IBM

Benefits and methods of implementing BPM on System z.

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Introduction

This white paper is intended to inform the reader of what business process management (BPM) is about, the benefits that can be obtained from its implementation, how to place BPM into operation and why IBM WebSphere® Process Server should deployed on the IBM System z™ mainframe. This paper will not cover service oriented architecture (SOA) or how to become SOA enabled. Instead, it will make an assumption that this has already been done in the reader's organization or that the reader is already familiar with SOA concepts and that BPM is a natural extension of becoming SOA enabled.

What is a business process?

A business process is a collection of related, structured activities that produce a service or product that meet the needs of a client. These processes are critical to any organization, because they generate revenue and often represent a significant proportion of costs. An example of a business process might be opening a new savings account at a bank. Realize that this is considered a composite business process, because it actually comprises several smaller and more specific processes, such as determining whether the applicant is an existing customer, obtaining the potential customer's employment and credit history and then making an informed decision based upon the results. Nevertheless, for the purposes of this paper, whether we are discussing a very focused, specific business process or a larger, composite business process, the information still pertains.

What is business process management

Forrester Research, Inc. defines BPM as referring to the designing, executing and optimizing of cross-functional business activities that incorporate people, application systems and business partners.[1]

BPM is a method of efficiently aligning an organization with the wants and needs of clients. It is a holistic management approach that promotes business effectiveness and efficiency while striving for innovation, flexibility and integration with technology. As organizations strive for attainment of their objectives, BPM attempts to continuously improve processes — the process to define, measure and improve your processes — a *process optimization* process.

IBM defines BPM as a *discipline* combining software capabilities and business expertise to accelerate process improvement and facilitate business innovation. For *software*, the set of capabilities that IBM brings to market is based on discussions with hundreds of clients and in-depth reviews with leading industry analysts. The key capabilities include modeling tools with simulation and analysis, policies and rules, an integrated development environment, a runtime engine and a management environment that includes dashboards and monitoring. *Expertise* does not equate simply to *implementation services*. Certainly expertise can be in the form of services, but it's much more than that. Expertise is the knowledge about the BPM engagement, but it can be packaged in different forms. Expertise can be packaged as services, but also as *prebuilt* components based on best practices, such as process models and agreed-to methods.

There are many other definitions of BPM as well. Whatever the source, they all agree that BPM allows an enterprise the agility and flexibility to define, observe and change business processes quickly and easily as business needs change. A layer of abstraction between the business processes and the application programming means that your business analysts can change and orchestrate the necessary processes without performing any actual coding. This simplifies and greatly reduces the time and resource commitments necessary to change your processes as needed, when dictated by business needs or customer requirements. It allows you the flexibility and agility to rapidly change on demand.

BPM addresses two very different aspects of business processes. One is integration-centric, which focuses on enterprise application integration and business process integration, representing the business side of operations. The other is human-centric, which focuses on workflow and human task management. While still tied to the overall business operations, it is more about the people involved and their specific roles and duties. Human workflow is about assigning the right work to the right people at the right time with the information they need, presented for immediate action. The associated development tooling and runtime engine allows for the integration of enterprise applications and business processes, as well as integrating human task management and providing escalation flows when needed.

One of the major benefits of BPM enabled by SOA is reuse. BPM provides two opportunities for reuse. The first is with your existing applications. Reusing and integrating your existing applications and avoiding having redundant applications and data can greatly simplify your IT operations. That's not to say that you cannot and should not change them or choreograph them differently to achieve different results. Instead, the point here is that BPM enabled by SOA allows you to reuse what you already have working today, and it allows you to avoid having to duplicate any of it, because reuse is one of the inherent strengths of SOA. After your existing applications become SOA enabled and exposed as services, they can be reused with another composite business process. The second opportunity for reuse is with new business processes. As new business processes and services are created, they become available for reuse. BPM, as part of an SOA, enables the composition of business processes from services and exposes them, in turn, as business services ready to be used (and reused).

BPM includes monitoring and modeling your business processes. It includes assembling the services needed to provide an end-to-end process solution. It includes deployment of the fully assembled model into a runtime environment. And it includes applying rules, policies and governance to your current business processes to ensure regulatory compliance, and allowing you to make policy changes to those processes without requiring the involvement of your IT department.

Why do I need BPM, and what will it do for me?

In today's fast-paced, global business world, agile companies need to be able to adapt to changes quickly and do more with less. You need to improve your company's ability to respond to unpredictable market forces — such as mergers and acquisitions, expanding regulatory requirements, globalization, activities of your competition, market demands and customer requirements. Couple this with pressures to reduce costs and overhead at the same time. How can you meet these challenges and still obtain your key business objectives? You can overcome these challenges and make your organization better as a result by implementing BPM.

Streamlining business processes, one of the key aspects of BPM, allows organizations to overcome the obstacles posed by today's environment and respond rapidly to changing conditions. Creating a responsive environment requires integrating all of an organization's resources — people, applications and information — into business processes. This integration, combined with the IBM System z mainframe and IBM z/OS® operating system, provides an efficient, scalable operating environment that offers a secure and reliable deployment platform for BPM solutions.

Another aspect of BPM, monitoring your business processes, allows you to obtain actual runtime data to be used for performance or historical analysis. This activity alone can reveal where you have challenges in performance, human activities and external services, and where you need to focus to resolve them.

A significant benefit of BPM is that by modeling and documenting your current business processes, you can gain an understanding of how they actually work and see the interrelated activities that are included in a composite business process.

Some of the additional benefits of BPM include optimization, automation, asset and process reuse, enhanced services, and the management of workflow and human tasks. Later, in the section *Examples of real business benefits provided by BPM*, we will see actual examples of where businesses have improved through their implementation of BPM.

An October 2007 U.S. and U.K. enterprise architecture and BPM online survey performed by Forrester Research on the status of BPM projects resulted in the following statistics: 29 percent of the 164 IT architect respondents have one or more BPM efforts underway, 16 percent have completed one or more BPM projects and 42 percent are actively planning for BPM projects.[1] The survey was completed by the vice president, director or manager of architecture (93), chief architect (39) or enterprise architect (32). The most widely used vendor is IBM. The primary benefits observed were increased productivity by process workers (24 percent), the ability to provide real-time visibility into key processes (18 percent), the ability to change processes quickly and easily (15 percent), the ability to model business processes (13 percent), process optimization (12 percent), consistent process execution across business units or geographies (12 percent), decreased reliance on IT for supporting and changing processes (4 percent) and the ability to test for compliance and to remediate problems (1 percent).

So, why do you need BPM? Business changes will happen whether you want them to or not, but they shouldn't inhibit your ability to respond to your customers' needs. BPM can provide you with the agility to change operations as needed, even without involving the IT organization, to respond quickly to changes in the business environment.

How involved in BPM do I need to be?

BPM provides you with end-to-end process management. You can implement BPM across your enterprise, or you can choose to implement BPM incrementally, in a slower, phased approach. You might have an immediate need to resolve a single business process problem, such as a bottleneck in a processs flow when a critical person is not responding, or you might want to improve several issues all at once. The choice is yours, and BPM offers the tooling, runtime environment and ability to enable simple business process changes, as well as a transformation of your entire IT department to become optimized for BPM after SOA is implemented.

A common first step is to use the modeling process to document your current business processes. Even if you go no further with BPM, this single activity will provide you with insight into your current business processes and therefore your operations. From this starting point, you will understand how your processes work together to perform a business activity. Having this knowledge alone will allow you and the associated stakeholders to understand your current state and where opportunities for improvement exist. You can also use the simulation capabilities of modeling to make *what-if* changes, which can provide benefits of their own.

The slide from the Forrester enterprise architecture and BPM online survey[1], shown in Figure 1, illustrates the value of adopting BPM. Although the process modeling activity provides a relatively lower overall value, it also provides valuable knowledge about the current state of your business processes. As you achieve efficiency, IT agility, compliance and consistency through BPM deployment and execution, the value provided by BPM increases. Through process monitoring, you gain business insight. Ultimately, through process optimization, you can achieve the highest value for your stakeholders.
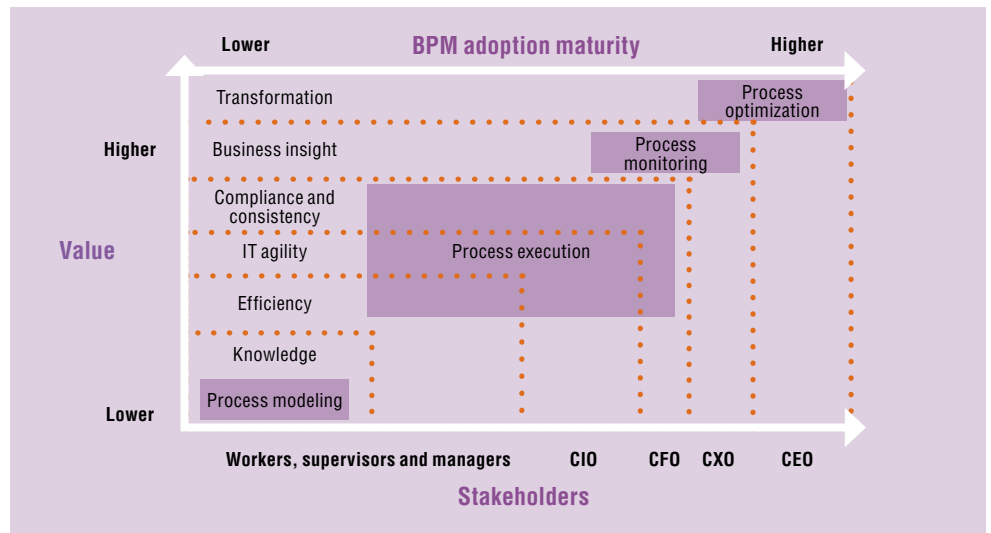
Figure 1. The BPM maturity model

If you decide to completely implement BPM to fully achieve your business objectives and desired agility, your IT department and stakeholders must be in full support, and you must be ready to completely immerse your organization in BPM. There is more to BPM than the initial effort of modeling, assembling, deploying and monitoring. There is a whole BPM life cycle to be aware of, and it will require individuals from the affected departments to be committed to its maintenance and success.

The BPM life cycle

Without knowing better, it would be easy to believe that after an organization's business processes are modeled, assembled and then deployed, no further maintenance would be required. However, nothing could be further from the truth. BPM requires ongoing maintenance in order to achieve the process flows and performance metrics that are desired and demanded by business executives. Even after the BPM deployment is completed and you are in production, the monitoring data that is collected can be fed back into the model to deliver historically accurate data for simulations and more accurate metrics. And even then, perhaps a human task needs to be added to the model, or a new business rule to streamline operations. These additions are part of the overall maintenance as the model changes.

The BPM project manager, business analyst, process modelers, associated IT developers, the deployment team and business managers might all be included in the ongoing maintenance of the BPM life cycle. Although they might all use different tools, they still need to be involved in the evolution of the optimization of the processes. This fine tuning and optimization is necessary to achieve the best performance results possible. Keep in mind, however, that the key business objectives must be strictly adhered to. For example, it might not be possible to add another resource to relieve a newly discovered bottleneck.

Although the BPM life cycle is ongoing and constantly evolving, there are opportunities to enter it at almost any stage. There should be continuous BPM activities for business flexibility, to meet customer and market demands and new services, to automate and streamline your processes to optimize your employees' productivity, and to keep your company agile, competitive and ready for the future. Continuous improvement and optimization is a core function of BPM; it might take several iterations of fine-tuning to achieve the desired and optimal results, even if there are no operational changes. The life cycle operates as shown in Figure 2.
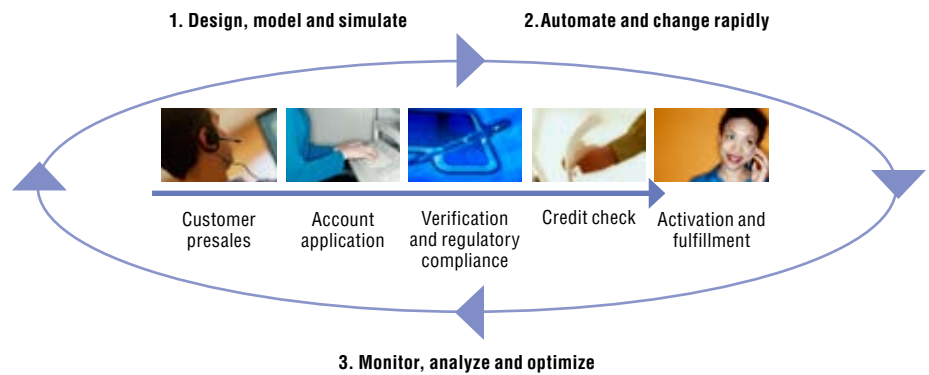

Figure 2. The BPM life cycle

Business activity monitoring

Monitoring your existing processes enables you to identify bottlenecks, as well as opportunities for streamlining and optimization. Monitoring allows a business analyst to see how your business processes are performing against defined metrics or key performance indicators (KPIs) in real time. This can be the starting point for observing the SOA business processes you already have inside organizations and across relationships with external partners and customers. This information is role based, targeted and focused to the status and results of specified operations, processes and transactions. It is used to make informed and quick business decisions and take actions to address identified problem areas. Business activity monitoring (BAM) systems collect and process business events that are produced from applications, integration software or BPM software. Every process running in your process server triggers an event when it begins and when it completes. So, business activity monitoring can be a starting point to view the performance of your current processes before making any changes to your model.

Business modeling and simulation

Modeling your existing business processes helps a business analyst to understand your current processes and make changes to allow for new process flows and collaborations, such as adding a human interaction task or bypassing an existing one when it is unnecessary. Modeling is a good way to document current business processes and see where changes can be made to provide new services or to streamline existing ones.

The simulation capabilities allow *what-if* scenarios to be created and tested before actual deployment is performed to identify the impact on the business. During simulation, you define the metrics (KPIs) that are used in the monitoring environment for performance measurements. Simulation could be a starting point to add a new flow to an existing process, such as performing a credit check for a new loan application, and approving or denying the application based on the returned results. Examples of running *what-if analyses* on the processes are "What if I have 75 percent of resources to do the same task?" or "What if I want to do the same job for 80 percent of the current cost?" Using actual historical data to support these simulations produces more accurate results. Later, when we discuss the actual tooling, we will see that data collected from monitoring can be fed back into the model for more accurate simulations.

After your current processes are modeled and you can clearly see where changes need to be made, you can then make those changes and simulate new scenarios. When ready, the business analyst will export the new, improved model to be used in the integration phase, where the various systems and services are assembled, tested and ready to be deployed into your production environment.

Integration

Integrating all your business processes and existing systems is the work of the IT department. Here is where the handoff occurs from the business side to the IT side. Integrating your traditional applications and back-end systems with new business processes allows you to reuse those applications and gain control of your enterprise from a BPM perspective. This phase is all about assembling the processes, systems, applications and services included in the process model to provide a working representation of the model.

In this phase, the IT analyst imports the completed version of the new model that the business analyst created in the modeling phase. The analyst integrates all the back-end systems, the existing applications and systems, and the internal and external Web services that are needed to complete the model. After it is tested successfully, the complete, integrated diagram with all of its metadata is exported for use in the runtime environment, the process server.

Deployment

After all your processes are documented, simulated, optimized, integrated and tested, you are ready to deploy them into your runtime environment. The runtime engine of all your business processes is the process server. The process server should provide a functional, graphical administrative console and allow you to view your running processes and make changes to accommodate business conditions as they occur.

At run time, the process server integrates the external services and performs the data transformation that is required to enable the exchange of data objects between the process steps. As an example, it can map the application data object used in your custom application to the format expected by the Web service, and then invoke it.

The process server also supports the business rules that have been implemented. For example, in performing a credit check on an applicant, an external Web service is typically invoked to obtain the applicant's credit score. The returned result is just a number. Based on the value of that number, the business rule returns a low, medium or high rating for the applicant's credit risk.

Also known as *workflow and choreography*, process execution and automation (including human task management) are important runtime elements of a business process. Preferably, process execution and automation occur with the process engine running on an enterprise service bus (ESB) and secure process server. Execution and automation can include integration with content management. In all business processes, information is either created or consumed as work progresses. Content is the primary object to be manipulated in a business process. Therefore, participants in a process need the ability to create new content as well as the ability to access and leverage existing content.

One other important aspect of the runtime environment is governance. SOA governance is the mechanism to ensure that the decision-making structure is solid, relationships between services and parties are managed and that there is compliance with the laws, policies, standards and procedures under which an organization operates. Because SOA applications are intrinsically fragmented, they introduce new governance challenges. But with the proper policies, principles, standards, procedures and processes in place, businesses can realize the full benefit of service orientation.[2] Although SOA governance incorporates governance of the running processes, it also dictates who has the responsibility of changing them. For example, to comply with government regulations, a change in the business process flow might need to be implemented. It is important that the change be made, and it is important that the person making the change has the proper authority.

Let's not forget transaction integrity. Although it is important that transactions are invoked, it is also important that there is mediation when there is a problem. We'll discuss that further in the section "WebSphere Process Server."

Continuous improvement and optimization
As mentioned previously, business activity monitoring is the ability to monitor process performance and detect events that can influence performance. This involves analyzing process efficiency and aligning process improvement with enterprise goals and objectives. This kind of continuous improvement and optimization can be achieved by using software agents (BAM technology) to listen for critical business events, and then correlating the event data and updating KPIs. When these procedures are combined with KPI dashboards, operational managers can visually monitor and thus better manage the progress of individual work items in real time. This approach enables managers to intercept work where appropriate and alter the work item or the process flow to improve the desired result.

Analysis and optimization require continuous evaluation of process execution and results, application of analytical insight, trending, and predictive, action-based suggestions to optimize the process model.

Ultimately, the goal is feedback into the model for continuous improvement and optimization. Actual historical data collected by the monitor can be fed back into the model for more accurate KPIs and simulation results.

Examples of real business benefits provided by BPM

In the following sections, we provide examples of companies that have implemented BPM and present the benefits they have gained as a result. Some are not mentioned by name, because we do not have authorization to do so.

Optimization and streamlining

A leading bank in Chile had three separate applications to obtain applicant information, view applicant loans and obtain applicant credit information. It also had a fourth application that generated the offer of products and services available for the applicant based on the information produced by the other three applications. This process of generating the offer was slow and complex. The bank created a new workflow that integrated the four applications, and developed a customized Web client to give a new look and feel to the new business process. With the new streamlined workflow, account executives can generate a customized list of product offerings in less than one minute. A staff activity (human intervention) was also added to the workflow, which allows a bank employee to approve the generated offer before showing it to the customer. This allows bank executives to monitor who presents offers to the end customer.

Automation

A leading mortgage insurer in Ireland reduced its mortgage-processing time from two or three days to a matter of hours after employing BPM. The insurer automated its operations by removing the manual, redundant data entry and human intervention associated with faxes, phone calls and e-mail. The company's new process uses business rules to review a submitted application and, based on the results of a credit check on the applicant, either accepts the application or replies with a request for further information on flagged items. This company not only automated its operations, but also implemented business rules to perform decisions based on results obtained through an external Web service.

Asset reuse

Having composite applications readily lends itself for reuse. The idea is to remove duplication of applications, databases and manual input, resulting in increased performance, a reduction of human errors and IT assets, and better use of your employee's time and services.

A leading U.S. bank needed to support multiple delivery channels and to reduce IT maintenance and support costs associated with duplicate business logic. Also, the bank wasn't able to provide consistent information across all of its delivery channels. The bank implemented an SOA solution to support its multiple delivery channels, eliminating duplicate business logic and reducing costs by leveraging common services while reducing IT maintenance.

Enhanced services

Caixa Economica Federal, in Brazil, extended its banking services through the government lottery offices that it operates. This delivered convenience and efficiency to its customers. Benefits include improved customer service and satisfaction as well as a 30- to 40-percent increase in transaction performance. The company saved millions of dollars on outsourcing expenses while achieving technological independence by creating an in-house solution, rather than continuing with the expensive, outsourced application that it was using previously. Since developing its own application using BPM tooling and a runtime engine, Caixa Economica Federal has been able to add new services efficiently and quickly. Now, a single machine located at the lottery offices also provides banking services to customers. As a side benefit, lottery participation increased 7 percent.

Workflow and human task management

Although the initial focus of BPM was on the automation of mechanistic business processes, it has since been extended to integrate human-driven processes in which human interaction takes place in series or in parallel with the mechanistic processes. A common human-driven process is assigning to appropriate members of an organization any steps that require human intuition or judgment (as with workflow systems). Human tasks are treated as just another service component.

More advanced forms of human-driven processes involve supporting the complex interaction between human workers in performing a workgroup task. In this case, many people and systems interact in structured, ad hoc and, sometimes, completely dynamic ways to complete one-to-many transactions.

How do I get started: The IBM BPM toolset

IBM offers a complete end-to-end suite of BPM tools to help you through the process life cycle of creation, optimization, deployment, and monitoring and modifying. These tools provide everything you need to manage your business processes.

IBM BPM tools include standards-based Integrated Development Environment (IDE) tools and Eclipse-based tooling, and comply with Java™ Enterprise Edition (JEE) and SOA standards. The ability to check out, develop, configure and test Business Process Execution Language (BPEL)-based process models allows the development community to ultimately support process deployment effectively.

You can choose to implement all of the products to achieve the most agility in your business, or you can incrementally approach BPM using only one or more products (see Figure 3). For example, to monitor the performance of your existing processes, you can simply start with IBM WebSphere Business Monitor. Or, to just document your existing processes, or to simulate various what-if scenarios, you can employ IBM WebSphere Business Modeler.

If you decide that BPM provides what your organization needs to become more dynamic and agile and to stay ahead of the competition, you'll still need to implement BPM one step at a time. For example, you cannot attempt to assemble SOA services without first having a proper model. Remember that individuals from various organizations will all play distinct roles in implementing BPM. Here is a typical high-level approach to implementing BPM:

1. *Create the model and set up the KPIs. Typically, the model of the current process flow is created to document that process flow. From that, the new model is created.*
2. *Import the new model into the assembly tool and assemble all of the services and applications included in the model. Test from within the tool.*
3. *Export the assembled BPEL code and import that code into the process server for deployment in the runtime environment.*
4. *Determine the processes and KPIs that you want to monitor (based on the choices made during modeling), set the view accordingly, monitor those business processes and optimize the model accordingly.*
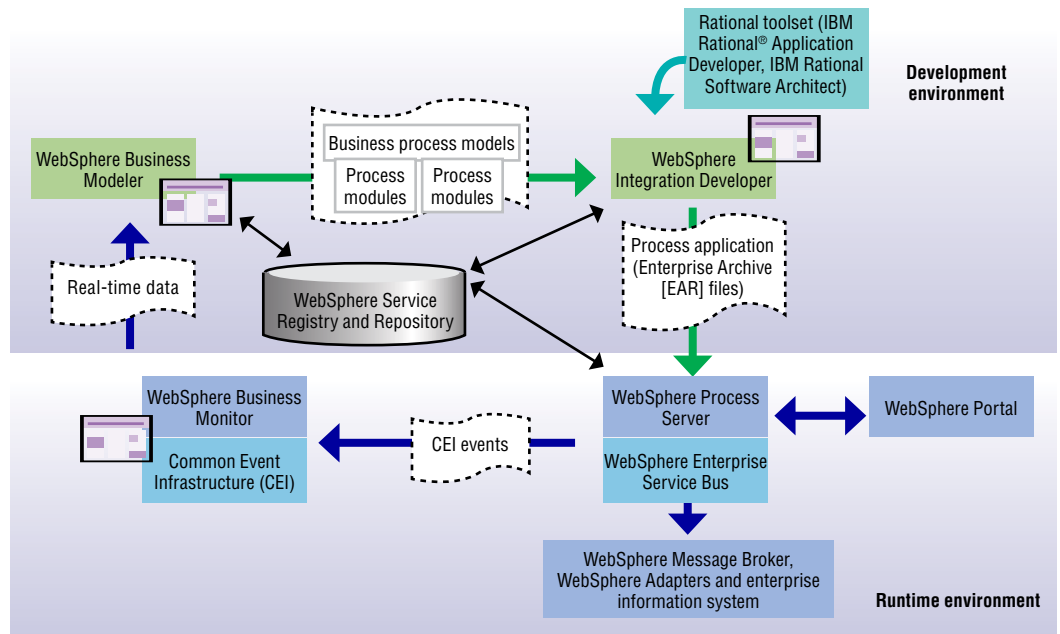
Figure 3. IBM tools for BPM

Next, we'll introduce each of the IBM BPM products so you can understand their purpose and functions and see where they add value to the overall BPM solution.

WebSphere Business Monitor
Monitoring involves the tracking of individual processes to clearly reveal information about their state and provide statistics on the performance of one or more processes. This information can be used to work with external customers and suppliers to improve their connected processes. Examples of the statistics include measures of how quickly a customer order is processed and how many orders were processed during the last month. The degree of monitoring depends on what information the business wants to evaluate and analyze, and how the business wants it to be monitored, in real time or ad hoc.

WebSphere Business Monitor is used by a business analyst to monitor business processes. This tool can monitor events from WebSphere Process Server, IBM WebSphere Application Server, IBM FileNet®, IBM WebSphere Enterprise Service Bus, IBM WebSphere Adapters, IBM WebSphere Message Broker and IBM WebSphere MQ Workflow. With WebSphere adapters, other back-end systems, such as SAP, can also be monitored. And with an IBM toolkit, you can create additional event emitters compliant with the Common Event Infrastructure for use when adapters are not available. BAM involves monitoring events generated in the BPEL from business rules, business state machines, human tasks and service component architecture (SCA) modules. The monitor must be *connected* to your processes so that it can capture common base events in a Common Event Infrastructure.

To view selected processes, business analysts can create custom Web 2.0 KPI dashboards that can run on a simple application server. A self-service capability of WebSphere Business Monitor allows analysts to personalize their views and to subscribe only to alerts and view only the metrics that they are interested in monitoring.

A more advanced view can be obtained when also implementing IBM WebSphere Portal Server, which provides an aggregate view of several items on one page. However, to keep focused on the core BPM products, we will not further address WebSphere Portal Server in this discussion.

WebSphere Business Modeler
WebSphere Business Modeler enables business analysts to design and optimize all of their business processes before deploying them. The model can be created from a blank screen, adding tasks and process flows. Or if a Visio diagram is available, the diagram can be used as input to provide the starting point. The modeled output, in BPEL, is directly imported into IBM WebSphere Integration Developer for the IT department to use in integrating and assembling the services specified in the model. When this activity is completed, the BPEL is exported from WebSphere Integration Developer and imported into WebSphere Process Server for use in the runtime environment.

WebSphere Business Modeler is also used for implementing business rules. Business rules are used by systems to provide definitions for governing behavior, and a business rule engine can be used to drive process execution and resolution. WebSphere Business Modeler is used to model the business rules, human tasks and business item states. It integrates with IBM Lotus® Forms software and with Microsoft® Office for reporting and analysis.

WebSphere Process Server

WebSphere Process Server is the heart of BPM. This is the actual server responsible for running all your business processes. WebSphere Process Server is a standards-based process server that provides a single, integrated runtime environment for all SOA-based process automation. It supports all aspects of process integration — business processes, human tasks, services, business rules and state machines (see Figure 4). *Business processes* are processes that carry out traditional business activities; *business state machines* are event-driven processes focused on business states. WebSphere Process Server contains an integrated ESB and seamless access to all available SOA services. Because IBM WebSphere Process Server is inherently based on SOA and the service control architecture, those SOA principles are inherited when WebSphere Process Server is deployed on the System z platform. In addition, WebSphere Process Server is built on WebSphere Application Server, so it fully leverages the breadth and capability that WebSphere Application Server offers.
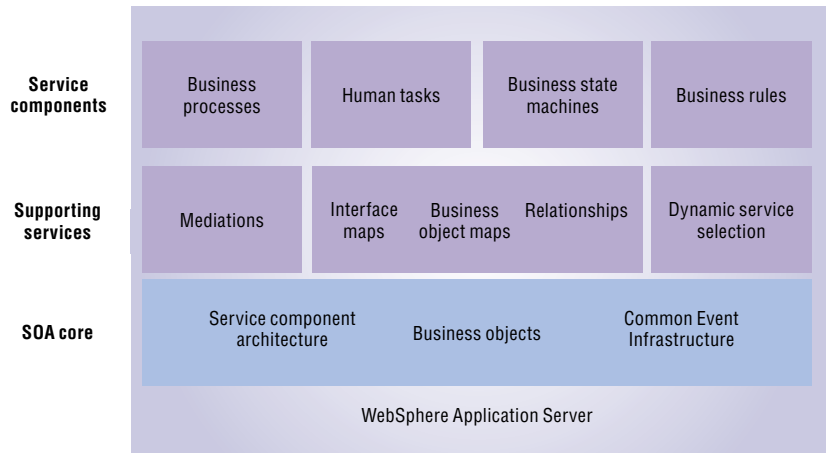
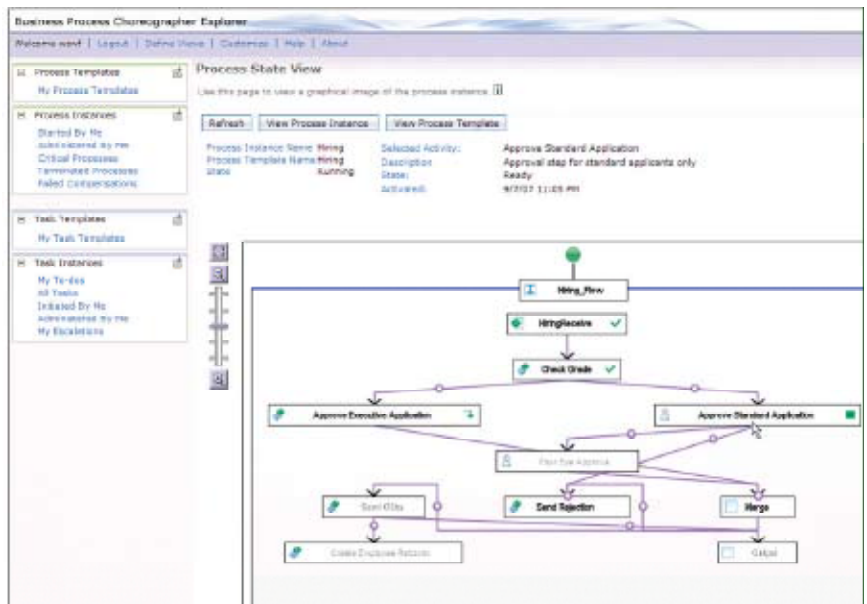*Figure 4. The WebSphere Process Server component architecture*

Figure 5. WebSphere Process Server enables you to graphically view the state of running processes and make changes quickly as needed.

WebSphere Process Server provides the following benefits:

- *True governance of services. WebSphere Process Server supports service governance with dynamic runtime discovery and invocation of services. Integration of IBM WebSphere Service Registry and Repository with WebSphere Process Server provides true end-to-end governance for all services, dynamically discovering and invoking services and service metadata information at run time.*
- *A rapid, Web-client-generation tool for business users to generate user interfaces and task lists.*
- *Support for a Web-services interface for workflow client applications on any platform, including .NET and Java 2 Platform, Standard Edition (J2SE), providing easier access for remote clients to interact with the process.*
- *Support for work to be assigned to a group or team of individuals who all share the same job or responsibility, in shifts or in parallel.*
- *Ad hoc task handling. Gives line-of-business users the flexibility to create additional tasks (insert additional tasks into a task list), schedule follow-on work for the same user or follow-up tasks for co-workers, and handle events that were not planned in advance. Allows a customized e-mail message for escalating human tasks (for example, to alert a manager that a task has not been processed).*
- *The ability to observe the state of running processes and make changes quickly as needed (see Figure 5).*
- *Post-processing of staff query results, which allows users to plug in customer-specific workforce management policies, such as staff workload balancing, substitute when absent or prefer active users. Supports the integration of additional custom staff repositories.*
- *Automatic transition directly from one human task to the next within the same business process using the server-controlled page- flow capability.*
- *Run-time administration (dynamic reconfiguration, with no need to rebuild or redeploy).*
- *Transaction integrity through maintaining the event sequence of incoming events — even when an error has occurred in the process flow, mediation (service invocation retry) or two-phase-commit processing, or while invoking an undo transaction.*

WebSphere Integration Developer

WebSphere Integration Developer is used by enterprise IT architects and developers to assemble and integrate all the services on an SOA foundation that are required by the business processes and defined in the business model (see Figure 6). This standards-based tool is for integrating services as Web-service endpoints, adapters and mediations (data binding and mapping). WebSphere Integration Developer supports all aspects of process integration, including the processes themselves, services, business rules, state machines, human tasks, user-interface generation and forms. In addition, this tool creates the monitor model using template-based generation for common metrics and KPIs.

Figure 6. Visualize, orchestrate and mediate your business processes with WebSphere Integration Developer.

The standards-based BPEL code created from the modeling and monitor tools is directly used as input to WebSphere Integration Developer.

One important feature of WebSphere Integration Developer is that it can synchronize with changes made by business analysts using WebSphere Business Modeler. For example, suppose that a business analyst built a model for a loan application process and exported the model to WebSphere Integration Developer, which dynamically adds an activity. Next, the analyst adds an escalation task in WebSphere Business Modeler. The processes in the two tools, WebSphere Business Modeler and WebSphere Integration Developer, are no longer in sync. But after the code is exported from WebSphere Business Modeler and imported into WebSphere Integration Developer, the tool *automatically* synchronizes the processes and can produce a compare-and-merge report that the analyst can use to manually make the accompanying change in WebSphere Business Modeler.

WebSphere Business Services Fabric
IBM WebSphere Business Services Fabric extends BPM enabled by SOA with composite business applications. As a technology platform, it is designed to build and run business services based on prebuilt, customizable SOA assets, semantic models and policies. It addresses modeling, assembling, deploying and managing these industry- and domain-specific components. And it does so in a way that supports a wide variety of industry and semantic standards, such as Association for Cooperative Operations Research and Development (ACORD), Health Insurance Portability and Accountability Act (HIPAA) and Health Level 7 (HL7).

WebSphere Business Services Fabric includes the IBM Business Services Foundation Pack and the IBM Business Services Tool Pack to help simplify the business, technology, governance and process-interoperability challenges associated with business services in an SOA.

WebSphere Business Services Fabric adds support for dynamic selection of services and adaptation based on business context. WebSphere Business Services Fabric allows you to make policy-driven changes to business services provided by composite business applications. It is an integrated offering that includes WebSphere Integration Developer and WebSphere Process Server, and provides optional industry content packs containing prebuilt SOA assets to reduce time to market, simplify interoperability and help ensure compliance with industry standards (see Figure 7). Currently, content packs are available for the health care, insurance, banking and telecommunications industries.
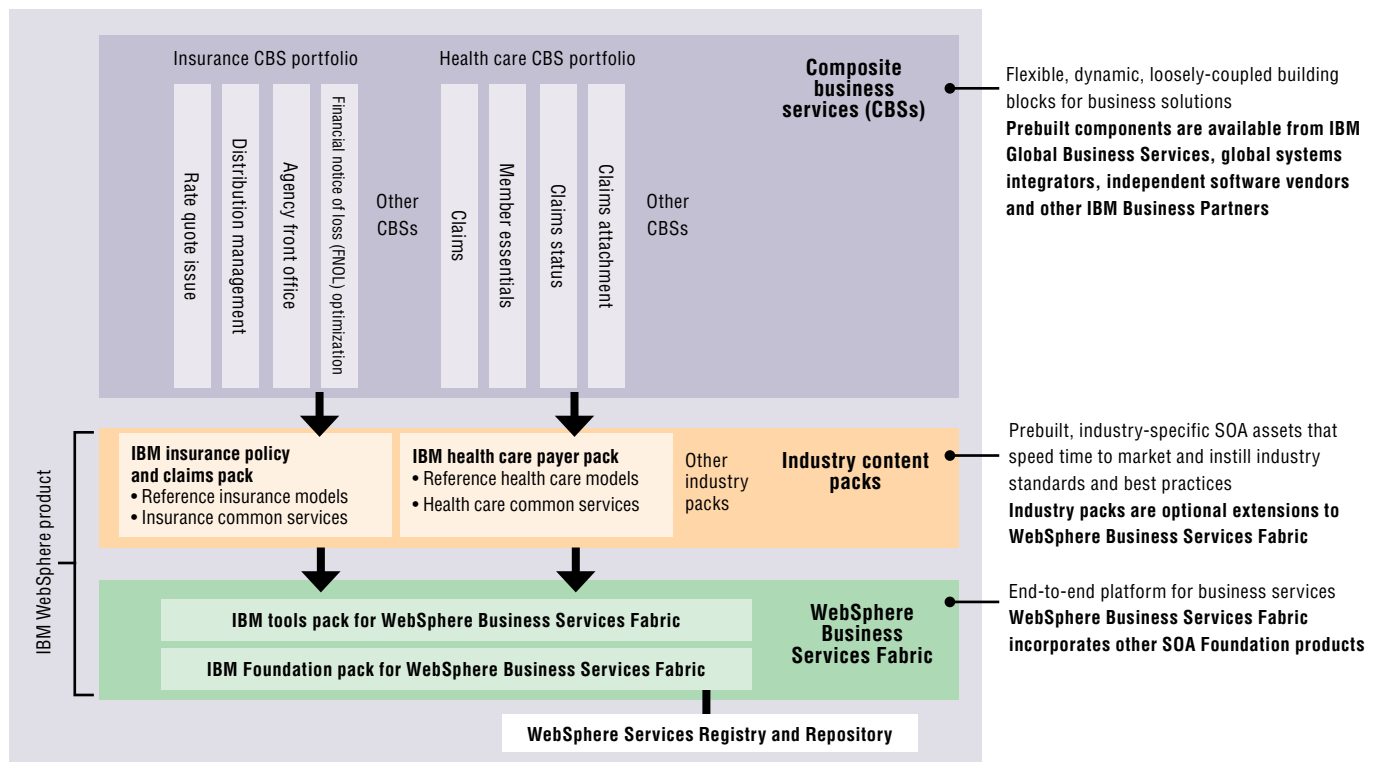

Figure 7. A closer look at the components in an industry SOA solution built with WebSphere Business Services Fabric

Tying it all together: The process of implementing BPM

Each organization has different needs and, therefore, might have a different starting point. Some might already have well-defined processes, and others will not. In either case, you'll want to start with understanding your current processes, and then work with the process problem that will provide the largest gain after it is optimized, streamlined or automated. Monitoring, modeling and simulating changes to your processes is a great way to begin your journey with BPM. Remember to obtain compliance from all the associated stakeholders for a successful project implementation. Also remember that governance is important to determine who has the rights to make changes and to define the changes that are to be made.

According to Gartner, the first step in many engagements is to simply monitor what is happening. A clear understanding of what is really happening inside the business makes it possible to enhance the most important and impactful parts of an organization.

IBM has an open-approach methodology for BPM engagements, based on best practices from hundreds of customer engagements. This methodology includes:

- A BPM advanced assessment, *which determines the level of adoption, the guidelines to frame the engagement (including risk and strategy analysis), the starting points, the appropriate software and next steps.*
- BPM expertise, *which maps BPM service components to adoption levels based on best practices, such as process-documentation techniques, process benchmarking, dashboard design and process-change management. It also incorporates interchangeable, market-leading, SOA-based software. This expertise provides value by synergizing industry-leading methodologies with best-in-class technology.*

Why on System z?

Although the IBM tool for BPM can run on various platforms, there are numerous reasons to deploy BPM and WebSphere Process Server on the mainframe. You already have your critical applications and databases running on the mainframe. By consolidating or hosting your key application infrastructure on IBM System z technology, you gain failover, transaction compensation, redundancy, data encryption, data and message compression, networking in a server with memory speeds (using the IBM HyperSockets™ function), plus robust change management, disaster recovery and testing. It makes good business sense to centralize and consolidate IT resources and to take advantage of the qualities of the mainframe. Reducing the number of physical tiers and operating system instances reduces overall management costs. These reduced management costs result from reducing the variation in platform skills required, the number of support staff members and the physical footprint of the server. Unlike other platforms that are generally dedicated to a single task (such as data serving) for every operating system instance, the IBM z/OS operating system can easily scale and manage application servers, database servers, security servers and messaging servers within a single operating system instance. z/OS can scale both vertically and horizontally through the proven clustering technology of IBM Parallel Sysplex®, which enables the operating system and database instances to behave as a single image while providing unparalleled capacity to process the most demanding application workloads. Deploying WebSphere Process Server on the mainframe provides you with the following benefits:

Proximity

By consolidating tiers, transaction latency related to network transmission and network formatting can be avoided. z/OS and related software provide high-speed and efficient native OS interfaces with secure, shared memory areas. Additionally, the System z server provides the infrastructure for two-phase-commit coordination, which reduces the number of required interactions between the resources involved in the two-phase-commit transaction.

With fewer physical tiers and operating system instances to enable for high availability, z/OS reduces the cost of building a solid infrastructure to execute your critical applications. Reducing the number of physical tiers also reduces the complexity of building a high availability environment.

With cross-memory connections between core business processes, applications and data (*network in a box*), fewer physical components and network connections result in a less complex infrastructure.

Availability

The mainframe is 99.999 percent available, or less than five minutes unavailable each year. The hardware and software are designed for maximum availability, including unique mainframe clustering technology for maximum uptime (Parallel Sysplex). It provides the capability to remotely deploy participating nodes in the sysplex cluster (through IBM Geographically Dispersed Parallel Sysplex™ software). A Parallel Sysplex environment offers a shared-all environment with a centralized coupling facility, which maintains global cache, global lock manager and a shared communications area, all of which can be accessed and shared by z/OS subsystems.

The mainframe provides the ability to recover virtual Linux® servers running remotely (external data representation [XDR]), the ability to replicate data in real time at remote locations (peer-to-peer remote copy [PPRC]) and the ability to switch to replicated data without application outage (through IBM HyperSwap™ software).

Resource Recover Services (RRS) and automatic restart manager (ARM) are z/OS technologies for fast failover and recovery.

Deploying WebSphere Process Server on the mainframe helps ensure 24x7 availability of business-critical processes through high availability manager and backup cluster support provided by WebSphere Application Server for z/OS.

Quality of service

Together, the System z platform and the z/OS operating system are a mature system that offers a variety of qualities of service that are equally mature. In addition, z/OS provides extreme computing advantages by streamlining robust qualities of service into the OS environment.

Transactional integrity is ensured through the RRS function, which is increasingly becoming a prerequisite for new resource managers, and for new capabilities in existing resource managers. Rather than having to implement their own two-phase-commit protocol, these products can use the support provided by RRS.

Security

The System z mainframe provides solid secure sockets layer (SSL) security, privacy, integrity and process isolation. It features public key infrastructure (PKI) services for client-managed digital certificate authority and life-cycle management.

Encryption features include System z cryptography hardware, which can remove the need for specialized external cryptography hardware, because it is capable of up to 6000 SSL handshakes per second on an IBM System z9® server. Its Integrated Cryptographic Service Facility (ICSF) transparently uses cryptographic functions to balance the workload to satisfy application requirements.

For network security, the System z platform provides support for Trusted Key Entry (TKE) capability, a basic security-key management system giving authorized persons a method of security-key identification, exchange, separation, update and management. Its Intrusion Detection Services help resist network-based attacks while embodying industry and international standards.

Identrus compliance provides an infrastructure of trust for electronic commerce widely recognized within the financial services sector.

Mainframe security is unparalleled, even today. Resource Access Control Facility (IBM RACF®) software, just one of your security options, provides the functions that let you identify and verify system users; identify, classify, and protect system resources; authorize the users who need access to the resources you've protected; control the means of access to these resources; log and report unauthorized attempts at gaining access to the system and to the protected resources; and administer security to meet your installation's security goals.

Workload management

The Intelligent Resource Director (IRD), introduced as part of System z and z/OS support, is designed to give your installation an enhanced ability to dynamically move resources to your most important work. IRD is part of the System z implementation of the IBM autonomic computing initiative, IBM's strategy for a self-managing IT infrastructure. IRD provides your LPARs with the ability to dynamically adjust as workloads dictate, meaning that it has the ability to manage resources across multiple partitions in the server.

Workload management in z/OS is not like workload management in any other environment. The z/OS dispatcher provides numerous methods of establishing priority and long-term and short-term weighting, all of which is adjusted dynamically. z/OS Workload Manager is designed to meet the needs of a heterogeneous workload while maximizing the investment in system resources by differentiating workloads so that more important workloads are not jeopardized by less important workloads. z/OS Workload Manager complements the System z hardware, which is designed to handle unpredictable, heterogeneous workloads. This combination of hardware and operating-system optimization enables System z servers to routinely run at or near 100-percent CPU utilization. System z support for workload management can help ensure that long-running tasks do not monopolize system resources, interactive tasks are completed within consistent and guaranteed response times, and resources are allocated according to business goals.

Summary

This paper was intended to provide a high-level view of BPM, why you might want to investigate it further in order to obtain the many benefits that it can provide your business, the supporting end-to-end tools that IBM provides and, finally, why the process server should be deployed on the mainframe.

For more information

To learn more about the tools IBM provides to support business process management, contact your IBM representative or visit the following sites:

WebSphere Business Monitor
ibm.com/software/integration/wbimonitor

WebSphere Process Server
ibm.com/software/integration/wps

WebSphere Integration Developer
ibm.com/software/integration/wid

WebSphere Business Services Fabric
ibm.com/software/integration/wbsf

Autonomic computing
ibm.com/servers/eserver/zseries/zos/sm/autonomic.html

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[1] *The View From The Field: BPM Survey Results.* Forrester Research, Inc. Presented at a teleconference on February 25, 2008.

[2] SOA governance and service life-cycle management. IBM. http://www-306.ibm.com/software/solutions/soa/gov/ (accessed March 2008).