Value-Added Metrics

Gilbert L. Roth

The terms "metric" and "metrics" have been used, abused and misused for many years in project management. Over the past three years, Gil Roth has conducted in-house workshops on metrics at Headquarters and NASA Centers. Currently the National Security Industrial Association and the Aerospace Industries Association are preparing a document to show how suppliers use a set of critical metrics to measure, control and improve their products and services in terms of adding value to performance, cost and schedule.

A metric is a quantitative measurement of an activity, results and/or reaction. Under activity, a meeting schedule is a typical example: Did we do what we planned to do when we planned to do it? Under results, after we met schedule, did we deliver a good product? Test and inspection should measure those results. Under reaction, attempts are made to recover to schedule status or improve receiving inspection results: What, if anything, should we do, based on activity and/or results?

Roth's next question: How do we measure value added? Mainly through effectiveness and efficiency. If work does the right things on time (effectiveness) with the right resources (efficiency) in the right way (quality), the organization will experience high or increasing productivity and the product or process will experience added value in performance, cost and schedule. Key questions for effectiveness include knowing your customers and their requirements: How do I measure and improve my performance against these requirements? Key considerations for efficiency include focusing on processes and finding ways to make better use of our resources by reducing or eliminating duplication, delay, unneeded complexity and unnecessary work.

A "good" metric adds value to the process or activity but it is also easy to comprehend by peers. It stands by itself and does not require clarification. The numerics can be easily substantiated, the table or chart fits the story being told, and the headings state a clearly understood numeric. (See Figure 14, Basic Tools.) It presents sufficient information to allow a timely and reasonably well-founded decision by providing a clear picture of strengths and weaknesses, an early warning for rate of approach (ROA) and some indication when corrective decisions can be made.

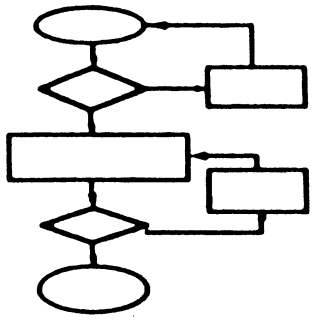
A "bad" metric requires excessive manipulation of input data (including mathematical solutions) and makes it difficult to obtain data or information in a timely manner. So, why measure in the first place? "Measurement enables us to evaluate our progress objectively, with facts, rather that subjectively," Roth says. "We recognize that it is sometimes difficult to avoid 'subjectivity' in measurement. The goal is to drive toward specific quality elements that can be quantified and expressed numerically."

Metrics also establish a baseline and enable us to determine progress or slippage towards goals. They should be able to tell us if we are satisfying customer requirements and if processes are working or not.

In sum, measurement is established for customer requirement and use of resources. Selected metrics should contribute to cost containment but there are some don'ts to consider:

- Don't have too many.
- Don't make them more complicated than they need to be.
- Don't lose sight of the goal.

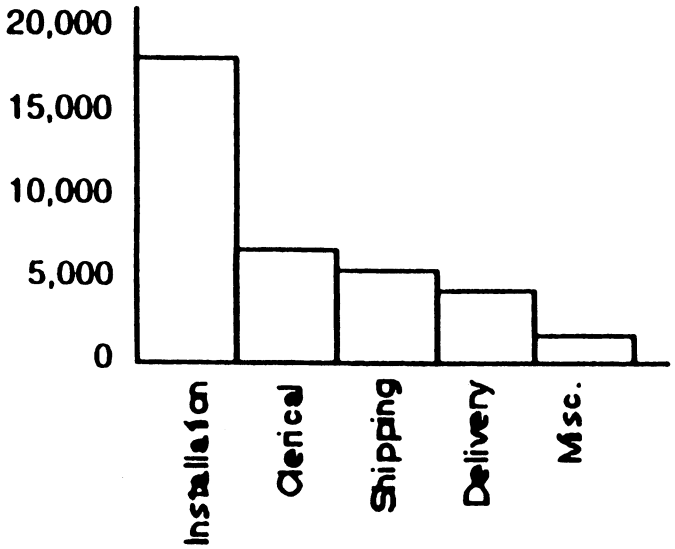
Metrics become increasingly significant in NASA's changing environment from a growing budget to a



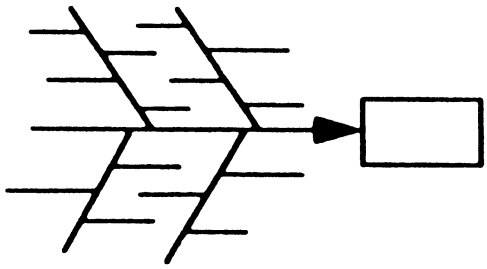
Process Flow Charting

Defect	May				Total
	6	7	8	9	
Wrong Size	III	II	IIII	III	12
Wrong Shape	IIII	IIII	III	III	14
Wrong Color	II	IIII	IIII	II	12
Total	9	10	11	8	38

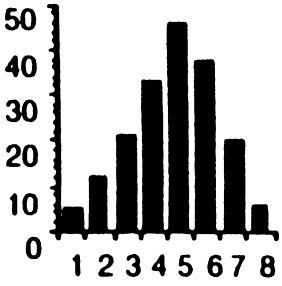
Check Sheet



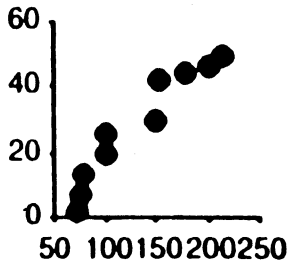
Pareto Diagram



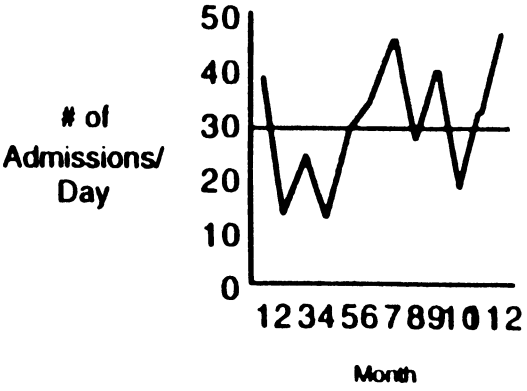
Cause and Effect Diagram



Histogram



Scatter Diagram



Run Chart

Figure 14. Basic Tools

fixed one, large programs to smaller projects, proven to new technology, politically to economic driven and from low risk to an acceptance of more risk.

Gilbert Roth
NASA Headquarters
Code QT
Washington, DC 20546
(202) 358-0559
gilbert.roth@hq.nasa.gov