

2.9 Product Delivery

The product delivery model is a specification of the project-customer relationship on technical aspects of the need for and acceptance of a product. This includes elements that address:

- (Customer Needs) How the product is perceived from a customer perspective in terms of capabilities it needs to provide, how it is to be used in operation of their enterprise, and minimal criteria for its acceptance;
- (Product Documentation) How the product is documented in forms sufficient to instruct and guide users in proper operational use;
- (Product Configuration and Packaging) How the product is configured and packaged for delivery to a customer;
- (Product Acceptance and Deployment) How customer product acceptance efforts, including validation and certification, and deployment into operational use are supported;
- (User Support and Feedback) How users are assisted for effective and efficient use of the product; how flaws and potential future needs are specified to inform the project in planning for product improvements.

Customer Needs

The customer needs element specifies a customer-oriented portrayal of needed product capabilities in the context of their operations, considering changes that use of the product may entail. This specification constitutes minimal essential criteria for validation of a product that will be perceived by the customer as beneficial to their operations. An adjunct to this element is an operational scenarios specification that illustrates customer operations, changed as envisioned with use of the product.

This specification, and any changes, must be consistent with commitments made through the customer relationship specification of the project management model. It may begin as either a marketing- or a customer-provided description of needed

capabilities. This description may be conveyed in any of various customer-familiar forms such as orally, free form text, diagrams, tables, scenarios, or model-based descriptions.

From a developer perspective, the customer needs specification represents an “under-constrained” specification of required product capabilities and behavior, identifying only those aspects of a product that if not properly supported would cause the customer to reject the product. Many different products could be built to satisfy customer needs specified in this way, leaving the developer flexibility to consider alternatives and tradeoffs in converging on a viable solution. This also means that customer uncertainties about needed capabilities can be addressed by building alternative versions of the product for empirical evaluations of best fit to the customer’s circumstances. This view of customer needs contrasts with the product requirements model, which must be consistent with the customer needs specification but is an “over-constrained”, build-to/as-built specification of the product’s expected observable behavior.

The essential goal for this element is to properly represent the customer’s perception of their needs and product capabilities that will address those needs. This is a means to ensure that what the customer expects is consistent with the project’s ability to build a product in response or, as needed, to engage with customer representatives to close any gap. The customer’s perception includes not only defining the problem that a product is expected to solve, but also describing current operations, quality priorities, and any constraints that are imposed by operational context, conventions, or other considerations. Actual needs become better understood, despite tending to change over time, even as a product is being built as well as after it has been put into use.

Characterization of potential future changes in needs or circumstances will provide the basis for building a product that is less difficult and costly to modify as changes occur.

This description is presumed initially to be incomplete, due to uncertainties and inadvertent omissions, and inaccurate, either in misrepresenting actual needs or in poorly communicating about those needs. It may be based on tacit assumptions, unconsidered tradeoffs and alternatives, unfamiliarity with emerging technology,

excessive or arbitrarily determined constraints, and prematurely resolved uncertainties¹. Failing to express needs clearly can increase development efforts: inadequately defined or inconsistently used terminology; unshared assumptions; poorly organized, vague, ambiguous, duplicate, overly verbose, or contradictory information; overly strict or unverifiable acceptance criteria. A refined specification of these needs is iteratively revised based on developer knowledge and past experience with similar products and in collaboration with customer or marketing representatives, and further revised as understanding of needs or circumstances change.

Practical issues of technical feasibility, availability of resources, cost, and delay can induce a customer to accept a product that does not fully conform to previously envisioned needs. Furthermore, once a product is deployed into use, the customer's perception of their needs often change further due to a better sense of how the product can enable changes in enterprise practices to better achieve its objectives, and in turn these changes can lead to changes in the customer's perception of the capabilities they need the product to provide.

The operational scenarios specification is a perspective on the context of customer operations on which the customer needs element is based. This specification reflects the nature of work to be performed with the product, including relevant actions that can be initiated and associated initial conditions and resulting effects of those actions. It entails representative customer examples of how customers work and how the product will be used in providing capabilities that they need. Scenarios serve as a basis for three purposes: for anecdotal understanding by the developer of customer needs, for dynamic product verification and validation (i.e., to construct one or more test packages for use in empirical evaluations of the product relative to corresponding needs), and for user training (i.e., how the product is used in performing various roles within the customer enterprise). These scenarios should be organized according to the customer's business process and operational roles and specified in a form that is suitable for formulating product verification model testing materials.

¹ G.H.Campbell, "The Illusion of Certainty", Naval Postgraduate School, 7th Annual Acquisition Research Symposium, May 2010, 257-264. <<https://www.domain-specific.com/PDFfiles/NPS-AM-10-022-ghc.pdf>>

Product Documentation

The product documentation element, being intended for particular audiences (e.g., different customer roles and responsibilities), communicates product model content in terms appropriate to each audience. Examples are the purposes and benefits of the product that motivate its use in customer operations, how product capabilities are used and their effects within the audience's operational context, and instructional and training materials that explain how the product is used in performing identified workflows.

Documentation may be provided in alternative forms of media, accessible using self-documenting capabilities of the product (using facilities of the product for this purpose, such as "About" or "Help" content) or as externally accessible elements of the product (e.g., as hypertext, videos, simulations, printable documents, or slide presentations), each tailored to a specified audience or viewpoint.

Product Configuration and Packaging

Product configuration and packaging element specifies the content of a product instance based on the product design model, by means of its product realization element. The realized product contains all prescribed operationally-useful elements of a baselined version of the product model. These artifacts include executable software object code and documentation in suitable form to provide instruction and guidance to users on the capabilities and usage of the product according to their roles in the enterprise.

Product realization may provide augmented means for safely replicating an operational environment created as specified in the product environment model. Depending on the product's intended use (e.g., for evaluation), it may be configured with instrumentation suitable for monitoring and controlling operation of the product.

The product may also include developmentally-useful elements, including product model specifications and development environment assets, if project management has committed to providing these to the customer.

Product Acceptance and Deployment

The product acceptance and deployment element specifies the provider-supported customer actions to accept and deploy the product into operational use. An adjunct to this element is a customer responsibilities specification that defines customer actions required in anticipation of product deployment into operational use.

The product acceptance specification defines how customer validation and certification efforts are supported requisite to acceptance for deployment into operational use. Initial product deployment is tentative, pending customer acceptance of the product as satisfying their then-current expectations. A deployed product will have derived from a consistent product model and verified as satisfying project-specified criteria (possibly including non-critical discrepancies). Product acceptance specifies the criteria and means by which a product is validated as meeting customer expectations and certified as acceptable for installation and use in the customer's operational environment. The product may be initially deployed into an isolated or facsimile environment until validation criteria, including all critical quality criteria, are known to be satisfied. Product acceptance efforts may build upon and extend means and results specified in the product analytics and product verification models.

The product deployment specification defines the means by which the product, consisting of hardware and software packaged for delivery, is installed into an operational environment (i.e., any operational context that conforms to the product environment model). The deployment specification assumes satisfactory completion of customer responsibilities as specified for customer needs. Such environment may be a customer's actual physical environment, a virtual environment, or an instrumented facsimile (simulated or hybrid) environment for product evaluation or training. Installation may include options for customizing the product to fit its intended use or environment. The installation is confirmed as meeting operational integrity criteria, along with pre-validation fitness tests to ensure the installation has completed correctly and adheres to prescribed customer processes and practices.

The customer responsibilities specification tracks the customer role in product delivery, identifying customer actions required in support of the development project. Such

actions include providing representatives to collaborate on defining and refining customer needs and product documentation, revising enterprise processes and practices to accommodate use of the product and support for associated logistics, and coordination of user involvement in product acceptance and deployment, training, and operational use.

User Support and Feedback

The user support and feedback element defines how the provider works with users in the customer enterprise to deliver appropriate guidance, training, and assistance to users, facilitate any associated logistical activities, and provide useful feedback to the project on potential improvements to the product.

User support is a realization of a project's customer relationship, facilitating actual customer use of the product for best effect. This includes understanding of the customer needs specification, documentation of how the product is to be used, and awareness of how the product is likely to change over time.

Feedback to the project is a consequence of providing support to the customer. This includes objective (e.g., analytic data) and subjective (e.g., perceptions) information gained from observations of customer activity as well as specific customer comments and questions. Feedback identifies perceived defects, imperfections, and inefficiencies, potential improvements in the product for a better fit to customers' current needs, and expectations concerning future changes in the customer's needs or operations.