

Subject: Job Requirements Documentation & Control	Effective Date: January 31, 2018	Initiated by: Head, Engineering Department
	Supersedes: Rev 2, Dated December 19, 2014	Approved: Director

Management System (Primary): 03.00 ENGINEERING (ENG)
Management System Owner: Engineering Department Head
Management Process: 03.06 Technical Project Management
Process Owner: Engineering Department Head
Sub-Process: 03.06.12 Scope Management, Planning, Definition, Verification,
and Scope Change Control
Sub-Process Owner: Engineering Department Head
Subject Matter Expert: Engineering Department Head

Applicability

This procedure implements the PPPL QAPD graded approach requirements for developing project requirements documents as described herein. Table 1 flows down the QAPD requirements regarding applicability and approval authority for developing and issuing General Requirements Document (GRD), the Systems Requirements Document (SRD), Systems Design Description (SDD) and Collaborations Agreements (CA).

Note: Requirements documents for software projects are prepared and issued in accordance with PPPL's Software QA Program; see QAPD for further instruction.

Introduction

This procedure establishes the criteria and process for developing and issuing GRDs, SDDs and CAs. The Cognizant Individual must be diligent in engaging all stakeholders in the preparation of requirements documents. CAs can pose special challenges – care must be taken to include all appropriate stakeholders in chartering, requirements gathering, planning, expediting, and closing collaborative jobs and projects. In some cases CAs may use titles, terms, and roles that differ from internal PPPL documents so care must be taken to correctly assign roles, work, and approvals.

Requirements change control provides an opportunity to review and approve changes and to review associated cost and schedule changes driven by requirements. This procedure, based on the graded approach, also establishes Change Control for formally approved GRDs, SRDs, and SDDs.

Definitions:

GRD - General Requirements Document

The GRD contains the technical expectations that define project goals and objectives, the physics requirements to perform a range of experiments and the overarching engineering design criteria. The

GRD is the fundamental building block in determining a project's technical feasibility and scope, cost, schedule, and resource needs. Any relevant physics or engineering constraints, goals, or performance criteria should be included in a GRD. See Table I for applicability and approval authority.

SRD - Systems Requirements Document

The SRD contains the engineering requirements that must be met for the system to function in accordance with the GRD. An SRD would typically specify any constraints, limits, system performance criteria, operations expectations, user interfaces, systems interfaces, and other services required for the system to function. See Table I for applicability and approval authority.

SDD - Systems Design Description

The SDD describes a design for a system in sufficient but not rigorous detail so a qualified individual with appropriate technical background could understand the system form, fit, and function as it has been proposed in the Design Verification process. See Table I for applicability and approval authority.

CA – Collaborations Agreement

A CA is any Task Agreement, Memorandum of Understanding, GRD, SRD, contract, Statement of Work, or any other means agreed upon by PPPL and the collaborator or partner that documents the requirements and indicates approvals. This usually defines major stakeholders, roles, requirements, and deliverables. It may define cost and schedule range or limitations. See Table I for applicability and approval authority.

Requirement Document (RD)

A document defining Physics, Engineering, Environment, Safety, Health, or other project management metric that by definition must be met to satisfy the goals and objectives of the project.

Requirement Change Control

A revision of the above documents and associated project documents requires similar approval as originally for inclusion in the scope of a project and includes review, acceptance, and approval of any cost and schedule changes pertaining thereto.

Note: For capital projects, project change control will be defined according to the Project Management System Description (PMSD), and the project specific Project Execution Plan. Nevertheless, the expectation of this procedure that a similar level of review and approval for a change as occurred originally will be maintained.

REFERENCES

QAPD	Quality Assurance Program Description
ENG-032	Project Work Planning
ENG-057	Project and Governance Roles and Responsibilities

Procedure

This procedure provides PPPL's process for developing and issuing requirements documents for projects. This procedure may be a stand-alone process or part of a larger construct per the PMSD for capital projects.

- | | |
|----------------------|---|
| Cognizant Individual | <ol style="list-style-type: none"> 1. Evaluates the scope of work and prepares a Work Planning (WP) form per ENG-032. 2. Selects appropriate requirement document deliverables on the WP form as required per Table 1. 3. Obtains unique identifiers, based on the WP number, for the documents from the Ops Center. 4. Evaluates the requirements and prepares appropriate requirement documentation. If necessary, the Cognizant Individual will update the WP accordingly if new requirements emerge. 5. Distributes to reviewers and approvers, as defined in Table 1. 6. Resolves comments and circulates for signature. |
| Approver | <ol style="list-style-type: none"> 7. Signs the requirement document after confirming the identifier with the Ops Center. |
| Cognizant Individual | <ol style="list-style-type: none"> 8. Files the approved requirement documents with the Ops Center. |
| Cognizant Individual | <ol style="list-style-type: none"> 9. As requirements change, revises requirements documentation and repeats the review and approval process. 10. Summarizes the achieved systems in the SDDs. 11. Circulates SDD for review and approval, per Table 1. |

Table I – Documentation requirements per risk classification

	A1*	A2*	A3*
GRD	Required		
Owner	Requesting Department Head, unless there is an assigned Project Director		
Reviewed by	Chief Engineer (and ES&H if relevant)		
Approved by	Requesting Department Head, unless there is an assigned Project Director		
Accepted by	Performing Department Head		
SRD	Required, for projects involving the design and installation of systems		
Owner	Requesting Department Head, unless there is an assigned Project Director		
Reviewed by	Project Manager Responsible Engineer Technical Authorities (and ES&H if relevant)	Project Manager Responsible Engineer	Project Manager
Approved by	Chief Engineer	Chief Engineer	Responsible Engineer
SDD	Required, for projects involving the design and installation of systems		
Owner	Responsible Engineer		
Reviewed by	Responsible Engineer Technical Authorities (and ES&H if relevant)	Responsible Engineer	-
Approved by	Chief Engineer	Chief Engineer	Responsible Engineer
Collaboration Agreement	Required for Collaborations involving parties other than PPPL		
Owner	Requesting Department Head, unless there is an assigned Project Director		
Reviewed by	Chief Engineer (and ES&H if relevant)		
Approved by	Requesting Department Head, unless there is an assigned Project Director		
Accepted by	Performing Department Head		

* Refer to the QAPD for the definitions of A1, A2 and A3; A1, A2 or A3 is the highest risk classification of any item involved in the activity.

TRAINING

- Head, Engineering Department 1. Ensures the appropriate training methods and means (below) are provided and obtains concurrence of the Management System Owner and the Management Process Owner.

Target Audience: REs, Cognizant Individuals, TMs, PMs, Department Heads, Supervisors

Instructor: Head, Engineering Department

Training Method:

- ☒ Briefings (major re-issue, new positions)
- ☒ Required Reading (major re-issue and minor revisions)
- ☒ Email distribution (minor revisions)

- Management System Owner or Designee 2. Notifies the Human Resources Training Office of the training so that they will be aware of the training requirements and be able to provide

assistance and guidance in the course development, implementation, tracking, and maintenance if needed.

Records Requirements specific to this procedure

Records Custodians must assure records are maintained as follows:

Record Title	Record Custodian	Location	Retention Time
Work Planning Form	*Operations Center	Project File	See record Schedule for specific Project Type <i>Reference Admin 17, Cartographic, Aerial Photography, Architectural & Engineering Records (30.c)</i>
Requirements Documentation	*Operations Center	Project File	See record Schedule for specific Project Type <i>Reference Admin 17, Cartographic, Aerial Photography, Architectural & Engineering Records (30.c)</i>

**All of these files must be sent to the Ops Center unless otherwise directed by project-specific document control procedure approved by Head, QA/QC.*

Attachment

1. Additional Guidance for Collaborations

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Additional Guidance for Collaborations			Attachment 1

Additional Guidance for Collaborations:

Collaborations may involve engineering deliverables like design, analysis, fabrication, procurement, assembly, installation, and testing. The jobs flow through the Work Planning procedures and system like in house PPPL jobs but collaborations introduce additional complexity. Communication will be more involved due to additional stakeholders. Therefore additional attention on the part of the Cognizant Individuals and the Project Managers for proper and consistent job management may be required.

This attachment provides guidance to be considered by Cognizant Individuals and Project Managers for collaborations jobs. While all jobs have these types of considerations, the complexity of a particular collaboration may require additional emphasis.

This guidance can also be used to outline and construct collaborations agreements. CAs may take the form of a collaborations agreement, memorandum of understanding, task agreement, requirements document, specification, or other instrument.

1. Job Initiation

- a. Goals/Charter – Because the job will involve two or more institutions, clear goals are necessary to adequately frame and assess the job and expectations. A Collaborations Agreement may be necessary to formally capture these criteria.
- b. Scope definition – The technical, cost, and schedule parameters by which the job will be judged need to be scoped or a plan to develop them jointly should be made. A formal requirements document may be necessary to define the job and provide a means for change control.
- c. Limitations – If particular hard and fast limitations apply then these limitations should be made clear so that either party can assess the likelihood of success and evaluate continued participation.
- d. Stakeholders – While most collaborations will be handled by an existing PPPL department for the collaboration, additional external relationships must be considered, built, and maintained throughout the life of the job especially for direct technical contact for interfaces and deliverables.
- e. Funding – Funding sources, levels, expectations, and limits may pose special challenges for collaborations. Additional input from senior management may be required prior to committing to a job or committing to changes.
- f. Staffing – Experience with collaborations or a particular institution should be considered when staffing a collaborations job. Also, sufficient commitment for engineering, drafting, shop time, and other lab resources must be made with priority.
- g. Roles and Responsibilities – staff may be assigned project or job specific roles and take responsibilities for portions of the work or for communications.
- h. Risks and Opportunities – Collaborations jobs require risk assessments as do other jobs; however, collaborations are often more visible and may require upper management involvement.
- i. Intellectual Property ownership may need to be defined.

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2. Requirements – GRD/SRD/RD//CA

- a. Requirements gathering may be a key step in adequately defining the job before committing resources.
- b. Site visits may be required to adequately assess the degree of difficulty, interfaces, and operational context.
- c. The degree of difficulty of the requirements may dictate that the job be reconsidered by upper management before committing to or continuing the job.
- d. If R&D will be required to adequately define the job scope then a phased approach to the collaboration may be necessary.

3. Planning

- a. Work Plan – As with other jobs, the WP system provides a tool to outline and plan the job. The WP also provides risk assessment and a list of approvals. The WP form Comments section can be used to list additional stakeholders, requirements, limitations, etc.
- b. Scope – The scope definition should be clear for content and for the boundary conditions of the job.
- c. Tasks – Collaborations may involve a progressive approach starting with design, adding analysis, and concluding with manufacturing. Special processes may be required for fabrication. If not included in the original scope, change control should be used to add tasks.
- d. Reviews – The granularity of the reviews should be commensurate with the work scope. Technical peer reviews should be held to gather and develop requirements especially if R&D or prototypes are necessary.
- e. Estimates – Collaborations should follow existing procedures for WAFs and reviews or use the collaborative institution equivalent.
- f. Schedules – Schedules need to be developed input from the technical, job, and collaborations stakeholders.
- g. Procurements – Collaborations procurements may have special issues relating to ownership, delivery, shipment, etc. Collaborations may need to bridge multiple institutional processes for procurements requiring definition, time, and coordination.
- h. Documentation – Transfer of drawings and analysis may be required to complete the job. Format and drafting applications need to be considered when planning a job.
- i. Deliverables – Formal agreements should include key deliverables to demonstrate success and allow for the job to be closed in a timely fashion.
- j. Domestic shipping and export control – adequate planning will be required to deliver on time and budget.

4. Execution

- a. Work Breakdown – A division of duties between collaboration institutions and PPPL may be required. Tasks should be delineated in advance prior to starting the job.

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- b. Plan Implementation – Once the Work Plan has been approved, the work should follow this plan. If the job requires changes, these should be approved to at least the same level of authority as with the original plans.
- c. Evaluate Scope, Cost, Schedule – The Cognizant Individual owns the progress of the job and provides a first point of contact to identify any scope creep, cost growth, delays, or other derailing anomalies to the job. The Cognizant Individual must execute the job with strong involvement and raise flags if problems arise or persist.
- d. Collaboration Communication – Cognizant Individuals, Project Managers, and Department Heads need to define points of contact, insure regularly scheduled discussions, foster site visits when needed, and develop partnerships to ensure quality paths of communications.
- e. Feedback on Expectations – Status, progress, and change needs to be communicated up and down the line so that expectations are clear and managed.
- f. Manage Information – The flow of information and its context is critical to managing expectations. Email chains, web sites, team meetings, video conferencing, and model and drawing access provide opportunities to transfer and manage the flow of information during the course of the job.

5. Monitor & Control

- a. Verify Scope, Cost, and Schedule – The Cognizant Individual and Planning & Control Officer should aggressively maintain tight control over technical, cost, and schedule parameters and use change control to allow for job growth.
- b. Provide Earned Value Management System (EVMS) – The Cognizant Individual provides cost estimates, job status, and reviews job cost reports to provide EVMS data.
- c. Evaluate EVMS criteria and performance – Collaborations will require review by departments or the Project Status Review Board for job performance.
- d. Feedback to Stakeholders – EVMS and job performance can be provided to all stakeholders
- e. Administer Change Control and Corrective Actions – Job growth requires formalized change control for additions. Corrective actions may include variance analysis.

6. Closeout

- a. Closeout reviews – Job completion may require a review to discuss completion. When work is complete the Work Plan should be closed.
- b. Closeout procurements – Contractual agreements and deliverables may need additional effort to close the job.
- c. Closeout control accounts – When charges against a control account are complete, the control account should be closed.
- d. Lessons Learned – Successful and not so successful jobs can provide means for continuous improvement for future work.