

21st Century Business Architecture

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While the vision of process management is not new, existing theories and systems have not been able to cope with the reality of business processes—until now. By placing business processes on center stage, as first class citizens in computing, corporations can gain the capabilities they need to innovate, reenergize performance and deliver the value today's markets demand. Business process management (BPM) systems discover what you do, and then manage the lifecycle of improvement and optimization, in a way that translates directly to operation. They see the world in terms of processes using notations and representations business people intuitively understand and which reflect the nature of the way business has to be—connected, collaborative, asynchronous, coordinated, conversational and constantly changing.

Reengineering Reengineering

During the business process reengineering (BPR) wave of the 1990s, management prophets' books full of stories about other companies were all you had to guide the transformation of your business. Although the underlying theories were based on age-old common sense and general systems theory proposed fifty years earlier, reengineering advocates offered no path to execution. New processes could be envisaged but what happened next? There was no *engineering* in reengineering. Instead, processes were handed off—or, more precisely, thrown over the wall—to IT.

By contrast, the process-managed enterprise grasps control of internal processes and communicates with a universal process language that enables partners and internal business units to execute on shared vision—to understand each other's operations in detail, jointly design processes and manage the entire lifecycle of their business improvement initiatives. Companies embracing this approach to enterprise computing are using a new class of mission-critical infrastructure, a new category of software, the Business Process Management System (BPMS), a *business platform* for business processes that exploits a company's existing technology infrastructures and assets.

Today, the vast majority of employees in large enterprises rely on nothing more than email, spreadsheets and word processing tools to *coordinate* work. Beyond this, automation is provided by expensive software applications maintained solely in the data center and by the staff of the IT department. Yet the majority of automation tasks needed each and every day in business are modest in relation to complexity of today's IT systems. For example, nearly everyone needs more visibility of and control over the myriad of activities around them, as they interact with colleagues, partners and customers. Such interactions and communications are indeed the essence of business processes. Business users need control of information flows so that everyone remains focused on the task and is coordinated with everyone else—business processes follow no simple pattern and cannot easily be packaged.

Perhaps 80% of process-related tasks and their coordination could be designed and implemented by business people themselves—if only they had properly designed tools to give them direct manipulation of their business processes. Moreover, business people should be able to implement changes to live business processes, meaning that the lifecycle of the process design and modification needs to be where the process is used, not in the data center. Such environments are possible as companies acquire a BPMS capability. By contrast, business intelligence and action lags behind the current business activity if business processes are engrained in rigid and brittle software systems.

Direct Representation and Manipulation

When business people develop numerical models using spreadsheets, they do not confuse the model and tool—the model and its representation has nothing to do with information technology. For example, a spreadsheet model might represent a budget, or an analysis of an engineering part. In contrast, the distinction between model and tool is often lost when trying to define BPM, which is often equated with systems integration or composite software development. While a BPMS may be *integrated* with other computing systems, and while the engrained processes in those systems may be reused to create new process models, the process model itself has little to do with “systems integration,” or “composite applications” and a lot to do with the budgeting process, or the engineering process.

Many in the IT industry perceive BPM only as a better, faster, cheaper way to integrate applications, and this view is exasperated by the focus of languages used to support Web services orchestration, such as BPEL. For all that is written about such languages one would think that BPM is only about systems interoperability, application integration and a smart new way to develop more software. This thinking totally misses the point. BPM is about better, faster, cheaper business processes, not better, faster, cheaper technology.

BPM technologies provide *direct representation* of business processes, and then opens those processes to complete lifecycle management: from discovery, to design, deployment, execution, operations, analysis and optimization. Tell business people that BPM is about technical integration and watch their eyes glaze over. Tell them their “problem” is applications integration or composite applications and watch them excuse themselves from the conversation.

In short, integration technology, however wrapped in process clothing, is only solving an integration need. This is not to say that integration products cannot evolve to become BPM products, or that BPM products cannot provide integration, but the distinction needs to be made. What distinguishes the BPMS is its central focus on the *direct representation and manipulation* of business processes, just as the RDBMS provides the representation and manipulation of business data and the spreadsheet provides the representation and manipulation of numerical data. On the other hand, a comprehensive BPMS incorporates robust application integration facilities, as corporations need to integrate automated processes in legacy systems or best-of-breed packages to the BPM level—integrate *once* to the BPM level of abstraction, then develop and manage many business processes

without returning to the technology plumbing. Processes embedded in legacy systems can be made “reusable,” and are mandatory participants in many of the business processes companies wish to manage more actively and directly.

BPM systems are helping organizations to obliterate, not just bridge, the business-IT divide by placing control of business processes directly in the hands of business people, including front-line workers. Personal, workgroup and departmental BPM tools, akin to tools commonly found in office productivity suites, are emerging. The role of IT is changing, away from custom development of more and more application software and toward the provision of BPM systems. Imagine a “Process Office” suite, providing an integrated, process-centric approach to collaboration, computation, work management, process modeling and simulation.

Aberdeen group elaborates, “The BPM category may arguably provide the greatest return on investment compared to any other category available on the market today. BPM gives organizations the ability to cut operational costs at a time when the economic downturn makes it increasingly difficult to boost revenues. ... Business Process Management enables government agencies to dismantle obsolete bureaucratic divisions by cutting the labor- and paper-intensive inefficiency from manual, back-end processes. Faster and auditable processes allow employees to do more in less time, reducing paper use as well as administrative overhead and resources.” In short, BPM is becoming the bedrock for a whole new world of *process work*.

Imagine a sales campaign “application.” It could be developed upon a relational data management system (RDBMS), but would the data model and software provide the flexibility required? Would such an application naturally fit and adapt to the business process? Companies in different industries have diverse need for sales campaign automation and individual companies in the same sector wish to compete with each other by differentiating sales processes. Packaging a sales campaign application in software on a static data model seems inappropriate. Not only is each sales campaign in each company different, they are different within the same company for different types of products and services. In addition, as each campaign progresses, processes associated with each prospective customer may have to vary widely from the initial “sales plan.” Therefore, instead of packaging the sales campaign as a software application, why not deliver it as a process. Give business people tools to build their own sales process. Allow them to customize the process for each customer. Give them the tools to include participants in the campaign as required, including employees, partners, systems and information sources. Let the BPMS manage the end-to-end state of all processes. Provide business people the tools they need query the state of the campaign along key dimensions such as customer, product, part, and based on this business intelligence, make adjustments to the process in order to respond to individual customer needs.

A formal foundation

Many trends have converged to create the brave new world of business process management—workflow management, business process modeling, quality management,

business reengineering, change management and distributed computing, to name but a few. Yet there was a vital and missing ingredient, the direct manipulation of business processes. The IT-facade behind today's business processes (consisting of disjoint data models, application logic, workflows and integration systems, repeated a hundred times in a hundred silos) can now be rationalized, not by replacing previous investments, but by exploiting what they offer in combination, recast in the form of new process models and systems. It has taken the IT industry 20 years to find a way to represent the computational elements needed for a unified *process representation* on which to build tools that can be used to conceive, compose and put new processes into operation.

The unifying theories needed for *business process computing* lie in an obscure branch of mathematics called the pi-calculus, whose conceptual father is Robin Milner, Professor of Computer Science at Cambridge University and a Turing Award winner. Pi-calculus plays a role in the BPMS like finite state machines play in the business spreadsheet and the relational algebra in database management systems. Pi-calculus and related formalisms are complex, but business people couldn't care less about formalisms. On the other hand, the automation tools they use, each and every day, depend upon such science for robustness and reliability. By representing business processes in a mathematically formalized way, processes developed in one part of the business, or by a business partner, can be connected, combined and analyzed in real time, providing a foundation for the true real-time enterprise behind the real-time enterprise slogan. While the notion of a real-time enterprise is all about agility, and while the basis for *technical agility* may be a service-oriented architecture (SOA), the basis for *business agility* is BPM, making the SOA necessary but insufficient for meeting today's business needs. Just as the operating system emerged as the platform for the RDBMS capability, Web services and SOA are emerging as the platform for the BPMS capability.

The central insight of pi-calculus is that all processes are acts of *communication*. This paradigm has enabled the Business Process Management Initiative (BPMI.org) to define document structures that capture the day-to-day communication that occurs in business at all levels—formal, informal, asynchronous, synchronous, human originated or machine initiated. Such process document structures can be used to define any process, from the highest level of business strategy to the most basic numerical computation. Process-based documents can evolve with the business—just like spreadsheets and word processing documents do today. Milner calls such processes *mobile*, reflecting the dynamic, agile, real-time and adaptive nature of real business processes, not the rigid automation functions of typical hard-coded computer applications.

Unlike application packages, the BPMS adapts to a company's processes, not the other way around. The BPMS platform is targeted at a new hybrid business role that combines the skills of the enterprise data architect and enterprise business architect, allowing them to create process tools for all employees to power their work, each and every day—the *process architect* is the true architect of 21st century business, and the BPMS is the foundation of 21st century enterprise architecture. To wit, a global telecommunications operator moving into broadband used BPM to facilitate the aggressive acquisition of large numbers of new customers, accelerating customer satisfaction well beyond the

competition. Flexible new processes allowed the operator to collect, store and queue orders to ensure that customers did not experience outages from failures in dependent systems operated by third parties. BPM allowed the customer service staff to be flexible in responding to numerous and diverse customer requests—it seems every customer has a custom need that demands custom business processes to fulfill. BPM insulated the customer service representative from changes occurring in third party service providers and the changes arising from the unbundling of service elements as a result of deregulation.

The Business Process Management System

Process management borrows and combines features from a number of familiar tools and technologies, but differs in its central focus on *communicating processes*. BPM feels similar to Computer-Aided Software Engineering (CASE) because of its emphasis on graphical notation, collaborative discovery and design. It shares with workflow management a focus on scripted events and task management. From the viewpoint of the systems architect, comparisons can be drawn with transaction processing monitors and application servers. For ERP practitioners, BPM's focus on process definition and optimization will have strong associations. Developers who have struggled with legacy system integration and who have employed enterprise application integration solutions will recognize similar ideas in BPM, especially where applications are to play key roles in end-to-end business processes. Process analysis tools used in conjunction with the BPMS will be familiar to users of online analytical processing (OLAP).

Because of these prior experiences, a company's existing IT skills can be readily transferred to the world of BPM. However, do not let these similarities lead you to conclude that BPM is simply a repackaging of existing technology—this year's latest IT branding. Although many vendors will try to hijack the BPM moniker, the reality of BPM is that it is unique in its ability to provide a top-down approach to business design that isolates business users from the vagaries of the numerous enterprise application systems already in place. Process models act like “live applications,” but they are only process-schemas deployed on and directly executed by the BPMS. There is no waterfall model of process development as there is in software development. Top to bottom, at all levels of the process model, the process representation is the same and is directly executed by a BPMS in the way that an RDBMS directly executes database structured query language commands. But “direct execution” does not quite capture what is going on, for processes are often confused with more traditional software procedures or scripted workflows. Rather, the process definition is a declarative description of the *now* and the *future*—as instances of the process are created, like a new row being added to a spreadsheet or a database, they proceed in line with their design.

In look and feel, the BPMS is to the business process designer what a design workstation is to the automobile designer. The computer-aided-design and computer-aided manufacturing (CAD/CAM) system of the automobile designer becomes the computer-aided-modeling/computer-aided deployment (CAM/CAD) system of the business process designer. Underlying the BPMS, as in the case of CAD/CAM systems, is a digital

representation and simulation of the real “thing” with which the designer is working. While the automobile designer works with digital artifacts such as tires, engines, body frames, aerodynamics and so on, the process designer works with digital artifacts such as orders, the fulfillment services of suppliers, third party billing services, bills of materials, the shipping schedules of trading partners and so on. When the automobile engineer pushes the “make it so button,” the computer-aided manufacturing part of the system actually implements the building of the new car. When the business process engineer pushes the “make it so button,” the computer-aided deployment part of the system actually implements the mission-critical, end-to-end business process across the disparate legacy systems inside the enterprise and across the value chain.

What about all the C++, Java, scripting, EAI, and other computer technologies that are involved? Where did they go in all this? They are still there, only now it is the BPMS that deals with them, not the designers and other business people who use the business process workstations and the underlying BPMS. With the BPMS, business information systems are developed and evolved by manipulating the business process directly, using the language and concepts of business, not the language and concepts of machines.

BPM is all about raising the level of abstraction from machine concepts to business concepts. Although BPM isn't a panacea for all computing needs, for BPM requires a deliberate step of abstraction and application integration to a common process model, BPM fulfills an increasing number of business-critical needs.

Crossing the chasm

Business process management products are available from many vendors, in versions ranging from departmental workgroup solutions to enterprise-scale infrastructures—a spectrum of solutions to meet diverse needs. Not all BPM systems, by any means, yet use the pi-calculus formalism, or process languages built from it such as the Business Process Modeling Language (BPML) published by BPMI.org. But as other make-do approaches hit technological walls, this will change. The underlying mathematics of pi-calculus and the semantics of BPML are hard to ignore, for these foundations are paramount to robust and reliable business process management. Process languages such as the vendor-sponsored Business Process Execution Language for Web Services BPEL4WS will converge and evolve towards the needs of a BPMS with a solid mathematical underpinning. Today, BPEL is primarily advocated for loosely coupled application integration and development, but as the needs for BPM go well beyond Web services and simple workflow requirements, BPEL will require the same theoretical foundation. CIOs will rightly disregard any other simplistic BPM “layer” as “yet another point solution” unless BPM systems can be shown that they embody a strong formal model of enterprise computing and mobile processes. Only then can the BPMS migrate from a niche category to a mainstream platform, similar to what companies already know and understand in other areas of IT support such as relational data management and network management. BPM is far more than another way to develop applications. The BPMS is a platform that will support a raft of new processes, new tools and new applications. A sales campaign isn't a software application—it's an *application of process management*.

How will BPM be assimilated by end-user organizations? There is no doubt that businesses will continue to look to their current software suppliers for BPM innovations, yet they need a true BPMS *today* even if their preferred supplier cannot deliver, opening the market for new entrants. In addition, companies that survived the turbulent era of reengineering may be tempted to feel that they have already reengineered, reinvented, mapped, analyzed and improved every aspect of their business processes. The reality is that they know, deep down, they have barely started and business processes are in a continual state of flux. The reengineering prophecy—“we’ve not done reengineering”—is indeed true.

Now, we are in uncertain times again—a down turned economy, corporate scandals, and the *IT Ice Age*. Today, companies are experiencing not one broad based economic reality, but a multitude of process-related problems. They absolutely must be able to do “more with less” Early adopters of BPM systems will therefore be those companies that face the most severe process management problems, just as early adopters of relational database systems were those that faced severe data management problems. It is not easy to cast business process related problems into neat little categories or magic quadrants and no pattern of an “ideal BPMS” has yet emerged. On the other hand, business processes and their management lie at the heart of *all* business activity. As a result, processes are taking center stage, driving demand for powerful BPM systems with “pi-calculus inside” that take the process complexity outside of a stovepipe applications and allow existing applications to be expressed in a form that business people, not just programmers, can understand, evolve and manage.

Sitting right at the divide between humans and machines—between business and IT—the BPMS represents a paradigm shift in the world of business automation—business process computing—that has a profound impact on the way companies structure and perform work, letting people speak in their native tongue and enabling machines to understand them, not visa versa. Designed top down and deployed directly in accordance with a company’s strategy, business processes can now be unhindered by the constraints of existing IT systems.

The implications are equally profound for the IT industry, for it must enter its next phase of evolution and maturity. As CAD/CAM systems enabled computer-integrated and “just-in-time” manufacturing, BPM can facilitate collaborative “just-in-time” business processes and a new era of process manufacturing. Those players in the IT industry that master BPM will share the new wealth with their customers: productivity gains, innovation and lowered costs like those the industrial design and manufacturing industries have already realized as a result of implementing a direct path from design to execution.

Welcome to the company of the future, the fully digitized corporation—the process-managed enterprise. Welcome to the next fifty years of business and IT.

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