manager

Editor: Donald J. Reifer ■ Reifer Consultants ■ d.reifer@ieee.org

Eight Secrets of Software Measurement

Betsy Clark

Twenty years ago, I left the security (and frustration) of working for a large corporation to begin a consulting career in software measurement. Since then, I've helped many firms implement software measurement programs. For some clients, the motivation for measurement was process improvement; for others, it was resolving an immediate crisis and getting a product out the door. In this column, I'll share the eight "secrets" of software measurement that I've learned. I call them secrets because they were not obvious to me at the beginning. Only in retrospect, as I've tried to discern patterns of success and failure, have these secrets become clear.

It's not about the metrics

Four-time Tour de France winner Lance Armstrong titled his autobiography *It's Not About the Bike: My Journey Back to Life* (Berkeley Publishing Group, New York, 2001). Although he has spent countless hours on the bike, for him, it was only a vehicle for his fight back from life-threatening cancer.

By the same token, measurement is not an end in itself; it's a vehicle for highlighting activities and products that you, your project team, and your organization value so you can reach your goals. But it's only a tool. To get anywhere, you must navigate the road—you've got to make decisions and act.

To create an effective measurement program, you first must understand exactly where you want to go or what you want to accomplish; that is the "why" of measurement.

Success comes from channeling an organization's pain into action

No matter how much I dislike this secret, I have found it to be so. It comes back to the fact that it's not about the metrics; it's about the strength of the motivation to know or improve something and to follow through with action. No matter how noble the intention, "Let's do metrics" just doesn't provide sufficient motivation.

The single biggest determinant of measurement success lies in the answers to the following questions: How badly do you want to know the information, and how will you use it?

Establishing a measurement program is easy; keeping it going is hard

I am continually impressed by how easy it is to think about potentially useful measures and how hard it is to implement an effective measurement program. Within a project or organization, it's often easy to get people enthused about measures—but all too often, that enthusiasm does not translate into action. Even when it does, it is unlikely to be sustained. Getting the numbers is easy; doing something with them is not.

What you need is no less than to change your organization's culture. Cultural change is hard.

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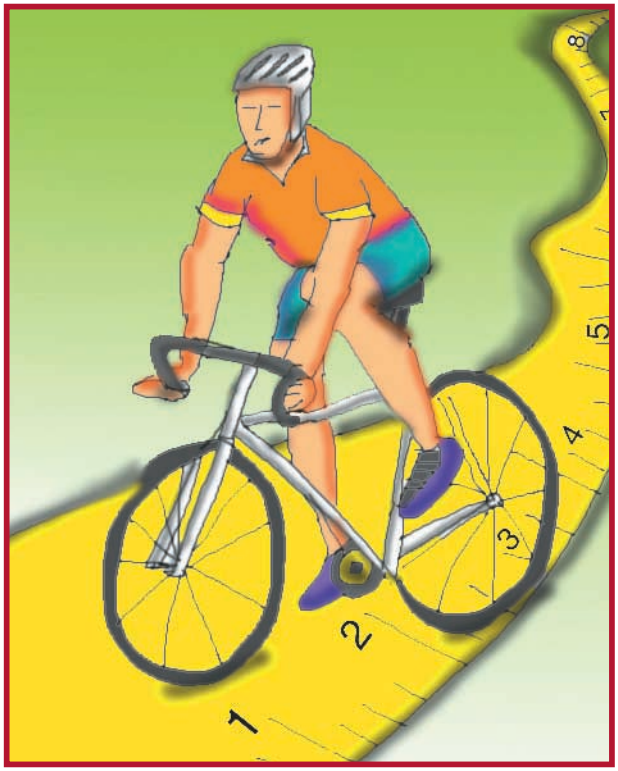
People skills matter more than quantitative skills

Every step of the measurement process requires input from the people within the project or organization who will provide and use the data. Emotion plays a strong role, especially at the beginning, leading to a variety of reactions from the individuals involved. Fear that the measures will be misinterpreted or misused can also lead to resistance. (We'll address this in more detail below.) Positive and negative reactions accompany any organizational change; anticipating and managing these are necessary.



In my experience, at least one person always steps up as an early adopter. This person intuitively understands the need for measurement and its benefits. I make sure to find that person and work with him or her. By demonstrating that providing the data isn't so hard and that it really is useful, such people can bring credibility to the measurement activities.

By the same token, I almost always encounter someone who feels threatened by the measurement program. This person—usually a long-term middle manager—often derives a sense of importance as the repository of organizational knowledge. Measurement sheds light on the organization's basic workings; so much of the knowledge previously held in that person's head now becomes an organizational asset accessible by all. That's good news for the organization but can be threatening to the particular individual who might lose status as the company's resident sage.

Senior-level sponsorship and leadership are critical

Although this one might be so obvious that it really shouldn't qualify as a secret, it's absolutely key and often neglected. Remember that it's not about the metrics; it is about articulating a vision and following through with consistent and persistent action. Without these, measurement won't help. The person at the top must participate in the measurement program, by

- Articulating organizational goals
- Behaving in ways that are consistent with these goals
- Creating a culture that exposes, rather than hides, problems
- Looking at the data and asking questions
- Making decisions and following through with action
- Expecting lower-level managers to do the same

Effective measurement will expose an organization's warts. To improve a situation, you must first understand where you are. In some ways, things might seem to get worse before they get better. They aren't really worse, but you are now, perhaps for the first time, bringing problems to light. Dealing with this challenge effectively takes courage and fortitude.

Measuring individuals can be okay

This is probably the most controversial secret. Every source of guidance I've read on measurement advises against measuring individuals. In conference presentations and casual conversation, people often repeat this observation. In my view, there are counterproductive ways of measuring individuals, but there are also times when it is appropriate.

Let's look first at some counterproductive ways. Punishing people for reporting honest results can quickly destroy data integrity. Organizations with effective measurement programs do punish people who hide risks and problems; they don't punish people for exposing them, especially when they also offer solutions. Rewarding one programmer for producing more lines of code per labor hour or punishing someone else for producing less is also inappropriate. That course ignores the fact that code quality and inherent task difficulty vary.

In looking at intelligent uses, I've worked with clients who have implemented detailed progress measures that begin with the individual, measuring actual progress against a plan. The measures can be rolled up, leading to an overall progress assessment, and they can be drilled down, to the level of teams or individuals, supporting a detailed assessment of problem areas. Such an approach lets managers hold individuals accountable for completing assignments as planned. There's nothing negative about this.

Don't go overboard trying to be perfect

Anyone who has gotten down and dirty with data quickly realizes the importance of understanding what the data represent. Even seemingly straightforward data can be ambigu-

ous. One of my early consulting engagements in capturing milestone dates brought this point home to me. When I asked for the date of a design review, I was asked, in turn, "Are you asking for the date the review was held or the date the customer signed off on it nine months later?" It is very important to understand what the data represent.

By the same token, keep in mind that "the good is the enemy of the perfect." You must continually balance clarity of definition with the need to get started. In my view, it's best to get started and work to improve the measurement process over time.

Understanding the reasons for variability in the data provides a powerful decision tool

One of the striking characteristics of real data is its huge variation. Look at any graph showing the relationship between size and effort or between size and defects and you'll see a very large spread—so large that these data are typically represented in logarithmic scales. If you can understand what's behind the variation, you'll understand a lot.

I once had a client who was embarking on a process improvement initiative. They wanted to baseline where they were at the beginning to establish a comparison point for assessing the impact of their improvement activities over time. In typical fashion, the relationship between size and effort varied across projects by an order of magnitude. They measured a number of characteristics about each project, including the project's percentage of personnel turnover. In this organization, turnover had a major impact on productivity. When turnover increased from 12 percent to 24 percent per year, the associated effort increased by 36 percent. In dollar terms, if a project with low turnover costs US$250,000, then one with high turnover would cost US$340,000. Within this organization, it makes monetary sense to minimize turnover.

Implementing an effective measurement program is full of challenges. Overcoming these challenges is worthwhile because measures provide insight supported by hard data. Measurement provides a vehicle for improving your ability to plan and track progress and for addressing risks and problems earlier. You'll know where you are and where you're going. You still have to set the direction and do the steering, but measurement wil be an important tool in navigating the road to success.

Betsy Clark is President of Software Metrics, a Virginia-based measurement consulting company she co-founded in 1983. She received her BA from Stanford University and PhD from the University of California, Berkeley, both in cognitive psychology. Contact her at Betsy@software-metrics.com.