPPORT (ML2)

The purpose of Configuration Management (CM) is to establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits.

SG 1 Baselines of identified work products are established.

- SP 1.1 Identify configuration items, components, and related work products to be placed under configuration management.
- SP 1.2 Establish and maintain a configuration management and change management system for controlling work products.
- SP 1.3 Create or release baselines for internal use and for delivery to the customer.

SG 2 Changes to the work products under configuration management are tracked and controlled.

- SP 2.1 Track change requests for configuration items.
- SP 2.2 Control changes to configuration items.

SG 3 Integrity of baselines is established and maintained.

- SP 3.1 Establish and maintain records describing configuration items.
- SP 3.2 Perform configuration audits to maintain the integrity of configuration baselines.

DECISION ANALYSIS AND RESOLUTION — SUPPORT (ML3)

The purpose of Decision Analysis and Resolution (DAR) is to analyze possible decisions using a formal evaluation process that evaluates identified alternatives against established criteria.

SG 1 Decisions are based on an evaluation of alternatives using established criteria.

- SP 1.1 Establish and maintain guidelines to determine which issues are subject to a formal evaluation process.
- SP 1.2 Establish and maintain criteria for evaluating alternatives and the relative ranking of these criteria.
- SP 1.3 Identify alternative solutions to address issues.
- SP 1.4 Select evaluation methods.
- SP 1.5 Evaluate alternative solutions using established criteria and methods.
- SP 1.6 Select solutions from alternatives based on evaluation criteria.

INTEGRATED PROJECT MANAGEMENT — PROJECT MANAGEMENT (ML3)

The purpose of Integrated Project Management (IPM) is to establish and manage the project and the involvement of relevant stakeholders according to an integrated and defined process that is tailored from the organization's set of standard processes.

SG 1 The project is conducted using a defined process tailored from the organization's set of standard processes.

- SP 1.1 Establish and maintain the project's defined process from project startup through the life of the project.
- SP 1.2 Use organizational process assets and the measurement repository for estimating and planning project activities.
- SP 1.3 Establish and maintain the project's work environment based on the organization's work environment standards.
- SP 1.4 Integrate the project plan and other plans that affect the project to describe the project's defined process.
- SP 1.5 Manage the project using the project plan, other plans that affect the project, and the project's defined process.
- SP 1.6 Establish and maintain teams.
- SP 1.7 Contribute process related experiences to organizational process assets.

SG 2 Coordination and collaboration between the project and relevant stakeholders are conducted.

- SP 2.1 Manage the involvement of relevant stakeholders in the project.
- SP 2.2 Participate with relevant stakeholders to identify, negotiate, and track critical dependencies.
- SP 2.3 Resolve issues with relevant stakeholders.

MEASUREMENT AND ANALYSIS — SUPPORT (ML2)

The purpose of Measurement and Analysis (MA) is to develop and sustain a measurement capability used to support management information needs.

SG 1 Measurement objectives and activities are aligned with identified information needs and objectives.

- SP 1.1 Establish and maintain measurement objectives derived from identified information needs and objectives.
- SP 1.2 Specify measures to address measurement objectives.
- SP 1.3 Specify how measurement data are obtained and stored.
- SP 1.4 Specify how measurement data are analyzed and communicated.

SG 2 Measurement results, which address identified information needs and objectives, are provided.

- SP 2.1 Obtain specified measurement data.
- SP 2.2 Analyze and interpret measurement data.
- SP 2.3 Manage and store measurement data, measurement specifications, and analysis results.
- SP 2.4 Communicate results of measurement and analysis activities to all relevant stakeholders.

ORGANIZATIONAL PROCESS DEFINITION — PROCESS MANAGEMENT (ML3)

The purpose of Organizational Process Definition (OPD) is to establish and maintain a usable set of organizational process assets, work environment standards, and rules and guidelines for teams.

SG 1 A set of organizational process assets is established and maintained.

- SP 1.1 Establish and maintain the organization's set of standard processes.
- SP 1.2 Establish and maintain descriptions of lifecycle models approved for use in the organization.
- SP 1.3 Establish and maintain tailoring criteria and guidelines for the organization's set of standard processes.
- SP 1.4 Establish and maintain the organization's measurement repository.
- SP 1.5 Establish and maintain the organization's process asset library.
- SP 1.6 Establish and maintain work environment standards.
- SP 1.7 Establish and maintain organizational rules and guidelines for the structure, formation, and operation of teams.

ORGANIZATIONAL PROCESS FOCUS — PROCESS MANAGEMENT (ML3)

The purpose of Organizational Process Focus (OPF) is to plan, implement, and deploy organizational process improvements based on a thorough understanding of current strengths and weaknesses of the organization's processes and process assets.

SG 1 Strengths, weaknesses, and improvement opportunities for the organization's processes are identified periodically and as needed.

- SP 1.1 Establish and maintain the description of process needs and objectives for the organization.
- SP 1.2 Appraise the organization's processes periodically and as needed to maintain an understanding of their strengths and weaknesses.
- SP 1.3 Identify improvements to the organization's processes and process assets.

SG 2 Process actions that address improvements to the organization's processes and process assets are planned and implemented.

- SP 2.1 Establish and maintain process action plans to address improvements to the organization's processes and process assets.
- SP 2.2 Implement process action plans.

SG 3 Organizational process assets are deployed across the organization and process related experiences are incorporated into organizational process assets.

- SP 3.1 Deploy organizational process assets across the organization.
- SP 3.2 Deploy the organization's set of standard processes to projects at their startup and deploy changes to them as appropriate throughout the life of each project.
- SP 3.3 Monitor the implementation of the organization's set of standard processes and use of process assets on all projects.
- SP 3.4 Incorporate process related experiences derived from planning and performing the process into organizational process assets.

ORGANIZATIONAL PERFORMANCE MANAGEMENT — PROCESS MANAGEMENT (ML5)

The purpose of Organizational Performance Management (OPM) is to proactively manage the organization's performance to meet its business objectives.

SG 1 The organization's business performance is managed using statistical and other quantitative techniques to understand process performance shortfalls and identify areas for process improvement.

- SP 1.1 Maintain business objectives based on an understanding of business strategies and actual performance results.
- SP 1.2 Analyze process performance data to determine the organization's ability to meet identified business objectives.
- SP 1.3 Identify potential areas for improvement that could contribute to meeting business objectives.

SG 2 Improvements are proactively identified, evaluated using statistical and other quantitative techniques, and selected for deployment based on their contribution to meeting quality and process performance objectives.

- SP 2.1 Elicit and categorize suggested improvements.
- SP 2.2 Analyze suggested improvements for their possible impact on achieving the organization's quality and process performance objectives.
- SP 2.3 Validate selected improvements.
- SP 2.4 Select and implement improvements for deployment throughout the organization based on an evaluation of costs, benefits and other factors.

SG 3 Measurable improvements to the organization's processes and technologies are deployed and evaluated using statistical and other quantitative techniques.

- SP 3.1 Establish and maintain plans for deploying selected improvements.
- SP 3.2 Manage the deployment of selected improvements.
- SP 3.3 Evaluate the effects of deployed improvements on quality and process performance using statistical and other quantitative techniques.

ORGANIZATIONAL PROCESS PERFORMANCE — PROCESS MANAGEMENT (ML4)

The purpose of Organizational Process Performance (OPP) is to establish and maintain a quantitative understanding of the performance of selected processes in the organization's set of standard processes in support of achieving quality and process performance objectives, and to provide process performance data, baselines, and models to quantitatively manage the organization's projects.

SG 1 Baselines and models, which characterize the expected process performance of the organization's set of standard processes, are established and maintained.

- SP 1.1 Establish and maintain the organization's quantitative objectives for quality and process performance, which are traceable to business objectives.
- SP 1.2 Select processes or subprocesses in the organization's set of standard processes to be included in the organization's process performance analyses and maintain traceability to business objectives.
- SP 1.3 Establish and maintain definitions of measures to be included in the organization's process performance analyses.
- SP 1.4 Analyze the performance of the selected processes, and establish and maintain the process performance baselines.
- SP 1.5 Establish and maintain process performance models for the organization's set of standard processes.

ORGANIZATIONAL TRAINING — PROCESS MANAGEMENT (ML3)

The purpose of Organizational Training (OT) is to develop skills and knowledge of people so they can perform their roles effectively and efficiently.

SG 1 A training capability, which supports the roles in the organization, is established and maintained.

- SP 1.1 Establish and maintain strategic training needs of the organization.
- SP 1.2 Determine which training needs are the responsibility of the organization and which are left to the individual project or support group.
- SP 1.3 Establish and maintain an organizational training tactical plan.
- SP 1.4 Establish and maintain a training capability to address organizational training needs.

SG 2 Training for individuals to perform their roles effectively is provided.

- SP 2.1 Deliver training following the organizational training tactical plan.
- SP 2.2 Establish and maintain records of organizational training.
- SP 2.3 Assess the effectiveness of the organization's training program.

PRODUCT INTEGRATION — ENGINEERING (ML3)

The purpose of Product Integration (PI) is to assemble the product from the product components, ensure that the product, as integrated, behaves properly (i.e., possesses the required functionality and quality attributes), and deliver the product.

SG 1 Preparation for product integration is conducted.

- SP 1.1 Establish and maintain a product integration strategy.
- SP 1.2 Establish and maintain the environment needed to support the integration of the product components.
- SP 1.3 Establish and maintain procedures and criteria for integration of the product components.

SG 2 The product component interfaces, both internal and external, are compatible.

- SP 2.1 Review interface descriptions for coverage and completeness.
- SP 2.2 Manage internal and external interface definitions, designs, and changes for products and product components.

SG 3 Verified product components are assembled and the integrated, verified and validated product is delivered.

- SP 3.1 Confirm, prior to assembly, that each product component required to assemble the product has been properly identified, behaves according to its description, and that the product component interfaces comply with the interface descriptions.
- SP 3.2 Assemble product components according to the product integration strategy and procedures.
- SP 3.3 Evaluate assembled product components for interface compatibility.
- SP 3.4 Package the assembled product or product component and deliver it to the customer.

PROJECT MONITORING AND CONTROL — PROJECT MANAGEMENT (ML2)

The purpose of Project Monitoring and Control (PMC) is to provide an understanding of the project's progress so that appropriate corrective actions can be taken when the project's performance deviates significantly from the plan.

SG 1 Actual project performance and progress are monitored against the project plan.

- SP 1.1 Monitor actual values of project planning parameters against the project plan.
- SP 1.2 Monitor commitments against those identified in the project plan.
- SP 1.3 Monitor risks against those risks identified in the project plan.
- SP 1.4 Monitor the management of project data against the project plan.
- SP 1.5 Monitor stakeholder involvement against the project plan.
- SP 1.6 Periodically review the project's progress, performance, and issues.
- SP 1.7 Review the project's accomplishments and results at selected project milestones.

SG 2 Corrective actions are managed to closure when the project's performance or results deviate significantly from the plan.

- SP 2.1 Collect and analyze issues and determine corrective actions to address them.
- SP 2.2 Take corrective action on identified issues.
- SP 2.3 Manage corrective actions to closure.

PROJECT PLANNING — PROJECT MANAGEMENT (ML2)

The purpose of Project Planning (PP) is to establish and maintain plans that define project activities.

SG 1 Estimates of project planning parameters are established and maintained.

- SP 1.1 Establish a top-level work breakdown structure (WBS) to estimate the scope of the project.
- SP 1.2 Establish and maintain estimates of work product and task attributes.
- SP 1.3 Define project lifecycle phases on which to scope the planning effort.
- SP 1.4 Estimate the project's effort and cost for work products and tasks based on estimation rationale.

SG 2 A project plan is established and maintained as the basis for managing the project.

- SP 2.1 Establish and maintain the project's budget and schedule.
- SP 2.2 Identify and analyze project risks.
- SP 2.3 Plan for the management of project data.
- SP 2.4 Plan for resources to perform the project.
- SP 2.5 Plan for knowledge and skills needed to perform the project.
- SP 2.6 Plan the involvement of identified stakeholders.
- SP 2.7 Establish and maintain the overall project plan.

SG 3 Commitments to the project plan are established and maintained.

- SP 3.1 Review all plans that affect the project to understand project commitments.
- SP 3.2 Adjust the project plan to reconcile available and estimated resources.
- SP 3.3 Obtain commitment from relevant stakeholders responsible for performing and supporting plan execution.

PROCESS AND PRODUCT QUALITY ASSURANCE — SUPPORT (ML2)

The purpose of Process and Product Quality Assurance (PPQA) is to provide staff and management with objective insight into processes and associated work products.

SG 1 Adherence of the performed process and associated work products to applicable process descriptions, standards, and procedures is objectively evaluated.

- SP 1.1 Objectively evaluate selected performed processes against applicable process descriptions, standards, and procedures.
- SP 1.2 Objectively evaluate selected work products against applicable process descriptions, standards, and procedures.

SG 2 Noncompliance issues are objectively tracked and communicated, and resolution is ensured.

- SP 2.1 Communicate quality issues and ensure the resolution of noncompliance issues with the staff and managers.
- SP 2.2 Establish and maintain records of quality assurance activities.

QUANTITATIVE PROJECT MANAGEMENT — PROJECT MANAGEMENT (ML4)

The purpose of Quantitative Project Management (QPM) is to quantitatively manage the project to achieve the project's established quality and process performance objectives.

SG 1 Preparation for quantitative management is conducted.

- SP 1.1 Establish and maintain the project's quality and process performance objectives.
- SP 1.2 Using statistical and other quantitative techniques, compose a defined process that enables the project to achieve its quality and process performance objectives.
- SP 1.3 Select subprocesses and attributes critical to evaluating performance and that help to achieve the project's quality and process performance objectives.
- SP 1.4 Select measures and analytic techniques to be used in quantitative management.

SG 2 The project is quantitatively managed.

- SP 2.1 Monitor the performance of selected subprocesses using statistical and other quantitative techniques.
- SP 2.2 Manage the project using statistical and other quantitative techniques to determine whether or not the project's objectives for quality and process performance will be satisfied.
- SP 2.3 Perform root cause analysis of selected issues to address deficiencies in achieving the project's quality and process performance objectives.

REQUIREMENTS DEVELOPMENT — ENGINEERING (ML3)

The purpose of requirements Development (RD) is to elicit, analyze, and establish customer, product, and product component requirements.

SG 1 Stakeholder needs, expectations, constraints, and interfaces are collected and translated into customer requirements.

- SP 1.1 Elicit stakeholder needs, expectations, constraints and interfaces for all phases of the product lifecycle.
- SP 1.2 Transform stakeholder needs, expectations, constraints and interfaces into prioritized customer requirements.

SG 2 Customer requirements are refined and elaborated to develop product and product component requirements.

- SP 2.1 Establish and maintain product and product component requirements, which are based on the customer requirements.
- SP 2.2 Allocate the requirements for each product component.
- SP 2.3 Identify interface requirements.

SG 3 The requirements are analyzed and validated.

- SP 3.1 Establish and maintain operational concepts and associated scenarios.
- SP 3.2 Establish and maintain a definition of required functionality and quality attributes.
- SP 3.3 Analyze requirements to ensure that they are necessary and sufficient.
- SP 3.4 Analyze requirements to balance stakeholder needs and constraints.
- SP 3.5 Validate requirements to ensure the resulting product will perform as intended in the end user's environment.

REQUIREMENTS MANAGEMENT — PROJECT MANAGEMENT (ML2)

The purpose of Requirements Management (REQM) is to manage requirements of the project's products and product components and to ensure alignment between those requirements and the project's plans and work products.

SG 1 Requirements are managed and inconsistencies with plans and work products are identified.

- SP 1.1 Develop an understanding with the requirements providers on the meaning of the requirements.
- SP 1.2 Obtain commitment to requirements from project participants.
- SP 1.3 Manage changes to requirements as they evolve during the project.
- SP 1.4 Maintain bidirectional traceability among requirements and work products.
- SP 1.5 Ensure that project plans and work products remain aligned with the requirements.

RISK MANAGEMENT — PROJECT MANAGEMENT (ML3)

The purpose of Risk Management (RSKM) is to identify potential problems before they occur so that risk handling activities can be planned and invoked as needed across the life of the product or project to mitigate adverse impacts on achieving objectives.

SG 1 Preparation for risk management is conducted.

- SP 1.1 Determine risk sources and categories.
- SP 1.2 Define parameters used to analyze and categorize risks and to control the risk management effort.
- SP 1.3 Establish and maintain the strategy to be used for risk management.

SG 2 Risks are identified and analyzed to determine their relative importance.

- SP 2.1 Identify and document risks.
- SP 2.2 Evaluate and categorize each identified risk using defined risk categories and parameters, and determine its relative priority.

SG 3 Risks are handled and mitigated as appropriate to reduce adverse impacts on achieving objectives.

- SP 3.1 Develop a risk mitigation plan in accordance with the risk management strategy.
- SP 3.2 Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.

SUPPLIER AGREEMENT MANAGEMENT — PROJECT MANAGEMENT (ML2)

The purpose of Supplier Agreement Management (SAM) is to manage the acquisition of products and services from suppliers.

SG 1 Agreements with the suppliers are established and maintained.

- SP 1.1 Determine the type of acquisition for each product or product component to be acquired.
- SP 1.2 Select suppliers based on an evaluation of their ability to meet the specified requirements and established criteria.
- SP 1.3 Establish and maintain supplier agreements.

SG 2 Agreements with suppliers are satisfied by both the project and the supplier.

- SP 2.1 Perform activities with the supplier as specified in the supplier agreement.
- SP 2.2 Ensure that the supplier agreement is satisfied before accepting the acquired product.
- SP 2.3 Ensure the transition of products acquired from the supplier.

TECHNICAL SOLUTION — ENGINEERING (ML3)

The purpose of Technical Solution (TS) is to select, design, develop, and implement solutions to requirements. Solutions, designs, and implementations encompass products, product components, and product related lifecycle processes either singly or in combination as appropriate.

SG 1 Product or product component solutions are selected from alternative solutions.

- SP 1.1 Develop alternative solutions and selection criteria.
- SP 1.2 Select the product component solutions based on selection criteria.

SG 2 Product or product component designs are developed.

- SP 2.1 Develop a design for the product or product component.
- SP 2.2 Establish and maintain a technical data package.
- SP 2.3 Design product component interfaces using established criteria.
- SP 2.4 Evaluate whether the product components should be developed, purchased, or reused based on established criteria.

SG 3 Product components, and associated support documentation, are implemented form their designs.

- SP 3.1 Implement the designs of the product components.
- SP 3.2 Develop and maintain the end-use documentation.

VALIDATION — ENGINEERING (ML3)

The purpose of Validation (VAL) is to demonstrate that a product or product component fulfills its intended use when placed in its intended environment.

SG 1 Preparation for validation is conducted.

- SP 1.1 Select products and product components to be validated and validation methods to be used.
- SP 1.2 Establish and maintain the environment needed to support validation.
- SP 1.3 Establish and maintain procedures and criteria for validation.

SG 2 The product or product components are validated to ensure they are suitable for use in their intended operating environment.

- SP 2.1 Perform validation on selected products and product components.
- SP 2.2 Analyze results of validation activities.

VERIFICATION — ENGINEERING (ML3)

The purpose of Verification (VER) is to ensure that selected work products meet their specified requirements.

SG 1 Preparation for verification is conducted.

- SP 1.1 Select work products to be verified and verification methods to be used.
- SP 1.2 Establish and maintain the environment needed to support verification.
- SP 1.3 Establish and maintain verification procedures and criteria for the selected work products.

SG 2 Peer reviews are performed on selected work products.

- SP 2.1 Prepare for peer reviews of selected work products.
- SP 2.2 Conduct peer reviews of selected work products and identify issues resulting from these reviews.
- SP 2.3 Analyze data about the preparation, conduct, and results of the peer reviews.

SG 3 Selected work products are verified against their specified requirements.

- SP 3.1 Perform verification on selected work products.
- SP 3.2 Analyze results of all verification activities.

GENERIC GOALS

GG 1 Achieve Specific Goals

The specific goals of the process area are supported by the process by transforming identifiable input work products into identifiable output work products.

GP 1.1 Perform the specific practices of the process area to develop work products and provide services to achieve the specific goals of the process area.

GG 2 Institutionalize a Managed Process

The process is institutionalized as a managed process.

GP 2.1 Establish and maintain an organizational policy for planning and performing the process.

GP 2.2 Establish and maintain the plan for performing the process.

GP 2.3 Provide adequate resources for performing the process, developing the work products, and providing the services of the process.

GP 2.4 Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.

GP 2.5 Train the people performing or supporting the process as needed.

GP 2.6 Place selected work products of the process under appropriate levels of control.

GP 2.7 Identify and involve the relevant stakeholders of the process as planned.

GP 2.8 Monitor and control the process against the plan for performing the process and take appropriate corrective action.

GP 2.9 Objectively evaluate adherence of the process and selected work products against the process description, standards, and procedures, and address noncompliance.

GP 2.10 Review the activities, status, and results of the process with higher level management and resolve issues.

GG 3 Institutionalize a Defined Process

The process is institutionalized as a defined process.

GP 3.1 Establish and maintain the description of a defined process.

GP 3.2 Collect process related experiences derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.