BPM Technology Taxonomy:

A Guided Tour to the Application of BPM

SAP **accenture**

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Contents

Abstract

This paper provides a survey of the practices and technology related to business process management (BPM). Basic concepts are explained, the transformational effect on the enterprise is examined, and the value that BPM can create is analyzed. The paper then presents a survey of the vast array of technology that is related to BPM and sorts out how and when such technology is used.

Introduction

As the modern enterprise grows in complexity and scope, managers have struggled to keep pace. The value-creating processes inside companies are more complex. More and more activities happen outside companies in extended business networks. Demands for increased compliance and better financial returns seem only to increase. The pace of change is faster than ever.

Business process management increasingly is seen as a way to master the swelling complexity of the modern corporations and coordinate the work of thousands of people through a focus on well-defined processes. Leading companies have shown that applying business process management (BPM) in the right way can fulfill the promise of IT to automate business processes and directly support strategy.

What is rarely described in discussions of BPM is the end-to-end picture. How exactly does the act of using the boxes, lines, and diamonds to describe processes ultimately lead to the goal of running a better business? What are the steps from start to finish to reach this goal? What value does an increased focus on business processes bring? How will an organization change in the wake of this focus? How does BPM transform the traditional solution-development lifecycle? What role does technology play? How does BPM incorporate ERP and the existing enterprise application landscape? How has the next generation of solutions, the so-called third-generation, been constructed using modeling, business rules, and SOA to fulfill the promise of BPM?

This paper aims to bring readers to a more complete understanding of what BPM means, how it works at many different levels, and how to get started. The authors intend to demonstrate that business process management is simply good management that emphasizes the central role of the business process. Business process management is the discipline of thinking first about how to optimally run your business through defined processes, and then finding a way to take advantage of the latest developments in technology to extend automation to achieve more effectiveness and efficiency.

The three questions executives at all levels should ask themselves are:

- Are we running our business with a process-centric management viewpoint?
- Are we defining and automating our processes with tools built for that purpose?
- Are we migrating our applications, infrastructure, tools, and program management processes to create a third-generation business process platform to support adoption of BPM?

This paper argues that companies will benefit from a process-centric approach that is supported by intelligent use of business process management technology. In making this case, the paper will start from scratch and explain the basics of both business process modeling, business process management, and a process centric approach. The paper will then move on to a detailed discussion of business process management-related technology.

The argument will unfold in the following sections, each of which answers key questions:

Understanding Business Process Management. Provides basic descriptions for terms that are often used and seldom clearly explained. Related areas to business process management such as performance management and organizational structure will also be explored. The following questions are answered in this section:

- What is a business process?
- What is the lifecycle of a business process?
- What is a model?
- What is business process modeling?
- What is business process management?
- How are business processes executed without BPM?
- How does BPM change the function of IT?
- How is performance management related to business process management?
- How is a process-centric approach changing the structure of modern companies?

The Business Case for Adopting Business Process Management. Reviews the arguments in favor of adopting business process management. This section presents the long-term vision for business process management, the more immediate business value, and explores the effect on business networks and the IT function. The simultaneous top-down and bottom-up propagation of business process management is also described. The following questions are answered:

- What is the ultimate vision for a process-centric company?
- What is the business value of BPM?

- o How does BPM help run an extended business network?
- o How do companies adopt BPM?
- o What skills are required to support BPM?

Applying the Technology of Business Process Management. Presents a taxonomy of business process models that can be used to quickly categorize and understand the appropriate use of the growing collection of business process management–related technology. The role of enterprise applications and service-oriented architecture (SOA) is explained along with examples of how to use various categories of BPM technology. It answers the following questions:

- o What is the purpose of BPM technology?
- o How does BPM technology expand the scope of IT?
- o What categories of BPM technology exist?
- o What is descriptive BPM technology and what is its value?
- o What is BPM technology for process automation and what is its value?
- o What functionality and components constitute a fully formed BPM suite?
- o What enabling standards and technology support BPM technology?

People who are new to business process management or who are seeking to refresh their knowledge should read the paper straight through. Cognoscenti should start at the section "Applying the Technology of Business Process Management," which breaks new ground and provides a helpful way to organize thinking when selecting technology.

This paper is intended to spark a continuing discussion of business process management, which will henceforth be referred to as BPM in the paper. To join this discussion, please go to one of the following online communities:

- Join the SAP BPX Community at https://www.sdn.sap.com/irj/bpx
- Get more information about SAP NetWeaver BPM at http://www.sap.com/platform/netweaver/components/sapnetweaverbpm/index.epx
- Go to Accenture Business Process Management Services at http://www.accenture.com/bpm
- For information on systems integration and technology from Accenture go to http://www.accenture.com/Global/Technology

Understanding Business Process Management

The terms process, business process, modeling, business process modeling, and business process management are seemingly self-explanatory enough that they are used most of the time without an explicit definition. Unfortunately, not everyone means the same thing when they use these terms. In this section of the paper we clear the decks of the basic concepts of BPM as well as explain some links between BPM and adjacent areas of concern.

The following definitions attempt to stay away from academic complexity and get to the heart of the matter.

What Is a Business Process?

A process to most people is a description of a way of doing things or the way something happens. A process is a transformation in which inputs are converted to outputs. In business, a process is a way to achieve a specific objective that is related to creating value for the end-customer, as shown in Figure 1.
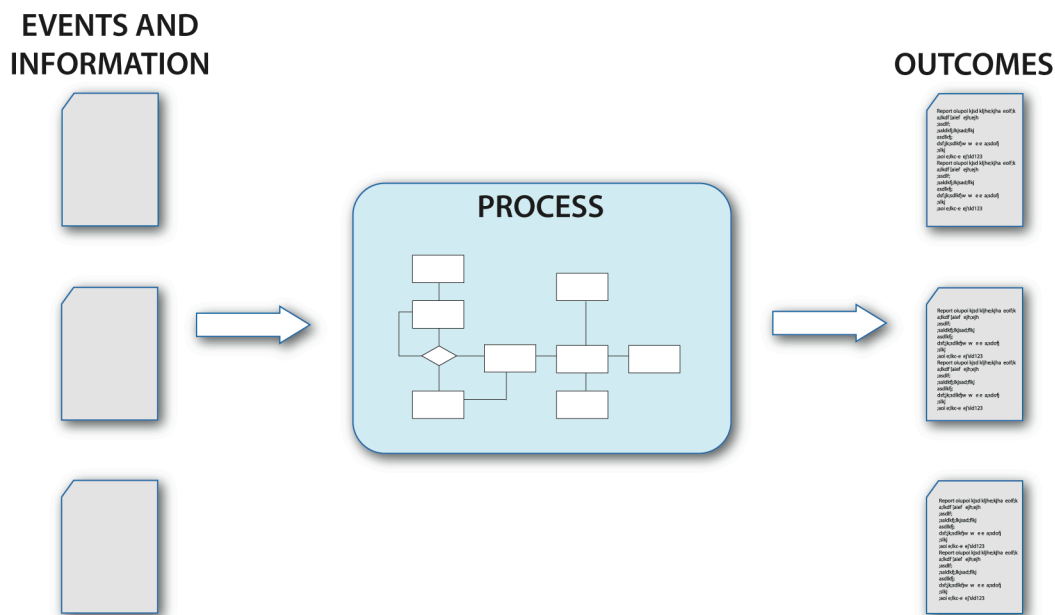
Figure 1. The Basic Structure of a Process

Business processes operate in the context of constraints, regulations, and defined roles and relationships. Everyday examples of task-level business processes include registering to vote, buying a book from a web site, or changing your address. Activity-level processes might include preparing your taxes or applying for a mortgage. Process-level processes have many steps, for example, buying a house or

selecting and enrolling in a university. The highest level processes are ongoing, complex activities such as marketing a small business or building a shopping center.

Sometimes the value created by a process is easy to see. Other times a process indirectly creates value by performing a task related to accounting, administration, and other management functions. There are many more ornate definitions of business processes, but they all come down to this simple level.

The challenge then becomes to describe how the inputs are transformed into outputs. Here is where things start to get more complicated.

What Is the Lifecycle of a Business Process?

Business processes emerge from experience. As a company does its work, patterns emerge. Eventually, the steps to doing something reliably, the complete set of information needed, and the roles everyone should play become clear. When all of this is understood, it is possible to describe and document the process in one of many different forms. Then, by executing the process and keeping track of the performance and the results, it is possible to understand ways of improving the process. These steps are captured in the following diagram that shows the general lifecycle of a business process.
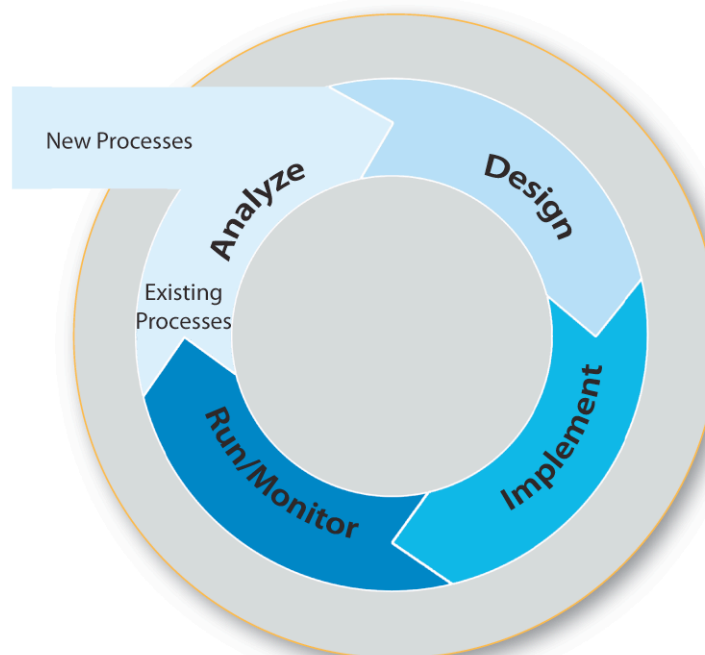

Figure 2. The Business Process Lifecycle

The cycle starts with the Analyze step, in which the new or existing processes are studied so that the requirements for the process are understood. The next step is Design, in which the process is defined in detail, followed by Implement, in which the process is supported or automated to the greatest extent possible. In these steps, the process comes off the drawing board and comes to life, first as a business process model and then as some form of technology that assists with implementation. Finally, the process is run and monitored and, if there is room for improvement, the cycle starts all over again. It is not uncommon for process simulations to be employed in the Design and Implement steps to improve the understanding of how a process will work in production. This cycle represents a common-sense approach to viewing processes and you may want to keep it in mind as we proceed through this discussion.

What Is a Model?

A model is a description of something, a representation of reality.[1] Often models summarize complex activity in a simplified form. But models can just as easily capture and represent complex processes. The point of models is communication— to portray the essence of something, to convey an improved understanding. Models can be expressed either in terms of metrics and equations or in terms of step-by-step instructions. Both types of models are relevant to BPM.

For example, the financial reports of a company represent a model of the company's financial performance. All of the capital and other resources are the inputs and the income produced is one of the key outputs.

Models that describe a process can take many forms. Most of the time in the world of BPM a visual representation of a process is what is referred to as the model. It is not uncommon to have lengthier forms of descriptions of each step of a visual model provided in longer documents that contain a narrative description.

What Is Business Process Modeling?

Business process modeling is the art of describing how work gets done in a company at the appropriate level to achieve the desired communication. The typical goals of business process modeling are to capture a process so that it can be better understood and improved or to describe a process in detail and associate it with technology so that it can be automated.

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[1] In his book, *High Performance Through Process Excellence* (Springer 2009), Mathias Kirchmer compares business process models and the way they represent reality to pop art paintings, which represent and capture reality in a different way.

A business process model in general is simply a description of a business process. Visual business models are descriptions of the steps that take place during a process and are frequently represented in flowcharts such as the one shown in Figure 3, although other forms of models such as numerical equations or step-by-step procedures are also sometimes used.
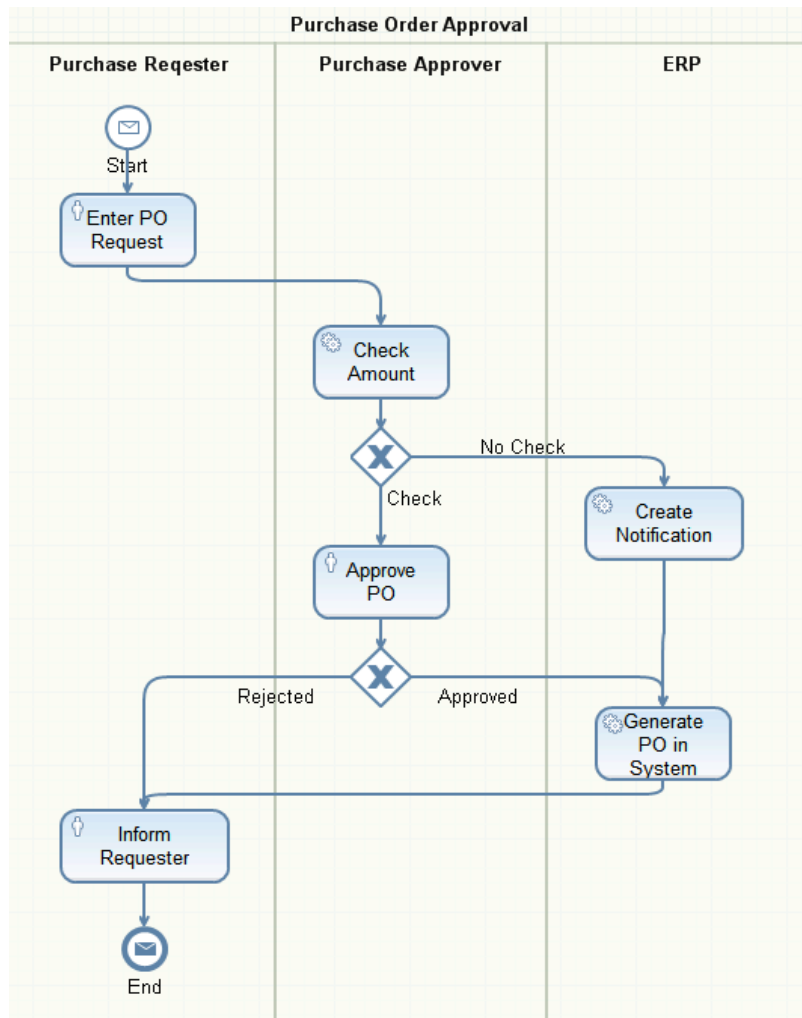

Figure 3. A Business Process

Most modern business process models, like the one above, are expressed in business process modeling notation (BPMN), a visual language using rectangles for steps in a process, lines showing the flow of activity, circles for start and end points, diamonds for decision points and branches, and various forms of annotations (see Figure 4).

Sometimes the activities of a process are separated into columns or rows called swim lanes that group steps that have something in common.

Plain Start Event
The starting point of the process. A plain start event leaves open what actually starts the process

Start Event with Message Trigger
A message that starts the process. This can be either via fax, mail, email, or any other message-like communication

End Event
The end of an execution path for the process

Activity
A unit of work or task.

Sequence Flow
The order in which things are done. Connect events, activities, and gateways

XOR Gateway
Splits or joins process flow. When splitting the flow, one of the outgoing branches is taken. When joining the process flow it merges incoming branches into the outgoing branch

Textual Annotation
Free textual description. Can be attached to anything to give further explanations. Has no process semantics but is free text

Figure 4. BPMN Elements[2]

BPMN is designed to allow processes to be described in a summarized, abstract way that can be understood by business people. BPMN also is rich enough to describe processes at the level of detail needed to allow technologists to use models to automate processes with technology. In a typical use of business process modeling, high-level models summarize business processes and then cascade downward in increasing levels of detail. The most detailed models have enough expressive power to describe applications, that is, to link each process step to a user interface or web service that helps support the step by providing information or the means to take action. ("Applying the Technology of Business Process Management" later in this paper goes into greater detail.) Because the same modeling language is used at all levels, the models can stay connected. When problems are identified at lower levels

[2] This graphic is adapted from *The Process of Business Process Modeling Using BPMN*, Alexander Grosskoph, Gero Decker, and Mathias Weske (Meghan-Kiffer Press, 2009)

of detail, the analysis of the problem can then cascade upward until the issue is resolved at the appropriate level.

Most models have one of two purposes: they can be descriptive or executable. A **descriptive model** is created to document the structure of some existing process or the desired new way of doing things. Descriptive models can be used for training and education and as part of change management programs and systems design. Simulations used to better understand the flow of data and work through a process are also primarily descriptive, even though they allow a process to come to life in a limited way.

Executable models are models intended to be translated into some form of automated solution that helps carry out a process. Executable models are descriptive, but they also incorporate components such as user interfaces, services, business rules, and other aspects that are involved in connecting a process to the outside world. Much of BPM technology involves using executable models as way for businesspeople and IT staff to describe the way they want a business process to work so that a solution to support that process can be generated from the model.

Process Summary Levels

One major challenge to understanding business process modeling is that it is used at many different levels of detail for many different purposes. When looking at a business process, first it is vital to ask yourself what level of detail is being expressed. While there is no canonical definition of the levels of business process modeling, the levels usually proceed from high-level (low granularity) to specific (high granularity).

When looking at a business process, first it is vital to ask yourself what level of detail is being expressed.

For example, business process modeling may be used to describe the high-level structure of a huge company. The boxes in this case may represent whole departments, like R&D, manufacturing, or supply chain. Such modeling is often performed by enterprise architects, people who design the processes and technology of a company at a broad level. In this paper, we say that such models have **enterprise focus** and they correspond to process summary level 1, as shown in Figure 5. Level 1 modeling describes the highest-level business scenarios. These models encompass broad collections of processes that describe the major functions of the enterprise, such as marketing, demand management, or product design. This level of modeling is usually descriptive.

Business process modeling may also be used to describe the details of a business process. This can be at a high level, such as describing all of the steps of the order to cash process, or at a very detailed level, such as describing all of the steps needed to

evaluate the credit of a potential buyer. We say such models have a **process focus** and correspond to process summary levels 2 and 3.

Level 2 is the process level in which the steps to carry out some complicated activity are described. A process has a relatively large scope that involves many activities. Fulfilling demand, that is making sure that products are there to be purchased. is a good example of a process at level 2, which may be part of the demand management scenario. This level of process, and all of those below it, can be descriptive or executable.

Level 3 is the activity level in which activities to carry out the steps of level 2 are described in detail. An activity is a set of single units of work that has to be done by multiple people. Managing supplier relationships might be one activity in the fulfilling demand process.

Modeling may also be used to describe tasks at varying levels of detail that may be used to automate processes. Models with a **task focus** can have many levels of detail, depending on the complexity of the task. Level 4 models describe specific actions that must be taken to carry out a task. Tasks are independent activities that can be done as a single unit of work by one person. Setting up a vendor contract would be a specific task in the managing supplier relationships activity.

Demand Management

Fulfilling Demand

Managing Supplier
Relationships

Setting Up
Vendor Contract

Level 1 — Models describe high-level business scenarios that span the enterprise, such as order to cash or procure to pay

Level 2 — The process level in which each step in the model represents some complicated activity

Level 3 — The activity level, in which a step in level 2 is described in detail. Usually the steps at this level are activities that are carried out by multiple people

Level 4 — The task level that describes the specific actions needed to carry out a task

Figure 5. Business Process Summary Levels Improve the Visual Explanation

These levels are somewhat arbitrary, and there are many gray areas between them. Each level may include cascading levels of detail. But these levels are useful when describing the modeling that takes place while creating business process models. The way that business process modeling separates areas of concern is especially useful when managing large-scale process design activities because the workload can be cleanly allocated across a group of specific subject matter experts.

What Is Business Process Management?

With a clear understanding of business process modeling in mind, it is straightforward to understand BPM, which is essentially the practice of managing a company by focusing on defining business processes, describing them in detail, monitoring them with appropriate metrics, and then using the improved understanding to optimize the performance of the business.

Notice that, in theory, no technology is required. BPM keeps the focus on the business process as the central concept around which all other management thinking and activity takes place. In practice, however, keeping track of all of those

process descriptions, automating processes where appropriate, instrumenting processes and tracking metrics, using models to generate solutions, and making the most of existing enterprise applications all require technology of various types.

The Evolution of BPM

The modern idea of BPM has its roots in the scientific management theories of Fredrick Winslow Taylor. It has evolved[3] through techniques for systematic improvement of processes such as total quality management, lean manufacturing and six sigma, and was most recently promoted under the banner of business process re-engineering.

While most of these methods have been successful in the context in which they were applied, it is worth looking at business process reengineering in a bit more depth because it sometimes is referred to in a negative way. Business process reengineering, which came to prominence in the 1990s, was, in essence, an attempt at applying BPM in a world populated with rigid technology. Reengineering took hold in an era in which the United States was under siege from foreign competition, especially from Japan, and companies were looking for ways to improve their performance. Business process reengineering worked brilliantly when the changes demanded of IT were modest and could be performed quickly. Most of the examples cited in books on reengineering are of this nature. But when moderate or major changes to IT were required, reengineering generally did not produce great results.

It is important to recognize how far IT has come since the early 1990s, the beginning of the second generation of integrated enterprise applications. ERP and other enterprise applications have been widely implemented, providing a foundation of standardized process automation. Eventually ERP and the rest of these applications (such as CRM, SCM, HCM, and PLM) were integrated, providing the highest level of fulfillment of the second generation paradigm.

The stirrings of the third generation of enterprise applications began in the early 2000s. The Internet has been built out providing ubiquitous, standardized connectivity. Many different types of web services are available for reuse, resulting in an explosion in so-called mashup applications. Enterprise applications are now much more manageable and configurable. These applications gain flexibility by participating in process automation through web services, which is now called SOA. Visual programming and application composition tools using models have gone through several generations and are now starting to allow both business people and

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[3] Chapter 2, "The Evolution of Process Management," in *Business Process Management: The SAP Roadmap* by Jim Hagemann Snabe, Ann Rosenberg, Charles Møller, and Mark Scavillo (SAP Press, 2009), has a useful summary of the history of BPM.

IT staff to build solutions. Standards for modeling of processes, their execution, and their implementation, have gone through several generations and are now mature. The infrastructure for monitoring processes and managing performance and compliance has been created. Six sigma and other quality management processes are now well understood. The paradigm shift for the third generation is from the notion of an integrated set of applications to the vision of a platform to support the creation and recombination of modular business processes. Such a platform brings together the ability to design, implement, monitor, analyze, and improve business processes without regard for the underlying technical or application constraints.

Given all of this technology, the lessons learned, and the urgency that results from increasing business complexity and competition, BPM has a chance of succeeding where business process reengineering failed.

An Example of BPM in Action

A merger of two companies with overlapping product portfolios provides a typical example of the value of BPM technology. Imagine that the two companies have different IT infrastructure that they do not plan on consolidating in the short term. But even so, the companies decide they want a common face to the consumer through web sites, call centers, and other channels for order taking. This is a perfect scenario for applying BPM technology.

The first step is to design the ideal order-to-cash process in which all the activities required, from order taking to fulfillment and through collecting money, are described in a business process model. Each step in the model must incorporate components such as user interfaces to present a unified product catalog or collect the data about the order. Existing services that communicate with the applications will be reused and missing services will have to be defined and implemented.

The call center and sales staff will use an application for order taking and fulfillment that will be generated from the business model. One of the steps in this model is a business rules component that looks at the products included in each order. The rules component analyzes the order to determine the correct company and specific factory to which the order should be sent using all available data, including product, size of order, geography of customer, and so on. Based on the recommendation provided by the business rules, the specific parts of the order are sent via messages to the companies that make the products. Another set of business rules is used to determine the correct web services to use to obtain status information.
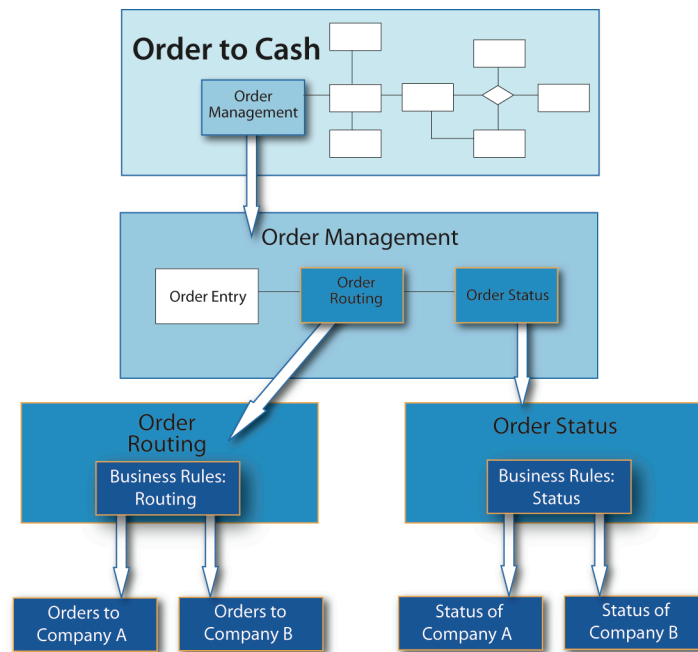
Figure 6. Unified Order-to-Cash Process for Two Distinct Companies

In this way, BPM technology allows the business process to be the driving force in determining how business gets done. The underlying complexity of the IT infrastructure is concealed and does not have to be the concern of those running the business.

How Are Business Processes Executed with and without BPM?

Sometimes it sounds as if proponents of BPM are suggesting that every activity of a corporation should be described or automated using formal business process models. Even the most enthusiastic proponents do not suggest that adoption of BPM go this far. Rather, the targets for BPM are the processes that are most important to creating value, those that will yield tremendous benefits if optimized, those that most need to rapidly change and evolve to keep pace with competitive markets.

But to truly understand what BPM is good for,

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it is vital that we also understand the other ways that work gets done, both those processes are less structured and those that are more structured. Figure 7 shows the types of processes and technologies on either side of BPM.
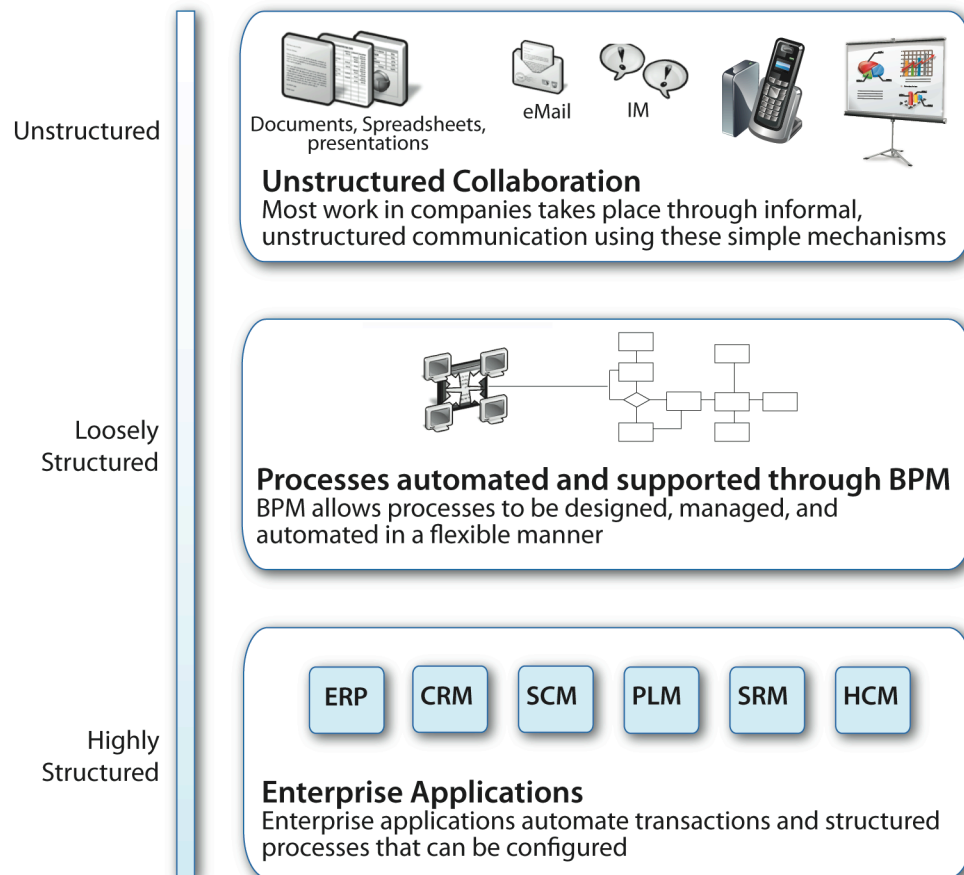
Figure 7. Process and Technology Types

Most of the work done in a company happens through unstructured collaboration and communication based on the simple mechanisms of email, spreadsheets, documents, presentations, and real-time communication through phones, IM, and text messaging. Do processes take place when we use such tools? Most would answer yes. Tasks are being performed, sometimes called **tacit interactions**, that have a starting point and a result, but work does not proceed in a predictable, step-by-step manner. Recruiting is a good example of such a process. It starts with a job description and ends with a hire, but exactly how all the interviews, evaluations, and meetings will go is not clear at the outset.

BPM does not invade this space for the most part, although, by paying attention to the patterns of communication and common forms of documents, it is possible to identify processes that could benefit from support with BPM.

What is sometimes misunderstood in discussions about how to automate business processes is the extent to which unstructured, manual techniques dominate the activity in a business. In *Business Process Management: The SAP Roadmap*, Jim Hagemann Snabe, Ann Rosenberg, Charles Møller, and Mark Scavillo suggest that only about 20 percent of all the processes used to run a business can be automated.

Enterprise applications such as ERP provide standardized implementations of the common processes of modern businesses and do most of the work for the approximately 20 percent of processes that can be automated. At the dawn of the enterprise software industry, it became clear that each company should not invest in creating its own custom application for accounting, finance, controlling, budgeting, invoice processing, and so on. Enterprise software vendors created software applications that implemented standard processes through configurable abstractions. These applications became rapidly adopted starting in the early 1990s with the arrival of the first comprehensive ERP packages. A succession of other applications followed, including CRM, SCM, PLM, and others. Today we have a comprehensive foundation for tracking and automating the transactional activities inherent in large companies.

Enterprise applications have become the systems of record and many of the non-automated activities use data that is stored in them. Enterprise applications also have units of functionality, such as taking orders, creating invoices and purchase orders, making payments, and setting up vendor relationships, that may be the end result of a nonautomated process such as making a sale.

BPM fills the space between the wide open, unstructured world of collaboration and the precise transaction processing of enterprise applications. It has become widely realized that important enterprise processes routinely cross the boundaries of enterprise applications. Processes like order-to-cash or procure-to-pay may involve several enterprise applications such as taking orders in CRM, ERP creating invoices and purchase orders, and managing production and fulfillment in SCM.

BPM, especially in combination with services that can move data in and out of enterprise applications and other information sources provides a way to explicitly define, manage, and automate processes that span enterprise applications. BPM also allows processes that bring in people and systems from outside the company to be defined. In this way, BPM supports processes that take place across an extended business network.

The personality of processes currently automated by BPM are as follows:

- They are more structured than the loose collaboration based on email and other such mechanisms
- They are more flexible than the transactional processes in enterprise applications
- They are wider in scope than processes in enterprise applications, crossing both application and company boundaries
- Their flow is explicitly defined, managed, and automated

It is important to point out that the scope of the processes currently automatable by BPM is limited by the granularity of the web services that are available. As time passes, not only will high-level web services be exposed, but lower level services as well. An enterprise application will be an erector set with parts that can make other parts that can make other parts. In such a world, BPM can be used for much more than the high-level orchestration described earlier, but also for more structured automation. In addition, it is likely that the boundaries between unstructured collaborative processes and BPM orchestration will also blur. In other words what is now a division between unstructured processes, BPM-style processes, and highly structured processes will become a continuum and BPM will expand in its ability to express the flow of work from beginning to end. The rest of this document provides a more detailed explanation of how BPM works in its current form.

How Does BPM Change the Function of IT?

Before the advent of BPM, the task of IT had two missions: providing tools to support unstructured collaboration and implementing and configuring structured enterprise applications. Both cases empower users. Collaborative tools provide the power to communicate, collaborate, and create and share documents, spreadsheets, and presentations. Enterprise applications record transactions, analyze the state of the enterprise, and participate in structured and well-defined business processes that are implemented in those applications.

BPM provides a new sort of empowerment and changes the role of IT to some extent. BPM allows business users—the people who are the masters of spreadsheets and presentations, who really make the most use of the technology they have—to start playing a major role in the discovery, definition, and automation of business processes.

As we shall see in more detail in the sections on BPM technology, one of the key ways that BPM changes a company is by empowering business users. If BPM technology is provided in tandem with an IT and application infrastructure to support SOA, it is increasingly possible for business staff to design their own processes and play a much more active and helpful role in generating new solutions to support them. It should also be noted that IT staff using BPM technology are able

to increase their productivity when building solutions. Regardless of who uses the technology, business process models are not only descriptions of how a company does its work but they can be the source for creating solutions. In other words, the business process models are semantic models of a business. As Professor Eric von Hippel's research on user-driven innovation[4] shows, when people are given tools to solve their own problems, a flood of innovation usually follows.

In the case of BPM, what usually happens is something like this:

- Business users realize that they can define processes and play a much more active role in creating solutions to automate them with BPM technology
- They start recognizing processes that have been executed in informal ways and use BPM technology to start to automate them
- In the automation process, information is retrieved and stored in enterprise applications through web services
- In cases where the needed web services do not exist, IT creates them to provide the needed information and functionality to support the process
- As time passes, more and more supporting BPM infrastructure is in place, business users become more adept at designing processes and some start building solutions for themselves, and IT makes sure everyone has the tools they need.

In a company that is at a high level of BPM maturity, the relationship between business and IT changes. Assuming the right BPM technology and web services are available, business users can do more for themselves and IT becomes involved on an exception basis. Instead of asking IT to solve their problems directly, users bring IT into the process when something is missing.

This transformation of the role of IT does not happen quickly at most companies because the adoption of BPM technology and the emergence of a full portfolio of services take place gradually. In the short term, BPM means that the alignment between business and IT dramatically improves. In the longer term, it should always be remembered that one of the results of BPM is the empowerment of an even broader range of users to innovate and solve their own problems.

How Is Performance Management Related to BPM?

The modern practice of performance management works hand in hand with BPM by applying measurements at various points in processes.

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[4] Eric von Hippel is a Professor and Head of the Innovation and Entrepreneurship Group at the MIT Sloan School of Management. His books on user driven innovation can be downloaded from his home page: http://web.mit.edu/evhippel/www/.

In the past, performance management has focused on measuring results, mostly at the end of the process and usually in financial terms. When performance management is applied in an organization that is adopting BPM several things change:

- Measurements take place at key control points at the beginning, middle, and end of the process
- Operational measures that indicate the pace and quality of processes become more prominent. These operational measures track nonfinancial inputs and outputs to processes, allowing more detailed analysis
- Metrics become better aligned with business objectives because they measure quantities that can be connected to specific value-creating processes
- Because the inputs and outputs of processes are being measured, it becomes possible to make business process models predictive tools. Inputs such as pipeline coverage may be eventually related to the number of sales closed. This means that a drop in pipeline coverage could be an important warning sign
- The granularity of measurement increases, providing not only metrics at the aggregate level at the end of a process, but also figures that break down metrics by product, geography, department, customer, supplier, and so on
- When a process is too complex and ad hoc to be defined by a business process model, the numerical model of the inputs and outputs provides a way to track and monitor performance of the process

By applying performance management to BPM, it becomes possible to identify problems much earlier in the operational cycle while there is still time to do something about it. In addition, as the relationships between the inputs and outputs of each process are better understood, the models become more predictive, making it possible to create better forecasts of business activity.

How Is a Process-Centric Approach Changing Modern Companies?

Companies that have aggressively adopted BPM have found that they must change their corporate organization to accommodate the focus on process at all levels. Before BPM, most companies were organized around functional silos. As BPM increases the focus on end-to-end processes, the siloed form of organization becomes less relevant to corporate activity and the need for new sorts of responsibilities arise.

Gradually, it becomes clearer that the focus of management accountability and performance should be on the end-to-end process—so the leadership changes focus. Instead of establishing VPs of organizational silos, the VPs are now in charge of

processes. Certain key supporting processes are used over and over in end-to-end processes. The owners of these supporting processes are in charge of making sure that their processes operate properly. In this way, the attention of executives becomes completely focused on process optimization and turf battles are minimized.

A parallel change happens in IT. The infrastructure is focused on creating the services and other elements that support processes. Enterprise applications are still supported but the emphasis becomes exposing the functionality of those applications through services. Services can then be used as components by BPM technology. Increasingly, departments design their own processes and then seek out IT to build the components and services needed to support those processes.

As an organization grows in process maturity, modeling and management of business processes become more prominent in the life of business users and executives on a day-to-day basis. There is a need for specialists in process modeling and service repositories as well as a need for technology skills to build components.

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With a more complete understanding of the basics of BPM, we can discuss how BPM creates value.

The Business Case for Adopting Business Process Management

Few individuals or corporations approach BPM as a casual activity. Most of the time, executives adopt BPM as a new way of managing their companies for one of three reasons: the executive team has become passionate about the idea, a department or business unit has shown tremendous results using BPM in a focused way, or an emerging crisis that has made it clear that the complexity of the management tasks cannot be handled in any other way.

Adopting a program of BPM means becoming a process-focused enterprise, which is not something that can happen in a month or even a year. That said, BPM is both a short-term and a long-term endeavor. Short-term projects can bubble up from the departmental level, have high impact, and pay for themselves quite quickly. But BPM as an enterprise-wide practice is fundamentally a long-term cultural change that must be understood widely in a company as a new way of thinking, no matter what methods and tools are used.

As a process-oriented mindset takes hold in a company, the strategy of the company is more precisely translated from the highest level into the design of processes and the metrics that track them. New ways of designing processes and building solutions arrive. The organization becomes focused on processes that flow through the company and the business network. Everyone starts to understand his or her role not just as an isolated cog in a machine, but as part of a much larger process of creating value for customers. People performing each role can see how what they do is supported by what comes before them and affects what comes after them.

Success then, in a program of BPM, is contingent not only on adopting new technology, new forms of organization, and new ways of thinking, but also, in a large part, on crafting a clear vision of what BPM means to your company and how it will create value. This section explores ways to communicate the value of BPM and some of the stronger arguments that people make in favor of a process-centric approach to management.

What Is the Ultimate Vision for a Process-Centric Company?

Expanding the practice of business process management is most valuable when pursued not as a tactical matter but as a cultural and philosophical change. BPM makes process the central focus—not the organizational unit, not the individual, and not the product or the metrics.
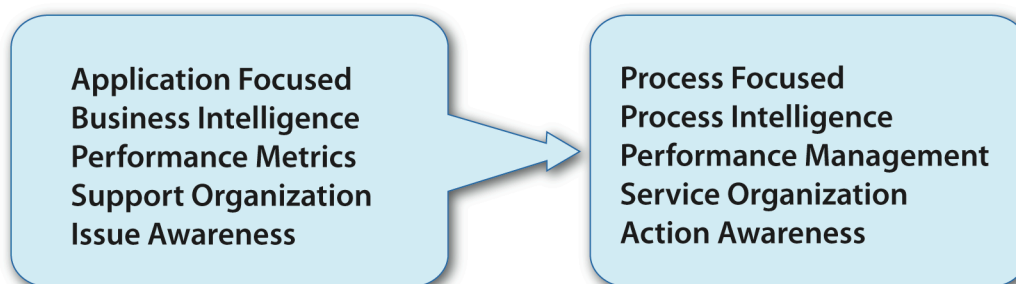
Process is not the focus for its own sake as a matter of style or fashion. Process is the focus because it is the most effective way to express what everyone in an organization should be doing in a way that connects the highest-level strategy to the

actions of each individual. Well-defined processes that are communicated widely in an organization require less management. Individual decision-making takes place in the context of what is coming before and what will happen afterward. The power of BPMN to depict processes at varying levels of detail allows each layer of management to model and manage processes at an appropriate level.

Shedding the Application-Focused Perspective

In most companies, the starting point for transformation to BPM is a departmentally organized, application-focused perspective on managing the enterprise. Since the arrival of suites of enterprise applications that automated standard processes in highly configurable ways, the focus of management has been on using these applications effectively. In many ways, the applications reinforced the siloed structure of the company. The CFO and COO got ERP, the VP of Sales got CRM, the VP of Supply Chain got SCM, and the VP of Manufacturing got PLM. But shortly after the emergence of these separate applications, the need for end-to-end process integration and optimization quickly became evident. Figure 8 summarizes the change in mindset.

Application Focused
Business Intelligence
Performance Metrics
Support Organization
Issue Awareness

Process Focused
Process Intelligence
Performance Management
Service Organization
Action Awareness

Figure 8. From Application-Focused to Process-Focused Mindset

Before the BPM mindset takes hold, much of the activity of a company is focused on making up for the weaknesses in the application-oriented perspective by using such techniques as business intelligence to consolidate data or performance metrics as a sort of poor man's model of what is going on in the enterprise. Unstructured collaboration is used to fill a lot of the holes in what enterprise applications do not do well.

In a process-oriented enterprise, process becomes the focus and, through web services, applications become subordinate to processes. The role of applications becomes providing information and supporting functions for end-to-end processes that are defined using BPM. A focus on metrics is replaced by a more comprehensive approach to performance management that tracks processes at a more granular level.

The Stages of Transformation to Process-Orientation

The transition to a comprehensive BPM perspective has several stages. In each stage, new capabilities and techniques improve performance and prepare the company for higher levels of performance and process maturity. This transition and the stages of maturity have been defined in many ways by many observers and analysts. One of the clearest ways to understand the transformation is to use the stages defined in Figure 9, which are based on the Capability Maturity Model, originally developed at Carnegie-Mellon's Software Engineering Institute for software development. CMMI has found wide application in many venues.

Business Process Management Maturity

Level 1	Level 2	Level 3	Level 4	Level 5
Non-Organized Process	Some Organized Processes	Most Processes Organized	Processes Are Managed	Processes Are Continuously Improved
A Culture of Heroes	Process Are Improved at the Work Group or Department Level	Process Are Organized and Redesigned at the Enterprise Level	Process Are Measured and Managed Systematically	Process Teams Continuously Improve Processes

Ross, Business Modularity: Based on CMMI

Figure 9. Transformation to Process-Orientation

Most companies start their journey to BPM at process maturity level 1. Processes are not defined separately from the functionality of applications. The term "culture of heroes" is used at this level to describe the fact that people are attempting to do their best. At level 1, most companies focus on gaining new application functionality.

At process maturity level 2, processes start to be defined at the departmental or workgroup level. The goal is to gain control and understanding of what is being done through documented processes. The benefits include reduced IT costs (as unneeded functionality is shed) as well as faster time-to-market and other forms of

acceleration. It is not unusual for a company to discover the benefits of BPM when one or more departments demonstrate the benefits.

At process maturity level 3, the process definition takes place at the level of the enterprise. End-to-end processes that span departments and reach in and out of key suppliers are mapped and analyzed. The resulting awareness usually highlights changes that can improve efficiency. Further optimizations can be made much faster starting from a well-defined foundation. The ability to change processes paves the way to a more responsive business that can better keep pace with market dynamics.

At process maturity level 4, performance management enters the picture and processes are instrumented not only to measure their results, but also to measure the inputs. By tracking the relationships between inputs and outputs of various processes, analysis can become more predictive. The increase in real-time transparency, especially of information that identifies risks and problems early on, allows problems to be identified in time to find solutions. Strategic goals can be expressed in the form of detailed metrics for processes at a high level of granularity.

At process maturity level 5, a company can build on the foundation of the first four levels to engage in continuous improvement and business optimization. IT is now more focused on servicing the processes of the organization rather than maintaining applications. The increased transparency and understanding of the big picture of the enterprise improves decision making.

Maturity models like this one can be aids to assessing a company's current state and planning the sorts of activities that will be most beneficial to progress. Paying attention to steps that move a company gradually forward prevents attempts to move too fast and overreach.

The end-state of BPM is a world in which a company starts to think of everything in terms of processes. This does not mean that everything is automated or that everything is locked down and rigid. It does mean, however, that the starting points, ending points, inputs, outputs, and goals are all defined and scrutinized so that each and every person knows the role he or she plays and the results that are expected.

What Is the Business Value of BPM?

The business value of BPM flows directly from the fact that the business process is front and center in everyone's thinking at all times. Focusing on a business process model helps overcome the tendency to get lost in the details of technology implementation.

BPM does not have to be and should not be implemented in every process to provide maximum value. Enterprise applications do a fine job of automating many stable processes. Collaborative technology will always be needed to handle the

unexpected. BPM shines when it is applied to processes that have a structure and that are crucial to creating value.

If we look at the automatable processes in an enterprise (which, as mentioned earlier, comprise about 20 percent of all processes), they generally fall into two groups. About 80 percent of the automatable processes are standard activities that do not provide competitive advantage. Technology visionary Geoffrey Moore in his book *Living on the Fault Line* (Collins Business, 2002) calls such activities examples of context processes[5] because they are necessary but do not differentiate a business. Typically such processes, which are common to many businesses, are implemented in enterprise applications.

The remaining 20 percent of automatable activities are unique to the operations of a company. Moore calls these kinds of processes core activities because they represent the source of the unique value created by a company. Frequently, these unique processes are key to winning in the marketplace. It is through understanding and automating this set of processes that companies can separate themselves from the competition.

The vision of BPM is not worth pursuing for its own sake. At every level of adoption, BPM must earn its keep by providing tangible business benefits. While these benefits will vary in magnitude, enough is known about BPM now that various patterns have emerged and we can confidently predict that companies will experience some of the following benefits.

Increased transparency. Management knows what everyone is doing and how they should be doing it. As more and more metrics are applied to processes, the real-time operations of a business become clear.

Increased traceability. It is possible to find out what happened and what is going to happen with respect to operational processes. This can be a huge help in auditing or analyzing problems as well as making it much easier to satisfy many compliance requirements.

Improved responsiveness and flexibility. In a process-oriented company, change can be effected more rapidly and precisely because the as-is state is documented and understood. The design of the to-be state starts from a clear foundation. In addition, well-defined business processes make simulation of current and proposed process designs much easier so that problems can be discovered earlier.

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[5] It is important to point out that Moore's categories of core and context apply to both automated and non-automated processes.

Continuous business optimization. As BPM implementation matures at a company, everything needed to understand performance falls into place. When new challenges arise, instead of just looking to cut costs, a more sophisticated view of performance improvement is possible. The key value-creating processes can be more easily identified and optimization and innovation efforts can be focused where they are likely to have the most impact.

Improved strategic alignment. Because more and more of a company's activity is defined, consciously designed, and precisely measured, it is possible to make adjustments to provide explicit targets for people at all levels. Process can be redesigned if needed, but more likely, performance targets can translate strategy from high-level directives to individual goals.

Improved business and IT alignment. Because business process modeling provides a language that can be used to express business processes at all levels in a way that is understandable by both business and IT staff, the connection between what must be done and the technology that will do it becomes stronger. Difficulties in implementation bubble up and are solved with the appropriate input from both business and IT by harmonizing the ideal business process design with what is possible to implement.

Accelerated identification of risk. As business process models become more predictive and key relationships between inputs and outputs are identified, potential problems can be spotted in time to address them or plan remediation.

Improved ability to perform acquisitions or divest businesses. A BPM perspective provides a clearer understanding of operations and integration points with new acquisitions and a clear approach and roadmap for integration. The same is true when divesting operations. With mature BPM, departments and divisions can be hived out cleanly. The sort of business process outsourcing (BPO) that Geoffrey Moore recommends for context activities becomes easier to achieve and manage.

Clear view of core and context processes. Once BPM has increased understanding of how a business creates value, it is easier to divide processes into those that are core to a company's mission and those that support the context. Many companies choose to outsource contextual activities to improve their focus and return on capital. BPM makes it easier to find and outsource contextual processes.

Improved management of outsourced relationships. A mature approach to BPM makes it easier to clearly define processes to outsource. The inputs, the measures of quality of a process, the metrics used to monitor the process in progress, and the outputs are defined for key processes as a part of implementing BPM. When it comes time to outsource a process, most of the knowledge needed to define the process, negotiate SLAs, and hand it off is already in place.

Make the most of standard enterprise software applications. BPM uses SOA to bring the data and functionality of standard enterprise software to processes throughout the enterprise. This amplifies the value of the investment in these applications.

Of course, all of these benefits do not appear all at once. They must be diligently pursued. But because BPM provides a persistent foundation, gains are not easily lost.

How Does BPM Help Run an Extended Business Network?

As a company becomes adept at managing its own operations through BPM techniques, it is also possible to apply them to extended business networks and ecosystems. Companies that are orchestrators of ecosystems can enforce BPM methods on business networks and ask that processes and metrics be defined and used to manage relationships. Companies that are participants can use BPM techniques to be optimal partners and increase their share of business.

The discipline of creating a formal definition of key business processes results in the ability to draw a clear line between parts of the process that should be carried out inside a company and those that should be carried out by partners. The model makes it easy to identify specific handoff points and the information that must be conveyed as the control of the process is transferred to a partner. The points of return are defined just as clearly as the steps in the process that are being executed remotely.

How Do Companies Adopt BPM?

Once the complete vision of BPM is understood, many people are daunted because they incorrectly think that BPM means changing everything right away. Indeed, changing how any organization thinks in a comprehensive fashion and then supporting that new culture with technology and methods is not something that happens overnight. But the only way transformation to a process-oriented enterprise will happen is through consistent effort from the top down and the bottom up. To avoid becoming too discouraged, it is vital to recognize the many smaller victories that occur through both kinds of incremental effort.

On the other hand, it is also vital that the long journey be underway explicitly in order to make progress over a span of years. Charting this course falls under the rubric of governance and program management. The second part of this section summarizes a program of governance that was specifically designed for the adoption of BPM.

The Top-Down and Bottom-Up Shape of Incremental Progress

Top-down victories occur when management sets out a new standard or encourages a new technique and the company adopts and benefits from it. The value of this approach is that the entire organization is exposed to an idea or technique. New ways of thinking and working get attention because senior executives promote them. These ideas could be as simple as creating explicit process maps for each department, or identifying metrics that help determine the efficiency of the most important processes. Top-down victories are not uniform victories. Usually some parts of the organization adopt suggestions more completely than others. The suggested steps are almost always incremental and bite-sized, but in communicating about simple suggestions, management reinforces the broader vision of the journey toward BPM adoption. Each bite-sized portion of progress makes further change easier.

Bottom-up victories occur when a department shows the way by implementing BPM-related techniques, or when the IT department offers services and BPM technology for use by early adopters to improve their practice. Bottom-up projects are incremental and may occur as an activity, such as implementing a new feature or rolling out a new version of a service-enabled enterprise application is transformed into a BPM project. The benefits of creating applications based on well-defined processes can bring value on a small scale as well as on a large one. This is especially true as routine upgrades to enterprise software tend to come with needed functionality. Bottom-up victories frequently spring from the enthusiasm of IT staffers and business users who see the benefits of BPM and seek to take advantage of them right away.

BPM Governance and Long Term Adoption

BPM governance provides the framework to ensure the efficiency and effectiveness of all BPM-related activities. This includes aspects such as defining common terms, establishing processes for strategy formulation, planning, training, and change management, providing tooling and infrastructure, and learning from experience to achieve continuous improvement. Any long-term program of BPM ends up being accomplished through a series of top-down and bottom-up victories that provide significant benefits as the culture of a company gradually changes. But the key to achieving higher and higher levels of performance is to bring order to the incremental projects. The smaller victories along the way must add up to a larger, coordinated transformation that everyone is aware of. In *Business Process Management: The SAP Roadmap*, the authors define a method for BPM governance based on four stages.

The first stage of BPM governance, **Strategy**, assures that the goals of BPM adoption are aligned with the corporation's larger objectives. The building blocks that prefigure progress include skills, incentive systems, performance management techniques, organizational structures, and technology components. At this stage, the general approach is chosen and likely problems are identified.

In the second stage, **Setup**, preparation for implementation takes place. Fundamental techniques for process modeling and measuring are selected along with ways for applying those techniques. Structures for decision making and program management are defined, as are the roles that will be played in process execution.

In the third stage, **Transition**, putting BPM to work to support and automate processes begins, guided by decisions from the Strategy and Setup stages. The Process Management Lifecycle of Analyze, Design, Implement, and Run/Monitor is performed over and over again using BPM tools. Process modeling takes place from the top to the bottom of the company. Performance management is implemented to measure processes. The organization is gradually transformed to make designing, automating, running, and optimizing processes everyone's focus.

In the **Continuous Improvement** stage, auditing, performance management, incentive systems, and other mechanisms are used to identify areas needing attention. The methods and techniques of BPM are then applied to address problems and increase performance.

These stages, shown in Figure 10, represent an organized program that ensures that the right thinking takes place at the right time. If applied consistently over a long period, they will guide incremental progress and lead to a profound transformation to a process-centric organization.
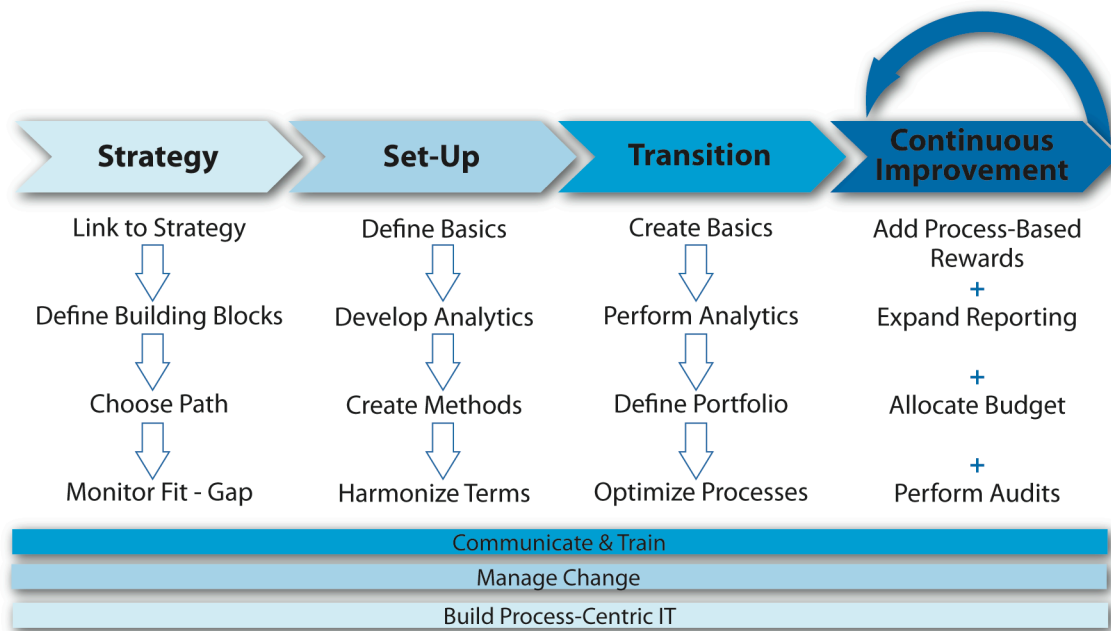
Strategy	Set-Up	Transition	Continuous Improvement
Link to Strategy	Define Basics	Create Basics	Add Process-Based Rewards
Define Building Blocks	Develop Analytics	Perform Analytics	+ Expand Reporting
Choose Path	Create Methods	Define Portfolio	+ Allocate Budget
Monitor Fit - Gap	Harmonize Terms	Optimize Processes	+ Perform Audits

Communicate & Train

Manage Change

Build Process-Centric IT

Figure 10. The Stages of BPM Governance[6]

What Skills Are Required to Adopt BPM?

The skills required to adopt BPM depend on the scope of what is being accomplished. For some bottom-up projects, it may be possible to make good progress with a limited knowledge of business process modeling and the components needed for automation. For a longer term, companywide program of adoption, a wide range of skills are needed in the following areas:

- End-to-end process definition
- Industry-specific process knowledge
- Process design and implementation using a third-generation business suite
- BPM technology
- BPM methodology
- BPM governance
- Business-to-IT communication skills
- Collaboration skills

A plan for acquiring and improving such skills is part of the larger process of adoption and is usually developed during the BPM governance process.

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[6] This graphic is adapted from *Business Process Management: The SAP Roadmap*, Jim Hagemann Snabe, Ann Rosenberg, Charles Møller, and Mark Scavillo (SAP Press, 2008)

Applying the Technology of Business Process Management

While a clear understanding of the general theory of how BPM helps manage complexity, advances alignment with corporate strategy, empowers staff to act in intelligent ways, and improves efficiency and flexibility of operations in a company is vital to success, all roads to BPM must eventually employ technology. One of the most daunting challenges for executives, technologists, and staff involved in any program of BPM adoption is understanding just what the technology presented to them does.

When faced with a new technology in the BPM space, it can be difficult to understand what it is, how it works, and how it is related to the work of describing and automating the many facets and levels of processes. To effectively use technology, we must understand the goals of the technology. What is its scope? How does it fit into the larger program of BPM adoption? Who is the intended user? How will it help? Unfortunately, in the world of BPM, so many technologies operate at different levels and combine many functions that it can be very hard to determine just what a technology does and who it is for.

This section presents a new way of categorizing BPM technology according to the purpose, scope, and level of detail of the business process modeling employed. Using this framework, it is possible to understand quickly what any BPM-related technology does, which removes a major obstacle to progress.

What Is the Purpose of BPM Technology?

The purpose of BPM technology is to automate, manage, and improve productivity for the tasks involved in the description and automation of business processes. Through BPM technology, companies can manage their business processes explicitly, using tools built for the task.

The main challenge of understanding BPM technology comes from the fact that it can be applied in a wide variety of ways at many different stages of BPM adoption, during which the perspective can range from encompassing the entire enterprise to a single task.

The first purpose of BPM technology is to help describe the structure of business processes. Almost all BPM technology starts by asking the person using it to create a business process model. Sometimes this model itself is the end result. BPM technology allows the model to be annotated, collapsed or expanded, shared, and so on. BPM technology empowers collaboration that centers on the creation, discussion, improvement, and evolution of a business process model. It is important to point out that the processes described have may have been or will soon be

analyzed, simulated, or perhaps even implemented and monitored already via a BPM suite (BPMS) or some supporting technology so that they have the best chance of being the optimal design.

The second purpose of BPM technology is to put a business process model to use in automating or supporting execution of the business process described. BPM suites are integrated collections of technology used to create a business process application using the business process model as the primary description (see "What is a Business Process Application?" for a definition). Sometimes the software application created interacts with users and other times it is a long-running, backend process. Each step of the model could be associated with one or more user interface screens or web services. The flow of control of the application is defined by the flow of the business process model. To change a business process application, you must change some aspect of the model.

What is a Business Process Application?

One of the purposes of a Business Process Management Suite (BPMS) is to allow a business process model to guide the creation of software that automates or supports execution of the business process described. To do this, steps in the model must be associated with specific technology components so that software can be created automatically. When a business process model is used in this way it is called an executable model. In this paper we call this type of software created from executable models **business process applications**, to distinguish them from enterprise applications and other software created via traditional methods. Business process applications are systems of processes applied to a business situation with the help of various forms of automation and assisted collaboration.

The third purpose of BPM technology is to provide some supporting functions for the first two purposes. A wide variety of componentry can be used when describing or automating business processes, including the following:

- **Process repositories.** Collections of standard chunks of processes that are reused
- **Business rules.** Collections of rules that provide some sort of useful decision-making or processing logic
- **Web service repositories.** Collections of descriptions of web services or enterprise services, services designed to support a business process, that

> may be invoked by applications automatically created from business process models
> - **User interface widgets.** Components, that is, portions of user interface pages, used when creating user interfaces from business process models
> - **Process and business activity monitoring**. Infrastructure for tracking the performance of processes historically and in real-time
> - **Simulations.** The ability to make assumptions about the flow of work and examine the behavior of processes under such conditions

BPM technology tends to make the creation of business process applications simpler than previous methods have done. This simplicity can lead to greater productivity on the part of technologists and businesspeople involved in creating software applications. Simpler tools also mean that in certain situations people can create solutions for themselves. Changing processes once implemented also becomes easier. **The ultimate purpose of BPM technology is to allow processes to be described, automated, monitored and improved as a part of a cycle of continuous innovation.**

How Does BPM Technology Expand the Scope of IT?

BPM technology could not work properly without the participation of previous generations of IT. Both the collaborative functions used in unstructured processes and the information and functionality used in systems of record are employed by BPM technology.

SOA and Enterprise Applications

SOA is the key to understanding how enterprise applications interact with BPM technology.

SOA posits that software should be built in a different way. In most software, a user-interface is the vehicle through which a person interacts with a computer program that performs some function and may store data in a database or communicate with other programs over a network. SOA sees programs as being built using services as building blocks. Services are units of functionality that can be accessed over the network to perform some useful functions. Google Maps provides services that allow you to access mapping functionality. Enterprise software vendors like SAP have opened up their enterprise applications so that you can access the systems of record through services, not just through user interfaces.

The application of SOA to enterprise applications opens up a new world of possibilities for companies seeking to extend automation. Services go beyond the capabilities of a user interface and provide two-way channels of communication between an enterprise application and the outside world. Services based on

enterprise applications lift the hood of those applications and, in effect, provide direct gateways so that information can flow back and forth between other applications that use the services and the enterprise applications that provide the services. In addition, services allow various functions of the enterprise applications to be invoked.

SOA overcomes many of the restrictions that have held back companies who have sought to extend the automation of business processes. Services provide access to any data, on any device, in any format, from any location, through any visualization, at any time. The access that services provide expands the scope of information available and the potential for developing deeper insights. Services also increase efficiency by allowing reuse of standard software components, making integration easier and providing a smooth path to advanced functionality as the underlying systems are upgraded and improved. But most of all, services provide flexibility—it is possible to create new programs that can automate that 20 percent of differentiating activities or provide other benefits such as increasing the efficiency of operational processes or improving integration with partners.

SOA and BPM

Now we have arrived back at the topic of our paper, BPM. It is possible to put services to work in many ways. You can write programs in languages like ABAP, Java, C#, or Ruby. You can invoke services from various programming frameworks that are intended to be used by experts. Or you can use BPM technology to design processes and then use information and functionality from services. For most companies entertaining adopting the BPM approach, the processes defined will use services that come from enterprise applications to gain access to data and functionality, although important services for mapping, ecommerce, and logistics and other functions will be available to a large variety of providers on the Internet.

BPM technology plays a crucial role in making the most of SOA. Through BPM technology, it is possible to accelerate creation of new solutions, which can support innovation in differentiating processes, extending existing application processes, or extending integration in the business network. Without BPM technology, SOA becomes a program of software development that can only be performed by highly technical staff who must take direction about what to do from businesspeople. While this structure has worked well in the past, it has three major problems:

- The capacity of technical staff who know how to write programs in Java, C#, and ABAP becomes a bottleneck to development
- The process of translating requirements for solutions from business staff to technology staff is difficult and error prone
- The process of developing solutions in this manner is slow

Most BPM technology is designed to be usable not only by technologists but also by business staff. BPM technology is used to create solutions through modeling, either using models that are executable or those that can be translated somehow into working solutions. In general, modeling is easier and faster than coding in languages like ABAP, Java, and C#, so, no matter who uses BPM technology, solution creation accelerates. Because business staff can now be added to technology staff and play a more active role, the pool of those who can create solutions is expanded, decreasing the development bottleneck. The common language of modeling increases alignment. Over time, it is possible that direct creation of solutions by business staff can reduce the need to translate requirements from the minds of business staff into some document used by IT to create the solution. Much of the popularity of techniques like mashups flows from this sort of do-it-yourself efficiency.

In other words, BPM and SOA are tightly linked. While it is possible to use SOA without BPM, to do so means that you end up slowing down development. Using BPM without SOA means modeling processes and automating solutions that are not connected to either existing transactional systems of record or to powerful functionality that can be offered over the Internet. Figure 11 shows how higher-level business process models cascade into more detailed models that then can be associated with technology components derived from enterprise applications and other sources.
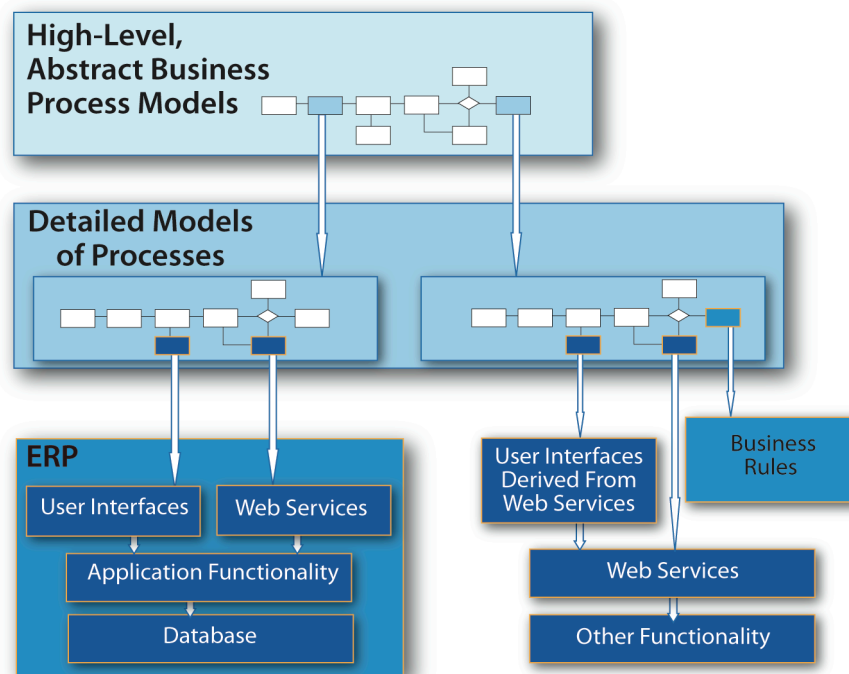

Figure 11. Business Process Models and Associated Technology Components

BPM and Collaborative Technology

BPM technology also takes advantage of collaborative technology in both direct and indirect ways. It is not at all uncommon for alerts about various events or actions in an application created with BPM technology to be sent via email. These sorts of notifications bring people back to the application so that work can continue.

But in a broader sense, many steps in a business process model cannot be automated. The process continues until these steps are encountered (for example, "determine new pricing" or "create marketing calendar") and then the people involved in the process must do the work that the step requires. Frequently, they do that work based on information provided by the application automating the process, and the results of that work are then captured to restart the flow of automation. In between, people use all of the technology and tools they have at their disposal, including collaborative technology.

The Role of Business Rules

When automating complex business processes, process designers come across more difficult decisions that must be made. In our previous example, we described a company that was sending orders to one of two subsidiaries. Other such problems could include computing a credit score, evaluating the right distribution mechanism, or choosing the right tax computation. The technology known as business rules was created to manage this complexity and increase the configurability of automation in such instances. Business rules systems allow complex rules to be applied to various inputs and provide some sort of output or support for a decision. Usually, the rules can be modified in a simple manner so that businesspeople can control the behavior of business rules components. In most BPM systems, business rules engines play an important role in helping provide the most automation in a simple. appropriate, and configurable form.

Analytics and Monitoring Technology

A business process model clearly defines the steps involved in execution of a task or activity, which makes it easy to monitor the flow of work in the past and present and to attempt to predict the future. Business intelligence and performance management techniques often look backward at business process activity and provide a historical view in the form of reports and dashboards. Business activity monitoring and complex event processing are used to analyze the work being done in a business process in real time so that patterns can be revealed and problems or opportunities be identified in time to take action. Predictive analytics and simulations use a business process model and historical data to attempt to predict future outcomes of a business or compare scenarios. Each of these sorts of technologies may be integrated into the components of a BPMS.

What Categories of BPM Technology Exist?

With the basic landscape explained, it is now possible to create a simple categorization that will make it easy to categorize and understand BPM technology. The goal of defining and explaining these categories is to reduce confusion and speed understanding. If we are successful, then, by using the categories as a guide, anyone will be able to ask a few questions and get answers that will make clear the purpose of any BPM technology being evaluated. For many forms of technology, this is a simple task. In the world of BPM, both the purpose and functionality of technology offerings overlap in vexing ways.

Most BPM technology starts by allowing the person using it to describe a business process model. As we know from our previous analysis, this business process model may describe how the departments of a company interact or it could describe how a team creates a purchase order. It is not uncommon for different technology to be used for different scopes of modeling.

Once that business model has been created, it can be used for the automatic assembly or creation of applications that can help execute business processes.

It is the distinction between these two ways of using BPM technology that define the two main categories:

- **Technology for business process description** is used to express the structure of business processes
- **Technology for business process automation** allows business process applications to be generated based on a description of the process

While separating BPM technology into these two categories is a good start, there are four other dimensions can help clarify the purpose of a particular technology.

Models: The Key to Understanding

The research performed for this paper revealed that by focusing on the purpose, level of detail, and type of orchestration of a model uses in a BPM technology, we can easily categorize what that technology is used for. This approach still works when a BPM technology solution contains a complex collection of technology that is intended to meet a variety of needs.

Here are the definitions of the terms that are fundamental to the technology. The first two dimensions were covered earlier in "What is Business Process Modeling?"

Purpose. By purpose of a model, we mean the type of knowledge being captured and the way the model is intended to be used. Two categories describe the purpose of most models:

- Descriptive models, which are used to describe the purpose and nature of processes as a way of communicating ideas between people
- Executable models, which are used to describe processes and to automatically assemble solutions

Descriptive models are not necessarily executable. All executable models are descriptive, although some forms of executable models are focused more on capturing detail rather than on simplifying communication.

Level of focus. The level of focus of a model, explained earlier, indicates what kind of activity and objects are described in the model. The focus of modeling varies widely in BPM-related technology and falls into the following categories:

- Models with **enterprise focus** are used by enterprise architects to model a company's high-level structure. The entities in an enterprise model may include large-scale concepts such as payroll processing, financing, recruiting, or more detailed structures such as the organizational chart for a department
- Models with **process focus** are focused on the tasks or process steps that must be carried out to perform some business activity
- Models with **task focus** are those that are focused on describing the structure, logical flow, and algorithms and are related to specific tasks

Orchestration. The third dimension concerns the type of orchestration described by the model in question. Business process models, especially when they are executable, tend to describe the orchestration of a variety of components at various levels of a business process application. It is possible that a particular technology may perform orchestration at more than one level. By keeping these levels in mind, it is possible to avoid confusion about what a particular technology does. Figure 12 shows the types of orchestration that most BPM technology effects.

- **Presentation flows** involve interaction between the user and the various user-interface components and the rest of the application component.
- **Orchestration of services** in the middleware layer of an application involves the sort of coordination that takes place when a process coordinates the activity of a collection of web services. Many BPM technology solutions fall into this layer
- **Human workflows** involve the sort of orchestration of a process you see inside a web service or inside an enterprise application. Sometimes this sort of orchestration is referred to as workflow
- **Data flows** involve the sort of orchestration that takes place in the database layer through mechanisms such as database triggers. It typically has not been the focus of BPM technology

These three dimensions—purpose, level of focus, and orchestration—create a sparse matrix that can be used to describe and quickly compare almost any BPM technology in a useful manner. The matrix is sparse because certain combinations either don't make sense (descriptive models with technology scope at level 4 or higher) or have not yet been the focus of developer's attention.

When faced with a new BPM technology, if you ask the following questions about the models and focus, it will be possible to avoid confusion and quickly understand what the technology is intended to do:

- Is this technology used for process description or for process automation?
- What is the level of focus of the models: the enterprise, the process, or the task?
- What layer of orchestration can be performed by this technology?

Note that the question about level of focus can be asked about both process description and process automation technology. The question about orchestration is only relevant for process automation technology.

User Interface

Presentation flows control the interaction between the user and user interface components and underlying services

Middleware

Orchestration of services coordinates the flow of control of a collection of web services

Human Workflow

The flow of control between individuals and groups of people working together

Database

Data flows, the logic inside a database to maintain relationships and trigger events
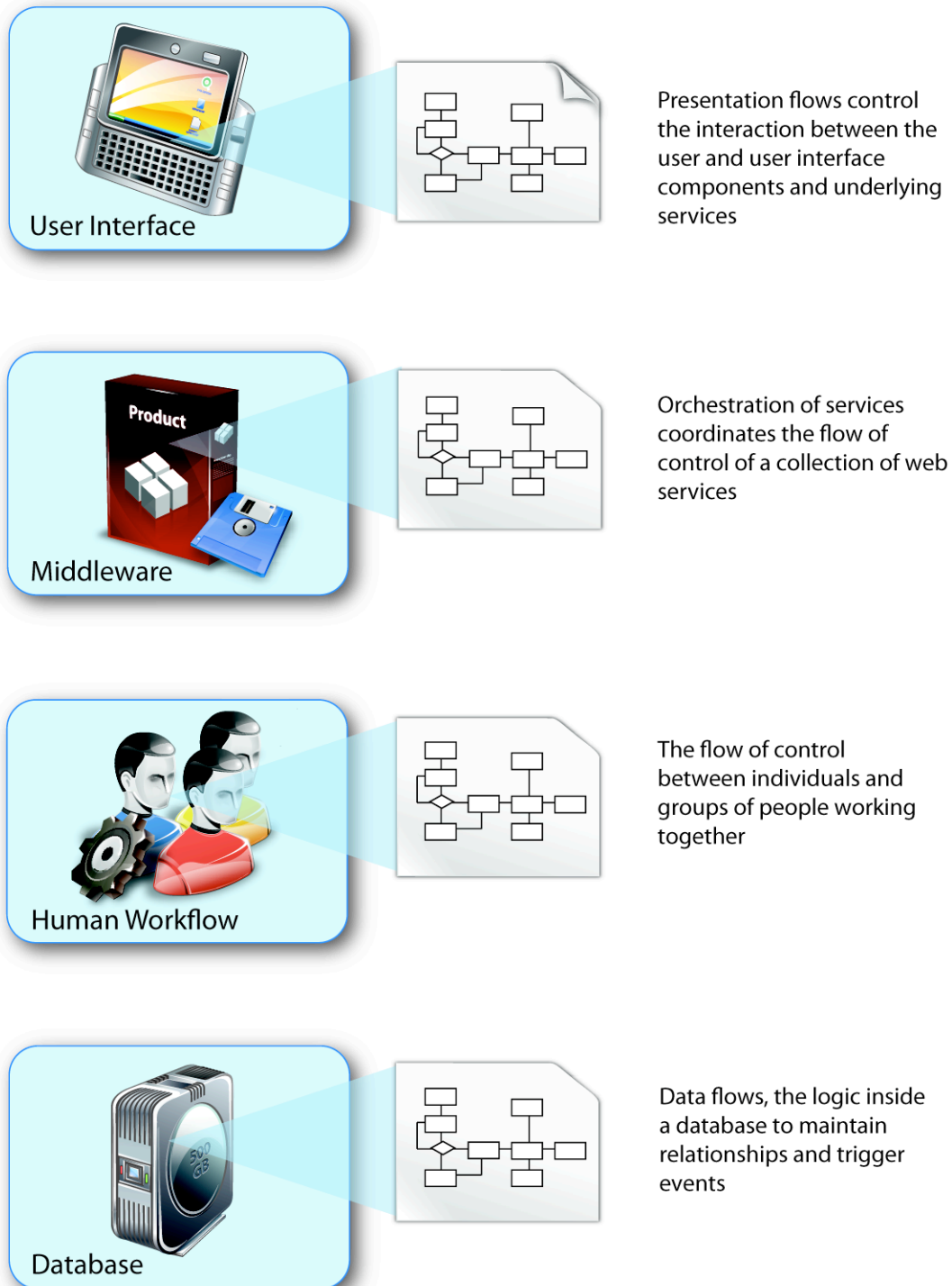
Figure 12. Types of Orchestration

With these dimensions in hand, it will be possible to explain the different types of BPM technology that are available with a higher degree of precision and clarity. Table 1 shows how the specific technologies we will describe fit into the dimensions used to describe business models.

Table 1. How BPM Technologies Are Categorized by Their Use of Models

	DESCRIPTIVE	AUTOMATED
ENTERPRISE	Enterprise Architecture	
PROCESS	Business Process Analysis Software Design and Analysis Simulations	Process Driven Assembly Presentation Mash-ups Workflow Configuration Enterprise Application Process Configuration Process Integration Business Rule Automation

What Is BPM Technology for Process Description?

BPM technology for process description allows business processes to be described and annotated, typically visually. Business process modeling environments usually allow the user to drag and drop various shapes on a canvas of some sort and then to connect shapes in a variety of ways. Shapes describe the flow of the process from step to step as well as decision points.

Descriptive technology varies in function based on the meaning of the shapes on the process diagram. Here is where dimensions help us distinguish the types of descriptive technology.

Enterprise Architecture

One category of descriptive BPM technology is used for enterprise architecture, that is, the mapping of high-level processes and systems that describe the business scenarios and supporting technology of a company.

There are numerous enterprise architecture frameworks such as The Open Group Architecture Framework (TOGAF) and Zachman. Each tends to create a new set of modeling primitives that provide the shapes used to represent the different parts of the enterprise and the processes and systems being described. Table 2 shows some of the more prominent types of technology in this category.

Table 2. Enterprise Architecture Technology

Category	Products	Supplier
Enterprise Architecture	ARIS Platform	IDS Scheer
	Corporate Modeler Enterprise Edition	Casewise
	MEGA Process	MEGA

Because these diagrams can become large and complex, it is not uncommon for this sort of modeling technology to drill down into greater levels of detail from a higher level enterprise architecture diagram .

Business Process Design and Analysis

Descriptive BPM technology that focuses on processes instead of on the enterprise is one of the most active areas for new products and new features. Business analysts use BPM technology that focuses on processes to describe all levels of process detail, from the most specific tasks to the broadest business scenarios. While a variety of notations for business process modeling had been in use for process-focused descriptive technology, Business Process Modeling Notation (BPMN) has emerged as the primary standard for such modeling. BPMN describes a set of standardized visual constructs used for modeling.

Table 3 shows products that provide this type of modeling.

Table 3. Business Process Design and Analysis Technology

Category	Products	Supplier
Business Process Design and Analysis	ARIS Platform	IDS Scheer
	MEGA Process	MEGA
	WebSphere Business Modeler	IBM
	Visio (using BPMN objects)	Microsoft
	Metastorm Enterprise	Metastorm

Technology Infrastructure Design and Analysis

While modeling technology infrastructure is not the central purpose of BPM technology, many products that are used for descriptive business process modeling can also be used to model technology infrastructure using standards such as unified modeling language (UML) or components of enterprise architecture frameworks suited to that purpose.

Other modeling environments are specifically designed for modeling technology and use standards like UML or other techniques used for IT infrastructure such as networks and data centers.

Software Design and Analysis

Another type of descriptive modeling environment uses tools that may also be used for business process modeling technology. This is the modeling of software design and analysis. Using standards such as UML and other forms of modeling, it is possible to model the structure of software and then automatically generate substantial portions of a software application. The same techniques used to automatically generate an application from an abstract visually expressed model are also used to generate an application from a business process model.

Simulations

Simulations of processes, though fundamentally descriptive, are an active and dynamic form of description. A simulation uses a business process model as a starting point and then simulates the flow of work through each step using assumptions for how long each step takes and the type of inputs that are coming in. The flow of work can then be analyzed to determine the optimal design for a process.

What Is the Value Provided by Descriptive BPM Technology?

Descriptive BPM technology can provide many forms of help in BPM adoption and process execution, both in top-down and bottom-up projects. Here is a representative sample of the sort of assistance that can be provided.

Enterprise architecture. Descriptive BPM technology can be used to map out the architecture of the structure, the processes, and the systems of an organization as a basis for deeper understanding, planning, and optimization.

Process discovery and design. Descriptive BPM technology can be used to map the current state of processes and to brainstorm about various improvements that can then be tested through simulations or prototypes.

Metrics development. Descriptive BPM technology can map out the structure of processes at any level of detail so that metrics can be defined to provide key information about the performance of the process.

Strategic alignment and optimization. Descriptive BPM technology can help provide a map of high-level processes and help determine which processes are most important to strategy. The crucial processes can then become the focus of

optimization effort. Where new processes need to be developed, descriptive BPM technology can assist with design.

Process simulations. Designs for new processes and underlying assumptions about the flow of work can be tested using process simulations. Simulations can be used to find design contradictions, unreasonable assumptions, and potential bottlenecks in business processes.

What Is BPM Technology for Process Automation?

BPM technology for process automation helps create software systems that play a key role in automating the execution of business processes. Unlike previous generations of business technology, in which processes were embedded in flows of documents or emails or database records, BPM technology for process automation starts with an explicit definition of the business process model and then constructs the supporting mechanisms starting from there. The business process definition is central, not an afterthought or something lurking in the background.

BPM technology for process automation relies on a rich set of components that come from enterprise applications through SOA, from collaborative technology, and from many other sources. These components are described in a later section.

BPM technology for process automation allows creation of software for process execution that can provide functionality at a variety of levels of modeling detail and orchestration. In terms of the dimensions of BPM technology described in an earlier section, BPM technology for process automation fits in as follows:

- The models are executable
- The models used have a process or task focus
- The level of detail is usually level 3 or below, although BPM technology for performance management may generate systems at level 1 or 2
- The models are most often used for orchestration at the middleware layer, less frequently for the presentation and human workflow layers, and almost never at the data flow layer

Here are the most common categories of BPM technology for process automation.

Process-driven assembly. Environments that start with a definition of a business process model and then allow an application to be created to execute that process are the most commonly discussed and analyzed form of BPM technology. In these environments, a process modeling environment defines the steps in the process. Each step can be associated with a user interface, a web service, a set of business rules, or an invocation of some other business process. Once the process has been defined and connected to all of the components, an application for process execution is created.

The primary benefit of such an application is that the process is in charge. If changes to the process are discovered, the business process model can be changed and the application can be recreated to support the new process. In many cases, these environments are simple enough so that business users can define and improve business process models. When this sort of BPM technology is applied to business processes that are central to value-creation, the barriers to innovation and change become lower, increasing the agility of the company and its ability to respond to changing market conditions.

Table 4 shows specific technology that falls into this category.

Table 4. Process-Driven Assembly Technology

Category	Products	Supplier
Process Driven Assembly	SAP NetWeaver BPM	SAP
	Savvion BPM Server	Savvion
	Teamworks	Lombardi Software
	WebSphere Process Server	IBM
	Oracle Business Process Management Suite	Oracle

Presentation mashups and widget-based technology. Based on simple user interface components designed to be assembled and presented together, presentation mashups and other widget assembly environments allow simple applications to be created. Simple forms of orchestration at the presentation level are possible in these environments as widgets post events that other widgets can react to. Usually each widget gathers information from other applications and systems using web services. In the most advanced of these environments, it is possible to describe a simple orchestration of a process that flows between several screens. It is this sort of functionality that brings the technology into the realm of BPM. Otherwise, it is primarily a way for users to assemble just the information they need by selecting from a portfolio of widgets.

Workflow configuration. A variety of different environments that appear in document management systems, enterprise applications, and other technology allows a business process model called a workflow to be defined. These workflow models may operate at the middleware orchestration layer, but more often are part of the backend layer. Usually, these environments allow a series of steps to be expressed. Specific documents or user interfaces are associated with each step, and then the user is guided through the steps, which are sometimes visualized for the user as the process is taking place. Workflow configuration is a precursor to more

modern forms of BPM technology for process automation. Tools for defining workflows are sometimes used by programmers so that the flow of control of an application can be controlled by a more abstract and easier-to-change mechanism than a programming language.

Specific technology that falls into this category includes:

- Workflow configuration in document management systems
- Workflow configuration in enterprise applications
- SAP Business Workflow

Enterprise application process configuration. Enterprise applications have always automated business processes. In early generations, those processes were hard coded into applications. As understanding of business processes matured, various other mechanisms were introduced to allow processes to be defined and configured. Metadata, that is, settings that control the behavior of an application, was one mechanism. Workflow of the sort just mentioned was another. The modern state of the art for this sort of process configuration is represented by systems that allow the flow of processes that cross the boundaries of applications such as ERP and CRM to be defined in a process-configuration environment. These environments allow not only for the process to be defined as much as possible, but also for the activity flowing through the process to be monitored. In this way, such configuration and application management tools overlap business process modeling, performance management, and business activity monitoring. These tools operate at the middleware and backend layers of orchestration and the more granular level of process detail. The ability of these systems to configure the behavior of a process is determined by settings the application designers created. Using these configuration mechanisms, it is possible to define the flow of and track an end-to-end process that crosses application boundaries. While this approach is not as flexible as the BPM technologies used for application assembly, quite a lot can be accomplished.

Table 5 shows technology that falls into this category.

Table 5. Enterprise Application Process Configuration Technology

Category	Products	Supplier
Enterprise Application Process Configuration	SAP Solution Manager	SAP
	Oracle Enterprise Manager	Oracle

Process integration. Some forms of business process modeling control the flow of processes that take place without user interaction. These business processes are

frequently used for integration between two systems, for the execution of long-running transactions, for the process of event-driven processes, or for a combination of all of these. Such environments frequently date back to the era of Enterprise Application Integration and were created to control the flow of XML messages. Now that web services and event-driven architectures have become more prominent, they have been incorporated. Backend process integration environments frequently use the BPEL standard to control the flow of process execution.

Table 6 shows specific technology the falls into this category.

Table 6. Process Integration Technology

Category	Products	Supplier
Process Integration	SAP NetWeaver Process Integration	SAP
	WebLogic Integration	Oracle
	WebSphere Business Integration Server	IBM
	ActiveMatrix BusinessWorks	Tibco

Business rules automation. Environments for creating business rules have become so powerful that they can be used to effectively control the flow of a business process when incorporated into an application in a variety of ways. Business rules systems allow many rules to be applied to specific inputs to determine the correct output. A business rule could be as simple as determining the right processing center to which to route a purchase order or as complex as computing a credit score based on hundreds of inputs. Because a business rule is so generally powerful, it could be used as a way to control the behavior of an application and as such it is a form of BPM. Business rules components can be invoked through application code by programming languages, by BPM technology for application assembly, from a widget environment, from a web service, or by other means. Business rules are used to allow the complex behavior of an application to be expressed in a more abstract form that is simpler to change.

Table 7 shows specific technology that falls into this category.

Table 7. Business Rules Automation Technology

Category	Products	Supplier
Business Rule Automation	SAP NetWeaver Business Rules Management	SAP
	PegaRules	Pegasystems
	Blaze Advisor Business Rules Management System	Fair Isaac
	Corticon Business Rules Management	Corticon Technologies
	Haley Office Rules	Haley Limited
	iLOG JRules	IBM

What Is the Value of BPM Technology for Process Automation?

Looking back on the categories of BPM technology for process automation reminds us that the desire for process configurability is long-standing. Not until the era of modern BPM tools combined with SOA was the business process truly separable from the application and able to be expressed and manipulated on its own. In practice, because layers of technology exist at most companies, it makes sense to use whatever mechanisms are convenient.

BPM technology for process automation creates value in a variety of ways that fit into the both top-down and bottom-up sorts of projects and at all stages in the BPM adoption process. While BPM technology can be broadly applied, in general, the first targets are the processes that are most crucial to value creation and that must be carefully measured and rapidly optimized.

Supporting end-to-end processes. Because the processes of BPM process automation technology are independent of any single enterprise application, but through SOA can retrieve data and invoke functionality from any enterprise application, it is possible to orchestrate and automate processes that flow from one end of the enterprise to the other. Such processes are often the most important to efficiency and value creation. Looking at them as an integrated sequence of steps can increase the opportunities for understanding, improve monitoring, and accelerate innovation.

Expanding process automation beyond enterprise boundaries. The web services of SOA and web-based user interfaces can expand the reach of end-to-end process automation beyond the boundaries of the enterprise. BPM technology for process automation can present user interfaces to suppliers and partners and also

invoke services that exchange information and invoke functionality in external systems.

Accelerating development. BPM process automation technology leverages the power of visual modeling and automated application generation techniques to speed assembly of a wide variety of components and web services. Whether in the hands of an IT professional or an expert business user, much more work can be done with a model-driven approach than with traditional programming languages once the proper components and web services are in place.

Promoting innovation and agility. BPM process automation technology increases the speed and lowers the cost of change compared with traditional development methods . In addition, by bringing more people into the process, especially business users who are expert in the details of a process, development and innovation cycles move faster.

User empowerment. BPM process automation technology is far simpler to use than traditional development techniques that employ programming languages. In some cases this means that business users will be able to design and implement processes on their own. A new role called the business process expert has started to emerge to help accelerate the training of users and to enable more rapid communication with IT. This new role also helps IT better understand the needs of business. In the context of BPM, this takes place using business models, which makes the process much more straightforward. Of course, if new processes require new components or services, IT staff usually must create them. Also, as a practical matter, even when a business user or business process expert develops a new application using BPM technology, IT staff are involved as coaches to ensure compliance with IT policies and for quality control.

Expanding the reach of enterprise applications to meet role-based needs. Sometimes it seems as if information goes into enterprise applications and remains trapped there. BPM technology can represent an escape hatch that presents just the information and functionality needed by a person playing a role in a process. The combination of web services (SOA) and BPM technology makes creating such role-based interfaces easy.

Table 8 shows that the sparse matrix mentioned earlier can now be filled, depicting which technologies are operative at each level of orchestration.

Table 8. Levels of Orchestration Related to BPM Technologies

Process Automation	ORCHESTRATION			
	Presentation Flows	Orchestration of Services	Human Flows	Data Orchestration
Process Driven Assembly	✔	✔	✔	✔
Presentation Mash-ups	✔			
Workflow Configuration			✔	
Enterprise Application Process Configuration			✔	✔
Process Integration		✔		
Business Rule Automation				✔

What Functionality and Components Constitute a Fully Formed BPM Suite?

The entire collection of technology for implementing BPM is sometimes referred to as a BPM Suite or BPMS. When choosing technology as a part of BPM adoption, sometimes these components come separately and sometimes all together as an integrated environment. In either case, it is worth understanding the different categories of components and functionality.

BPM technology for process automation helps assemble components into an application based on the flow defined by a business process model. Functionality must exist to create and manage the business process model. Controlling a set of components using a model is sometimes called orchestration.

The assembly of a business process application cannot take place unless components of various kinds such as user interfaces, web services, and business rules have been created that support the application being assembled. In addition, once created the components must be stored and managed in repositories built for that purpose. At times, these components must be integrated together in ways that are not controlled by the BPMS.

Once the application has been created, the activity being performed may need to be tracked and monitored.

Here is a list of the most common components and management mechanisms that are involved in application assembly.

Web services. BPM needs SOA. The act of creating executable business process models is the start of creating new applications to help automate and support business processes. To allow each business process step to interact with the world, web services are needed to create a two-way communication with enterprise

applications and to reach out to other sources of information and functionality on the Web.

Business rules. Process steps can involve the application of sets of business rules that determine some sort of result, based on the inputs passed in and the rules in effect. Rules could be used to determine the routing of a document, the credit score of an individual, or a suggestion for a product to upsell.

User interfaces. When process steps need to interact with people to collect information or to define a task that must be performed manually, a user interface is needed. In this way, a user interface is a component that is included in the set of parts that are assembled into a working application by the BPM process automation technology. User interface components can be generated automatically, based on interactions implied by web services, business rules, or data required by process steps. User interface components can also be created by users and developers using a variety of tools.

Modeling and orchestration tools. Modeling and orchestration tools are used at many different levels of a BPMS. The center of a BPMS is usually an environment for modeling used to define business process models or the orchestration of services. Modeling can be used to create services and user interfaces. Modeling also can be used to define the integration and mapping of data from one source to another.

Simulation tools. In order to understand the flow of work through a proposed business process, simulation tools may be employed. Assumptions are made about the amount of inputs to each process and the amount of time it takes to perform each process step. In this way bottlenecks or key areas for optimization can be found. These key areas can be closely monitored to find problems early on in implementations or to confirm the validity of assumptions.

Model and process repositories. When models are created, they must be stored in repositories, which allow them to be accessed and shared by large groups of people. In any large program of BPM adoption, some processes are used over and over. These process components must be stored in a central location and reused in other business process models.

Web services repositories. To link business process steps and user interfaces to the invocation of services, it is important to be able to find services, understand what they do, and identify the data sent and retrieved through them. Web services repositories contain information about the interfaces and functionality of the services and the underlying applications the services are connected to at runtime.

Integration tools. It is not uncommon for a business process to require two systems to work together in specific ways. Perhaps a purchase order must be transferred from the CRM application to ERP. Frequently, the BPMS does not

contain the capability to perform such integration and so other integration tools must be used to create the needed functionality. The BPM tools then invoke a service that performs the integration defined by the integration tools. In this way, specific integrations become components used by BPM technology.

Centralized task management. One of the most important transitions in a business process model occurs when a software application asks a person to perform a task. It is vital that the task to be performed be adequately described and that the results of performing the task be recorded. A single user may be getting requests to perform tasks from many different business process applications. Centralized task management components create a single inbox into which all requests from business process applications are sent, which streamlines monitoring and executing those tasks.

Process and activity monitoring tools. Once an application has been created using a BPMS, it is important to monitor the business process model during execution. By monitoring the activity of specific steps, it is possible to monitor not only the technological activity of the system such as database reads and writes or network traffic, but also the progress of the business process, that is, number of purchase orders created or customer service requests handled. Systems created based on business process models take a large step toward achieving the promise of the field of business activity monitoring, complex event processing, predictive analytics, and simulations.

What Enabling Standards and Technology Support BPM Technology?

When evaluating and adopting BPM technology, two standards are referenced over and over: BPMN and BPEL. To fully understand what BPM technology does, it is important to understand the role of these and other standards, which provide a common infrastructure for process modeling and automation.

Business process modeling notation or BPMN is a standard for the visual definition of business processes. Most of the modern tools for business process modeling support BPMN or are based on it. BPMN defines the primitive constructs that are used to represent business processes, such as starting points, end points, process steps, decision points, and so on.

Business process execution language or BPEL is a standard for expressing the steps required to execute a business process by invoking a series of web services. BPEL is more like a programming language for carrying out a business process than a modeling system for describing the process flow.

Web services technology standards are vital to BPM because they enable web services to communicate with enterprise applications and other systems using appropriate mechanisms for security, self-discovery, versioning, and other important matters.

Industry standards for web services define specific sets of services that are used to automate communication between two companies in a particular industry. BPM technology frequently makes use of such web services when creating systems that cross company boundaries and incorporate partner companies into a process.

Moving Forward

The development and widespread implementation of enterprise applications, the improvements in IT based on the transformational effect of the Internet, and several generations of learning about how to simplify software development through executable models have set the stage for the promise of business process management to be fulfilled. This is no longer a matter of theory, but a point that has been proven repeatedly by early adopters who have applied business process management at scale. We now understand that business process management is not just a general philosophy or a set of technology or an approach to transforming strategy into initiatives and then specific goals for each department and individual in a company. Business process management is all of those things. Better performance means moving forward in all of these dimensions. The authors hope that this paper has been helpful in determining a variety of specific ways that companies can move forward.

To participate in a continuing discussion of BPM, please go to one of the following online communities:

- Join the SAP BPX Community at https://www.sdn.sap.com/irj/bpx
- Get more information about SAP NetWeaver BPM at http://www.sap.com/platform/netweaver/components/sapnetweaverbpm/index.epx
- Go to Accenture Business Process Management Services at http://www.accenture.com/bpm
- For information on systems integration and technology from Accenture go to http://www.accenture.com/Global/Technology