

**NOAA NESDIS  
CENTER for SATELLITE APPLICATIONS  
and RESEARCH (STAR)  
STAKEHOLDER GUIDELINE**

**SG-7  
STAR MANAGER  
GUIDELINES  
Version 3.0**

# NOAA NESDIS STAR

STAKEHOLDER GUIDELINE SG-7

Version: 3.0

Date: December 31, 2009

TITLE: STAR Manager Guidelines

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TITLE: SG-7: STAR MANAGER GUIDELINES VERSION 3.0

AUTHORS:

Ken Jensen (Raytheon Information Solutions)

## VERSION HISTORY SUMMARY

<b>Version</b>	<b>Description</b>	<b>Revised Sections</b>	<b>Date</b>
1.0	No version 1		
2.0	No version 2		
3.0	New Stakeholder Guideline adapted from CMMI guidelines by Ken Jensen (Raytheon Information Solutions)	New Document	12/31/2009

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## LIST OF ACRONYMS

ATBD	Algorithm Theoretical Basis Document
BB	Baseline Build
CDD	Critical Design Document
CDR	Critical Design Review
CDRR	Critical Design Review Report
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
CoRP	Cooperative Research Program
CM/DM	Configuration Management/Data Management
CMMI	Capability Maturity Model Integration
CPI	Cost Performance Index
CREST	Cooperative Remote Sensing and Technology Center
CTD	Code Test Document
CTR	Code Test Review
CTRR	Code Test Review Report
DDD	Detailed Design Document
DG	Document Guidelines
DPP	Development Project Plan
DPR	Development Project Report
EPG	Enterprise Process Group
EPL	Enterprise Product Lifecycle
EUM	External Users Manual
EVMS	Earned Value Management System
G1R	Gate1 Review
G1RR	Gate1 Review Report
G2R	Gate 2 Review

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G2RR	Gate 2 Review Report
G3R	Gate 3 Review
G3RR	Gate 3 Review Report
G4R	Gate 4 Review
G4RR	Gate 4 Review Report
G5R	Gate 5 Review
G5RR	Gate 5 Review Report
IMP	Integrated Master Plan
IMS	Integrated Master Schedule
IPT	Integrated Product Team
IT	Information Technology
IUM	Internal Users Manual
MDD	Metadata Document
MOU	Memorandum Of Understanding
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
OCD	Operations Concept Document
PAR	Process Asset Repository
PBR	Project Baseline Report
PCOD	Pre-Operational Code
PDD	Preliminary Design Document
PDR	Preliminary Design Review
PDRR	Preliminary Design Review Report
PG	Process Guidelines
PMC	Project Monitoring and Control
PP	Project Proposal
PRG	Peer Review Guidelines
PRD	Project Requirements Document
PRR	Project Requirements Review
PRRR	Project Requirements Review Report
PSR	Project Status Report
PTEST	Pre-Operational Test Data
QA	Quality Assurance
R&D	Research & Development



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RAD	Requirements Allocation Document
RAS	Requirements Allocation Sheet
RCOD	Research Code
RNM	Requirements/Needs Matrix
RTEST	Research Test Data
SC	Steering Committee
SEI	Software Engineering Institute
SG	Stakeholder Guideline
SOW	Statement Of Work
SPI	Schedule Performance Index
SPSRB	Satellite Products and Services Review Board
SRD	System Readiness Document
SRR	System Readiness Review
SRRR	System Readiness Review Report
STAR	Center for Satellite Applications and Research
STP	System Test Plan
SWA	Software Architecture Document
TBD	To Be Determined
TD	Training Document
TG	Task Guideline
TRD	Test Readiness Document
TRR	Test Readiness Review
TRRR	Test Readiness Review Report
UTP	Unit Test Plan
UTR	Unit Test Report
VVP	Verification and Validation Plan
VVR	Verification and Validation Report
WBS	Work Breakdown Structure

## 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<sup>1</sup>, CIMSS<sup>2</sup>, CIOSS<sup>3</sup>, CIRA<sup>4</sup>, CREST<sup>5</sup>) 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 Stakeholder Guideline (SG) for users of this process, which has been designated as the STAR Enterprise Product Lifecycle (EPL).

### 1.1. Objective

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.

The objective of this Stakeholder Guideline (SG-7) is to provide a detailed description of the standard tasks of a **STAR Manager**. The intended users of this SG are STAR Division Chiefs and Branch Chiefs who are managing STAR development projects that are following the STAR EPL process.

A **STAR Manager** is a STAR Division Chief or Branch Chief. STAR Managers provide project monitoring and control oversight of STAR development projects, including participation in project management (Gate) reviews.

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<sup>1</sup> Cooperative Institute for Climate Studies

<sup>2</sup> Cooperative Institute for Meteorological Satellite Studies

<sup>3</sup> Cooperative Institute for Oceanographic Satellite Studies

<sup>4</sup> Cooperative Institute for Research in the Atmosphere

<sup>5</sup> Cooperative Remote Sensing and Technology Center

Stakeholder satisfaction is a critical component of the process. The intention is for the process to be more of a benefit than a burden to stakeholders. If stakeholders are not satisfied that this is the case, the process will require improvement.

Comments and suggestions for improvement of the process architecture, assets, artifacts and tools are always welcome. Stakeholders can provide feedback by contacting:

Ken.Jensen@noaa.gov

## 1.2. Version History

This is the first version of SG-7. It is identified as version 3.0 to align it with the release of the version 3.0 STAR EPL process assets.

## 1.3. Overview

This SG contains the following sections:

- Section 1.0 - Introduction
- Section 2.0 - Reference Documents
- Section 3.0 - Reviews
- Section 4.0 - Project Artifacts
- Section 5.0 - Task Descriptions

## 2. REFERENCE DOCUMENTS

All of the reference documents for the STAR EPL process are STAR EPL process assets that are accessible in a Process Asset Repository (PAR) on the STAR website.

[http://www.star.nesdis.noaa.gov/star/EPL\\_index.php](http://www.star.nesdis.noaa.gov/star/EPL_index.php).

Process assets include:

- Process Guidelines
- Stakeholder Guidelines
- Task Guidelines
- Peer Review Guidelines
- Review Check Lists
- Document Guidelines
- Training Documents

### 2.1. Process Guidelines

Process Guideline (PG) documents describe STAR's standard set of practices and guidelines for tailoring them to specific projects.

- STAR EPL Process Guidelines (PG-1)
- STAR EPL Process Guidelines Appendix (PG-1.A)

PG-1 and PG-1.A apply generally to each EPL step. Each stakeholder performing tasks during each step can benefit from a familiarity with these documents.

### 2.2. Stakeholder Guidelines

A Stakeholder Guideline (SG) is a description of how to perform all STAR EPL standard tasks assigned to a given type of stakeholder. For each type of stakeholder, the appropriate SG provides that stakeholder with a complete description of the standard tasks for that stakeholder role, along with references to all appropriate process assets and project artifacts. This functions as a complement to the Task Guidelines (TGs), which provide a

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completion description of all stakeholder tasks for a specific process step. The relevant SG for **STAR Managers** is SG-7 (this document).

### 2.3. Task Guidelines

The STAR EPL is designed as a sequence of 11 process steps that take a product from initial conception through delivery to operations. These steps are:

- Step 1 - Basic Research
- Step 2 - Focused R & D
- Step 3 - Project Proposal
- Step 4 - Resource Identification
- Step 5 - Project Plan
- Step 6 - Project Requirements
- Step 7 - Preliminary Design
- Step 8 - Detailed Design
- Step 9 - Code & Test Data Development
- Step 10 - Code Test And Refinement
- Step 11 - System Integration and Test

A Task Guideline (TG) is a description of how to perform the tasks of a STAR EPL process step. There is one Task Guideline for each step in the STAR EPL. Table 2.3.1 lists the Task Guidelines that are relevant for **STAR Managers**.

**TABLE 2.3.1 – Relevant Task Guidelines**

ID	Step
TG-3	Project Proposal
TG-4	Resource Identification
TG-5	Project Plan
TG-8	Detailed Design
TG-11	System Integration and Test

## 2.4. Peer Review Guidelines

For each review (c.f. Section 4), there is a Peer Review Guideline (PRG) that describes the objectives of the review, the required artifacts, standards for reviewers, requirements for approval, and options other than approval. Table 2.4.1 lists the Peer Review Guidelines that are relevant for **STAR Managers**.

**TABLE 2.4.1 – Relevant Peer Review Guidelines**

ID	Review
PRG-3	Gate 2 Review
PRG-5	Gate 3 Review
PRG-8.2	Gate 4 Review
PRG-11.2	Gate 5 Review

## 2.5. Review Check Lists

For each review (c.f. Section 4), there is a Review Check List (CL) that captures all the objectives for a review as a set of check list items. Each item in the check list should have a "Disposition" column that contains "Pass", "Conditional Pass", "Defer", "Waive", or "N/A" (Not Applicable). Each item will also have columns for Risk Assessment and for Actions generated. Table 2.5.1 lists the Review Check Lists that are relevant for **STAR Managers**.

**TABLE 2.5.1 – Relevant Review Check Lists**

ID	Review
CL-3	Gate 2 Review
CL-5	Gate 3 Review
CL-8.2	Gate 4 Review
CL-11.2	Gate 5 Review

## 2.6. Document Guidelines

There is a Document Guideline (DG) for each standard STAR EPL document. Each DG includes a description of the purpose for the document, a standard document outline (table of contents), a brief description of each subsection in the outline, and an Appendix containing an example document.

Table 2.6.1 lists the Document Guidelines that are relevant for **STAR Managers**.

**TABLE 2.6.1 – Relevant Document Guidelines**

<b>ID</b>	<b>Document</b>
DG-0.1	Document Style Guideline
DG-3.2	Gate 2 Review Report (G2RR)
DG-5.5	Gate 3 Review Report (G3RR)
DG-8.5	Gate 4 Review Report (G4RR)
DG-11.8	Gate 5 Review Report (G5RR)

## 3. REVIEWS

The relevant reviews for **STAR Managers** are:

- Gate 2 Review (G2R)
- Gate 3 Review (G3R)
- Gate 4 Review (G4R)
- Gate 5 Review (G5R)

### 3.1. Gate 2 Review

Gate 2 is a STAR review of a Project Proposal (PP). 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. Resource issues are not considered at this time. If a project passes Gate 2, the PP is forwarded to SPSRB for consideration in accordance with the SPSRB process.

Standard Gate 2 Review objectives:

- Review the project proposal and supporting artifacts (algorithm theoretical basis, software architecture, R&D code and R&D test results) to determine whether the algorithm has operational potential.
- Identify a STAR Division and Branch to implement Development

Standard Gate 2 Review entry criteria:

- Entry # 1 - An Algorithm Theoretical Basis Document (ATBD v1r1) has been written.
- Entry # 2 - A Software Architecture Document (SWA v1r1) has been written.
- Entry # 3 – Research code to implement the algorithm has been written.
- Entry # 4 – A Project Proposal (PP) has been submitted to STAR
- Entry # 5 – A User Request has been attached to the PP

Standard Gate 2 Review exit criteria:

- Exit # 1 – Algorithm and ATBD are satisfactory



- Exit # 2 – Software architecture and SWA are satisfactory.
- Exit # 3 – Research test results, documented in the ATBD, demonstrate that the algorithm has operational potential.
- Exit # 4 – Proposed operational products support the NESDIS mission and strategic plan
- Exit # 5 - A STAR Division and Branch has been identified to implement Development
- Exit # 6 - Project is recommended for Development

Refer to PRG-3 for a more detailed description of the Gate 2 Review. The standard Gate 2 Review Check List Items (CLI) are documented in the process asset CL-3 (c.f. Section 2).

### 3.2. Gate 3 Review

Gate 3 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.

Standard Gate 3 Review objectives:

- Identify relevant stakeholders and their planned involvement according to the project plan.
- Review the planned work tasks and Work Breakdown Structure (WBS)
- Review the planned project lifecycle
- Review the planned review objectives, entry criteria, exit criteria, and check lists
- Review the planned work products and project artifacts
- Review the Integrated Master Plan (IMP) and Integrated Master Schedule (IMS)
- Review the expected costs and funding
- Provide an initial assessment of project risks

## Standard Gate 3 Review entry criteria:

- Entry # 1 - A Development Project Plan (DPP) has been written. The Gate 3 reviewers have access to the current baseline version of the DPP.
- Entry # 2 - A Project Status Report (PSR) has been written. The Gate 3 reviewers have access to the current baseline version of the PSR.
- Entry # 3 - A Gate 3 Document (G3D) has been written. The Gate 3 reviewers have access to the current baseline version of the G3D.
- Entry # 4 - A Project Baseline Report (PBR) has been written. The Gate 3 reviewers have access to the current baseline version of the PBR.

## Standard Gate 3 Review exit criteria:

- Exit # 1 - Project plan and DPP are satisfactory.
- Exit # 2 - Project status and PSR are satisfactory.
- Exit # 3 - Project baseline and PBR are satisfactory.
- Exit # 4 - Project risks are acceptable.
- Exit # 5 - Status of risk mitigation actions is acceptable
- Exit # 6 - Project is ready for the Design phase

Refer to PRG-5 for a more detailed description of the Gate 3 Review. The standard Gate 3 Review Check List Items (CLI) are documented in the process asset CL-5 (c.f. Section 2).

Gate 3 Review objectives, entry criteria, exit criteria, and check list may be tailored. Tailoring guidelines are provided in the process asset PG-2 (c.f. Section 2). Refer to the Development Project Plan (DPP) Section 5 to determine whether there has been any project-specific tailoring for the Gate 3 Review.

### 3.3. Gate 4 Review

Gate 4 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.

## Standard Gate 4 Review objectives:

- Review the implementation of the Integrated Master Plan (IMP) and Integrated Master Schedule (IMS)
- Review the technical status and risks of the project
- Review the cost status and risks of the project
- Review the schedule status and risks of the project
- Determine whether corrective actions are needed to allow the project to proceed to the Build phase as planned
- Determine whether a re-plan and a delta Gate 4 Review are needed.

## Standard Gate 4 Review entry criteria:

- Entry # 1 - A Gate 3 Review Report (G3RR) has been written. The Gate 4 reviewers have access to the current baseline version of the G3RR.
- Entry # 2 - A Critical Design Review Report (CDRR) has been written. The Gate 4 reviewers have access to the current baseline version of the CDRR.
- Entry # 3 - A Development Project Plan (DPP) has been written. The Gate 4 reviewers have access to the current baseline version of the DPP.
- Entry # 4 - A Project Status Report (PSR) has been written. The Gate 4 reviewers have access to the current baseline version of the PSR.
- Entry # 5 - A Gate 4 Document (G4D) has been written. The Gate 4 reviewers have access to the current baseline version of the G4D.
- Entry # 6 - A Project Baseline Report (PBR) has been written. The Gate 4 reviewers have access to the current baseline version of the PBR.

## Standard Gate 4 Review exit criteria:

- Exit # 1 – CDR status and CDRR are satisfactory
- Exit # 2 - Project plan and DPP are satisfactory.
- Exit # 3 - Project status and PSR are satisfactory.
- Exit # 4 - Project baseline and PBR are satisfactory.

- Exit # 5 - Project risks are acceptable.
- Exit # 6 - Status of risk mitigation actions is acceptable
- Exit # 7 - Project is ready for the Build phase

Refer to PRG-8.2 for a more detailed description of the Gate 4 Review. The standard Gate 4 Review entry criteria, exit criteria, and check list is documented in the process asset CL-8.2 (c.f. Section 2).

Gate 4 Review objectives, entry criteria, exit criteria, and check list may be tailored. Tailoring guidelines are provided in the process asset PG-2 (c.f. Section 2). Refer to the Development Project Plan (DPP) Section 5 to determine whether there has been any project-specific tailoring for the Gate 4 Review.

### 3.4. Gate 5 Review

Gate 5 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 operations is ready to receive the pre-operational system from the developers. If a project passes Gate 5, the pre-operational system and all associated artifacts are delivered to operations.

Standard Gate 5 Review objectives:

- Review the implementation of the Integrated Master Plan (IMP) and Integrated Master Schedule (IMS)
- Review the technical status and risks of the project
- Review the cost status and risks of the project
- Review the schedule status and risks of the project
- Determine whether corrective actions are needed to allow the project to proceed to operations as planned.
- Determine whether a re-plan and a delta Gate 5 Review are needed.

Standard Gate 5 Review entry criteria:

- Entry # 1 - A System Readiness Review Report (SRRR) has been written. The Gate 5 reviewers have access to the current baseline version of the SRRR.
- Entry # 2 - A Development Project Report (DPR) has been written. The Gate 5 reviewers have access to the current baseline version of the DPR.
- Entry # 3 - A Project Status Report (PSR) has been written. The Gate 5 reviewers have access to the current baseline version of the PSR.
- Entry # 4 - A Gate 5 Document (G5D) has been written. The Gate 5 reviewers have access to the current baseline version of the G5D.
- Entry # 5 - A Project Baseline Report (PBR) has been written. The Gate 5 reviewers have access to the current baseline version of the PBR.

Standard Gate 5 Review exit criteria:

- Exit # 1 – SRR status and SRRR are satisfactory
- Exit # 2 – DPR is satisfactory.
- Exit # 3 - Project status and PSR are satisfactory.
- Exit # 4 - Project baseline and PBR are satisfactory.
- Exit # 5 - Project risks are acceptable.
- Exit # 6 - Status of risk mitigation actions is acceptable
- Exit # 7 - Project is ready for delivery to operations

Refer to PRG-11.2 for a more detailed description of the Gate 5 Review. The standard Gate 5 Review entry criteria, exit criteria, and check list is documented in the process asset CL-11.2 (c.f. Section 2).

Gate 5 Review objectives, entry criteria, exit criteria, and check list may be tailored. Tailoring guidelines are provided in the process asset PG-2 (c.f. Section 2). Refer to the Development Project Plan (DPP) Section 5 to determine whether there has been any project-specific tailoring for the Gate 5 Review.

## 4. PROJECT ARTIFACTS

Project Artifacts are a set of items that must be produced by the appropriate stakeholders during the product life cycle to support the reviews. They are established and maintained under Configuration Management (CM) by an Enterprise Process Group (EPG) under the direction of a Steering Committee.

The project artifacts are maintained in a project artifact repository. This is a complete set of configuration-managed artifacts developed by each project in accordance with STAR standards. When a project artifact has been approved at a Technical Review or Gate Review, it is placed in the project artifact repository under CM.

Responsibility for producing project artifacts is assigned to stakeholders during the Plan phase, and may be tailored from the standard assignment. The project artifacts that are usually the responsibility of **STAR Managers** are listed in Table 4.1.

**TABLE 4.1 – Relevant Artifacts**

Artifact	Type
Gate 2 Review Report	Report
Gate 3 Review Report	Report
Gate 4 Review Report	Report
Gate 5 Review Report	Report

**Gate 2 Review Report:** The Gate 2 Review Report (G2RR) is produced for each project approved for development. It reports the results from the STAR review of the project proposal. It should identify the STAR Branch that will be responsible for development, identify a Development Lead, optionally identify other Development personnel, and identify requested funding for the development project. It should include an initial assessment of project risks, and a preliminary identification of risk mitigation actions. Refer to DG-3.2 for detailed G2RR guidelines.

**Gate 3 Review Report:** The Gate 3 Review Report (G3RR) summarizes the Gate 3 Reviewers' assessment of the project plan and project status, including identified risks, risk mitigation actions, and status of readiness to proceed to the Design phase. Refer to DG-5.5 for detailed G3RR guidelines.

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**Gate 4 Review Report:** The Gate 4 Review Report (G4RR) summarizes the Gate 4 Reviewers' assessment of the project plan and project status, including identified risks, risk mitigation actions, and status of readiness to proceed to the Build phase. Refer to DG-8.5 for detailed G4RR guidelines.

**Gate 5 Review Report:** The Gate 5 Review Report (G5RR) summarizes the Gate 5 Reviewers' assessment of the project status, including identified risks, risk mitigation actions, and status of readiness to transition the pre-operational system to operations. Refer to DG-11.8 for detailed G5RR guidelines.

## 5. TASK DESCRIPTION

**STAR Managers** participate in the following process steps:

- Step 3 - Project Proposal (TG-3)
- Step 4 - Resource Identification (TG-4)
- Step 5 - Project Plan (TG-5)
- Step 8 - Detailed Design (TG-8)
- Step 11 - System Integration and Test (TG-11)

The standard **STAR Manager** tasks for each of these steps are described below. **STAR Managers** may also refer to the relevant TGs for a complementary task description.

### 5.1 Project Monitoring and Control

The primary task of **STAR Managers** under the STAR EPL is to provide project monitoring and control (PMC) via periodic review and approval of the project plan, as documented in the DPP, and project status with respect to the plan, as documented in the PSR. The mechanism to accomplish PMC is the Gate Reviews.

Figure 5.1 shows the PMC process flow.



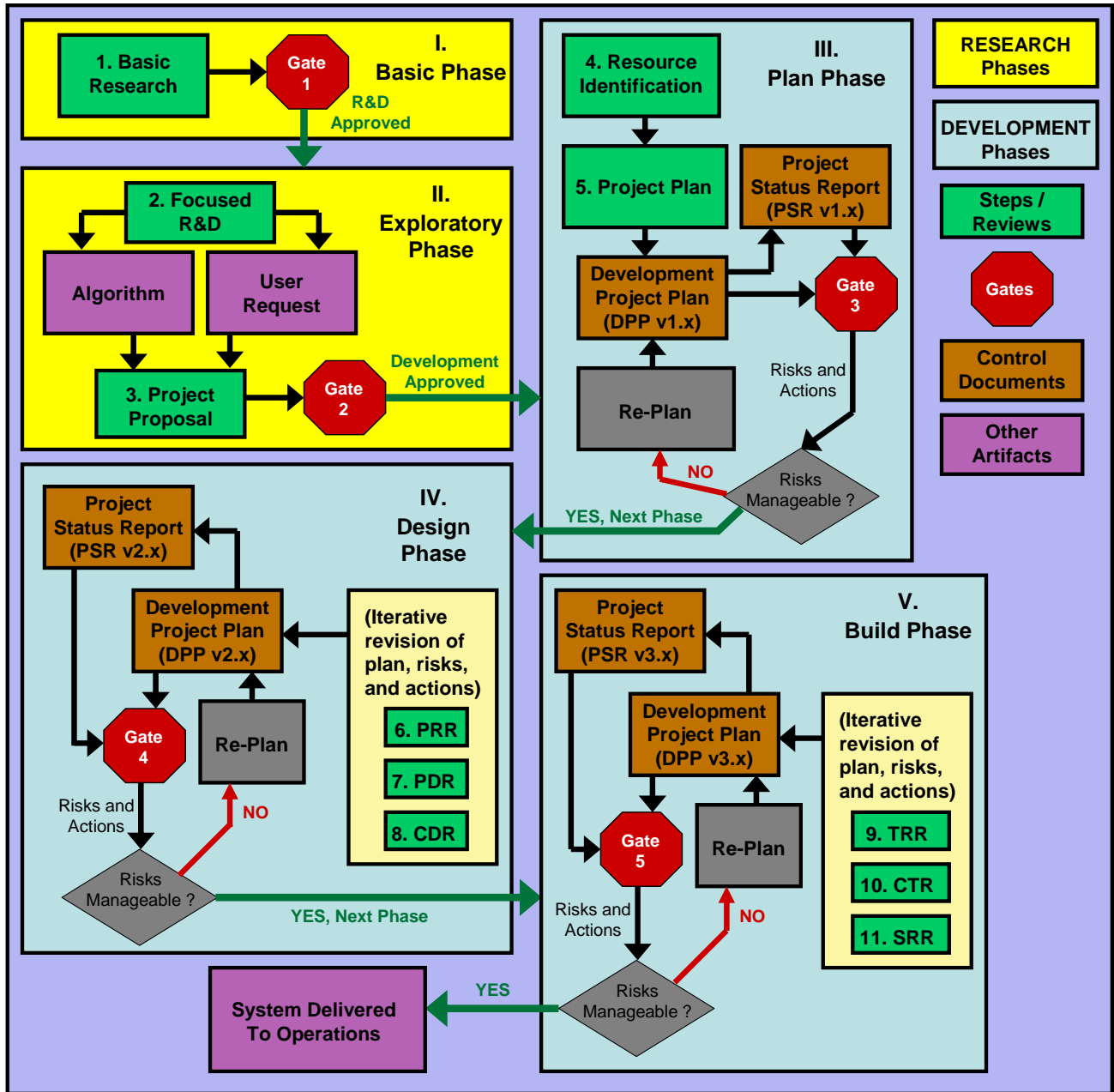


Figure 5.1 – Project Control Process Flow

Figure 5.1 shows that each of the five phases of the 11 step EPL culminates with a Gate Review that determines whether the project is approved for the next phase.

Note that the DEVELOPMENT phase Gate Reviews (3, 4, and 5) are focused on PMC through review and approval of the DPP and PSR.

This is accomplished by an examination of project risks and risk mitigation actions and a consequent determination of whether the risks are manageable.

If the risks are determined to be manageable, the project is approved for the next phase. If not, the project plan needs revision until the risks become manageable. **STAR Managers** will direct this revision by including specific instructions in the review report (G3RR, G4RR or G5RR). The DPP and PSR are updated to document the revised plan and status of the project with respect to the revised plan.

**STAR Managers** may at their discretion require a presentation of the revised project plan and project status at a delta Gate Review. Alternatively, they may decide that it is sufficient to review and approve the revised DPP and PSR without a new presentation. The more extensive the revision, the more a delta review is needed.

The Gate 3, 4, and 5 review objectives, entry criteria, and exit criteria (see Section 3) are designed to ensure that the PMC process is followed. Refer to PRG-5, PRG-8.2 and PRG-11.2 for detailed guidelines on using the Gate Reviews to accomplish PMC.

## 5.2 Project Proposal Tasks

Figure 5.2 shows the process flow for step 3.

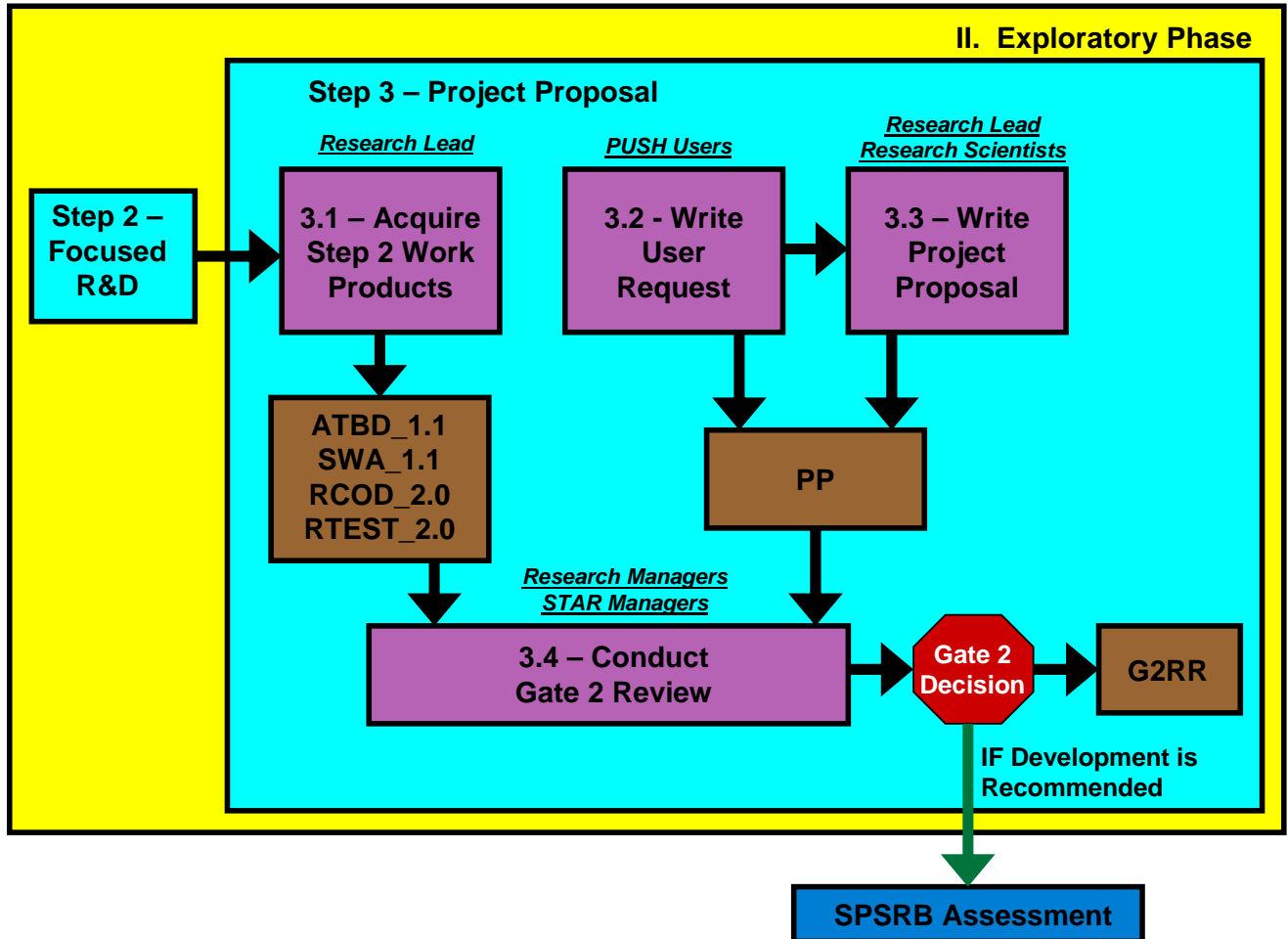


Figure 5.2 – STEP 3 Process Flow

### 5.2.1 Expected BEGIN State

- The research algorithm has been matured and documented in ATBD v1r1
- A software architecture has been matured and documented in SWA v1r1
- R&D code has been written that implements the algorithm well enough to produce proxy data products to support a Project Proposal (PP) to STAR.
- R&D code has been run with research test data to produce the proxy data products

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- R&D code test results, documented in ATBD v1r1, demonstrate whether or not the algorithm's operational potential warrants the submission of a PP.

## 5.2.2 Task Inputs

**Algorithm Theoretical Basis Document v1.1:** The Algorithm Theoretical Basis Document (ATBD) provides a theoretical description (scientific and mathematical) of the algorithm that is used to create a product that meets user requirements. The ATBD is typically updated from the v1.0 version, as R&D provides additional maturity. At this step, the algorithm's operational potential has been demonstrated to the satisfaction of the Research organization and is now being further developed to support a research to operations development proposal. The purpose of ATBD v1.1 is to demonstrate that the algorithm should be developed for transition to operations. Refer to DG-1.1 for detailed ATBD guidelines.

**Software Architecture Document v1.1:** The Software Architecture Document (SWA) complements the ATBD by providing the software architecture for the processing code that will implement the algorithm. The SWA may be updated from the v1.0 version, if the additional algorithm maturity warrants additional and/or more detailed software architecture. Refer to DG-1.2 for detailed SWA guidelines.

**R&D Code:** Research & Development (R&D) Code (RCOD v2) is research code that implements the algorithm. It should use input data and produce output data that is described in the ATBD and SWA. It should include the processing functionality described in the ATBD and SWA. R&D code is expected to be an upgrade over Basic Research code. Code may include additional functionality to reflect upgraded software architecture and may be revised to comply with SPSRB coding standards. If the project is approved for development, this version of the code will be built into the initial project baseline, It is therefore expected that SPSRB coding standards will begin to be applied to the code. Currently, coding standards exist for Fortran, C, and C++ code, and general programming standards exist for all code. These standards are found on the SPSRB web site at [http://projects.osd.noaa.gov/spsrb/standards\\_prog.htm](http://projects.osd.noaa.gov/spsrb/standards_prog.htm)

**R&D Test Data:** R&D Test Data (RTEST v2) are the data files used to test the R&D code, including the input data and output data identified in the ATBD and SWA. They may be upgraded from the Basic Research Test Data, if the upgraded R&D code requires this.

**Gate 1 Review Report:** Gate 1 Review Report (G1RR) is the report of the Gate 1 Reviewers. The G1RR should consist of an assessment of the Gate 1 Review artifacts and

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a yes/no decision on proceeding to the next phase of the EPL. Refer to DG-1.3 for G1RR document guidelines.

### 5.2.3 Desired END State

- A Project Proposal (PP) has been submitted to STAR.
- A User Request has been attached to the PP.
- A Gate 2 Review of the PP has been conducted.
- A Gate 2 Review Report (G2RR) has been written.
- If the project has been recommended for Development, a STAR Division and Branch has been selected to implement Development, and a Development Lead has been identified. This information is included in the G2RR.
- The PP and G2RR have been submitted to the SPSRB for its assessment.

### 5.2.4 Task Outputs

- Project Proposal
- User Request
- Gate 2 Review Report

### 5.2.5 Stakeholder Activities

**Research Lead** takes control of the step 2 work products (ATBD, SWA, R&D code, R&D test data).

**Research Lead** and **Research Scientists** prepare a Project Proposal (PP), using the step 2 artifacts as references and DG-3.1 for guidance.

**PUSH Users**, who may be the **Research Scientists**, prepare a User request, using SPSRB standards for guidance. The User Request is attached to the PP.

**Research Lead** informs **STAR Managers** that a proposal is ready for a Gate 2 Review.

**STAR Managers** decides which Branch of which Division will lead the Gate 2 review. This Branch will usually continue to oversee the project's development during subsequent

phases. **STAR Managers** will select a Gate 2 Review team, including a **Review Lead**. The **Review Lead** is nominally the Branch Chief, but an alternative lead can be selected by the Branch Chief in consultation with the Division Chief. PRG-3 should be consulted to ensure that the review team is qualified to assess the PP. It is expected that a representative from **Research Management** will participate. Reviewers should be familiar with the Gate 2 Review guidelines (PRG-3) and checklist (CL-3).

**Gate 2 Reviewers** will determine whether the PP demonstrates that the project is compatible with the NESDIS mission and strategic plan, and is technically feasible for development into an operational product. If so, the project is recommended to the SPSRB for Development. If not, the project is either terminated or returned to the research organization with recommendations for improvement and re-submittal. **STAR QA** verifies that the Gate 2 Review was conducted in accordance with STAR EPL standards.

This step culminates with the Gate 2 Review Report. This artifact is written by the **Review Lead** with assistance from the **Gate 2 Reviewers**. Guidelines for this report will be found in DG-3.2. The PP and G2RR are submitted to the SPSRB for its assessment.

**Each stakeholder** who performed activities during step 3 is encouraged to document an assessment of the experience in a personal record. This assessment should include: what was good, what was bad, what worked, what did not work, what can be improved, how it can be improved. At the conclusion of Development (step 11), the **Development Lead** will collect the final edited personal stakeholder records and incorporate them into a Development Project Report (DPR).

### 5.3 Resource Identification Tasks

Figure 5.3 shows the process flow for step 4.

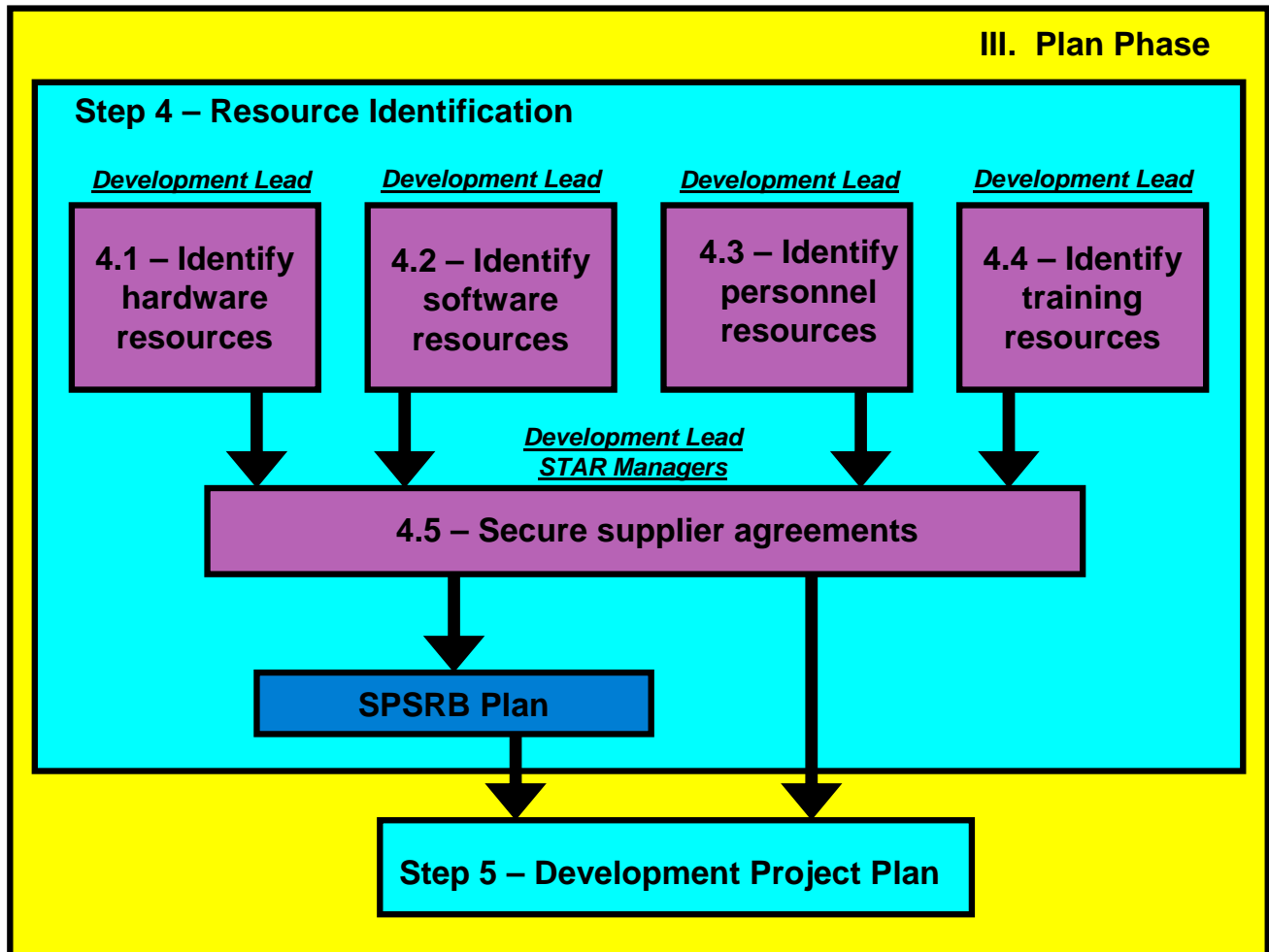


Figure 5.3 – STEP 4 Process Flow

### 5.3.1 Expected BEGIN State

- The research algorithm has been matured and documented in ATBD v1r1
- A software architecture has been matured and documented in SWA v1r1
- R&D code test results, documented in ATBD v1r1, demonstrate that the algorithm’s operational potential warrants development.
- A STAR Division and Branch has been selected to implement Development.

- The project has received SPSRB approval for development
- A Development Lead has been selected.

### 5.3.2 Task Inputs

***Project Proposal:*** The Project Proposal (PP) is produced for the Gate 2 Review. SPSRB and STAR will review the project proposal to determine whether the project should be approved for transition from research to operations. SPSRB requires a User Request to initiate this review. STAR standards call for the project proposal to include this User Request, and describe the supporting artifacts (research code and test data, ATBD, SWA). The PP should provide the information needed for a Technical Assessment, a Cost Assessment, and Resource Identification.

### 5.3.3 Desired END State

- Required and available resources (hardware, software, personnel, and training) have been identified.
- An SPSRB Project Plan that identifies these resources has been written

### 5.3.4 Task Outputs

- Identified hardware resources
- Identified software resources
- Identified personnel resources
- Identified training resources
- Supplier agreements
- SPSRB Plan



### 5.3.5 Stakeholder Activities

The **Development Lead** and **STAR Managers**, in consultation with the **SPSRB**, should identify resources for implementation of the Development Project. Resource identification includes hardware, software, personnel, and training resources.

The **Development Lead** and **STAR Managers** should determine which resources can be obtained internally and which should be acquired from external suppliers. The latter should be secured with supplier agreements. These can be formal agreements (e.g., Contracts and SOWs with contractors, MOUs with other Government agencies) or informal agreements. Informal agreements may introduce risk, depending upon the reliability and history of the suppliers.

The **Development Lead**, in consultation with the **SPSRB**, should produce an SPSRB Plan. The identified resources should be included in the SPSRB Plan. The SPSRB Plan, produced in collaboration with the SPSRB, follows SPSRB guidelines and is therefore not a STAR EPL artifact.

Once all resources have been identified and supplier agreements secured, **STAR Managers** direct the **Development Lead** to proceed with step 5 (Development Project Plan).

**Each stakeholder** who performed activities during step 4 is encouraged to document an assessment of the experience in a personal record. This assessment should include: what was good, what was bad, what worked, what did not work, what can be improved, how it can be improved. At the conclusion of Development (step 11), the **Development Lead** will collect the final edited personal stakeholder records and incorporate them into a Development Project Report (DPR).

### 5.4 Project Plan Tasks

Figure 5.4 shows the process flow for step 5.

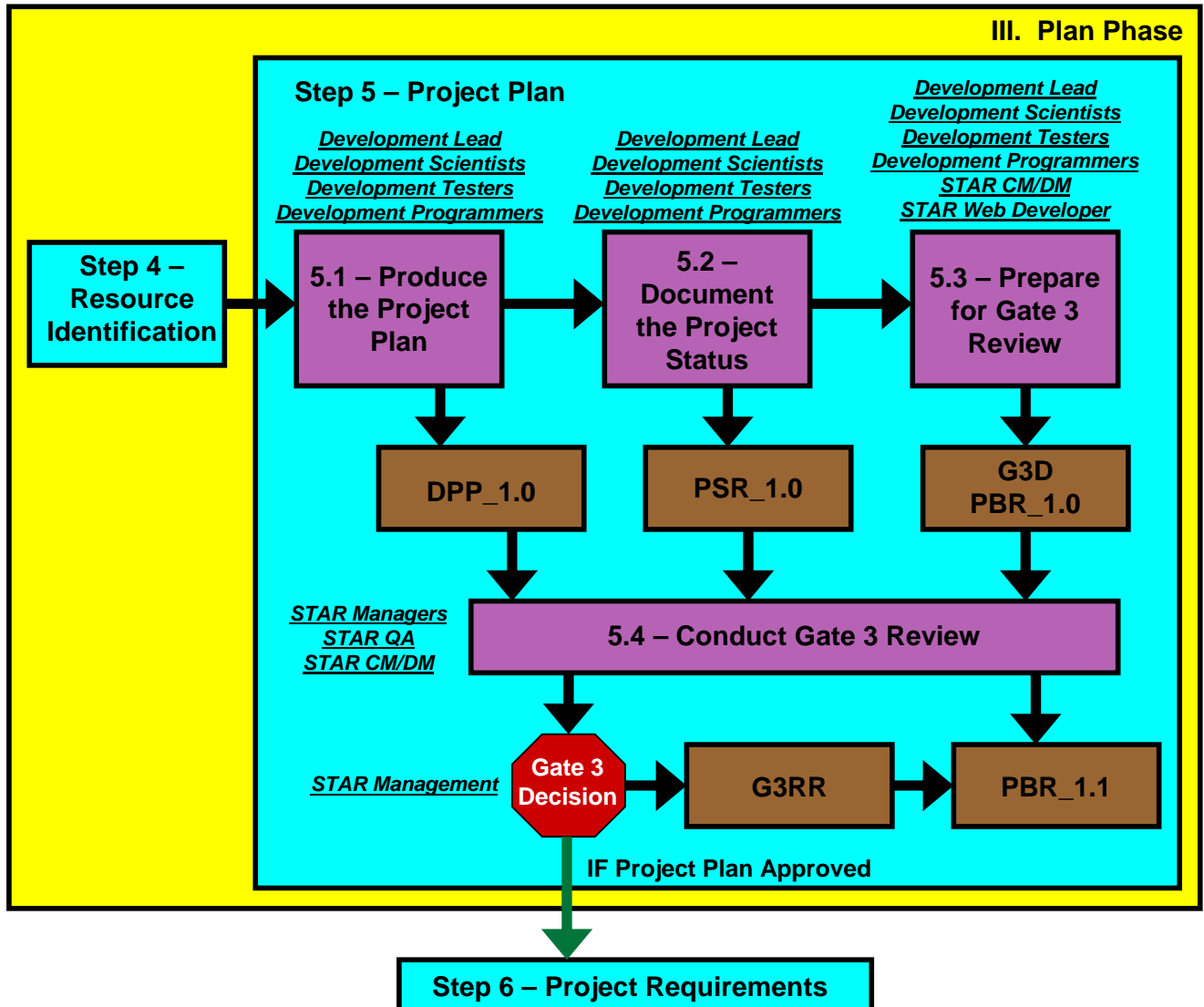


Figure 5.4 – STEP 5 Process Flow

### 5.4.1 Expected BEGIN State

- REQUIRED: A project proposal (PP) that includes a User Request has been reviewed at a Gate 2 Review
- REQUIRED: The project has been approved for development by SPSRB and STAR.

- **REQUIRED:** A STAR Division and Branch has been selected to implement Development, and a Development Lead has been identified.
- **REQUIRED:** Required and available resources (hardware, software, personnel, and training) have been identified.
- **REQUIRED:** An SPSRB Project Plan that identifies these resources has been written.
- **EXPECTED:** The research algorithm has been matured and documented in Algorithm Theoretical Basis Document (ATBD) v1r1.
- **EXPECTED:** A software architecture has been matured and documented in Software Architecture Document (SWA) v1r1.
- **EXPECTED:** Research and Development (R&D) code has been written.
- **EXPECTED:** R&D code has been run with research test data to produce proxy data products.
- **EXPECTED:** R&D code test results are documented in ATBD v1r1.

## 5.4.2 Task Inputs

- Algorithm Theoretical Basis Document v1.1
- Software Architecture Document v1.1
- R&D Code
- R&D Test Data
- Project Proposal
- Gate 2 Review Report
- SPSRB Project Plan

## 5.4.3 Desired END State

- Project objectives and concept of operations have been derived from user/customer needs and expectations
- Project stakeholders have been identified

- The project's process has been defined, by tailoring the STAR EPL set of standard processes. The defined process includes the project lifecycle steps, project reviews, review artifacts, work products, and Baseline Builds (BB).
- The planned work has been organized into an Integrated Master Plan (IMP) and Integrated Master Schedule (IMS).
- Expected project costs and cost schedule have been identified
- Project risks have been identified and assessed
- Risk mitigation actions have been identified
- The initial version of the DPP has been written
- Project status has been documented in the initial version of the PSR
- Risks and actions have been documented in an Appendix to the PSR
- A Gate 3 Review of the project plan and project status has been conducted
- A Gate 3 Review Report (G3RR) has been written, approving the project for the Design phase.
- Baseline Build 1.1 has placed the required items in the project artifact repository
- PBR\_1.1 documents the status of the BB 1.1 project baseline

#### 5.4.4 Task Outputs

Task outputs consist of the following BB 1.1 items:

- Development Project Plan (DPP\_1.0)
- Project Status Report (PSR\_1.0)
- Project Risks and Actions (PSR\_1.0 Appendix)
- Gate 3 Document (G3D)
- Gate 3 Review Report (G3RR)
- Project Baseline Report (PBR\_1.1)

## 5.4.5 Stakeholder Activities

Step 5 activities include:

- 1) Produce the project plan
- 2) Document the project status
- 3) Prepare for Gate 3 Review
- 4) Conduct Gate 3 Review

### 5.4.5.1 Produce Project Plan

The **Development Lead** oversees the preparation of a DPP. The DPP is a required artifact for the Gate 3 Review. **Development Scientists, Development Testers, Development Programmers**, and **STAR QA** assist the **Development Lead** in the DPP preparation.

### 5.4.5.2 Document Project Status

The **Development Lead** oversees the preparation of a PSR in accordance with PSR guidelines DG-5.2 and DG-5.2.A. The PSR is a required artifact for the Gate 3 Review. **Development Scientists, Development Testers**, and **Development Programmers** assist the **Development Lead** in the PSR preparation.

The PSR includes an Appendix that reports the current status of project risks and associated risk mitigation actions. Risk status includes the identification of risks, quantitative risk assessment, identification of actions to mitigate the risks, action closure criteria, assignment of responsibility for closing the action, and an action closure plan

### 5.4.5.3 Prepare Gate 3 Review

**STAR Managers** select a Gate 3 Review team, including a Review Lead. The Review Lead is nominally the Branch Chief, but an alternative lead can be selected by the Branch Chief in consultation with the Division Chief. Reviewers should be familiar with the Gate 3 Review guidelines (PRG-5) and Check List (CL-5). The Gate 3 Review team should be documented in the DPP.

The **Development Lead** leads the preparation of the Gate 3 Review presentation. The presentation slide package is the Gate 3 Document (G3D). The G3D is prepared by the

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**Development Lead, Development Scientists, Development Testers, and Development Programmers**, in accordance with G3D guidelines DG-5.3.

The **Development Lead** informs the **Gate 3 Reviewers** when the Gate 3 Review artifacts are available for their assessment. Review artifacts should be available at least 1 week in advance of the review, though this interval may be tailored.

**STAR Managers** are encouraged to examine the artifacts and communicate issues to the **Development Lead** prior to the review date, so that the artifacts and/or review presentation may be revised to respond to **STAR Management** concerns.

#### 5.4.5.4 Conduct Gate 3 Review

The “Project Plan” step culminates with a Gate 3 Review.

The Gate 3 Review consists of the presentation of the project plan and project status by the development team (**Development Lead, Development Scientists, Development Testers, and Development Programmers**) and the disposition of the review CLI, including entry and exit criteria, by **STAR Managers** and other Gate 3 reviewers,

On the basis of the Gate 3 Review, **STAR Managers** determine whether the project can proceed to the Design phase, based on information in the DPP and PSR. If not, recommendations are made for correcting deficiencies. Deficiencies can be technical, based on the PSR Appendix, or cost/schedule, based on the DPP and PSR. This process is iterated until the Gate 3 Reviewers are satisfied with the technical, cost and schedule status of the project.

This step culminates with the Gate 3 Review Report (G3RR), written by the **Gate 3 Reviewers**. Guidelines for this report will be found in DG-5.5. The final version of the G3RR should include approval for the project to proceed to the Design phase, and will indicate all open actions that have been deferred to the Design phase.

**Each stakeholder** who performed activities during step 5 is encouraged to document an assessment of the experience in a personal record. This assessment should include: what was good, what was bad, what worked, what did not work, what can be improved, how it can be improved. At the conclusion of Development (step 11), the **Development Lead** will collect the final edited personal stakeholder records and incorporate them into a Development Project Report (DPR).

## 5.4.6 Corrective Actions

The G3RR will document any actions that are needed to reduce risk. Usually, these actions should be closed before the next project review.

**STAR Managers** do not have specific tasks to perform during steps 6 (Project Requirements) and 7 (Preliminary Design), as these steps culminate with Technical Reviews.

However, additional corrective actions may be generated during steps 6 and 7, to mitigate project risks that are identified during requirements development and preliminary design. Project risks and risk mitigation actions should be identified in the PSR Appendix.

The needed corrective actions may require revisions to the project plan, typically by the addition of sub-tasks and revisions to the task schedule. The **Development Lead** should determine whether these revisions are manageable or are so significant that a re-plan is needed. If necessary, the **Development Lead** should consult **STAR Managers** on the advisability of a re-plan. Re-planning is expected to be a rare event, but it may occur if the project requirements have added significant scope or if unexpected technical issues have been discovered.

### 5.4.6.1 Delta Gate 3 Review

If it is determined that a re-plan is needed, actions should be taken to conduct a delta Gate 3 Review. A delta Gate 3 Review should be prepared for and conducted in the same manner as the normal Gate 3 Review. Refer to the step 5 Task Guideline (TG-5) and the Gate 3 Peer Review Guideline (PRG-5) for guidance. Following approval of the re-plan, the project can return to its step 6 and step 7 activities under the new plan.

## 5.5 Detailed Design Tasks

Following the Gate 3 Review, **STAR Managers** are not directly involved in project tasks until the Gate 4 Review that occurs at the end of step 8. Figure 5.5 shows the process flow for step 8.

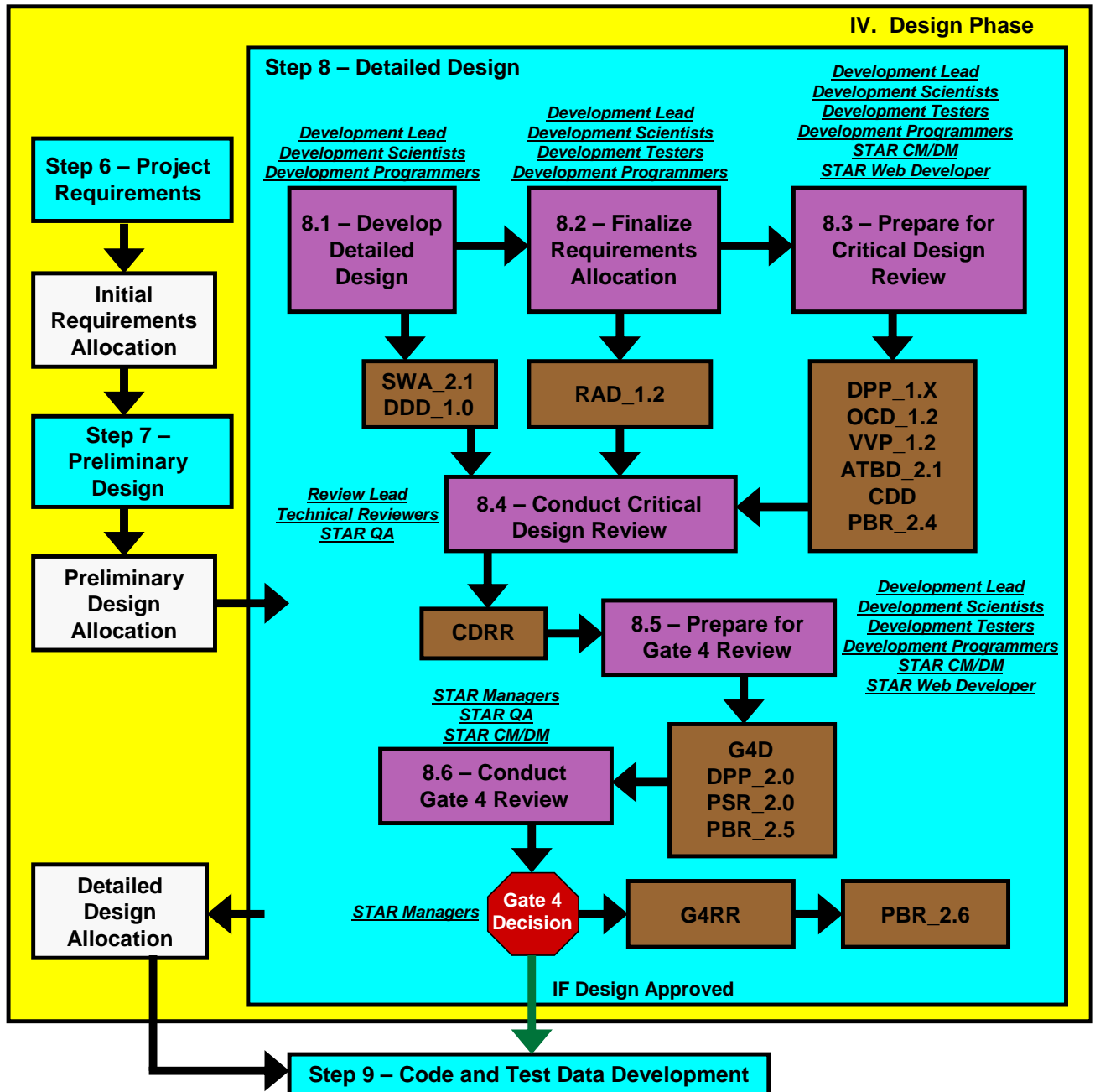


Figure 5.5 – STEP 8 Process Flow



## 5.5.1 Expected BEGIN State

- REQUIRED: A PDR has been conducted
- REQUIRED: A preferred solution to meet the requirements has been selected and approved.
- REQUIRED: A Preliminary Design Allocation for the selected solution has been developed and approved
- REQUIRED: Baseline Build (BB) 2.3 has placed the following items in the project artifact repository:
  - DPP, including Appendices
  - OCD
  - RAD, including Appendices
  - VVP
  - ATBD
  - SWA
  - Preliminary Design Document (PDD)
  - Preliminary Design Review Report (PDRR)
- EXPECTED: BB 2.3 has placed the following items in the project artifact repository:
  - R&D code
  - R&D test data
  - PP
  - Gate 2 Review Report (G2RR)
  - Gate 3 Review Report (G3RR)
  - Project Requirements Document (PRD)
  - Project Requirements Review Report (PRRR)
- REQUIRED: PBR\_2.3 documents the status of the BB 2.3 project baseline
- REQUIRED: PDR reviewers have approved the project to proceed to the Detailed Design step, and have documented this approval in the PDRR.

## 5.5.2 Desired END State

- An operations concept, developed from user/customer needs and expectations, explains what products are to be produced, why they are being produced, and how they will be produced in an operational environment,

- Basic project requirements have been developed from the operations concept
- Requirements have been analyzed in light of the customer's needs, mission objectives, system constraints, and design constraints to develop more specific product, system, and process requirements for the system.
- Derived project requirements have been developed from analysis of the basic requirements and other derived requirements
- A detailed software architecture has been developed.
- A Detailed Design Allocation of the requirements identifies product and system components down to the Sub-Unit-Layer, and traces each component to one or more requirement.
- A plan has been developed for monitoring the status of the requirements and their allocation to ensure that the integrity of the requirements allocation is preserved as the implementation of the detailed design proceeds through the Build phase.
- A plan has been developed to verify the identified work products, validate the identified requirements, and validate the identified products.
- The project plan has been updated as necessary
- The status of project risks and actions has been updated
- A CDR of the project plan, operations concept, requirements, software architecture, and requirements allocation has been conducted
- A CDRR has been written
- A Gate 4 Review of the project plan and project status has been conducted.
- A Gate 4 Review Report (G4RR) has been written, approving the project for the Build phase.
- Baseline Build 2.6 has placed the required items in the project artifact repository
- PBR\_2.6 documents the status of the BB 2.6 project baseline

### 5.5.3 Detailed Design Activities

Step 8 activities include:

- 1) Develop detailed design
- 2) Finalize requirements allocation

- 3) Prepare for CDR
- 4) Conduct CDR
- 5) Prepare for Gate 4 Review
- 6) Conduct Gate 4 Review

### 5.5.3.1 Develop Detailed Design

The detailed design consists of the detailed software architecture, developed by the **Development Scientists**, and a detailed code description, developed by the **Development Programmers**. The software system is an integrated collection of software elements, or code, that implements a solution, producing well-defined output products from a well-defined set of input data. The software architecture describes the structure of the system software elements and the external and internal data flows between software elements.

### 5.5.3.2 Finalize Requirements Allocation

The Detailed Design Allocation represents the culmination of the iterative development of requirements, solutions, and design during the Design phase. The Detailed Design Allocation is achieved when it is determined that a complete design has been developed to implement the preferred solution that was approved at the PDR, including all layers of the software architecture, and a detailed code description.

### 5.5.3.3 Prepare for CDR

The **Development Lead** leads the preparation of the CDR presentation.

### 5.5.3.4 Conduct CDR

The CDR consists of the presentation of the Detailed Design Allocation by the development team (**Development Lead, Development Scientists, Development Testers, and Development Programmers**) and the disposition of the review CLI, including entry and exit criteria, by the reviewers (**Technical Review Lead and Technical Reviewers**).

### 5.5.3.5 Prepare Gate 4 Review

Once the project passes its CDR, it is referred to the Gate 4 Review. The Gate 4 review is included in step 8 because the project status and plan will usually be modified significantly during the Design phase, so a management review of the project plan and status is typically desirable.

**STAR Managers** select a Gate 4 Review team, including a Review Lead. The Review Lead is nominally the Branch Chief, but an alternative lead can be selected by the Branch Chief in consultation with the Division Chief. Reviewers should be familiar with the Gate 4 Review guidelines (PRG-8.2) and Check List (CL-8.2). The Gate 4 Review team should be documented in the DPP.

**Development Lead** updates the PSR to version 2.0, assisted by **Development Scientists**, **Development Testers**, and **Development Programmers**. Version 2 of the PSR, along with its Appendix, documents the status of project tasks, cost, schedule, risks, and actions at the conclusion of the Design phase.

The **Development Lead** leads the preparation of the Gate 4 Review presentation. The presentation slide package is the Gate 4 Document (G4D). The G4D is prepared by the **Development Lead**, **Development Scientists**, **Development Testers**, and **Development Programmers**.

The **Development Lead** informs the **Gate 4 Reviewers** when the Gate 4 Review artifacts are available for their assessment. Review artifacts should be available at least 1 week in advance of the review, though this interval may be tailored.

**STAR Managers** are encouraged to examine the artifacts and communicate issues to the **Development Lead** prior to the review date, so that the artifacts and/or review presentation may be revised to respond to **STAR Management** concerns.

### 5.5.3.6 Conduct Gate 4 Review

The “Detailed Design” step culminates with a Gate 4 Review.

The Gate 4 Review consists of the presentation of the project plan and project status by the development team (**Development Lead**, **Development Scientists**, **Development Testers**, and **Development Programmers**) and the disposition of the review CLI, including entry and exit criteria, by **STAR Managers** and other Gate 4 reviewers,

On the basis of the Gate 4 Review, **STAR Managers** determine whether the project can proceed to the Build phase, based on information in the CDRR, DPP and PSR. If not, recommendations are made for correcting deficiencies. Deficiencies can be technical, based on the CDRR and PSR Appendix, or cost/schedule, based on the DPP and PSR. This process is iterated until the Gate 4 Reviewers are satisfied with the technical, cost and schedule status of the project.

This step culminates with the Gate 4 Review Report (G4RR), written by the **Gate 4 Reviewers**. Guidelines for this report will be found in DG-8.5. The final version of the G4RR should include approval for the project to proceed to the Build phase, and will indicate all open actions that have been deferred to the Build phase.

#### 5.5.4 Corrective Actions

The G4RR will document any actions that are needed to reduce risk. Usually, these actions should be closed before the next project review.

**STAR Managers** do not have specific tasks to perform during steps 9 (Code and Test Data Development) and 10 (Code Test and Refinement), as these steps culminate with Technical Reviews.

However, additional corrective actions may be generated during steps 9 and 10, to mitigate project risks that are identified during code development and testing. Project risks and risk mitigation actions should be identified in the PSR Appendix.

The needed corrective actions may require revisions to the project plan, typically by the addition of sub-tasks and revisions to the task schedule. The **Development Lead** should determine whether these revisions are manageable or are so significant that a re-plan is needed. If necessary, the **Development Lead** should consult **STAR Managers** on the advisability of a re-plan. Re-planning is expected to be a rare event, but it may occur if the project requirements have added significant scope or if unexpected technical issues have been discovered.

## 5.5.4.1 Delta Gate 4 Review

If it is determined that a re-plan is needed, actions should be taken to conduct a delta Gate 4 Review. A delta Gate 4 Review should be prepared for and conducted in the same manner as the normal Gate 4 Review. Refer to the step 8 Task Guideline (TG-8) and the Gate 4 Peer Review Guideline (PRG-8.2) for guidance. Following approval of the re-plan, the project can return to its step 9 and step 10 activities under the new plan.

**Each stakeholder** who performed activities during step 8 is encouraged to document an assessment of the experience in a personal record. This assessment should include: what was good, what was bad, what worked, what did not work, what can be improved, how it can be improved. At the conclusion of Development (step 11), the **Development Lead** will collect the final edited personal stakeholder records and incorporate them into a Development Project Report (DPR).

## 5.6 System Integration and Test Tasks

Following the Gate 4 Review, **STAR Managers** are not directly involved in project tasks until the Gate 5 Review that occurs at the end of step 11. Figure 5.6 shows the process flow for step 11.

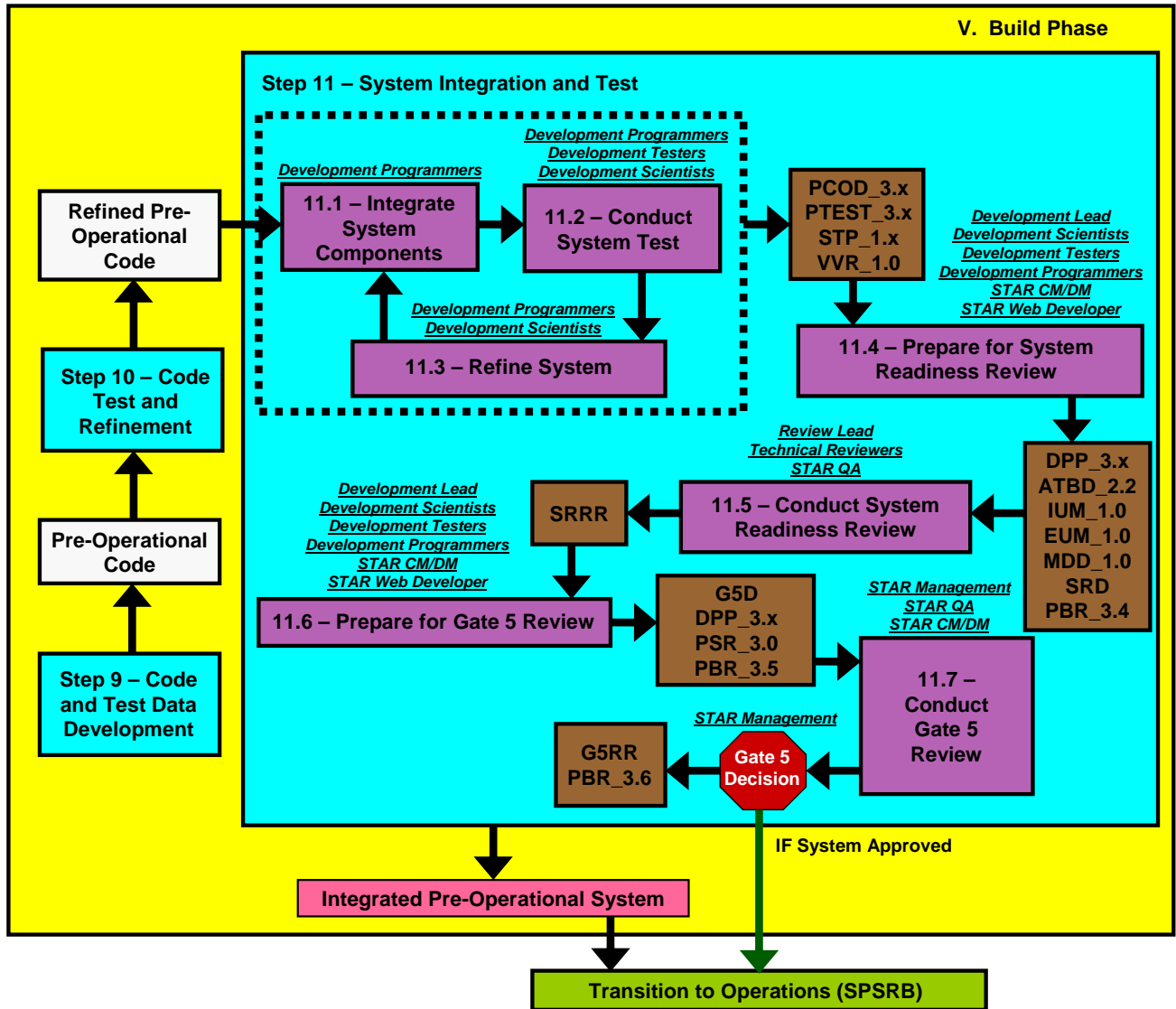


Figure 5.6 – STEP 11 Process Flow

### 5.6.1 Expected BEGIN State

- REQUIRED: Pre-operational code has been refined and debugged as necessary until it passes all unit tests.

- REQUIRED: Unit test results have been documented in a report.
- REQUIRED: A plan for system testing has been developed. The plan ensures that the system test will address all system requirements and product requirements.
- REQUIRED: All data required for implementation of the system test plan has been acquired or developed, and is available in the designated test environment.
- REQUIRED: A CTR has been conducted
- REQUIRED: CTR reviewers have approved the project to proceed to the System Integration and Test step, and have documented this approval in the Code Test Review Report (CTRR).
- REQUIRED: Baseline Build (BB) 3.3 has placed the following items in the project artifact repository:
  - Refined pre-operational code
  - System test data
  - DPP, including Appendices
  - RAD, including Appendices
  - VVP
  - ATBD
  - SWA
  - DDD
  - UTP
  - UTR
  - STP
  - Code Test Document (CTD)
  - CTRR
- EXPECTED: BB 3.3 has placed the following items in the project artifact repository:
  - R&D code
  - R&D test data
  - Project Proposal (PP)
  - Gate 2 Review Report (G2RR)
  - Gate 3 Review Report (G3RR)
  - Operations Concept Document (OCD)
  - Project Requirements Document (PRD)
  - Project Requirements Review Report (PRRR)



- Preliminary Design Document (PDD)
- Preliminary Design Review Report (PDRR)
- Critical Design Document (CDD)
- Critical Design Review Report (CDRR)
- Gate 4 Document (G4D)
- Gate 4 Review Report (G4RR)
- Test Readiness Document (TRD)
- Test Readiness Review Report (TRRR)
- Project Status Report (PSR), including Appendix
- REQUIRED: PBR\_3.3 documents the status of the BB 3.3 project baseline

## 5.6.2 Desired END State

- The Detailed Design Allocation of the requirements that identifies product and system components down to the Sub-Unit-Layer, and traces each component to one or more requirement, has been verified.
- The functionality of all system components in the detailed design (software units and sub-units) has been implemented in pre-operational code that meets coding standards.
- Unit testing of the code has ensured that all required code functionality and code outputs have been satisfied.
- The code and system test data have been integrated into a complete pre-operational product processing system.
- The pre-operational system has been refined and debugged as necessary until it satisfies all system requirements and product requirements, as determined by system testing.
- System test results have been documented in a report.
- All required documentation has been produced.
- The project plan has been updated as necessary
- Project status, including project risks and actions, has been updated
- An SRR of the project plan, system test results, and supporting documentation has been conducted

- An SRRR has been written. The SRRR approves the readiness of the product processing system and supporting documentation to be delivered to operations.
- A Gate 5 Review of project status has been conducted.
- A Gate 5 Review Report (G5RR) has been written. The G5RR approves the project for transition to operations.
- Baseline Build 3.6 has placed the required items in the project artifact repository
- PBR\_3.6 documents the status of the BB 3.6 project baseline

### 5.6.3 Stakeholder Activities

Step 11 activities include:

- 1) Integrate system components
- 2) Conduct system test
- 3) Refine system
- 4) Prepare for SRR
- 5) Conduct SRR
- 6) Prepare for Gate 5 Review
- 7) Conduct Gate 5 Review

#### 5.6.3.1 Integrate System Components

The pre-operational system is produced by integrating the system components that have passed unit testing into a complete end-to-end product processing system. This should be done in the system test environment that was designated in the system test plan.

**Development Programmers** prepare the system test environment, in accordance with the system test plan, and perform the system integration.

#### 5.6.3.2 Conduct System Test

**Development Programmers** build the system test configuration, in accordance with the system test plan.

**Development Testers** run the system test, assisted by **Development Programmers**.

**Development Scientists** assist in evaluating the system test results.

### 5.6.3.3 Refine System

**Development Programmers** iteratively refine, debug and re-test the integrated pre-operational system as needed, based on the system test results.

**Development Testers** refine the system test data as necessary until the system test requirements are satisfied. **Development Scientists** assist in refining the system test data.

### 5.6.3.4 Prepare for SRR

The **Development Lead** leads the preparation of the SRR presentation, assisted by the **Development Lead, Development Scientists, Development Testers, and Development Programmers**.

### 5.6.3.5 Conduct SRR

The SRR consists of the presentation of the integrated pre-operational product processing system and supporting documentation by the development team (**Development Lead, Development Scientists, Development Testers, and Development Programmers**) and the disposition of the review CLI, including entry and exit criteria, by the reviewers (**Technical Review Lead and Technical Reviewers**).

The **Technical Review Lead** and the **Technical Reviewers** conduct the SRR to determine whether the integrated pre-operational system has satisfied system test success criteria and is ready for delivery to operations.

The SRR reviewers complete a System Readiness Review Report (SRRR), following guidelines in DG-11.6. The SRRR will include the reviewers' assessment of the status of the SRR artifacts, the project risks, and associated risk mitigation actions, and an Appendix that consists of the reviewers' disposition of each SRR CLI.

### 5.6.3.6 Prepare Gate 5 Review

Once the project passes its SRR, it is referred to the Gate 5 Review, the final STAR review prior to delivery of the pre-operational system to operations. The purpose of the Gate 5 Review is to ensure **STAR Management** approval of the project status prior to delivery.

**STAR Managers** selects a Gate 5 Review team, including a Review Lead. The Review Lead is nominally the Branch Chief, but an alternative lead can be selected by the Branch Chief in consultation with the Division Chief. Reviewers should be familiar with the Gate 5 Review guidelines (PRG-11.2) and Check List (CL-11.2). The Gate 5 Review team should be documented in the DPP.

**Development Lead** updates the PSR to version 3.0, assisted by **Development Scientists, Development Testers, and Development Programmers**. Version 3 of the PSR, along with its Appendix, documents the status of project tasks, cost, schedule, risks, and actions at the conclusion of the Build phase.

The **Development Lead** leads the preparation of the Gate 5 Review presentation. The presentation slide package is the Gate 5 Document (G5D). The G5D is prepared by the **Development Lead, Development Scientists, Development Testers, and Development Programmers**, in accordance with G5D guidelines DG-11.7.

The **Development Lead** informs the **Gate 5 Reviewers** when the Gate 5 Review artifacts are available for their assessment. Review artifacts should be available at least 1 week in advance of the review, though this interval may be tailored.

**STAR Managers** are encouraged to examine the artifacts and communicate issues to the **Development Lead** prior to the review date, so that the artifacts and/or review presentation may be revised to respond to **STAR Management** concerns.

### 5.6.3.7 Conduct Gate 5 Review

The “System Integration and Test” step culminates with a Gate 5 Review.

The Gate 5 Review consists of the presentation of the project plan and project status at the conclusion of the Build phase by the development team (**Development Lead, Development Scientists, Development Testers, and Development Programmers**) and the disposition of the review CLI, including entry and exit criteria, by the reviewers (**STAR Management**).

On the basis of the Gate 5 Review, **STAR Management** determines whether the project can be delivered to operations, based on information in the SRRR, DPP and PSR. If not, recommendations are made for correcting deficiencies. Deficiencies can be technical, based on the SRRR and PSR Appendix, or cost/schedule, based on the DPP and PSR. This process is iterated until the Gate 5 Reviewers are satisfied with the technical, cost and schedule status of the project.

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**STAR QA** verifies that the Gate 5 Review was conducted in accordance with STAR EPL standards.

This step culminates with the Gate 5 Review Report (G5RR), written by the **Gate 5 Reviewers**. Guidelines for this report will be found in DG-11.8. The final version of the G5RR should include approval for the project to be delivered to operations.

#### 5.6.4 Corrective Actions

The G5RR will document any actions that are needed to reduce risk. Usually, these actions should be closed before delivery to operations.

The needed corrective actions may require revisions to the project plan. **STAR Managers** should determine whether these revisions are manageable or are so significant that a re-plan is needed. Re-planning after the Gate 5 Review is expected to be an exceedingly rare event that is warranted only if a critical deficiency in the developed system has been discovered. This would represent a major failure of the SRR, which the EPL process is designed to prevent.

##### 5.6.4.1 Delta Gate 5 Review

If it is determined that a re-plan is needed, actions should be taken to conduct a delta Gate 5 Review. A delta Gate 5 Review should be prepared for and conducted in the same manner as the normal Gate 5 Review. Refer to the step 11 Task Guideline (TG-11) and the Gate 5 Peer Review Guideline (PRG-11.2) for guidance.

**Each stakeholder** who performed activities during step 11 is encouraged to document an assessment of the experience in a personal record. This assessment should include: what was good, what was bad, what worked, what did not work, what can be improved, how it can be improved. At the conclusion of Development (step 11), the **Development Lead** will collect the final edited personal stakeholder records and incorporate them into a Development Project Report (DPR).

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