

The V-model of project execution

Specification phases & QA

Software Development, System Development,
Business Process Optimisation

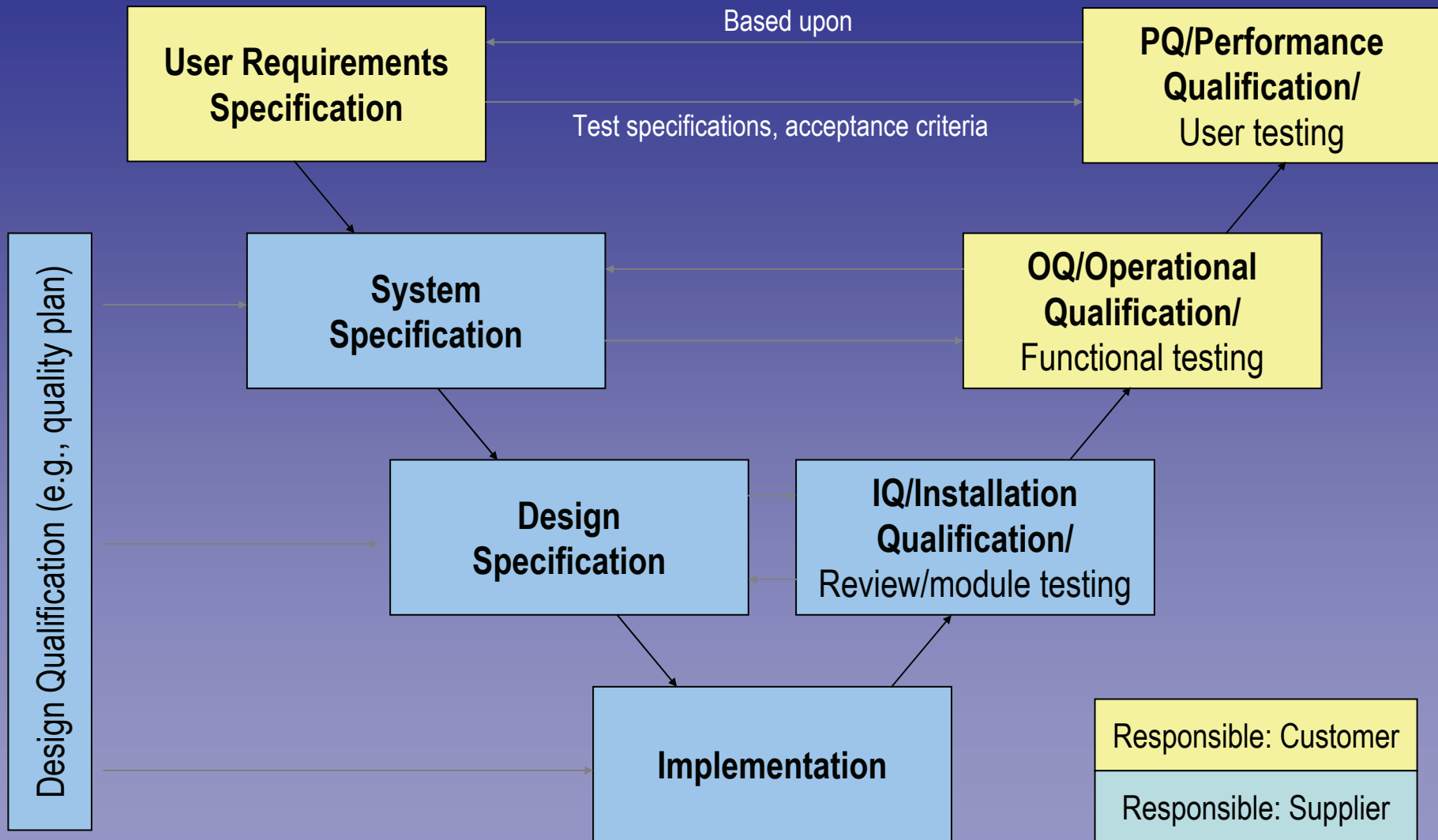
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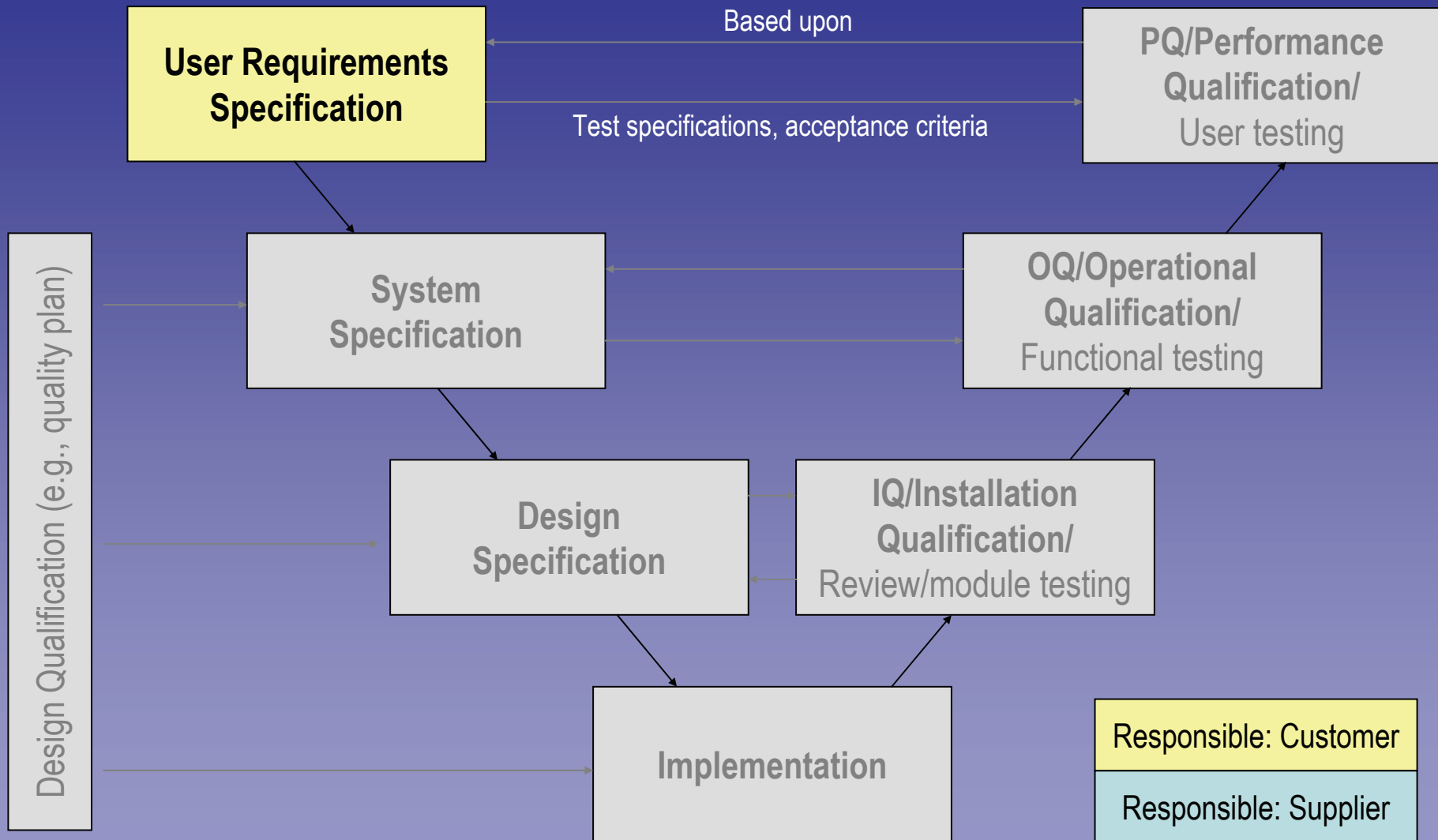
Introduction

- The V-model of project execution is a systematic approach to
 - Understand and document user requirements
 - Map user requirements to process definitions and a system architecture
 - Provide clear and unambiguous specifications to developers
 - Perform tests on multiple levels, each linked to a certain level of specification
 - Trace all user requirements through the entire project life cycle
- Result: Maximum transparency for both the customer and the supplier.

V-Model of project execution - overview



Phase I: User Requirements Specification



Phase I: User Requirements Specification

- The URS is a user (customer) document
- It describes the requirements regarding the new process / system
 - from the user's point of view
 - using the user's language
- It will be used as the basis for user acceptance tests (performance qualification)
- It should be the basis of requests for quotations and of the contract between customer and supplier.

Phase I: User Requirements Specification

- All requirements defined in the URS should be uniquely identified, in order to track them through the entire project life cycle.

Phase I: User Requirements Specification

- Example requirements (URS, software):
 - Requirement-ID: **TDB-01**
 - *The technical database must support document-type dependent document review and release processes.*
 - Requirement-ID: **TDB-02**
 - *The technical database must support project-dependent document review and release processes.*
- Example requirements (URS, process):
 - Requirement-ID: **RA-01**
 - *Prior to submitting a quote to a customer, all commercial and technical risks must be evaluated in a reproducible manner.*

Phase II: System specification

- The system specification is a supplier document
- It describes
 - New / modified processes
 - basic algorithms
 - hardware / software components and modules
 - Main interfaces and interface technologiesto be applied in order to meet the requirements defined in the user requirements specification
- It is used as a reference for operational qualification (functionality test / integration test)
- It serves as the basis for the supplier's commercial calculation

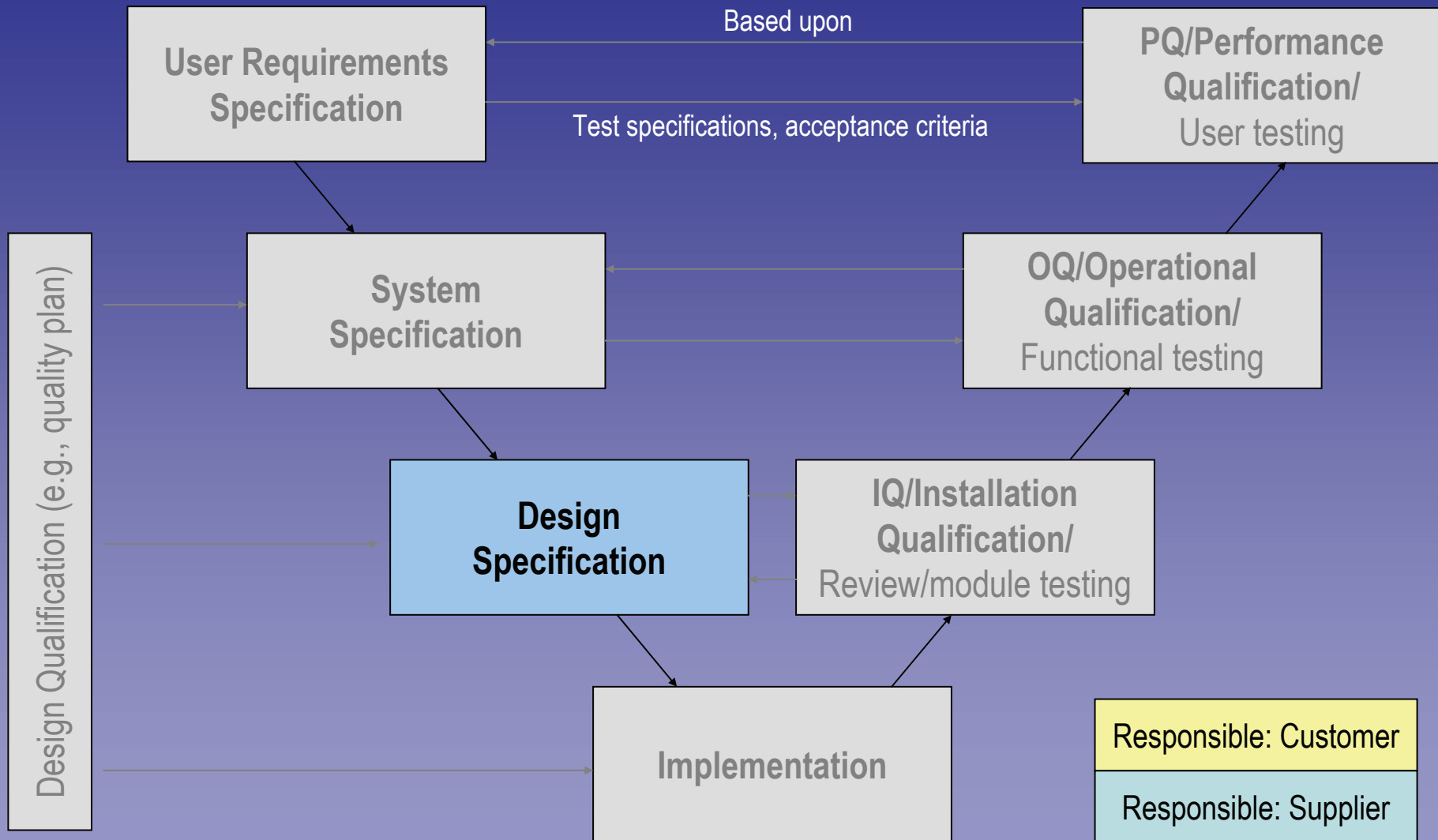
Phase II: System specification

- The system specification should refer to all requirements defined in the URS. It should either define which approach is taken to meet the requirement, or explicitly state if a requirement cannot be fulfilled.

Phase II: System specification

- Examples:
 - *For all workflow definitions, the standard „workflow“ module will be used. This module allows to define document-type specific workflows. → req. TDB-01*
 - *For project-specific workflows, an extension of the workflow module will be developed → req. TDB-02*
 - *A formal risk analysis process will be introduced, documentation / training needs to be prepared. → RA-01*

Phase III: Design specification



Phase III: Design specification

- The design specification is a supplier document
- It describes in exact terms
 - All documents / trainings / changes, that need to be created / performed in order to establish a new process
 - All required hardware configurations
 - All required software configurations
 - All modules and additional functionality that must be developed
- It is used as a reference for installation qualification (completeness check of definitions, documents, HW and SW) and internal module tests
- It serves as the exact basis for all implementation activities

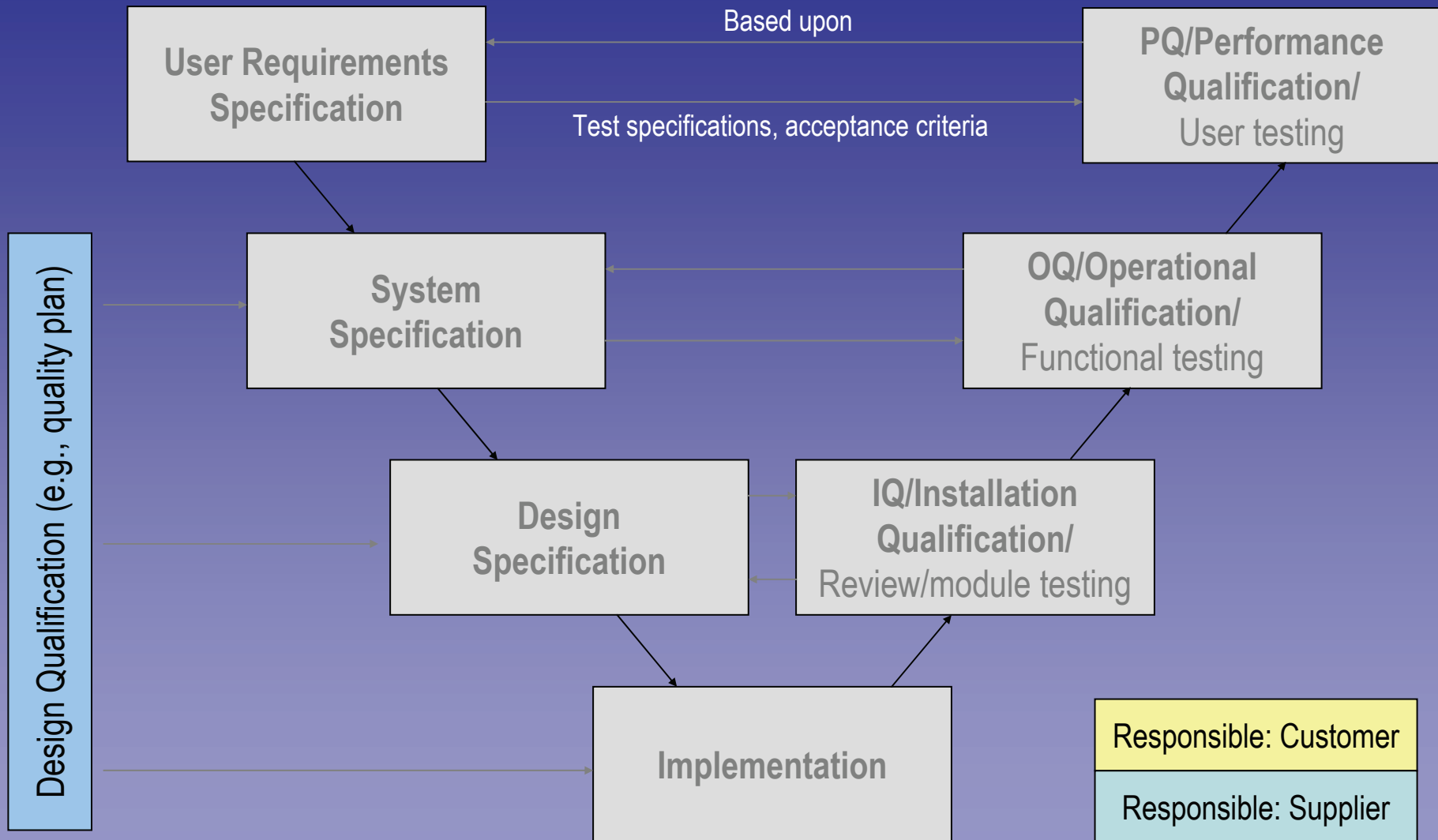
Phase III: Design specification

- Developers should be able to perform implementations using the design specification alone.
- Example specification:
 - *Module: Workflow*
 - *Extension: Project-specific workflow*
 - *Specification:*
 - *Datamodel modifications:*
 - *An attribute „PROJECT“ (String) must be added to the class „Workflow“.*
 - *The PROJECT can contain the name of a known project or a „*“ (i.e., workflow is valid for all projects)*
 - *When launching a workflow for a document, workflows are looked for in the following order:*
 - » *Project-specific, document-type specific*
 - » *Project-specific*
 - » *Document-type specific*
 - » *General*
 - *User interface modifications: ..*
 - *Etc.*

Phase III: Design specification (Process optimisation)

- Consultants and trainers must be enabled to create complete and consistent documentation using only the DS. Depending on wording and the level of detail contained in the DS, the DS itself can become a training document / work instruction.
- Example:
 - *Quotes shall be classified into three classes of risk (low, medium, high). The following criteria for classification shall be applied: ...*
 - *Depending on the risk class, the risk assessment will be performed on different levels of detail, i.e. ...*

Quality Assurance / Design Qualification



Quality Assurance / DQ

- During Design Qualification (DQ), the correspondance between design specification and requirements specification is verified.
- DQ comprises:
 - **Completeness** – Are all requirements listed and solutions defined?
 - **Traceability** – Are the proposed solutions linked to the requirements such that it is understandable how and why a solution was chosen?

iXIT Services around the V-model

- For the customer
 - Define a stable, concise user requirements specification
 - Perform risk analysis
 - Evaluate of system specification and aid in selection of suppliers
 - Define test strategies and test plans
 - Quality insurance during design, implementation, factory acceptance tests and site acceptance tests
 - Ensure seamless handover from supplier to customer.

iXIT Services around the V-model

- For the supplier
 - Analyse customer's user requirements specification
 - Perform risk analysis
 - Help to define system specification and ensure traceability between user requirements specification and system specification
 - Define test strategies and test plans
 - Quality insurance during design, implementation, factory acceptance tests and site acceptance tests
 - Ensure seamless handover from supplier to customer.

About iXIT Engineering Technology GmbH

- **Our main activities** are project management, technology consulting, and software and systems development.
- **Our customers** are successful in pharmacy, power generation, and process technology,
- **Our projects and solutions** are deployed world-wide.
- **Our mission** is to enable our customers to improve quality, efficiency and pay back of their business processes that are related to product development, manufacturing, operation, maintenance and service.
- **Our competence** is based on business and process know-how that is relevant to our customers, and on detailed technical expertise in information technology and automation.

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