

1.3 Developing Performance Metrics – University of California Approach

Introduction

Performance metrics should be constructed to encourage performance improvement, effectiveness, efficiency, and appropriate levels of internal controls. They should incorporate "best practices" related to the performance being measured and cost/risk/benefit analysis, where appropriate.

Performance measurement is an important cornerstone of the contracts between the University of California and the Department of Energy for the operation of the laboratories. This section discusses the principles and concepts used in developing effective performance metrics for these contracts.

The Department of Energy has promulgated a set of Total Quality Management guidelines that indicate that performance metrics should lead to a quantitative assessment of gains in:

- Customer satisfaction
- Organizational performance
- Workforce excellence

The key elements of the performance metrics to meet these guidelines should address the following key elements:

- Alignment with organizational mission
- Quality of product
- Timely delivery
- Cost reduction and/or avoidance
- Cycle time reduction
- Customer satisfaction
- Meeting DOE requirements
- Meeting commitments

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The Process

The first step in developing performance metrics is to involve the people who are responsible for the work to be measured because they are the most knowledgeable about the work. Once these people are identified and involved, it is necessary to:

- Identify critical work processes and customer requirements.
- Identify critical results desired and align them to customer requirements.
- Develop measurements for the critical work processes or critical results.
- Establish performance goals, standards, or benchmarks.

The establishment of performance goals can best be specified when they are defined within three primary levels:

- **Objectives:** Broad, general areas of review. These generally reflect the end goals based on the mission of a function.
- **Criteria:** Specific areas of accomplishment that satisfy major divisions of responsibility within a function.
- **Measures:** Metrics designed to drive improvement and characterize progress made under each criteria. These are specific quantifiable goals based on individual expected work outputs.

The SMART test is frequently used to provide a quick reference to determine the quality of a particular performance metric:

- **S = Specific:** clear and focused to avoid misinterpretation. Should include measure assumptions and definitions and be easily interpreted.
- **M = Measurable:** can be quantified and compared to other data. It should allow for meaningful statistical analysis. Avoid "yes/no" measures except in limited cases, such as start-up or systems-in-place situations.
- **A = Attainable:** achievable, reasonable, and credible under conditions expected.
- **R = Realistic:** fits into the organization's constraints and is cost-effective.
- **T = Timely:** doable within the time frame given.

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Types of Metrics

Quality performance metrics allow for the collection of meaningful data for trending and analysis of rate-of-change over time. Examples are:

- Trending against known standards: the standards may come from either internal or external sources and may include benchmarks.
- Trending with standards to be established: usually this type of metric is used in conjunction with establishing a baseline.
- Milestones achieved.

"Yes/no" metrics are used in certain situations, usually involving establishing trends, baselines, or targets, or in start-up cases. Because there is no valid calibration of the level of performance for this type of measure, they should be used sparingly. Examples are:

- Establish/implement a system.
- System is in place (without regard to effectiveness).
- Analysis performed (without criteria).
- Reporting achieved (without analyses).
- Threshold achieved (arbitrary standards).

Classification of Performance Metrics

Measure of...	Measures...	Expressed as ratio of...
Efficiency	Ability of an organization to perform a task	Actual input/ planned input
Effectiveness	Ability of an organization to plan for output from its processes	Actual output/ planned output
Quality	Whether a unit of work was done correctly. Criteria to define “correctness” are established by the customer(s).	Number of units produced correctly/total number of units produced.
Timeliness	Whether a unit of work was done on time. Criteria to define “on-time” are established by the customer(s).	Number of units produced on time/total number of units produced.
Productivity	The amount of a resource used to produce a unit of work	Outputs/inputs

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The following questions serve as a checklist to determine the quality of the performance metrics that have been defined:

- Is the metric objectively measurable?
- Does the metric include a clear statement of the end results expected?
- Does the metric support customer requirements, including compliance issues where appropriate? (Keep in mind that in some areas compliance is performance; e.g., ES&H.)
- Does the metric focus on the effectiveness and/or efficiency of the system being measured?
- Does the metric allow for meaningful trend or statistical analysis?
- Have appropriate industry or other external standards been applied?
- Does the metric include milestones and or indicators to express qualitative criteria?
- Are the metrics challenging but at the same time attainable?
- Are assumptions and definitions specified for what constitutes satisfactory performance?
- Have those who are responsible for the performance being measured been fully involved in the development of this metric?
- Has the metric been mutually agreed upon by you and your customers?

Common Terms with Performance Metrics

Commonly used terms concerning performance metrics are:

Baselining: The process of establishing a reference set of data that reflect the current state of a process, system, or product.

Benchmark: A standard or point of reference for measurement. By providing ranges or averages, benchmarks enable an organization to compare performance in certain key areas with other organizations.

Benchmarking: A method of measuring a process, system, or outcome within an organization against those of a recognized leader. The purpose of benchmarking is to provide a target for improved performance.

Best in class: Leader or top performer in relation to a particular performance goal as identified through a benchmark.

Effectiveness: The ability to accomplish a desired result or to fulfill a purpose or intent.

Efficiency: The quality or degree of effective operations as measured against cost, resources, and time.

Goal: A target level of performance expressed as a tangible, measurable objective against which actual achievement can be compared.

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Lower control limit: The lower line on a control chart below which variation is not expected. This is mathematically represented by the average minus three standard deviations.

1-10-100 Rule: The rule that states that if a problem is not fixed in a timely manner when first discovered, it will be more costly to fix later (in terms of both time and money). The rule recognizes that it makes a difference when a problem is discovered and resolved.

Quality Grid: A quality improvement concept that divides quality work into *what is* done (doing the right things) and *how* its done (doing things the right way)-

How You Do It

Right Things Wrong	Right Things Right
Wrong Things Wrong	Wrong Things Right

What you do

Re-engineering: A process of rethinking and redesigning work processes to achieve noticeable improvements in service delivery responsive to customer needs and/or achieve significant reductions in cost.

Standards: A prescribed set of rules, conditions, or requirements used to measure or define the quality or quantity of particular performance elements.

Value-added: Process or steps that enhance an outcome.

Upper control limit: The upper line on a control chart above which variation is not expected. This is mathematically represented by the average plus three standard deviations.

References

Three basic references useful in the development of performance metrics are “Total Quality Management Guidelines,” U.S. Department of Energy, December 1993, and the annual “Malcom Baldrige National Quality Award Criteria” and its companion volume, “The Handbook for the Board of Examiners.” The latter two documents are published by the National Institute of Standards and Technology, an agency of the U.S. Department of Commerce.

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