

Business Performance Management: Have We Gotten Anywhere?

BPM Is Strategic, So CIOs Must Be Strategic

BPM can impact the entire organization. Rapid changes inside organizations and within markets require agile IT organizations that can not only accommodate this change but also help lead it. CIOs need to think differently.

BPM Is Broad, So CIOs Must Be Prepared

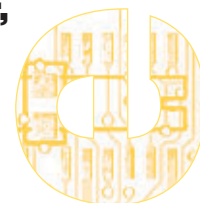
BPM systems touch many topics, including process management, measurement, compliance, security, integration of multiple quality and process frameworks, visualization, knowledge management, collaboration, and corporate culture. Getting the many facets of BPM right is critical for success.

“BPM determines the key forces within and around the enterprise that create success and, through the correct use of information technology, allows the enterprise to better monitor, predict, and manage those forces.”

— Vince Kellen, Guest Editor

Opening Statement

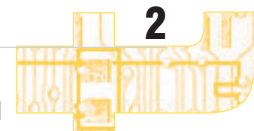
by Vince Kellen



2

Are We There Yet? Three Challenges for BPM

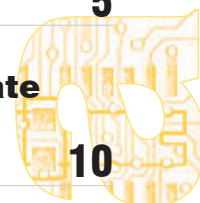
by Russell Keziere



5

BPrM: The CIO's Ticket Back to the Corporate Mainstream

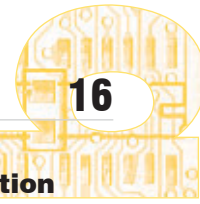
by Peter A. McGrath and Manoj Sinha



10

All Together Now: Merging IT Quality and Other BPM Frameworks

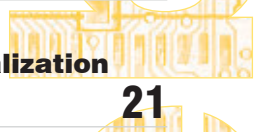
by Sevgi Ozkan



16

I Can See Clearly Now: BPM and Data Visualization

by Tawfik A. Hammoud



21

The Security Management Triple Play: Protection, Detection, and Visualization for SOX Compliance

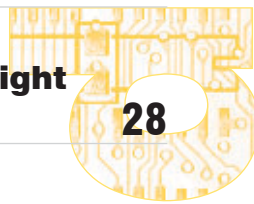
by Anthony Tarantino



24

BPM: Out of the Darkness and Into the Light

by Vince Kellen



28



Opening Statement

by Vince Kellen

It is seductively easy to look at business performance management (BPM) as a technology play, which partially it is. It is also not uncommon, in our haste as business or technology professionals, to elide the tremendous impact BPM can have on the success of organizations. And in between the lower-level bits and bytes of BPM technology and the rarified air of BPM's strategic impact lies a plethora of subjects too broad to adequately address in any medium, much less this one.

Even the acronym BPM is a bit beguiling. We've deliberately chosen the term *business performance management* instead of the more specific terms *business performance measurement* or *business process management*. Other catch phrases, such as the real-time enterprise, business activity monitoring, corporate scorecards, key performance indicators, and even the dreaded word "dashboard," just don't do the subject justice. These terms are narrower in scope, often more focused on the technology itself, and not inclusive of human and business process concepts.

While it is true that the term "business performance management" frequently gets hijacked by software vendors selling everything from accounting software to data

and application integration tools, the term (hereafter called BPM) captures the essence of the matter best. Management is a multi-disciplinary affair; using that term instead of measurement broadens the topic and gives it a more direct linkage to strategy. Reflecting this idea, Performance-Measurement.net, one of the top BPM portals, uses the phrase *performance measurement and management* (www.performance-measurement.net). For its part, the UK's Cranfield School of Management, one of the most productive centers of BPM research, uses the phrase *measurement and management of organization performance* (www.som.cranfield.ac.uk/som/research/centres/cbp).

How then would we define BPM? BPM is an approach to managing the enterprise that goes further than traditional accounting measures and techniques. BPM determines the key forces within and around the enterprise that create success and, through the correct use of information technology, allows the enterprise to better monitor, predict, and manage those forces.

BPM has a rich and varied history, interlinking with other concepts like economic value added, activity-based costing, quality

management, and the balanced scorecard (BSC). Not surprisingly, BPM focuses on tangible assets and operational processes, which are more easily measured. However, in today's markets, knowledge and other intangibles such as brand value, intellectual capital, and management team performance are coming up as emerging issues that require better measurement and management. On the software side, BPM has been addressed with event management and alter software, BSC software, business activity monitoring software, and, of course, software carrying the business performance management/measurement banner. By my count, there are at least 50 software vendors in the market vying for our attention.

With all the maturity and depth here, why address BPM in 2005? Because mastering BPM is still hard! New wrinkles appear and old problems resurface. While data systems are improving, markets are moving faster, creating change not just from outside but within firms.

As you would expect, the authors in this issue of *Cutter IT Journal* address some of those old problems and a set of new, intriguing, and often little-discussed wrinkles. First up is Russell Keziere of Pegasystems Inc., a provider of

rules-based business process management software. Keziere discusses three key challenges for BPM: the rate of change in business goals, increasing amounts of unstructured data and events to deal with, and lastly, the need for speed. The perfect storm of increased compliance demand and ongoing business change creates an execution gap in BPM system deployment. Keziere argues that organizations will need to adopt a different way of thinking in order to close this gap.

Peter McGrath and Manoj Sinha, both BPM experts and solution providers, rightfully point out that the process aspect of BPM is where the CIO can firmly implant him- or herself in the corporate mainstream. They give us the eye-catching acronym BPrM (your eye runs over the “r” like a road bump) to differentiate business process management from BPM more generally. With the dominance of enterprise resource planning (ERP) systems and the rise of customer relationship management (CRM) systems, many CIOs are now pursuing process improvement to foster successful adoption of ERP. BPM systems are getting increasingly agile, shortening implementation cycles and enabling CIOs to help close the BPM execution gap of which Keziere reminds us.

There exists a strong relationship between BPM and quality frameworks such as ISO 9000, Six Sigma, the Baldrige National Quality Program, and the like. Many enterprises have adopted these frameworks, typically with BPM

systems in place to support them. IT organizations, too, have long since adopted such frameworks, typically tailored for the IT environment. These include the Software Engineering Institute’s Capability Maturity Models® (CMMs®), as well as some newer frameworks such as CobiT (Control Objectives for Information and Related Technology) and ITIL (IT Infrastructure Library). As BPM system adoption proceeds, enterprises will often need to integrate or align multiple frameworks. Middle East Technical University researcher Sevgi Ozkan compares and contrasts several of these frameworks and shows how they can complement each other, offering some interesting conclusions for those managing IT frameworks.

As we can easily imagine, lots of data flows through BPM systems. But just because we have access to data does not mean that we are any wiser because of it. How data gets transformed into action is a curious puzzle, and Tawfik Hammoud discusses the impact that data visualization can have in BPM systems. I must admit that I have a soft spot for this topic, as my current research is examining this point. The first (and current) crop of BPM analysis tools gave us the typical dashboards and data displays that we have known for the past two decades. However, a new crop of vendors and thinkers are eagerly exploring more advanced visualization techniques that can aid in business decision making. Hammoud digs a bit deeper and discusses how these tools

Cutter IT Journal®

Cutter Business Technology Council:
Rob Austin, Christine Davis,
Tom DeMarco, Lynne Ellyn,
Jim Highsmith, Tim Lister, Lou
Mazzucchelli, Ken Orr, Ed Yourdon

Editorial Board:

Larry L. Constantine, Bill Curtis,
Tom DeMarco, Peter Hruschka,
Tomoo Matsubara, Navyug Mohnot,
Roger Pressman, Howard Rubin,
Paul A. Strassmann, Rob Thomsett,
George Westerman

Editor Emeritus: Ed Yourdon

Publisher: Karen Fine Coburn

Group Publisher: Tara Johnson

Managing Editor: Karen Pasley

Production Editor: Linda M. Dias

Client Services: Carol Bedrosian

Cutter IT Journal® (ISSN 1522-7383) is published 12 times a year by Cutter Information LLC, 37 Broadway, Suite 1, Arlington, MA 02474-5552, USA (Tel: +1 781 648 8700 or, within North America, +1 800 964 5118; Fax: +1 781 648 1950 or, within North America, +1 800 888 1816; E-mail: citjeditorial@cutter.com; Web site: www.cutter.com).

Cutter IT Journal® covers the software scene, with particular emphasis on those events that will impact the careers of IT professionals around the world.

©2005 by Cutter Information LLC.

All rights reserved. Cutter IT Journal® is a trademark of Cutter Information LLC. No material in this publication may be reproduced, eaten, or distributed without written permission from the publisher. Unauthorized reproduction in any form, including photocopying, faxing, and image scanning, is against the law. Reprints make an excellent training tool. For information about reprints and/or back issues of Cutter Consortium publications, call +1 781 648 8700 or e-mail service@cutter.com.

Subscription rates are US \$485 a year in North America, US \$585 elsewhere, payable to Cutter Information LLC.

Reprints, bulk purchases, past issues, and multiple subscription and site license rates are available on request.

can bring some answers to the BPM puzzle.

The US Sarbanes-Oxley Act (SOX), security, and regulatory compliance are typically not the stuff that BPM dreams are made of. However, in today's climate of increased regulation, this underbelly of BPM demands CIO attention. SOX expert and regular Cutter Consortium contributor Anthony Tarantino examines the details of compliance and security management and discusses what some of the leading software providers in this area are building into their solutions. Like Hammoud, Tarantino also points out the need for information visualization to help enterprises effectively manage this now data-rich world of security and compliance.

Lastly, I leave us with a potpourri of tales from the darker side of BPM — and suggest that there is light at the end of the tunnel. Fellow practitioners exploring this territory for the first (or even the second, third, or fourth) time might find interesting the different potholes or bends in the BPM highway that I've tried to share here. Rarely is the path from

point A to point B a straight line, especially when it involves human beings, motivation, and our often constrained brains. For example, BPM metrics, like car tires, wear out and need replacing. Organizational defensiveness can lead astray even the best of BPM plans. The knowledge within BPM systems often flows, like a meandering river, past water coolers and into corporate culture in unpredictable ways. While the obstacles are there, BPM systems are nevertheless a potent combination of knowledge and motivation.

More than just a class of software, BPM systems are computing systems and human processes clasped together. While we sometimes struggle with this concept, we ought to remember that today's youth established their social personas using AOL, MSN, and Yahoo instant messengers (see avatars). For this group of future corporate leaders, it is not simply that the human processes are inside the machine, it's the soul of the human inside the machine. When this generation reaches the executive office, what will our BPM

systems look like? When human personalities and computing architectures converge, the user-interface design and perhaps the features themselves within the technical interface will change; they will also need to service personal self-image needs. If so, what does this have to say about metrics, measurement, and performance management? Are we thinking too narrowly given the next generation?

In his book *Management Challenges for the 21st Century*, Peter Drucker points out that knowledge worker productivity is one of the key management issues before us. That's why it's so fitting for this journal to tackle BPM. CIOs and IT professionals stand in a hub of information and knowledge. Because the knowledge latent within BPM systems is tied so closely to corporate action and human desires, it is perhaps this knowledge that is the most significant and strategic within the organization. CIOs will need to contribute their fair share both technically and strategically to make BPM a success.

The Politics of IT Management

Guest Editor: Robina Chatham

IT professionals are not typically prepared, by tradition or training, to deal with the ambiguities of organizational politics. Yet there are times — many times — when “being right” is not enough. For IT professionals to achieve their goals, they will have to learn to engage stakeholders and influence executive decision makers. In our next issue, Guest Editor Robina Chatham will lead a lively debate on the politics of IT management. You'll discover the six characteristics of a successful politician, find out how framing the political environment can impact decision making, and learn how to recognize common political “games” — and put a stop to them. Join us next month for an intriguing look at “the art of the possible.”

Are We There Yet? Three Challenges for BPM

by Russell Keziere

There are three challenges facing today's business performance management (BPM), both the business philosophy and the technologies that support it. The first is the exponentially increasing rate of change to the goals and objectives against which we measure our performance. The second is the new challenge of encompassing complex, external unstructured data and events. The third challenge, both for the technology and management practice, is to act in a timely and effective manner on the imperatives that arise from performance measurement and analysis.

The BPM spirit is strong, but the operational flesh, one might say, remains weak. We can see the "good" in our BPM balanced scorecard (BSC) dashboards; we can see clearly the start of a path to increased growth, reinvestment in customer equity and loyalty, and new opportunities for productivity, but actually executing the process and business rule changes seems no easier than it was before we had the vision.

PLANNING FOR UNPLANNED CHANGE

The first challenge is self-evident to anyone following the global economy. Globalization has made a

tremendous impact on the rate of change. For many organizations, outsourcing is a prerequisite for remaining or becoming competitive. Consumer goods manufacturers must ensure that their product codes and supply chain logistics map to global and unique identifiers (i.e., electronic product codes [EPCs]), with radio frequency identification (RFID) around the corner. Wal-Mart's interdependency with the Chinese consumer goods manufacturing sector (70% of Wal-Mart's low-priced goods are sourced in China¹) continues to spiral upward. Consolidation in the financial services sector continues unabated. Against this backdrop, the changes in how we do business obviously increase, but more importantly, so too do our strategies and goals — how we *want to* and know we *should do* business.

Compliance with government-imposed reporting requirements, such as the US Sarbanes-Oxley Act (SOX), adds significantly to the challenge of managing unplanned change. Organizations must now provide full documentation of their

current processes, document all changes to processes that affect the business in a material way, and show audit trails and prove appropriate levels of security. No one who has recently gone through a SOX 404 audit looks forward to the next one. How can one think about planning for change in the future when you are forced to focus so much energy on the past and as-is process? While SOX compliance is undeniably a costly burden, the long-term result may actually provide an unexpected dividend for BPM. Building cross-functional process-centric perspectives and metrics is ultimately useful for building better-grounded, actionable, and measurable plans.

A senior database application manager at a global aerospace manufacturing company confided to me that ever since his company built in compliance-oriented project management and change requests (which oblige business sponsors to justify and show strategic alignment for new projects), the number of poorly thought-out and allegedly urgent but ultimately dead-end projects that formerly preoccupied IT development has dropped significantly. The signal-to-noise ratio has increased, and they now find themselves working on more projects that have a greater impact on the

¹See Ted C. Fishman, *China, Inc.: How the Rise of the Next Superpower Challenges America and the World* (Scribner, 2005), especially chapter 10, "The Chinese-American Economy."

business and the prospect of a longer shelf life. This is a good example of accountability at work; the business has achieved higher productivity because governance requirements have given it a default baseline of processes to work and measure against.

Of course, metrics alone do not drive business change. One Six Sigma black belt at a utilities conglomerate told me that the project that had the most impact on the business (a business rules-driven process management project) did not fall within the strict guidelines for a Six Sigma project. She ended up selecting smaller, more easily measurable — but ultimately less important — projects for her accreditation.²

Globalization and compliance converge when management is forced into a cycle of continually revising its goals and objectives. This cycle of change affects both the rate and volume of granular procedural changes and business rule changes. The gap between goals and execution increases in the very act of trying to bring the two closer together. For example, an insurance company is tasked with introducing many new and different kinds of products, each requiring a different set of processes, procedures, and rules. As the teams

struggle to bring these new products to market, they must also maintain the old ones, leading to delays and an ever-increasing lag that makes it difficult to catch up.

This is the perfect storm — obliged to comply, forced to compete, and burdened with newfound insight thanks to advanced business intelligence (BI) that further fuels a sense of urgency. In the same week that Apple's stock split, HP (whose share price has remained flat since 2001) asked its CEO Carly Fiorina to step down, citing a pressing need to "execute" the strategy. Increased vision and insight without the ability to exercise effective change adds to the execution gap. It is ironic that one of the most ambitious business process modeling projects ever was HP's own adaptive enterprise initiative — the as-is and to-be states were mapped to incredible detail after thousands and thousands of hours of modeling. Alas, the project is on hold and did not execute in time to be of assistance to Ms. Fiorina (although one finds it hard to feel sorry for someone with a US \$21 million severance package). BPM, in short, cannot be a theoretical exercise. It must find a way to be immediately actionable to accommodate the fierce rate of change in business today as well as the growing burden of compliance.

SENSE AND RESPOND

The second major challenge facing BPM is the need to broaden its purview to include unstructured and complex event data within

the enterprise business intelligence dashboard. The BSC becomes imbalanced quickly if the measurement criteria exclude changing events and discernible patterns found in both internal and external events. Event, causality, time, and event abstraction are our new data attributes, and the volume of data that must be parsed against these dimensions defies imagination and metaphor.

Consider the use case of EPC-coded RFID chips in the millions of products flowing through a global supply chain. EPCs are next-generation bar codes that not only identify what kind of product has the tag but also the specific unit. Retailers and manufacturers will be swimming in an ocean of data as products are removed from store shelves and inventory fill orders are handled dynamically. But what potential event patterns will be correlated and detected that will further drive the rate of business change as we know it?

Situations such as the Barings Bank fiasco (precipitated by the infamous rogue trader Nick Leeson, who traded derivatives on multiple exchanges in an attempt to hedge a hedge) are precisely the kind of complex events one might want to detect earlier rather than later. And, of course, those microscopic and soon-to-be-ubiquitous RFID chips will mean billions of events everywhere. It is interesting to note that two of the leading forces behind RFID adoption are the Chinese government and Wal-Mart. If Wal-Mart

²Six Sigma aspirants must log a certain number of "flight hours" with projects that conform strictly to the Six Sigma approach of reducing measurable defects and attaining quantifiable productivity gains.

already imports \$12-\$20 billion worth of goods a year from China, how much more efficient could the company be in the future with an RFID-enabled supply chain? In other words, the event clouds are gathering and becoming omnipresent.

While complex event-processing technology is still emerging, it is now included in the reference architectures and roadmaps from major IT vendors such as Oracle and IBM. The underlying premise of complex event processing is compelling. Business performance managers and management technologies that remain blinkered to this larger if initially bewildering world of event data will continue to be surprised by change. An appropriate first step is to ensure that performance management is supplemented by a “sense and respond” capability that is change aware, alert to events within the enterprise itself, and able to listen for, detect, and correlate patterns.

THE EXECUTION GAP

The third challenge facing BPM is the execution gap itself. We are asked to make operational change in a timely, iterative manner, to make good on the promise of continuous improvement, and to avoid the fate of modeling and BI paralysis. However, the promise of a Web services-driven architecture that can offer pan-application process transparency to break down application silos needs a reality check. In the early days of enterprise resource planning (ERP) implementation, we would have considered

the expression “ERP silo” to be an oxymoron. ERP was supposed to be the all-encompassing hub for the enterprise, capable of supporting many spokes. And yet in recent years, we have come to speak of ERP systems as constituting silos that are much larger and more daunting than any of the others. (Just talk to anyone who has gone through an SAP upgrade lately.)

In the early days of enterprise application integration (EAI), we were warned that integrating legacy or ERP systems might involve significant duplication, as enterprise models, data, and processes were mirrored, patched, and connected on initially passive bus frameworks. We did this, of course, to address the demand for more openness and agility, to expose self-service customer portals, and to provide nimble, primarily Internet-based applications that could “bridge” existing applications. Now, however, we are beginning to see EAI projects stretching far into the future, and they appear as forbidding in scope as the legacy ERP silos they were meant to bridge.

Services-oriented bus approaches, in their turn, offered the promise of standardization, of a level playing field of device- and environment-independent business models. Sounds familiar! XML promised us portable data and B2B transparency but instead delivered a confounding proliferation of conflicting standards and no inherent ability to police its own data integrity. So too did the Enterprise Service Bus (ESB), which is becoming a victim of its own popularity. There are now

The event clouds are gathering and becoming omnipresent.

many flavors of ESBs, from multiple vendors, and this proliferation of versions will require yet another layer of translation. We must now navigate *across* ESBs with their various dialects in the same way we convert one variant of SQL to another to help transform data between databases.

It is against this backdrop of high hopes, loosely coupled Web services enthusiasm, and even more work that we face the familiar problem of executing informed business processes and effectively messaging real-time operational changes so that the business can truly perform against its own BSC. Business processes span applications and trading partners, but procedures and practices are discrete, specific, and situational. If process management is to become effective, it needs to incorporate rules-driven business models. (Disclosure: I am employed by Pegasystems Inc., a software vendor that offers rules-driven business process management, and I am naturally informed by the company’s research and philosophy.)

Process management is by its very nature procedural, rooted in workflow, but it is inspired by the change imperative. Performance management leads inevitably to declarative objectives, goals that are oblivious and insensitive (as they should be)

to the impact they have on process. This longstanding debate has dominated computer science textbooks for the past two decades, and it has strong parallels in business. The declarative programming world (Prolog, LISP, etc.) resembles the executive management of a business in that it does not especially care how specific goals are achieved, so long as they are.

Meanwhile, those in the procedural world care very much which step follows the next, since they are the ones that must do it. Rules-driven business process management has become the place where these two worlds collide. The strong declarative heritage of rules engine and rules management technologies is an important and missing part of the puzzle.

The declarative programming world resembles the executive management of a business in that it does not especially care how specific goals are achieved, so long as they are.

RULES RULE

Rules were born in the early 1980s, part of the declarative programming movement within expert systems and artificial intelligence. They were once the sole domain of healthcare, financial services, and insurance organizations, which used them to handle large volumes of complex claims and exception

processing. But business rules are now becoming more and more mainstream. The number of business applications and software companies that will be adding a rules engines capability to their portfolios is growing steadily. Oracle, CA, Microsoft, and IBM, for example, now have rules within their roadmaps and reference architectures.

Rules are in fact destined to become a larger part of our Internet life, as a cornerstone of the Semantic Web. This academic and industry project intends to bring into existence a smart Web, one that can search, sense, and respond to “meaning” rather than merely repetitive or frequently searched words. The Semantic Web wants to provide context and logic rather than just communicate packets. Distributed and connected inference rule engines that can translate, normalize, deduce, and detect will help make the Semantic Web real. (Interestingly, the business rules community also includes early adopters of Semantic Web concepts; they have reason to converge.)

In the meantime, while the Semantic Web bubbles in the background, rules lend themselves well to the situationally specific requirements for executing business decisions. They also offer an effective conduit for communicating and executing iteratively changed processes that come from goal expressions without any predetermined procedural path (i.e., “I don’t care how you get it done,

just do it”). Once these rules and the precise specific responses they produce can be (1) managed easily without egregious coding, (2) rendered visible, and (3) easily maintained in real time, their importance to BPM as a whole will be even greater, and we will find them an effective means to help close the gap between goals and execution.

CONCLUSION

Business performance management, as a business strategy, implies a higher order of reporting and analysis; one that:

- Spans internal processes as well as unstructured external events
- Can create a synoptic view of all these events (a single view of the truth)
- Assumes that the business can effectively measure itself against goals (a BSC)

Today’s software vendors offer to help achieve some of this, with suite offerings that combine enterprise information integration, activity-based cost accounting, business analytics, opportunistic data aggregation, dashboard paradigms that offer a view of the pulsing vital statistics of an enterprise, cross-functional process monitoring, and more.

Industry analysts who cover BPM want it to be “agile” — a part of the “real-time” enterprise. They want it to create “a business nervous system” and help foster an “adaptive

enterprise.” These word choices are revealing, as they point not just to the technology or to the business philosophy but also to the people who use it and deploy it. To attain this adaptive and agile state, one imagines empowered champions and a team of inspired IT professionals who somehow find the time to nail down a robust enterprise object model in between patching up the sagging legacy infrastructure and beating away a clamoring horde of business users who keep adding to a backlog of application requests that never seems to diminish — no matter how enthusiastic the Jolt Cola devotees of Rational Unified Process or agile programming might be.

Technology alone is not a magic pill that will create the adaptive business nervous system that allows you to work in real time. These adjectives (“agile,” “adaptive,” and “nervous”) describe the future of BPM to be outward-facing, current, and mapped to the strategic thinking of the enterprise. The global economy is a busy, nervous place to be sure, made even busier by governance and compliance requirements. The universe of complex event data threatens to increase the velocity and magnitude of change even more.

It is the nature of business goals to be injunctive and declarative. And it is the nature of performance analytics to be summary and abstract. Increased clarity and visibility are welcomed, but they also exacerbate the execution gap, since the BPM vision inspires new goals, corrective measures, and a sense of urgency and opportunity. Like Tantalus, we find that the object of our desire remains forever out of reach. That is why business performance management must become part of a much more holistic and cohesive approach and include process management and the immediate execution of new business rules and policies. When that happens, our performance metrics dashboards — useful for knowing where we are going and how fast and how much fuel we have left — will finally be equipped with an accelerator pedal, a brake, a turn signal, and a steering wheel.

Russell Keziere is VP of Business Process Management at Pegasystems Inc., the leading supplier of rules-driven business process management software. He has worked as a consultant, analyst, and writer, and has worked in and commented on the software industry since 1983.

Mr. Keziere can be reached at Russell.Keziere@pega.com.

BPrM: The CIO's Ticket Back to the Corporate Mainstream

by Peter A. McGrath and Manoj Sinha

The IT profession has suffered a thousand cuts over the past decade. In many organizations, the CIO position has lost status, and its place on organizational charts has been marginalized.

One of the key reasons is that the CIO's role has traditionally been viewed as a support function, which by definition comes with its own constraints. In order to gain leverage in the decision-making process and exert a greater influence in a company's operations, CIOs need to embed their IT organizations in the revenue-generation process.

CIOs have traditionally catered to the information requirements of people within their organizations. To become more effective, they must expand their focus to include customers and vendors, paying special attention to attracting and serving the customers who provide the revenues essential for the organization's very existence.

The information, automation, and support needs of the CIO's IT organization will therefore change as a result of this market/revenue focus. CIOs must refocus their priorities and goals, placing particular emphasis on integrating channels of delivery, creating integration links between information silos, creating the flexibility necessary to

change process configurations and definitions as needs change, and, most importantly, identifying opportunities to use variable or utility pricing (as opposed to infrastructure pricing) for identified solutions.

As we discuss in this article, the emergence of business process management (BPrM) technology presents CIOs with an opportunity to deliver on these requirements, making the CIO an essential part of the operational and strategic parts of the organization.

THE RISE AND FALL OF THE CIO ROLE

The role of CIO arose in response to the need that corporations and government organizations had to put one individual in charge of the rapid adoption of computer-based technology. The CIO's role began in the 1960s with the implementation of mainframe software applications designed initially for accounting purposes and then, depending on the organization, for other core functions such as human resources, production, sales, and inventory control. At the beginning of the information technology age, few people understood IT or had the skills needed to make it work in a large organization. Both public- and private-sector entities saw the need to reward those who

had this expertise, and the result was the creation of high-level CIO positions throughout industry and government. The rise of the PC in the 1980s, however, created conditions that started a move toward commoditization of IT, and one result has been a subsequent reduction in the corporate status of those in the CIO position.

This trend accelerated with the advent of vendor-provided enterprise resource planning (ERP) and customer relationship management (CRM) software, which more often than not went notoriously over budget and demanded that organizations make significant changes to business processes in order to implement these systems. In addition, complex CRM and ERP systems are big-budget projects that often require the assistance of third-party IT consultants, increasing costs even more. One of the unintended consequences of this has been the relative decline in status of the traditional CIO. Without the ability to implement these projects with internal resources, the CIO's role has been reduced to that of being a coordinator of third-party consultants.

Although the results of ERP implementations have often been disappointing, the problem with these ERP systems has not been

the software itself but rather the need to customize the software to fit the unique business processes that typically exist within each company. Organizations trying to implement a one-size-fits-all ERP system have found themselves facing the daunting task of having to reengineer each of their business processes to conform to vendor-supplied, hardwired ERP software solutions that reflect the way business processes supposedly “should” work, as opposed to what might be best for each individual organization.

ERP implementations carry significant costs for an organization. The up-front license costs and the ongoing yearly maintenance costs are not inexpensive. In addition, the need to reengineer business processes can be internally disruptive and push other important projects further down the priority list. Implementation time is often months longer than expected, and future modifications often require costly customization. The budget funds to do this reengineering are often dollars that have been drained away from the CIO’s budget, thus further marginalizing this position within the organization. Even more frustrating is the realization that after organizations spend all this money on these enterprise-class solutions, the applications lack the necessary flexibility to adapt to changes in environment, business processes, and evolution in the organization over time, leading to a disconnect between solutions and users.

Another significant problem is that these solutions come with an infrastructure cost model that requires significant up-front investment and a long gestation period before any results can be seen. To be fair, these past investments in technology are now being absorbed and have resulted in some improvement in operational efficiency. However, the goal of ERP advocates to fully integrate all key functional aspects within an organization has remained elusive.

CIOs: THE REALITY TODAY

Revenue generation is critical for any organization. Those role players in an organization that contribute to revenue generation typically control the decisions about what investments are needed to make that revenue generation possible. Since in most organizations the CIO is a support role and not a revenue role, there is seldom any opportunity to play a significant part in the organization’s decision making. For this to change, the CIO needs to be embedded in the revenue-generation process.

Technology-driven organizations that have embraced the role of technology and use it to bring their products and services to market have placed key executives in the CIO position. Certain leading financial services organizations and leading Internet retailers are prime examples of such organizations.

CIOs must explore additional strategies to bring value to their

To play a significant part in the organization’s decision making, the CIO needs to be embedded in the revenue-generation process.

organizations and search for better ways to provide and pay for new technology. They must identify ways to bring operational improvements to their organizations with minimum risk of failure, at a reasonable cost, and without the delays that have been problems in the past. CIOs who can accomplish these tasks will see their status within the organization rise and find themselves recognized as corporate heroes.

WHAT IS REQUIRED: FIVE SUCCESS FACTORS

The pathway to success for the CIO includes five key success factors. Any successful IT strategy needs to address these factors:

- 1. Customer focus.** CIOs need to insert themselves in the process of revenue generation, which will give them the necessary maneuvering room for other initiatives. To achieve this key objective, they need tools that are adaptable to the changing needs of the marketplace; that help integrate disparate systems in order to provide relevant information to customers in an accurate, efficient, and timely manner; and that help deliver these through different channels — phone, fax, portal, e-mail, paper.

2. **Adaptable architecture.** Any strategic solution the CIO considers should have the flexibility to deliver support for changing business processes. CIOs can increase the probability of success by using tools and technologies that not only provide a good initial fit but also have an architecture that supports easily changing configured processes at minimal cost. An adaptable architecture allows the organization to leverage the same investment in ever-changing business scenarios and provides the flexibility needed to achieve the most cost-effective solution for process execution.
3. **Time to market.** Another important aspect of any proposed approach is the speed at which solutions can be delivered to users, customers, and vendors. This means accelerating all the activities of a project, from concept to execution (i.e., system design, configuration, and implementation), with the ultimate goal being the delivery of information to the customer in a timely fashion.
4. **Open, interoperable technologies.** The CIO who invests in solutions based on open technologies will have the flexibility to leverage existing infrastructure and keep a wider variety of options open both in terms of computing infrastructure and the kind of “experts” and “expertise” required.
5. **Utility pricing.** Equally important for CIOs is to have

maximum flexibility when committing an organization’s resources to new initiatives. CIOs must be able to easily switch technologies, products, and tools if they find a certain approach does not work. Utility or usage-based pricing models will help the CIO to meet this requirement.

Any strategic solution the CIO considers should have the flexibility to deliver support for changing business processes.

THE BPrM STRATEGY

The BPrM approach has emerged in the past several years, and it holds the promise to address most if not all of the issues discussed above. In its most basic form, BPrM helps automate and streamline business processes. It does this efficiently and without having to resort to time-consuming engineering tasks. Built on top of a relational database, BPrM allows for process simulations, captures transactional information, and provides managers with process dashboards and the ability to access statistical reports and documents via a secure Web portal.

HOW CAN BPrM HELP?

BPrM stands in contrast to the traditional approach of managing the entire system development, deployment, and maintenance lifecycle.

This approach either deploys off-the-shelf products and customizes them to the extent possible or involves the design and use of custom applications. The solutions that this approach provides has the disadvantage of being “hard-wired.” This makes the approach difficult for organizations to easily adapt it to changing market and business conditions or alter it if the requirements were not properly understood in the first place.

The BPrM approach and the tools that subscribe to it have the capability to integrate different silos of information and configure changes to business processes — making it possible to rapidly configure, deploy, and implement processes. This will help CIOs achieve their objective of being more responsive to the needs of information consumers. BPrM tools, because of their ability to map and configure business processes on a living-breathing enterprise deployment platform, offer an ideal means of beginning to attack these issues. An end-to-end BPrM solution can help integrate different applications already in production as well as provide a way to unify delivery channels.

Disparate systems, isolated implementations, and paper are some of the worst obstacles to achieving success with business process improvement initiatives. Integrating these information silos and filling functionality gaps is perhaps the first, most significant step toward a whole new level of process improvement. Accomplishing this

is not easy, but there are some strategies available with BPrM technology that will make it easier to achieve this goal.

Hands Off the Business Processes!

One of the biggest advantages of the BPrM approach is that there is no need to reengineer business processes, an activity that carries with it a tremendous business dislocation risk. While business process reengineering has its merits, any reengineering exercise should be mandated by business needs rather than dictated by the requirements of implementing a hardwired solution. The BPrM approach facilitates replication rather than replacement of current business processes. Any solution should work with “the given” in an organization — starting with its people. The BPrM approach helps capture the organizational structure, the roles in the organization, and the designated individuals who fill those roles.

What makes BPrM technology singularly applicable to meeting the needs of CIOs is its ability to map, configure, and deploy business processes without the need to write custom software code. What used to take weeks and months of software development time can now be done in hours and days. Further, changing a process once built and implemented is no longer a time-consuming and expensive task. All this places CIOs in a position where they can respond rapidly to the changing needs of information consumers.

What We Have Here Is a Failure to Communicate

BPrM technologies also provide a solution to the problem represented by those standalone silos of information that can't communicate with each other. This problem has arisen because of the way information technology has evolved. Applications and databases were created to store information related to a specific problem or functional area within an organization, such as production, inventory, or accounting. These were developed at different times and often without consideration being given to other organizational units.

Moving information from one silo to another is not an easy task. The result is that when information needs to be exchanged, the process often breaks down. It typically requires communication using spreadsheets, documents, faxes, e-mails, or phone conversations. This leads to duplication of work, threatens the integrity of data, and introduces inefficiencies into a business process.

While all this may not seem significant with respect to any one person or activity, when taken as a whole across all functional areas within an organization, the impacts on cost and responsiveness to the information consumer are huge. Most BPrM tools provide features needed to ease data interchange with other databases and legacy systems. This means that disparate databases and application systems can now “talk” to each other. As a result, BPrM technology has greatly improved the potential

The person at the center of making these improvements possible is the CIO.

for business process improvement and increased the organization's ability to respond to information consumers.

Play by the Rules

BPrM tools are designed so that business rules are embedded in the process. Participants in a process are required to follow these business rules in order for a given transaction to move forward. Compliance with company policies and government regulations such as the US Sarbanes-Oxley Act thus becomes easier to enforce and manage. With BPrM's strong reporting and tracking capabilities, managers at all levels now have a tool with which to develop performance standards and the metrics by which to measure success. The net result is better information on which to base decisions; and the person at the center of making these improvements possible is the CIO.

Transact, Document, Calculate

As complex entities, organizations spend significant resources communicating internally and externally with vendors, partners, regulators, and customers — the information consumers. Transmitting documents as e-mail attachments has certainly been an improvement over sending hard-copy documents by mail and fax.

E-mail, however, is only a partial solution. While e-mail messages facilitate quick communication both internally and externally, the information they contain still needs to be filed and stored for later use. Users can save the electronic files within their e-mail program or print out e-mails and file them with other related paper documents. Neither solution is very efficient.

When change comes, as it inevitably does, BPrM's adaptable architecture enables the quick response to market changes that is impossible with hard-wired applications.

The goal of better information delivery can be achieved by unifying the worlds of document processing and transaction processing. This can be done by providing unified document repositories and transaction databases that can be accessed with a Web browser from any location with Internet access. This would directly lower the cost of retrieving information in a timely manner.

And Then Automate and Integrate

Organizations have made great progress in automating their core business processes. However, processes that involve paper and some form of manual activity still remain in every organization, and they consume a disproportionate

amount of an organization's resources. BPrM can be used to streamline these remaining paper-intensive and manual processes. Most business processes still require people to use e-mail, fax, or phone. There is an enormous opportunity to increase efficiency by automating these processes, and the CIO now has a technology solution available that can make this possible on an incremental basis using internal resources. Because of BPrM's flexibility, it can be used to automate processes that are small in nature and involve nonstandard components. BPrM also makes it possible for the CIO to provide a quick action response in a corporate environment that increasingly faces change driven by market reactions and regulations.

BPrM technology has emerged and matured over the past three to four years. There are several vendors that now offer this software, and each product offers its own unique features and user interface. What all of these solutions have in common, however, is the ability to automate almost any business process regardless of industry or functional area.

Each step in a process usually has some activity that needs to be streamlined and automated. BPrM software has process modeling and configuration components to design and replicate these activities. Using these BPrM features, an organization can specify and configure the business rules associated with each step in the process. The process can then be

deployed without having to expend time and money reengineering it.

BPrM solutions also provide features that allow administrators and managers to track and monitor the status of every transaction in a process. Some BPrM systems have a built-in simulation tool that allows planners to do "what if" analysis to identify and cure potential system bottlenecks.

WHAT ARE THE BENEFITS OF BPrM FOR THE CIO?

Looking at the five key success factors for a successful technology strategy, BPrM gives the CIO what is needed to address these challenges. BPrM is a strong customer focus tool because it is adaptable to the rapid economic and financial changes that result from changes in consumer tastes, rising or falling interest rates, and global market forces. When change comes, as it inevitably does, BPrM's adaptable architecture enables the quick response to market changes that is impossible with hard-wired applications. A corollary of this is the speed that BPrM offers in the quest for ever more rapid time-to-market solutions. BPrM's open, interoperable technology and the fact that it can be priced on a utility basis also provide potential cost savings. With the advent of BPrM, the CIO can be a catalyst for significantly improving the organization's operations on both the revenue-generation and cost fronts. With BPrM, CIOs now have a tool to provide the necessary speed, flexibility, and integration between systems

and channels of delivery. These systems become more responsive, thus resulting in better customer service, increased satisfaction, and higher revenues.

In terms of developing automated systems, what used to take weeks and months can now be done in hours and days. Keeping automated processes in sync with changing requirements is made more affordable due to the flexibility inherent in the BPrM approach. By increasing productivity (and thus reducing costs), BPrM offers another significant opportunity for CIOs to create value for their organizations.

It is clear that because of BPrM, the time is ripe for CIOs to reestablish their leadership position in using technology to improve the operations of their organizations.

BPrM is now a key factor that will help CIOs make more money for their companies. While BPrM can add dollars to the bottom line through cost reduction, remember that it is revenue enhancement that will attract the most attention and result in a new corporate status for the CIO.

Peter A. McGrath is CEO of Coriend, LLC, which is based in Rosemont, Pennsylvania, USA. Coriend provides BPrM solutions to private- and public-sector organizations.

Mr. McGrath can be reached at Tel: +1 610 527 1411; E-mail: pmcgrath@coriend.com.

Manoj Sinha is founder and CEO of BISIL, which is based in Rosemont, Pennsylvania. BISIL has developed and markets an acclaimed BPrM software product called Enj. He is also cofounder of Coriend.

Mr. Sinha can be reached at Tel: +1 610 527 8890; E-mail: msinha@bisil.com.

All Together Now: Merging IT Quality and Other BPM Frameworks

by Sevgi Ozkan

INTRODUCTION

Today IT managers can choose from a bewildering array of quality disciplines for performance management. On the one hand, CEOs tend to dictate such well-recognized quality models as Six Sigma, the European Foundation for Quality Management (EFQM), the Baldrige National Quality Program (BNQP), and ISO 9000. These are tempting approaches since quality theory originates from business process environments. On the other hand, IT auditors impose IT-focused disciplines, such as Capability Maturity Models® (CMMs®) for software development, CobiT (Control Objectives for Information and Related Technology), and the ITIL (IT Infrastructure Library) for IT operations and services. But can the IT-focused quality frameworks coexist with the well-known business performance management (BPM) frameworks? Moreover, how can the effectiveness of such coexistence be evaluated?

In this article, I argue that present IT performance measurement disciplines are highly sophisticated and comprehensive. One of the underlying reasons for this is that whereas most early applications of IT were “discrete technologies” applied to specific or closely

related functions, these comprehensive IT frameworks attempt to integrate and link together the whole range of functions across an organization. This comprehensiveness often makes them much too detailed to be practical, and thus these models are not as effective in practice as they are intended in theory. As a consequence, organizations seek reduced complexity, either choosing to (1) build their own quality framework, or (2) merge or fuse the available frameworks, taking the best of each model and making use of two or three models simultaneously [2].

I will argue that none of the quality models or quality frameworks should be seen as a substitute for or a competitor with another. Depending on the type of the organization, one framework on its own may not be sufficient, and therefore two or more frameworks may be applied together in complementary fashion. For instance, very often the CobiT framework is too generic to make the control objectives operational. To translate the control objectives to concrete measures, organizations can use such standards as the CMM for software development, ITIL for IT service management, and/or ISO for general quality management.

There are various success stories within the empirical research literature that demonstrate the effectiveness of “model alignment” and “model combination” in such companies as Philips, HP, Nortel Networks, and Mastercard [3, 4, 7]. Such alignments (fusion models) take the best of each model to create the most effective and efficient methods for the organization. After determining which IT processes are relevant for a particular organization, the models and methods incorporated in an IT quality discipline (i.e., CobiT, ITIL) should be used. In the remainder of this article, I briefly describe the CMM, CobiT, and ITIL performance management frameworks and discuss:

- Business process fusion
- Applicability and the importance of the organizational context
- The complementary nature of the frameworks
- Process alignment

CMM, CobiT, AND ITIL

It has been observed that, in most organizations, senior IT managers see IT management frameworks (CobiT for IT management audit and ITIL for IT service management) as the holy grails of

business-IT alignment. However, they are IT management frameworks, not business management frameworks, and as such they place IT in the middle and the business on the outside. As long as IT clings to its own frameworks and shuns business management frameworks that are shared across the business (including IT), then there is a poor chance of alignment and no chance of integration. The result is bad news for the business when it comes to agility and value for money.

Organizational case studies have shown that alignment of business processes with IT is hard to achieve [1, 4, 9, 11]. Organizations are trying to find answers for the perfect alignment of their IT and business goals [1], and one common strategy is to align business processes in the IT function with process models and methodologies such as CMM, CobiT, and ITIL [3, 4, 6, 11]. These all are practical choices for achieving best practice performance. Table 1 provides a brief comparison of CMMs, CobiT, and ITIL.

As the pace of change in business increases, business risk is compounded by unaligned and rigid IT infrastructures. However, enterprises that achieve business process fusion (i.e., coexisting performance management models) will see increased IT infrastructure flexibility, which mitigates risk and improves returns.

BUSINESS PROCESS FUSION

Business process fusion is the transformation of business

activities brought about by integrating previously autonomous business processes to create a new scope of management capabilities. It will drive stronger alignment of IT with core business processes and provide linkage of operational and management processes with a true end-to-end scope.

Business process fusion should not be seen as just another IT integration project. The objective of CMM-CobiT-ITIL process alignment strategies is to integrate business processes to create value, regardless of how — or even whether — the underlying technology is integrated. In that regard, business alignment (in the context of IT governance) can be viewed as business driving IT (top-down) and IT driving the business (bottom-up). This is achieved through a combination of leadership, organizational structure, and processes.

Business driving IT, in theory, is cascading strategy and objectives down into the organization. The organization is responsible for determining its business objectives and the IT strategic plan based on these objectives, and it must ensure that the necessary control processes and monitoring mechanisms are in place. The latter, IT driving business, refers to the feedback loop. It is a continuous metric-driven process that checks IT performance to enable the organization to take corrective action when reports indicate that IT is not in alignment with business goals and to ensure continuous improvement.

“When looking at business in its entirety, strategy-aligned change links with business process fusion to help overcome the disconnect between top-down policy, strategy, change, and bottom-up infrastructure constraints we call the Grand Canyon of Strategy,” said business analyst Jorge Lopez. “This process coincides with the two things executives say are the most difficult to change: corporate culture and information systems. Using this approach improves business returns, resolves internal conflicts, reduces business risk, and defines IT infrastructure” [6].

APPLICABILITY AND THE IMPORTANCE OF THE ORGANIZATIONAL CONTEXT

The IT quality models that have been briefly discussed here are most appropriate for use by organizations whose organizational goals are explicitly defined. This means that organizations willing to use such disciplines should have their processes specified with concrete definitions of inputs and outputs. This is usually the case for profit-oriented organizations where the organizational goals are clear-cut (cost, effort, ROI, production, etc.). When the organization’s business goals are well defined, a top-down approach may be taken. Implementing such a top-down approach would commence with redefining and modifying the business processes of the organization. These optimized business processes may then be aligned with an IT framework.

Table 1 — Definitions and Comparison of CMMs, CobiT, and ITIL [4, 5, 8-10]

Framework	CMMs (Capability Maturity Models)	CobiT (Control Objectives for Information and Related Technology)	ITIL (Information Technology Infrastructure Library)
Sponsor	Software Engineering Institute (SEI), Carnegie Mellon University	Information Systems Audit and Control Association and the IT Governance Institute	The UK Office of Government Commerce, Pink Elephant, and others
What It Is	<p>Maturity growth models organized into five maturity levels</p> <p>Allow organizations to assess their practices and compare them to those of other organizations</p> <p>CMMs that the SEI is currently involved in developing, expanding, or maintaining are:</p> <ol style="list-style-type: none"> 1. CMMI (CMM Integration) 2. P-CMM (People CMM) 3. SA-CMM (Software Acquisition CMM) 	<p>An audit-oriented set of guidelines for IT processes, practices, and controls</p> <p>Geared to risk reduction, focusing on integrity, reliability, and security</p> <p>Addresses four domains: planning and organization, acquisition and implementation, delivery and support, and monitoring</p> <p>Has six maturity levels, similar to the CMMs'</p>	<p>Best practices for IT service management and operations (such as service-desk, incident, change, capacity, service-level, and security management)</p> <p>Especially popular in Europe</p>
Strengths	<p>Most comprehensive process improvement models available for product and service development and maintenance</p> <p>Strong in organizational practices and provide a roadmap for continuous process improvement</p> <p>Build on and extend the best practices of CMMs and other process improvement models</p> <p>Can be used for self-assessment</p>	<p>Good checklists for IT</p> <p>Enables IT to address risks not explicitly addressed by other frameworks and to pass audits</p> <p>Can work well with other quality frameworks, especially ITIL</p>	<p>Well established, mature, detailed, and focused on IT production and operational quality issues</p> <p>Can combine with CMMI to cover all of IT</p>
Limitations	<p>Don't address IT operations issues, such as security, change and configuration management, capacity planning, troubleshooting, and help-desk functions</p> <p>Focused exclusively on software development processes</p> <p>Set goals but don't say how to meet them</p>	<p>Says what to do but not how to do it (i.e., weak in processes)</p> <p>Doesn't deal directly with software development or IT services</p> <p>Doesn't provide roadmap for continuous process improvement</p>	<p>Doesn't address the development of quality management systems</p> <p>Not geared to software development processes</p> <p>Use is highly dependent on interpretation</p> <p>Limited in security and system development</p>

This implementation approach supports the argument that “any system can be said to be effective as long as it adds value to the organization’s goals” [11]. However, it is important to

underscore here that this could only be valid for profit-oriented organizations whose organizational goals are explicitly defined with measurable inputs and outputs.

THE COMPLEMENTARY NATURE OF THE FRAMEWORKS

None of the quality models or frameworks should be seen as a substitute for or a competitor

to another. For process alignment purposes, any two, three, or more of these may be combined, or they may be used separately. For instance, the CobiT framework may be aligned with ITIL, CMM, and ISO, as mentioned above.

ITIL tracks problems in IT service areas such as help desk, applications support, software distribution, and customer-contact system support, and it overlaps CMM in certain areas such as configuration management. For example, ITIL tracks the changes made to operational systems, but the quality of those changes — in terms of the number and severity of problems resulting from them — is more a CMM metric [6]. Similarly, John Lainhart [8], one of the developers of CobiT, states that CobiT and ITIL should be seen as complementary and not competitive. ITIL describes service management processes and recommends security and control practices, but it does not have a standard for them. This is where CobiT comes in, because it provides a framework to perform audits on a particular organization's ITIL processes. So rather than compete, CobiT and ITIL complement each other.

One of the many examples of such successful alignments is the Philips' IT performance measurement strategy [4]. The Philips International BV internal audit department has a long-standing tradition of using CobiT along with the company's performance measurement program. In addition to extensive internal audit implementations, the corporate IT department of Philips

International used the CobiT framework when participating in two company-wide initiatives:

1. **The BEST (Business Excellence through Speed and Teamwork) quality improvement program.** This program has strong, visible support from senior management and is one of the top five items on the management agenda. As part of this program, Philips developed a process survey tool for IT, which is completely based on the CobiT model.
2. **The Statement on Business Controls program.** This formal statement is issued by each organizational unit within Philips. It is consolidated into the annual report's internal controls statement and therefore has complete support of senior management. The IT section of the Statement on Business Controls is also based on the CobiT control objectives.

PROCESS ALIGNMENT

It is also evident from the empirical research that once they are aligned with the organization, current IT quality disciplines facilitate root-cause analysis of problems (i.e., finding the real cause of a problem and dealing with it rather than simply continuing to deal with the symptoms). These models are good at identifying what needs to be done; however, they do not provide much guidance on how to fix a problem or on how to achieve the IT performance objectives. For instance, CobiT documentation provides definitions for

all control objectives but does not guide the organization toward the achievement of these documented objectives. It does not even provide a roadmap for aligning the organizational processes with the CobiT.

This is one of the reasons why large IT organizations tend to develop their own IT quality frameworks. Only in this way can they make effective *and* efficient use of such models as CobiT or ITIL. These custom-built, home-grown IT quality frameworks are well suited to the organization's goals, and therefore they can be aligned with the organization's business objectives. For example, HP has its own program called HP OpenView, in which it maps ITIL to the CobiT and COSO (Committee of Sponsoring Organizations of the Treadway Commission) frameworks. OpenView combines industry control frameworks in both accounting and IT, and HP recommends the framework for companies that want to be in control of the IT services that are essential for business operations and reporting [3, 4]. CobiT works well in HP's case because it has a knowledge and perspective of business needs. It ties control objectives back to business objectives. In that regard, CobiT plays an instrumental role when aligning technology with the organization's strategic business goals.

For its part, IBM uses ISO 9000, CMM, ITIL, Six Sigma, and several home-grown quality programs. Meanwhile, other equally sophisticated companies also prefer to roll their own. For instance,

MasterCard International Inc. has adapted parts of several programs to its own way of doing business. It underwent an external CMM assessment and implemented some ideas from that, but it hasn't adopted the framework formally. MasterCard's hybrid quality program has reduced the development time for new software releases from 18 months to 12, as well as reducing the number of software defects.

For some organizations, an outside body's stamp of approval, such as an ISO 9000 or CMM certification, may be an important factor. For example, Nortel uses a telecommunications-oriented version of ISO 9000, a choice driven by the organization's customers and partners.

CONCLUSIONS

As we've seen, the IT performance measurement frameworks — namely, CMM, CobiT, and ITIL — are all compatible within themselves and can complement other general BPM frameworks such as ISO 9000, Six Sigma, and the balanced scorecard. By using a systematic IT-based performance measurement discipline embedded into a general BPM framework, companies can improve their organizational performance.

REFERENCES

1. Brand, K., and H. Boonen. *IT Governance: A Pocket Guide Based on CobiT*. Van Haren Publishing, 2005.
2. Chickowski, E. "Models of IT Governance." *Processor*, Vol. 26, No. 15, 9 April 2004.
3. *HP ITSM and HP OpenView: An Approach to Attaining Sarbanes-Oxley Compliance*. HP, 7 April 2004.
4. Information Systems Audit and Control Association Web site (www.isaca.org).
5. IT Governance Institute Web site (www.itgi.org).
6. ITIL College Web site (www.itilcollege.com).
7. IT Service Management Forum Web site (www.itsmf.com).
8. Lainhart, J.W., IV. "CobiT: A Methodology for Managing and Controlling Information and Information Technology Risks and Vulnerabilities." *Journal of Information Systems*, Vol. 14, No. 1, 2000 Supplement, pp. 21-25.
9. Paulk, M.C., B. Curtis, M.B. Chrissis, C.V. Weber. *Capability Maturity Model for Software, Version 1.1*. Technical Report CMU/SEI-93-TR-024, ESC-TR-93-177. SEI, February 1993.

10. SEI, Carnegie Mellon University Web site (www.sei.cmu.edu/cmm/cmms/cmms.html).

11. Yuthas, K., and M. Eining. "An Experimental Evaluation of Measurements of Information System Effectiveness." *Journal of Information Systems*, Vol. 9, No. 2, Fall 1995, pp. 69-84.

Sevgi Ozkan is an IT lecturer and a Ph.D. candidate in information systems at the Informatics Institute at Middle East Technical University (METU), Turkey. Her research interests include IT evaluation, IT performance measurement, e-quality measurement, and Internet-related information and communication technologies. She has served as an advisor on IT governance and software process evaluation for HP Turkey and for large Turkish enterprises in such industries as defense, software development, and telecommunications.

Ms. Ozkan received her B.A. and M.A. in electrical engineering and information sciences from the University of Cambridge, UK, and her M.Sc. in business information systems from the University of London, UK. Prior to her doctoral studies, she worked as an engineer for IBM UK and Motorola UK. Ms. Ozkan is a member of Centre of IT Economics Research, the Netherlands. She is currently working on a book about software process measurement.

Ms. Ozkan can be reached at the Informatics Institute, Main Engineering Building No. 418, Middle East Technical University, 06531, Ankara, Turkey. Tel: +90 532 5961040; E-mail: sozkan@ii.metu.edu.tr.

I Can See Clearly Now: BPM and Data Visualization

by Tawfik A. Hammoud

Business performance management (BPM) solutions help companies understand their entire organization in a business context and take action based on that holistic view. When you can see and understand how people, processes, infrastructure, and assets act together across your enterprise to affect business performance, you can respond rapidly and effectively to whatever demands, opportunities, and threats come your way.

Take the example of Joe Shelly. Joe is senior director of procurement and logistics at a large manufacturing concern in the Midwest. As part of his daily responsibilities, he has to read multiple reports to see the status of all current projects and sift through mountains of data, stored in dozens of locations and formats, to be able to make educated decisions involving hundreds of millions of dollars in purchasing, inventory management, and logistics activities. Joe has several business intelligence (BI) and BPM tools at his fingertips to help him achieve his goals, but none gives him a real-time, single-view window into all the relevant data he needs to seek answers and look for potential opportunities and problems. When he needs a particular piece of information not readily available within

the existing tools, he has to put in a written request to IT and wait 48 hours to get a customized report.

Joe's situation is, unfortunately, fairly common. Even today, with all the solutions available in the marketplace, most companies are not reaching their optimal performance because of the lack of software that truly allows business users to "see" and analyze the data available.

WHAT IS DATA VISUALIZATION?

The amount of data stored within organizations continues to grow at an alarming rate. Yet while most organizations have mastered the art of collecting data, they have not mastered what to do with it. In recent years, BI/BPM solutions have become increasingly popular to help organizations make sense of all this data — data from transactional systems such as enterprise resource planning (ERP), supply chain management, financial, and customer relationship management (CRM) systems, as well as information held in data warehouses and data marts.

In the broadly defined BI/BPM marketplace, there are two general areas where most vendors have failed to provide a compelling solution: access to details and data presentation. But the last couple of

years has seen the emergence of niche software players focused on extending a company's BI/BPM investment.

This segment of the market, defined as data visualization or active data visualization, fills a key void in the BI spectrum by providing added functionalities (such as visual queries, dynamic data discovery, or multiple linked images) that are critical in the decision-making process for most business users. Data visualization collects data from multiple sources and formats (not always compatible) and presents it in an efficient and business-intelligent manner, thus allowing users to quickly digest and interpret the data. A data visualization tool also allows non-IT users to do data prospecting or data drilling — browsing through data and information to identify patterns, trends, opportunities, and issues — without requiring knowledge of the data structure or programming languages.

The objective of data visualization is literally to take thousands or millions of data points and represent them in a way that non-power users can understand in seconds. This represents a significant shift from traditional charts, which are geared more toward plotting a few

hundred data points. Unlike other forms of graphical representation, such as those used in most current BI/BPM tools, information visualization is also a tool for exploring and viewing the unknown — for the discovery of critical issues, relationships, and structure. With information visualization, the visuals convey critical information that allows users to interact: exploring, browsing, filtering, drilling down, and zooming. This ability to interact with the presentation lets users ask questions and then ask more refined questions. Very few people realize that the average human brain can process up to eight dimensions visually — and much more effectively than with text.

In a nutshell, data visualization software puts into the hands of the right people the ability to finally convert data into intuitive, relevant, actionable information.

HOW DOES THIS CAPABILITY IMPACT A COMPANY'S BPM INVESTMENT?

Companies that have invested in BPM solutions find themselves wondering how to best leverage that investment. My colleagues and I believe data visualization is one way of increasing the ROI of BPM solutions. But key questions remain: Is BPM data appropriate for visualization? What impact does visualization have on the adoption of BPM systems? What about cost?

Data visualization solutions allow for an intuitive presentation of data that easily accommodates an organization's business logic. Easy

and intuitive access to business-relevant information — from internal and external sources — gives the users the insight they need to respond rapidly to opportunity and change.

In a nutshell, data visualization software puts into the hands of the right people the ability to finally convert data into intuitive, relevant, actionable information.

BPM solutions allow for robust monitoring of business performance and coordination of activity across strategy, management, and operations. This enables companies to create a business that is aligned, accountable, and action-driven. BPM is great at monitoring key metrics, implementing balanced scorecard initiatives, and delivering better planning, budgeting, and forecasting processes. BPM data comes in a variety of formats and stems from multiple data sources. The visualization layer is usually data- and vendor-agnostic and can coexist with most BPM solutions. Most often, visualization solutions are browser-based and use very flexible architectures to accommodate a large set of technology scenarios and requirements.

Visualization also increases user adoption rates significantly. Custom visual reporting tools are geared toward the non-data-savvy users — a subset of users who can't (or

don't) use BPM tools. They are typically overly dependent on support groups such as IT or analysts to investigate unforeseen issues, and the last thing they want is more reports or metrics.

Deploying a BPM solution is only half the battle: ensuring usage is the key. Some cases have resulted in full project failure due to lack of end-user adoption. As a client recently told us, "If you can't visualize the problem, chances are you won't be able to solve it." By implementing data visualization solutions, companies equip a much larger subset of users with the tools to make accurate and timely business decisions.

Finally, the cost of a BPM software package is often a fraction of the overall expense. Unless carefully selected, a major software package implementation can consume a considerable amount of your organization's time and energy. Visualization solutions are usually deployed within four to eight weeks and require very little user training. The cost of adding software is minimal compared to the benefits realized.

SELECTING A DATA VISUALIZATION TOOL TO HELP YOU ACHIEVE YOUR GOALS

According to business integration consultant Steve Craggs, "Concerns are beginning to mount about BPM's capability to deliver real business value and return on investment" [1]. A significant portion of BPM implementations do not achieve their expected ROI.

Why? As I previously observed, one reason is that organizations often build the “right” solution for the wrong users. Another reason is that most BI tools claim to be able to do everything — but don’t.

Many BPM vendors claim to have presentation layers that allow the users to interact with data in an effective way. Others are adding capabilities by developing or acquiring true visualization technology. The reality is that today only a handful of small niche vendors have really mastered the art of data visualization. The vast majority of complex business problems have many dimensions, yet most reporting/visual tools only expose two or three dimensions at a time, so users are expected to run multiple data simulations and piece together the information for a comprehensive picture. My colleagues and I have found that most visual tools are either too simple (graphs, charts) or too complex (scatter plots, scientific visualization) for the average business user.

As the analyst firm IDC reported in early 2004, simple visualization tasks such as charting or plotting are common, but the future lies with tools that provide people with visual navigation and guide them in terms of how to drill down [2]. As many an executive has discovered, dashboards are only adequate for answering questions the user already knew to ask.

Before deciding to invest in data visualization software, you need to ask yourself some questions and

assess whether you are currently optimizing the use of your data:

- Do your people get the critical information they need to do their jobs?
- Is critical business information only available to power users?
- Do you get too many reports that are not actionable?
- Do you need to submit requests and wait for reports to get key information?
- Are complex queries required to fully understand the data?

The following functionalities, while by no means an exhaustive list, are key in getting the most out of your data visualization tool:

- Ability to drill down through the multiple layers of data; see the forest and each tree
- Meaningful visual indicators with color-coding rules
- Actionable alerts
- Integration with other data sources and back-end applications
- Ability to nonprogrammatically filter the information at a detail level
- Easy implementation, rapid deployment
- Scalability
- Speedy performance on large data sets
- Customization features
- Ability to see both summary and details in context

Gaining a competitive edge increasingly entails the ability to leverage existing data and obtain critical insights into business performance. While most organizations have the systems in place to capture and store reams of data, few can use that data for actionable decision making. Companies that have that capability gain an advantage over competitors by being able to anticipate problems and exploit opportunities that remain buried elsewhere.

In summary, the use of data visualization as a complementary technology provides enhanced functionality for users and allows a much larger section of users within an organization to harness the power of data. That increases the return on the investments companies have made in BPM software.

REFERENCES

1. Craggs, Steve. “Business Process Management — The Holy Grail or Just Another Mirage?” *DM Review*, February 2005.
2. *Report on Visualization Software*. IDC, 18 February 2004.

Tawfik A. Hammoud most recently served as VP of Marketing and Corporate Development at Antarctica Systems, a pioneer provider of BPM software. He was previously a founder of Citadon Inc., a project management software company, and a management consultant at Bain & Company. He has more than 10 years’ experience as an entrepreneur and software executive.

Mr. Hammoud can be reached at thammoud@antarctica.net.

The Security Management Triple Play: Protection, Detection, and Visualization for SOX Compliance

by Anthony Tarantino

The US Sarbanes-Oxley Act (SOX) has received a great deal of attention as organizations struggle to meet its internal controls provisions. Internal controls have been given a broad definition by the US Securities and Exchange Commission (SEC), which adopted a framework established over many years by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).¹ Section 104 of SOX requires the Public Company Accounting Oversight Board (PCAOB) to conduct a continuous program to inspect public accounting firms. A recent article in *Compliance Week* reports that one-third of companies inspected by the PCAOB to date have identified deficiencies [3].

Companies are struggling with the initial phases of internal controls compliance due to decades' worth of lackluster efforts to support external audit, internal audit, and risk management and to improve corporate governance overall. Core

to any internal controls regime is security management. Two sections of SOX will have a direct and profound impact on security management:

1. Section 404 mandates that organizations attest to the viability of internal controls. This includes proof that auditable security measures are in place to protect an organization's assets.
2. Section 409 mandates the timely reporting (i.e., within four working days) of material events using Form 8-K. Material events can include a variety of problems caused by security violations.

SOX is only the beginning of a global trend to improve internal controls as a means to provide transparency in financial reporting. All such efforts will have a COSO framework and strong security management at their core. Many are also embracing a CobiT (Control Objectives for Information and Related Technology) or ISO 17799 framework to improve IT governance. Global efforts underway include the following:

- OMB Circular A-123 mandates SOX-like regulations for US federal agencies.
- Canada's Instruments 52-109 and 52-111 closely parallel US SOX 302 and 404.

- The UK's Turnbull Guidance actually predates SOX and follows a COSO framework.
- The Basel II Accord applies a COSO-like framework to global banking.
- The OECD Principles are becoming a global standard for improved controls.

Beyond the demands to improve internal controls in order to comply with regulatory requirements, good security management is also essential in maintaining robust business performance management (BPM). Those who embrace all three elements of security management described below will be following a BPM best practice.

THE THREE ELEMENTS TO GOOD SECURITY MANAGEMENT

There are three elements to good security management that support efforts to improve internal controls. I will use the analogy of a burglar alarm to demonstrate them:

1. **Prevention** is the strong lock on the door.
2. **Detection** is the alarm system that is triggered upon attempted entry; it may include monitors to record the activities of the intruder.

¹COSO defines an internal control as a "process, affected by an entity's board of directors, management, and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories: effectiveness and efficiency of operations, reliability of financial reporting, and compliance with laws and regulations" [1].

3. Visualization is the means of identifying actual intrusions versus numerous false alarms.

There are software providers who focus on each of the three elements. There are those that also offer both detection and prevention capabilities. The leaders are moving quickly to offer all three. I will explain why all three are essential for complying with SOX and the host of related regulations mentioned above. Let's begin by listing capabilities that the leaders are offering for each of the three elements.

Prevention

- Automate key data changes within business applications.
- Secure master-level data, such as customers, suppliers, and items.
- Ensure data integrity (i.e., make sure that data is entered accurately to prevent reporting issues and downstream control problems).
- Enforce tolerance limits on the number of fields accessible to a user.
- Enforce approvals within key process flows and updates, such as application setups, credit limits, and signing limits.
- Enforce segregation of duties down to the function and user level.
- Provide change control and system monitoring.
- Prevent assignment of responsibility and function conflicts.
- Prevent unauthorized updates to sensitive setup or transactional data.

- Restrict access to pick-lists, pull-down menus, and lists-of-values by user or responsibility.
- Provide alerts as to the time, origin, and nature of any attempted violations.

An after-the-fact monitoring device would trigger an alarm only after the break-in had occurred and the thief was long gone.

Detection

- Monitor responsibility and function conflicts that already exist.
- Monitor key data changes within business applications.
- Monitor failed transactions or stuck interface transactions.
- Monitor changes in process controls.
- Report on responsibility and function conflicts.
- Report on control violations (e.g., segregation of duty conflicts).
- Provide a comprehensive audit history at the field level for key data changes (e.g., setups, master data, transactions).

Visualization

- Provide a visual and global dashboard that captures all relevant internal controls.
- Create alerts for the dashboard when out-of-tolerance situations occur, such as past due dates, violations of security

protocols, and potential material events.

- Provide hierarchical functionality, which summarizes alerts at an executive level and permits drill-down navigation for more details on the origin and nature of the alert.
- Provide alternatives to the popular red light/green light alerts to support users who are visually impaired.²

THE INHERENT RISKS OF AFTER-THE-FACT DETECTION SOLUTIONS

There is a significant difference between software solutions that provide continuous prevention, monitoring, and reporting, and tools that only provide continuous monitoring and flag violations after the fact. To continue the burglar alarm analogy, an after-the-fact monitoring device would trigger an alarm only after the break-in had occurred and the thief was long gone. In a worst-case scenario, the alarm would not go off in the police station for a day or two after the break-in. Those responding typically have to sort through a large number of false alarms as well. Little wonder that we typically ignore alarms and that police give them their lowest-priority response.

In today's global business environment, with 24/7 operations, even the most robust after-the-fact monitoring systems could experience substantial delays in detection and

²For more information, see the US government's voluntary accessibility program Web site (www.section508.gov).

require users to sort through many false positives. Imagine a detection system in which human beings must look at thousands of daily transactions, and it is easy to see how an actual violation would not be flagged immediately or could escape detection altogether.

A clever person wishing to commit fraud could time his or her activities to coincide with evenings, weekends, and time zone differences to provide as much as a two-to-three-day period before the fraud was detected by such a system and another few days for humans to sort through the false alarms. For example, a person working in the Pacific time zone of the US could wait until Friday afternoon and commit fraud after the East Coast-based IT folks have departed for the weekend. Assuming reports and alerts are run daily, the fraud may not show up on an alert or report until Monday and may not be reviewed or acted upon until mid-week or later. Even if the activity is only an innocent and unintentional error, it may raise to the threshold of requiring an organization to declare a material weakness using Form 8-K under Section 409 of SOX — a major breakdown in internal controls.

While auditors, analysts, and investors will welcome an after-the-fact detection system as a good first effort, they will not be pleased when it documents the extent of an organization's poor internal controls. They will be unmerciful when it documents breakdowns that require the filing of a Form 8-K.

Indeed, an after-the-fact detection tool may well provide regulators and litigants with the ammunition they need to win convictions and settlements against an organization. It is no accident that many privately held companies have traditionally and intentionally maintained records in a sloppy and haphazard manner to complicate and frustrate tax and financial audits. Nonetheless, SOX clearly requires stringent record keeping, making a preventative solution (in addition to after-the-fact reporting) a necessity. Such a solution goes beyond SOX compliance, and represents a BPM best practice.

VISUALIZATION IS THE NEXT STEP

Leading software providers have combined both prevention and detection capabilities. Obviously, a strong lock that prevents entry is the most essential element, followed by a means to detect break-ins. But in larger organizations with thousands of users creating several thousand transactions on a daily basis, there is a need to feed all these outputs into a user-friendly compliance dashboard that summarizes data and provides very concise and visual alerts³ when problems arise. This is called a "visualization" solution, and it is seen as an obvious

next step for the best-of-breed compliance solutions.

Certus's Governance Suite and Paisley Consulting's Risk Navigator are examples of leading point solutions that provide process visibility at every organizational level, highlight the risks associated with those processes, and suggest the means of mitigating those risks. This entails visibility across complex business topographies (multi-national and multidivisional organizations) and across heterogeneous IT environments (multiple and disparate financial systems).

Oracle's Internal Controls Manager and SAP's Management of Internal Controls are examples of efforts by the top two enterprise resource planning (ERP) players to provide visualization for their risk management solutions. These products provide a centralized view of risks and controls across an entire organization. Visualization includes summarized internal control dashboards that can be customized, real-time views as to changes in the control and certification of processes, and the rankings of risk mitigation efforts.

Visualization is also being added to preventive solutions. Logical Apps offers solutions that combine

³Many of these dashboards rely on popular red light/green light graphics to alert users to out-of-tolerance situations, but they are also sensitive to users who are visually impaired, color-blind, or dyslexic. Section 508, a voluntary provision of the US Rehabilitation Act, calls for text backups to graphics; for example, the text "Green," "Good," or "Pass" might appear in a green field. Such products also avoid the use of flashing lights within certain frequency ranges due to the danger of causing epileptic seizures.

both prevention and detection capabilities, using a compliance dashboard to summarize an array of data in a simple visual format. The company has added visualization to its Q2 2005 product roadmap.

WHY THIS IS ESSENTIAL BEYOND REGULATORY COMPLIANCE

Joseph Wells is a former FBI agent and criminologist who, in 1988, founded the Association of Certified Fraud Examiners (ACFE). In his book *The Corporate Fraud Handbook: Prevention and Detection* [2], Wells cites a 2004 ACFE report that measured the cost of fraud among the 30,000 ACFE members. In a 2004 survey, participants were asked, based upon their personal experience and general knowledge, what they believed a typical entity loses to fraud and abuse. Their median response, which the author states is consistent with two prior surveys, was that *fraud represents 6% of annual gross revenues*. Applied to the US gross domestic product of \$10 trillion, this results in *\$600 billion in losses a year*.

So beyond complying with corporate governance requirements,

security management is integral to BPM and clearly makes good economic sense. Security management efforts that can cut fraud by even a small percentage can be self-funding. Organizations that utilize all three elements of security management will enjoy a competitive advantage through:

- Reduced risk of material deficiencies and weaknesses
- Reduced fraud losses
- Reduced antifraud enforcement costs
- Improved investor confidence
- Higher analyst ratings, which translate into improved share prices

REFERENCES

1. COSO. *Internal Control — Integrated Framework*. National Commission on Fraudulent Financial Reporting, 1992.
2. Wells, Joseph T. *The Corporate Fraud Handbook: Prevention and Detection*. John Wiley & Sons, 2004.
3. Whitehouse, Tammy. "PCAOB Inspections Reveal Problems; Board Way Behind." *Compliance Week*, 15 February 2005.

Anthony Tarantino is a recognized authority in supply management and the internal controls-related provisions of SOX and related regulatory requirements coming to Canada, Europe, and the UK. Dr. Tarantino has 10 years' executive-level consulting experience and 20 years' industry experience in supply management. He has nearly 30 years' experience in management positions in a variety of industries. He has implemented more than a dozen ERP, procurement, and supply management systems.

Dr. Tarantino is a regular contributor to Cutter Consortium's Business-IT Strategies Advisory Service and various industry publications, including Inside Supply Management, Sarbanes-Oxley Compliance Journal, and Line 56, on topics such as corporate governance and SOX, as well as informational supply chain and e-business. He is a frequent speaker at the Institute of Supply Management (ISM) and various SOX-related conferences.

Dr. Tarantino has held a Certified in Production and Inventory Management certification from the Association for Operations Management, is pursuing his lifetime Certified Purchasing Manager certification from ISM, earned a Ph.D. in organizational communications from the University of California, Irvine, and a B.A. from the University of California, Santa Cruz. He is now working with Logical Apps as Chief Compliance Strategist.

Dr. Tarantino can be reached at agtarantino@hotmail.com.

BPM: Out of the Darkness and Into the Light

by Vince Kellen

Business performance management (BPM) systems are quickly becoming mainstream. Dashboards, scorecards, key performance metrics, business activity monitoring, and other terms pop up perennially on the CIO agenda. Despite the continued optimism and often unquestioned head-first plunge into the deep end, there lurks a darker side to BPM that practitioners should contemplate. Problems include:

- The bewildering diversity of the field
- Lagging adoption rates in the mid-market
- Data quality problems
- Poor BPM satisfaction scores
- Difficulties in making the linkage to strategy
- The short shelf life of metrics
- Cognitive limitations inherent in human beings
- Organizational defensiveness
- The slippery and social nature of knowledge that BPM systems can generate

BPM systems are a potentially powerful source of organizational alignment and motivation. If practitioners are mindful of these challenges, successful adoption can be close at hand.

THE DARK SIDE

Mind-Boggling Diversity

Perhaps the first important issue with BPM is its diversity. Andy Neely of the UK's Cranfield School of Management cites 12 million Web sites dedicated to performance measurement (PM) (up from 200,000 in 1997), a significant rise in the number of conferences worldwide on the subject, and widespread adoption of the balanced scorecard (BSC) in large organizations [20]. He also cites tremendous diversity in the academic field as well, with experts in accounting, economics, human resource management, marketing, operations management, psychology, and sociology all exploring the subject independent of each other. Neely notes that at a 1998 multidisciplinary conference on performance management in the UK, the 94 papers presented cited 1,245 books and articles, of which fewer than 10% were cited more than once. More importantly, he argues that there is little agreement on what are the most important themes and theories in PM.

Mediocre Adoption Rates

DePaul University Professor Mark Frigo and Boise State University Professor Kip Krumwiede report that the BSC approach is in use at about

40% of *Fortune* 1000 companies [9]. In the public sector, only 33% of US counties with populations of more than 50,000 were using PM systems in any form, with a similar adoption rate among cities [5]. BPM system adoption may be following a diffusion pattern similar to that of other productivity improvements, many of which have taken a generation to achieve widespread acceptance. It may turn out that BPM adoption can be advanced with a more tactical approach focusing on specific activities and outputs, while tackling the larger issue of achieving strategic outcomes at a more deliberate pace. Linking BPM to higher-level outcomes requires stakeholder or customer perceptions of timeliness, quality, and usefulness of services, all of which involve data not widely gathered [5].

Poor Data Quality

BPM systems typically draw their data from data warehouses, which in turn draw their data from source enterprise systems and numerous ancillary software and data sources throughout an enterprise. Bad data quality is affecting the usefulness of data warehouses in general. The Data Warehousing Institute (TDWI) reports that 40% of the 647 companies it surveyed have suffered losses, problems, or costs due to poor data quality [6]. Sources of

data quality problems include lack of validation routines in data entry systems or in system loading; mismatched syntax, data formats, and code structures; unexpected changes in source systems; the number and complexity of system integration interfaces; poor system design; and data conversion errors [6]. Mistrust of data can torpedo adoption of BPM technology. CIOs should marry an aggressive data quality improvement program with BPM system adoption.

I Can't Get No (BPM System) Satisfaction

The Institute of Management Accountants (IMA) conducts an annual survey of its 1,300 members on BPM systems, practices, and trends and performs followup interviews with respondents. The 2001 IMA survey reported that 31% of all respondents (BSC users and non-BSC users combined) felt their existing PM system was less than adequate to poor in supporting management's business objectives and initiatives. Only 15% considered their PM systems as very good to excellent in communicating strategy. BSC users fared much better in perception (see Table 1 for a breakdown) [8].

One key challenge for BPM systems lies in managing intangible assets (human and information capital) and innovation [7]. In the IMA survey, 60% of the respondents said that innovation was a key part of their firm's mission statement, yet more than 50% rated their BPM system as poor or less than adequate in this area. Overall, less than 10% of the respondents rated

performance measures for intangible assets as very good or excellent [8].

The American Institute of Certified Public Accountants and Lawrence Maisel of the Balanced Scorecard Collaborative conducted a study to determine current perceptions and practice regarding PM systems [17]. The study included 2,000 respondents to a survey and on-site interviews with a smaller number of companies. Only 35% of the respondents rated their PM systems as effective, and 80% considered the information from their PM systems as merely adequate if not poor. Many respondents indicated using BSCs even though their BSC systems failed to meet the criteria set by BSC creators Robert Kaplan and David Norton [13].

Performance measurement involves change management; and therefore, staff buy-in, education, and leadership are all required. The benefits of BPM include improved organizational development and leadership, financial performance, operating performance, decision making, and strategy and alignment. Common barriers cited include issues related to buy-in, leadership, education, and the measurement process itself. Better

information quality and technology were cited as areas that needed improvement [17]. In addition, a recent KPMG study of US and European business and government executives noted the following factors in BPM system failures: measuring things that are easily measured versus what should be measured, data inaccuracy, measures that were too complicated, and users who didn't understand the system and its measures [14].

Challenges in Measuring Strategy

BPM systems come in two distinct flavors: strategic and operational. The balanced scorecard is an example of a strategic BPM system. Operational BPM systems help managers with specific operational process control issues that may or may not be directly related to the strategy. Measurement plays a crucial role in translating business strategy into results. Researchers John Lingle and William Schiemann surveyed 203 executives, 72% percent of whom were top executives, and found that only six in 10 place confidence in the data presented to them [16]. Factors that prevent successful measurement include fuzzy objectives, unjustified trust in informal feedback systems, and existing

Table 1 — User Perceptions of BPM Systems

Percent rating PM system either "very good" or "excellent"	Percent rating PM system either "very good" or "excellent"	
	BSC users	Non-BSC users
Supporting management's objectives and initiatives	52%	5%
Communicating strategy to employees	48%	3%
Supporting innovation	22%	2%

entrenched measurement systems that make adoption more difficult. Those who reported that they actively measured performance said they gained agreement on the strategy; had clarity of communication, focus, and alignment; and received organizational culture advantages.

Measuring performance is certainly important, but not all measures are good ones to include in a strategic measurement system. Strategy and performance measurements need to be intertwined and, as a result, are likely to be unique for each company. Companies should measure how parts of their value chain actually fit together for an overarching advantage instead of relying on process-by-process metrics [21]. Despite the widespread understanding of the link between strategy, measurement, and success, and the need for some balance between internal/external information and leading/lagging indicators, many companies rely solely on internal, lagging metrics to populate their BPM systems [15].

Different Conceptions of Strategy

In practice, companies craft their strategies differently. In some cases, strategy is a planned and deliberate process. In others, it is unplanned and emergent [19]. How a firm actually crafts, executes, and controls its strategy can have a significant effect on its BPM system. The way firms construct their strategic BPM systems — that is, the ones that measure the strategy — will most likely need to mirror the way they constructed the strategy itself. Is it conceivable that

a top-down strategy (in which the details of the strategy are known to a few at the top of the firm) can be measured with a BPM system built using bottom-up approaches (asking managers and directors closer to the front lines how to measure the strategy)? Emergent strategies will have provisional BPM that must evolve over time, either using top-down and/or bottom-up conversations in the firm to describe how to formulate the strategy and how to best measure it.

Past-Their-Prime BPM Metrics

However appropriate a metric may be when it's first devised, almost all measures lose their ability to discriminate between good and bad performance over time [18]. Improved performance often renders a specific metric unusable; either the bar must be raised, or another activity should be measured. Some employees learn how to meet the measure without improving the performance that is sought ("gaming the system"). Some firms replace low-performing metrics with high performers to "look good" (selection) or withhold performance data when differences persist (suppression). These maneuvers require firms to change measures and search for new measures that can discriminate performance better.

Cognitive Limitations

Technology and process considerations aside, decision making based on measurement data is fraught with individual biases, depending on how the measurement data and problems are presented within the relevant decision-making context.

The way decision problems are described (framed) can lead to decision outcomes that deviate from standard decision-making theory (utility theory) [12]. For example, managers consistently exhibit unwarranted risk aversion and a propensity to look at decisions in narrow terms, often isolated from future or past decisions (narrow framing). This tendency could quite possibly lead to, in aggregate, incorrect management choices.

A PM system project that proceeds unaware of the framing issues, the heuristics people employ when making judgments under uncertainty, and the cognitive biases that even statistical experts possess and employ may have little impact on the business or, worse still, actually accelerate faulty decision making. Many of the errors and biases in decision making can be overcome through the use of information visualization and careful presentation of the data required for decision making. The implication for BPM is that information representation can have a significant impact on the number of decision errors made as a result of common cognitive limitations.

Defensiveness and Organizational Learning

Beyond cognitive limitations and problem framing lurks more danger. It is one thing to frame the problem appropriately and represent the performance data properly. It is another to get human beings to discuss the information and its implications and take appropriate action. The way that

organizations deal with threatening information is thus another substantial concern.

Well-known organizational learning consultants and researchers Chris Argyris and Donald Schön have examined the role defensiveness plays in organizational learning. Organizational inquiry (the intertwining of thought and action that proceeds from doubt to the resolution of doubt) can produce a change in thinking and acting within an organization. This learning, however, takes two distinct forms: single-loop and double-loop learning. Single-loop learning produces a change in behavior but not a change in the underlying assumptions within the organization. For example, a normal product process improvement inquiry may yield changes in the manufacturing process but not impact basic assumptions about the organization. Double-loop learning, on the other hand, results in a change in the strategies and assumptions governing the activities [3]. The relationship between the two forms of learning is depicted in Figure 1.

Argyris and Schön describe two models of theories in action. These are theories that organizations actually put into use (action theory) versus theories that organizations say they put into action (espoused theory). The first model, Model-I, is one the researchers claim to have observed in many organizations in many environments throughout the world. It has four main governing values and accompanying action strategies (see Table 2).

An organization with this learning model (which Argyris and Schön contend is a great many organizations) is “highly unlikely to alter its governing variables, norms, and assumptions” [3]. The second model, Model-II, has three main governing values and accompanying action strategies (see Table 3).

If an organization follows the latter model, the degree of defensiveness between individuals and groups will tend to decrease, and double-loop learning will be enhanced [3]. Argyris contrasts the organizational reasoning associated with these two models as defensive reasoning

and productive reasoning, respectively. He points out that productive reasoning in dynamic environments is especially difficult for people because it requires them to “reexamine their basic assumptions and test their judgments against changing conditions” [1].

Argyris further argues that organizations need to move beyond the static conception of the world that is reflected in deterministic causality to forms of probabilistic reasoning. He notes, “Because the world of action is dynamic and uncertain, probabilistic reasoning is more realistic and accurate in assessing

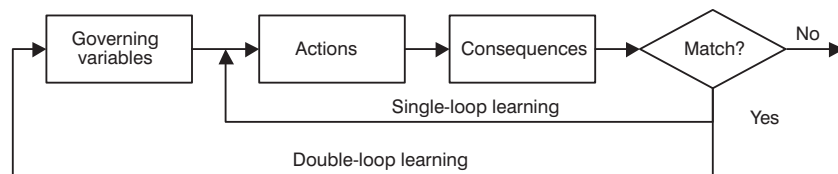


Figure 1 — Double-loop and single-loop learning (adapted from [2]).

Table 2 — Model-I Values and Action Strategies

Value	Action Strategy
1. Define goals and try to achieve them.	Design and manage the environment unilaterally (be persuasive, appeal to larger goals).
2. Maximize winning and minimize losing.	Own and control the task (claim ownership of the task, be guardian of the definition and execution of the task).
3. Minimize generating or expressing negative feelings.	Unilaterally protect yourself (speak in inferred categories with little or no directly observable data, be blind to impact on others and to incongruity, use defensive actions such as blaming, stereotyping, suppressing feelings, intellectualizing).
4. Be rational.	Unilaterally protect others from being hurt (withhold information, create rules to censor information and behavior, hold private meetings).

Table 3 — Model-II Values and Action Strategies

Value	Action Strategy
1. Valid information	Design situations where participants can be originators of action and experience high personal causation.
2. Free and informed choice	Jointly control the task.
3. Internal commitment to the choice and constant monitoring of its implementation	Recognize that protection of self is a joint enterprise and oriented toward growth (speak in directly observable categories, seek to reduce blindness about own inconsistency and incongruity); engage in bilateral protection of others.

the likelihood of accomplishing our intended result” [1]. Action can more easily follow from probabilistic reasoning for Model-II organizations. Organizations holding to defensive reasoning are more likely to dismiss probabilistic evidence that challenges the organization’s espoused theory.

Organizational defensiveness has significant implications for BPM systems. While cognitive biases can be overcome by reframing and representing problems so they are more intuitively understood, organizational biases due to defensive behaviors are much harder to root out and change. Argyris points to some hope in the form of management information systems, which he says offer the following benefits [1]:

- Technology allows the design of information practices that support individual and organizational learning.
- Storing and retrieving relevant actual performance information is relatively easy and timely.

- Individuals can use IT tools to record and discover discrepancies between stated goals and actual performance in a nonthreatening setting.
- All members of the organization can have access to confirming and disconfirming data, lowering the cloak of secrecy and control.
- By linking accurate, timely information to the sense of stewardship among decision makers, the likelihood of learning increases. As organizations begin to change their practices, individuals within them will feel less threatened and be more willing to correct their mismatches between intent and action as part of an ongoing development process.

To date, most BPM systems excel in assisting single-loop learning; that is, correcting specific processes so that they meet stated goals. BPM systems are currently not designed specifically or solely to help manage the double-loop learning problem. That requires more. Since organizational environments

(markets and competitive situations) can rapidly change and extinguish even the largest or seemingly most durable entity, enhanced double-loop learning is critical for long-term survival.

The Social Nature of Knowledge

The notion of knowledge as a social phenomenon is emerging as a significant contribution to knowledge management (KM). Knowing what constitutes the social and cognitive context required for individuals to understand things is critical for successfully managing knowledge in an organization. IBM researchers John Thomas, Wendy Kellogg, and Thomas Erickson go so far as to relabel KM as “knowledge socialization” [23]. Some social techniques for managing or creating knowledge include Bohm dialogues (noncompetitive group conversations that balance continued inquiry with the need for an answer), systematic use of metaphor, strategy mapping, storytelling and narrative, and expressive communication.

Complexity sciences researcher Ralph Stacey criticizes what he calls mainstream thinking on KM for many oversimplifications or inadequate explications [22]. The key concepts in mainstream thinking — double-loop learning, tacit and explicit knowledge, systems dynamics, sender-receiver models of knowledge transmission from information theory, dialogue as a special form of communication — have the following problems:

- They treat individual learning differently from organizational

learning and hence require not one but two theories of how learning takes place.

- They fail to account for how new knowledge is created.
- They cannot explain the unpredictable patterns of knowledge that may emerge outside of the control of the managers.

Stacey argues that “systems, databases, stored and written artifacts” are simply “records that can only become knowledge when people use them as tools in their process of gesturing and responding to each other” [22]. He goes even further, arguing that knowledge is not designed but emerges from the conscious and unconscious interactions and gestures between individuals, and as such can be thought of as a complex adaptive system.

What this means for BPM is that the art of identifying, linking, and gathering data for a BPM system is only part of the problem and not the thorny problem at that. Getting knowledge regarding the PM data diffused and used throughout an organization is at the core of what KM and BPM are all about. With BPM systems, culture and human context matter.

INTO THE LIGHT

So, forewarned is forearmed. With a recognition of the problems that beset BPM systems, and a better understanding of the organizational context they require, we’re prepared to take BPM out of the darkness and into the light.

Constructing BPM Systems

Adopters of BPM systems should understand that these systems have their own nuances and commonalities with other systems. Like other systems, end-user involvement is important. For example, BSC users report that BSCs work best if employees have input into the formation of their parameters [10]; the number and type of parameters must be well thought out in advance. Firms should limit the number of parameters so that using the BPM system does not become too cumbersome and time-consuming.

As in other key technologies, establishing a process for implementing BPM systems helps. BPM researchers Eileen Van Aken and Gary Coleman have identified such a process [24]. After defining the need for measurement and improvement, the process proceeds through the following steps:

1. Creating a common understanding of what the organization does (its mission, key processes, and key outputs) comes first.
2. Defining key performance areas and understanding the metrics (so everyone knows if the process was successful) are next.
3. After a balanced and focused set of metrics has been defined, the measurement system must be implemented, taking into account required resources, technology, training, and communication.
4. In the remaining steps, the management team must

systematically use the measurement system to assess performance, determine improvement actions, and review the impact of these actions.

Van Aken and Coleman report that firms can take as little as one to two months to implement a BPM system if no major technologies or tools are needed [24]. Kaplan and Norton also state that a BSC can be created in about eight weeks [13]. These short, two-month adoption time frames seem to bode well for BPM systems. Or do they? Should firms spend more time planning and designing the BPM system? Perhaps. George Mason University researchers Anne Jensen and Peter Sage describe a process for selecting and refining metrics (see Figure 2) [11]. Since metrics in a BPM system do change over time, firms need to establish a process for accommodating this change.

Successful Violations of Accepted BPM Principles

The widely accepted model of performance management and measurement adheres to three basic principles: performance should be clearly defined, performance should be accurately measured, and rewards should be contingent upon measured performance. However, continued acceptance of these three principles may be misguided. Cutter Business Technology Council Fellow Rob Austin and Brandeis University Professor Jody Hoffer Gittel document cases where firms deliberately violated one or more of these

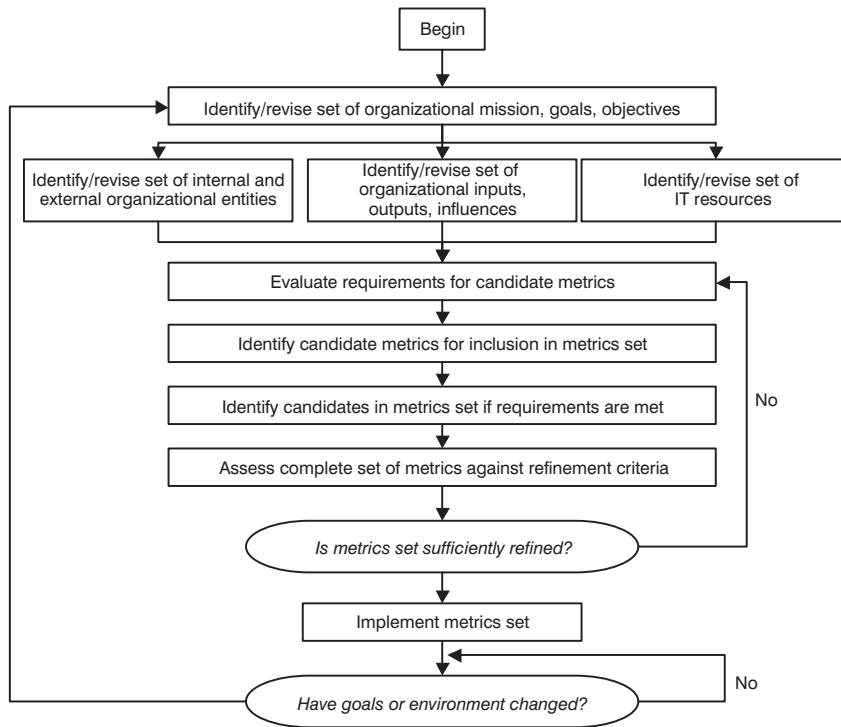


Figure 2 — Metrics identification and refinement process flowchart [11].

three principles but still exhibited high levels of performance relative to competitors [4].

The widely accepted model of performance is based on compliance and extrinsic motivation. Extrinsic motivation typically consists of recognition, rewards, compensation, and behavioral norms to encourage specific behavior. According to Austin and Gittel, these approaches tend to give rise to undesirable outcomes, including the distortion of information quality, the displacement of employee effort from real organizational goals to ones that can be more easily prespecified and measured, and a deterioration of performance [4]. In contrast, the firms in the

anomalous cases used a PM approach that was based on ambiguity and intrinsic motivation. In these approaches, information quality tends to be high and requires dialogue across levels in the organization to determine the right thing to do in a particular context. Moreover, in these ambiguity-loving environments, individuals are frequently not identified in specific performance situations, thus the “information-reducing” effect of fear is minimized.

CONCLUSION

The strategic, human, and dynamic features of BPM dwarf the purely technical issues. While the story here does indeed seem dark at

times, there is a light at the end of the tunnel. Perhaps the biggest contribution BPM systems can make is in serving as an integral piece in a larger organizational development process. Technology executives must master the factors discussed above in order for their organizations to be successful. Mastery will involve plenty of executive collaboration and integration of the enterprise, which for the foreseeable future will allow technology executives to keep a seat at the strategy table.

REFERENCES

1. Argyris, Chris. “Initiating Change That Perseveres.” *American Behavioral Scientist*, Vol. 40, No. 3, January 1997, pp. 299-309.
2. Argyris, Chris. *On Organizational Learning*. 2nd ed. Blackwell Publishing, 1999.
3. Argyris, Chris, and Donald A. Schön. *Organizational Learning II: Theory, Method, Practice*. Addison-Wesley, 1996.
4. Austin, Rob, and Jody Hoffer Gittel. “When It Should Not Work But Does: Anomalies of High Performance.” In *Business Performance Measurement: Theory and Practice*, edited by Andrew Neely. Cambridge University Press, 2002.
5. Berman, Evan. “How Useful Is Performance Measurement?” *Public Performance and Management Review*, Vol. 25, No. 4, June 2002.

6. Eckerson, Wayne W. *Data Quality and The Bottom Line*. TDWI, 2002.
7. Frigo, Mark L. "The State of Strategic Performance Measurement: The IMA 2001 Survey." *The Balanced Scorecard Report*, November 2001.
8. Frigo, Mark L. "Strategy, Business Execution, and Performance Measures." *Strategic Finance*, Vol. 83, No. 11, May 2002.
9. Frigo, Mark L., and Kip R. Krumwiede. "The Balanced Scorecard." *Strategic Finance*, Vol. 81, No. 7, January 2000, pp. 50-54.
10. Ho, Shih-Jen Kathy, and Ruth B. McKay. "Balanced Scorecard: Two Perspectives." *The CPA Journal*, Vol. 72, No. 3, March 2002, pp. 20-25.
11. Jensen, Anne J., and Peter B. Sage. "A Systems Management Approach for Improvement of Organization Performance Measurement Systems." *Information, Knowledge, Systems Management*, Vol. 2, No. 1, 2000, pp. 33-61.
12. Kahneman, Daniel, and Amos Tversky. "Choices, Values, and Frames." In *Choices, Values, and Frames*, edited by Daniel Kahneman and Amos Tversky. Cambridge University Press, 2000.
13. Kaplan, Robert S., and David P. Norton. *The Strategy-Focused Organization*. Harvard Business School Press, 2001.
14. KPMG. *Achieving Measurable Performance Improvement in a Changing World: The Search for New Insights*. KPMG, 2001.
15. Krell, Eric. "The State of Corporate Performance Management." *Business Finance Mag.com*, June 2002.
16. Lingle, John H., and William A. Schiemann. "From Balanced Scorecard to Strategic Gauges: Is Measurement Worth It?" *Management Review*, Vol. 85, No. 3, March 1996.
17. Maisel, Lawrence S. "Performance Measurement Practices: A Long Way from Strategy Management." *The Balanced Scorecard Report*, May-June 2001.
18. Meyer, Marshall W. "Finding Performance: The New Discipline of Management." In *Business Performance Measurement: Theory and Practice*, edited by Andrew Neely. Cambridge University Press, 2002.
19. Mintzberg, Henry. "Crafting Strategy." *Harvard Business Review*, July 1987.
20. Neely, Andy, ed. *Business Performance Measurement: Theory and Practice*. Cambridge University Press, 2002.
21. Porter, Michael E. "The Importance of Being Strategic." *The Balanced Scorecard Report*, March-April 2002.
22. Stacey, Ralph D. "The Emergence of Knowledge in Organizations." *Emergence*, Vol. 2, No. 4, 2000, pp. 23-39.
23. Thomas, John C., Wendy A. Kellogg, and Thomas Erickson. "The Knowledge Management Puzzle: Human and Social Factors in Knowledge Management." *IBM Systems Journal*, Vol. 40, No. 4, 2001.
24. Van Aken, Eileen M., and Gary D. Coleman. "Building Better Measurement." *Industrial Management*, Vol. 44, No. 4, July 2002, pp. 28-33.

Vince Kellen is the VP of Information Systems and a member of the faculty of DePaul University. Prior to joining DePaul in 2003, Mr. Kellen served as a business strategy and IT consultant for several large and mid-sized companies, including 20th Century Fox, Exxon/Mobile, General Mills, SC Johnson, Arthur J. Gallagher Insurance Co., and R.R. Donnelley. He has spoken nationally and internationally on CRM, KM, and information visualization. Mr. Kellen has written four books on database technologies and numerous articles on technology topics. He lectures on enterprise architecture, CRM technologies, and distributed systems and is currently researching the impact information visualization has on decision making.

Mr. Kellen can be reached at School for Computer Science, Telecommunications, and Information Systems, DePaul University, 1 E. Jackson, Chicago, IL 60604, USA. E-mail: vkellen@depaul.edu.

Cutter IT Journal

Part of Cutter Consortium's mission is to foster the debate of, and dialogue on, the business-technology issues challenging enterprises today, to help 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 Cutter Fellow Ed Yourdon, **Cutter IT Journal** is one of Cutter's key venues for debate.

The monthly **Cutter IT Journal** and its weekly companion *Cutter IT E-Mail 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.

Unlike academic journals, **Cutter IT Journal** doesn't water down or delay its coverage of timely issues with lengthy peer reviews. Each month, our expert Guest Editor delivers articles by internationally known IT practitioners that include case studies, research findings, and experience-based opinion on the IT topics enterprises face today — not issues you were dealing with six months ago, or those that are so esoteric you might not ever need to learn from others' experiences. No other journal brings together so many cutting-edge thinkers or lets them speak so bluntly on issues such as:

- Proving the value of IT ROI
- The give and take of offshore outsourcing
- The value of high-quality data
- The evolution of agile project management
- When and how to kill a dying project

Cutter IT Journal subscribers consider the **Journal** a "consultancy in print" and liken each month's five or six articles exploring a single topic to the debates they participate in at the end of a day at a conference — with every participant in the conversation forcefully expressing his or her viewpoint, backing it up with data and real-life experience.

Every facet of IT — application integration, security, portfolio management, and testing, to name a few — plays a role in the success or failure of your organization's IT efforts. Only **Cutter IT Journal** and the *Cutter IT E-Mail Advisor* deliver a comprehensive treatment of these critical issues and help you make informed decisions about the strategies that can improve IT's performance.

Cutter IT Journal is unique in that it is written by IT professionals — people like you who face the same challenges and are under the same pressures to get the job done. The **Journal** brings you frank, honest accounts of what works, what doesn't, and why.

Competition remains intense in the high-tech world. Budget cutbacks and short deadlines have become the norm. You need advice and experience you can rely on. Put your IT concerns in a business context. Discover the best ways to pitch new ideas to executive management. Ensure the success of your IT organization in an economy that encourages outsourcing and intense international competition. Avoid the common pitfalls and work smarter while under tighter constraints. You'll learn how to do all this and more when you subscribe to **Cutter IT Journal**.

CUTTER
IT
JOURNAL

Vince Kellen, Guest Editor



Vince Kellen is the VP of Information Systems and a member of the faculty of DePaul University. Prior to joining DePaul in 2003, Mr. Kellen served as a business strategy and IT consultant for several large and midsized companies, including 20th Century Fox, Exxon/Mobile, General Mills, SC Johnson, Arthur J. Gallagher Insurance Co., and R.R. Donnelley. He has spoken nationally and internationally on customer relationship management (CRM), knowledge management, and information visualization. Mr. Kellen has written four books on database technologies and numerous articles on technology topics. He lectures on enterprise architecture, CRM technologies, and distributed systems and is currently researching the impact information visualization has on decision making. He can be reached at vkellen@depaul.edu.

www.cutter.com or +1 781 648 8700