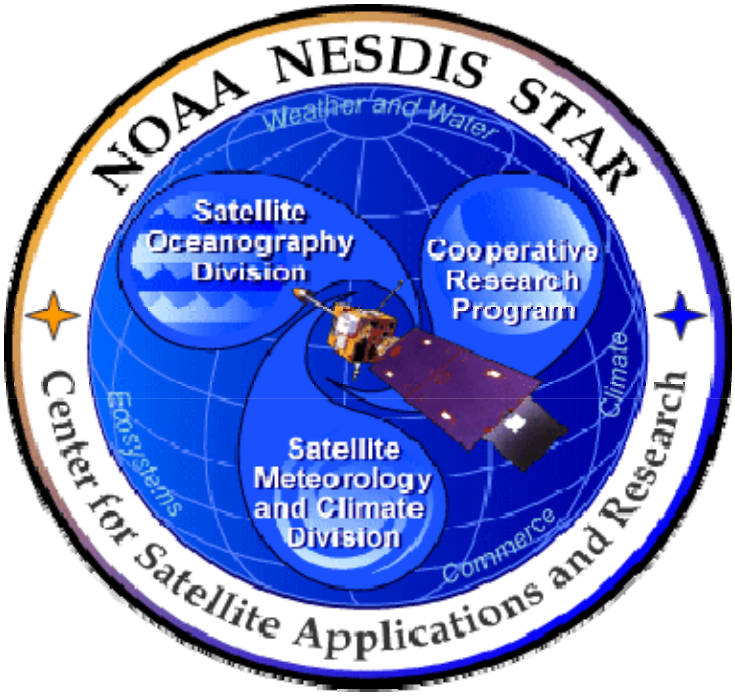

NOAA NESDIS
CENTER for SATELLITE APPLICATIONS and RESEARCH (STAR)

TAILORING GUIDELINE

PG-2
ENTERPRISE PRODUCT LIFECYCLE PROCESS GUIDELINE

Version 3.0

TITLE: PG-2: ENTERPRISE PRODUCT LIFECYCLE TAILORING GUIDELINE VERSION 3.0

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VERSION HISTORY SUMMARY

Version	Description	Revised Sections	Date
1.0	No version 1		
2.0	No version 2		
3.0	New Process Guideline adapted from CMMI guidelines by Ken Jensen (Raytheon Information Solutions)	New Document	10/01/2009

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LIST OF ACRONYMS

BB	Baseline Build
CDR	Critical Design Review
CI	Cooperative Institute
CICS	Cooperative Institute for Climate Studies
CIMSS	Cooperative Institute for Meteorological Satellite Studies
CIOSS	Cooperative Institute for Oceanographic Satellite Studies
CIRA	Cooperative Institute for Research in the Atmosphere
CL	Check List
CLI	Check List Item
CM	Configuration Management
CMMI	Capability Maturity Model Integration
CREST	Cooperative Remote Sensing and Technology Center
CTR	Code Test Review
DG	Document Guidelines
DPP	Development Project Plan
EPG	Enterprise Process Group
EPL	Enterprise Product Lifecycle
G3R	Gate 3 Report
G4R	Gate 4 Report
G5R	Gate 5 Report
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
OSDPD	Office of Satellite Data Processing and Distribution
PAL	Product Area Lead
PAR	Process Asset Repository
PBR	Project Baseline Report
PDR	Preliminary Design Review
PG	Process Guidelines

PRG	Peer Review Guidelines
PRR	Project Requirements Review
PSR	Project Status Report
QA	Quality Assurance
R&D	Research & Development
RAS	Requirements Allocation Sheet
RNM	Requirements / Needs Matrix
SEI	Software Engineering Institute
SG	Stakeholder Guideline
SPSRB	Satellite Products and Services Review Board
SRR	System Readiness Review
STAR	Center for Satellite Applications and Research
STP	System Test Plan
TD	Training Document
TG	Task Guideline
TRR	Test Readiness Review
UTP	Unit Test Plan
VVP	Verification and Validation Plan

1. INTRODUCTION

The NOAA/NESDIS Center for Satellite Applications and Research (STAR) develops a diverse spectrum of complex, often interrelated, environmental algorithms and software systems. These systems are developed through extensive research programs, and transitioned from research to operations when a sufficient level of maturity and end-user acceptance is achieved. Progress is often iterative, with subsequent deliveries providing additional robustness and functionality. Development and deployment is distributed, involving STAR, the Cooperative Institutes (CICS[1], CIMSS[2], CIOSS[3], CIRA[4], CREST[5]) distributed throughout the US, multiple support contractors, and NESDIS Operations.

NESDIS/STAR is implementing an increased level of process maturity to support the development of these software systems from research to operations. This document is a Process Guideline (PG) for users of this process, which has been designated as the STAR Enterprise Product Lifecycle (EPL).

1.1. Objective

The objective of this PG is to explain how a project's defined process can be developed by tailoring the EPL standard set of processes.

The intended users of this PG are project planners.

1.2. Version History

This is the first version of PG-2. It is numbered version 3.0 to align it with the release of the version 3.0 STAR EPL Process Asset Repository (PAR). The PAR is described in Section 5.1 of the STAR EPL Process Guidelines (PG-1) and the Process Guidelines Appendix (PG-1.A).

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1 Cooperative Institute for Climate Studies (c.f. Section 3.2.2.1)

2 Cooperative Institute for Meteorological Satellite Studies (c.f. Section 3.2.2.2)

3 Cooperative Institute for Oceanographic Satellite Studies (c.f. Section 3.2.2.3)

4 Cooperative Institute for Research in the Atmosphere (c.f. Section 3.2.2.4)

5 Cooperative Remote Sensing and Technology Center (c.f. Section 3.2.2.5)

1.3. Overview

This PG contains the following sections:

Section 1.0 - Introduction
Section 2.0 - Reference Documents
Section 3.0 – The Defined Process
Section 4.0 – Tailoring Options
Section 5.0 – Tailoring Restrictions

2. REFERENCE DOCUMENTS

CMMI-DEV-v1.2 (2006)

This reference contains the goals and practices of the current Capability Maturity Model Integration (CMMI) of the Carnegie-Mellon Software Engineering Institute (SEI). The STAR EPL is designed to achieve all CMMI goals and practices that are required for the organization to operate at a CMMI-DEV Maturity Level 3. This document can be accessed from the SEI website:

(http://www.sei.cmu.edu/publications/documents/06.reports/06tr008.html).

3. THE DEFINED PROCESS

3.1. CMMI Set of Standard Processes

The STAR EPL consists of practices that enable it to attain CMMI-DEV Maturity Level 3. The ensemble of these practices is called the EPL set of standard processes. This set of standard processes results in a process that is performed, managed, and defined. The STAR Enterprise Process Group (EPG) establishes and maintains this set of standard processes.

The STAR EPL set of standard processes is established in the STAR EPL process assets

http://www.star.nesdis.noaa.gov/star/EPL_index.php

3.2. The Defined Process

A performed process accomplishes the needed work to produce work products. In practice, a process is performed by implementing specific practices of the set of standard processes.

A managed process is a performed process that is planned and executed in accordance with policy; employs skilled people having adequate resources to produce controlled outputs; involves relevant stakeholders; is monitored, controlled, and reviewed; and is evaluated for adherence to its process description.

A defined process is a managed process that is tailored from the organization’s set of standard processes according to the organization’s tailoring guidelines; has a maintained process description; and contributes work products, measures, and other process improvement information to the organizational process assets. In practice, a defined process is established for each individual project. The project’s Development Lead, with assistance from EPG, STAR Quality Assurance (QA), and project stakeholders, produces a project's defined process by tailoring the organization's standard process to the unique conditions and needs of the project. STAR Management reviews and approves this defined process at the Gate 3 Review and subsequent reviews (see Section 4.3), with project QA assistance. All of a project’s tailoring activities should occur during project planning, when the defined process is developed.

Flexibility in tailoring and defining processes is balanced with ensuring appropriate consistency in the processes across the organization. Flexibility is needed to address contextual variables such as the domain; nature of the customer; cost, schedule, and quality tradeoffs; technical difficulty of the work; and experience of the people implementing the process. Consistency across the organization is needed so that organizational standards, objectives, and strategies are appropriately addressed, and process data and lessons learned can be shared.

4. TAILORING OPTIONS

Tailor the organization's set of standard processes and other organizational process assets according to the tailoring guidelines to produce the project's defined process. A project's defined process is based on the following:

- Customer requirements
- Product and product-component requirements
- Commitments
- Organizational process needs and objectives
- Operational environment
- Business environment

Sometimes the available lifecycle models and standard processes are inadequate to meet a specific project's needs. Sometimes the project will be unable to produce required work products or measures. In such circumstances, the project will need to seek approval to deviate from what is required by the organization. Waivers are provided for this purpose.

4.1. Tailoring Stakeholders

The STAR Enterprise is comprised of a large number of organizations that participate and cooperate in the development and production of environmental satellite data products and services. Individual project teams are customarily composed of personnel from these organizations, supplemented by contractor personnel. These organizations and project teams are referred to as the STAR Enterprise stakeholders.

An overview of the stakeholder roles in tailoring the project's defined process is provided in this section. A more detailed description can be found in the Stakeholder Guidelines (SG).
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4.1.1. Development Stakeholders

Development Lead guides the project's product development efforts from research to operations. Customarily, these are the STAR Project Leads. Development Lead is responsible for ensuring that the organization's process objectives are appropriately

addressed in the project's defined process. Refer to SG-13 for a complete description of how to perform the standard **Development Lead** tasks.

Development Scientists mature a research algorithm into an operational algorithm, developing project requirements, supporting product design, coding and testing, and providing science maintenance. **Development Scientists** may provide tailoring assistance to the **Development Lead**, particularly in assessing the technical risks generated by the tailoring options. Refer to SG-14 for a complete description of how to perform the standard **Development Scientist** tasks.

Development Testers identify pre-operational test data, acquire and integrate the test data into the pre-operational product processing system, create pre-operational unit and system test plans, execute unit and system tests, analyze test results, and report test results for review. **Development Testers** may provide tailoring assistance to the **Development Lead**, particularly in assessing the verification risks generated by the tailoring options. Refer to SG-15 for a complete description of how to perform the standard **Development Tester** tasks.

4.1.2. Operations Stakeholders

Operations Lead is responsible for the planning and oversight of the installation and acceptance testing of code in the operations environment, routine operational production, monitoring and reactive maintenance. Customarily, these are the OSDPD Product Area Leads (PALs). The **Development Lead** should consult with the **Operations Lead** during project planning to ensure that the defined process is compatible with operator needs and expectations.

Operations Management consists of the OSDPD Division Chief and Branch Chief for the OSDPD Branch that will accept the system from the developers. **Operations Management** participation in the review and approval of the defined process at the Gate 3 Review is desirable.

4.1.3. STAR Management

STAR Management consists of the Division Chief and Branch Chief for the STAR Branch that has been assigned responsibility for Development. **STAR Management** participation in the review and approval of the defined process at the Gate 3 Review is essential. Refer to SG-7 for a complete description of how to perform the standard **STAR Management** tasks.

4.2. Project Lifecycle

The STAR EPL version 3 is designed as a sequence of 11 process steps that take a product from initial concept through development of a pre-operational system that is ready for transition to operations. The process steps are organized into two “Research” phases and three “Development” phases. Each phase culminates with a management review that determines whether the project should proceed to the next phase. These reviews, called "Gates" are discussed in Section 4.5. In this lifecycle, project stakeholders (c.f. Section 4.3) work together to enable a product to predictably mature as it progresses through the lifecycle steps.

RESEARCH steps have limited standards. Tailoring is completely at the discretion of the research organization, except the output from step 3 should be a Project Proposal that will pass a Gate 2 Review. RESEARCH steps (1,2, and 3) should be waived if a project is already approved for development (e.g., through the Satellite Products and Services Review Board (SPSRB) process).

DEVELOPMENT steps should all be followed, but input/output from each step can be tailored, consistent with the tailored entry/exit criteria for the pertinent reviews (c.f. Section 4.3).

The standard lifecycle model should NOT be tailored. This model is a hybrid Waterfall/Iterative with the Waterfall model applying to the phases, and the Iterative (or Spiral) model applying to the steps within a phase. Each phase should be concluded by a Gate review (c.f. Section 4.3) that is intended to ensure that all project objectives for the phase have been achieved before the project proceeds to the next phase.

4.3. Project Reviews

As noted in the previous section, the standard process includes a series of reviews that form the primary milestones of a project’s development lifecycle. There are two types of reviews:

1) GATE REVIEWS are a series of reviews that review project status to determine whether a project should proceed to the next phase in the product life cycle. Gate Reviews are management reviews of the project status, focusing on cost and schedule status with respect to the project plan and the evaluation of program risks. Gate Review standards are established and maintained under Configuration Management by an

Enterprise Process Group under the direction of a Steering Committee. They are contained in the PAR.

2) TECHNICAL REVIEWS are a series of reviews that review the technical progress of a project with respect to standard criteria. Technical Review standards are established and maintained under Configuration Management by an Enterprise Process Group under the direction of a Steering Committee. They are contained in the PAR.

The reviews are a critical component of the process. They are the primary mechanism to accomplish Project Monitoring and Control. Each of the five EPL phases culminates with a Gate Review that determines whether the project proceeds to the next phase. Six of the 11 EPL steps culminate with a Technical Review that determines whether the project proceeds to the next step.

Each review has entry criteria and exit criteria to manage risk and maintain quality control. STAR standard entry and exit criteria are established and maintained in documented Peer Review Guidelines (PRG) and Review Check Lists (CL).

A common tailoring choice is to combine Reviews. This can save time and money, for projects under tight budget and/or schedule constraints. This introduces risk, as each review is designed so that the accomplishment of the review objectives helps to lower risk factors for the next review. The balance of cost/schedule savings with risks is something that depends on the unique characteristics of each project.

Permissible review combinations include:

1) Combine Project Requirements Review (PRR) and Preliminary Design Review (PDR). PRR and PDR can be combined if the algorithm and design is relatively mature compared with the requirements development.

2) Combine PDR and Critical Design Review (CDR). PDR and CDR can be combined research code exists that already has a detailed software architecture. If PDR and CDR are to be combined, it is strongly recommended that interface requirements and requirements allocations to interfaces and software units be developed and presented at the PRR.

3) Combine CDR and Gate 4 Review (G4R). CDR and G4R can be combined if the Gate 3 Review (G3R) determines that project risks are not severe and are manageable. If the project is carrying many high risks entering the Design phase, it is important to close or reduce many of these by the CDR so that the G4R is not faced with a large number of high risks.

4) Combine Test Readiness Review (TRR) and Code Test Review (CTR). TRR and CTR can be combined if the software architecture for the research code is detailed, the research code meets coding standards, and the research code has already been tested to demonstrate functionality and verify performance against product requirements. Another condition for which the TRR and CTR may be combined is if the operators and/or users are involved in the project and are amenable to receiving and reviewing quick look code, test plans, and test data well in advance of the combined TRR/CTR.

5) Combine CTR and System Readiness Review (SRR). CTR and SRR may be combined if the requirements and software architecture are such that unit testing and system testing can be conducted in parallel. It is often difficult to know this prior to the conclusion of the Design phase, so the combination of CTR and SRR is discouraged for the version 1 plan but possible in the version 2 plan.

6) Combine SRR and Gate 5 Review (G5R). SRR and G5R can be combined if the Gate 4 Review (G4R) determines that project risks are not severe and are manageable. If the project is carrying many high risks entering the Build phase, it is important to close or reduce many of these by the SRR so that the G5R is not faced with a large number of high risks. The plan can provisionally combine SRR and G5R prior to the Design phase, if the Gate 3 Review (G3R) determines that project risks are not severe and are manageable. In that case, it may reasonably be inferred that project risks will not be severe and/or unmanageable in the future. If the version 1 plan combines the SRR and G5R, a risk item should be generated and tracked to ensure that project risks do not grow during the Design phase. If risks are higher at the G4R than at the G3R, it is recommended that the process be revised to separate the SRR and G5R.

Reviews may NOT be combined if they normally occur during different phases (e.g., do NOT combine CDR and TRR). If reviews are combined, take care to ensure that the objectives, entry/exit criteria, and Check List Items (CLI) for the combined review preserve the necessary content of the two reviews. Tailored review check lists MUST be included with the Development Project Plan (DPP), if reviews are to be combined.

Tailoring of review objectives will occur if reviews are combined, as the combined review must meet combined objectives. This is a relatively benign modification. Greater care should be taken when considering the deletion of review objectives. Risk must be carefully assessed and a rationale for incurring such a risk must be clear and convincing.

Review entry criteria, exit criteria, and CLI may be revised to accommodate the tailoring of review objectives and review artifacts (c.f. Section 4.4 of this PG). It is important to ensure that the tailored review objectives will be met if these revisions are made.

To assist in making review tailoring choices, an overview of the STAR EPL Gate Reviews and Technical Reviews is presented in the following subsections. More detailed descriptions are found in the PRGs, CLs, and Task Guidelines (TG).

4.3.1. Gate 1 Review

Gate 1 is an internal review of Basic Research by the research organization. Its purpose is to determine whether organization funds and resources should be expended on Focused R&D of a new/improved algorithm, leading to a Project Proposal to develop a product for transition to operations.

A Gate 1 Review can always be waived at the discretion of the research organization. Once SPSRB accepts a proposal for STAR development, Gate 1 review is automatically waived.

4.3.2. Gate 2 Review

Gate 2 is a STAR review of a STAR Research Project Proposal. Its purpose is to determine whether the proposal is compatible with the NESDIS mission and strategic plan, and is technically feasible for development into an operational product. If a project passes Gate 2, a Development Lead is assigned and the Plan phase commences. For projects that will be authorized by SPSRB, the Gate 2 Review is superseded by the proposal evaluation activities of the SPSRB process.

A Gate 2 Review can be waived at the discretion of STAR management. Once SPSRB accepts a proposal for STAR development, Gate 2 review is automatically waived.

4.3.3. Gate 3 Review

G3R is a STAR review of the project's readiness for development. Its purpose is to determine whether the development plan is feasible, the identified resources are available, and the identified risks are manageable. If a project passes Gate 3, the project proceeds to the Design phase.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the Gate 3 Review can be found in the Project Plan Task Guideline (TG-5).

Standard review CLI can be found in the Gate 3 Review Check List (CL-5).

All information needed to prepare for, conduct, and close the Gate 3 Review can be found in the Gate 3 Review Guideline (PRG-5).

4.3.4. Project Requirements Review

PRR is a Design Phase Technical Review. Its purpose is to establish the requirements to be satisfied by the project and the means to validate them. Upon completion of this review, step 7 (Preliminary Design) commences.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the PRR can be found in the Project Requirements Task Guideline (TG-6).

Standard review CLI can be found in the PRR Check List (CL-6).

All information needed to prepare for, conduct, and close the PRR can be found in the PRR Review Guideline (PRG-6).

4.3.5. Preliminary Design Review

PDR is a Design Phase Technical Review. Its purpose is to assess the preliminary design for the pre-operational system. Upon completion of this review, step 8 (Detailed Design) commences.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the PDR can be found in the Preliminary Design Task Guideline (TG-7).

Standard review CLI can be found in the PDR Check List (CL-7).

All information needed to prepare for, conduct, and close the PDR can be found in the PDR Review Guideline (PRG-7).

4.3.6. Critical Design Review

CDR is the final Design Phase Technical Review. Its purpose is to assess the detailed design for the pre-operational system. Upon successful completion of this review, a Gate 4 Review is held to determine whether the project should proceed to the Build phase.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the CDR can be found in the Detailed Design Task Guideline (TG-8).

Standard review CLI can be found in the CDR Check List (CL-8.1).

All information needed to prepare for, conduct, and close the CDR can be found in the CDR Review Guideline (PRG-8.1).

4.3.7. Gate 4 Review

G4R is a review of the project status following the CDR, under the direction of STAR. Its purpose is to determine whether the project is ready to begin development of the pre-operational code and test data. If a project passes Gate 4, the project proceeds to the Build phase.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the Gate 4 Review can be found in the Detailed Design Task Guideline (TG-8).

Standard review CLI can be found in the Gate 4 Review Check List (CL-8.2).

All information needed to prepare for, conduct, and close the Gate 4 Review can be found in the Gate 4 Review Guideline (PRG-8.2).

4.3.8. Test Readiness Review

TRR is a Build Phase Technical Review. Its purpose is to determine whether code and test data development are sufficient to allow testing of the pre-operational software components (unit testing). Upon successful completion of TRR, step 10 (Code Test and Refinement) commences.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the TRR can be found in the Code and Test Data Development Task Guideline (TG-9).

Standard review CLI can be found in the TRR Check List (CL-9).

All information needed to prepare for, conduct, and close the TRR can be found in the TRR Review Guideline (PRG-9).

4.3.9. Code Test Review

CTR is a Build Phase Technical Review. Its purpose is to determine whether the pre-operational software units are ready for integration unto a pre-operational system. Upon successful completion of this review, step 11 (System Integration and Test) commences.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the CTR can be found in the Code Test and Refinement Task Guideline (TG-10).

Standard review CLI can be found in the CTR Check List (CL-10).

All information needed to prepare for, conduct, and close the CTR can be found in the CTR Review Guideline (PRG-10).

4.3.10. System Readiness Review

SRR is the final Build Phase Technical Review prior to Gate 5. Its purpose is to determine whether the pre-operational product system satisfies its functional and performance requirements, and is ready for installation in the operations environment. Upon successful completion of SRR, preparations are made for a Gate 5 review of readiness for transition to operations.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the SRR can be found in the System Integration and Test Task Guideline (TG-11).

Standard review CLI can be found in the SRR Check List (CL-11.1).

All information needed to prepare for, conduct, and close the SRR can be found in the SRR Review Guideline (PRG-11.1).

4.3.11. Gate 5 Review

G5R is the final review of the project status readiness before it is transitioned to operations, under the joint direction of STAR and SPSRB. Its purpose is to determine whether the pre-operational system is ready for delivery to Operations. If a project passes Gate 5, the pre-operational system and all associated artifacts are delivered to operations.

STAR EPL standard review objectives, review artifacts, entry criteria, and exit criteria for the Gate 5 Review can be found in the System Integration and Test Task Guideline (TG-11).

Standard review CLI can be found in the Gate 5 Review Check List (CL-11.2).

All information needed to prepare for, conduct, and close the Gate 5 Review can be found in the Gate 5 Review Guideline (PRG-11.2).

4.4. Work Products

Most common tailoring involves reducing the number of project documents by selecting specific standard documents to omit. Omission of standard documents saves time and money, but potentially adds risk, which should be identified and mitigated through the customary risk management process. Documents may be omitted if the project has an overall low Technical Risk, but higher Cost and/or Schedule Risk. Make sure that review entry/exit criteria and CLI are tailored to be consistent with the defined project artifacts.

If work products are deleted, the contents of the Baseline Builds (BB) should be revised to account for the reduced set of artifacts. BB content is determined by tailoring the standard BB content that is documented in PG-1.A. Tailoring should consist of selecting the set of project artifacts planned for each review, since the BBs are aligned to the reviews. If reviews are combined (c.f. Section 4.3 of this PG), the number of BBs will be reduced. The project plan should be careful to ensure that the tailored BBs include the tailored review artifacts.

If deleted work products are also standard review artifacts, these must be waived. This will have the affect of forcing a deletion of review entry criteria and exit criteria (c.f. Section 4.3 of this PG), as these are directly linked to the review artifacts. Refer to the standard Review Check Lists (CL) and Peer Review Guidelines (PRG) to determine which criteria must be deleted. Deletion of review entry and exit criteria usually involves some risk. Make sure that these risks are identified, assessed, and tracked.

Note that the maturation of project requirements during the Design phase may result in a need to revise the list of work products.

4.5. Deliverable Items

Every Development project should determine a list of items to be delivered to Operations, and document this list in the project plan. This list will depend upon the needs of operators

and end users, so communication with operators and end users during the Plan phase is highly encouraged. The list of deliverables is of necessity a subset of the list of work products (c.f. Section 4.4). Therefore, the list of work products and list of deliverable items should be determined in parallel during the Plan phase. Note that the maturation of project requirements during the Design phase may result in a need to revise the list of deliverable items.

4.6. Algorithm Selection

Evaluation of alternative algorithms is part of the standard process for the Design phase, but it is often the case that an algorithm has been selected during R&D. This can occur because a heritage algorithm has already been demonstrated to be low risk and meet performance requirements, especially if it is already producing validated operational products. In that case, algorithm selection activities can be deleted from the process. If algorithm selection is deleted, it is often the case that the PRR and PDR can be combined (c.f. Section 4.3 of this PG).

Development personnel have complete discretion to evaluate alternative solutions. Best practice will balance Technical, Cost, and Schedule risks. It is important that development stakeholders effectively assess these risks. Typically, this decision will involve whether to accept higher-risk solutions (Technical, Cost, Schedule) to increase probability of meeting performance requirements. Higher risk solutions typically involve algorithms with limited operational heritage. Scientists need leeway to assess costs and benefits.

4.7. Coding Standards

Although the EPL does not include coding standards, there are SPSRB general programming standards and SPSRB standards for Fortran and C code. These standards apply to new code. Legacy code is exempt from the standards.

4.8. Testing

The standard process includes unit testing and system testing in accordance with test plans that are traceable to project requirements through a Verification and Validation Plan (VVP). Unit testing in accordance with a Unit Test Plan (UTP) is usually performed and completed before system testing commences.

Projects may choose to waive unit testing and/or system testing, or perform unit testing and system test in parallel.

Unit testing should only be waived if the pre-operational code consists of a significant re-use of code that has already been unit tested (e.g., code that is already operational).

System testing may be waived if the developers and operators agree that the pre-operational code to be delivered to operations will consist on un-integrated software units. In this case, the operators implicitly agree to do the system testing. Under these circumstances, it is highly recommended that the operators produce a system test plan (STP) in collaboration with the developers before the pre-operational code is approved for delivery to operations.

Unit testing and system testing may be performed in parallel, thereby combining the activities of EPL process steps 10 and 11. This can save time, thereby relieving schedule and budget pressure. There is a risk that this tailoring will actually increase schedule and budget pressure, because system test activities on software that has functional or performance deficiencies may be inefficient. It is often difficult to know this prior to the conclusion of the Design phase. Therefore, the combination of unit testing and system testing is discouraged for the version 1 plan, but possible in the version 2 plan. Test risks should be identified and closely monitored in that case.

5. TAILORING RESTRICTIONS

Some of the EPL standard set of processes are so important for achieving CMMI Maturity Level 3 that they should not be tailored, except under compelling circumstances.

5.1. Project Planning

Every project should produce a DPP, following guidelines in STAR EPL Development Project Plan Document Guidelines (DG-5.1), and go through a Gate 3 Review. There is no other way to ensure that the project's defined process is satisfactory.

5.2. Project Monitoring and Control

The EPL reviews are designed to provide the project monitoring and control needed for a CMMI Maturity Level 3 process. Although the reviews may be tailored (c.f. Section 4.3), all of the review objectives should be achieved. In particular, there should be at least one Technical Review for each of the Design and Build phases. Every project should maintain a Project Status Report (PSR). Each review should result in the production of a review report that assesses the status of the project at the close of the review.

5.3. Risk Management

To establish and maintain project control, risks are identified during project planning and periodically evaluated and revised. In particular, risk evaluation and identification of new risks is a standard part of each review. Review exit criteria require an acceptable mitigation plan for each risk. The STAR EPL risk management process is based on quantitative risk assessment.

Risk evaluation will generate risk mitigation actions. Review exit criteria require that the risk mitigation plans have identified the necessary actions to implement the plans. Actions are examined at each review. Satisfactory completion of the action closure plan must be demonstrated for approval of closed actions, Review exit criteria require that a satisfactory closure plan be defined for each open or new action.

The standard EPL risk management process includes quantitative assessment, identification of risk mitigation actions, and aggressive tracking of risk status at each review.

This process is at the heart of quality assurance. Tailoring of this process is discouraged. Risk status should be quantitatively assessed, presented, and reviewed at each review. Mitigation of risks is already at the discretion of review teams, who can consider project constraints, so there is no rationale for tailoring this process. Every project should maintain a PSR Appendix that documents the status of project risks and risk mitigation actions.

5.4. Requirements Management

Requirements should be traceable to user and operator needs and expectations. The Requirements / Needs Matrix (RNM) is designed to provide this traceability. Every project should produce an RNM, following guidelines in DG-6.2.

Requirements should be allocated to product components and system components of the system design. This process ensures that unit testing and system testing will address all the project requirements. Requirements allocation may be waived only in cases of extreme schedule/budget pressure or in cases where the products are upgrades of existing operational products that have been thoroughly validated. Except for these cases, every project should produce a Requirements Allocation Sheet (RAS), following guidelines in DG-6.2.

5.5. Configuration Management

The establishment and maintenance of a project baseline under Configuration Management (CM) is highly encouraged. The risk management, requirements management, and project monitoring and control processes will not function well if project work products are not under configuration control. Every project should produce a Project Baseline Report (PBR), following guidelines in DG-5.4,

5.6. Key Documents

The DPP, PSR, PSR Appendix, RNM, RAS, PBR, and review reports function to implement essential processes of Project Planning, Project Monitoring and Control, Risk Management, Requirements Management, and Configuration Management. They should not be waived.

END OF DOCUMENT