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this issue

The Target: A Good Requirement!

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The Target: A Good Requirement!

Article By Leonard Kaufer, DHFPro

Sometimes requirements are poorly written and/or confused with specifications. This article describes the attributes of a good, well written, requirement.

Requirements are the one point in a project's lifetime where everyone involved knows exactly what is being talked about. Everything that comes before requirements (i.e.: user input, marketing requirements, etc) is too vague to be understood without ambiguity. Everything that comes after the requirements is too detailed and specific to be understood equally by all project stakeholders.

"Good requirements are critical in our product development process."

Robert Lathrop

Attribute	Explanation
Unambiguous	Subject to one and only one interpretation
Complete	There is no missing information
Verifiable	Implementation of the requirement can be verified
Atomic	Contains only one requirement
Necessary	Represents a characteristic the absence of which will result in a deficiency that cannot be ameliorated
Traceable	Meets all or part of a stated need
Feasible	The requirement can be implemented within the constraints of the project
Consistent	Does not conflict with other requirements and is consistent with external documentation

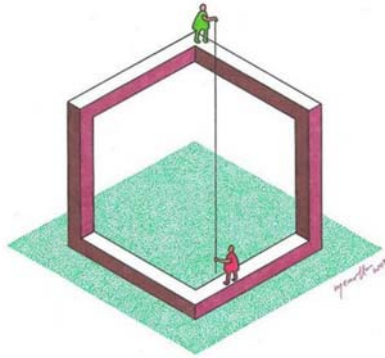
“Requirements are the crucible into which all input is poured and out of which comes the definition of the task at hand.”

Requirements are at the center of the project documentation. All design and verification activities can be traced directly to the requirements. Requirements should also be at the center of project control. Project scope should be zealously controlled through the use of approved requirements.

Given their importance to the success of a project, requirements must be of the highest quality. This newsletter looks at the attributes of requirements: Writing a requirement properly. For a complete treatment of requirements, Lathrop Engineering recommends *Exploring Requirements: Quality Before Design* (Gause & Weinberg).

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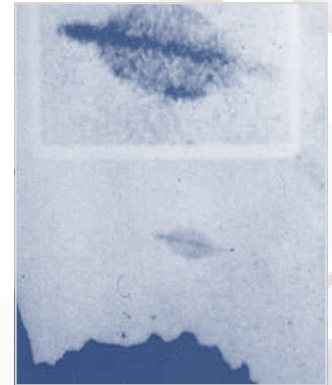
Unambiguous



Ambiguity is the most frequent and most damaging error in requirements:

- Subjective requirements
- Jargon and acronyms
- Vague subjects and prepositions
- Confusing wording, compound sentences

Verifiable



Four ways to verify a requirement:

- Inspection
- Demonstration
- Test
- Analysis

One of the most common mistakes in this area is giving a specification without a tolerance.

Complete



- The requirement is fully stated in one place with no missing information
- When more than one case is specified, insure that all cases are specified
- Often the incompleteness of the requirements must be deduced

Atomic



- Each requirement should contain exactly one requirement.
- Combined requirements:
 - ⇒ Make traceability more complex
 - ⇒ Make test results less clear
 - ⇒ Suggest design solutions that combine the requirements

Exceeding Expectations By Design!

Necessary



This attribute represents a characteristic the absence of which will result in a deficiency that cannot be ameliorated.

- Unnecessary requirements can be difficult to identify
- Common unnecessary requirements are duplicate or redundant requirements

Traceable



- This attribute is aimed at backward traceability
- It meets all or part of a stated need
- If you cannot identify where the requirement comes from, one of the following 'bad' things is likely to happen:
 - ⇒ The parent document is incomplete
 - ⇒ There are creeping requirements
 - ⇒ The requirement is actually design ("how") rather than requirement ("what")

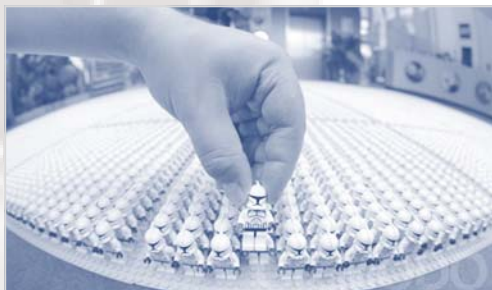
Feasible



Can the requirement be met within the constraints of the project?

- Do not accept requirements as dictates from on high if they are unrealistic
- If a requirement is intentionally unrealistic it should be defined as a goal rather than a requirement

Consistent



A requirement must be consistent with all other requirements:

- With requirements in the same document
- With requirements from other parts of the system
- With requirements from external sources
 - ⇒ Regulatory standards
 - ⇒ Company standards

Requirement. (noun)
"Something essential to the existence or occurrence of something else." A requirement tells what must be done.

Design tells how it is to be done. When evaluating a requirement, look for whats and avoid hows. Consider the following requirement that was presented to Lathrop: "The optical power of the illuminated spot shall be at least 10mW." We identified this as a *specification* and were able to uncover the underlying requirement: "The system shall be able to detect sample concentrations as low as 1 part per billion." With the true requirement in place, the designers had the freedom to reach the optimal solution.

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Lathrop has been providing top notch design and engineering services since its founding in 1982.

Upcoming Events

- **SLAS 2015**

February 8-10, 2015: Washington DC

Booth 1040

- **AACR 2015**

April 19-22, 2015: Philadelphia, PA

Booth 2263

Lathrop exhibits and attends many tradeshow throughout the year across the country. Come visit us at our booth. If you cannot make it to the tradeshow, call us and we can schedule a visit while we are in your area.

LathropNEWS

For further information on defining and writing requirements for your instrumentation project, contact the experts at Lathrop Engineering today!



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