IT METRICS FROM CUTTER INFORMATION CORP.® STRATEGIES

HELPING MANAGEMENT MEASURE SOFTWARE & PROCESSES AND THEIR BUSINESS VALUE

IT Organization, Benchmark Thyself

by Michael Mah

Last month in the article entitled "Meditations on Which Metrics Matter," I described the importance of two perspectives of IT measurement. One was the measurement of outcome, which addresses the gains that are accomplished from the implementation of a technology or an IT application. In many companies, the responsibility for this aspect of measurement might fall within the individual business units — the end user — and not with IT itself — the provider of technology.

The other perspective I discussed was measurement of output. This aspect deals with benchmarking the productivity of an IT department. The goal is to quantify the capacity of IT to deliver applications for use by the individual business units or end users of IT. The responsibility for this largely falls within IT.

In some ways, these two perspectives are quite separate issues. For instance, an IT department can undertake heroic efforts on a very complex project and succeed in delivering a system. Take, for example, a system that might result in large amounts of revenue to the company — one that enables them to enter a part of the marketplace that was not otherwise possible and generates huge returns. What if the "productivity" exhibited by the project during its design, construction, and implementation was not stellar — and perhaps for good reason? There might have been a great deal of cutting-edge technology that required immense development research. Things took time. There were unforeseen labor costs. It was *hard.*

To take a nonholistic view of this project would do everyone involved a great injustice. If low values for productivity metrics were used to judge

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Discipline of Market Leaders and Other Impediments to Measurement

by Stan Rifkin, Master Systems, Inc.

We often hear that it is difficult to get software measurement into practice. At least one important reason for this is that traditional software measurement is not aligned with the strategic objectives of the organization. When software measurement is aligned with an organization's market discipline, the implementation is accelerated.

As stated above, one of the reasons it is difficult to get measurement implemented is that it is unaligned with organizational objectives. For example, measurement is traditionally used to increase quality, increase programmer productivity, and reduce costs. Oddly enough, these are not the highest-priority objectives for a number of organizations; therefore, traditional measurement is difficult to implement in those organizations.

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executive summary

The first article in this month's ***ITMS*** follows up on "Meditating on Which Metrics Matter," an article that appeared in the February issue of ***ITMS***. Last month's article focused on the importance of a usable and practical approach to IT metrics, one that is intended to help us understand IT productivity and make better decisions in the process.

This month, I describe the fundamental concept behind the "how-to's" for building your own productivity baseline — without needing a consultant. It starts with the Carnegie Mellon Software Engineering Institute's "minimum data set" discussed last month, but it can be extended to further levels of granularity. The essential goal is to move away from a "numbers-numbing" approach to metrics that is characteristic of arcane numeric tables and ratios. Instead, I set the stage for a graphical approach where a picture says a thousand words. To illustrate the point, I use examples drawn from health statistics maintained by the Centers for Disease Control and Prevention and the National Center for Health Statistics.

The next two articles are from guest authors whom I greatly admire. The first is by Stan Rifkin who, prior to his move to Master Systems, Inc., was a key figure at the Software Engineering Institute. His thought-provoking article discusses why it is often difficult to implement measurement because of misalignments between metrics and organizational strategy. What he says might make you see things in a different light, and he offers some new concepts you may want to enact in your organization.

Then Jim Mayes of BellSouth tackles the often overlooked problem of one-dimensional thinking in metrics. In this article, he addresses a holistic and practical approach to achieving speed, cost, reliability, and business benefit for IT projects.

Overall, the direction we're heading toward with ***ITMS*** is "try this at home." We think you'll be pleased with the results.

Michael C. Mah, Editor

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CUTTER CONSORTIUM

people scatter to other projects, gather the core metrics.

- While you're at it, **write down what worked** and what didn't — all the environmental characteristics of the project and the lessons learned, warts and all.
- **Tell people the purpose of the endeavor; make them co-owners of the process.** Explain that even if the project struggled, the post-implementation review isn't about blame and attribution; it's about acquiring learning from the experience to help with the next project.

Organize What You've Learned

- **Keep the knowledge of what happened in a library of information** that people can access later.
- **Keep this record electronically.** Add the project to a metrics database (preferably Web-centric) that will help build a growing, living baseline to better understand the organization's IT capacity. Use an application service provider model as the basis of the architecture. This ensures that all the collective wisdom is maintained in one place for the organization to tap into. Knowing IT capacity will ensure that new projects will be more realistic, staying within the organization's capability (aka technology bandwidth). Hopefully, this will also provide a sanity check for future promises, so that teams will not be saddled with targets that are far beyond what is reasonable.

Present What You've Collected

- **Plot multiple charts on one view.** Sometimes the relationships between metrics are more obvious when you see them side by side. For example, a chart with speed versus project size juxtaposed with a defect chart will show you the impact of accelerating schedules on reliability. To give an example: ongoing metrics research on industry data shows that it is not unusual for defects to rise sixfold when you double the project staff in an attempt to achieve an "Internet speed" schedule. I've described this as the 200/20/6x rule: double the staff by 200%, shorten schedules by 20%, increase defects by a multiple of 6. Scary phenomenon, but important to know during planning and execution.
- **Sort data by selection sets.** This will reveal the various patterns that inevitably emerge for different types of projects. You'll see how new development behaves compared to major enhancements, minor enhancements, broke/fix maintenance, and other classifications. You'll also reveal patterns that might be exhibited between different lines of business. Network applications, billing systems, customer care, and enterprise/financial projects might all exhibit different levels of productivity, and for good reason.

Where You Can Go from Here

These steps are a good place to start for do-it-yourself metrics. In the coming months, we'll feature case studies and articles describing how companies have implemented metrics frameworks like those mentioned. There is also plenty to say about productivity baselines for outsourcing, process improvement, organizational learning, conflict management, and negotiation.

Charts like the ones discussed here often yield pleasant surprises, too. They're in the form of the "long-necked giraffes" I referred to in the February issue of ***ITMS***: projects that reveal just how special they are when measures tell a previously unknown story. They have a strange habit of popping up in ways IT professionals may not have expected.

Upcoming issues of ***ITMS*** will offer an overview of productivity statistics and trends from industry research as well as a challenge to the IT industry for a new metrics initiative.

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This article seeks to bring together two normally disparate subjects: organizational strategy and software measurement. It looks for what is commonly a misfit between strategy and measurement and proposes a set of antidotes. The misfit might be, for example, between a company's organizational strategy and the Software Engineering Institute's (SEI) Capability Maturity Model (CMM) for Software or the International Organization for Standardization's ISO 9000 standard for software quality systems.

A third area where you may find that misfit for metrics initiatives is in difficulty of implementation. In other words, because of the misfit between organizational strategy and software measurement as traditionally practiced, implementing software measurement is impeded.

The Discipline of Market Leadership as a Guidepost

The Discipline of Market Leadership is a survey of how 80 organizations out-achieved their competitors. The authors found that the answer to organizational success was focused on one of three market areas or disciplines:

- Operational excellence
- Customer intimacy
- Product innovativeness

Operationally excellent organizations have a "formula" for their services or products. Their menu of choices is limited, but within that menu, they deliver excellently. Common examples are McDonald's and Federal Express.

Customer-intimate organizations seek quite a different market niche: a total solution. Whatever the customer wants gets added to the menu. The menu is long and custom-made for each engagement. Financial service institutions are a great example. For them, customer intimacy is a way to get a greater share of the customer's wallet, since there are very few other venues for all the services that financial institutions now offer (checking and savings accounts, overdraft protection, certificates of deposit, credit and debit cards, traveler's checks and money orders, foreign currency exchange, travel arrangements, insurance). All of the "big five" accounting firms are customer intimate.

Product-innovative organizations pride themselves on maximizing the number of turns they get in the market. They introduce many new products, selling innovation and features as opposed to price. Examples are Intel, 3M, Sony, and Bell Labs. They measure their success by the number of new product introductions, the number of patents, and/or the number of Nobel Prizes.

The authors of *The Discipline of Market Leaders* are quick to point out that all organizations must have at least threshold characteristics of all three disciplines, but they must focus on and excel at only one.

One example of lopsidedness cited is IBM. At one point, its legendary customer intimacy was outweighed by its inattention to price (or operational excellence). The result was that competitors that were not as strong in customer intimacy could still make inroads to IBM customers with a lower price.

Measurement for Operationally Excellent Organizations

Measurement of the type we are used to, the type espoused by SEI and the International Function Point Users Group, for example, applies almost exclusively to organizations wishing to be operationally excellent. Our current measurement or improvement methods typically have nothing to offer customer-intimate and product-innovative firms.

The problem is that many software development organizations themselves do not strive to become operationally excellent, so we have neglected these areas. We hear keynote speakers at national conferences and their criticism of the process. These speakers talk about how they have to wrestle resisters to the ground, how managers handle time bombs and remain clueless, that would-be adopters are too impatient. We hear them say that disaster is imminent, businesses will be ruined, software professionals are irresponsible and guilty of gross malpractice, and, in the end, that everyone involved simply has bad character!

In fact, this criticism stems from nothing more than a mismatch of goals. There is, for example, a large set of software development organizations that strive for customer intimacy and essentially will do anything their clients request. Those organizations get to know their clients very, very well — sometimes better than the clients know themselves. An example of this might be a payroll service that has seen every variation on payroll and knows more about payroll processing than any inhouse payroll department could. The most customer-intimate payroll service providers could easily take over their customers' entire payroll departments!

To take another example, what about Microsoft? What do you think its market discipline is? Its discipline is product innovation. It touts its new, glitzy features, not its up-time or reliability. It wants to own/earn its clients based on new features, not by offering software that is operationally excellent.

In this context, CMM is silent on product innovativeness and customer intimacy. It applies only to organizations wanting to be operationally excellent. The same is true for traditional measurement.

Missing: Measurement for Customer-Intimate and Product-Innovative Organizations

What are we missing in all of this? A more global view, one that listens to and responds to our measurement customers. We need to see that the potential rejection of our measurement efforts is not an indicator of bad character or resistance, but may be an appropriate response to measures that do not fit the strategy. We need to problem solve together with our clients to develop new classes of measures that simultaneously meet our high standards for objectiveness and their high standards for relevance. Let me relate several efforts in which I have participated.

Example 1: The brokerage house. One brokerage house was not interested in software costs or quality, but rather what it called time-to-market. During the frantic time that a deal (such as an initial public offering) was being put together, the IT department was asked to respond quickly. The response had to be quick enough that the broker could earn as much as possible by offering as many services as possible during the short services-negotiation phase of the initial public offering lifecycle. It was a question of wallet share, which is a customer-intimate measure. So the brokerage really wanted the customer to maximize spending with the brokerage. That meant it needed the longest menu of services possible. It appeared to be a time issue, but if we would have tried to improve delivery time, we would have missed the point — time was not the major variable at all. It was flexibility: already having a systems architecture that could accommodate the requested services without having to engage in time-consuming new development. What looked like a time question was in fact a flexibility concern: Was the systems architecture sufficiently flexible to incorporate the new features/services with little additional programming?

We settled on a measure of the percentage of the total deal that did not go to the brokerage. IT's job, then, was to offer a realistic plan for continual reduction of that "missed wallet share" figure. Incidentally, this brokerage has a CMM-based software process improvement program that was frustrated, underfunded, and generally neglected. The new measure invigorated and revived the improvement program by taking the focus off irrelevant, operational-excellence goals and shining on what really counted for the business: winning as much of the initial public offering deal as possible.

Example 2: The defense contractor. One computer-oriented defense contractor said it wanted project measures: a one-time, one-budget record. But when pressed, it became clear that projects were not managed — and therefore not measured — in the traditional way. The government client wanted a provider that would do what it requested, not one that would study the request and offer alternatives or push-back. Cost, quality, and duration were not important to the client, only that it got what it wanted in reasonable terms. This, too, is a customer-intimate approach, one that makes the menu of services as long as the list of customer requests.

Naturally, the provider has to deliver the systems within a threshold value of cost, quality, and duration. But already there were many other providers that performed better in terms of cost, quality, and duration and were rated too low in customer responsiveness to be considered! In fact, the client changed its mind often, rendering previous work inapplicable. This caused rework that would traditionally be held against the provider. Traditional project-oriented measurement was irrelevant in this setting.

We recommended several measures: the total spent by the customer; how much went to other providers (to be minimized); time spent in adversarial settings (to be minimized); time spent with the customer understanding its business (to be maximized); and number of people on the staff with credentials like our client's (to be maximized). All are

customer-intimate measures, not project performance ones, since the contractor is not really held to traditional project performance standards.

Example 3: The computer services firm. A computer services firm had been the prime contractor for a long-time government client. The firm provided all of the computer programming and operations for a particular type of payment that the government entity made to deserving applicants. The contract was up for renewal (that is, to be recompeted) and the incumbent wanted to propose a set of measures going forward that would indicate its operational excellence.

The usual suspects were offered in discussions with the provider (now bidder), but those measures did not seem to resonate, even though they were "reasonable." It turns out that the government organization was feeling behind the times in terms of technology and really wanted a new, modern IT provider, not a better, cheaper, faster provider of old technology. In fact, there was no business driver for the desire for more modern technology, only a (vague) belief that such technology would reap financial benefits to the government in terms of lower costs and greater flexibility.

The measures we settled on were:

- Plan versus actual implementation of a set of new technology introductions
- Hours spent training the government client on the principles of that new technology
- Reliability measures directly related to the government organization's business, for example: cost of government rework due to provider payment errors, idle government worker hours due to system downtime, and government time spent in meetings or on the phone with applicants due to provider service failures

These measures were *instead* of other, traditional measures such as percentage of system availability data-entry error rates and a threshold number of ABENDs (abnormal end of task) per day, none of which related to the government mission or daily reality. This, too, is a customer-intimate strategy: expanding the menu of services to include new technology and then measuring around the effectiveness of the menu.

Customer-Intimate Traits

Customer-intimate organizations seek flexibility so that they can extend their menus (infinitely). Accordingly, in order to be aligned with that organizational strategy, they need measures of flexibility and wallet share. For example, in peer reviews, the items to be examined most closely should be the elements that limit future options, such as a limit to the number of items in a list and built-in "magic" numbers. It is also critical to judge comprehension during reviews; artifacts will constantly be expanded and enlarged as a strategy, so they have to be understandable.

Configuration management for customer-intimate organizations should be measured by how many of the interfaces are managed. It is the interfaces, after all, that matter in an ever-expanding system. This will enable multiple end-to-end solutions.

Probably the most important ingredient for customer-intimate systems providers is the existence of a systems architecture. The details of systems architecture, particularly software or applications architecture, are beyond the scope of this article; suffice it to say that architecture deals with the highest level of abstraction, the one expressing the relationship among the largest entities and their patterns of connection and interaction. Therefore, one simple measure related to customer-intimacy strategy would be the count of architecture checks and violations.

Product-Innovative Traits

The mark of a product-innovative organization is a concentration on features at the expense of quality, reliability, cost, and flexibility (unless those are the features being optimized, which is rare). Users of such products have a certain patience that is required with all new kinds of products, such as the PalmPilot, Walkman, Watchman, wearable cell phone, Linux, and Windows 2000.

One of the disciplines to fall by the wayside of innovative organizations is traditional planning. Planning is not as important as innovation. One often hears, "The plan is not a deliverable!" Planning for these organizations

is more about a diversity of investment alternatives — planning that some "bets" will fail to bear fruit and creating a diversified portfolio. We see this plainly with pharmaceutical firms, which do not require that a particular drug be discovered by a particular deadline, but rather that discoveries are regularly in the pipeline and, on balance, that there is a healthy proportion of winners. (Anyway, what would their plan be — "Budget for 1.4 stunning breakthroughs per fortnight?")

For those who care about a process focus, the challenge here is to create lightweight, generic processes that can be applied with large helpings of intelligence and judgment. I suppose the measure of "lightweightness" is really "fit": how well do the processes fit our strategy?

Those of us with a process focus hate the phrase "good-enough quality." But that is what is required in innovative firms. Again, quality is not the deliverable — features are. Therefore, goals around quality are pegged to thresholds, benchmarks, and, especially, time to market. Again, our measure would look at comparative fit: how does our quality stack up against competitors with similar features and time-to-market requirements?

Organizations with customer-intimate or product-innovative strategies are organized differently than those with operational-excellence strategies. Paul Lawrence and Jay Lorsch find that product-innovative companies, in particular, have both high differentiation and high integration. Differentiation refers to experts; integration refers to the job of getting disparate, possibly competing experts to serve in the interests of a common, corporate goal. One of the measures I use (yes, I measure more than product and process) is a count or proportion of the number of people in the organization whose job it is to integrate those competing interests to make a product happen. In the applications area of Microsoft (Office and programming language products) for example, there is such a person who heads a 10-person team, so that both the count and ratio are high at Microsoft relative to customer-intimate and operationally excellent firms.

We Need More

The implication for measurement is that a wholly different set of measures would apply to the customer-intimate and product-innovative activities compared to the technical activities; the technical problem is more or less solved with the measures we have. Now, we as a profession need to turn to the other two disciplines of market leaders and offer them something!

Acknowledgments

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About the Author

Stan Rifkin is a principal with Master Systems, Inc., an advisory services firm that concentrates on improving the processes by which organizations manage and develop software. Each year *Wall St. and Technology Magazine* selects two CIOs of the year; last year Rifkin was the only one to have served as consultant to both of these CIOs. He has worked at the Software Engineering Institute, where he was a project leader in the process improvement program. Rifkin's speciality is implementation, deployment, and putting best practices into practice. Rifkin can be reached at sr@Master-Systems.com.

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