

# **Business Process Management: The Third Wave**

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## About this Book

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, corporations can gain the capabilities they need to innovate, reenergize performance and deliver the value today's markets demand. This book heralds a breakthrough in process thinking that obliterates the business-IT divide, utterly transforms today's information systems and reduces the lag between management intent and execution.

A process-managed enterprise makes agile course corrections, embeds Six Sigma quality and reduces cumulative costs across the value chain. It pursues strategic initiatives with confidence, including mergers, consolidation, alliances, acquisitions, outsourcing and global expansion. Process management is the only way to achieve these objectives with transparency, management control and accountability. During the reengineering 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 their underlying theories were based on age-old common sense and general systems theory proposed fifty years earlier, they offered no path to execution. By contrast, the process-managed enterprise grasps control of internal processes and communicates with a universal process language that enables partners 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.

Process management is not another form of automation, nor a new killer-app nor a fashionable new management theory. Process management discovers what you do, and then manages the lifecycle of improvement and optimization, in a way that translates directly to operation. Whether you wish to adopt industry best practices for efficiency or pursue competitive differentiation, you will need process management. Based on a solid mathematical foundation, the BPM breakthrough is for business people. Designed top down in accordance with a company's strategy, business processes can now be unhindered by the constraints of existing IT systems. Short on stories and long on insight and practical information, this book will help you write your own story of success. It provides the *first* authoritative analysis of how BPM changes everything in business—and what it portends. 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.

## Appendix B

# Business Process Management Systems

*Firms will need process integration servers that model and carry out broad business processes.*

—Forrester Research, 1999.

*The Business Process Management System (BPMS) enables companies to model, deploy and manage mission-critical business processes, that span multiple enterprise applications, corporate departments, and business partners—behind the firewall and over the Internet. The BPMS is a new category of software and opens a new era of IT infrastructure.*

The BPMS can be viewed in one of two ways: either as a new platform upon which the next generation of business applications will be constructed, or as a new capability deeply embedded within existing categories of business systems. In each case the analogy is between the existing RDBMS and the new BPMS, between relational data and processes, between the lifecycle management of data and the lifecycle management of process. In either case, by acquiring BPMS now companies gain unprecedented control over the management of their business processes, supplementing their existing systems and accelerating the achievement of business objectives.

Companies will either procure process management systems from a vendor specialized in BPMS or they will wait for BPMS capabilities to arrive in a subsequent version of a business infrastructure that they have already procured. In either case they will use process management systems along side existing IT investments.

Process management borrows and combines features from a number of familiar tools and technologies, but differs in its central focus on processes. Practitioners from many disciplines are going to feel at home with third-wave BPM, and vendors of existing products in related areas

are already moving to a process-centered future.

BPM feels similar to Computer-Aided Software Engineering (CASE) because of the emphasis on graphical notation, collaborative discovery and design. It shares with workflow management a focus on scripted events and task management. The rigor, control and exception recovery that systems administrators apply to data and systems management can be extended to processes. From the viewpoint of systems architects, comparisons can be drawn with transaction processing (TP) 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 EAI solutions that use processes to define and implement integration paths will recognize similar ideas in BPM. New process analysis tools used in conjunction with the BPMS will be familiar to users of online analytical processing (OLAP). Finally, those implementing business-to-business integration (B2Bi) will find in BPM such familiar concepts as process participants, location independence and non-invasive integration. BPMS is going to astound and delight, but companies existing IT skills can be readily transferred. Our experience is that the learning curve is entirely manageable.

Business process management products are available from many vendors, in versions ranging from departmental workgroup solutions to enterprise-scale infrastructure—a range of solutions to meet all needs. It is possible that personal BPM tools, akin to the commodity databases that form part of commonly used office productivity suites, will emerge. Imagine a “Process Office” suite, providing an integrated, process-centric approach to collaboration, computation, work management, process modeling and simulation. Such a vision is entirely realistic if based on a third-wave approach.

Processes management is going to be a rich source of innovative new approaches for all suppliers of enterprise software, in both horizontal and vertical industry solutions. Why do we make this claim? Simply because the mark of the third wave is far more than a new software package, it is a far reaching shift in business-IT thinking toward “all things process” becoming the central focus of attention—for all packages. The next fifty years of IT will be dominated not by separate data, application, document and business object paradigms, but by living, breathing *holistic* processes.

How will this trend be absorbed by end-user organizations? There is no doubt that users heavily dependent upon ERP systems will continue to look to their preferred supplier for BPM innovations. But there will also be huge demand for independent Business Process Management Systems (BPMS). Companies need BPMS capability today. We are equally convinced that all enterprise applications will eventually be rebuilt upon a BPMS foundation.

For all of the reasons above it is not possible to describe a “typical” BPMS. Some vendors may not even use that term. Terms such as the *fourth tier*, *business services orchestration* (BSO) and *composite application* are all indicators of the BPM movement. Marketing terms such as *next-generation workflow*, *smart middleware*, *hyper-tier* and *real-time enterprise* are also part of the unfolding story, each shifting “processes” to the center of IT.

In this book, therefore, our only option is to sketch the features of a BPMS based on our current understanding of the potential of BPM. Real products may differ from the descriptions that follow, but if they are “third-wave” they will have more than mere “process-inside”: they will treat processes as their *first-class entity*. We have, therefore, chosen to describe an enterprise-class, “plain vanilla” BPMS. Analysts report that this thing called “BPM” is rapidly becoming the business platform of choice for Global 5000 organizations. We believe that this is the basic capability companies are seeking in their search for control of enterprise processes.

In look and feel, the BPMS is to the 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.

Unlike shrink-wrapped packages, BPM adapts to a company’s processes, not the other way around. The BPMS is targeted at a new hybrid business role—that combines the skills of the enterprise data architect and enterprise business architect. The *process architect* will be the true architect of 21st century business.

Underlying the BPMS, as in the case of CAD/CAM systems, is a digital *simulation* of the real “thing” with which the designer is working. While the automobile designer works with digital models of such artifacts as tires, engines, body frames, aerodynamics and so on, the process designer works with digital models of such artifacts as orders, the ful-

fillment 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.

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 their 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. The BPMS sits right in the middle of the two worlds of humans and machines, letting people speak in their native tongue and enabling machines to understand them—a paradigm shift in the world of business automation that has a significant impact on the way businesses structure and perform work. Business change now proceeds unhampered by the rigid machine-oriented business technology of the past.

## **The Process-Managed Enterprise**

Throughout the last decade companies have been using increasingly complex processes to maintain their operations, but have yet to see an IT infrastructure capable of fully supporting these processes. The great benefit of the last decade’s enterprise resource planning (ERP) packages was supposed to be their ability to promote integration—everything the business needs, all in one place—but realizing this goal was not really possible until now, with the advent of BPMS.

Competition and the escalating influence of the business Internet, have put pressure on companies to create new processes and extend existing ones to customers, trading partners and suppliers. Processes used to be embedded in ERP and other monolithic systems. It didn’t take long to realize that embedding processes in software was a bad idea, but no better ideas were available. The reason for this is threefold. First,

packaged enterprise applications such as ERP systems manage only those parts of the business process that have to be automated at any cost—typically such processes as materials resource planning and financial reporting. Second, the deployment of new end-to-end processes on some IT infrastructures requires prior organization of enterprise data, a formidable process that has already taken several decades to complete. Third, the processes ingrained in most application packages cannot be changed easily nor combined with others, let alone integrated or freed up for collaboration.

For these reasons, ERP and similar systems require massive process reengineering efforts even for internal processes; it is therefore unlikely that any *packaged* enterprise software will be able to automate the countless possible interactions between the processes of multiple business partners. There are both theoretical and practical reasons for this.

From a theoretical standpoint, the complexity of integrating multiple processes increases exponentially with the number of processes and the internal complexity of each process. Take just one example: a standard application for automating the build-to-order process. How could such an application be suitable for all companies in all industries? To claim that it could is comparable to claiming that a universal application had been found for implementing the “dollars-to-more-dollars” process! Application developers who stick to a paradigm based on data and procedures face an uncertain future. Their business model is based on perfecting processes that appeal to all companies and all situations in all industries. That model is absurd, and developers will soon abandon it: When you find yourself in a hole, stop digging.

From a practical standpoint, business partners have heterogeneous IT infrastructures provided by various vendors, and as a result, cannot rely on a single solution to cover every possible case. Even if one company does manage to standardize on one application, this standard can rarely be imposed on others. Industry gorillas that believe they can impose a standard across a value chain are deluding themselves. The long lead times for deployment and customization of any standard package is debilitating. Companies seeking value-chain integration should instead separate process innovation from process integration. Integrate applications once, to the BPMS, and be free ever after to manage end-to-end processes.

The problem of integrating the IT infrastructures of multiple busi-

ness partners in a vendor-agnostic fashion will be solved in part by the standardization of collaborative business-to-business interfaces. Examples include, RosettaNet in the high-tech industry, ACORD in the insurance industry and CIDX in the chemical industry. Nevertheless, there remains the question of how to integrate these interface processes with existing IT infrastructures, which consist of multiple packaged enterprise applications that are increasingly complemented by new e-business applications such as procurement, fulfillment and service-chain management. But that's not all. Partners want to innovate rapidly and deploy innovations from end to end, not just establish a standard interface at the boundary between companies. Standards organizations must not repeat the mistake of packaged software suppliers: They must focus on a *standard process representation*, not *standard processes*.

Companies should abandon piece-meal individual integration projects and instead use a process foundation for building a coherent IT infrastructure—an enterprise architecture—that encompasses all packaged, departmental and enterprise systems. In this way, unique processes can be extended to business partners and customers—a method we call multi-channel, multi-system and multi-company integration. It's an “integrate-once and customize-many” approach. It contrasts sharply with the approach of distributing packaged software across the industry, which puts a company's proprietary process at risk of being replicated, destroying its competitive edge.

The BPMS enables implementation of business processes directly on the IT infrastructure without the prohibitive cost of software reengineering. The key element of a BPMS is what we call the *process virtual machine*, although different vendors may use different names. This is a scaleable concurrent-processing execution environment for business processes that execute the language of business process much as the Java virtual machine executes the computer programming language Java.

The BPMS does not replace existing applications, although its ability to easily define and execute new processes will be used to replace some application development as experience gives companies the confidence to take that step. Existing heritage systems, however, remain valuable for both internal and external process-based development, because their functionality, currently ingrained and embedded, can be tapped and encapsulated by the BPMS as software components that contribute to new or improved business process designs. Nor do we dismiss any

newly invented “best-of-breed” applications that companies may wish to integrate into end-to-end process designs. The flexibility is desirable not only from the point of view of end users but also from that of software suppliers that want to build a repository of application components from other vendors, which they can use to manufacture processes that meet the needs of particular industries or individual customers. This convergence of application and process will deepen over time. Process management systems already exist that “project,” or view, standard software in the form of explicit, manageable, process data. This flexibility is what end-user organizations need, and vendors that do not listen will ultimately pay the price.

## **Benefits of a BPMS**

The BPMS, whether purchased as a separate system or included with next-generation application packages, will enable the enterprise to live by the adage “Say what you do, and do what you say.”

Since a packaged application cannot adequately address the challenges raised by the integration of business processes, the only alternative, in the absence of a BPMS, is extensive custom development involving traditional programming. Even if the software development approach is versatile, a major drawback remains: Software code does not directly reflect business processes, and thus becomes incredibly difficult to maintain over time, as processes require modification. Although internal processes can be successfully maintained if current development methodologies are carefully adhered to, the same is not true for processes that extend to partners. Traditional approaches can no longer handle the complexity of the task: All the programmers in the world, even if a company could afford them, could not keep up with the growing demand for end-to-end business processes.

The intermediary step between the definition of business processes and their implementation on the IT infrastructure can be avoided with a process-centric infrastructure (Figure B.1). This, in turn, confers upon the IT infrastructure the advantages of adaptability and control.

*Adaptability: The BPMS is the primary business velocity engine.* Companies are under great pressure to embrace the unprecedented changes fostered by the economy, manage dynamic relationships with business partners and retain an edge over the competition. Business analysts customize

business processes through user-friendly design tools and through business rules expressed in natural language. This dramatically reduces the time required for the deployment of new business processes.

*Manageability: The BPMS enables business process intelligence.* For the same competitive reasons, the enterprise needs to measure its performance directly. Analysts, never shy about introducing new three letter acronyms, refer to this as enterprise performance management (EPM). The “P” in EPM ought to stand for “process.” EPM is not an amalgam of existing ERP, CRM and SCM applications, as some analysts have defined it, but should be defined as the third wave of business process management and heralds a shift to BPMS as the foundation for enterprise architecture.

Traditionally, business measurement—what analysts call “business intelligence”—has been based on the analysis of *data* extracted *after the fact* from past operations of implicit business processes. The BPMS, on the other hand, enables business analysts to do real-time process analysis—to *directly measure the business value of explicitly defined business processes*. These processes can now be optimized on the fly without the need for additional software development, tremendously simplifying the management of their design over their lifetime.

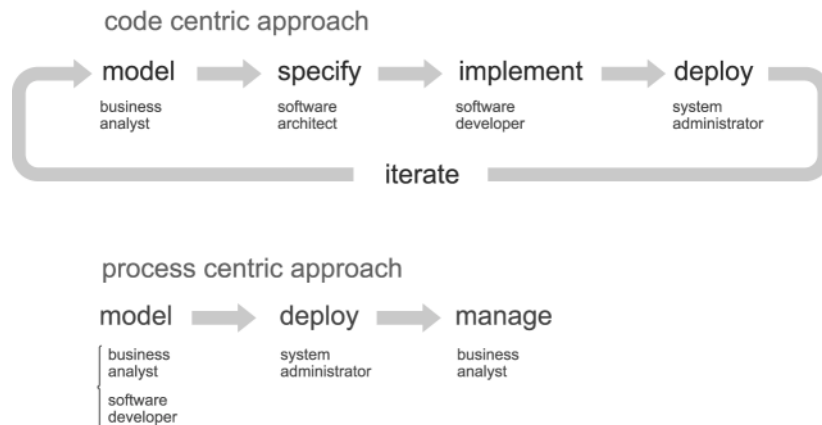


Figure B.1. Software versus Process Development Lifecycle

## Requirements for the BPMS

The BPMS must meet three mandatory requirements: extreme flexibility, reliability and security. It must be able to model, deploy, and manage any business process, in any vertical industry, across any enterprise application, corporate department or business partner. This requires a high degree of flexibility, which is provided by the process representation used by the BPMS. The system must possess scalability, fault-tolerance and quality of service if it is to be viewed as a mission-critical infrastructure component. And since the BPMS serves as the frontier between internal IT infrastructure and that of business partners, it must also offer advanced process-level security. No other enterprise software infrastructure has ever provided all of these features.

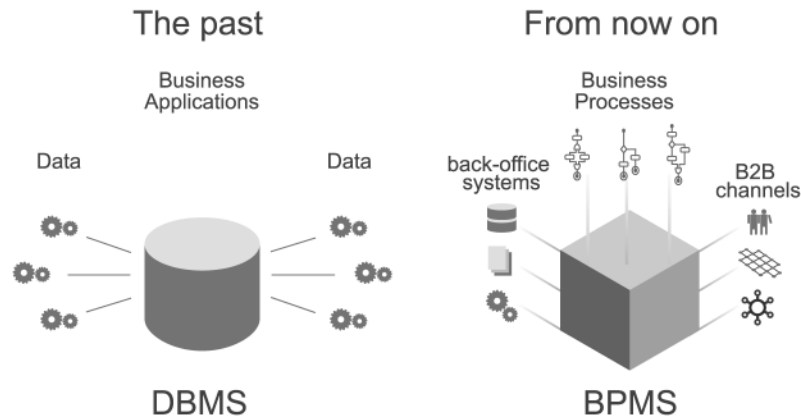


Figure B.2. Mission-Critical Enterprise Software Infrastructure<sup>1</sup>

*Flexibility.* Just as flexible relational database management systems were based on the powerful relational model for the modeling, indexing, and retrieving of data, the business process management system must be built around a powerful business process model for the modeling, deployment, and management of enterprise-wide business processes.

Therefore, as Gartner's David McCoy advised,

Enterprises should begin to take advantage of explicitly defined processes. By 2005, at least 90 percent of large enterprises will have BPM in their enterprise nervous system (0.9 probability). Enterprises that continue to hard-code all flow control, or insist on manual process steps and do not incorporate BPM's benefits, will lose out to competitors that adopt BPM.<sup>1</sup> Business process management's potential for business improvements through advanced process automation is the most compelling business reason to implement an 'enterprise nervous system' (ENS). Where ENS

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<sup>1</sup> The cube is the symbol adopted by the Business Process Management Initiative to represent the BPMS, as opposed to the cylinder that has traditionally denoted the database management system. The cube and is not a trademark of the BPMI nor of any member of the BPMI. The top face of the cube always represents processes. The left and right faces can be used to represent either internal applications and external business channels, or information sources and process participants.

implementations risk being seen as infrastructure in search of a problem, BPM allows enterprises to raise the level of discussion and make specific business process support the primary reason for application integration efforts.<sup>2</sup>

The BPMS must knit process components together and allow the accurate measurement of the performance of business processes using advanced business-process intelligence technologies. It must enable business analysts to customize existing business processes for specific market segments, trading partners and customers. The system must enable the enterprise to leverage its existing IT investments by providing an open architecture based on industry standards, simplifying its integration with any back-office system, enterprise middleware, or packaged application, on any platform or operating system. Most importantly, the system must support standard business-to-business collaboration protocols, without requiring business partners all along the value chain to be running the same business process management system. This flexibility will be augmented by means of building interfaces between process systems, mediated by interface processes that partners agree to use for collaborative, distributed process management.

*Reliability.* A process-oriented business infrastructure must provide a foundation for existing mission-critical applications that rely on it to gain access to core process services. This has been the case for ERP packages, which typically rely on an external database management system provided by a third party. In addition, BPM is based on parallel (concurrent) computing, which means that the business process management system must offer an extreme degree of scalability and reliability—including support for clustering, load balancing and failover—so that the continuous execution of processes is never interrupted.

Reliability is usually the result of multiple factors, mainly of a technical nature. Scalability must be offered in terms of both scope and complexity so that the business process management system will be able to support a broader range of business processes that span an increasing number of enterprise applications, corporate departments, and business partners. Fault-tolerance should be provided through a proper architecture that minimizes the number of single-points-of-failure and supports the redundancy of critical components. Quality of service must be guaranteed based on process-level agreements negotiated between business partners, and embodied in explicit digital process interface

designs.

The same criteria that companies have applied to existing products can be used to evaluate the BPMS. However, it will also be necessary to evaluate the capabilities of process management systems in terms similar to those used to evaluate early database management systems. For example, it is possible to determine the degree to which a relational database product adheres to the relational data model as set out by E. F. Codd:<sup>3</sup>

- Large data banks must be protected from having to know how the data is organized in the machine (the internal representation)
- Activities of users and most application programs should remain unaffected when the internal representation of data is changed
- Changes in data representation will often be needed as a result of changes in query, update, and report traffic and natural growth in the types of stored information
- A model based on *n-ary* relations, a normal form for data base relations, and the concept of a universal data sub-language are introduced
- Three of the principal kinds of data dependencies need to be removed from existing systems: ordering dependence, indexing dependence, and access path dependence

Replacing the word “data” with “process,” similar criteria can be extended to BPMS—and we encourage vendors to take this step. Reliability will be paramount. Will BPMS work in the correct manner under all conditions, and can the outcomes of executing processes be predicted?

*Security.* The BPMS must serve as a “business firewall,” offering security and auditability. In any open environment, across companies or across internal-divisions, security is, not an optional feature that can be added over time through point solutions, but a *mandatory feature* that should be addressed in the early stages of development. Whether it sits on a private community network or the open Internet, the business process management system is the boundary between a relatively unsecured IT infrastructure and a community of partners that, unfortunately, are not always trustworthy or well intentioned.

For example, business partners commonly require the ability to

validate the employment of a person claiming to work for the other partner. In the past, this problem was typically solved by providing one partner access, over a virtual private network (VPN), to the human resources systems of the other partner. The VPN grants physical access to desktop computers, servers and mainframes, however, leaving potential security holes. It provides access to far too much information, even within the HR system alone, when all that is really needed is a confirmation of employment. Because trading partners need to reach deep into one another's systems, companies are not able to change any of their existing systems without coordinating explicitly with partners.

BPMS eradicates this constraint by mediating the connection between partners. The BPMS can receive a partner's request, access the correct information, provide a response in an agreed-upon way and modify the rules for doing so as needed—all expressed explicitly in a process design. The boundary between the partners is the process interface. The private implementation component of the process resides inside a particular partner's security boundary. The boundaries between private and publicly shared process-design information and process data content can be adjusted dynamically according to the needs and wishes of the partners and the different security roles granted to specific users. The BPMS is, a *business process firewall*, as illustrated in Figure B.3.

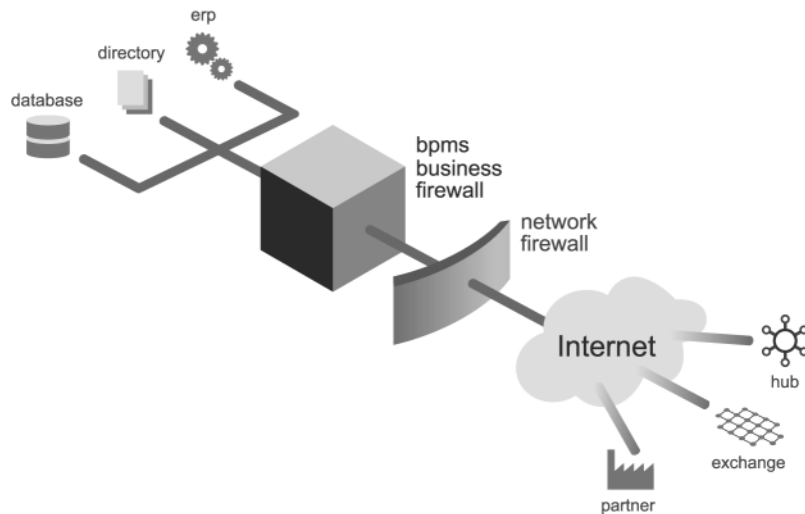


Figure B.3. The BPMS as Business Firewall

In contrast to the rigidity of most hardware firewalls, the configuration is flexible and can change according to the needs of the business—without compromising security. Processes can be used to define and execute a security policy. Process participants can act as mediators in an end-to-end security process.

As a business firewall, the BPMS enables the enterprise to audit the security of its IT infrastructure. In a distributed environment, users must be identified with certitude, and therefore the business process management system must support user authentication through digital certificates. Furthermore, security policies must be deployed at the enterprise level, which requires integration with existing directory services. Finally, communications with business partners must be encrypted to guarantee the proper level of confidentiality. Consequently the BPMS must support existing public key infrastructures (PKI). In this way, business partners establish the process-level of identity required to authenticate members of trade communities.

## The Business Process Management System

Beyond compliance with complex technical requirements, the busi-

ness process management system must provide the foundation for a *straight-through process integration* methodology. As shown in Figure B.4, the BPMS *integrates once* with existing IT systems so that the enterprise can leverage its previous investments while retaining the ability to innovate rapidly in the area of process design. In addition, it must provide an evolutionary path to support future business-to-business *collaboration protocols* that will grow dramatically in scope and complexity over the coming decade. Companies are now looking for products that implement process management in general, not the specifics of particular protocols. Such hard-coded solutions will be left in the dust by the BPMS.

AMR Research<sup>4</sup> enumerates the ten typical capabilities that will be embodied in a business process management system:

- |                              |                          |
|------------------------------|--------------------------|
| 1. Process Modeling          | 6. Process Automation    |
| 2. Collaborative Development | 7. B2B Collaboration     |
| 3. Process Documentation     | 8. End-User Deployment   |
| 4. Process Simulation        | 9. Process Analysis      |
| 5. Application Integration   | 10. Knowledge Management |

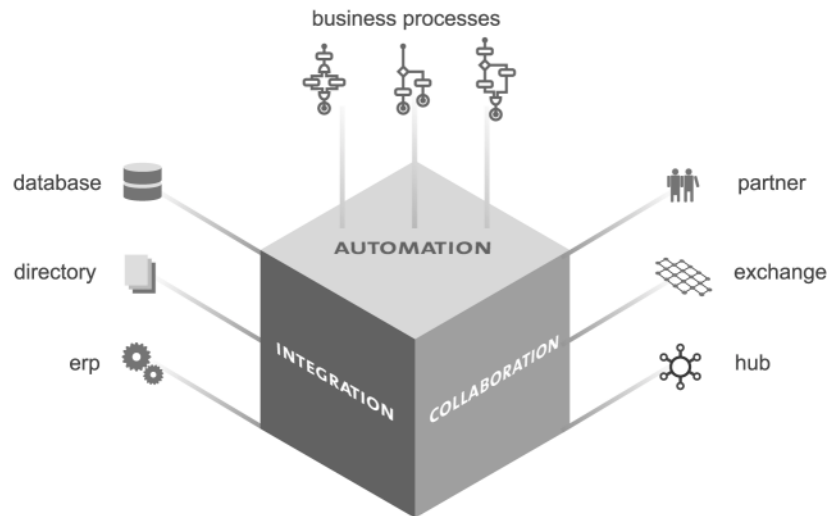


Figure B.4. The Business Process Management System

*Model, Deploy, Manage.* The business process management system enables a three-step, straight-through process integration methodology for the integration of business processes. When a BPMS is first employed, these steps should involve different categories of users—business analysts, software developers and systems administrators—with the constant participation of business analysts over the entire lifecycle.

First, business processes are modeled with a graphical user interface (GUI) and the underlying process design patterns are stored in a process repository. The process repository is responsible for the distributed authoring of business processes by multiple users over Internet-based networks.

Second, business processes are deployed from the process repository to the business process management system with process management tools accessible from any browser. Processes can be deployed and updated in real-time, without any interruption to the process server. Tools for users can dynamically query the state of any process instance, as well as the status of the business process server itself.

Third, business analysts and system administrators can begin to manage business processes with system management tools using standard business process query languages. For example, operators are able to manage the division of work between partners in the execution of processes. BPMS must provide for the fluid movement of process activities and responsibilities across organizational boundaries, which is so important in value chain integration and business process outsourcing.

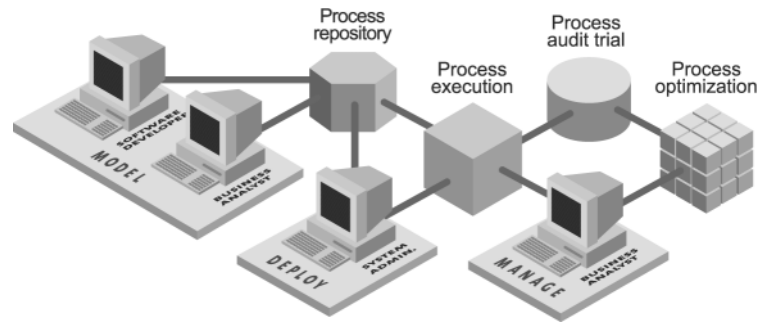


Figure B.5. The Model, Deploy and Manage Methodology

Process management offers a clean approach to the division of responsibilities between business and IT in the management of the process-centric enterprise infrastructure. The “process-neutral” BPMS infrastructure is owned by the corporation and entrusted to IT to manage—either in-house or through outsourcing to a third party. The processes running on the BPMS are owned by the corporation, by lines of business or by functional workgroups, depending on how the processes are segmented and designed. High-level end-to-end processes are probably owned by the corporate office. Controlled adaptations of these processes will be owned by local entities, particularly in federated organizations, where it is necessary to “think globally, but act locally.” The BPMS will be the repository of organizational learning and best practices.

The extent to which IT is involved in the design of processes will vary from company to company and from process to process. It will depend partly on culture, partly on skills and partly on the type of processes being deployed. Although we have consistently used the phrase *business process* in this book, we do exclude IT processes, such as data center operations or IT service management, from the scope of our definition, for these are business processes in their own right. IT will naturally be more involved in the managing of its own processes than it is in processes owned by HR or logistics.

Most importantly, BPMS will empower the business side as never before. The business side will focus mainly on process discovery, design, optimization and analysis, and will share responsibility for process

deployment, execution and operations with IT, although as processes bed in, even those responsibilities will fall to the business, not IT, whose focus will be to assure the business continuity of the BPMS service itself. In addition, software engineers may still be required to implement some “last-mile” aspects in all process design. Vendors will seek to minimize these out-of-process-bound activities.

Business analysts will design high-level process patterns (process skeletons). Business people will use these reusable processes to create their own actual processes and put them into operations on the BPMS. There will be no set pattern either for how the BPMS should be used or how the organizational structures should grow up around it. Companies will find that BPM adapts to the way they work.

The BPMS will inevitably be used with a wide variety of existing tools in the company, including those shown in Table B.1.

Process discovery tools	Rules management systems	Integrated development environments
Simulation	Modeling tools	Integration brokers
Transaction servers	Source code control	Publishing systems
Application servers	Directories	Groupware
Databases	Systems management tools	Public key infrastructure (PKI)

Table B.1. Existing IT Tools To Be Integrated With BPMS

IT will be responsible for integrating these with the BPMS where they already exist in the enterprise, or will decide which BPMS products contain the richest and most complete set of tools. Standards will play a major role.

*Integration, Automation, Collaboration.* In order to support such a methodology, the business process management system must provide a high-level abstraction of the peripheral entities with which it must interact. Modeling, deployment, and management of business processes must be totally independent of the mundane details related to any specific back-office system or business-to-business collaboration protocol. This “model once, deploy many times” philosophy is enabled by a three-tier architecture comprising, at its most basic, an integration tier, an automation tier, and a collaboration tier, as shown in Figure B.6. This diagram is deliberately abstract and simplified; because we encourage end user

companies to examine real products and services from vendors and consulting firms.

The integration tier is responsible for the integration with back-office systems, enterprise middleware, and packaged applications. It offers a schema-driven mapping framework and off-the-shelf connectors to leading databases, directory servers, message-oriented middleware, transaction-processing monitors, application servers, and packaged enterprise applications.

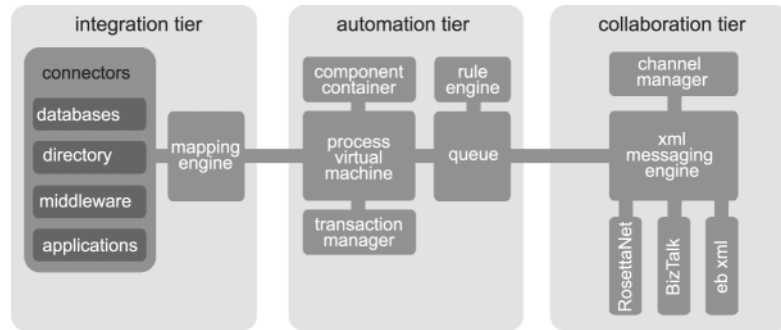


Figure B.6. The Abstract, 3-Tier, BPMS Architecture (Simplified)

The automation tier is responsible for the reliable execution of business processes and the processing of business rules. It relies on advanced distributed and concurrent computing technologies including a message queue, a transaction manager, a component container, a rule engine, and a process virtual machine.

The collaboration tier is responsible for the support of standard business-to-business collaboration protocols, as well as any future standards or any custom protocols such as those already in use by industry. It is built on top of a versatile XML messaging engine and offers customizable implementations of leading business-to-business (B2B) collaboration protocols as well as a hierarchical channel manager.

*Process Integration Environment.* The business process management system is not simply an execution engine for business processes. Rather, it's a complete platform for the modeling, deployment and management of all process-related information. While this environment is specifically targeted at business analysts and supports distributed collaborative

development, it is also designed to inter-operate with existing integrated development environments (IDE) used by software developers. Existing repositories of enterprise “software” assets must be accessible to the BPMS. Completing the platform are system management tools designed for system administrators.

## A Process Server

Just as today’s data management systems can be accessed from different programming languages using structured query language (SQL) or other connectivity tools, the same will be true for process management systems. The DBMS is a general purpose “data server”; the BPMS will be a general purpose “process server.” Although it will be possible to work entirely using BPML, we can expect a variety of software engineering techniques to grow up around the BPMS. One of the most significant will be the process equivalent of SQL, the Business Process Query Language (BPQL). This will enable the development of “process-aware” applications, regardless of platform or programming language.

The reason that software developers will readily adopt BPQL and process servers is that they simplify the development of applications in the context of *entire processes*. In traditional development, pieces of a business process are scattered; a piece in one application; a piece in another; a piece in my system, a piece in the system of a partner. Implementing “e-business” using such an approach is extremely time consuming. Process-aware applications, on the other hand, see all processes and all process data, limited only by the rules of process-level security (itself defined as a process). With BPQL, it will be trivial to write software programs that monitor, interrupt, interact with and intercede in end-to-end processes. The “e” in “e-business” stands for integration, collaboration and coordination. When processes are first-class citizens, the “e” is pre-built into every process and doesn’t have to be “e”-programmed for each, just like Lego bricks are designed to snap together.

BPQL will also make it possible to write the equivalent of database “stored procedures and triggers” whereby the process server can invoke, interrupt and interact with business processes on the fly. We expect developers to be very inventive—perhaps too inventive—finding ways to write all kinds of code to manipulate processes offline, online or even during process execution. This process-centric application development

environment will not be different in kind from traditional programming, but it will be incredibly more powerful. Process-aware code will have a 360-degree view of the processes—past and present—spanning systems, departments and businesses.

Remarkably enough, process-aware applications can be written in such conventional programming languages as COBOL, Java and RPG, as well as in such database query tools as SQL, ODBC and XPath. If *process* is the new “data,” then a raft of new techniques will emerge, offering a rich palette of opportunities for new technology start-ups that choose to build on, not re-build, the new process foundation the BPMS provides.

Although the advocates of process management systems envision a world in which the business process design alone supersedes the application as the organizing principle for software, old habits die hard. Application development using established programming languages will continue for the foreseeable future. But the trend is clear: BPMS will greatly simplify application development in the way that DBMS did in days past. In a world of processes, don't expect software to go away. Companies should develop guidelines for determining when the different paradigms—process aware (BPQL), data-aware (SQL)—should, and should not, be used.

## **The Integration of Applications and Processes**

Companies that set out to define and execute processes using a BPMS will be surprised to find how easy it is to integrate existing applications into process design. Although the system will be most commonly used to integrate existing back-office systems, it has far greater potential. For example, many companies already use simulation and other business-intelligence tools. These can now be extended into the realm of executable processes. When the simulator has been integrated, once, to the BPMS, it can freely participate in any process design, requiring nothing more from the user than drag-and-drop operations on the process design desktop user interface. The user specifies using BPML how the simulator's process exchanges information with the processes of other participants. The simulator becomes a new agent in the system. It can add intelligence to the process and oversee and predict the behavior of entire processes. For example, it could provide a

running simulation of market response to new products.

Integrating a simulator in this way provides *simulation as a service* to every process participant. But BPMS vendors and some companies may take simulation a step further, providing access from the simulator to the process server using BPQL. In this way, all persistent process data will be available to the simulator, opening up vast possibilities for new business insight. Companies should count on this being possible today and start to plan the applications it enables.

Any existing IT system can be integrated to the BPMS or included within a process design as a participant. For example, supply-chain planning tools and value-analysis tools can now have access to the end-to-end process data they need from across the whole chain. It's no more difficult to achieve than designing the required process.

## **Process Management and the IT Industry**

The emergence of process management systems does not mean that packaged “software” is going to go away—far from it. It is possible to package a digital process in the same way that it is possible to package software objects. Packaged processes are a form of packaged software.

Software companies that develop and sell enterprise packages want new ways to customize their products. Process management systems offer an answer. Many software companies are considering strategies for componentizing their current monolithic products, and several have already made significant progress in this effort. Their goal is to allow customers to pick and choose only the components they need, as they are needed. Others are exploring the possibility of packaging software components as “business services” and selling them using an ASP (application service provider) or BSP (business service provider) approach.

If we extrapolate such activities into the future, we can envision the era of building application packages giving way to an era of “process manufacturing.” Package suppliers, including those who strive to offer a “complete” solution, can embrace the principles of mass-customization in their offerings. Initially these suppliers will use process management to adapt their existing packages to the needs of vertical industries—a process that has already begun—then to niche markets, and eventually to individual customers. Providing process solutions to small and mid-

size enterprises (SMEs) , which cannot afford the huge ERP packages of the past, is a considerable market opportunity.

Packaged software is poised to change in two significant ways. Firstly, packages will look more like processes and suppliers will provide process management tools for adapting them to the enterprise. In days of old, package suppliers urged their customers to avoid customization, for they well knew the consequences. When a company did modify a package and things went astray, the suppliers often threw up their hands and said, “It’s not our fault.” Tomorrow, packaged software suppliers with process management systems embedded in their offerings will encourage customization. They know that this is how competitive advantage is achieved and they want prosperous customers. In the era of BPM, when a customer modifies a package, the suppliers will throw up their hands and say, “Let’s celebrate!”

Secondly, a wave of new “process software,” built on the foundation of the BPMS, will emerge. Although the notion of “process software” may sound inconsistent with the principles of the third wave of BPM—the eradication of software development and IT involvement in process design—it is really no different than the emergence of support tools for data management. These tools will fall into one of two general categories:

- Advanced tools provided, not by the BPMS supplier, but by companies specializing in various aspects of the process lifecycle, such as discovery, design, operations, optimization and simulation.
- Applications built on the BPMS and taking advantage of its capability to persist and manage the state of end-to-end processes. For example, future ERP, SCM, CRM and workflow—indeed all applications—will be built on, or evolve toward, the BPMS.

Such developments are inevitable: The BPMS is not a silver bullet or panacea, any more than any other packaged system is. However, because the step from data to process is so profound and so powerful, many companies may find less need for specialized applications, relying instead upon the general-purpose process management system. This is the experience of companies that have already deployed the first generation of third-wave BPM solutions. They are finding they have a very powerful “application” (process) development environment. Not only

this, but the “applications” (processes) they develop work together with no further integration work required from IT.

## Crossing the Process Chasm

As end-user organizations, software providers and consultants move to process-centered information systems, the pattern of adoption will be similar to that of the migration to the database platform: There will be early adopters, mainstream adopters and the laggards. In tables B.2 and B.3, we compare key factors in the migration to the standards-based database platform with those involved in the migration to the BPMS.

	<b>Preexisting Applications</b>	<b>First Generation Innovators</b>	<b>Mature Data Applications</b>
<b>Data</b>	Embedded	Partially explicit	Fully explicit
<b>Data representation</b>	Proprietary	Proprietary	Standard (relational)
<b>Data query language</b>	None	Proprietary	Standard (SQL)
<b>Data management tools</b>	Ad hoc	Proprietary	Platform (RDBMS)
<b>Business impact</b>	Unable to easily manage data within and between applications	Easier to manage stovepipe data but no enterprise data query	Enterprise wide (shared) data management (and data-aware applications)

Table B.2. Evolution of Data Management

First-generation BPM innovators represent where we are today, and the industry is poised to take the next step. Most businesses and the software companies that supply them are in a headlong race to obtain process-management capabilities, although much of the effort thus far has been spent on finding ways to extend the existing “data-application” paradigm by embedding “application-interface” integration brokers with packaged applications. As companies experience increasing pressure to find new competitive advantage, and as they recognize business process management as the means to that end, the race to BPM maturity will set a new speed record for the mainstream acceptance of a radical

breakthrough.

	<b>Preexisting Applications</b>	<b>First Generation Innovators</b>	<b>Mature Process-Applications</b>
<b>Process</b>	Ingrained	Partially explicit	Fully explicit
<b>Process representation</b>	None or implicit	Proprietary, and, possibly not first-class citizen	Standard (BPML)
<b>Process query language</b>	None	Proprietary	Standard (BPQL)
<b>Process management tools</b>	None	Proprietary	Platform (BPMS)
<b>Business impact</b>	No ability to change processes without software engineering	Some discrete processes manageable (point solution)	Enterprise wide (shared) process management (and process-aware applications)

Table B.3. Evolution of Process Management

## A New Era of Business Infrastructure

The introduction of the business process management system will lead to pervasive yet evolutionary changes in the corporate IT infrastructure. First, new packaged enterprise applications will leverage the BPMS as a mission-critical process execution facility. Second, the BPMS will act as a business firewall, federating multiple directory services across the enterprise—the foundation for future enterprise-process repositories. Third, the BPMS will be tied to future process-analysis servers—the cornerstone of the next generation of business process-intelligence technologies. As a result, the BPMS will become the center of gravity of the modern enterprise architecture.

Over the last two decades, companies have undertaken many business-reengineering initiatives, with mixed success. As a result, they are much more experienced in discovering, understanding and modeling their business using processes. We believe that companies are ready to take the next step, adopting business process management as the primary mission-critical enterprise software infrastructure governing process innovation. In fact, many are going to be surprised by how

liberating that step will be, thanks primarily to the design-driven architecture (DDA) of BPM, further explained in Appendix C. Those that choose to participate will deploy and manage their own innovative business processes making changes when required, the way they always wanted to. The BPMS is the cornerstone of the company of the future.

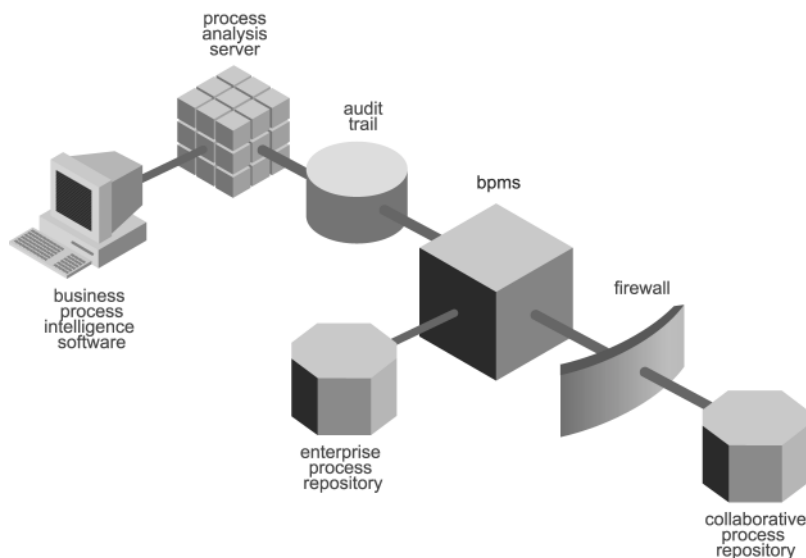


Figure B.7. The BPMS-Centric Enterprise Software Infrastructure

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