

From SMART requirements to quality products

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New course on Requirements Management & Engineering

A customer asks a supplier to bring him a rock. When the supplier delivers the rock, the customer looks at it for a moment and says, "Yes, *but*, actually, what I really wanted was a *small blue rock*." With the delivery of the small blue rock, it turns out that the customer expected a *spherical small blue rock*. Ultimately, it may turn out that the customer was thinking all along of a small blue *marble*. Or maybe he was not sure what he wanted, but a small blue marble would have been sufficient. At each subsequent meeting with the customer, the developer may exclaim, "What do you want it to do?" The developer is frustrated because he had something entirely different in mind. He has been working long and hard to produce the rock with the characteristics he thought the customer wanted; the customer is equally frustrated because he is convinced that he did express it clearly. "These developers just don't understand!"

More and more organizations are becoming aware of the need for the definition of good requirements and of the need of managing these requirements. This example shows that the lack of (good) requirements can lead to building or defining the wrong product. Good communication between the customer and the supplier is crucial in delivering the right product.



What is quality?

Quality is frequently misunderstood. We talk of a Rolls-Royce as being a quality car. However, we would not choose it for cross-country driving. A 4-wheel drive vehicle would be a better choice.

We choose to define quality as "fitness for purpose", or "conformance to requirements".

But what then is a requirement? A requirement is an expression of a need, demand or obligation. Requirements are the "To-do" lists of the project team. Defining requirements is a modeling activity. Requirements are models that are built in advance of the real system to improve the final system. The user requirements define the results that the users expect from the system. The system requirements define what the sys-

tem must do to satisfy the users. These are different types of requirements that represent the system in different ways.

The most important aspect of requirements management is to ensure that the needs of the users are taken note of and expressed clearly and concisely. This alone is the largest contribution we can make towards ensuring the quality of a product.

SMART

We can now try to rely on the capability of the customer to define or the supplier to capture the needs both clearly and concisely. However, it is better to define 'SMART' requirements from the customer as well as from the supplier's point of view. Many of you who attended management courses have come across SMART. The same principles apply to requirements. SMART is an acronym that stands for:

- Specific,
- Measurable,
- Achievable,
- Realistic, and
- Traceable.

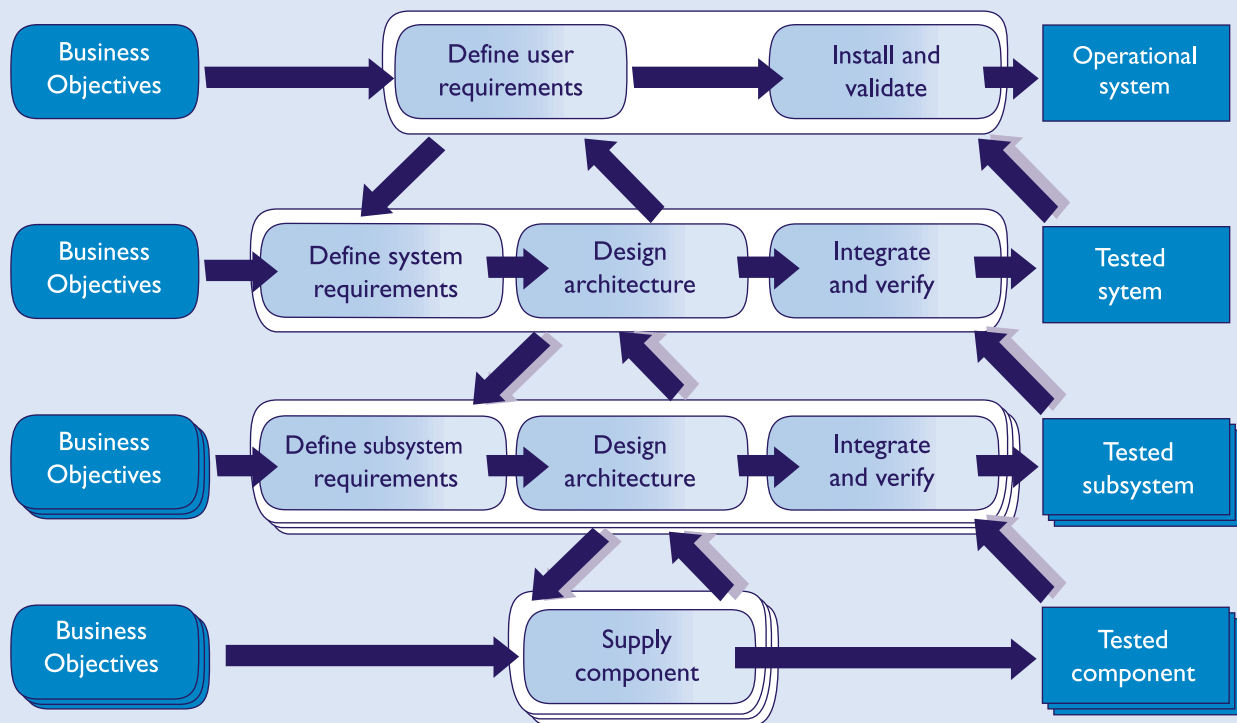
SMART is a practical way to check the quality of requirements. There are many more techniques for defining and checking the quality of requirements but SMART is an easy technique that can be used by both the customer and the supplier.

Specific

First of all, a requirement must be specific. To be able to determine if a requirement is specific, we try to answer the following questions: Who? What? Where? When? Which? Why? You might not be able to answer all these questions, but most of them are crucial and need to be answered. Otherwise, there is no real need for the requirement. For example, if we do not know who defined the requirement then *why* do we need it? If nobody is asking for the requirement then it is obvious there is no need for it. "Is it clear *what* is being asked for in the requirement?" is the second question we can ask ourselves. Maybe we think we understand what is being requested, but is there a different way we can interpret the requirement? Is the requirement unambiguous? Words often have more than one meaning. Is the requirement clear enough so it can only be interpreted in one way by everyone who will read the requirement?

Measurable

We should establish concrete criteria for measuring progress towards the achievement of each requirement we define. These criteria are often called test criteria or acceptance criteria. If we do not define these criteria, how will we be able to check and accept that the requirement has been realized in the delivered product? The example of the rock showed that the customer refined his requirement every time the supplier delivered a new version of the rock. This could have been prevented if the supplier had asked the customer what the criteria would be to accept the solution, e.g. a small blue marble.



This process accepts the system and subsystems or components and measures if all requirements have been met.

Achievable

As a customer, we will not always be able to identify if it is possible or achievable to create a solution for our need. The technical feasibility of the requirement must be defined by the supplier, since he should know about the latest technology available to provide a solution. This technology might not yet be known to the customer since it might still be in development. Therefore, most logically, the supplier should determine if it is possible to create a solution for the requirement.

Realistic

To be realistic, a requirement must represent an objective. We should be both *willing* and *able* to meet this objective. We can all come up with many brilliant ideas that could be technically feasible but every solution has a price. Therefore, the question is not only if we are able to deliver a solution but also if we are willing to pay the price for this solution. In our example, the customer could have asked for a diamond as the solution to his rock question. However, as identified in the example, a small blue marble would have been sufficient. The customer will not accept the price for the diamond as a solution so this is not a feasible solution. At first, it might seem that it is not realistic to ask for a solution that is 100% reliable. In most situations, we are not willing or able to pay the price for such a solution. In the medical device industry, there are situations in which the solution must be 100% reliable (at least within a certain time frame). For example, a pacemaker has to be 100% reliable, or people could die.

Traceable

Every requirement should be traceable to its source. A user requirement should be traceable to the customer who defined the requirement. In the same way, a function or feature of the product has to be linked to the initial need of the customer. Therefore, links to a requirement should be created from its conception through its specification to its subsequent design, implementation and test.

Requirements and CTT

CTT's mission is to offer courses on subjects that contribute to the Philips development practice and have proven to be more than just hypes. Requirements management is not just a hype. The industry has shown many examples of where, without proper documentation and proper requirements, we are not able to create and maintain our products efficiently. The quality of our products depends on how a product meets the customer's expectations. These customer's expectations are captured in the form of requirements. Therefore, by improving the quality of the requirements, we improve the quality of our products. One way to improve the quality of the requirements is to use the SMART method, as described. These methods and other techniques are part of the Requirements Management & Engineering training course, which is now part of the CTT training portfolio.

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