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"Dashboards have not been invented to be mere data displays; their mission should be to help users make better decisions and achieve their goals."

— Ilenia Fronza, Guest Editor

Making Managerial Dashboards Meaningful

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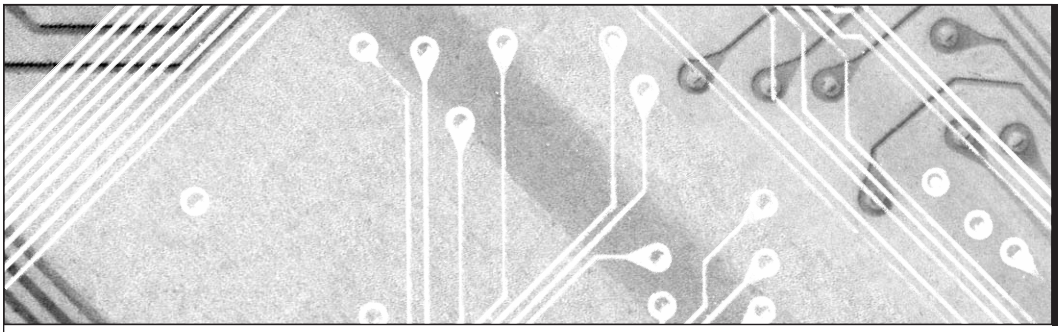

Cutter IT Journal

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Part of Cutter Consortium's mission is to foster debate and dialogue on the business technology issues challenging enterprises today, helping organizations leverage IT for competitive advantage and business success. Cutter's philosophy is that most of the issues that managers face are complex enough to merit examination that goes beyond simple pronouncements. Founded in 1987 as *American Programmer* by Ed Yourdon, *Cutter IT Journal* is one of Cutter's key venues for debate.

The monthly *Cutter IT Journal* and its companion *Cutter IT Advisor* offer a variety of perspectives on the issues you're dealing with today. Armed with opinion, data, and advice, you'll be able to make the best decisions, employ the best practices, and choose the right strategies for your organization.

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Editor Emeritus: Ed Yourdon
Publisher: Karen Fine Coburn
Group Publisher: Chris Generali
Managing Editor: Karen Pasley
Production Editor: Linda M. Dias
Client Services: service@cutter.com

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Opening Statement

by Ilenia Fronza, Guest Editor

IT organizations worldwide use dashboards to provide managers with the key information they need to steer their organizations in the right direction and make important strategic business decisions. Managers must be able to understand at a glance the information presented in the dashboard and to take effective corrective actions if needed. The success of this process strongly depends on providing managers with properly designed dashboards. Indeed, a poorly designed dashboard can be confusing and may even convey misinformation.

While there are guidelines for designing dashboards, the available dashboard examples demonstrate that practitioners do not always agree on a specific design, which naturally leads to different results. This means that we do not yet have a clear definition of "properly designed" in this context.

To design an effective dashboard, there are many challenges we have to address. First, the data we measure must be meaningful if the dashboard is to have any value. We can waste considerable effort and resources tracking the wrong information. Second, all the information has to be organized to fit one screen. Thus, we must select the most effective visualizations for the data in question. Third, we need to regularly review dashboards to ensure they incorporate data from all relevant sources and show useful and up-to-date information.

In this edition of *Cutter IT Journal*, we will focus on the selection of the metrics that organizations should include in their dashboards to indicate how the business is performing. Moreover, we will learn best practices and guidelines for showing the information on the screen and the main requirements to keep in mind when designing dashboards. We will consider different contexts for dashboards, such as development teams and global enterprises, and we will see how different the requirements for a dashboard can be depending on their context of application.

In this issue, our authors explore a number of approaches and solutions. They come from a variety of areas and experiences — including academia, consulting, and corporate environments — but they share some common themes. All of them agree on the need to choose carefully both the data to be displayed and the type of visualization to be used. However, they acknowledge that there is no magic formula for doing that. We need training and experience, guidelines and examples. That's why each article offers practical applications, examples, and guidelines — not merely theoretical discussion. By the end, you will take away some action steps you can use in your own organization.

Managers must be able to understand at a glance the information presented in the dashboard and to take effective corrective actions if needed.

NO DASHBOARD WILL REPLACE PROJECT MANAGEMENT SKILLS

A dashboard is a supplement and helps managers to focus their attention. It is not a substitute for managers' intuition and skills. In our first article, IT management consultant Paul Clermont states the mandatory condition for a good dashboard to succeed: a good manager. Assuming this condition to be satisfied in our organizations, how we can avoid designing dashboards that mislead good managers? Clermont suggests starting from the following three key questions: what are you measuring, why, and for whom? While finding your answers, keep in mind that dashboards must measure "what counts," and they must measure it well enough that managers can trust them to focus their questions and guide their actions. If you can answer these questions, then your dashboard will have a strong foundation. Clermont provides typical dashboard examples from IT and a list of problems inherent in measurement, along with possible solutions to those problems.

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SHOW AND FORECAST (IN A TIMELY MANNER) ONLY WHAT THE MANAGER NEEDS

In our next article, Cutter Fellow Robert N. Charette asks "why a reasonably planned IT project using a dashboard would fail." He finds only one reasonable answer: the IT project dashboard doesn't provide meaningful information to the manager responsible for the project.

Measures cannot be a random collection. We need rigor and expertise.

In his article, Charette provides a definition of "meaningful IT dashboard information" using three characteristics:

1. Dashboards should be as timely as possible and provide meaningful insights into future project deviation possibilities.
2. Dashboards should provide predictions about what information is expected at the end of the next review period, so the manager can compare expected and actual results. Making discrepancies between project perception and project reality visible enables the project manager to take more timely corrective action.
3. The information being displayed should represent the decision-driven information needs of the project manager.

If project managers are provided this meaningful information, Charette notes, "maybe, just maybe, there will be a few more IT project successes than there might have been otherwise."

UPCOMING TOPICS IN CUTTER IT JOURNAL

FEBRUARY

Vince Kellen

SMAC: Social, Mobile, Analytics, and Cloud

MARCH

San Murugesan

The Emerging Cloud Ecosystem: Innovative New Services and Business Models

DESIGNING EFFECTIVE DASHBOARDS

Dashboards have not been invented to be mere data displays; their mission should be to help users make better decisions and achieve their goals. In our next article, Andrea Janes, Alberto Sillitti, and Giancarlo Succi of the Free University of Bozen–Bolzano describe the results of their experience designing a dashboard for a software development team. The proposed dashboard was developed with a focus on two main aspects: selecting the "right" data and choosing the "right" visualization techniques. The authors discuss their approaches to these challenges so that the reader can apply them as practical solutions to the biggest issues related to dashboard design. Janes and his coauthors have developed their own model for choosing the "right" data: a GQM+Strategies model that documents measures together with the reasons why the data is being collected. To choose the most effective visualizations, the authors provide some guidelines for obtaining visualizations that minimize the time needed to understand the information that has to be communicated.

ABANDONING PERFORMANCE MEASURES: A RADICAL TREATMENT

OK, now we get it. Measures cannot be a random collection. We need rigor and expertise. For many years, our next author, David Parmenter, has been advocating the proper use of performance measures. Now he is convinced that, in many cases, a radical treatment is necessary: abandoning performance measures (and dashboards). Why? Because, he argues, "the greatest danger of performance management is dysfunctional behavior," and an organization with dysfunctional performance measures would function much better without them. Does your organization need this radical treatment? You can find out by simply using Parmenter's checklist for assessing the damage poorly designed performance measures may be causing in your organization.

If you need the radical treatment, well, this is what you should do: stop monitoring or reporting performance measures for, say, three months. During this time frame, management should find out which measures they have missed. At that point, Parmenter says the organization can gradually begin reintroducing measures — only the necessary ones! — to the dashboard. He concludes with further action steps you can take to instill "some intellectual rigor into your performance measurement process."

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GLOBAL INFORMATION SQUEEZED ONTO A SCREEN

In today's global economy, global enterprises operate across more than one geography. As our next author, TCS's Ravi Tej Kanteti, notes, this means that they must be able to "handle different cultures, laws, languages, and timelines." Moreover, these enterprises have a distinctive structure in their IT departments: besides the global CIO, multiple local CIOs are needed. What are the challenges in designing dashboards for such global enterprises? In his article, Kanteti presents the parameters that global and local CIOs typically need to monitor. Finally, the author suggests a framework and processes for building — and maintaining — these dashboards over the long run.

A DASHBOARD IS NOT THE HOLY GRAIL

In our final article, Lawrence Fitzpatrick of Computech argues that "traditional PPM dashboards produce unreliable information, at high cost, frustrating CIOs and project managers alike." The solution Fitzpatrick proposes is to build an innovative PPM dashboard that considers people, process, and tools and creates a protocol for developing project management skill. Three elements are required to implement this new protocol:

1. A minimalist project management framework
2. A dashboard that automatically provides reliable, up-to-date information about the project manager's — and the project's — performance
3. A group of experts who evaluate project management skill through the PPM dashboard and mentor fledgling project managers

In this context, the dashboard must be designed to show data useful for both assessing the skill with which the work is performed and for communicating the work that is being done.

CLOSING REMARKS

The wide range of topics covered by our authors helps us understand when we should think about adopting a dashboard and how we should design it so it can be used effectively. Each author, in one way or another, has highlighted the importance of showing "useful" data and has proposed some strategies for achieving this goal. Another theme that has emerged is the importance of adopting effective visualizations, because the goal must be to show relevant information clearly, not merely to obtain a fancy dashboard. Other challenges include adapting dashboards to different contexts and maintaining them continuously.

To sum up, much work has been done and much more is yet to come in order to accomplish the ultimate goal of dashboards: to make the numbers talk.

Much work has been done and much more is yet to come in order to accomplish the ultimate goal of dashboards: to make the numbers talk.

Ilenia Fronza holds a PhD in computer science from the Free University of Bozen–Bolzano (Italy) and is currently a nontenured researcher in its Faculty of Computer Science, where she teaches the Software Engineering and Software Project course. Her research interests focus on empirical software engineering, machine learning and data mining, software process visualization and improvement, and agile methodologies. Dr. Fronza has been a program committee member of the International Workshop on Emerging Trends in Software Metrics (WETSoM) and has organized the CASE International Summer School on Practical Experimentation in Software Engineering. She can be reached at ilenia.fronza@unibz.it.

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Dashboards Are Great, But We Still Must Watch the Road!

by Paul Clermont

WHAT IS A DASHBOARD?

If you've driven a car, you know about dashboards. They concentrate a lot of constantly updated, useful information in our line of sight: how fast we're going, how much fuel remains in the tank and how far it will take us, what radio station is coming through, the outdoor temperature and where we are on a map, and warnings about overheating, insufficient oil, failing brakes, failed light bulbs, low tire pressure, and unlatched doors. (When I was reversing in a rental car recently, its navigation system turned into a TV picture of what was behind me.) Quite simply, a dashboard is a cognitive aid to safe, convenient, and trouble-free driving whose functionality keeps growing as the price of the requisite technology keeps falling. Yet if the circuits connecting the dashboard were suddenly to fail, we could keep on driving safely for some time based on what we see on the road. And even if our dashboard worked perfectly, a tarp suddenly thrown over the windshield would bring us to a screeching halt.

Dashboards for managers are similar. Retrospectively, they help us notice and quantify problems that have developed. Prospectively, they provide early visibility into problems before they fester and metastasize. They help us focus our attention and probing.

For an enterprise, they're even more. They can enhance the productivity and effectiveness of managers by providing a structured, easy-to-use set of information that facilitates rigorous comparison across entities, over time, and against goals. The information is primarily quantitative, displayed as gauges that show the actual metrics, or warning or "traffic" lights based on metrics.

That said, the managerial equivalent of the windshield must be kept clear. No dashboard can replace it.

MEASUREMENT: NECESSARY BUT NOT SUFFICIENT

Lord Kelvin, the consummate engineer, told us, "If you cannot measure it, you cannot improve it." It's hard to dispute that at an operational level, but Einstein, the wise scientist, told us something subtler that's critical to management — and that should temper our expectations of dashboards — when he said, "Not everything that counts can be counted and not everything that can be counted counts."[1] Peter Drucker, the student of human nature, suggested that even counting what counts can be problematic when he observed that "what gets measured gets managed." If the dashboard measure can be made to look good by doing something one knows isn't quite right but will not be noticed because it's not captured on the dashboard, well … that could happen.

AUDIENCES FOR THE IT DASHBOARD

Within IT, dashboards are for people who have responsibility for something — applications, operations, field support, contracts, whatever — or for the whole shebang. Substantively, dashboards help these individuals maintain or improve performance. Politically, the earlier they can see problems before their bosses or customers tell them, the better for all concerned.

Outside IT, IT dashboards primarily serve a political function, helping the CIO "manage" up and out. When the inevitable issues arise, it's important that the conversation be about factual data on performance rather than vague impressions. This requires that the data presented be meaningful to the user, not just internally to IT. (More on this later.) Also, a well-designed dashboard demonstrates both IT's managerial and (we hope) technical competence, or at least it puts any hiccups in perspective.

CHOOSING THE "INSTRUMENTS"

The value of a dashboard is no greater than the value of its instruments. First, they must measure phenomena we care about — what "counts," as Einstein would say. Second, they must measure it well enough that we can trust them to focus questions and guide, though not usually prescribe, actions.

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What Makes a Measure Good

The first three of the following criteria apply to measures of anything; the others are more particular to measures designed for managers:

- The measure is **valid**. It either measures directly or is highly correlated with whatever phenomenon we're interested in.
- It is **reliable**. Similar behavior of the phenomenon results in similar measurements (i.e., readings are comparable over time and across entities).
- The **signal-to-noise ratio** — a term borrowed from communications engineering — is high enough to dispel most ambiguity. (Dispelling it all may be impractical.)
- What it measures and why it's important, valid, and reliable are **easy to explain in business terms**.
- It **reflects the audience's view** of the phenomenon. For example, uptime at the desktop means something to the end user. Uptime at the server or data center does not.
- It is **difficult to fudge and game**. If it's easy, that will inevitably happen. We are human; not being called on the carpet is best, but being called tomorrow is better than being called today. Who knows, something good could happen by then!
- It **can be crosschecked** if it can be made to look good by means we wouldn't like, as Drucker implicitly warned us. (The sidebar "Counting What Counts" shows how client G's materials management system proved its value through well-thought-out measurement.)
- The **cost of collecting the data is reasonable** given its value. Ideally it's a byproduct of what is done anyway. If it requires something new that is only done to create data for the measure, it will be easy for the required discipline to slack off.

COUNTING WHAT COUNTS

Client G, a defense contractor, had come under pressure from its military customers about the rapidly growing IT costs being factored into their approved overhead rate. It wasn't that the brass objected to the spending per se, they simply wanted something to demonstrate that reasonable business benefits were being obtained. My colleagues and I were asked to look at, among other things, a materials management system that had been in place for about a year. (Materials management was an overhead function.) The CFO had grumped that he "hadn't seen any heads walking out the door."

In a factory, the basic job of materials management is to ensure that the right amount of the right stuff shows up in the right place at the right time. Without IT, there are two ways to accomplish this. You can maintain high levels of raw materials and work-in-process inventory "just in case." Alternatively (or also), you can employ a number of expeditors who interrupt normal workflows to get rush parts specially made to hand-carry wherever they're needed. These are both costly and inefficient approaches, which is why production management was one of Client G's early targets for automation.

Client G's head of materials management maintained a dashboard that showed the materials management function had gotten much better at their basic job: parts shortages on the shop floor were down by 60%. Better yet, this improvement had not come from more inventory; that was down too. And while "no heads had walked out the door," no new heads had walked in, despite the fact that the volume of end product shipped had grown significantly. The dashboard proved that the investment in IT had enabled materials management to support more shop-floor work much more effectively with no more people and less inventory. The military was convinced. (And so was the CFO!)

A Taxonomy of Measures

Not everything we could want to measure can be measured as precisely as we might like, so we have to deal with different flavors:

- **Direct vs. surrogate**. While direct measures are naturally more desirable, they are not always possible. Uptime, for example, can be measured directly. Progress on a system implementation cannot be, so we have to rely on surrogates like the on-time completion rate of milestones. When milestones are not chosen well, games can be played. When their completion is "subject to interpretation," fudges will happen. (Client G's shortages and inventory, described in sidebar, were directly measured but were indirect measures of shop-floor efficiency in that some shortages are of trivial consequence while others create disruptions that ripple far and wide for days.)
- **Objective vs. subjective.** This distinction may seem similar to the previous dichotomy, but it's not. In the previous, there is an objective and at least theoretically quantifiable thing happening, but we may not be able to measure it directly. In this dichotomy, the distinction is between fact and opinion. The familiar Likert scales (five or seven points ranging from "strongly

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agree" to "strongly disagree") or five-point poor-to-excellent ratings allow us to quantify subjective perceptions, such as a system's ease of use or the helpfulness of support people. A sizable sample is required for validity, especially if we want to compare across populations. By definition, these are *periodic* or *episodic* samplings rather than *continuous* measures.

- **Retrospective vs. predictive**. The former tell us how well we've done, while the latter tell us where to be concerned about the future. For example, the last month's uptime may look good in total, but if there was an uptrend in outages toward the end, some investigation may be merited. On the other hand, if such a monthly profile is typical, its occurrence would not be predictive. Of course, investigation of *why* it happens could still be appropriate from the viewpoint of quality management. (Client G's measures were all retrospective but were maintained in a timely enough manner to focus management attention if inventories and shortages started edging up.)

Figure 1 shows the efficacy of measures as a function of their objectivity in terms of managerial value, action-driving, predictive accuracy, and proneness to gaming and fudging.

Measures can also be presented in different ways. A simple dial, like a speedometer, assumes we know how to interpret the reading we see. If that's not a good assumption, the dial can be enhanced with colored zones, like the red and yellow lines of a tachometer. For ease of overall comprehension, traffic light displays can be used.

Finally, dashboards can include graphics and tables that enable comparisons over time and across entities.

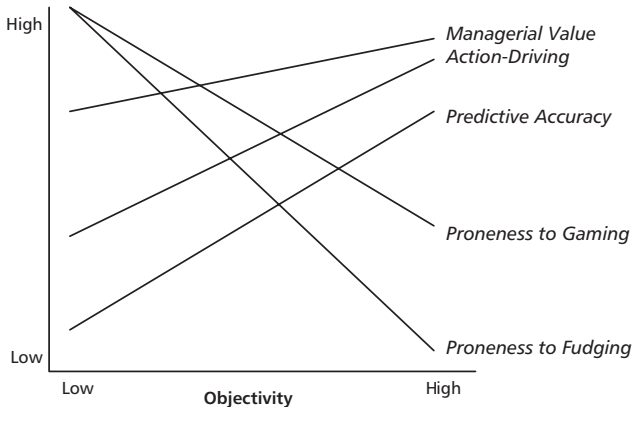

Figure 1 — The value of objective measures.

Measures to Avoid

Measures that could be interpreted as self-serving (e.g., subjective and qualitative assessments by the manager in charge of the activities assessed) are inherently problematic unless they can be backed up by objective measures. Even if it's made with total candor, a positive assessment that turns out to be wrong creates a problem gratuitously.

Politically charged measures whose validity is arguable are also a problem. Every CIO's dream is to be able to show facts and figures that conclusively prove IT's contribution to the bottom line. This will, for the foreseeable future, remain a dream. To suggest that this contribution can be measured accurately enough for a dashboard is to invite not just skepticism but derision.[2]

TYPICAL DASHBOARD EXAMPLES FROM IT

Dashboards for IT managers fall into several categories, as described in this section.

Infrastructure-Oriented

Infrastructure-oriented dashboard measures are primarily objective and retrospective and are most effective when direct. Examples include:

- System availability and uptime
- Outage frequency and repair times
- Hardware and system response times
- Web-related response times
- User support response times
- Trouble ticket volume and resolution times

Subjective measures can also be used; for example, to capture perceived performance and address more subjective matters such as user support courtesy and helpfulness.

Applications-Oriented

Predictability of applications work — that is, delivering the promised functionality and technical performance on schedule and within budget — has been the bugbear of IT management since the earliest days. This has been true whether we're talking about custom development or installation of purchased software, or whether the work is done primarily by employees or contractors.

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That's why applications work is an ideal candidate for a dashboard approach — it's where things go the furthest wrong the fastest. The problem, of course, is that progress is very hard to gauge until completion is almost at hand. Much progress has been made in software engineering disciplines, but the desired *valid* and *reliable* measure of percent complete (or earned value, as it's called in contracting) remains elusive.

Showing actual milestone completion versus scheduled completion tries to address this, but it's only useful if certain conditions are met:

- To minimize late-breaking surprises, milestones must represent meaningful, tangible accomplishments and still be granular enough to provide sufficient visibility over progress.
- They must reflect well-thought-through schedules where critical paths are clearly recognized.
- Their completion must be able to be assessed unambiguously — it's done or it isn't, no fudges!
- They must be comparable in terms of effort or difficulty, or measures like "percent of milestones on or ahead of schedule" can be too easily gamed by including lots of easy marks to hit.

Measures should be as objective as possible. They are retrospective, but they're intended to be used prospectively to focus attention on potential problems.

Customer-Oriented

With ever more business being transacted over the Internet, and with Facebook and Twitter presence becoming *de rigeur*, statistics reflecting the quantity, quality, and depth of direct interactions with customers are vital not just to IT. Counting hits or visits — the crude measure used in the early days — is no longer enough. It's also important to track, for example, completed transactions and their value, aborted transactions, purely browsing visits, repeat visits, and evidence of customers' confusion in navigating.

Financially Oriented

The more attention the culture pays to budgeting, reporting, forecasting, and chargeback, the more important these are to stay on top of. Measures should track to the chart of accounts used in budgeting, though measures that might be meaningful to IT management (e.g., differentiating staff costs among various applications and infrastructure activities[3]) should be tracked as well, even if not for "public" consumption. By definition, measures are direct and objective.

HOW DASHBOARDS CAN MISLEAD

Poor Selection of Measures

The most obvious problem is when the chosen measures aren't very good; that is, they're not sufficiently valid and reliable to be credible indicators. Such measures must not drive action without significant additional corroboration from other means. (Corroboration is never a bad idea, but it's a matter of degree.) Most people would not deliberately choose inferior measures (unless they want to discredit the whole dashboard concept), yet they are often backed into doing so. This can happen for a number of reasons:

- Measures we'd like to have either cannot be made or cannot be made cost-effectively, so we accept poor substitutes without putting enough intellectual energy into finding better or at least cross-checkable surrogates. One example, as suggested above, is milestones met as a measure of progress when milestone quality is not ensured.
- We cannot come up with measures that seem good, but we feel pressure to measure something rather than "admit defeat."
- We overdelegate the selection of measures to those being measured, without requiring sufficient defense of why the proposed measures are valid, reliable, and all the rest of the criteria. Most people will naturally tend to select measures more likely to make them look good than to invite scrutiny and intervention, and it helps if the measures are easy to fudge, "just in case."

Bad measures are usually worse than no measures at all. They mislead us into investigating things that are going well and overlooking things that aren't, and as these flaws become apparent, the whole idea of measurement and dashboards gets discredited. But even a well-done measure selection can have unexpected problems. If there seem to be too many false positives and/or negatives, fix — don't just start ignoring — the dashboard.

Problems Inherent in Measurement

Few measures are pure signal (i.e., noise-free), especially if we try to use them prospectively. The biggest danger of false positives and negatives comes from traffic signal displays. There have to be boundaries between what is green and yellow and red, but those boundaries are necessarily arbitrary. Green lights don't always mean there's no need to pay attention. The underlying indicator may be clearly trending toward

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yellow but hasn't gotten there yet. By the same token, red lights can, if we're not careful, lead to overly hasty and ill-thought-out interventions.

WHO'S MANAGING THE REFINERY?

Client P installed a state-of-the-art control system in one of its refineries. It featured real-time displays showing measures of the process at every stage. When the refinery manager showed it off to the VP of refining, the VP was so enthusiastic he said he wanted the display in his office as well. The manager replied, "Fine. I'll resign, since you'll be able to run the refinery yourself and won't need me." The VP did not accept this offer.

A VIEW FROM THE EXECUTIVE SUITE

Dashboards are valuable but have their limits. The big limits stem from the culture in which the dashboard is applied. For example:

- When those who want control of information resist putting real data in the dashboard, the result is "garbage in, garbage out."
- The dashboard becomes a place where people can disclose information and use that disclosure to pass the risk up the chain of command: "I told you back in the last dashboard report that X was a problem; you did nothing about it."
- Participants work to manipulate the measures themselves by adjusting definitions or by choosing vague definitions that can subsequently be changed to meet the needs of the reporting entity. My favorite: "The item is green as long as there is at least a 1% chance that we will make the deadline; we'll change it when we miss it." I actually got that definition from a high-level manager talking about a major IT initiative!

The biggest risk in using a dashboard is the mental error we commit when, as managers, we think that because we have a good dashboard in place, we can depend on it to identify risks with enough time to act. It's the dashboard and the users that deliver results. These are great tools to drive change and accountability, but "buyer beware."

If a measure is worth making, it should be made on schedule and with rigor. Spotty collection of data happens easily, especially when the data is *only* collected for dashboard purposes. It's best to use data already produced.

Fudges and games can be minimized by careful selection of measures, but they cannot be eliminated for any measure that's not purely objective. Where things go really wrong is when people are allowed to get away with fudging and gaming. Worse yet is when fudging is tacitly encouraged from above — fudge and nudge!

Insufficient follow-through on what measures say breeds cynicism about the program, leading to spottier collection, more blatant fudges, and ultimate abandonment. For example, when a caution is raised due to a dependency on something outside the manager's control that is not going well, yet those who could investigate or take action do nothing, what message does that send?

Failing to properly match the measures and level of detail with the audience can undercut the purpose, invite cynicism, and create a temptation to micromanage (see sidebar "Who's Managing the Refinery?").

What gets measured gets done. Measures lacking cross-checks can lead to undesired effects *not* reported on the dashboard as people make sure dashboard measures look good. (This notably did not happen with Client G.)

It's easy to get the balance wrong between delegation and intervention. Lower-level managers don't learn and develop when they're not given enough space to recognize and solve their own problems. But letting things slide until the problem gets serious and spreads isn't good either. A deft hand and knowledge of people are critical.

Misuse

Dashboards are all about visibility and transparency. For that to become a reality — "how we do things here" — openness must be rewarded. Dashboard-driven interventions by managers need to come across as positive problem-solving and learning experiences rather than negative, punitive encounters. Not doing this invites ever more fudges and games, beclouding the visibility. It's important to get the full story before assuming that a dashboard reading is unambiguous evidence of a screw-up.

Finally, we must not forget what we know about the specific people whose activities are measured on the dashboard when choosing when and how to intervene.

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That applies also to things that *appear* to be going well, not just those with apparent problems.

Inappropriate Expectations

Good dashboards can make a good manager better but are unlikely to bring a sub-par manager up to par. We must recognize the limitations; a dashboard is a supplement, not a substitute for "old-fashioned" management. They are not an autopilot, and they don't guarantee anything. A manager needs to know not just what is happening in her purview but why, and that's a lot harder to measure. We could say that a dashboard is a digital approach to managing an analog world.

The sidebar "A View from the Executive Suite" gives a COO-level government executive's perspective on dashboards.

Creating a dashboard is also a journey. It can always get better, and it should. Learning will be necessary as we calibrate and tune — and occasionally replace — the instruments.

GETTING STARTED

What Measures, Why, and for Whom?

The first step is to identify the audiences. Next, we need to think through the questions the dashboard should answer, always putting ourselves in the shoes of the audience. While this is a great learning opportunity for high-potential junior people, it is not a job to delegate to them without a fair bit of supervision. We need to ask:

- What does the audience need and want to know and at what level of detail?
- How close to real time do they need or want to know it?
- Is this information amenable to dashboard presentation, or will we raise more questions than we answer?

While audience members obviously need to participate in this process, just asking them what they want is a lazy approach that rarely fails to backfire. And once they've told you, it's hard to back away when what they've asked for proves difficult or infeasible to deliver. Audiences should be approached with potential measures formulated to be as meaningful as possible to them yet still practical to deliver. This requires a serious effort to visualize walking in their shoes.

Obtaining the Information

Quality matters. We must be able to ensure validity and reliability of measures with crosschecks and make them as fudge- and game-proof as possible. To repeat, if we can't come up with a good measure, we should not gin up something questionable just to tick a box.

Presentation

Dynamic instrumentation is most appropriate for direct measures of operational performance. The choice between traffic light indicators and actual data is tied to the question of whether the dashboard is intended to convey specifics or to create an overall impression. In a car, we surely need to know our speed, but we do not need to know the temperature of the coolant, just whether it rises above an acceptable range. In general, impressionistic data is better for external consumption.

Presenting specific information — snapshots and time series — is a mix of science and art, and books and courses have been devoted to it.[4] The role of the many graphic choices a spreadsheet offers is to help us separate signal from noise. Figures 2 and 3 track a phenomenon with an acceptable average frequency of 100 a day, where fluctuations within ±5% are not of concern. Data from two different weeks is shown. Figures 2a and 3a obfuscate what's going on, while Figures 2b and 3b make it clear. These admittedly trivial examples point up the editorial power, for good or ill, of graphic details.

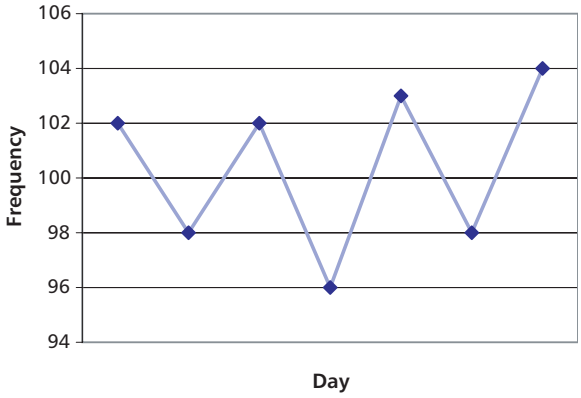

Figure 2a — Noise disguised as signal.

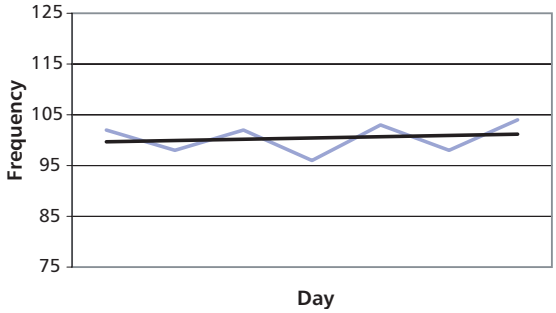

Figure 2b — Noise as noise.

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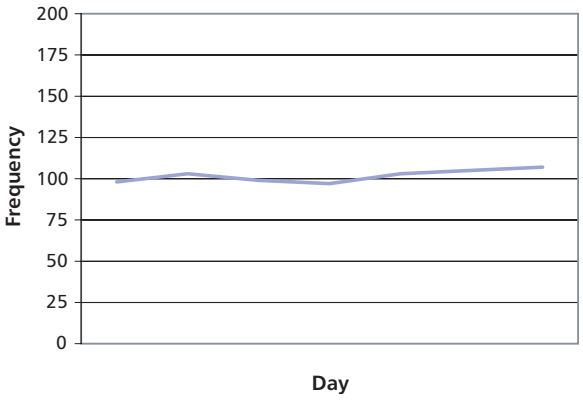

Figure 3a — Signal disguised as noise.

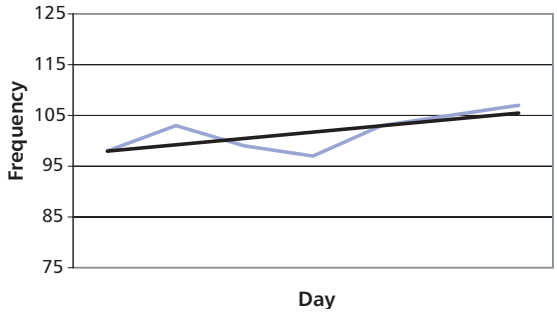

Figure 3b — Signal as signal.

Dashboard Building Sequence

Building dashboards doesn't have to be done all at once and should not be. There's too much to learn, and it's too easy to make mistakes that cast a shadow over the whole program. Therefore, it's best to start internally and build the discipline needed for data collection and use before making a big public splash. It is also best to start with the most objective measures.

DASHBOARDS IN CONTEXT

A dashboard is a supplement, not a substitute for "management by walking around." It may suggest priorities of where to walk, but it is not a sat nav–generated route. The role of gut feel and intuition and the importance of a "nose for news" should not be minimized. Finally, as US President Ronald Reagan said about disarmament agreements, "Trust but verify."

As with any management tool, the word "management" is much more important than the word "tool"!

ENDNOTES

[1]Einstein's original authorship of this is not certain; he has been credited with writing it on a blackboard. The first confirmed printed citation is: Cameron, William Bruce. *Informal Sociology: A Casual Introduction to Sociological Thinking*. Random House, 1963.

[2]Clermont, Paul. "Cost-Benefit Analysis: It's Back in Fashion, Now Let's Make It Work." *Information Strategy: The Executive's Journal*, Vol. 18, No. 2, 2002, pp. 6-11.

[3]Infrastructure activities might distinguish among such categories as server operation, network management, and help desk. Applications activity might differentiate among maintenance, enhancement, replacement, and implementation of totally new capabilities.

[4]Professor Emeritus Edward Tufte of Yale has published extensively on this topic; see Tufte, Edward R. *The Visual Display of Quantitative Information*. 2nd edition. Graphics Press, 2001.

Paul Clermont has been a consultant in IT strategy, governance, and management for 30 years. Before going into individual practice, he was a Principal with Nolan, Norton & Co., a boutique consultancy that became part of KPMG. His clients have been primarily in the financial and manufacturing industries, as well as the US government. Mr. Clermont has spoken and written and taught executive MBA courses on the challenges of getting significant and predictable value from IT investments. Before joining Nolan, Norton & Co., he directed IT strategy at a major Boston bank and launched its IT executive steering committee. His undergraduate and graduate education at MIT's Sloan School of Management was heavily oriented toward operations research. Mr. Clermont can be reached at clermontconsulting@gmail.com.

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A Case for Decision-Focused Dashboards

by Robert N. Charette

In November 2012, the US Air Force finally decided to cancel its Expeditionary Combat Support System (ECSS) modernization project after spending US $1 billion on it. ECSS was intended to replace more than 240 outdated Air Force logistics computer systems, some over 40 years old, with a single, integrated system. The Air Force deemed the effort critical to the successful modernization of its antiquated and operationally costly logistics infrastructure. However, in April 2012 the Air Force's comptroller told the US Senate Armed Services Committee, "We're now approaching seven years since funds were first expended on this system…. I'm personally appalled at the limited capabilities that project has produced relative to that amount of investment."[1] The Air Force's ECSS project leadership offered various excuses for the project's failure, but the reasons all boiled down to the claim that they did not have adequate insight into the project's implementation.

The Air Force's claim of ignorance is curious given that there was a government mandate to provide detailed project status information to the US Department of Defense's CIO, who in turn was required to review it and then post said information on a government-wide, publicly available IT dashboard along with her personal assessment of the ECSS project's risk status on a quarterly basis. A quick look at the dashboard shows that the project was rated as only a moderate risk at its demise and had been "closely monitored" by the CIO for the past two years.[2]

A better example of an ineffective IT dashboard for making project decisions would be hard to find.

IT DASHBOARDS: PART OF THE SOLUTION OR PART OF THE PROBLEM?

The ECCS debacle leads to the interesting question of why a reasonably planned IT project using a dashboard would fail.[3]

Setting aside project suicides as a possible explanation, there really seem to be only three possibilities. The first is that project management doesn't want to hear bad news; therefore, bad news doesn't show up on the dashboard, or if it does, it is ignored.[4]

The second is that project managers don't understand what the information on the dashboard is telling them. This is always a possibility, especially if the dashboard provides too much information or presents it in a way that is confusing. Still, that's unlikely for anyone with a minimal amount of professional project management training and a bit of project management experience.

The third is that the IT project dashboard doesn't provide meaningful information to the manager responsible for the project.[5] I will discuss what I mean by "meaningful information" shortly, but we should remember that a project manager's *sine qua non* is to monitor project status and, when required, to make decisions regarding changes or deviations to the project plan. If a project plan were perfect, you wouldn't need a project manager.

But what *is* a project plan? A plan is merely a proposed sequence of activities to be carried out over a period of time to achieve some set of feasible objectives, given specific constraints and assumptions (which we call the project's *context*). When the project's activities or context deviate from what is expected — say, the activities were harder to complete than expected, the context changed, or what have you — then it is management's job to intervene and try to adjust the project plan to achieve the original (or recalibrated) objectives given the changed set of circumstances.[6]

WHAT IS MEANINGFUL IT DASHBOARD INFORMATION?

It Is Timely

In an ideal world, a project manager would be able to know in advance that a deviation from the project plan is likely to occur so that he can be prepared to intervene if the deviation does in fact occur or to take action to reduce its likelihood. The reality in most projects, however, is that the project manager only finds out action is necessary after a deviation has already occurred. This is because the project status measures the dashboard is tracking are typically backward-looking. Like a car's rearview mirror, they describe events that have already happened.

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For example, take a project's cost, which comes in two flavors: planned and actual. While planned cost information is useful, actual cost data is critical. Typically, there is a time delay between when actual costs are being incurred and when they are displayed on the dashboard. If this lag time is long, the project may be overrunning its planned budget significantly before the project manager has any knowledge of the fact.

Once informed, the project manager is now in a similar position to that of a NASA controller on Earth trying to deal with a Mars rover that has run into trouble. By the time the controller sees indications on her display that there is trouble with the rover, 14 minutes will have passed on Mars. Even if the controller takes immediate action, it won't take effect until almost 30 minutes later.

For the project manager, any lag time in information can produce similar kinds of effects. If it takes two weeks for cost overrun data to show up, then the activities causing the overrun have been running for at least two weeks before the manager knows about it. He now has to assume that the reasons for the overrun are still occurring (which means the cost overruns have actually been occurring for a month), and that every day it takes to track down the reasons and stop them will result in more cost overruns. Not only that, but the cost overruns will likely have impacts on other project activities (i.e., their resources will likely be reduced to make up for the shortfall), which will increase the likelihood of their deviating from their activity plans as well. The other option is to seek additional funds to cover the shortfall, ideally from a management reserve or not so ideally from an external source, assuming one is available.

Long information lag times can easily cause a project to spin out of control quickly. Unfortunately, few if any dashboards highlight the age of the information being displayed. Of course, the provision of actual project information in real time would be extremely helpful to a project manager to avoid issues related to lag time, but that requires an investment in infrastructure support (e.g., for cost data, a direct tie-in to the organization's financial reporting system along with the definition of corporate procedures to capture information from, say, timesheets every day) that is beyond most organizations' capabilities.

In general, we can say that for dashboard information to be meaningful, it must above all be as timely as possible. That said, while real-time information is extremely useful, it doesn't necessarily guarantee that the project manager can diagnose and rectify any project deviations that may occur before they go from being a problem to becoming a crisis. For that to happen, a dashboard needs to provide meaningful insights into future project deviation possibilities as well.

It Provides Active Management Control

As we noted above, IT dashboard information should let a project manager know when the prospect of a project deviation is increasingly apparent. Nearly all dashboards provide trend information that is used to indicate when the project is starting to deviate from the plan, but trending information is subject to lag-time issues as well.

Furthermore, trending data usually depicts activity or outcome measures and rarely performance measures. For instance, let's say the project plan requires software module–level testing. The dashboard may depict that the testing *activity* has started. It may also show that the *outcome* of the testing has found 10 defects per thousand lines of code. However, for the information to be very meaningful, a project manager has to know whether the 10 defects per thousand represent good or bad software programming *performance*. That is, what is the criterion against which the outcome is measured, and how does project performance change over time? If the project manager is shown only activity or outcome measurement information, she may think she is in control of the project when in fact all she has is an illusion of control.

Even having performance measures displayed over time is usually not enough to provide the requisite insights into a project's status that would enable the project manager to proactively keep the project out of trouble. What is really needed is a way for the project manager to actively anticipate where potential problems — aka risks — lie. Risk assessments are a means to help a project manager, but most risk assessments provide only a limited snapshot of the project state at a particular point in time. To be useful, project risks have to be continually updated.

One way to help spot risks early is for the project manager to predict what she thinks will happen next on a project and then compare this forecast against what actually happened. By comparing the forecast against the actual outcome, meaningful insights into the state of the project are possible.

A useful analytical and graphical technique that has long been used in gauging the accuracy of economic forecasting, but has been overlooked by designers of IT dashboards, is the prediction-realization diagram developed in 1964 by the pioneering Dutch econometrician Henri Theil (see Figure 1).[7] What makes Theil's technique useful is that it accounts for something that is usually missed in forecasts — the accuracy both in the size and direction of the forecast.

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We can illustrate Theil's concept with a simple example. Suppose the project management team predicts that project personnel turnover will be 10% below the project's average for the next measurement period, but in fact it is 15% above average. This situation, as depicted by the star in quadrant II of Figure 1, is called a turning point error, or a prediction that is opposite to what was realized. Turning point errors graphically highlight the fact that something is happening in the project that is not expected or is misunderstood. *How* unexpected will depend on the magnitude of the difference between the project team's prediction and its realization. Turning point errors indicate that there may be a fundamental misalignment between a manager's perception of project reality and reality itself, signaling that activities may be occurring that put the project in jeopardy and are not readily apparent. At the very least, turning point errors indicate that the project is in danger of getting out of control and the reasons should be investigated.

If, on the other hand, the prediction and realization align, it indicates that the prediction is correct, although the percentage change may be off. A perfect alignment of prediction and realization results in being on the diagonal.

If the project manager makes several forecasts on key measures using a prediction-realization approach, the resulting plot can quickly identify whether she generally understands what is happening on the project (i.e., prediction and realization are in alignment), is overoptimistic or overpessimistic (i.e., in alignment but having either overestimated or underestimated the percentage change), or possibly is completely out of touch with reality (i.e., turning point errors). Using prediction-realization techniques is similar to what NASA Mars rover controllers do to keep from losing control of a rover.

Therefore, a second rule of thumb for making dashboard information more meaningful is to ensure that predictions are made about what information is expected to be displayed at the end of the next review period. If the ECSS project had been required to use prediction-realization diagrams, it is likely the project would have been cancelled earlier at lower cost, as the difference between project perception and reality would have been visible to all.

It Is the *Right* Information

In his book *Psychology: The Science of Mental Life*, psychologist George Miller writes:

> In truth, a good case could be made that if your knowledge is meager and unsatisfactory, the last thing in the world you should do is make measurements. The chance is negligible that you will measure the right things accidentally.[8]

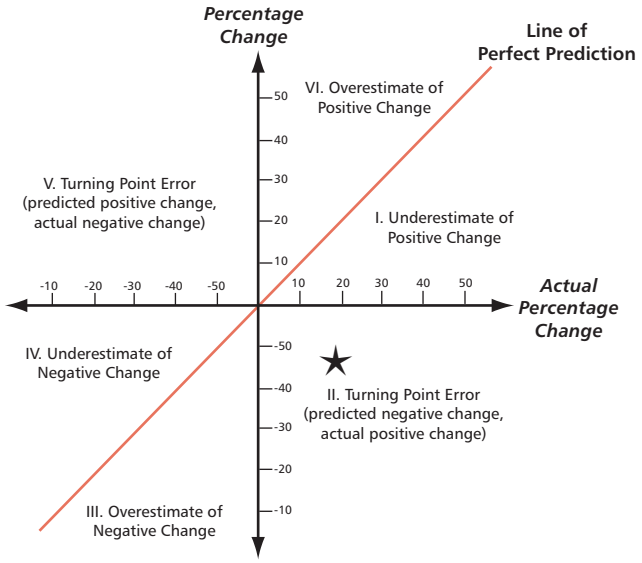

Figure 1 — Prediction-realization diagram. (Source: Theil.)

Miller's comment highlights that the most important consideration with regard to information being captured and displayed on IT dashboards is that it in fact be the *right* information. What people often forget when designing IT dashboards is that the information displayed is supposed to help project managers make better decisions. If decision-focused information isn't being displayed, the effort of collecting and displaying dashboard information is wasted.

What this tells us is that before a dashboard is ever created, the dashboard designer needs to develop a thorough inventory of the types of decisions the project manager and other relevant stakeholders are likely to face over the course of the project (e.g., recurring, or known critical decisions) — along with *when* the project manager or stakeholders will need to make those decisions. Once the "decision inventory" has been developed, the kinds of information the manager will need to make the various decisions will have to be identified and captured.

The types of decisions a project manager is required to make naturally change over time, which means the information displayed on the dashboard will also have to change over time. This is especially true as an IT project gets closer to becoming operational. The information needed to make the *business* decision to "go live" is much different than what is needed for making *technical* decisions regarding the project's direction on a day-to-day basis. For instance, a "go live" decision point for a major project will require the dashboard to support the information needs of the CIO, the CFO, and possibly the CEO and board members, not just those of the project manager.

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Recall that the project manager's purpose in life is to monitor a project's status and to intervene if the project deviates (or is about to deviate) unacceptably from the plan. Recall also that a project exists in a particular context defined by its objectives, assumptions, and constraints. My experience is that the project context is rarely reviewed, yet this is where projects are most vulnerable. A change in a critical project constraint or assumption can obviously undermine the likelihood of a project's success, just as a crack in a foundation can bring down a house. Project context information should be on every project dashboard, for it is, in my opinion, the most meaningful project information of all.

Next to project context information, the other information that dashboards usually don't display but really must is the project's status as perceived by the project participants themselves. A project's morale is a critical measure of likely future success. Typically, only indirect and heavily time-lagged measures are used to measure morale, such as project turnover rate. If a project manager's only insight into poor project morale is a high turnover rate, then the project is as good as cancelled.

There are now appearing dashboards, such as ITBuzz from CAI, that incorporate ongoing surveys to solicit team member feedback as a means to provide qualitative as well as quantitative program status information to project managers.[9] These surveys also extend to customers and other project stakeholders to offer even more insight into the project's status from different perspectives. Combining these types of surveys along with the use of prediction-realization diagrams could be a powerful way to create meaningful information and conversation about a project's true progress.

ANSWERING THE RIGHT QUESTIONS

French sociologist Jean Baudrillard once wrote, "Information can tell us everything. It has all the answers. But they are answers to questions we have not asked, and which doubtless don't even arise."[10]

You could be forgiven if you thought Baudrillard was writing about the ECSS project dashboard. And the point he makes could be applied to today's IT dashboards in general: too often they provide information that is not meaningful to the questions that a project manager needs to ask — or knows need to be asked — and to answer concerning an IT project's status.

What we require is a dashboard focused on providing the information to support the myriad different types of decisions a project manager has to make over the course of a project's life. When that information is provided in a timely fashion and is combined with forecasting techniques such as prediction-realization diagramming, dashboards will begin to provide information that is truly meaningful. And maybe, just maybe, there will be a few more IT project successes than there might have been otherwise.

ENDNOTES

[1]Serbu, Jared. "Air Force 'Appalled' by $1B IT System That Produced Few Capabilities." Federal News Radio, 20 April 2012 (www.federalnewsradio.com/412/2834438/Air-Force-appalled-by-1B-IT-system-that-produced-few-capabilities).

[2]"Expeditionary Combat Support System IT Dashboard." US Office of Management and Budget (www.itdashboard.gov/investment?buscid=22) (archived copy).

[3]A "reasonably planned IT project" is defined as one that is technically feasible and has adequate resources of time, money, and people.

[4]Ketrick, Paul K. et al. *Assessment of DoD Enterprise Resource Planning Business Systems*. Institute for Defense Analyses, February 2011 (www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA563798).

[5]Note that when I say "project manager," I am including anyone on the project who has decision authority.

[6]Deviations may also be caused by opportunities to gain increased benefits from the project in less time and/or with less cost.

[7]Theil, Henri. *Optimal Decision Rules for Government and Industry*. North Holland Publishing Company, 1964.

[8]Miller, George. *Psychology: The Science of Mental Life*. Harper & Rowe, 1962.

[9]"ITBuzz: Enterprise Management Solution." Computer Aid, Inc. (www.caibuzz.com).

[10]Baudrillard, Jean. *Cool Memories*. Translated by Chris Turner. Verso, 1990.

Robert N. Charette is a Fellow with Cutter's Business Technology Strategies *practice. He is also President of ITABHI Corporation and Managing Director of the Decision Empowerment Institute. With 35 years' experience in a wide variety of international technology and management positions, Dr. Charette is recognized as an international authority and pioneer regarding IS, IT, and telecommunications risk management. He is long-time member of the IEEE and ACM and a Lean Systems Society Fellow. Dr. Charette is also contributing editor to* IEEE Spectrum *and writes its popular* Risk Factor *blog. He can be reached at rcharette@cutter.com.*

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Effective Dashboard Design

by Andrea Janes, Alberto Sillitti, and Giancarlo Succi

In the 19th century, the term "dashboard" was already being used to refer to a board in front of a carriage that stopped mud from being splashed (dashed) into the vehicle by the horse's hooves. Later, cars began using dashboards to inform the driver about the status of the car's various systems. When a problem arises, the colors of the dashboard indicators show how urgent the matter is (see Figure 1):

- **Red** indicators typically mean that the problem is serious and that some action is needed immediately. Red indicators such as "Check Engine" or "Low Oil" require the driver to halt the car right away to prevent further damage. Safety issues, such as a nonworking air bag, are also shown using red lamps.
- **Yellow** indicators show that some action is required soon, such as the yellow "Low Fuel" light.
- **Green** indicators inform the driver that some system is turned on, such as the "Low Beam Lights."

The dashboard is designed to ensure the correct functioning of the car. It is, so to speak, aligned to the business goal of the driver. It helps the driver achieve the goal, which is to drive from point A to point B.

In an organization, the term "dashboard" is used to describe a system that visualizes data useful for decision making.[1] Dashboards, as in a car, have the goal of informing while not distracting users from their actual task. Therefore, data in dashboards is summarized using charts, tables, gauges, and so on (see Figure 2). To allow users to interpret an element on the dashboard correctly, dashboards typically allow them to see the original data on which the summarization was based.

Some authors distinguish between dashboards and scorecards,[2] depending on whether the data measures performance (dashboard) or charts progress (scorecard). We treat the terms "dashboard" and "scorecard" as synonyms.

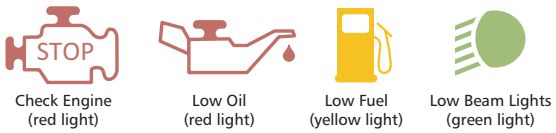

Figure 1 — Typical indicators in a car dashboard.

THE IDEAL DASHBOARD

Dashboards visualize data. Ideally, dashboards are useful. They are useful if they support their users in fulfilling their goals. Unfortunately, many dashboards are not designed to be useful.[3] Instead, they are designed to visualize as much data as possible, to demonstrate the graphical abilities of the dashboard, to impress potential customers, and so on.

To obtain a useful dashboard, our approach focuses on two aspects: selecting the "right" data and choosing the "right" visualization technique:

1. To choose the right data, we develop a measurement model (see next section) that defines *which* data we collect, together with the reasons *why* we collect it. For example, we could define that we collect McCabe's cyclomatic complexity of every method (what) because by using that measurement, we can decide to what extent we have to test that code (why). Once the collected data is linked to the reason *why* we need it, it is possible to correctly interpret the data and reuse it for future projects, since we are able to put it into the correct context.[4]

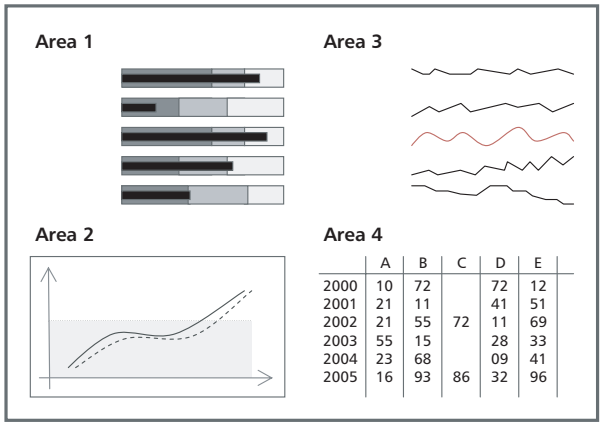

Figure 2 — A typical dashboard. (Source: Adapted from Few.)

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2. The next step is to choose the right visualization techniques. We focus on visualizations that minimize the time needed to understand what has to be communicated.

HOW TO CHOOSE THE "RIGHT" DATA

Generally speaking, we can measure everything that we can observe. Some things can be observed with our senses, while some things — such as the Higgs boson — require the use of expensive equipment such as the Large Hadron Collider in Geneva. Not everything that *can* be measured should be measured. Measurement costs, so the decision of what to measure has to be based on the expected benefit of the measurement.

By creating a measurement model, we document — starting from the measurement goal — which questions we want to answer and which data we have to collect to answer them. To achieve this, we have adopted the GQM+Strategies approach,[5] which is based on GQM (Goal-Question-Measurement) models.[6] We will explain the latter first.

A GQM model is defined on three levels:

1. The **goal** — the conceptual level — defines what we want to study and why. What is studied is the "object of study," the specific products, processes, and resources. Why something is studied identifies the reason, the different aspects taken into consideration, the considered points of view, and the environment.
2. The **questions** — the operational level — define (a) what parts of the object of study are relevant, and (b) what properties of such parts are used to characterize the assessment or achievement of a related goal. These properties are often called the "focus" of the study.

   Altogether, the questions specify which specific aspects of the object of study are observed to understand whether the goal is achieved or not. Questions are measurable entities that establish a link between the object of study and the focus. For example, if the object of study is a car and the focus is its environmental impact, a question could be: "How high are the car's carbon dioxide emissions?"
3. The **measures** — the quantitative level — define which data has to be collected to answer the questions in an objective (quantitative) way.

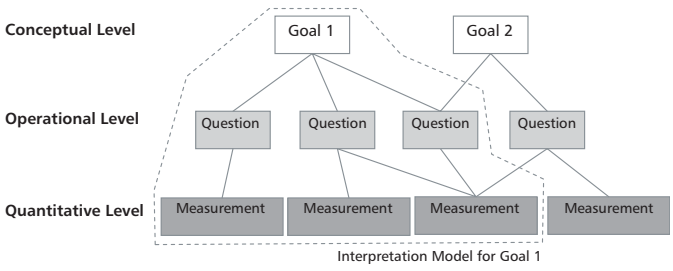

Figure 3 — A GQM model.

These three levels are complemented by an interpretation model that defines how to interpret the collected data to evaluate the measurement goal.

It is important not to confuse the focus with the point of view. The focus is the part of the object of study that is studied. It is an objective view of the object of study. The point of view describes who is measuring and represents the subjective view of the measurement goal.

The GQM model is a hierarchy of goals, questions, and measurements (see Figure 3). This hierarchy details what is measured and how the results have to be interpreted.

Showing How It's Done with the King of Wines

To explain how a GQM model defines the collection and interpretation of data, in the following example we use the model to evaluate the taste of a glass of Barolo, an Italian red wine.

The model is depicted in Figure 4. A precise definition of the goal — evaluating a glass of Barolo wine — helps us to obtain data (answers to the defined questions) that has an impact on the goal.

In this example, we evaluate the taste using three criteria: the sweetness, the aroma, and the flavor of the wine. To objectively measure the sweetness of the wine, we use an electronic oscillating U-tube meter. To measure

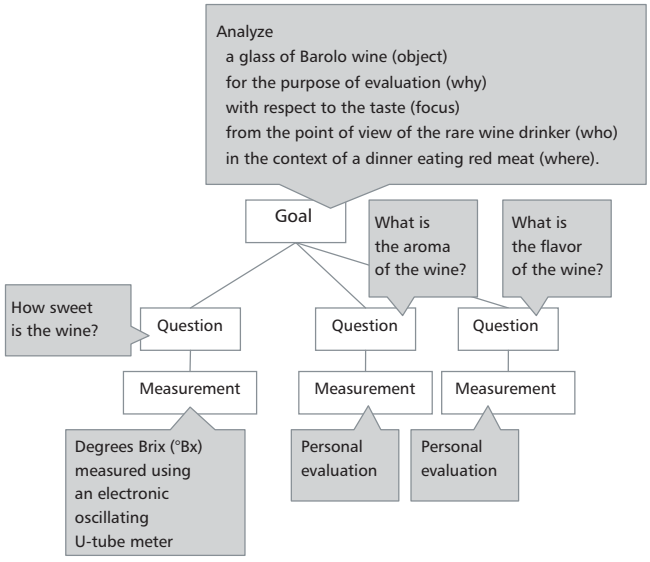

Figure 4 — A GQM model for evaluating the taste of a glass of Barolo wine.

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aroma and flavor, we use the personal evaluation of our sommelier, who is an expert in the field. The sommelier's opinion is not that objective, but it is also not as subjective as asking a beginner.

The interpretation model for the example in Figure 4 has to state how the collected data answers the questions and how the answers to the questions influence the measurement result. The model has to specify how to combine the results to evaluate how well Barolo wine tastes to a rare wine drinker who is eating red meat.

As we said above, the definition of measurement goals is critical to the successful application of the GQM approach. To facilitate the definition of precise measurement goals, the authors of the GQM approach developed a goal template (see Figure 5). The goal template requires the dashboard's designer to state the purpose of the measurement (what it is measuring and why), the perspective (what specifically is observed, the focus, and from which point of view the observation is made), and the environment (in which context the measurement takes place).

The explicit formulation of the purpose, the perspective, and the environment helps us to understand which data is needed to fulfill the measurement goal and to understand how to interpret the collected data.

Once we have defined one or more goals, we define questions that characterize the goal in a quantifiable way and the measurements to describe the data that will be used to answer the questions. GQM questions can be classified into three groups:[7]

1. Questions that *characterize* the object of study with respect to the overall *goal* (e.g., "Is Barolo considered a superb, good, or miserable wine?")
2. Questions that *characterize* relevant attributes of the object of study with respect to the *focus* (e.g., "What is the aroma of the wine: spicy, smoky, oaky, etc.?" or "What is the sensation of the wine: sparkling, acidic, crisp, etc.?")
3. Questions that *evaluate* relevant characteristics of the object of study with respect to the *focus* (e.g., "Is the taste satisfactory from the viewpoint of a rare wine drinker?" or "Does the taste match well with the meat?")

After defining the questions, we have to define which measurements we are going to collect to answer them, as multiple measurements might be used to answer the same question. As we have seen before, the sweetness of wine can be measured using an electronic oscillating U-tube meter, but it could be also evaluated using a personal evaluation.

The selection of measurements to answer the developed questions depends on different factors, such as the amount and quality of data that is already available, the cost-benefit ratio of performing a specific measurement, the level of precision needed, and so forth.

A Hierarchy of Goals

So far we have not mentioned that measurement goals can occur on different levels in the organization. In fact, every activity within an organization is a means to an end, a part of the organizational strategy to achieve an organizational goal. In any organization we can observe a goal hierarchy: beginning from the main organizational goal, all subsequent goals are derived from the previous goal.

In the example in Figure 6, the organization decides to obtain a given financial goal through an increase in

Purpose

Analyze: *a glass of Barolo wine*
(objects: process, products, resources)

for the purpose of: *evaluation*
(why: to characterize, evaluate, predict, motivate, improve)

Perspective

with respect to: *the taste*
(focus: cost, correctness, changes, reliability, …)

from the point of view of: *a rare wine drinker*
(who: user, customer, manager, developer, corporation, …)

Environment

in the following context: *a dinner eating meat*
(where: environmental factors influencing the measurement)

Figure 5 — A GQM goal template.

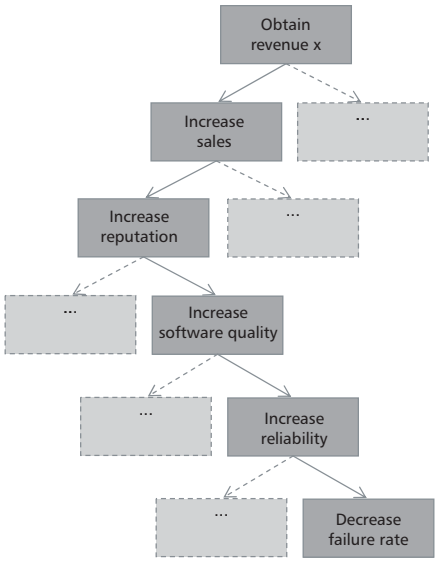

Figure 6 — A goal hierarchy.

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sales, which should be achieved through an increase in the reputation of the company. (Alternative options at each step in the hierarchy would be shown in the dashed boxes.) The organization believes it can attain this increase in reputation by increasing its software quality. Moreover, in this example, the software department decides that it should achieve this through an increase in the reliability of the software, which implies a decrease in the failure rate.

Such a goal hierarchy fulfills two functions. First, it describes abstract goals in more detail; for example, "increase reliability" better describes what is meant by "increase software quality." Second, it describes means-end relationships, such as to increase the reputation of the company being the means to increase sales.[8]

Deciding how a given goal is to be achieved — what means will be used to achieve it — is defined by the strategy. The organization accepts the strategy as the right approach to achieve its goals, given its context and assumptions.[9] The strategy explicitly states what steps the organization has to take to obtain the desired goal.

At this point, we see how the GQM+Strategies approach extends the GQM model. It considers the goal hierarchy motivated by the organizational strategy and creates a measurement model that links business goals to measurement goals. Figure 7 illustrates the concept: every element of the goal hierarchy is linked to a GQM model that measures the achievement of the business goal at that level.

The GQM+Strategies measurement model describes what we call the "ideal dashboard." It measures the achievement of the organizational strategy (i.e., the business goals). To measurements it adds the context, meaning the reasons for collecting them, and the business strategy that justifies this.

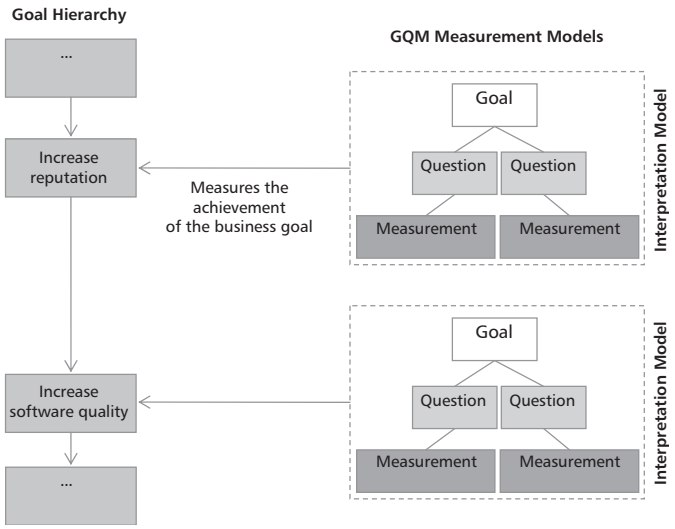

Figure 7 — A GQM+Strategies measurement model.

It is not always feasible to elaborate a detailed GQM+Strategies measurement model; for example, if the strategy is frequently changing as a reaction to a volatile market. As we said earlier, measurement costs. Therefore it is up to the organization to decide which level of monitoring and what kind of information are worth collecting and visualizing.

Authors typically distinguish between strategic, tactical, and operational dashboards. Seen from the perspective of the GQM+Strategies measurement model, a strategic dashboard visualizes the achievement of the upper goals of the goal hierarchy, a tactical dashboard deals with the goals in the middle, and an operational dashboard handles the most detailed goals at the bottom.

It is out of the scope of this article to discuss *how* the data required to evaluate the measurement models is obtained. We recommend automating this step as much as possible using noninvasive measurement.[10, 11]

HOW TO CHOOSE THE "RIGHT" VISUALIZATION

Dashboards can be designed in a variety of ways. There is no one right or wrong way — it depends on the requirements the dashboard has to fulfill. In this section we want to discuss two usage scenarios for a dashboard: "pull" and "push."[12]

In the pull scenario, the user wants to get a specific piece of information and uses the dashboard to obtain it. In such a case, aspects of technology acceptance become important, such as the dashboard's perceived usefulness and perceived ease of use.[13] Important considerations include:[14]

- The dashboard should help the user to understand the context of the data: why it was collected, how it should it be interpreted, how it can be used in future projects, etc.
- The dashboard should help the user understand the meaning of the data. Visualizations should require minimal effort to get the conveyed message, be coherent, allow the user to choose the level of detail of the data, etc.

In the push scenario, the dashboard has to be designed so that important information is pushed to the user. That is, it must capture the user's attention and inform him.

Whether a dashboard is more suited to the push or pull scenario depends on how much effort a user has to

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invest to see the dashboard. A dashboard that pushes the information to the user has the advantage of informing him in unexpected, unforeseen situations about problems, anomalies, and the like. A dashboard that is designed to support the pull scenario should offer more possibilities to explore the data, to filter and to search, to investigate the reasons that caused the data, and so on.

To set up a dashboard that is used in a push scenario, we found the following considerations important:[15, 16]

- The user should be able to see the dashboard without any effort. For example, in a car, the dashboard is built in such a way that it is in the range of vision of the driver. An organizational dashboard should be displayed on a monitor in the corridor or somewhere in the office where many are passing by. The information will be pushed to the users without their active participation. An example of such a dashboard is the Andon board, used in lean manufacturing, which is placed so that everybody can see if there is a problem on the assembly line (see Figure 8).
- The user should not need to interact with visualizations to understand the data. The charts have to be designed so that an interaction is only necessary when the user switches into "pull" mode (i.e., the dashboard got the attention of the user and she wants to investigate further).
- Arrange the data to minimize the time needed to consult the dashboard. Always place the same information in the same spot. Allow the user to develop habits; for example, every morning as he passes by with his coffee in hand, he can check the current size of the error log displayed in the upper-right corner of the dashboard.
- Guide the attention of the user to important information. There are different mechanisms you can use to draw the attention of the user, but make sure not to overuse them. If everything on the dashboard is blinking, the user will ignore it.
- Since we want users to look at the dashboards by choice, there are also aesthetic factors to consider. Displaying dashboard elements in a visually appealing way can increase the user's interest in looking at the dashboard.

To highlight important data, we use a technique called "pre-attentive processing." Researchers have identified different graphical properties (grouped into form, color, motion, and spatial position) that cause people to process information before they are even paying conscious attention to it.[17] Pre-attentive processing elements have the advantage of being processed (i.e., understood) faster than elements that are not pre-attentive.[18]

In Figure 9, both boxes a and b contain numbers. If we look at box on the top (Figure 9a) and try to count the number of 3s, we have to process the numbers sequentially. That is, we have to look at each number separately and decide if it resembles the form of the number 3.

It is much easier to count the number of 3s in the bottom box (Figure 9b). This is because we identify color/shading differences faster than the meaning of a symbol.

How strongly something is noticed pre-attentively depends on how different the highlighted element is from the others and how different the other elements are from each other. Moreover, combining two

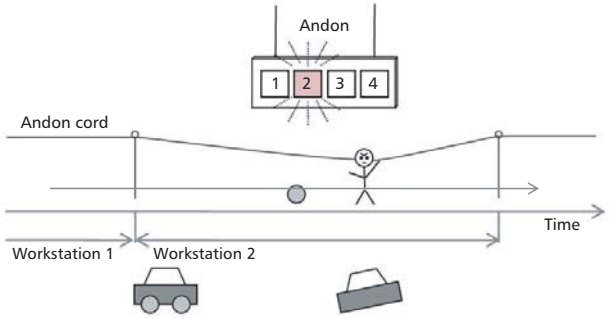

Figure 8 — An Andon board in lean manufacturing.

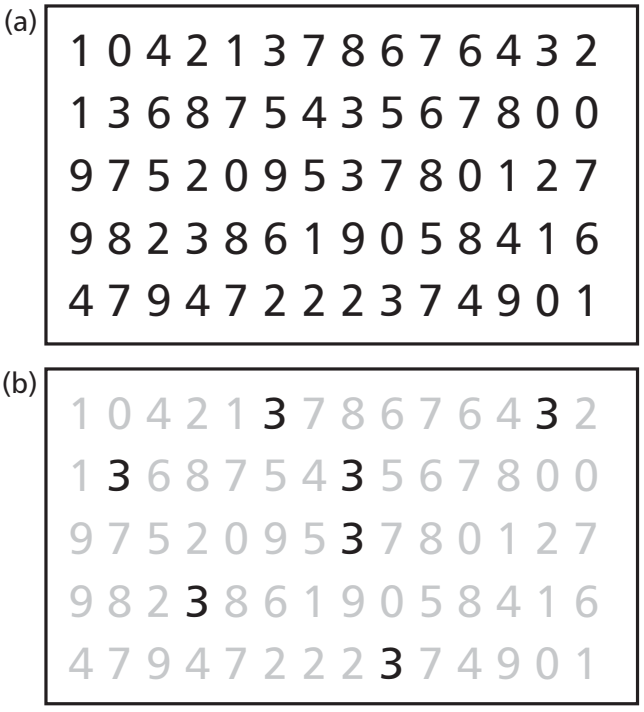

Figure 9 — How many 3s are present in the box?

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pre-attentively processed properties (such as color and shape in Figure 10) doesn't work. The information cannot be processed pre-attentively but will again require sequential processing.

COMBINING THE "RIGHT" DATA WITH THE "RIGHT" VISUALIZATION TECHNIQUES

In this section, we present a dashboard we designed for a software development team, combining the concepts discussed above. The starting point for the dashboard's development was the development of the goal hierarchy. The top business goal for the team was to increase development productivity. Starting from that, we developed subgoals such as "Improve component reuse" and "Reduce average development effort."

For each business goal, the development team together with the project manager developed measurement goals and modeled them as GQM models (see Figure 11 for an example).

To display the measurements, we then used colored tiles that visualize the outcome of the measurement, the trend (if the value is decreasing, stable, or increasing over time), and the classification of the measurement as "good" (green), "warning" (amber), or "critical" (red).

It is also possible to use shades of gray, patterns, or a different line thickness if the dashboard has to be accessible to color-blind people. For example, in the US, the Section 508 Amendment to the Rehabilitation Act of 1973 states that "Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element." While this legal requirement applies only to US federal agencies, it is a good idea to add a second distinctive element, such as line thickness, or to choose colors that are different enough that they become distinctive shades of gray for a color-blind person.

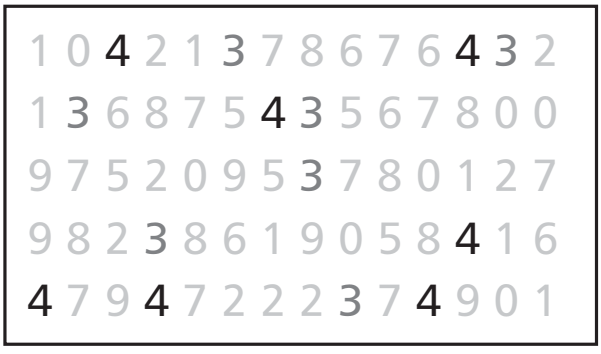

Figure 10 — How many 3s and 4s are present in the box?

The tile in Figure 12 is red (or dark gray if depicted in shades of gray), meaning that the measurement is classified as "critical" and requires the attention of the team. The name of the measurement is "A," and the current value is 10. The arrow shows that since the last time the measure was evaluated, the value has increased.

Figure 13 depicts a dashboard based on such tiles. Each tile represents the outcome of a measurement. The measurements are grouped with their questions and goals. We use colors to depict the status of a measurement to allow users to look at the dashboard using pre-attentive processing. The idea is that green (or light gray) tiles do not need to be read; they can be ignored. Amber (or medium gray) and red (or dark gray) tiles require attention; developers and managers should have a look at them.

The dashboard represents the measurement goals connected to one business goal. In our dashboard implementation, the values displayed within a measurement tile can either originate from actual data or be the result of another measurement goal.

Figure 14 illustrates how the dashboard described here allows users to navigate through the GQM+Strategies measurement model. In Step 1, the user clicked on the red tile related to the business goal "Increase reputation." That tile is not calculated using actual data but rather is the result of a measurement goal that belongs to the business goal "Increase software quality." Therefore, after clicking on the tile, the user obtains the GQM model for the business goal "Increase software

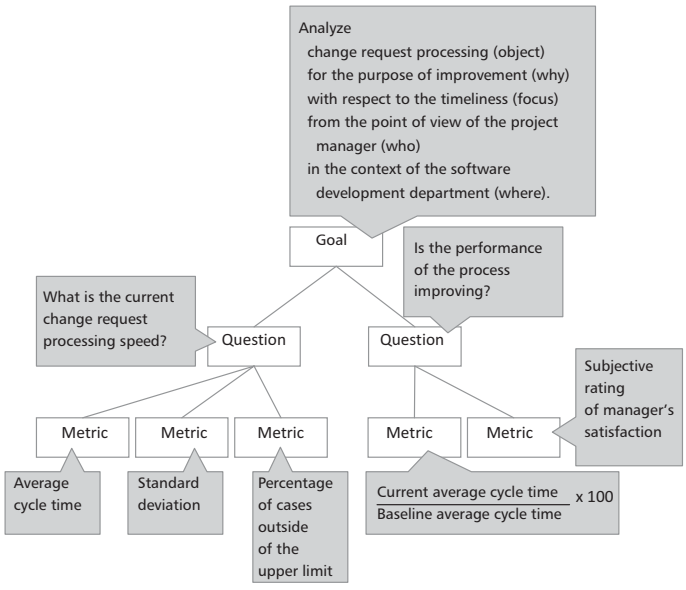

Figure 11 — GQM model to evaluate the timeliness of change request processing.

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quality." Moreover, the user sees why the tile of the business goal "Increase reputation" was marked "critical": one of the tiles of the business goal "Increase software quality" is critical.

Tiles do not necessarily need to be connected to other GQM models. In Figure 14, Step 2, the user clicks on the red tile that is the result of an analysis performed over the source code repository. This analysis identified a problem with a module stored in the repository and reports a quality issue using a bar chart.

CONCLUSIONS

The dashboard we have described here illustrates how to use a GQM+Strategies measurement model as a basis for developing a dashboard that supports its users to achieve their business goals. In our case study, this implementation led to the following conclusions:

- A dashboard is successful to the extent that it follows the findings of the Technology Acceptance Model — that is, according to its perceived usefulness and perceived ease of use.
- Dashboards that follow a "push" approach get more attention than dashboards following a "pull" approach, but they allow less freedom in their design.
- For a dashboard to be useful, it has to contain data related to the business goals. The development of such a dashboard requires the involvement of management and experienced collaborators.[19]
- The development of a dashboard is a continuous process, since the organization is always learning. It is important to constantly ask whether it is time to update the current business goals, assumptions, strategy, and measurement goals.
- The visualization style you adopt is crucial — it has a huge impact on the acceptance of the dashboard.

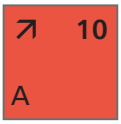

Figure 12 — A tile that represents a measurement outcome.

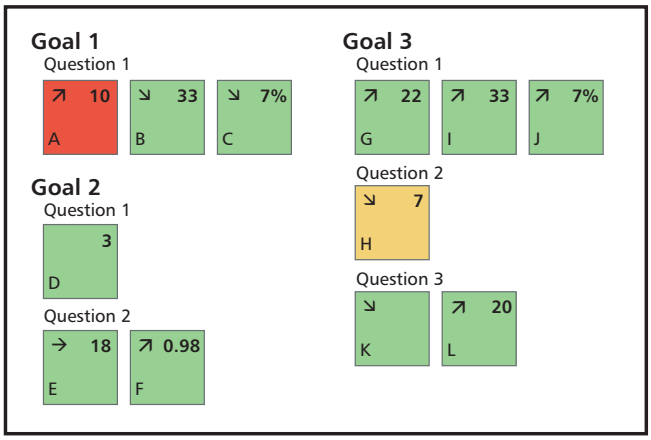

Figure 13 — A dashboard showing the measurement outcomes as tiles.

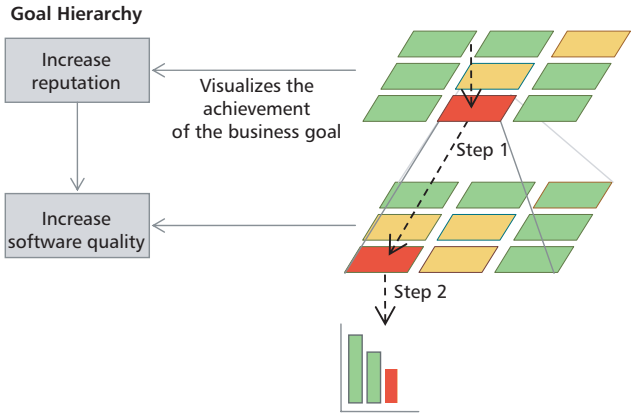

Figure 14 — Possible drill-down path in the dashboard.

ENDNOTES

[1]Few, Stephen. *Information Dashboard Design*. O'Reilly Media, 2006.

[2]Eckerson, Wayne W. *Performance Dashboards: Measuring, Monitoring, and Managing Your Business*. 2nd edition. John Wiley & Sons, 2011.

[3]Few. See 1.

[4]Rombach, H. Dieter, and Bradford T. Ulery. "Improving Software Maintenance Through Measurement." *Proceedings of the IEEE*, Vol. 77, No. 4, April 1989.

[5]Basili, Victor, Jens Heidrich, Mikael Lindvall, Jürgen Münch, Myrna Regardie, Dieter Rombach, Carolyn Seaman, and Adam Trendowicz. "Linking Software Development and Business Strategy Through Measurement." *Computer*, Vol. 43, No. 4, April 2010.

[6]Basili, Victor R., and H. Dieter Rombach. "Goal Question Metric Paradigm." *Encyclopedia of Software Engineering*. 1st edition. John Wiley & Sons, 1994.

[7]Basili, Victor R., Gianluigi Caldiera, and H. Dieter Rombach. "The Goal Question Metric Approach." *Encyclopedia of Software Engineering*. 1st edition. John Wiley & Sons, 1994.

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[8]Schwarz, Rainer. *Controlling-Systeme: Eine Einführung in Grundlagen, Komponenten und Methoden des Controlling*. Gabler Verlag, 2002.

[9]Basili et al. See 5.

[10]Danovaro, Emanuele, Andrea Janes, and Giancarlo Succi. "Jidoka in Software Development." *Proceedings of OOPSLA 2008*. ACM, 2008.

[11]Janes, Andrea, Alberto Sillitti, and Giancarlo Succi. "Non-Invasive Software Process Data Collection for Expert Identification." *Proceedings of the International Conference on Software Engineering & Knowledge Engineering*. Knowledge Systems Institute, 2008.

[12]Janes, Andrea, and Giancarlo Succi. "To Pull or Not to Pull." *Proceedings of OOPSLA 2009*. ACM, 2009.

[13]Venkatesh, Viswanath, and Hillol Bala. "Technology Acceptance Model 3 and a Research Agenda on Interventions." *Decision Sciences*, Vol. 39, No. 2, May 2008.

[14]Few. See 1.

[15]Few. See 1.

[16]Ware, Colin. *Information Visualization: Perception for Design*. 3rd edition. Morgan Kaufmann, 2012.

[17]Ware. See 16.

[18]Ware. See 16.

[19]For an example of tool support for collecting experience, see: Danovaro, Emanuele, Tadas Remencius, Alberto Sillitti, and Giancarlo Succi. "PKM: Knowledge Management Tool for Environments Centered on the Concept of the Experience Factory." *Proceedings of the 30th International Conference on Software Engineering*. IEEE, 2008.

Andrea Janes is Assistant Professor of Software Engineering at the Free University of Bozen–Bolzano (Italy). His research interests include lean software development, value-based software engineering, and empirical software engineering. Mr. Janes holds a master of science degree in business informatics from the Technical University of Vienna and is pursuing a PhD in informatics at the University of Klagenfurt (Austria). He can be reached at ajanes@unibz.it.

Alberto Sillitti is Associate Professor of Computer Science at the Free University of Bozen–Bolzano. He has been involved in several EU-funded projects related to open source software, services architectures, and agile methods in which he applies noninvasive measurement approaches. Additional research areas include mobile and Web services. Dr. Sillitti has served as a program committee member of several international conferences and as program chair of OSS 2007, XP2010, *and* XP2011. *He is the author of more than 80 papers for international conferences and journals. Dr. Sillitti holds a PhD in electrical and computer engineering from the University of Genoa. He can be reached at asillitti@unibz.it.*

Giancarlo Succi is a Senior Consultant with Cutter Consortium's Agile Product & Project Management *practice. He is Professor of Software Engineering and Director of the Center for Applied Software Engineering at the Free University of Bozen–Bolzano. Dr. Succi's research areas include agile methodologies, open source development, empirical software engineering, software product lines, software reuse, and software engineering over the Internet. He is the author of one book and more than 100 papers published in international conference proceedings and journals. He can be reached at gsucci@cutter.com.*

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Should We Abandon Performance Measures?

by David Parmenter

I have worked with performance measures for over 20 years, and in that time I have witnessed minimal progress in the right direction. Deriving measures is often viewed as an afterthought. Measures are regarded as something we fill into a box to say we have achieved a goal.

I firmly believe that performance measures exist for a higher purpose — helping align the staff's daily actions to the organization's critical success factors (CSFs). Yet all too often the measures in an organization amount to a random collection prepared with little expertise signifying nothing. To make matters worse, these measures cost the organization dearly:

- Measures are gamed to the detriment of the organization so that executives can increase their pay.
- Teams are encouraged to perform tasks that are contrary to the organization's strategic direction.
- Costly "measurement and reporting" regimes lock up valuable staff and management time.
- Measures are often derived from six-figure consultancy assignments that yield little more for the organization than another "doorstop" report.

A RADICAL TREATMENT FOR AN ACUTE PROBLEM

Why would an author who has preached about implementing winning KPIs now have a change of heart? Because I have witnessed the failure of too many performance measurement initiatives. I am now convinced that, in many cases, a more radical approach is necessary.

For centuries the medical profession has realized that acute cases demand extreme action. Some treatments for critically ill patients involve the eradication of the immune system and then slowly, step by step, reintroducing it. An abandonment of all performance measures, albeit on a short-term basis, may well be the radical treatment required before we can cure the patient (the organization). We need to cut the rot out; otherwise it will eventually destroy all new performance measurement initiatives. Starting anew will enable the organization to rebuild the way performance measures are used from the ground up.

PERFORMANCE MEASUREMENT SYSTEMS ARE BROKEN

Performance measurement systems are broken, and the reason for this is very simple. Organizations, in both the private and public sectors, are being run by managers who have not yet received any formal education in performance measurement. Unlike accounting and information systems, where rigorous processes have been formulated, discussed, and taught, performance measurement has been left as an orphan of business theory and practice.

Whilst writers such as Edwards Deming,[1] Margaret Wheatley and Myron Kellner-Rogers,[2] Gary Hamel,[3] Michael Hammer,[4] and Dean Spitzer[5] have for some time illustrated the dysfunctional nature of performance measurement, their valuable arguments have not yet been reflected in business practice. There is a long journey ahead in order to get performance measurement functioning properly. We will be well on our way to this goal when students are attending lectures on measurement and professionals are being examined on their understanding of performance measurement in order to obtain their desired professional qualifications.

In order to get performance measures to work, we need to challenge the myths they have been built on. To illustrate my point, I would like to draw your attention to six of the performance measurement myths[6] that need to be challenged:

1. Most measures lead to better performance.
2. All measures can work successfully in any organization, at any time.
3. All performance measures are KPIs.
4. By tying KPIs to pay, you will increase performance.
5. There is a need to set annual targets.
6. You need performance measures in order to drive performance.

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MYTH #1: MOST MEASURES LEAD TO BETTER PERFORMANCE

Measurement initiatives are often cobbled together without the knowledge of the organization's CSFs and without an understanding of a measure's behavioral consequences. It is a myth of performance measurement that most measures lead to better performance. Every performance measure can have a dark side, a negative consequence, an unintended action that leads to inferior performance.

In order to make a performance measure work, one needs to anticipate likely human behavior and minimize the potential dark side of the measure. The key is to find the dark side and then tweak how the measure is used so that the behaviors it will promote are appropriate.

I suspect well over half the measures in an organization may be encouraging unintended negative behavior. Dean Spitzer's book *Transforming Performance Measurement* provides a vast array of examples of dysfunctional performance due to poor measurement. Below are some examples of dysfunctional activities promoted by the inappropriate use of performance measures:[7]

Public-Sector Examples

- Experienced caseworkers in a government agency will work on the easiest cases and leave the difficult ones to the inexperienced staff because they are measured on the number of cases closed.
- An Australian city rail service penalized train drivers for late trains, resulting in drivers skipping stations in order to achieve on-time schedules.
- A UK accident and emergency department was measuring timely treatment of patients. The nurses then delayed the ambulances from offloading patients until the doctors could see them, thus achieving a zero time difference. Within hours of this measure being implemented, ambulances were circling the hospital, as the ambulance bay was full. The follow-on result was obvious: ambulances arriving late at emergency calls.

Private-Sector Examples

- A fast-food restaurant manager was striving to achieve an award for zero wastage of chicken. The manager won the chicken efficiency award by waiting until the chicken was ordered before cooking it. The long wait times that resulted meant a huge loss of customers in the following weeks.
- A company that was measuring product that left the factory on time had a 100% record, yet 50% of customers complained about late delivery. The reason was that nobody cared about what happened next after the product left the factory.
- Sales staff met their targets at the expense of the company, offering discounts and extended payment terms and selling to customers who would never pay. You name it, they did it to get the bonus!
- Purchasing departments awarded for receiving large discounts started to buy in too large a quantity, creating an inventory overload.
- A stores department maintained a low inventory to get a bonus, which resulted in a production shutdown because of stock outs.

Spitzer's statement that "people will do what management inspects, not necessarily what management expects" is very apt. The greatest danger of performance management is dysfunctional behavior. As Spitzer notes, "the ultimate goal is not the customer — it's often the scorecard." He has heard executives, when being candid, say, "We don't worry about strategy; we just move our numbers and get rewarded."[8] The checklist in Table 1 will help you assess the potential damage in your organization.

MYTH #2: ALL MEASURES CAN WORK SUCCESSFULLY IN ANY ORGANIZATION, AT ANY TIME

Contrary to common belief, all measures will not work successfully in any organization, at any time. The reality is that there needs to be, as Spitzer argues, a positive "context of measurement"[9] for measures to deliver their potential.

In order to have an environment where measurement will thrive, the following seven foundation stones need to be in place:[10]

1. Partner with the staff, unions, and third parties.
2. Transfer power to the front line.
3. Measure and report only what matters.
4. Source KPIs from the CSFs.
5. Abandon processes that do not deliver.
6. Understand human behavior.
7. Ensure organization-wide understanding of winning KPIs.

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Table 1 — Dysfunctional Performance Measures Checklist

1. Is the reward structure tied to the key performance indicators?	Yes/No
2. Are measures constructed by teams or individuals who have not received training or guidance on what makes measures work or fail?	Yes/No
3. Are annual targets set that will trigger bonuses if met?	Yes/No
4. Does management believe that performance can only be achieved if there is a financial reward attached to that performance?	Yes/No
5. Are measures typically adopted without testing and assessing their potential negative behavioral impact?	Yes/No
6. Is it common for staff to be asked to "force" compliance to a measure just to achieve a target, even though the action may damage the organization's reputation?	Yes/No
7. Does your organization have some measures that are leading to dysfunctional behavior?	Yes/No
8. Has your organization had to remove measures due to the damage they have created?	Yes/No
9. Does your organization have measures that are solely used to make departments look good rather than focusing on actions that will benefit the overall organization?	Yes/No
11. Does your organization have a history of "gaming" performance measures?	Yes/No
12. Do you have over 100 measures in your organization?	Yes/No
13. Are measures introduced without any estimation of the likely cost/benefit?	Yes/No
14. Is there a high degree of cynicism about the effectiveness of performance measures in your organization?	Yes/No

Your score: Every "yes" indicates a problem. If you have over five affirmative responses, it may be best to put a stop to all new performance measures and start rebuilding your measures from scratch.

These seven foundation stones are explained at length in my recent book *Key Performance Indicators for Government and Non Profit Agencies*.[11]

MYTH #3: ALL PERFORMANCE MEASURES ARE KPIs

Throughout the world, from Iran to the US and back to Asia, organizations have been using the term "KPIs" to mean all performance measures. No one seems to worry that the KPIs have not been defined by anyone. Thus, measures that are truly key to the enterprise are being mixed with measures that are completely flawed.

Let's break the term down. "Key" means key to the organization, while "performance," naturally, means that the measure will assist in improving performance. I have come to the conclusion that there are four types of performance measures.[12] They have different functions and frequency of measurement (see Table 2).

The common characteristic of key result indicators (KRIs), which are often mistaken for KPIs, is that they are the result of many actions. They give a clear picture of whether you are traveling in the right direction and of the progress made toward achieving desired outcomes and strategies. They are ideal for governance reporting, as KRIs show overall performance and help the Board focus on strategic rather than management issues.

KRIs do not tell management and staff what they need to do to achieve desired outcomes. Only performance indicators (PIs) and KPIs can do this. Examples of KRIs include:

- Customer satisfaction
- Employee satisfaction
- Return on capital employed

Separating out KRIs from other measures has a profound impact on the way performance is reported.

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Table 2 — The Four Types of Performance Measures

Type of Performance Measure	Number of Measures in Use	Frequency of Measurement
1. **Key result indicators (KRIs)** give an overview of the organization's past performance and are ideal for the Board (e.g., return on capital employed).	Up to 10	Monthly, quarterly
2. **Result indicators (RIs)** summarize activities of a number of teams and thus have a shared responsibility (e.g., yesterday's sales).	80 or so (If it gets over 150, you will begin to have serious problems.)	24/7, daily, weekly, fortnightly, monthly, quarterly
3. **Performance indicators (PIs)** are measures that can be tied back to a team but are not "key" to the business (e.g., number of sales visits organized with key customers next week/fortnight).		
4. **Key performance indicators (KPIs)** are measures focusing on those aspects of organizational performance that are the most critical for the current and future success of the organization (e.g., planes that are currently over two hours late).	Up to 10 (You may have considerably fewer.)	24/7, daily, weekly

There is now a separation of performance measures into those impacting governance (up to 10 KRIs in a Board dashboard) and those result indicators (RIs), PIs, and KPIs that impact management.

Probably the most controversial statement in my work has been that every KPI on this planet is nonfinancial. I argue that when you have a dollar amount, you have simply quantified an activity. Whilst financial measures are useful, they are RIs, not KPIs. The seven characteristics of a KPI are:[13]

1. It is a nonfinancial measure (not expressed in dollars, yen, pounds, Euros, etc.).
2. It is measured frequently (e.g., 24/7, daily, or weekly).
3. It is acted upon by the CEO and senior management team.
4. All staff understand the measure and what corrective action is required.
5. Responsibility for the measure can be tied down to a team.
6. It has a significant impact (e.g., it impacts on more than one of the CSFs and more than one balanced scorecard perspective).
7. It encourages appropriate action (i.e., it has been tested to ensure it has a positive impact on performance, whereas ill-thought-through measures can lead to dysfunctional behavior).

Examples of KPIs include:

- **Planes late by more than x hours or x minutes.** This would be measured 24/7 and would focus staff on the important issue of getting a plane back on time even if it was not a problem of their own making.
- **Late deliveries to key customers.** By focusing only on timeliness of deliveries to key customers, we are telling staff to focus on these shipments first. If you measure *all* deliveries, staff will pick the easiest and smallest deliveries in order to achieve a high score, thereby sacrificing the large, complex orders to key customers, which is where companies typically make most of their profit.
- **Number of CEO recognitions of staff achievements planned for next week, next fortnight.** Recognition is a major motivator, and great CEOs are good at giving it frequently. As Jack Welch says, "Work is too much a part of life not to recognize moments of achievement."[14] This KPI could be reported each Friday morning so that the CEO has the opportunity to say, "There must be more teams we can celebrate next week. Please find them and organize it." In nonperforming organizations, everybody is invariably too busy chasing their tails to stop and celebrate success. Not so in high-performing ones. That is why this measure deserves to be called a KPI.

The winning KPIs methodology clearly indicates that KPIs are a rare beast. KPIs are reported immediately and thus will never find their way into a balanced scorecard that is reported to the senior management team two or three weeks after month end.

MYTH #4: BY TYING KPIs TO PAY, YOU WILL INCREASE PERFORMANCE

It is a common belief that the primary driver for staff is money, and thus one needs incentives in order to get great performance. Although this is the case with employees who are sitting on the first two rungs of Maslow's hierarchy of needs,[15] it does not apply to

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Table 3 — A Performance-Related Pay System That Will Never Work

Category	Perspective Weighting	Measure	Measure Weighting
Financial	60%	Economic value added	25%
		Unit's profitability	20%
		Market growth	15%
Customer	20%	Customer satisfaction survey	10%
		Dealer satisfaction survey	10%
Internal	10%	Above-average rank in industry-based quality survey	5%
		Decrease in dealer delivery cycle time	5%
Innovation and learning	10%	Employee suggestions raised vs. implemented	5%
		Satisfaction from employee survey (re: coaching, empowerment, etc.)	5%

many managers or staff. Recognition, respect, and self-actualization are more important drivers. This factor has a big impact on how we treat KPIs.

In all types of organizations, there is a tendency to believe the way to make KPIs work is to tie them to an individual's pay. I believe KPIs are so important to an organization that performance in this area should be treated as a given, or as Jack Welch says, "a ticket to the game."[16] When KPIs are linked to pay, they create key *political* indicators, which will be manipulated to enhance the probability of a larger bonus.

Because KPIs are special performance tools, it is imperative that they not be included in any performance-related pay discussions. KPIs are too important to be manipulated by individuals and teams to maximize bonuses. Although KPIs will show — 24/7, daily, or weekly — how teams are performing, it is essential to leave the KPIs uncorrupted by performance-related pay.

Performance bonus schemes, using a balanced scorecard, are often flawed on a number of counts:

- The balanced scorecard is often based on only four perspectives, ignoring the important environment, community, and staff-satisfaction perspectives.
- The measures chosen are open to debate and manipulation.
- There is seldom a linkage to progress within the organization's CSFs.
- Weighting of measures leads to crazy performance agreements such as the one in Table 3, in which the message is "Find a way to manipulate these numbers, and you will get your bonus." The damage done to the business by such schemes is only discovered in subsequent years.

MYTH #5: THERE IS A NEED TO SET ANNUAL TARGETS

We'd like to think that we know what good performance will look like before the year starts and, thus, can set relevant year-end targets. In reality, as Jack Welch observes, it leads to constraining initiative, stifling creative thought processes, and promoting mediocrity rather than giant leaps in performance.[17]

All forms of annual targets are doomed to failure. Far too often management spends months arguing about what is a realistic target, when the only sure thing is that it will be wrong. It will be either too soft or too hard. I am a follower of Jeremy Hope's work. He and his coauthor Robin Fraser were the first writers to clearly articulate that a fixed annual performance contract was doomed to fail.[18]

Far too often, organizations end up paying incentives to management when in fact you have lost market share. In other words, your rising sales did not keep up with the growth rate in the marketplace.

As Hope and Fraser point out, not setting an annual target beforehand is not a problem as long as staff members are given regular updates about how they are progressing against their peers and the rest of the market. They argue that if you do not know how hard you have to work to get a maximum bonus, you will work as hard as you can.

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MYTH #6: YOU NEED PERFORMANCE MEASURES IN ORDER TO DRIVE PERFORMANCE

If the organization has recruited the right staff, there is a clear understanding of what the organization's CSFs are, and if staff work in a supportive environment with great managers and leaders, the organization will succeed. Performance measures don't drive performance — they support and enforce the positive environment that already exists.

I am now convinced that an organization with dysfunctional performance measures would function much better without them, for the following reasons:

Staff Management

Managers would spend time discussing goals with staff. Having one-to-one meetings on a regular basis would ensure that progress against goals was monitored, feedback was given, and celebrations were held.

Performance-Related Pay

Bonuses would no longer be based on very dubious formulae matrices. Instead, the organization would reward staff based on a retrospective look at their performance, including a comparison against the performance of peers and that achieved by third parties. Taking this approach would dispel one of the greatest myths of performance measurement, which is that linking pay to performance measures increases performance.[19]

Balanced Scorecard Initiatives

All those balanced scorecards that are not delivering would be frozen, giving the organization a chance to evaluate how it is using this important methodology.

Measurement of Team Progress

The organization would monitor progress against milestones achieved and output from the team. Comparisons could be drawn from prior periods of outstanding performance, and agreements could be reached relatively painlessly between the manager and staff concerned.

Ascertaining the Organization's CSFs

With no measures, the CEO could take a step sideways and realize that the organization does not in fact know what its CSFs are. This is a vital realization. Whilst most organizations know their success factors, few organizations have:

- Worded their success factors appropriately
- Segregated out success factors from their strategic objectives
- Sifted through their success factors to find their *critical* ones
- Communicated the CSFs to staff

Monitoring the Organization's Performance

The CEO would be analyzing actual performance and would be notified of exceptions that warranted his or her attention. There would be daily and weekly reporting, as well as some instantaneous exception reports beamed to his or her smartphone in cases where a phone call was needed to chase something up. The CEO would be encouraged to "go out and see" — a Toyota principle — rather than hide behind a bank of data.

The CEO would now need to promote leadership and innovation within the organization and adopt more of the management practices preached by great paradigm shifters such as Jim Collins, Gary Hamel, Jack Welch, and Peter Drucker.

Consultancies Rethinking Their Product Range

The abandonment of performance measures would have a profound impact on the bottom line of consultancy firms. Large assignments performed on balanced scorecard implementations would cease, for the time being, and clients' staff would no doubt breathe a sigh of relief.

Gaming of the Performance Management System

The manipulation of performance reporting for the sole benefit of one's pay packet would no longer be a worthwhile activity. Senior management would now spend more time improving the bottom line. The annual target-setting travesty would be replaced by the setting of "big hairy audacious goals" that motivate and energize staff.

SUGGESTED ACTION STEPS

To address the issues discussed above, I propose the following action steps:

- **Do some background reading** on the topic. The sources listed in the endnotes to this article would be a good place to start. Everybody, no matter how busy they are, can find the time to read a chapter or two, three times a week.
- If you think you are working with dysfunctional measures, **negotiate a three-month moratorium on**

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using performance measures within your organization. In this window of opportunity, perform the tasks set out below.

- Complete a thorough exercise to **ascertain your organizations' CSFs** and then ensure that all measures used by the organization relate back to the CSFs.[20] It is the CSFs, and the performance measures within them, that link daily activities to the organization's strategy. This, I believe, is the El Dorado of management.
- **Commence the grooming of an inhouse expert in performance measurement.** Dean Spitzer suggests using the title "Chief Measurement Officer" (see below).

A Three-Month Moratorium on Using Performance Measures

After three months with no performance measures being monitored or reported, management would have a good idea of the measures it has missed and the ones that should be permanently abandoned. The CEO would be invigorated from the closer contact with the operation and be in a better position to lead an initiative to revitalize performance, more effectively linking staff to the CSFs of the enterprise. As part of the gradual reintroduction of measures, I would recommend:

- **Establishing a measurement project team** with four to five representatives from the finance, HR, IT, and operations teams. Their role would be to explore how to embed wining KPIs in their organization, approve all measures, and start a process of education within the organization. This project team would be disbanded once the organization established the Chief Measurement Officer position and appointed someone to fill it.
- **Consulting with staff** so that you have some idea of the possible unintended consequences of a measure. Ask, "If we measure x, what action will you take?"
- **Piloting each performance measure** you intend to use. This simple step will enhance the measure's chance of success. Implementing measures without doing this testing is at best naive and at worst incompetent.

Appointment of a Chief Measurement Officer

Performance measurement is worthy of more intellectual rigor in every organization that is on the journey from average to good and finally to great. The chief measurement officer would be part psychologist, part teacher, part salesperson, and part project manager. He or she would be responsible for:

- Testing each new measure to ensure the dark side is minimal
- Vetting and approving all measures in the organization
- Leading all balanced scorecard initiatives
- Promoting the abandonment of measures that do not work
- Developing and improving the use of performance measures in the organization
- Learning about the latest thinking in performance measurement
- Being the resident expert on the behavioral implications of performance measures
- Replacing annual planning with quarterly rolling planning

I envision this position having a status equivalent to the senior IT, accounting, and HR officials. The position would report directly to the CEO, as befits the knowledge and diverse blend of skills required for this position. Only when we have this level of expertise within the organization can we hope to move away from measurement confusion to measurement clarity.

IN CONCLUSION

I hope this article will trigger some actions in your organization. Perhaps it will encourage you to abandon some broken measures, reexamine the way measures are introduced, or launch a KPI project to put some intellectual rigor into your performance measurement process. If nothing else, I hope it has sparked a commitment to ensuring that performance measures exist to better align your staff to the organization's CSFs.

ENDNOTES

[1]Deming, W. Edwards. *Out of the Crisis*. MIT Press, 2000.

[2]Wheatley, Margaret, and Myron Kellner-Rogers. "What Do We Measure and Why?" *Journal for Strategic Performance Measurement*, June 1999.

[3]Hamel, Gary, with Bill Breen. *The Future of Management*. Harvard Business Press, 2007.

[4]Hammer, Michael et al. "The Seven Deadly Sins of Performance Measurement (and How to Avoid Them)." *MIT Sloan Management Review*, Vol. 7, No. 1, Spring 2007.

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[5]Spitzer, Dean R. *Transforming Performance Measurement: Rethinking the Way We Measure and Drive Organizational Success*. AMACOM, 2007.

[6]Parmenter, David. "The Myths and Flaws of Performance Measurement." White paper, DavidParmenter.com, 2013.

[7]Spitzer. See 5.

[8]Spitzer. See 5.

[9]Spitzer. See 5.

[10]These seven foundation stones are explained at length in: Parmenter, David. *Key Performance Indicators for Government and Non Profit Agencies*. John Wiley & Sons, 2012.

[11]Parmenter, David. *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs*. 2nd edition. John Wiley & Sons, 2010.

[12]Parmenter. See 11.

[13]Parmenter. See 11.

[14]Welch, Jack, with Suzy Welch. *Winning*. HarperBusiness, 2005.

[15]Maslow, Abraham H. *Motivation and Personality*. Harper, 1954.

[16]Welch. See 14.

[17]Welch. See 14.

[18]Hope, Jeremy, and Robin Fraser. *Beyond Budgeting: How Managers Can Break Free from the Annual Performance Trap*. Harvard Business School Press, 2003.

[19]I have written about how to fix performance-related pay in: Parmenter, David. *The Leading Edge Manager's Guide to Success*. John Wiley & Sons, 2011.

[20]This process is outlined in: Parmenter, David. "Finding Your Organization's Critical Success Factors." White paper, DavidParmenter.com, 2012.

David Parmenter is an international presenter who is known for his thought-provoking and lively keynote addresses and workshops, which have led to substantial change in many organizations. Mr. Parmenter has worked for Ernst & Young, BP Oil Ltd, Arthur Andersen, and Price Waterhouse. He is a fellow of the Institute of Chartered Accountants in England and Wales. He is the author of four books published by John Wiley & Sons Inc. and has written over 50 articles for accounting and management journals. Mr. Parmenter has won two "article of merit" awards from the International Federation of Accountants. He can be reached at parmenter@waymark.co.nz; website: www.DavidParmenter.Com.

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Creating Dashboards That Think Globally, Act Locally

by Ravi Tej Kanteti

Today's global economy has spawned global enterprises that traverse boundaries and operate across more than one geography — effectively meaning they encounter and handle different cultures, laws, languages, and timelines.

Many of these enterprises embrace "glocalization," wherein they localize their operations and adapt their products and services to suit the local environs and needs. While glocalization isn't a new phenomenon, few enterprises have been able to perfectly balance the level of globalization and localization and harmonize the benefits that both these models have to offer. Increased globalization/centralization offers better control over the geographically disparate IT operations. It also helps drive standardization across IT operations and presents opportunities for economies of scale. On the contrary, improved localization enables the local IT departments to respond faster (and in a more efficient manner) to the local business needs. It also helps the enterprise conform to local regulatory and legal compliance requirements.

It's not surprising, then, that global enterprises grapple with balancing how much autonomy to delegate to the local IT departments and how much control to retain centrally/globally. These enterprises typically operate with a global CIO at the helm of overall IT operations supported by multiple local CIOs managing their respective IT operations. Building dashboards for global and local CIOs requires us to clearly understand how their priorities and focus areas differ:

- A *Fortune* 30 insurance firm recently replicated its products and services and core business processes across its Asian operations (spanning eight countries) in a bid to improve standardization and leverage economies of scale. The Asian CIO was tasked with fostering application reuse across each of the eight countries for the standardized business processes, consolidating all the IT partners and centralizing the procurement process, streamlining data center deployments, and replicating the IT operating model. The local CIOs were responsible for effectively responding to the local business needs, ensuring compliance to the regulatory requirements, and ensuring effective implementation of the various transformation programs initiated by the global IT department.
- The Australian entity of one of the world's oldest credit bureaus was transforming its IT operations to improve alignment with its business strategy. The Australian CIO was given the responsibility of improving the level of business process automation, reducing the risk posed by employee attrition, and reining in the overall IT costs — while adhering to globally mandated technology frameworks and architecture standards.

This article presents the typical parameters that global and local CIOs seek to monitor when managing their IT operations, showcases illustrative dashboards from my consulting experiences, and explores the various challenges that an enterprise faces when building CIO dashboards. Finally, it introduces a framework for building the dashboards, including a governance mechanism for sustaining these dashboards over the long run.

PRIORITIES OF GLOBAL AND LOCAL CIOS

Traditionally within enterprises, the priorities of CIOs centered around how best to support the business requirements, optimize IT costs, improve delivery quality and response times to the business, and so on. For managing daily operations, typical parameters to track included:

- Level of business process automation
- Split across application technology platforms
- Infrastructure capacity utilization
- Personnel allocation across technologies
- Functional and technical adequacy of applications
- Status of transformation programs

Figure 1 shows the illustrative dashboards used by the CIO of an Australian credit bureau for managing the IT operations.

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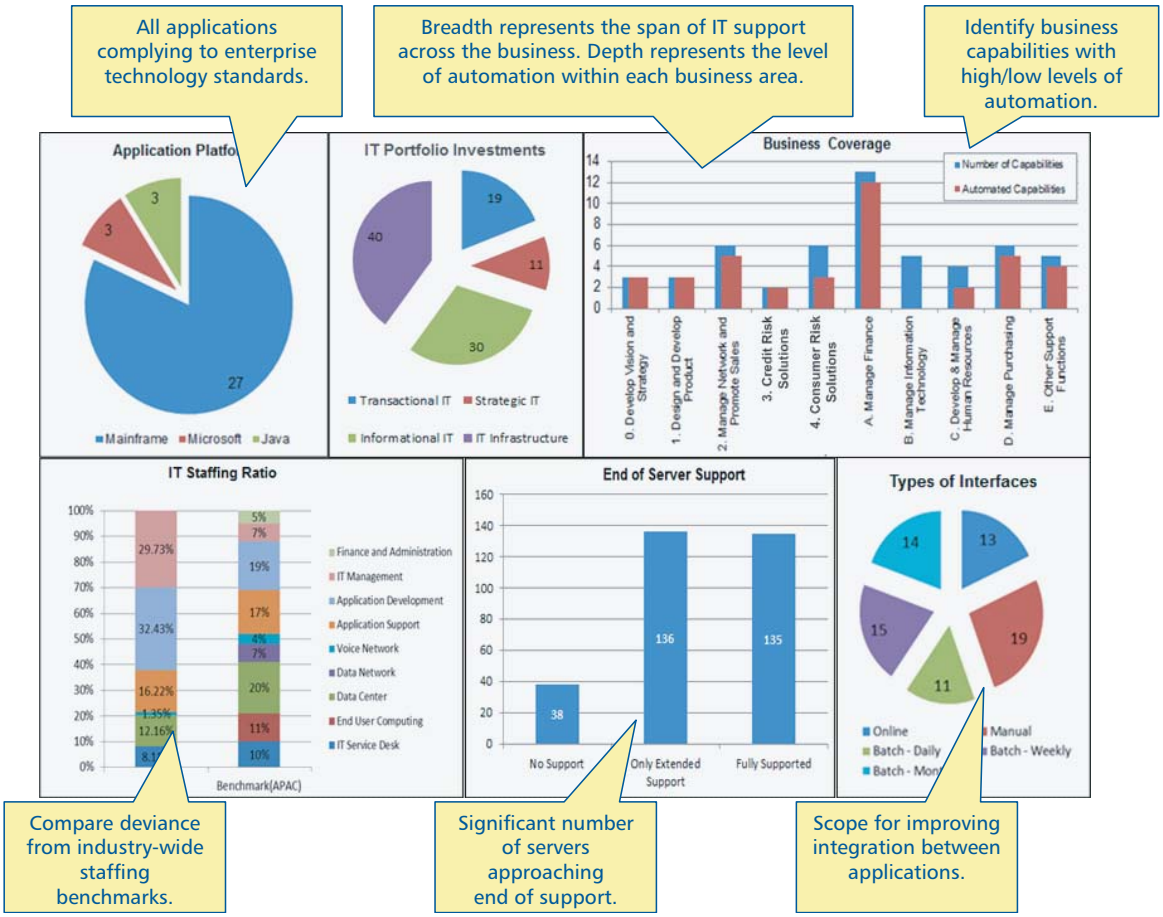

Figure 1 — Illustrative dashboards used by a CIO managing a traditional enterprise.

As enterprises have embraced globalization, the resultant CIO priorities as well as the organization structures of the IT departments have changed to make room for a global CIO and multiple local CIOs. Depending on the complexity of the operations and the enterprise's operating model, there could be regional CIOs for specific geographies (as we saw above) in order to improve focus and leverage synergies across local operations.

While the objectives of these global and local CIOs are similar in terms of enabling IT to effectively support the enterprise, improving process automation, optimizing costs, improving resource and capacity utilization, and the like, their individual priorities and focus areas vary vastly.

The priorities of global (and regional) CIOs are more strategic, dealing with how to streamline and standardize operations, improve economies of scale, benchmark IT performance of various local operations, and identify rationalization opportunities for applications, infrastructure, and vendors/partners. The priorities of local CIOs are more operational and similar to those of CIOs who manage traditional enterprises.

Some of the key illustrative parameters that global CIOs seek to track include:

- Level of application portfolio reuse across operations
- Vendor consolidation opportunities
- Applications versus cost across operations
- Compliance to enterprise technology standards
- Applications technology platform split across operations
- Comparison of IT spending per employee across operations

Figure 2 shows the illustrative dashboards of a regional CIO who manages the Asian operations of a *Fortune* 10 insurance firm.

CHALLENGES WITH BUILDING EFFECTIVE DASHBOARDS

The primary difficulty in building dashboards in a global enterprise involves stakeholder management. Given the differing priorities/focus areas of the various CIOs, it is

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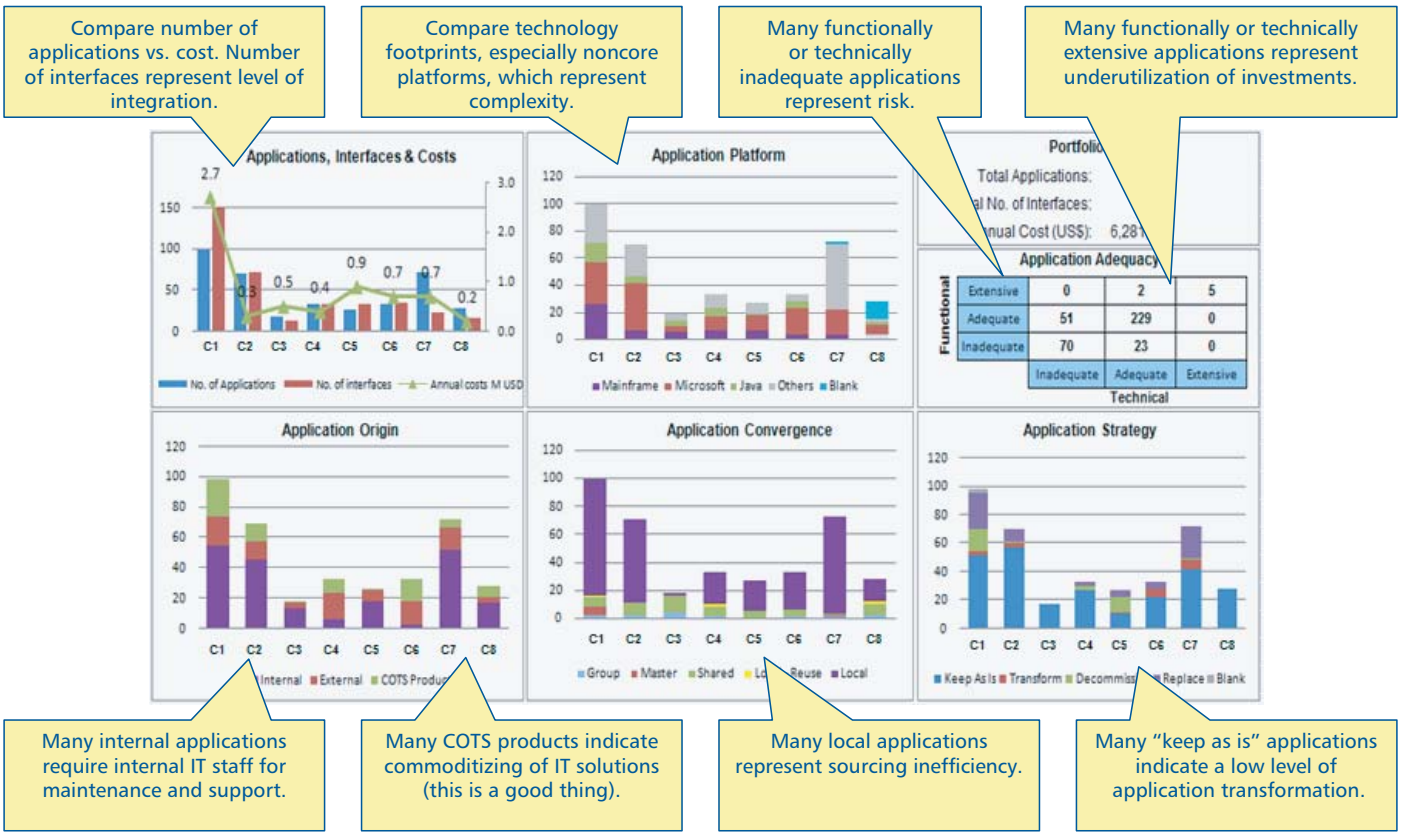

Figure 2 — Illustrative dashboards used by a global/regional CIO managing a global enterprise.

tough to build a consensus on what dashboards to build and maintain, who should build and maintain them, and how this should be done. Exacerbating the situation is the geographically disparate nature of the IT operations and key IT personnel in a global enterprise.

Detailed below are some of the key challenges an enterprise faces in building effective dashboards:

- Defining and agreeing on a set of dashboards that cater to the requirements of both the global and the local CIOs and "templatizing" them
- Identifying the relevant information parameters (data points) that are critical to realizing these dashboards as well as their primary data sources and subject matter expert stakeholders from across the enterprise
- Establishing a governance framework to address the following:
  - Identifying the roles (globally and locally) and responsibilities essential for building and maintaining the dashboards, as well as the reporting structure
  - Developing a "dashboard template building/updating process" for creating the dashboard template and continually keeping it up to date to reflect changing enterprise and CIO priorities
  - Establishing a "dashboard maintenance/refresh process" for ensuring that dashboards are accurate and reflect the current state of IT at any given point in time

FRAMEWORK FOR BUILDING CIO DASHBOARDS

While dashboards are a great resource for CIOs — they aid in strategic analysis as well as operational monitoring, in decision making as well as performance reporting — the overall dashboard building and maintenance processes needn't necessarily be effort- and cost-intensive. Many of the ingredients for building effective dashboards are already available within the enterprise. The framework for building effective dashboards comprises the following three components:

1. Tools
2. People
3. Process

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Tools

It is not necessary to use an expensive, specialized tool for capturing the information parameters required for building a dashboard. Many enterprises already capture details about their application portfolio and infrastructure in a comprehensive manner in an application portfolio manager, an enterprise architecture modeling tool, or, more commonly, an Excel-based repository. Enterprises can readily leverage (or extend) these tools for building dashboards as long as they cover the following categories of information about their IT department:

- Information about existing applications and transformation programs, including linkage to business processes, technology platform, application convergence levels, interfaces and integration patterns, application sourcing details, etc.
- Information about infrastructure (the primary data center as well as the disaster recovery [DR] site), including linkages to applications, type and class of hardware, current utilization levels, etc.
- Information about IT personnel, including staffing split across technology platforms, the staffing split across operations support, ratio of employees to contractors, etc.
- Information on costs, including ratio of CAPEX to OPEX, application licensing and maintenance costs, infrastructure costs (storage, server, network, cooling, etc.), IT spending on employees, projected TCO of transformation programs, etc.

People

The enterprise will need people to build the dashboards as well as keep them current. To ensure long-term utility of dashboards, the enterprise must apportion some effort (~15 FTE per year per geography) toward keeping the dashboards relevant and updated. While having dedicated resources would be overkill, the enterprise architecture team can be given the responsibility of maintaining the dashboards. This responsibility may also be shouldered by the project management office or a similar IT function that reports to the CIO.

In the global insurance firm referenced earlier, the office of enterprise architecture was entrusted with developing and maintaining the global and local dashboards. Each of the geographies already had dedicated enterprise architects operating locally and reporting to the local CIOs.

In case enterprises do not have a mature enterprise architecture practice (i.e., one that spans across geographies), each local CIO can nominate a dashboard single point of contact (SPOC) to coordinate with the global EA team and maintain the local dashboards.

Figure 3 illustrates an example of the roles, responsibilities, and reporting structure for maintaining CIO dashboards.

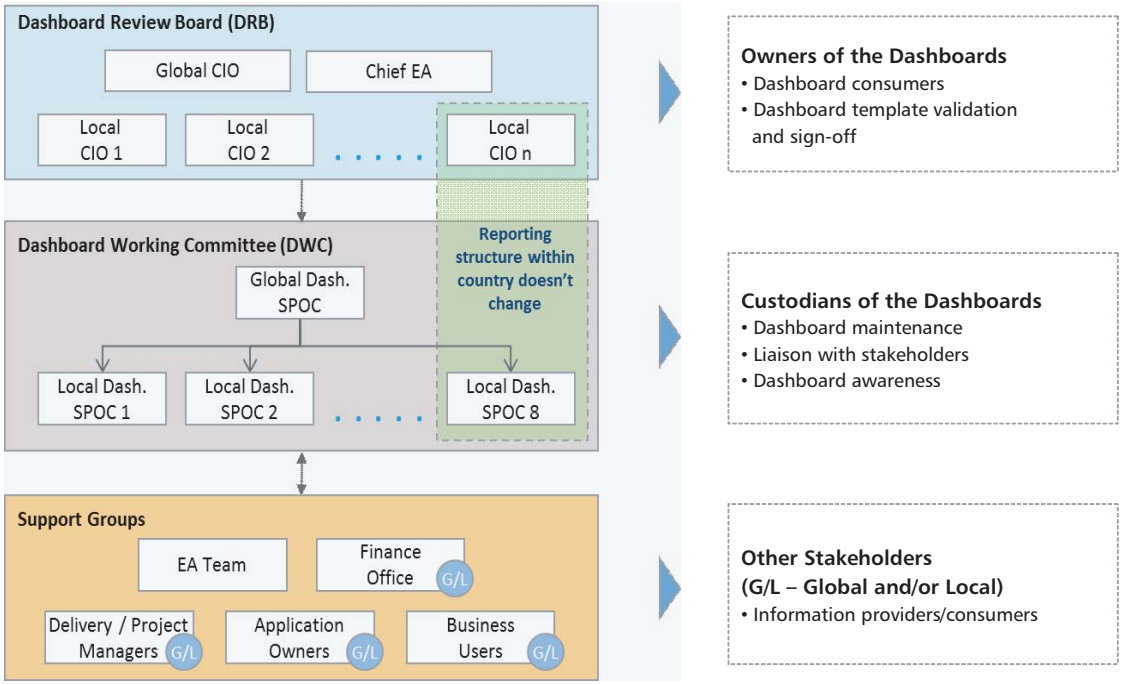

Figure 3 — Maintaining CIO dashboards: roles, responsibilities, and reporting structure.

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The *Dashboard Review Board (DRB)* consists of the global and local CIOs as well as the head of enterprise architecture. The DRB would be responsible for defining the set of dashboards to be "finalized and templatized." DRB members are the owners and also the consumers of the various dashboards.

The *Dashboard Working Committee (DWC)* would be composed of the global and local dashboard SPOCs, who are the custodians of the various dashboards. They are responsible for building the dashboards as well as maintaining them. Reporting to the global CIO and the head of enterprise architecture, the global dashboard SPOC identifies the information parameters/data points required for building the dashboards, in addition to their primary data sources. Once finalized, these parameters are disseminated to all the local dashboard SPOCs for information gathering from the primary data sources/stakeholders. Some of these parameters could already be captured and available within the enterprise's application portfolio manager or enterprise architecture modeling tool.

It's important to note that an enterprise embarking on a dashboard exercise can nominate existing key IT personnel for the various roles that make up the DWC and should avoid hiring dedicated staff for this exercise.

Process

The process component of the dashboards framework comprises two key processes:

1. Building/updating the dashboards template (see Figure 4)
2. Dashboard maintenance/refresh (see Figure 5)

Why	To ensure that all dashboards that are part of the template cater to the requirements of the majority of the stakeholders (CIOs), a best practice is to agree on a standardized dashboard template and establish a process for governing changes to it.
Periodicity	Dashboards template building process — once Dashboards template updating process — annually
Benefits	• This approach achieves better ROI for the effort invested in building and maintaining the dashboards. • The method for building the dashboard (defining data points, identifying data sources and stakeholders, etc.) can be defined once and replicated across all the geographies, optimizing the FTEs invested by the DWC.

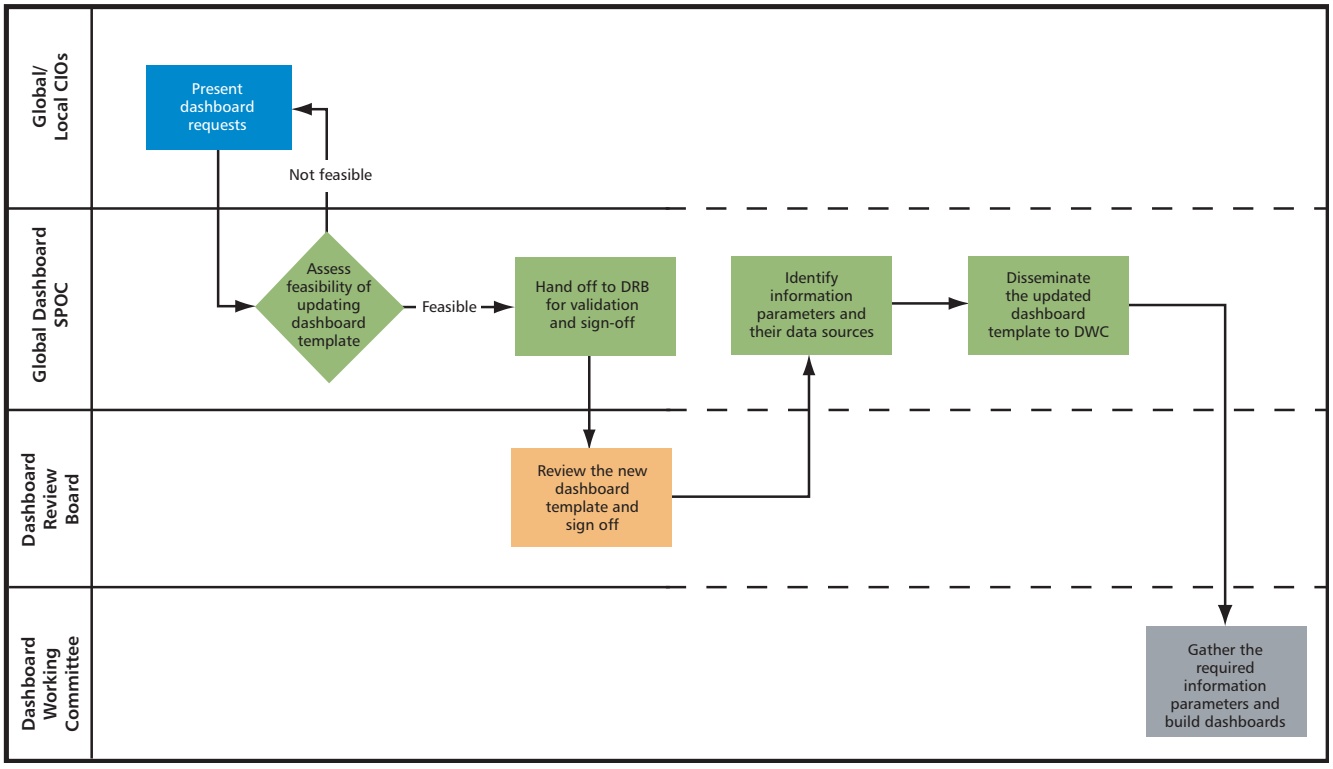

Figure 4 — Dashboard template building/updating process.

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Why	The IT department of any enterprise undergoes several changes on a daily basis, including implementation of transformation programs, changing business and technology trends, etc. When CIOs base their decision making and performance reporting on dashboards, it's important that the dashboards reflect the current state of IT operations in as accurate and updated a manner as possible.
Periodicity	Quarterly
Benefits	• A structured approach helps optimize the DWC's efforts toward maintaining the dashboards. • Accurate and reliable dashboards propagate usage amongst CIOs and result in improved ROI for the effort.

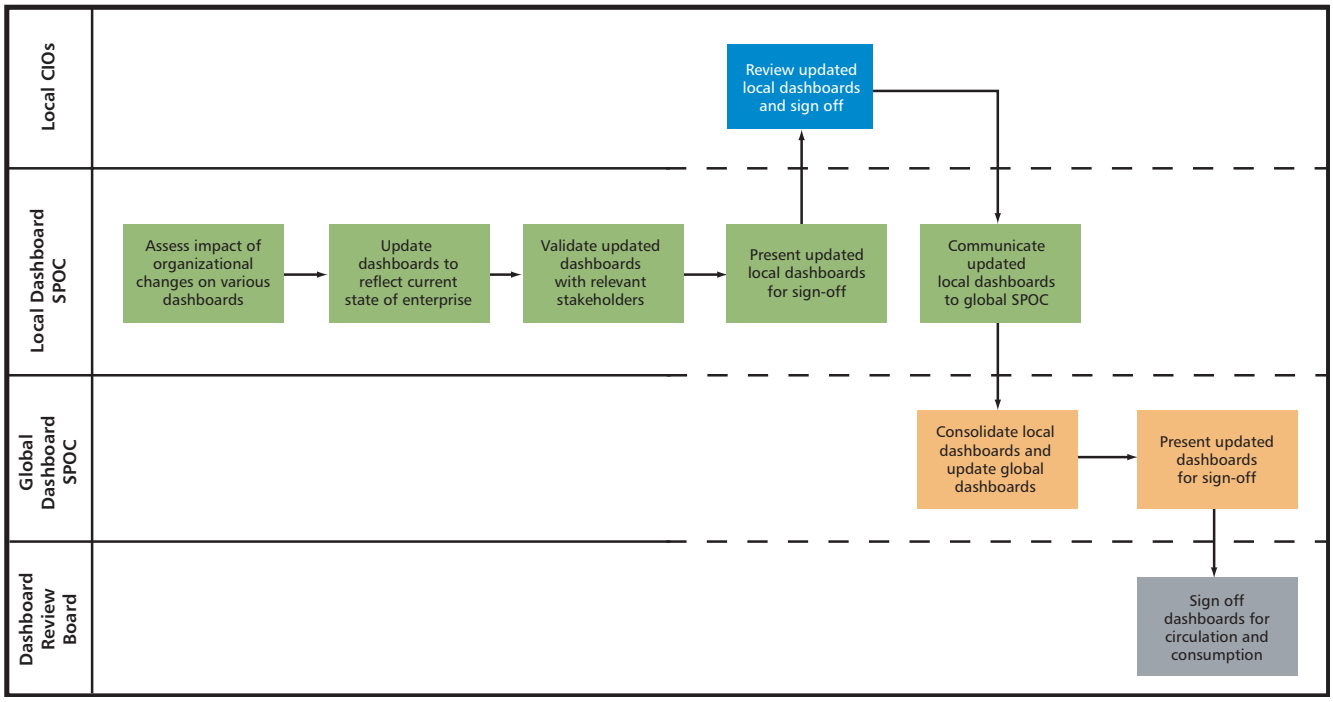

Figure 5 — Dashboard maintenance/refresh process.

CONCLUSION

While many enterprises appreciate the importance of CIO dashboards, far too often these initiatives fail for some of the following reasons:

- CIOs don't prioritize focus areas and end up tracking too many organizational parameters. This often results in complicated dashboards, leading to paralysis by analysis.
- Alternatively, dashboards end up being overly simplistic and do not contribute any analytical value to influence decision making.
- Dashboards represent outdated information, as a framework isn't available for keeping them current.
- Cost and effort investments required are overestimated, resulting in funding challenges.

By clearly defining the objectives of the dashboards, building a consensus amongst all the key stakeholders, and establishing a well-defined framework for building and maintaining the dashboards, an enterprise can effectively leverage the advantages offered by these helpful resources.

Ravi Tej Kanteti is a Chennai, India–based IT Strategy and Architecture Consultant with the Global Consulting Practice (GCP) of TCS. Over the past five years, Mr. Kanteti has been engaging with the CIOs of banking and insurance firms across Europe, the Middle East, and Asia Pacific in the space of IT strategy definition, enterprise architecture and governance, portfolio rationalization, and enterprise mobility strategy. He is a TOGAF-certified Enterprise Architecture Practitioner, an IBM-certified SOA Associate, and is also ITIL Foundation certified. Mr. Kanteti holds an MBA degree in IT business management and a B.Tech in information technology. He can be reached at ravitej.k@tcs.com.

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Building Project Management Skill: How the Right Dashboard Drives Organizational Performance

by Lawrence Fitzpatrick

The holy trinity of information technology is people, process, and tools. Yet in practice, IT fixates on tools first, process second, and then largely ignores people. Nowhere is this more evident than in project portfolio management (PPM) — the process of managing and communicating the project activities within an organization. Despite their widespread use, traditional PPM dashboards produce unreliable information, at high cost,[1] frustrating CIOs and project managers alike. The alternative is to focus — not on project management reporting, but *on project management skill* and the results that follow. Building effective project management skill, through simplified processes and an innovative PPM dashboard, will deliver the results CIOs have been seeking.

TRADITIONAL PROJECT PORTFOLIO MANAGEMENT

Project management is an activity that depends inherently on human performance; project management cannot be reduced to following checklists, and it cannot be automated. Measuring project management effectiveness requires techniques that center on human performance. Sadly, the dominant PPM approaches ignore human performance and focus instead on specifying detailed processes and collecting more and more detailed information in the hope of avoiding risk. Ironically, more information has not led to better project management.[2]

The problem? Flaws in the way PPM dashboards are implemented and managed, usually by a program management organization (PMO). The traditional PMO takes an *outside-in* approach, beginning with the dashboard. They design dashboard displays and reports driven by metrics that are easy to calculate but irrelevant as predictors of outcomes. To collect the data needed by the dashboard, they then specify numerous, complex artifacts to be provided by project managers through burdensome, duplicative reporting tools. Then, pro forma review processes attempt to enforce compliance.

The result? Inconsistent and unreliable reporting, a marked decrease in efficiency, and — arguably — increased project risk. Over time, project managers are turned into "template zombies"[3] who push paper to satisfy checkboxes. All this is due to an emphasis on reporting as enforced by processes and tools that are so cumbersome they leave little time to invest in what really matters — *how project managers are managing*.

FOCUS ON PROJECT MANAGEMENT SKILL

While the need to monitor and communicate program information remains as pressing as ever, an alternative to traditional PPM that avoids the relentless pursuit of ever more information can deliver results. This alternative approach recognizes that the fundamental driver of project performance and transparency is skill — project management skill. It works *from the inside out*, and by focusing on skill, project success and reliable reporting follow.

There can be no denying that some project managers have a better track record of success. Whether attending to staffing, clarifying objectives, mitigating risk, or communicating effectively, successful project managers *do the things necessary* for delivering positive outcomes. While many managers believe that success is due to innate talent, in reality success is due to skill. The good

BAD PPM IS EXPENSIVE

While most IT organizations have PPM dashboards, few executives have faith that the dashboards accurately reflect program performance or project status. Moreover, project managers are frustrated by the effort they invest in producing unreliable information. A true accounting of the costs in dollars, time, and risk to maintain traditional dashboards might be a cause of alarm.

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news is that skill can be learned, and less experienced project managers can improve by learning those skills employed by their better-performing peers.

Taken in this light, the project portfolio dashboard should be viewed as a window into the skill of the project manager, rather than as a window into project performance. The dashboard should show whether the project manager is doing the things that a skilled project manager should be doing and reveal how well he or she is doing them. When the dashboard is viewed this way, it also serves remarkably well as a window into project performance.

A skill-focused dashboard is one of three components to drive project management performance. Another component is a simplified framework for guiding the essential activities of a project manager. The framework establishes the consistency necessary for both building the dashboard and communicating effectively about projects. The third component is a small cadre of expert support people to assess performance and remediate deficits. Note their emphasis is on developing skill, not on overseeing projects.

Each of these three elements — framework, dashboard, and mentors — reinforces the others. The combination unlocks the potential of the organization to perform.

CASE STUDY: DATA-DRIVEN DASHBOARD FOR PROJECT PORTFOLIO MANAGEMENT

A well-known regulator merged with another regulator, launched several new business initiatives, and faced dire performance concerns with aging, mission-critical systems. All of these factors spurred significant growth in the IT organization. A maintenance portfolio had mushroomed into a hundred new projects, and IT faced two challenges: (1) on-boarding hundreds of new employees to meet project needs, and (2) communicating a large volume of fast-changing, complex information reliably and simply to nervous stakeholders.

The management team seized the initiative to create a project portfolio dashboard to meet the PPM challenge. The approach was driven by practices that overturned convention:

- **Hide nothing.** Visible to the whole company, the dashboard provided summary views of the portfolio, drill-downs to detailed project views, and access to real project artifacts.
- **Capture data once, from living management artifacts.** Managers used standard project reporting tools, and the dashboard aggregated, parsed, and displayed this data regularly and automatically.
- **Emphasize sound project management, and reporting will follow.** Project managers were provided training, documentation, coaching, and mentoring on an ongoing basis to reinforce discipline.
- **Innovate incrementally.** Dashboard capability increased gradually over time as the organization matured.

The dashboard contributed to a near-perfect record of on-budget, on-time project delivery of valued projects over many years. Adoption was painless: within six months, 50-plus projects were operating consistently. The total cost of building, running, and sustaining the organization was less than 1% of the project budget — 1/10 the cost of a conventional PMO!

HOW DOES IT WORK?

This alternative to traditional PPM takes a new look at people, process, and tools and creates a protocol for developing project management skill that offers immediate, meaningful results. With increasingly skilled project managers producing meaningful project information, risks can be identified early enough to make a difference. Project visibility afforded to all stakeholders shifts the perception of the project organization from expensive and unpredictable to valued partners. Finally, as the portfolio grows and changes, the new PPM approach and dashboard build capacity on the fly, enabling smooth on-boarding and development of skilled project managers.

Three elements are required to implement this new protocol. Each corner of the holy trinity of IT — process, tools, and people — is represented (see Figure 1):

- A minimalist project management framework focuses on the bare essentials (managing scope, schedule, budget, staff, risk, and communication). Implemented through guidelines and simple, extensible templates, these essentials are designed for actual project management but also facilitate reporting.
- A dashboard automatically reads and organizes information from project management artifacts, providing reliable, up-to-date visibility into project manager — and project — performance.

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- A corps of seasoned project managers evaluate project management skill through the PPM dashboard, enabling them to mentor newer managers and to pinpoint and coach skill gaps.

Constant attention to all three elements is necessary. When attention to any one element is relaxed or eliminated, performance on all fronts suffers. When followed, this approach becomes a way of conducting business — a practice.

Simplified Project Management Framework

Project management is a well-understood discipline, with widely available books, frameworks, and courseware. More information than most project managers will ever need is found in the *PMBOK Guide*,[4] a comprehensive codification of project management practice. Thus, there is no need to reinvent the wheel.

But project management is often overcomplicated, and skilled project managers are hard to find. Because many people managing projects have skill gaps, the first element in this new approach is to establish a minimal but essential set of techniques that the organization expects all project managers to use. Across almost all projects, just six activities are key. These activities relate to managing:

1. Scope
2. Budget
3. Schedule
4. Staffing
5. Risk
6. Communication

Moreover, any person doing project management should be maintaining some artifact to support his or her management of each of these six areas. Together, these artifacts minimally constitute *the plan*.

This approach defines a *meta-template* for supporting each activity. Implemented in standard office productivity tools, the meta-templates structure the performance of the activities. They are lightweight and specify the core elements to be managed (see Table 1). Equally important, they are flexible, making it easy to support the local variation required by different projects and project managers. Rather than attempting to specify all possible situations that a project may encounter, this approach focuses on the elements common to all projects.

The meta-templates are accompanied by a set of guidelines for using them. The guidelines are not meant to be all-inclusive, self-contained tutorials, but instead to set expectations and provide crisp definitions. For example, "A risk's impact can be small, moderate, or severe," and "Schedule milestones should be stated in business terms."

Using meta-templates for standard office documents has several advantages. Because office productivity tools are used by project managers everywhere, they are the least disruptive tools that could be used. Also, expecting project managers to *own* their documents fosters accountability. By standardizing the essential elements of each artifact, it is possible to provide positive reinforcement to those who may still be developing skills. Finally, the consistency established by standardization makes it possible to build a streamlined, automated dashboard.

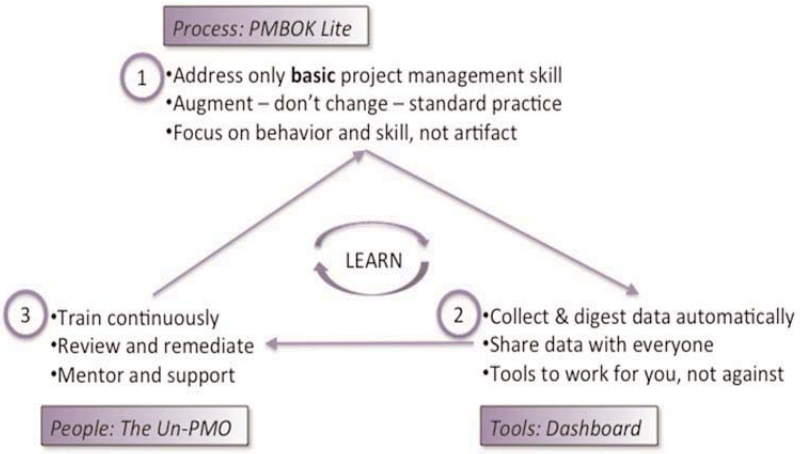

Figure 1 — A balanced protocol for elevating project management skill, resulting in improved outcomes and increased communication.

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Table 1 — Basic Project Management Meta-Templates Define the Plan

Activity	Template	Guidelines
Scope	Text document	Succinctly state *capabilities* and *business benefits* to be realized.
Budget	Spreadsheet	Track the available *budget, actual* expenditures to date, and *forecast* to complete.
Schedule	Project planning tool	Specify project *deliverables* and high-level intermediate *milestones* that demonstrate progress. Short-duration milestones must be understandable and measurable by the customer.
Staffing	Spreadsheet	Capture the team composition over time. This may include, *role, name* if known, *start* date, *end* date, and *utilization* rate.
Risk	Spreadsheet	Record risks, issues, and dependencies. Focus on brief *description*, *mitigation* strategy, *progress* against, *impact, severity, owner*, and *target close* date.
Communication	Text document	Explain *variations* from plan and highlight any positive *accomplishments,* such as meeting a milestone, on-boarding staff, and/or closing a risk.

A Meaningful Dashboard

> Transparency of information breeds self-correcting behavior.
>
> — Admiral Thad Allen, US Coast Guard

The principle behind the new project portfolio dashboard is that actual work should throw off data useful for both assessing the skill with which the work is performed and communicating the work that is being done. By taking advantage of the consistency and discipline established by the meta-template approach, status reporting becomes an outgrowth of doing the work.

At designated intervals, the dashboard software reads and parses the project management artifacts all project managers use. By design, the parsing engine pays attention only to the core elements established by the meta-templates and ignores any extensions created for localized needs. In the interest of evaluating skill development, the dashboard does not enforce compliance or data quality but accepts whatever the project manager provides — the good, the bad, and the ugly — and makes it visible to all.

The data extracted from the project artifacts is loaded into a database, and a user interface provides a navigable view over all projects. A summary page provides a succinct overview of all projects, and each project has a link to a detailed status page (see Figure 2). The source artifacts are stored in the database and can be downloaded and viewed for complete details.

Supporting the varied needs of different stakeholders, the project portfolio dashboard is available to every person in the organization. Customers and executives have 24/7 access to their own — and others' — projects. Peers can monitor interdependencies. Most importantly, senior managers can assess the performance skill of their project managers. Everyone sees the same data, thus avoiding the confusion created by the word-of-mouth relays that too often dominate internal business communication.

Developing and Sustaining Skill

A small cadre of project management experts is the final ingredient in achieving high-performance project management across an organization. These experts act as trainers and coaches and are able to leverage the dashboard as they mentor less-skilled project managers. While project performance is obviously the subject of mentoring, unlike in traditional PMO-driven PPM, the mentors leave project performance oversight to the senior managers and other project stakeholders — possibly even a PMO.

Initially, the experts provide project managers with fundamentals training on how to use the framework and the dashboard. Skilled project managers can be up and running in less than an hour, and even inexperienced project managers can come up to speed in a few hours. The real growth begins as project managers use the framework for their daily activities and those activities are displayed through the dashboard.

The language project managers use in their project plans — to describe scope, budget, schedule, staffing, risk, and so on — is a window into the thoughts and skill of the project manager. Skill gaps are revealed quickly in the dashboard as experts look for signs that indicate such deficits (see sidebar "Mind the Skill

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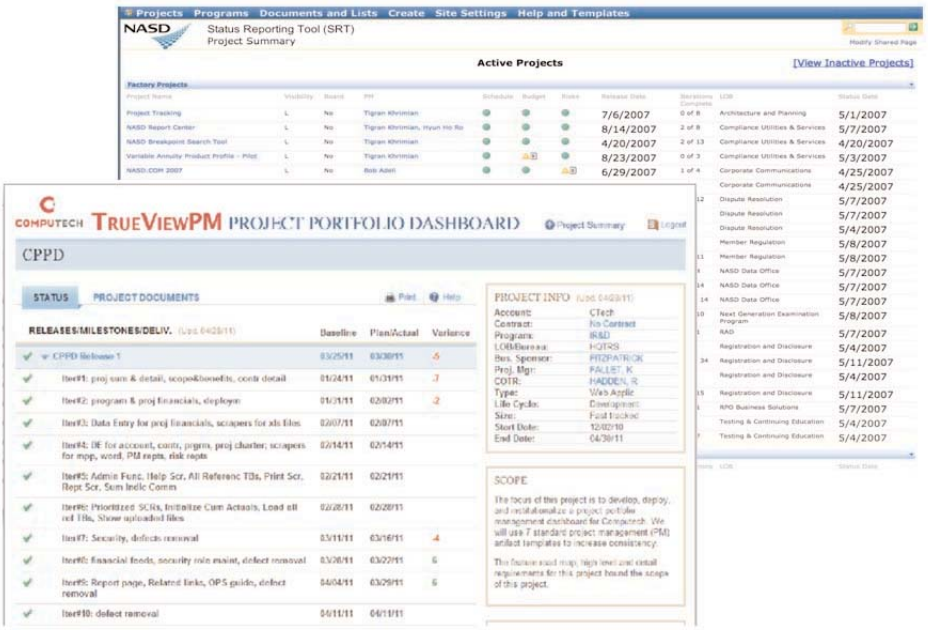

Figure 2 — Project summary and detail screen.

Gap"). Informed by this information, mentors can work with the project manager, either to advance a baseline project management skill or hone a skill required to handle a particular project's challenges. In most cases, skill gaps can be overcome with short-term, targeted coaching. Rarely but importantly, the gaps expose individuals who are not suited to project management.

The use of experts as mentors and coaches to facilitate skill development is essential. There is no way to encode all the knowledge required to manage the variety of projects an organization encounters — problem-solving *in the trenches* is the most efficient way to learn and to teach. By reinforcing a consistent set of practices embedded in the project management framework, and by using the dashboard as a skill diagnostic, mentors spend coaching time only where and when needed. By keeping the overhead low — as little as one mentor for up to 30 project managers — the organization expends more of its resources delivering value for the business.

MIND THE SKILL GAP

Examples of the types of skill deficits demonstrated through the dashboard:

- Work not described in business terms (aka, using "geek speak") may indicate that the project manager cannot see the forest for the trees, potentially presaging a disconnect with customers.
- Overly broad risks ("If we don't get resources in time, the schedule will slip"), or risks not described as events that can be mitigated, may reflect poor risk management skill.
- Project milestones that can't demonstrate progress may reflect poor work planning.
- A resource plan that doesn't match the level of effort or type of activity can reflect poor accountability for or understanding of the problem.

LESSONS FROM THE FIELD

The gravitational pull of tradition can be strong, and traditional project portfolio management is ubiquitous. But this new project portfolio dashboard approach holds real promise both to build organizational capacity and to deliver projects successfully.

Successful implementations of the project portfolio dashboard approach offer these guiding principles:

- Accountability for project management should remain with project managers. Don't let well-intentioned policies, people, or processes undermine accountability for results. Consider adopting the mindset of the US Federal Aviation Administration's Pilot in Command authority[5] (see sidebar "Pilot in Command").
- Successful project delivery begins and ends with skilled project managers, so develop skill through

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PILOT IN COMMAND

The FAA has issued the following guidelines for a pilot in command of an aircraft:

Responsibility and authority of the pilot in command:

(a) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.

(b) In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.

(c) Each pilot in command who deviates from a rule under paragraph (b) of this section shall, upon the request of the Administrator, send a written report of that deviation to the Administrator.

coaching and mentoring. If success is the goal, no amount of process, procedures, or metrics can obviate the need for skill.

- Populate the dashboard by mining the data *naturally* found in the project artifacts that skilled project managers *naturally* use. Don't change the way they work — if you can't find the data in well-structured management artifacts, you probably don't need it.
- Standardize only the bare essentials *and* allow variation. Don't try to codify the infinite complexity possible from all projects; focus instead on what's common to all projects.
- Give everyone visibility, but make sure it is safe to be transparent. Don't punish lack of skill; punish obfuscation.

Since 2005, several implementations of this alternative PPM dashboard have reliably achieved project portfolio transparency within three months and consistency and predictability within six months. By developing consistency and competency in project management, project risks have been exposed earlier — when they can be remediated — thus leading to far fewer project failures. In addition, several organizations have streamlined their PMOs because they no longer need to compensate for poor performance and poorer communication. Perhaps best of all, due to the availability of accurate, salient, and timely project information organization-wide, suspicion and mistrust of IT have been replaced by confidence and respect.

ACKNOWLEDGMENTS

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ENDNOTES

[1]Common estimates for a PMO exceed 10% of the total IT budget, of which a significant component is project oversight and reporting. In our experience with dozens of organizations, the PPM dashboard "project" is frequently one of the most expensive and endless in the IT portfolio. In a survey of 291 organizations, PM Solutions found that the median size of a PMO is 6.25% of project budgets; see: "The State of the PMO 2010: A PM Solutions Research Report." PM Solutions Research, 2010 (www.pmsolutions.com/collateral/research/State%20of%20the%20PMO%202010%20Research%20Report.pdf).

[2]"PMO Effectiveness, Part 1: Why Traditional PMOs Are Failing and Being Abandoned." The Hackett Group, September 2012.

[3]Demarco, Tom et al. *Adrenaline Junkies and Template Zombies: Understanding Patterns of Project Behavior*. Dorset House, 2008.

[4]*A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Project Management Institute (PMI), 2009.

[5]US Office of the Federal Register. Code of Federal Regulations (CFR) Title 14, Part 91.3.

Lawrence Fitzpatrick has a record of software delivery and transformational software management that spans commercial software product development, corporate IT, academia, and government for over 30 years. Currently, Mr. Fitzpatrick is President of Computech, Inc., an innovative application development firm headquartered in Bethesda, Maryland, USA. Until mid-2009, Mr. Fitzpatrick served as Senior VP of the Financial Industry Regulatory Authority (FINRA). During a time of significant change in the financial sector, he grew and ran an application development team of over 500 individuals and was accountable for the delivery of numerous key systems. Prior to joining FINRA in 2002, Mr. Fitzpatrick led delivery of commercial software products as VP at Open Text Software (OTEX) and as CTO at Personal Library Software. Mr. Fitzpatrick has degrees from the University of Virginia and Georgetown University and holds a private pilot license. Mr. Fitzpatrick can be reached at lfitzpatrick@computechinc.com or fitzpatl@gmail.com.

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