

Performance-Based Requirements (PBRs)

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Introduction

Historically, military procurements were characterized by requirements (in standards and specifications) that not only governed what was being procured, but also provided detailed instructions on how the procured item was to be designed and manufactured. For example, contracts routinely specified what parts could be used, how manufacturing processes were to be performed, what plans were required, and so forth. A key part of Defense Acquisition Reform has been a move from this “how-to” type of contracting to *performance-based contracting*. Inherent in this approach is the need for and reliance on performance-based requirements (PBRs).

The concept of performance-based service contracting has been a part of government-wide contracting for a long time. In fact, OFPP Policy Letter 91-2 (April 9, 1991) defined performance-based contracting as a means of “structuring all aspects of an acquisition around the purpose of the work to be performed as opposed to either the manner by which the work is to be performed or broad and imprecise statements of work.” Yet, with occasional exception, it was common practice within the Department of Defense (DoD) and the military services to tell contractors what was needed, what to do, and how to do it. Under Defense Acquisition Reform, performance-based contracting and the use of PBRs have become realities

within DoD. In large measure, the implementation of performance-based contracting has been supported by the Defense Standardization Program, under which the complete system of military specifications and standards has been changed.

Under the Defense Standardization Program, many specifications and standards have been rescinded, converted to performance-based documents, changed to guidance documents, and so forth. Greater reliance is being placed on the use of commercial standards and specifications. Finally, military procurement agencies cannot impose any military or commercial standards without a waiver. Compare this policy with its predecessor under which the decision *not* to use many military standards required a waiver.

Concept

It has been stated that performance-based contracting requires the use of PBRs. Just what is a performance-based requirement? As discussed in SD-15 (See “For Further Study,” 2.b), performance-based requirements describe the required results and provide criteria for verifying whether or not these results have been met. Performance-based requirements do not state the methods for achieving the required results. Ideally, they have the following characteristics:

1. Requirements are stated quantitatively
2. Requirements are verifiable
3. Interfaces are stated in sufficient detail to allow interchangeability with parts of a different design
4. Requirements are material and process independent

Table 1 compares performance-based requirements with non-performance-based requirements.

Table 1: Comparing Performance-based Requirements with Non-performance-based Requirements

Area of Comparison	Performance-based Requirements	Non-performance-based Requirements
Purpose	Describe functions product is to perform and level of performance	Describe how product is to be designed and manufactured
Key Criteria	Describe means for verifying performance	Describe means of ensuring specified processes are followed
Design Latitude Given to Contractor	Allow contractor to determine best ways to achieve results	Force the contractor to use prescribed methods and approaches
Responsibility	Responsibility for results clearly belongs to contractor	Responsibility for results shared by customer and contractor

Four types of performance specifications are used by DoD: commercial item descriptions (CIDs), guide specifications (GSs), standard performance specifications (SPSs), and program-unique specifications. Performance specifications are also categorized by the type of item being acquired. There are material specifications, component specifications, and system specifications.

Developing PBRs

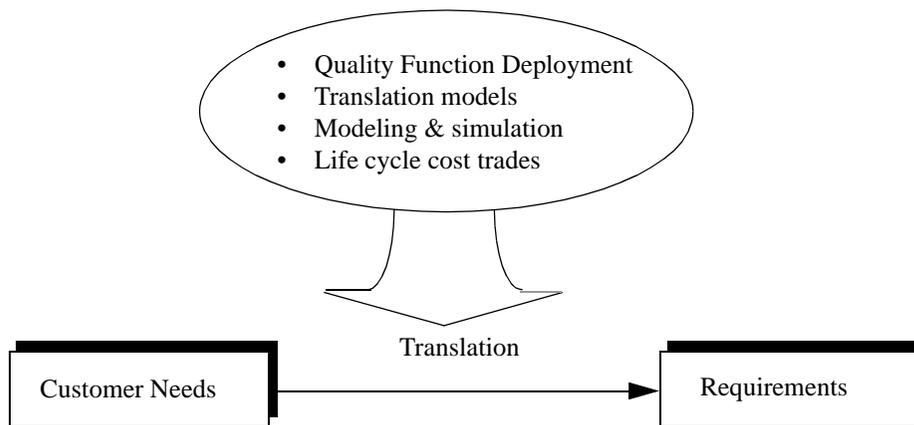
Customers have needs or expectations regarding the products they buy. These needs include the function(s) to be performed and the level of performance (stated quantitatively or qualitatively). Identifying these needs is the first step a contractor must take in developing a product. Often, the customer needs include all factors that influence performance. Some of these factors may be well beyond the ability of the contractor to affect in any meaningful way. Consequently, it makes sense that requirements derived from the customer's needs reflect only those factors within the control of the contractor.

In the commercial world, the customer's requirements almost always are stated as needs and any necessary translation is done by the manufacturer. For example, consumers may want (i.e., need) an automobile that "feels comfortable." Industry must interpret this need and translate it into meaningful design requirements. In the military world, the customer's needs are

explicitly stated in an Operational Requirements Document. The acquisition agency then develops a procurement package that includes system-level requirements derived from these needs.

In general, the process of developing requirements can be described in Figure 1.

As indicated in Figure 1, performance-based requirements are derived from the customer's needs. This derivation, or translation from needs to requirements, is not an exact science. Various methods and tools are used, as indicated in the figure. Quality Function Deployment (QFD) is one such tool. QFD is a tool for translating defined customer requirements into appropriate design requirements at each stage of design and development. Commercial companies often use *benchmarking* to determine the level of performance required to remain competitive or expand market share. Comparisons with previous products is also a method used to develop the requirements. Whatever method is used, the goal should be to develop requirements that are quantitative and verifiable.



- Explicitly or implicitly stated by customers usually in qualitative terms (commercial)
- Explicitly stated by customers in qualitative and quantitative terms (military)
- Stated in customer's terms (both)
- Often derived by contractors through market surveys and other means (commercial)

- Developed by the manufacturer for consumer products; sometimes by the customer for industrial products
- Developed at the end item level by the acquiring agency for military products; by the contractor for lower levels
- Stated in engineering and design terms (both)

Figure 1. Requirements Development Process

For Further Study:

1. Web Sites. Additional information on Performance-based Requirements and related topics can be obtained from the following web sites.
 - a. <http://www.hq.nasa.gov/office/procurement/pbcencl.htm>
 - b. <http://www.hq.nasa.gov/office/procurement/perfbase.htm>
 - c. <http://www.amsc.belvoir.army.mil/vacante.html>
 - d. <http://www.acq-ref.navy.mil/turbo/scdrd.htm>
 - e. <http://www.acq-ref.navy.mil/turbo/rfp34.htm>
 - f. <http://members.aol.com/drmassoc/QFD.html>
 - g. <http://www-far.npr.gov/BestP/BestPPBSC.html>
2. Publications:
 - a. "A Guide to Best Practices for Performance-Based Service Contracting," Interim Edition, Office of Federal Procurement Policy (OFPP), Office of Management and Budget (OMB), April 1996.
 - b. "Performance Specification Guide," SD-15, Defense Logistics System Command (DLSC/LM), June 29, 1995.
 - c. Carl Peckinpugh, "What is Performance-Based Contracting? A Legal View," Federal Computer Week, May 26, 1997.
 - d. Kenneth Crow, "Customer-Focused Development with QFD," DRM Associates, 1996.
 - e. "Specifications and Standards - A New Way of Doing Business," OSD Memorandum, 19 June 1994.

Other START Sheets Available:

- 94-1 ISO 9000
- 95-1 Plastic Encapsulated Microcircuits
- 95-2 Parts Management Plan
- 96-1 Creating Robust Designs
- 96-2 Impacts on Reliability of Recent Changes in DoD Acquisition Reform Policies
- 96-3 Reliability on the World Wide Web
- 97-1 Quality Function Deployment
- 97-2 Reliability Prediction
- 97-3 Reliability Design for Affordability
- 98-1 Information Analysis Centers
- 98-2 Cost as an Independent Variable
- 98-3 Applying Software Reliability Engineering (SRE) to Build Reliable Software
- 98-4 Commercial Off-the-Shelf Equipment and Non-Development Items
- 99-1 Single Process Initiative

To order a free copy of one or all of these START sheets, contact the Reliability Analysis Center (RAC), 201 Mill Street, Rome, NY, 13440-6916. Telephone: (888) RAC-USER (888 722-8737). Fax: (315) 337-9932. E-mail: rac@iitri.org. These START sheets are also available on-line at <http://rac.iitri.org/DATA/START> in their entirety.

Future Issues:

RAC's Selected Topics in Assurance Related Technologies (START) are intended to get you started in knowledge of a particular subject of immediate interest in reliability, maintainability and quality. Some of the upcoming topics being considered are:

- Reliability Growth
- Accelerated Testing
- Mechanical Reliability
- Software Reliability

Please let us know if there are subjects you would like covered in future issues of START.

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About the Reliability Analysis Center

The Reliability Analysis Center is a Department of Defense Information Analysis Center (IAC). RAC serves as a government and industry focal point for efforts to improve the reliability, maintainability and quality of manufactured components and systems. To this end, RAC collects, analyzes, archives in computerized databases, and publishes data concerning the quality and reliability of equipments and systems, as well as the microcircuit, discrete semiconductor, and electromechanical and mechanical components that comprise them. RAC also evaluates and publishes information on engineering techniques and methods. Information is distributed through data compilations, application guides, data products and programs on computer media, public and private training courses, and consulting services. Located in Rome, NY, the Reliability Analysis Center is sponsored by the Defense Technical Information Center (DTIC). Since its inception in 1968, the RAC has been operated by IIT Research Institute (IITRI). Technical management of the RAC is provided by the U.S. Air Force's Research Laboratory Information Directorate (formerly Rome Laboratory).