Redpaper

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The Process Architect: The Smart Role in Business Process Management

This IBM® Redpaper™ publication describes the concept of *business process management* (BPM) and specifically focuses on the role of the process architect within BPM. This paper covers in detail how to design business processes and how to enhance those processes for automated business process execution on a BPM platform. It addresses the requirements to successfully drive BPM programs in terms of what process knowledge, methodology, and technology needs to exist or be developed within an organization.

Within the context of this paper, the *process architect* is defined as having the responsibility to model, analyze, deploy, monitor, and continuously improve business processes. This paper defines the role of the process architect as the driver of creating and improving processes and as a key bridge between business and process focused technology.

This paper is intended for anyone who is involved in creating and improving BPM within an organization.

Introduction

Today, organizations that are facing aggressive market challenges share focus. To be more agile and to react faster to market changes, they must understand business processes better and in more detail. Business processes represent the organization's key assets. The way a company invents, provides, and controls its core products and services depends on its core business processes. How well these processes can be managed and adapted to market changes is critical and more important than ever.

Knowing business processes in detail requires further investigation. People from lines of businesses and from IT must understand the details of their business or IT capabilities. Over time, both in business and IT, uncontrolled growth can lead to unclear structures and duplicate or missing implementations. Business and IT can invest in understanding assets in more detail.

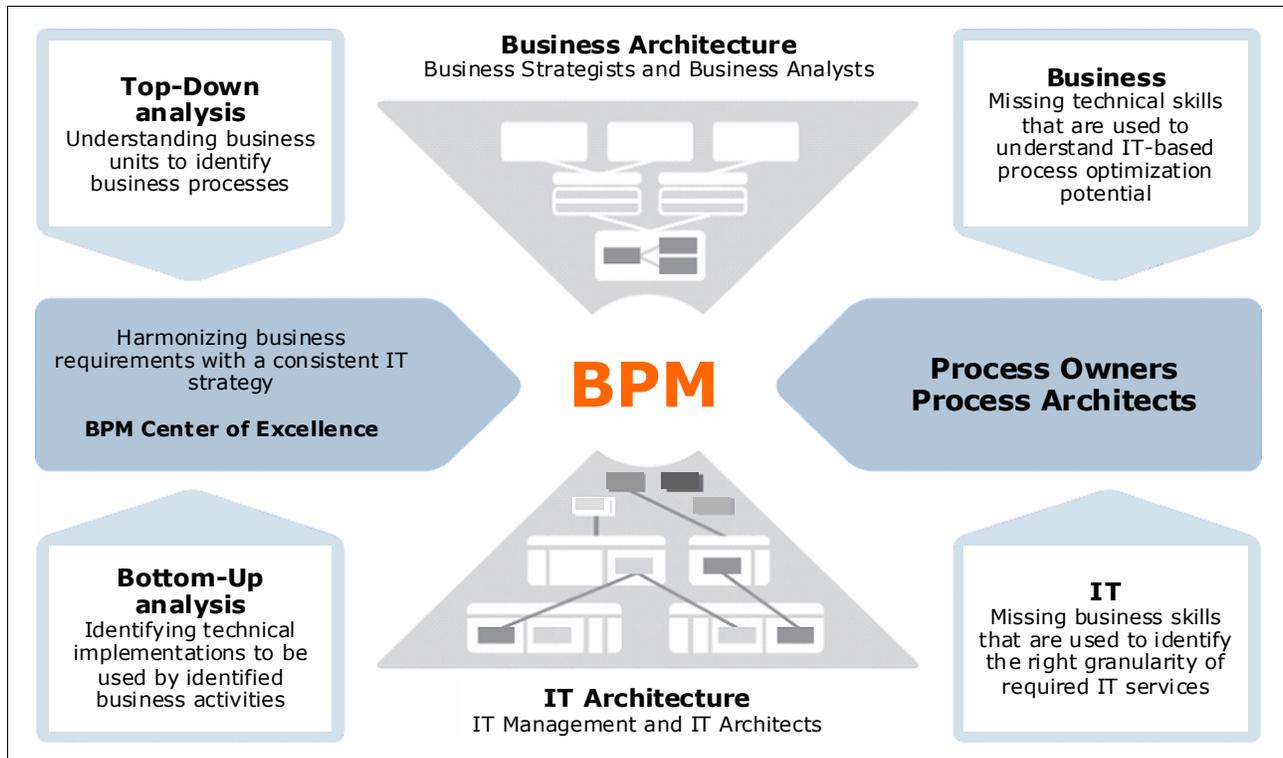Figure 1 illustrates how BPM can enhance existing business and IT architectures.

Figure 1   Using BPM with existing business and IT architectures

Businesses make huge investments both in the business and IT to better understand how these capabilities grow, often with uncontrolled growth. You can model business architectures to understand the capabilities of various units, in detail, to identify weaknesses and strengths to improve overall business performance. To lower maintenance costs and harmonize heterogeneous assets, you can streamline IT architectures to deliver faster IT support.

Both business and IT are important and are challenged with the following mindsets:

► Businesses are unaware of many technical possibilities that IT departments can provide.

► IT departments are unaware of the details for real business needs and, therefore, the benefits of dedicated IT assets.

These two worlds, business and IT, are often separated in different organizational silos and have different orientations, skill sets, and mentalities. To stay in business, these two worlds are merging and using BPM to manage processes and to optimize the overall performance of the organization. In this environment, business processes are key for those organizations that have invested in IT-supported BPM. Business processes have the potential to unite business and IT to optimize the overall business performance of the organization.

From the business side, the business lays out business architectures detail and identifies business activities and processes. IT can support and automate those business processes, and for each identified business activity (or step in the business process), IT can make an IT-based service available. Each business activity, therefore, is a requirement that forces IT to identify the IT service. The IT service either can use an existing asset or can implement a new service. The IT architecture must be able to accept business requirements that are derived from an increasing demand.

Building a successful IT infrastructure by identifying business processes, optimizing those processes for better results, and finally taking those processes to production is a journey that can take years. For the greatest success and speed when creating BPM, you should document your experience and preferred practices in a BPM *center of excellence* within your organization. This center of excellence bundles all the activities that are required when moving forward with BPM. It is staffed with people from both business and IT, thus synchronizing these two groups. People from business quality centers or business operation units can also join the center of excellence over time.

As business processes become candidates for IT supported BPM adoption, introducing the following roles within an organization is vital for success:

► Process *owners* are measured on the performance of processes for which they are responsible.

► Process *architects* enhance and transform business processes into technically enhanced and executable process templates. These templates are then deployed in an IT-owned BPM production environment using automated execution and monitoring.

These roles work closely with your BPM center of excellence to move forward BPM adoption throughout the organization.

An overview of BPM

Business process management (BPM) is a discipline that combines software capabilities and business expertise to accelerate business process improvement and to facilitate business innovation. BPM governs an organization's cross-functional core business processes. It helps you achieve strategic business objectives by directing the deployment of resources from throughout the organization into efficient processes that create customer value. This focus on driving overall top and bottom-line success by integrating verticals and optimizing core work differentiates BPM from traditional methods of functional management disciplines. BPM also provides continuous process improvements, which increases value generation and sustains the market competitiveness (or dominance) of an organization.

Many companies refocus on BPM to optimize their business processes by following the disciplines of BPM, as illustrated in Figure 2.
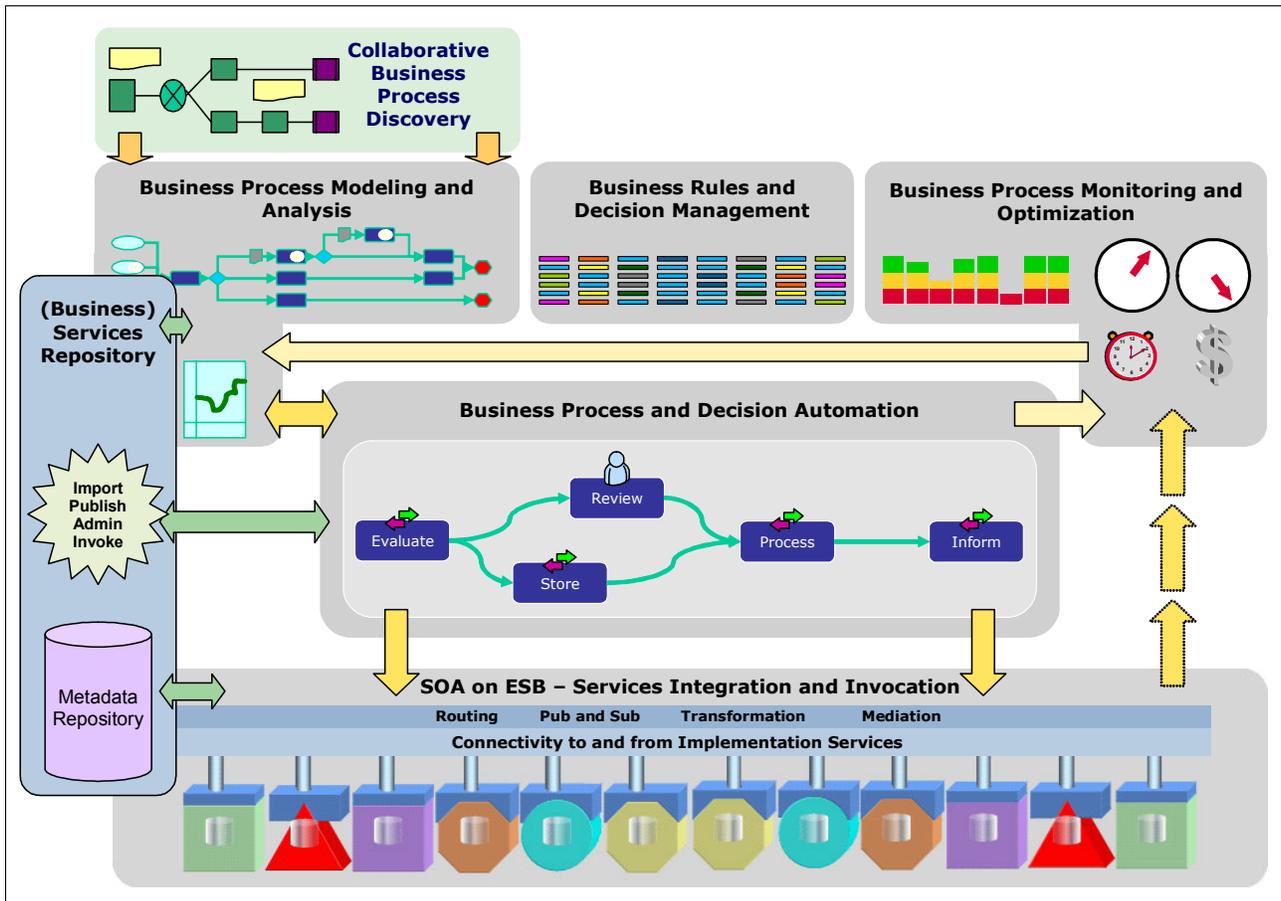

Figure 2   Disciplines of BPM

BPM automates business processes for performance monitoring and efficiencies in service. After an organization analyzes and optimizes these processes, it can then place the processes into production. Today, BPM combines with service-oriented architecture (SOA) to reuse new and existing services when executing automated processes.

As shown in Figure 2, standard BPM consists of the following disciplines:

► Collaborative Business Process Discovery

Because many business processes are not yet documented within organizations, processes must be discovered. Many people within an organization touch business processes and can help in the discovery phase. When moving from discovery to actual details about specific business processes, fewer people are involved in the planning.

► Business Process Modeling and Analysis

Business processes must be documented on a detailed level so that a multitude of people can understand the implementations. When done, business analysts, to understand the process optimization potentials, might need to further vet the process model.

- ► Business Rules and Decision Management

  Most business process decision rules are externalized in business rules systems so that these rules can be flexibly changed without affecting business process implementations. In this paper, it is accepted that business rules management and BPM must be used together to achieve the best results.

- ► Business Process Monitoring and Optimization

  To act quickly, execution of business processes is monitored by IT systems and people to detect process failure or bad performance. Dashboards and scoreboards are important to process owners and business analysts for use of key performance indicators (KPIs).

- ► Business Process and Decision Automation

  Process engines navigate through process templates and start the tasks that must be executed, as defined in business process models. Using SOA ensures that all these tasks are implemented by services that follow the concepts of SOA. These tasks includes ones that are implemented by a business rules management system. This juncture is where business activities and services defined by processes are meeting IT implementations and services provided by IT.

- ► Services Repository

  In large installations, a repository is required to maintain all services that are created and available in an SOA. The repository comes with meta service information to handle service level agreements (SLAs), and services lifecycle management allows for reuse in various aspects of SOA and BPM.

- ► SOA and ESB

  The enterprise service bus (ESB) is the physical layer that binds service requesters with providers. In BPM, a process engine starts services as implementations of its process tasks (the business activities). The process engine then turns services requests over to the ESB. When the service completes, and the process engine expects an answer, the ESB sends the service's answer back to the process engine. The process engine continues to the next task of the process instance as defined in the process model.

In IT-supported BPM, every business activity that is identified by business in a business process model must be implemented with a dedicated technical service provided by IT, as illustrated in Figure 3.
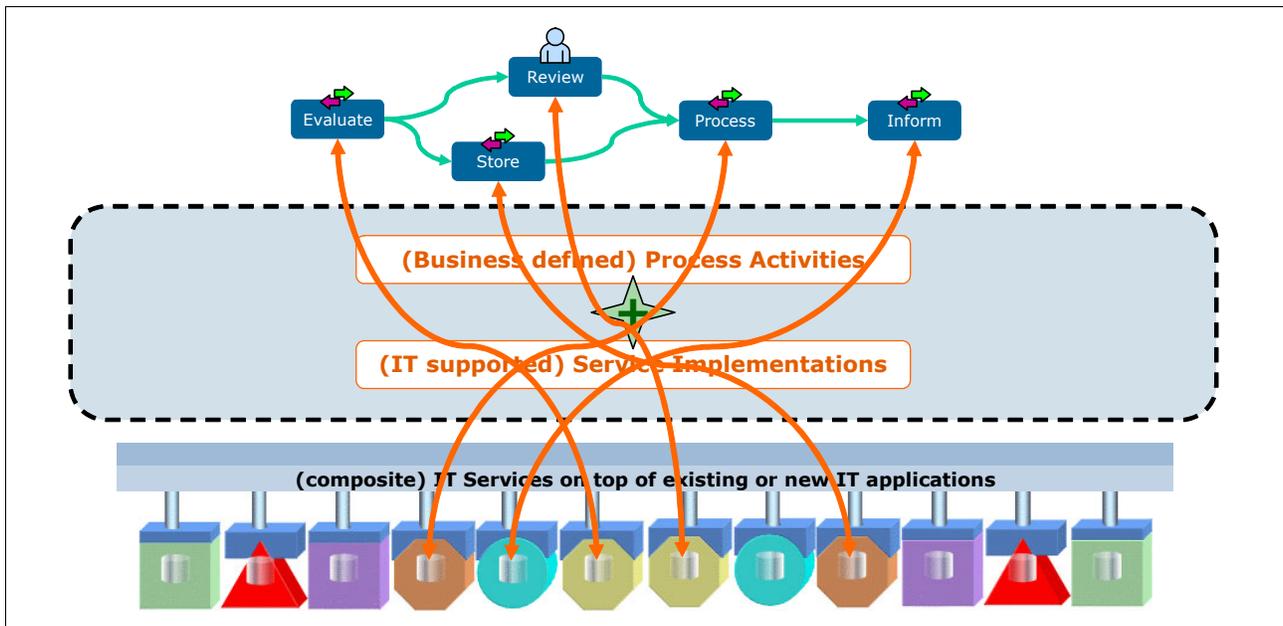

Figure 3   Dedicated technical services provided by IT

From a conceptual point of view, BPM on SOA is simple. Identified business activities are implemented by IT in a *service*, as shown in Figure 3. The concept of a BPM project is completed when a service is created for each business activity.

The concept of a BPM project is simple, but the project is complex and includes organizational and technical issues. These issues can be a challenge to understand and to change, whether the change is supported by technology.

Many roles are involved with BPM and SOA, as shown in Figure 4. These roles must collaborate throughout the seven disciplines of BPM to find and achieve a BPM target.
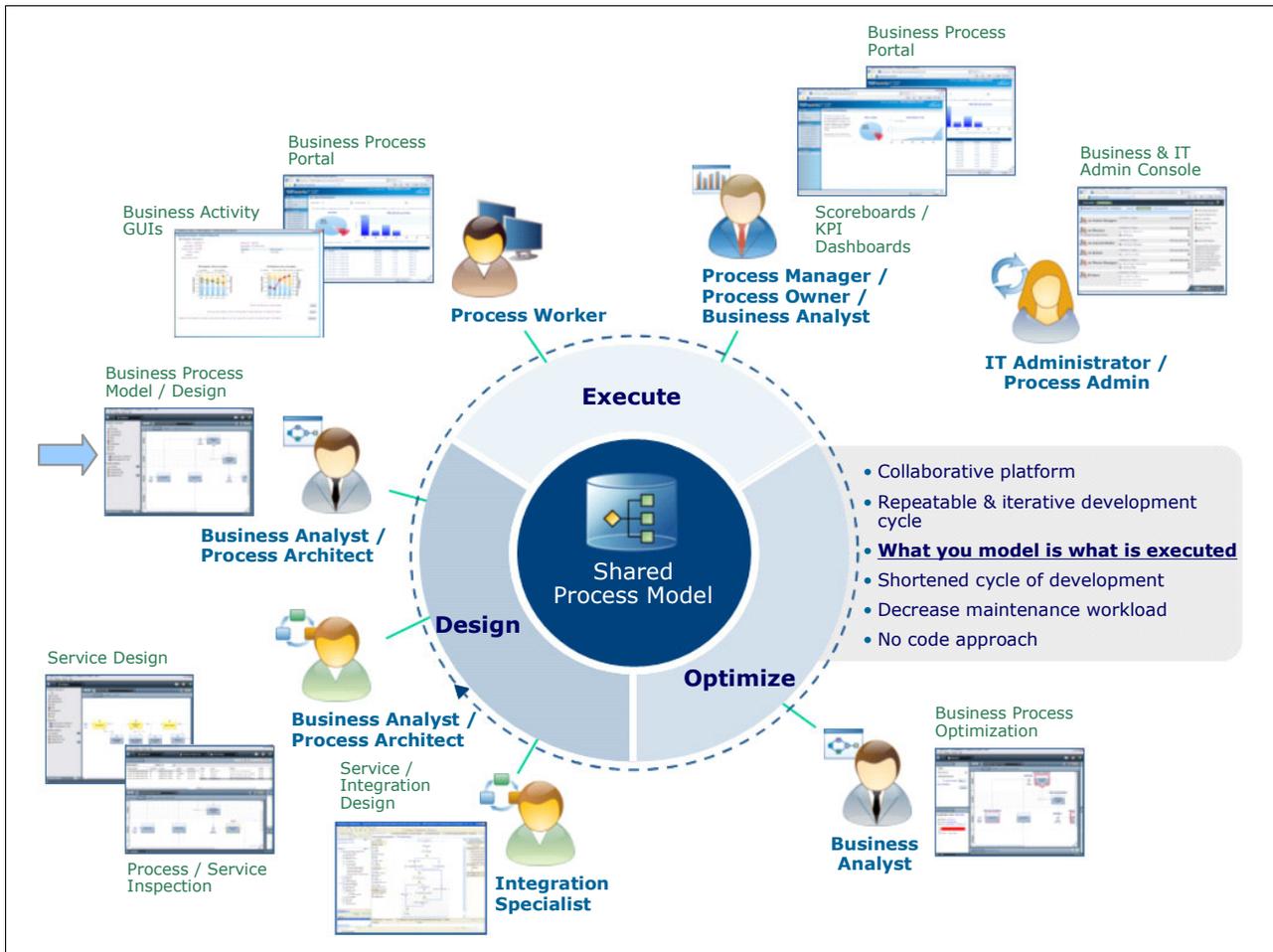

Figure 4   The key roles of various groups that work together to deliver BPM projects

The roles illustrated in Figure 4 might not be complete, because this diagram focuses only on those roles that deal with key BPM disciplines. These roles have different interests, goals, and measurements, but because they must work together, they must agree on the business processes that they are sharing.

The sections that follow describe some of the challenges in BPM and how organizations can meet these challenges.

Challenges in BPM

As shown in Figure 2 on page 4 and Figure 4, the disciplines of BPM require teamwork between people from the business community, the actual workforce, the IT community, and management within business and IT. All parties must work together, with different levels of intensity, knowledge, and expectations.

However, BPM also includes another level of complexity: modeling. *Modeling* is a pure methodology of capturing details into a model to focus on only key aspects. This concept holds true for all modeling exercises, no matter what is modeled.

Consider the business process modeling illustrated in Figure 5. The process modeling levels begin at the top of the pyramid with Level 0. More detail is required from Level 2 to Level 6. At times, even more levels are involved in the detailing process that specifies the executable business process model that is used by a process engine. People within an organization have different expectations and needs for the business process models, such as in business process documentation, analysis, monitoring, and automation.
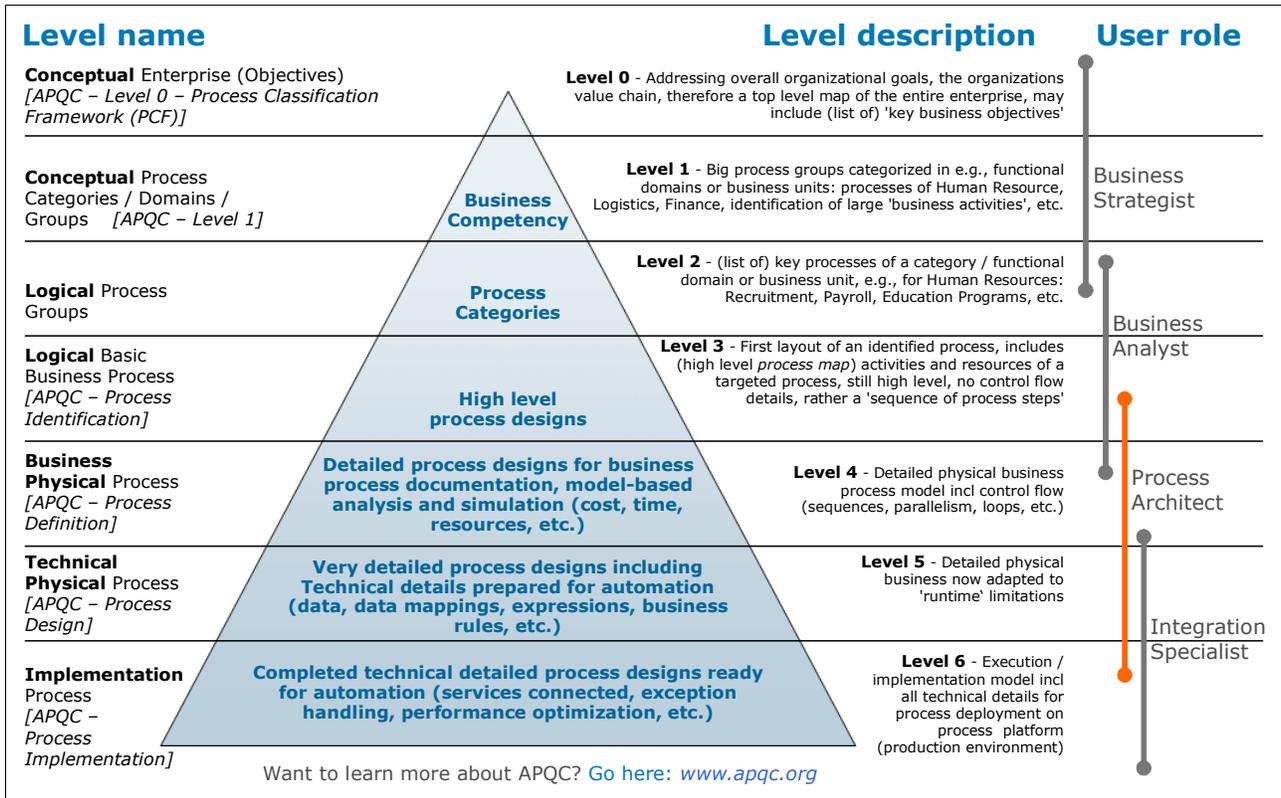

Level name		Level description	User role
Conceptual Enterprise (Objectives) [APQC – Level 0 – Process Classification Framework (PCF)]		**Level 0** - Addressing overall organizational goals, the organizations value chain, therefore a top level map of the entire enterprise, may include (list of) 'key business objectives'	
Conceptual Process Categories / Domains / Groups [APQC – Level 1]	**Business Competency**	**Level 1** - Big process groups categorized in e.g., functional domains or business units: processes of Human Resource, Logistics, Finance, identification of large 'business activities', etc.	Business Strategist
Logical Process Groups	**Process Categories**	**Level 2** - (list of) key processes of a category / functional domain or business unit, e.g., for Human Resources: Recruitment, Payroll, Education Programs, etc.	
Logical Basic Business Process [APQC – Process Identification]	**High level process designs**	**Level 3** - First layout of an identified process, includes (high level *process map*) activities and resources of a targeted process, still high level, no control flow details, rather a 'sequence of process steps'	Business Analyst
Business Physical Process [APQC – Process Definition]	**Detailed process designs for business process documentation, model-based analysis and simulation (cost, time, resources, etc.)**	**Level 4** - Detailed physical business process model incl control flow (sequences, parallelism, loops, etc.)	Process Architect
Technical Physical Process [APQC – Process Design]	**Very detailed process designs including Technical details prepared for automation (data, data mappings, expressions, business rules, etc.)**	**Level 5** - Detailed physical business now adapted to 'runtime' limitations	Integration Specialist
Implementation Process [APQC – Process Implementation]	**Completed technical detailed process designs ready for automation (services connected, exception handling, performance optimization, etc.)**	**Level 6** - Execution / implementation model incl all technical details for process deployment on process platform (production environment)	

Want to learn more about APQC? Go here: *www.apqc.org*

Figure 5   The modeling pyramid - applying details when modeling business processes

The left side of Figure 5 shows that the model moves from the conceptual level, to the physical business level, and then to the technical physical level.[1] Business strategists work on the highest level, not knowing much about the business processes underneath in detail. A wide range of business analysts then take over the business goals and address business process modeling with various details. Finally, IT transforms the business processes that are identified into IT projects and application integration scenarios by creating automated process execution services.

The following gaps are identified between the modeling levels:

▶ Gap between Level 0 and Level 1

Overall business goals are described in Level 0, including the business units responsible for certain goals, customers in various markets to address with products services, and how these business units are related to each other. No detailed business process categories, groups, or specific business processes are identified at this level.

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[1] Figure 5 references *APQC levels*. APQC is a non-profit organization that specializes in benchmarking, knowledge management, measurement, and process improvement and provides information to companies to improve business performance. For more information, see http://www.apqc.org/.

► Gap between Level 1 and Level 2

Process categories and groups are identified in Level 1, and the business units that are in charge of those aspects. Those business units also provide services to the related internal and external customers.

► Gap between Level 2 and Level 3

Specific business processes per process category and group are identified in Level 2. Process landscapes identify how business processes relate to each other, and how they are bound to the business units in charge. Overall business process performance indicators are described in general with no details in terms of process steps.

► Gap between Level 3 and Level 4

Business process maps are identified in Level 3. These maps are drawn with coarse-grained process business activities. Reasonable cost, time, and resource attributes are unknown during this phase and refinement is still required for detailed process documentation and business process analysis. Even during this stage of planning, Business Process Modeling Notation (BPMN) modeling methodologies and notations can be applied.[2]

► Gap between Level 4 and Level 5

Detail is added in Level 4 to the process models created in Level 3. These details are for business process documentation and analysis that simulate business processes to understand cost, time, and resource behavior. Processes are composed of fine-grained business activities with the required business attributes specified. Some of these attributes, in terms of modeling, are cost, time, resources, organizational belonging, and customized classifiers. Also, for business process analysis and future planning, simulation scenarios are defined and business processes are simulated with various resource assignments and simulation volumes. No details are required at this stage for process automation with IT support.

► Gap between Level 5 and Level 6

Technical attributes and specifications are added in Level 5 for process automation using a process engine provided by IT. Depending on the process engine used, the technical requirements to be added to the business process model vary. Personnel involved in this stage need technical skills, an understanding of process engine runtime behavior, and IT integration knowledge. These attributes are needed to address IT service implementations and to complete the process model for execution. Additional tools might be needed to deploy the process model to the BPM production environment.

► Gap between Level 6 and the production environment

Technical specifications identified in Level 6 are added for error handling, technical runtime performance, service invocation and compensation, overall and dedicated security aspects, and transactional execution specifications that conform to atomicity, consistency, isolation, and durability (ACID). Technical specifications and needs vary according to the business category.

The levels do not have to be strictly separated from each other, and transition between the levels is not limited.

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[2] BPMN is a standardized graphical notation for creating diagrams of business processes.

From a business process point of view, the following key issues must be bridged:

► Understanding the specific business goals to be implemented, the extent of the implementation of those goals, and which business processes are used to achieve the goals.

► Understanding what technical integration work is required for automated execution of these business processes, including both existing and new IT applications and IT systems.

In BPM, an identified business activity designed by business must be implemented with a service provided by IT. Solving these issues and gaps are the biggest challenge in BPM. Addressing these issues correctly is more than a technical challenge; it requires smart people that work together with smart tools to bridge the different expectations, goals, and needs. Business processes are key. Therefore, understanding as much as possible about them with a specific purpose in mind is important for all the roles outlined in Figure 4 on page 7. Teamwork is critical between business and IT. Tools can help, but it is up to the people using the tools to make the process work.

The following roles are identified with different interests and needs when working with business process models:

► *Process workers and participants* are those people who actually participate in the business processes in place as executed currently with or without IT support. The workforce wants to understand the flow of the tasks to understand how the business processes work from a procedural point of view. They use available process models for their own education to know how their own and others' work proceeds.

► *Business analysts* are analysts with various skills and interest. Their interest is business process optimization to increase overall business performance. This goal requires an understanding of the detailed process and includes performing the necessary analysis for process optimization.

  Business analysts might optimize the processes in terms of cost reduction, cycle time reductions, or optimized resource utilization. If parts of the processes are implemented in IT systems, they must talk to IT to understand how the process knowledge is captured in applications and what data is required, created, or used to complete the processes. When looking at business process implementations, with or without IT systems, they want to see the current business process performance in terms of KPIs and other business metrics. Some business analysts are experts in Six Sigma or lean management. They are always looking for business process optimization potentials inside and outside of BPM.

► *Management* has various focuses in both business and IT. Line of business management needs insights into business processes for better decision making. If they agree on process changes, they want to know up front what the impact of these changes. Will these changes reduce costs? Will business process execution accelerate? Will customer satisfaction increase because of increased process quality? Does these changes lead to more products or services sales? Will these changes create workforce efficiencies? Management also understands the overall business process performance by looking at KPIs and acting if required.

  IT management must understand the impact of business process changes to the IT infrastructure. Does the workload increase impact IT system performance? Are new service implementations required? Are new SLAs, communicated by business to the business partners or customers, going to affect IT systems? Are the IT systems in place ready to handle increased business process volumes?

> ▶ *IT personnel* include integration specialists, IT architects, and SOA architects. Implementing business requirements requires understanding those requirements as best as possible. Implementation of requirements by newly written services or in integrating existing applications with each other can be done in multiple ways with or without visible process knowledge. IT projects support business processes and vary in their extent.
>
> IT needs to access issues that relate to the process flow, the process data, the resources required, how the resources work together, the dedicated runtime requirements in terms of overall process and system performance, and expected volumes and work loads. A detailed business process model that includes some technical information is critical for IT to implement new business solutions requested by those business units.

All this information can be captured in business process models and made visible to these different groups of people. At this stage, you can then apply the various aspects, with respect to business process details, according to the *modeling pyramid*.

This paper poses the following important questions:

▶ What collaborative business process discovery tools are available for the simple capturing of business processes by many people?

▶ What tools are required for professional business process modeling of all vital aspects and information for the expert business analysts?

▶ What roles and personnel are able to deliver all these details, even when moving down the pyramid levels, for business process automation?

▶ What must be specified in detail to provide business processes automation?

Keep in mind: Not all BPM business process discovery, documentation, or modeling initiatives lead to business process automation. For example, you might decide to only document business processes and perform changes for business process optimization using organizational restructuring activities, outsourcing, or other optimization methods. However, this paper focuses on the benefits of business process automation. We suggest automating even high-level business process models and adding required technical details only when automation is done.

The power of smarter business models

The modeling pyramid shown in Figure 5 on page 8 illustrates a high-level, conceptual business process model that can transform into an executable physical reality. The steps of this process are a template or guide to creating the reality of automated business implementation. The *technical process template* goes into production, creating process instances that physically exist. The process execution model is a model and an executed reality. The model must be fully specified and made real to become real.

As an example, consider that years ago it was not possible to transform a technical blueprint or paper-based engineering drawing of a machine part into its physical representation. Now, with Computer Aided Design (CAD), engineers are "modeling" new parts using CAD software. They are completing, with one tool, the details that are required to physically create these machine parts on Computer Numerically Controlled (CNC) machines. These machines do not have to be installed in the same building. CAD allows engineers to design machine parts, called *prototypes*, for creation by CNC machines. Prototypes can then be produced in high volumes on production lines after testing and further technical refinements.

CAD did not start out with these capabilities. The process was created and evolved over time. The tools improved, the engineers using the tools were educated, and engineers improved the CAD tools according to their business requirements. Later, integration with the CNC machines developed and continues to evolve. Using CAD blueprints to "deploy" engineering drawings directly on CNC machines is state of the art in many industries that produce physical goods. This process with CAD and CNC led to a revolution with respect to the following objectives in these industries:

► The time required for product development cycles for new products was reduced.

► Products can be tested virtually, based on model data only, before putting them into production.

► Creating alternative products becomes simple by using variations of product model data.

► New products are produced and assembled quicker by using model data to create additional components and by setting up the production line.

► Product documentation can be rapidly created by reusing model data.

This CAD example is comparable to the concept of BPM. The same evolution happens in business process automation simply by bringing together smart people with smart tools. Together, they deploy the executable business processes in an IT infrastructure, which is the BPM production environment. In the case of BPM, you start with the business process definitions, which are realized later with the click of a button that automates a process. The process creates work for people and orchestrates services.

A sample scenario

In this sample scenario, people are working together with access to various IT systems, exchanging information through phone calls, emails, and spreadsheets. There is no overall or centralized control during the execution of the business process.

Figure 6 illustrates this common BPM scenario by showing how BPM is implemented.
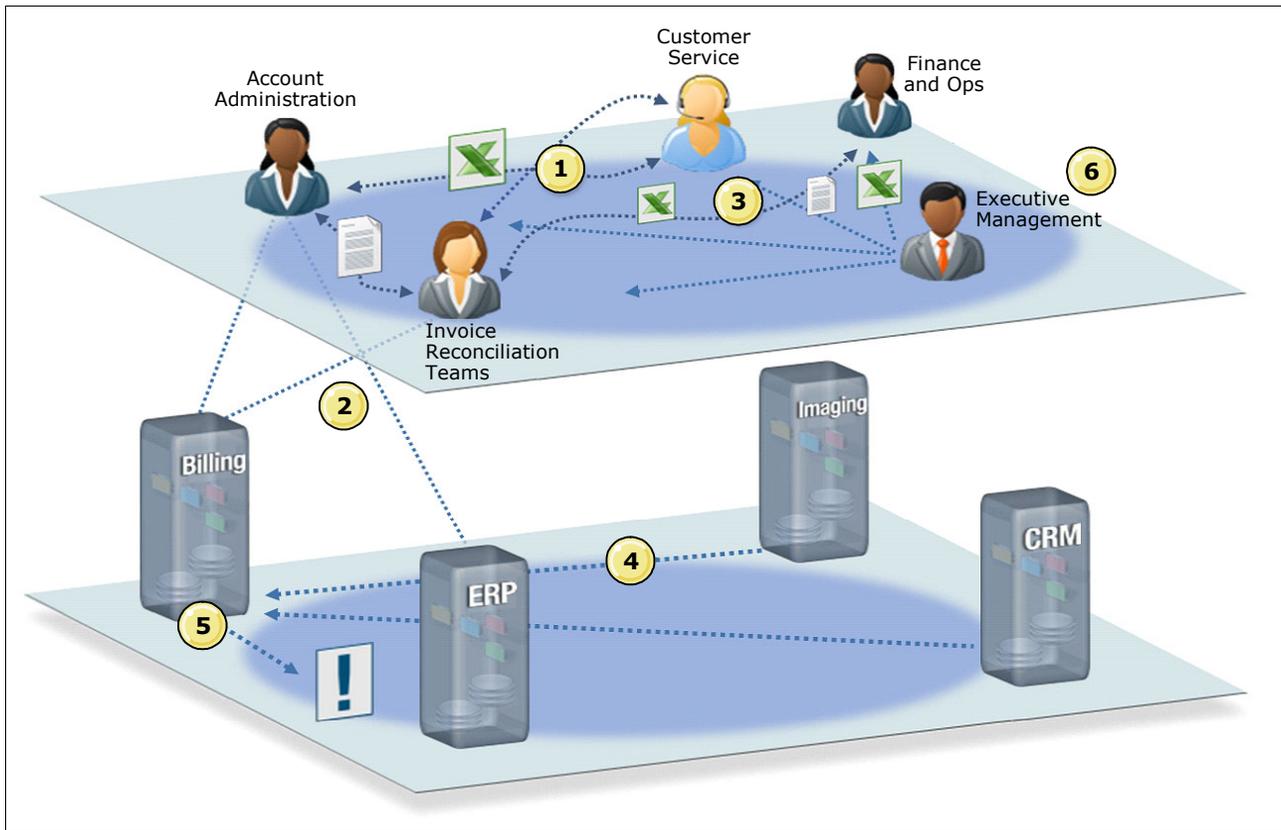

Figure 6   A typical business process

In this simplified business process, a number of people work together to handle a request from a customer account. Because they send emails to each other and enter data on Microsoft Excel spreadsheets, who is receiving what mail with what data is under no one's control. In addition, phone calls are placed, and executive management must ask a number of people to get information about the state of the process. The process state is not apparent during the execution of the request.

Many IT systems are storing account, customer, and other business relevant information used by the process participants. Current account information must be accessed by the customer service clerk when talking to the customer and the invoice reconciliation team, and the invoice data must be checked. Finance and operations clerks must find the correct data, often in huge spreadsheets, and executive management receive up-to-date business information about the number of account requests handled. Business reports, created by staff manually, collect this information, rather than accessing the underlying IT systems.

No one person can explain how a specific request for an account is handled when creating an account or changing an existing account. Various people must be asked to get the full picture of these processes. There might be existing documentation, but this documentation might be outdated. The documentation is static and does not show the dynamics of business process execution. Reports about the account creation process are not available, either because programs to extract data are not written yet or the account is created yet in the IT systems. The knowledge about how the process participants work individually and together, who gets what information when and to what level of detail, is only available in their heads and is not apparent to others.

This process is complicated for a new employee. BPM documentation is tedious, but it creates automated processing and increases productivity for new employees.

When looking at *manual* or *human* process implementation, there is room for improvement when introducing BPM. Identifying the organic type of process model currently in place and the crude process engine navigating through that model achieves the following advantages:

► Everyone knows how the process must be executed when looking at the process model. In addition, variations of the process are known and treated equally.

► Analysis can be performed on the process model to understand the impact of process or resource changes. This analysis leads to better prediction of the performance of proposed changed business process, and to a better version being placed into production. Doing so creates a better automated process versus simply automating the current business process in place.

► Every process is executed the same way, ensuring that every account opening process is done the same way, and progress no longer depends on who was manually working on the account creation.

► All people are involved in the execution of the process as defined in the process model based on their roles, skills, and abilities.

► All the data needed by the process participants is provided to them, and gathered from underlying IT systems if possible. Some data might have to be retrieved from the customer by placing a phone call. Process participants do not have to find the data by themselves in IT systems; they get what the need when they need it, provided by integrated IT systems.

► Some steps in the business process can be fully automated. Manually looking for some specific account information can be done by a service. That service can send its result to another IT system for some automated update. No humans are involved, and that time is now available for more important business tasks.

► Although the business processes are executed automatically by a process engine, the process state of each single process instance is tracked and can be aggregated for all process instances over a defined time period. This process is called *process monitoring* and presents insights into business process execution exactly when the processes are executed in real time. Reports for executive management, process owners, and other line of business managers are always available. In addition, specific process, customized, or standard KPIs can be defined and monitored.

BPM has more advantages; however, those advantages that are listed here are most useful.

A modeled business process is put between the process participants and the IT systems. A process engine navigates through the process model, extracts and stores the process data, and interacts with the correct people at the correct time.

These functions are defined in the business process model and shown in Figure 7.
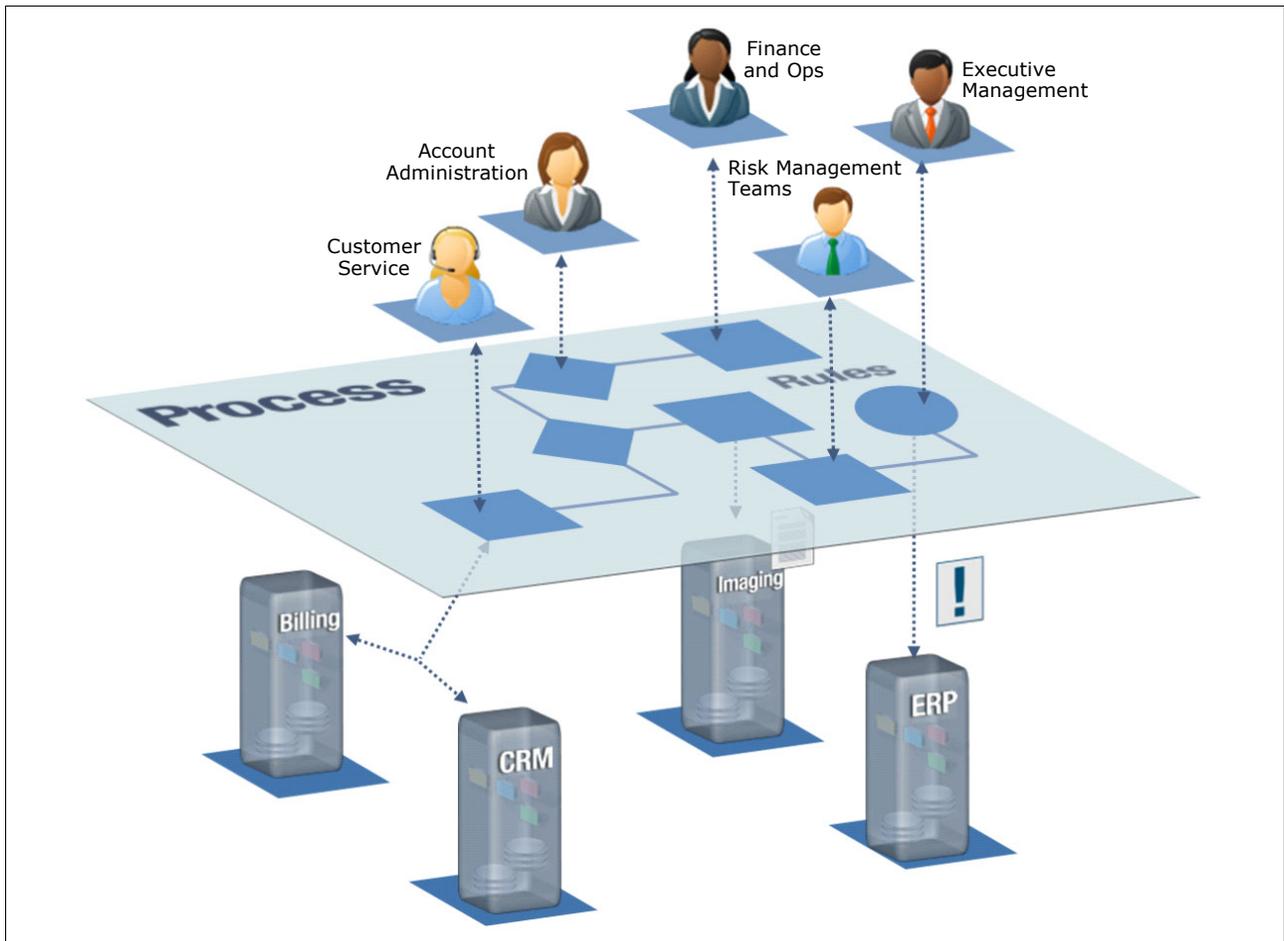

Figure 7   An automated IT service in place

Business process automation, as proposed by BPM, does not mean that there is no human involvement. Having people that participate in business processes is sometimes required, because not every step can be automated. The process engine defines, based on the process model, who does what with specific data in a specific time frame. All these business processes are designed and monitored by people who seek ongoing business process optimization.

IBM Business Process Manager

The current BPM offering from IBM is IBM Business Process Manager. It is a comprehensive and rich offering to handle BPM requirements. Figure 8 shows its main components.
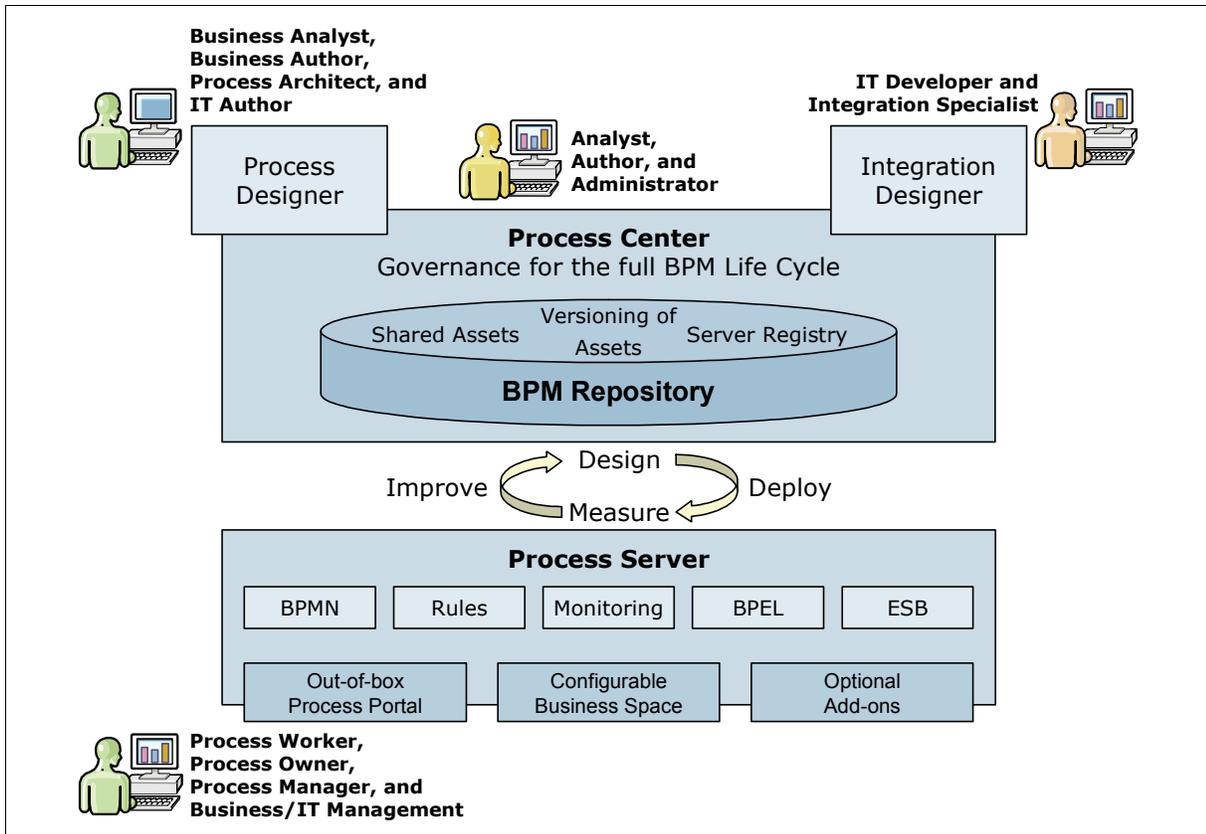
Figure 8   IBM Business Process Manager Advanced is a complete BPM offering

The IBM Business Process Manager Advanced deals with all aspects of BPM. It provides business and IT with the ability to design, analyze, simulate, test, deploy, automate, monitor, and optimize business processes.

The following main components are included with IBM Business Process Manager:

► *IBM Process Designer* is the business process definition (BPD) tool used to model business processes for documentation and run analysis or automation. These programs include specification of KPIs and business metrics for monitoring. Business activities are linked with IT service implementations.

► *IBM Integration Designer* is the tool for IT to either implement new services, or use existing back-end applications as services. IBM Integration Designer enables IT developers to develop services that easily plug into processes to provide powerful integration and routing logic, data transformation, and straight-through BPEL subprocesses. IBM Integration Designer comes with an ESB tool for state-of-the-art services integration that works with the SOA programming model, which provides its methods and methodologies. The IBM Integration Designer is only part of IBM Business Process Manager in Advanced Edition.

► *IBM Process Center* is a scalable central repository and control center for organizing and managing all process artifacts, applications, and services that are created as part of a BPM solution. It is the foundation of the collaborative authoring environment and enables a single view of the process from creation to deployment. The process center provides an integrated design time experience that spans all roles, asset sharing, and versioning from a single repository. Thousands of process components can be organized, shared, and found easily with auto-tagging and smart folders. You no longer need to search through unwieldy folder hierarchies.

Versions can be created with a single click by taking a snapshot of the process applications. Process Center is used for managing process deployments to IBM Process Server throughout all runtime environments essential for program-wide governance. Service components assigned to the business activities from the BPDs are made reality by combining the unit's underlying process and services components with the models from a BPMN and standardized BPDs.

► *IBM Process Server* is the runtime process engine. It automatically navigates through the executable process templates or the actual dedicated process instances. IBM Process Server starts the IT services assigned to the business activities, and creates task items to process participants presented in Process Portal for completion. The ESB implementation aspect finds and starts services endpoints using various administration tools to grant operational efficiency and correctness. It includes additional subcomponents to deal with monitoring and calculation of business metrics presented to authorized staff. The metrics from the process portal inform you about the performance of business process instances that run in real time.

IBM Business Process Manager provides many capabilities not described here in detail.

The hub of IBM Business Process Manager is the Process Center. You can use this repository to access the shared model, where *shared* means that there is only one model for business and for IT. A shared model avoids model transformation when high-level business process models must be further enhanced with technical details for automation. Business focused teams are detailing, modeling, and designing with the same model that the IT team uses to enhance the product with technical details, process data, data mapping, decision expressions, business rules, web services integration, and many other things that must be done for business process automation.

Thus, IBM Business Process Manager is ready to design business processes from the high entry level of BPD and documentation down to the completion of the tangible and executable business process template.

Figure 9 shows the modeling pyramid of business process modeling, but this time the IBM tools that support business process modeling and the roles that work with the tools at various modeling levels are also illustrated. This diagram highlights the roles that work with the tools at various modeling levels and introduces the *process architect*.
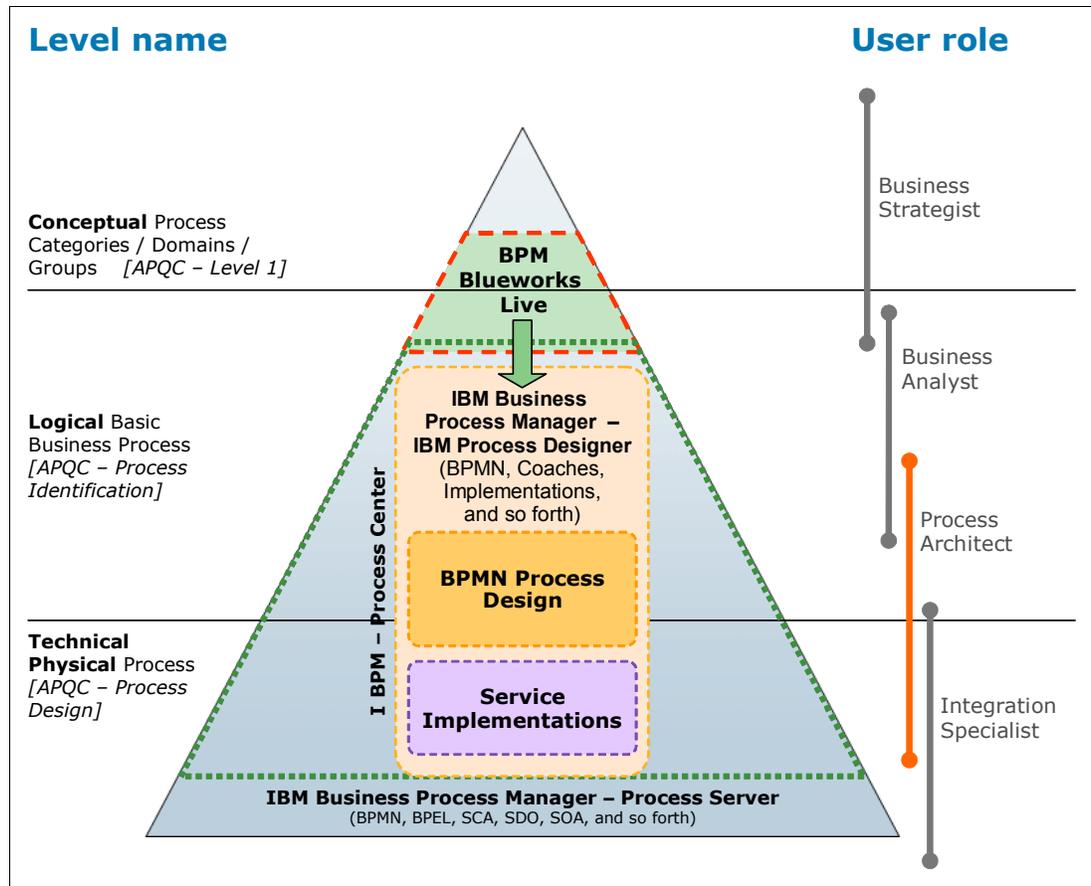

Figure 9   User roles and IBM tools that support BPM

What people can do all the things offered by the tool? Business analysts might not be able to perform the technical aspects. IT teams might not be able to understand the business imperatives expressed in the BPD. Similar to the CAD analogy where former designers suddenly were able to sharpen a design ready to be produced on CNC machines, business and IT coming together have evolved a new role that requires new skills and design capabilities.

In BPM, this new role is the *process architect*. This person's job is to use an important tool, the IBM Process Designer, to refine a high-level business process model. In IBM Process Designer, this refinement is called a *business process definition* (BPD). BPD is the executable process template. The IBM Business Process Manager deploys BPDs to the Process Server. BPDs can be performed from the Process Center with appropriate authorization. Figure 9 shows how the process architect works using IBM Process Designer, spanning multiple modeling levels with one tool.

The process architect is the key role that closes the gap between the high level conceptual business design and the required technical process execution model. The process architect is not the only role required when modeling business processes; other roles often apply, especially in larger organizations.

Here are more details about the roles as illustrated in Figure 9 on page 18:

► The *business strategist* captures the business strategy that guides the operations and actions of the business throughout the organization.

The strategic intent and motivation of business is further refined into operational capabilities to identify transformation opportunities. The business strategist lays out the first high-level process maps in BPMN and links an organization's operational capabilities to business processes. These processes are shown in more detail further down the modeling pyramid. When using tools from IBM, the business strategist can use IBM Blueworks Live™.[3]

► The *business analyst* takes over the process maps provided by the business strategist and starts adding more details using a business process modeling tool.

When not reusing process maps from IBM Blueworks Live or another process discovery tool, the business analyst is starting right away in IBM Process Designer. In Level 3, more details are added in terms of fine-grained process steps, typifying the tasks by using the BPMN standard user tasks, decision tasks, system tasks, and subprocess tasks. The business analyst can also add resources required for the tasks, or use business data objects that show what data is used by the tasks.

► The *process architect* adds more detail as required depending on the purpose of business process modeling, such as business details of time, cost, and additional resource information that assists the business process in modeling and analysis. The process architect can also add IT details about the technical information that is required for automated business process execution.

The process architect further enriches the modeled BPD provided by the business analyst. When you look at the pyramid, notice how many levels the process architect spans. The process architect is a powerful role, and depending on the job role implementation within the organization, the process architect is able to achieve more or less with respect to BPD.

► The *integration specialist* looks at the service integration and invocation requirements defined in the BPD and then makes the required IT implementations and services available to the BPD.

In IBM Process Designer, service implementations can be done either in IBM Process Designer or services that exists elsewhere, such as web services, and those services can be linked to business activities using various mechanisms. If the integration specialist already made existing IT implementations known to IBM Process Designer, for example, using toolkits, then the process architect can assign these services and implementations to the business activities modeled in the BPD. In this case, the process architect defines a service requirement, including the services name, and input and output data. After the integration specialist provides the service, as an implementation done in IBM Integration Designer, the process architect assigns these services as the implementation of a business activity. The integration specialist is an important role that assists the process architect by creating the required IT services and implementations to complete the BPDs for execution.

This outline is a structured way about how various roles work together to specify detailed executable business processes that begin as high-level business strategies. In reality, business analysts provide more data, such as information about business process KPIs, insights of cost, and time behavior. However, if this situation is not the case or if the data is insufficient or inaccurate, the process architect must find ways around these issues.

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[3] IBM Blueworks Live is an offering from IBM that is available at https://www.blueworkslive.com. It comes with a 30-day trial version.

Compare this process with the CAD analogy, and notice that there is no transformation from the BPD (modeled in IBM Process Designer) to the technical executable process template deployed on IBM Process Server. The key in BPM is to have the correct IT services and implementations available that are derived from the underlying IT systems. If all IT services and implementations are available and known to IBM Process Designer, the process architect can assign those services to business activities in the BPD. Then the process architect can perform other processes and deploy the process in IBM Process Center. The process architect creates the executable process template directly from the BPD with no further model transformation. The process architect models exactly what is executed on IBM Process Server.

Collaborative business process discovery

Business processes must be discovered before talking about business process modeling for execution. Discovering the business process comes first, because there might little or no knowledge about the business processes.

The business strategist can link multiple maps, such as a process map with a strategy map and some operational capability maps, as shown in Figure 10.
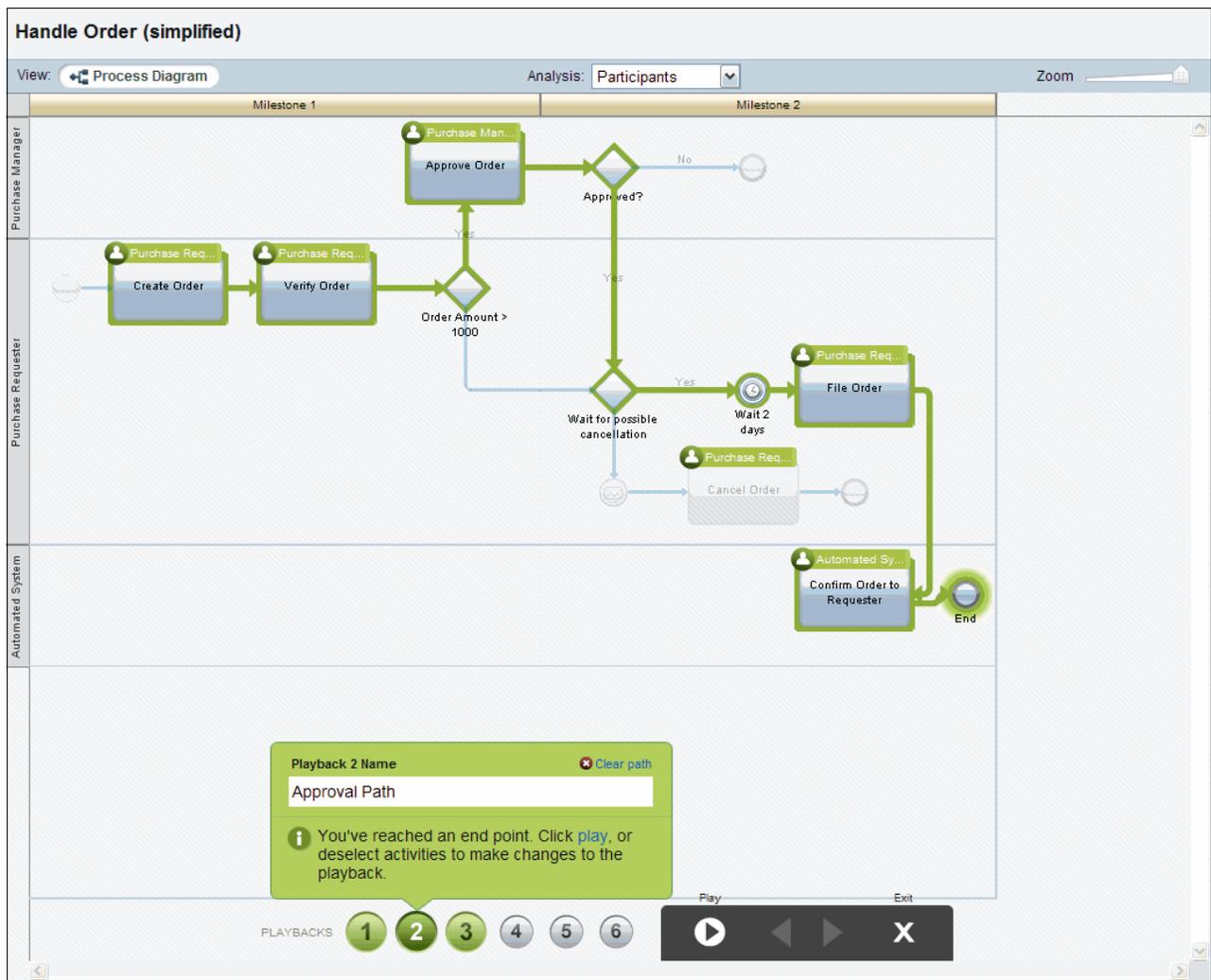
Figure 10   A high-level process map in BPMN done by a business strategist or business analyst in IBM Blueworks Live

The process map contains large-grained tasks, some control flow information, and some high-level resource information. However, it is already using BPMN and can be imported into IBM Process Designer. IBM Process Designer is the business process modeling tool of IBM Business Process Manager and used by the process architect.

Business Process Discovery can be done in various ways, and can be completed by hiring business process consultants. The consultants interview process participants to learn what these people are doing in the context of a certain business process. Then the consultants use business process documentation tools, such as Microsoft Visio and Microsoft PowerPoint, or other advanced tools, to capture the discovered business processes. They also begin creating business process diagrams, including information such as business data, business process performance data, or information about required resources. These models are helpful in identifying optimization potential, and understanding business processes for a broader audience within an organization. The process models created that way can be used for further process automation initiatives. Verify that the export format of these process modeling tools is compatible with the import format expected by the process engine.

IBM offers *IBM Blueworks Live*, which is a collaborative business process discovery tool. A 30-day trial version of this tool is available at:

https://www.blueworkslive.com/

After the 30-day trial, a low monthly rate applies per seat.

IBM Blueworks Live is a cloud-based offering and does not require any software installation on the client machines, but it does require an Internet browser and access to the Internet. It graphically depicts business process maps in a simple and powerful way and focuses on collaboration. As many people as required are able to participate, discover, and identify business processes in a simple way, without thinking about any technical implications.

The process diagram taken from IBM Blueworks Live, shown in Figure 10 on page 20, includes the following information:

► A start node indicates where the process begins.

► A stop node indicates where the process ends.

► Five tasks, represented by the rectangles, describe the process steps.

► One decision and merge control construct indicates that either the Approve Order task is performed or options to file or cancel the order (if the order cannot be filed) are performed.

The diagram in this case shows that the process itself already identified various possible cases of the process. The Approval Case highlights the tasks that are performed when the order is approved.

This example is a simple business process and is unlikely to go into production without changes. It is an example of the beginning of the work that is needed to begin qualifying the business process. Another part of the work is adding the details that are required for execution for the modeling levels that are identified in the modeling pyramid.

A business analyst or the process architect can add more information to perform business process analysis. In this paper, the process architect takes over the process map from the business strategist or from the business analyst to complete it in IBM Process Designer. This task can be easily done when connecting from IBM Process Designer to IBM Blueworks Live.[4]

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[4] You can use IBM Process Designer to connect to IBM Blueworks Live with a click of a button. Then, all available process maps are presented and can be selected to be imported into IBM Process Designer.

In BPM, there is no requirement to use IBM Blueworks Live for business process discovery. Other vendor tools can be used as well. IBM Blueworks Live can export and reuse almost everything that was modeled over to the IBM Process Designer; exports from other tools must be verified for compatibility.

If an organization chooses not to spend time in collaborative business process discovery as presented here, it can immediately start with IBM Process Designer. IBM Process Designer is powerful but requires more skills. IBM Process Designer must be used for business process automation. For collaborative business process documentation initiatives, IBM Blueworks Live is the correct tool to use.

An overview of the role of the process architect

The process architect role is challenging. It can span a scope from high-level BPD down to technically correct process models used for immediate deployment on a process platform. In this paper, IBM Business Process Manager and its process platform are used for supporting this aspect.

When modeling business processes, those processes owned by line of business people do not come with detailed technical information. They also usually lack technical operational aspects, and fault or exception handling. This missing information must be acquired and defined for process execution.

For an executable business process model to be ready for automation with IBM Business Process Manager, it must meet the following minimum requirements:[5]

► The process flow must be syntactically and semantically correct. It also must follow the BPMN standard specifications, which are described in "The current work overview" on page 26.

► Every business activity and every task or process step in the business process needs a service implementation at run time. This implementation must be assigned to the task during design time to allow for task execution after the process engine starts the tasks. These tasks include manual tasks, which are also called user tasks, which are completed by a person. It also includes fully automated tasks, called system tasks, which are completed by software or services. More task types are available and are explained in "Completing the tasks" on page 30.

► Basic data operations provide data for the tasks as input information and handle data as task output, which can be included in data manipulation.

► Process gateways must be enhanced with transition conditions that describe the circumstances under which a specific gateway exit is used.

► Business rules must be defined to externalize business logic from the process execution logic and fosters the separation of business process logic and business rules logic.

► In case of exceptions or faults, some initial fault handling needs to be added to the process model.

► A graphical user interface (GUI) for all user tasks must be present to process participants so that people can interact with the tasks they were assigned.

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[5] This paper does not describe other requirements, such as a service registry, an ESB, or business rules management (as illustrated in Figure 2 on page 4). These requirements are important when applying BPM on a larger scale and must be considered.

The process architect meets the requirements to bridge the gap between business process model and business process execution model. Basic business process models become available from the high-level process maps created by business strategists or analysts that work in IBM Blueworks Live.

Vision becoming reality

The purpose of BPM is to close the gap between theory and reality. BPM transforms business concepts into executable process definitions. A process architect, who can perform all the steps required to create the executable business process template, needs only one tool, which is the IBM Process Designer. As identified in the modeling pyramid, IBM Process Designer starts with the details from the business aspects, enhances the process model, and completes all the technical information. With IBM Process Designer, the question is not what tool is used to accomplish BPM, but what skills are required from one person to accomplish this task using one tool.

The process architect defines and requests from the IT team the business activity implementations. IT also provides a process execution platform named a process runtime environment. This environment supports skilled process architects and expert business people to deploy their business processes directly to that process platform. The process architect is then able to complete and deploy the business process model with one business level process modeling and design tool with no further engagement of the IT team to help create the execution model.

Today, many businesses cannot imagine that this vision is possible, whether from a tools perspective, a personal skills perspective, or from organizational perspectives. This vision is the future of BPM, and is offered by IBM to customers. It is not the end of the journey, but, for the first time, there is one model that serves as the business process model and the executable technical process template. In IBM Process Center, they are both hosted in a shared repository. Both business and IT work together through the repository. Together they deliver the business content or the technical content that ends with a robust executable business process template. Business content is a precise BPD and conforms to BPMN. The technical content is the service implementations that are assigned to the business activities.

The creation of various executable process versions and deciding how to deploy them raises more questions. These questions are answered by IBM Business Process Manager by using the process application deployment features of IBM Process Center.

The process architect role in the current environment

The process architect's role requires the characteristics outlined in the following sections.

Skills and education
The process architect can fulfil this role. The person in this role can be brought in from IT to learn the relevant aspects of the business side or from the business side to learn the relevant IT aspects. A person with a technology background needs a mix of system and IT architecture experience, an understanding of concepts, the software development skills that are needed, and an understanding of system administration aspects. A person with a business background in this role must be familiar with industry-specific business processes, process design methodologies, industry-specific terminology, and standards.

The process architect must be familiar with BPM and SOA technologies and practices, including a rather broad knowledge and good understanding of the enterprise IT environment. Specifically from the BPM side, the process architect must understand standard BPMN and generic methods and methodologies and how to model business processes, including the purpose of modeling, the level of detail of modeling, and modeling for analysis, simulation, and monitoring.

Goals

The process architect creates an accurate model of the existing business processes using BPMN. These processes can still be understood by line of business people and understood by IT for process execution semantic and service implementation requirements for execution.

As the key user for IBM Process Designer, the process architect also designs business processes from high-level process maps down to executable business processes. The person in this role interacts with IT to understand the nature of the required technical artifacts, which are provided by IT, and links to the business processes for automated execution. The process architect also understands the technical performance imperatives when using specific BPMN process modeling constructs.

Tasks

The process architect meets with business and IT subject matter experts (SMEs) to analyze the existing business processes while capturing key use cases. This role builds large-scale frameworks or process landscapes for classes of business processes in large organizations, teams with business analysts and business strategists, and identifies the reuse potential of single business processes, single business activities, or single business services.

The process architect also models and further refines business processes in IBM Process Designer and makes them ready for process automation. This role uses the features in IBM Process Designer to further analyze and simulate the business processes and identifies the best process version by matching overall business and organizational goals.

The process architect teams with IT to determine which services exist in terms of SOA and can be consumed immediately. The role decides which services must be adapted to new business activity requirements and which services must be created. In addition, this role implements business activities and performs the required steps in IBM Process Designer to deploy and reuse the services provided by IT.

The process architect performs the data mappings in IBM Process Designer to correctly transfer data to the activities and extend the follow-up activities. Additional data mappings on the service implementation level are most likely done by the IT team in IBM Integration Designer that is providing the service implementations for use by the process architect in IBM Process Designer. This role also increases skills for GUI design. IBM Process Designer provides user task services, implemented in so-called coaches, that are used to perform screen flows of defined user interfaces. For complex GUIs or GUIs on dedicated platforms, the process architect can team with professional GUI designers or IT support. In some cases, IT can take over if needed.

The process architect increases skills to define business rules using Business Action Language (BAL) to define decision tasks. This role extends work in IBM Process Designer to specify the KPIs and custom data presented in Process Portal and tests the BPDs to prove correct execution behavior with the tools provided in IBM Process Designer.

The process architect presents business process models to business sponsors, LoB clients, process participants, and business and IT SMEs, including the IT development team. This role provides further guidance to the IT development team when it has questions about the business requirements of the IT services it must provide for process automation. Teams with development groups and integration specialists help decide about the usage of dedicated service implementation technologies. These technologies lead to process execution models and must meet business process performance expectations.

The process architect works with the broader IT test team to prepare reasonable business scenarios and business use cases for process test scenarios. These scenarios include user acceptance testing when development nears completion. When the process application is in production, the scenarios include the quantity structures of the expected real-time volumes.

This role also incorporates new business requirements into the business process implementation as they emerge. The role acts as a focal point for cross communication with business analysts and LoB business consumers for the business processes under their charge.

IBM Process Designer, shown in Figure 11, brings together business process modeling, service implementation, and how business activities are implemented using specific IT services. These items are indicated by the red bars to the left and right of the layered model.
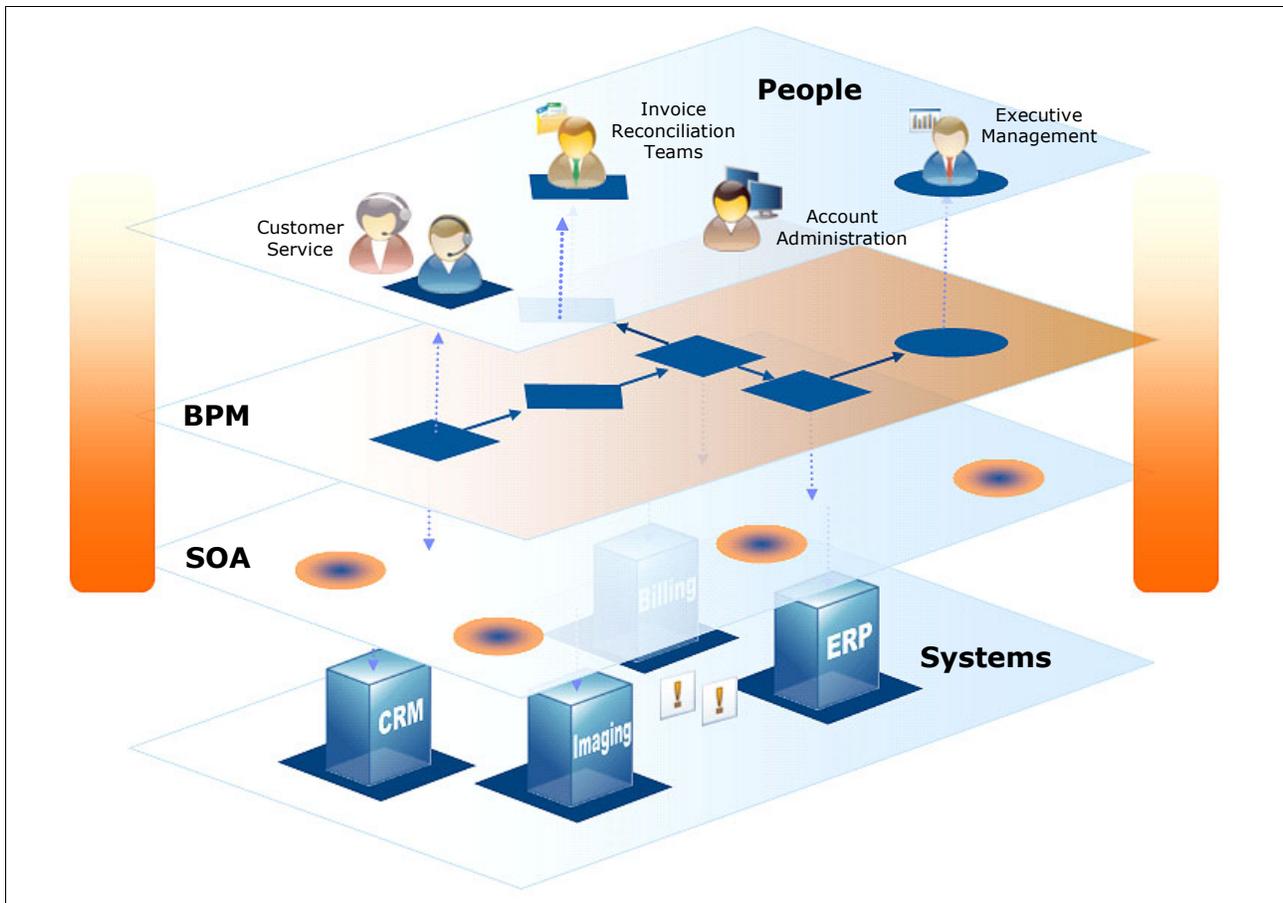
Figure 11   IBM Process Designer brings to together business process modeling, services, and activities

Tools

The process architect can use the following tools:

► IBM Blueworks Live, Microsoft Visio, or any other rather high-level process modeling tool that the process architect can use to take control over process maps.

► IBM Designer allows the process architect to complete the business process modeling by maximizing its capabilities, including modeling, analysis, simulation, testing, and monitoring.

► IBM Business Process Manager and IBM Process Designer must be understood and used for their concepts, and the mechanisms of IBM Process Center used for deployment and testing. The process architect works with IBM Integration Designer for advanced services integration.

► Process Portal and IBM Business Process Manager administrative tools are used when testing the process applications on either the Process Center Playback Server or on a Process Server test environment provided by IT.

The process architect drives the required mediation between business and IT addressing organizational communication and teaming challenges. The process architect uses the visual power of BPDs when mediating.

When it comes to business process models, the process architect finalizes the former high-level business process models down to their technical execution models, so that they are ready for test and deployment. This task is done in IBM Process Designer; the required skills are described here, and described operationally in IBM Process Designer later in this paper.

IT provides a process platform for process automation, and IT specialists are required for supporting deployment to the real production environment.[6] The process architect defines only what the service is named when a specific business activity is made ready, but IT ensures that no faults happen when starting the service implementation. IT prepares the underlying IT systems to handle the expected processes and services volumes and all security issues. IT must provide additional tools and dashboards for the overall control and performance of the process applications deployed and running on the Process Server production environment.

The process architect role is the focal point in BPM and BPM projects that address almost all BPM issues based on business process models and beyond. This role is so vital that BPM projects are not successful without process architects in place.[7]

The current work overview

The process architect is taking over basic process maps from other tools, such as IBM Blueworks Live, and imports them into IBM Process Designer.

IBM Process Designer offers business process modeling, simulation, and analysis capabilities to help business users to understand, document, analyze, test, and deploy business processes for continuous improvement. IBM Process Designer integrates with web services and advanced integration services provided by IBM Integration Designer, formerly known as *IBM WebSphere® Integration Developer*.

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[6] Providing a process platform for process automation requires a skilled IT team to handle many more technical requirements and challenges. This topic is not within the scope of this paper.

[7] The role can have a different name, but the process architect role must be present, regardless of the terminology used.

Business processes, taken over from IBM Blueworks Live or other high-level business process documentation tools, require details for business process completion in various aspects. Business process completion always depends on the purpose of business process modeling and specific customer expectations.

This paper focuses specifically on what must be done to bridge the gap from the high-level business process model to deployment of services on IBM Business Process Manager:

► The business process is specified and validated for process automation with IBM Business Process Manager.

► Every business activity, task, or step needs an implementation that is started when the process engine navigates through the business process during execution.

In IBM Business Process Manager, some new terminology is introduced:

► Every business process model created in IBM Process Designer is called a *business process definition* (BPD). A BPD can be encapsulated in a subprocess and be used in other BPDs.

► Every service implementation, no matter how it is implemented in detail, is called an *implementation* in IBM Process Designer.

► Every BPD is part of a *process application*, which can contain an unlimited number of BPDs.

► To increase reuse capabilities, BPDs and other process application fragments can be packaged in *toolkits*. An unlimited number of toolkits can be assigned to process applications.

► A *snapshot* of a process application with all of its content can be taken. Deploying a process application means that a specific snapshot of that process application is deployed.

A BPD in IBM Process Designer conforms to the BPMN standard. More specific details include BPMN gateway types, BPMN boundary event types, and BPMN task types (named *implementations* in IBM Process Designer).

Figure 12 shows how business processes are designed in IBM Process Designer.
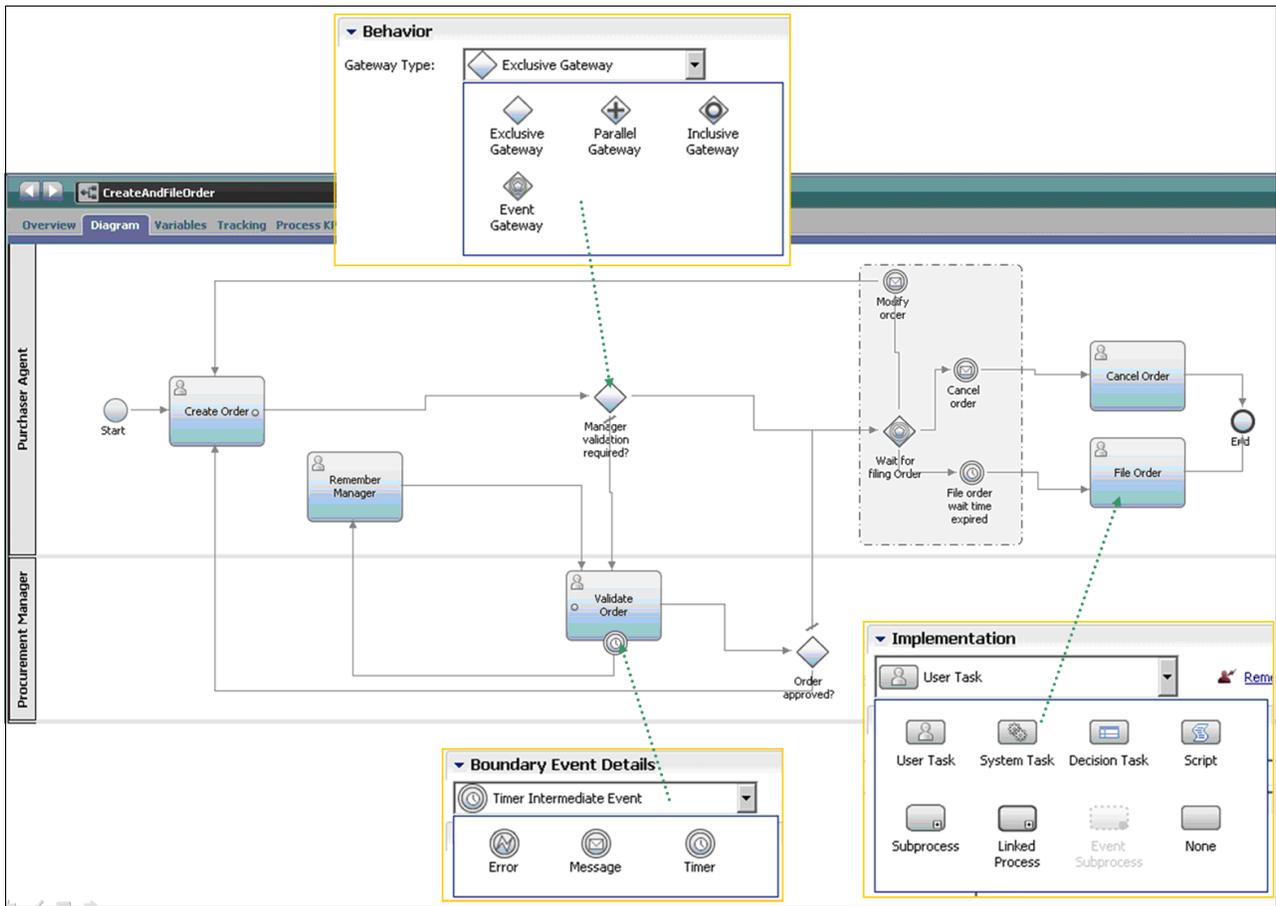

Figure 12   IBM Process Designer

From a business process modeling point of view, IBM Process Designer comes with no surprises, as it offers a graphical business process diagram editor. This editor is used for creating business processes supported by a BPMN process modeling objects palette. The tasks can be placed in swimlanes that identify the process participants required to work on the tasks, modeled horizontally, and milestones, modeled vertically, though not shown in Figure 12.

Each BPD and each task have properties to further define the process or the task. One or several BPDs are forming a process application, and a snapshot taken from the process application is on the runtime environment.

When looking closer at IBM Process Designer, notice that there is an intentional distinction between the process design itself, the BPD, and the service implementations, as shown in Figure 13. First comes the business process model or BPD. Then, for every task, an implementation is required and connected to that task's service.
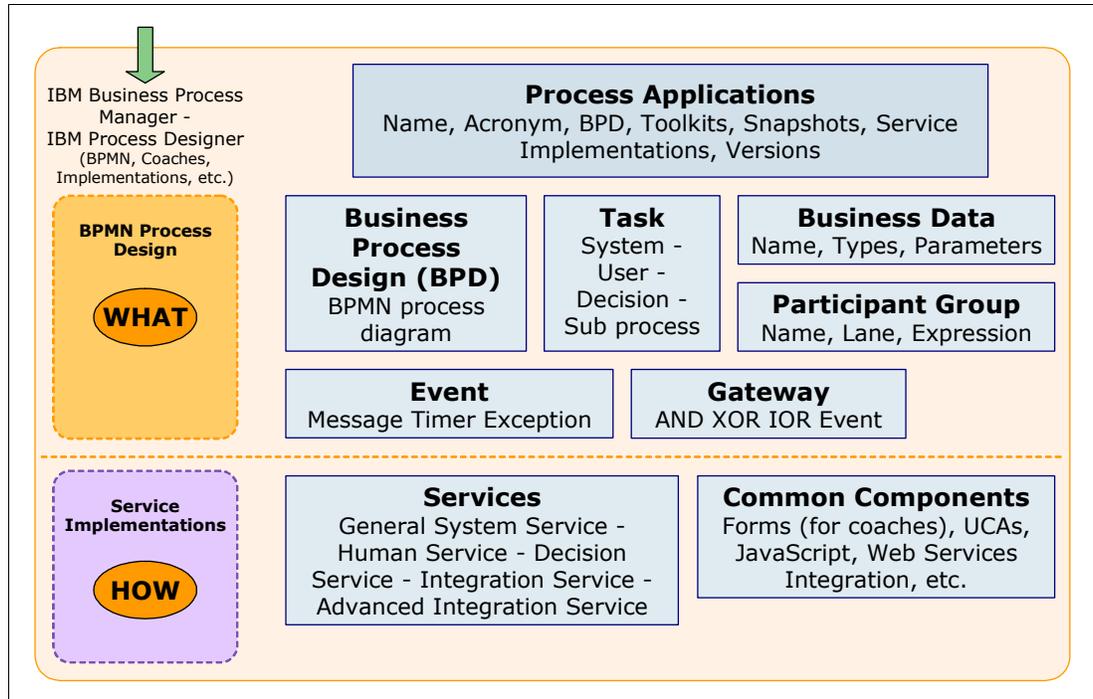
Figure 13   Separation of the "what" and "how" in IBM Process Designer

In IBM Process Designer, the process application is built. The process application comes with a number of settings. Every process application contains at least one BPD. Every task of every BPD requires an implementation. The implementation, defined in IBM Process Designer, can be accessed through web service integration, an Advanced Service Integration using services provided by IBM Integration Designer, or other mechanisms shown in Figure 13.

The following list provides a brief overview of the process architect's steps that are required to complete a BPD for deployment in IBM Process Designer:

► Complete the task implementations.

  Every task needs an implementation during execution. The process architect defines first the BPMN task type, then its implementation, by creating new services or reusing services provided by IT. These services can be maintained in a larger business service repository, and provided for reuse in toolkits.

► Complete the data flow.

  The process architect adds detailed business data objects to define the input, output, and private data for the process. This action is also performed for all input and output data sets for all process tasks. The process architect performs the data mapping required to provide the input data for the tasks, and to map the task's output data back to the process data sets.

► Complete the control flow.

The process engine needs a semantically correct process model for navigation. Expressions are required for decision gateways to branch correctly, and loops need expressions for exit conditions during process execution. The process architect ensures that the process logic is specified, which includes gateways and events.

► Simulate the BPD.

This step is an optional step, but can help improve and optimize business processes.

► Test and validate the BPD.

The process architect can perform the Initial tests by using the Inspector perspective in IBM Process Designer. This perspective shows whether the processes execute as expected.

► Define KPIs.

If the process architect's sponsors want to see a business dashboard that visualizes KPIs, the process architect must define and check KPIs, business measures, and specific custom process data. The business analyst can specify the initial settings for KPIs and present that data after the BPDs are in production. The KPIs might need further enhancement and refinement.

► Deploy the process model.

IT must provide a process server platform that the process architect uses. After the process architect creates a snapshot of the process application, those snapshots can be deployed by the process architect on the provided process servers.

The next sections describe the broad steps that are identified in this list.

Defining the process architect tasks

Defining each task more specifically simulates the completion of a BPD and its deployment to IBM Business Process Manager.

Completing the tasks

Whatever the BPD is or represents, the first step is to become more precise. The task type must be specified for every task. In IBM Process Designer, the following task types are available:

► The *user task* is presented at run time to a human for completion.

► The *decision task* is an automated task that implements a business rule.

► The *system task* is an automated task that is implemented by any IT system. It is not further specified on this level.

► The *script task* is in automated task that is implemented by a set of JavaScript commands and requires JavaScript skills to be fully defined.

► The *subprocess task* is implemented by a local subprocess and can use all task types listed here.

► The *linked process* task is implemented by another BPD, also known as the *global subprocess*, and can us all the task types listed here.

► The *event subprocess task* is implemented by a local subprocess that is started from its parent process by a number of different mechanisms.

► The *none task* has no implementation yet and is not executable. It must be typified before deploying the BPD.

All these tasks have different meanings and usage scenarios in the BPMN standards specification. For IBM Process Designer, conforming to BPMN, the task type is specified on the Implementation tab of the task. The task type is revealed when selecting the implementation drop-down menu, as shown in Figure 14. As part of the BPD process, you must name the service that implements the task for execution.
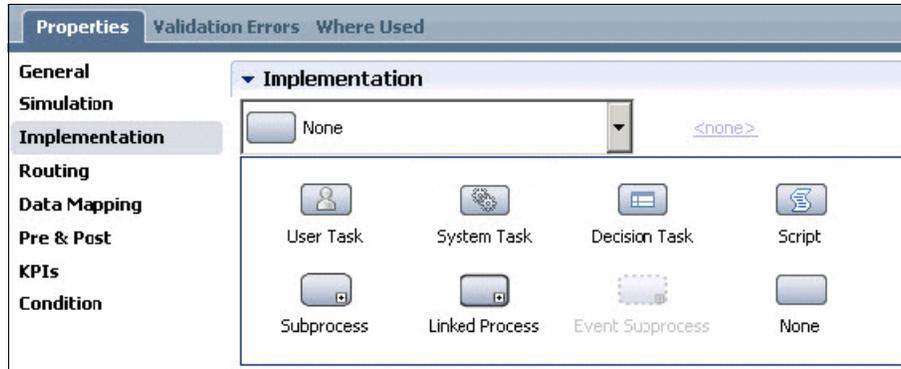

Figure 14   Task implementation type selection

The concept used in IBM Process Designer is the same for all task types available. When you define the task type, you must select the service that is implementing the task. If the service is already available, you can select it from the available service implementations lists.

The process architect ensures that the correct service type is selected. Services for user tasks are different from the services for the system task types. The difference is that user tasks come with a GUI implementation to present the relevant data to the user. If available in IBM Process Designer, either service can be selected, as shown in Figure 15.
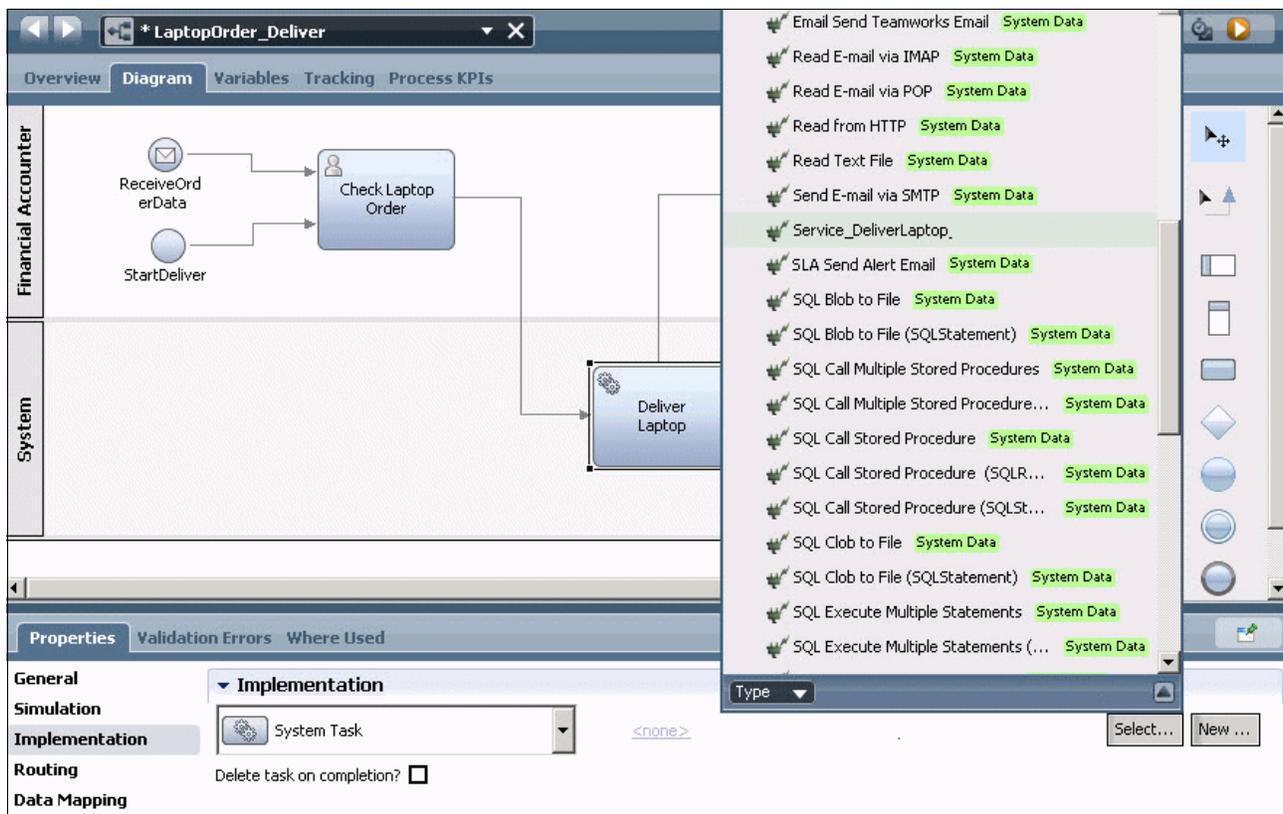
Figure 15   Select service as task implementation from the list of available services

IBM Process Designer makes it simple for the process architect to fully specify the implementation of the task.

The services available for selection as task implementations can be provided by IT, and shared in toolkits. Toolkits easily create reusable artifacts, which includes complete BPDs, services, data objects, and process participant groups.

If services required for task implementations are not yet available, these new services must be created. IBM Process Designer has various ways to accomplish this task.

IBM Process Designer supports the following types of services to fit different types of tasks and usage scenarios:

► User interfaces

  Provides services for user tasks through user interfaces and screen flows. In IBM Process Designer, these services are built by *coaches*, which is the IBM Process Designer term for user GUIs.

► Rules Service

  The Rules Service is the implementation of a business rule that follows the concepts of Business Action Language (BAL) as used in IBM WebSphere Operational Decision Management (formerly *IBM WebSphere ILOG® JRules*).

► General System Services

  Provides small services that deal with validations of process variables.

► Integration Services

  Provides outbound integrations to external web services or Java classes.

► Undercover agents

  Provides inbound message sensors that listen and schedule. They are used to make process instances aware of events.

► Web services

  Includes unbound web services that are implemented and published in toolkits.

► Advanced Integration Service

  Connects to the world of J2EE, SCA, BPEL, and ESB. This service is available only with IBM Business Process Manager Advanced.

► IBM Case Manager Integration Service

  Connects to the world of Enterprise Content Management.

► Ajax Service

  Adds implementations to verify inputs on coaches.

► External Implementation

  Allows an external application to deal with manual tasks.

Some integration services types are explained in more detail on the next pages.

Creating new user interfaces

The process architect can use IBM Process Designer to directly create user interfaces based on process and task data sets. For these user interfaces, a graphical editor is available to create the screen flows or control buttons, as shown in Figure 16. Depending on the control buttons on the user GUIs, the process engine at run time navigates to the next user windows. In addition, certain validations can be added to the user interface service.
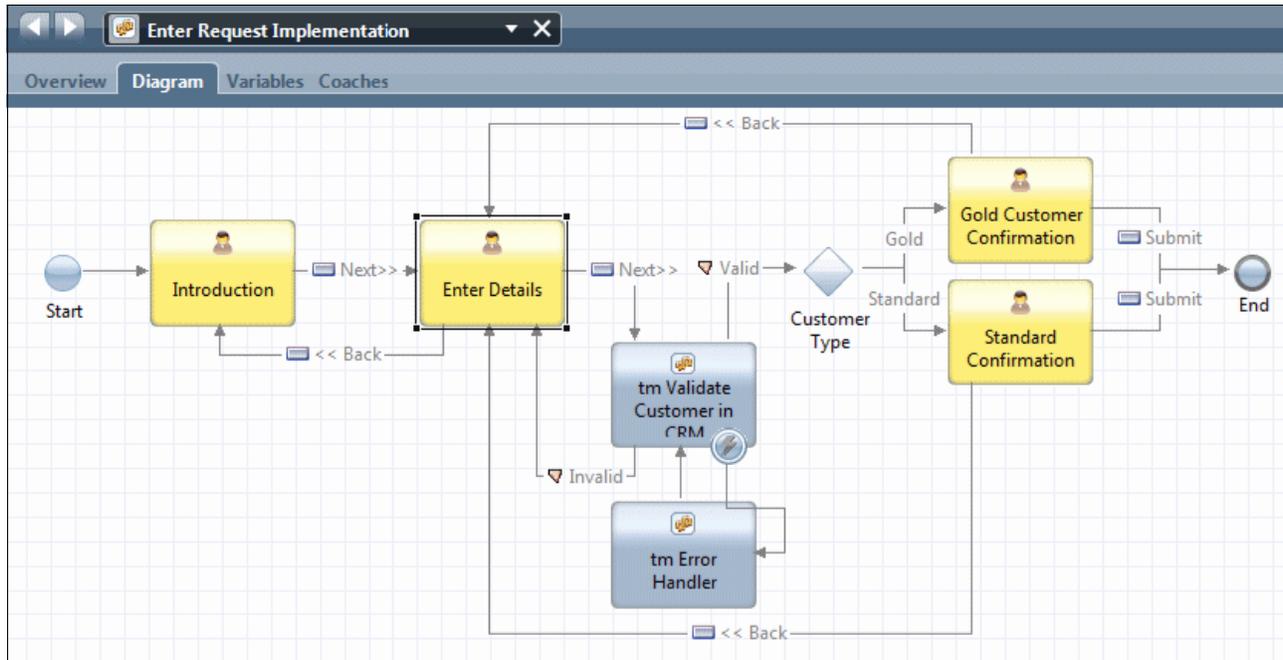

Figure 16   A user interface service with coaches, control buttons, and additional validations

On the actual user GUIs, additional Ajax services can be used to validate the user actions when they are performed. The user GUI controls are directly linked to the task variables. Variables are input or output data sets. The user GUIs, at run time, look exactly as designed. A user GUI is shown in Figure 17.

Figure 17   User GUI designed in IBM Process Designer

The entry fields on this GUI are mostly disabled to prevent the user from making changes. Entry fields are directly connected to the task data, so that the task input data can be quickly presented on the GUI. The information entered by the user is also immediately stored in the task's output data.

The capabilities of IBM Process Designer are comprehensive and are not fully described in this paper. This paper does reflect the important aspect that a user task can be implemented by a screen flow, defined here in IBM Process Designer, which operates on the process and task data. The screen flow, with its user GUIs, is the implementation of the BPMN user task that is specified in the BPD.

Creating new rules services

Similar to the user interfaces required for user tasks, rules services are required as implementations for BPMN decision tasks. Similar to the user interface service, a business rule service can be defined in IBM Process Designer and use BAL. BAL is an aspect of Business Rules Management Systems.

The power of BAL is that it creates business rules in a fashion that is close to spoken language. This situation is convenient for the business user audience that creates the business rules at design time and changing the business rules at run time. In IBM Process Designer, the process architect creates these simple rules. The process architect can test them in IBM Process Designer Inspector perspective, and if they work as expected, these rules services are selected as implementation for decision nodes.

Similar to the user interface services, the rules service can directly operate on the tasks input and output data, as shown in Figure 18.
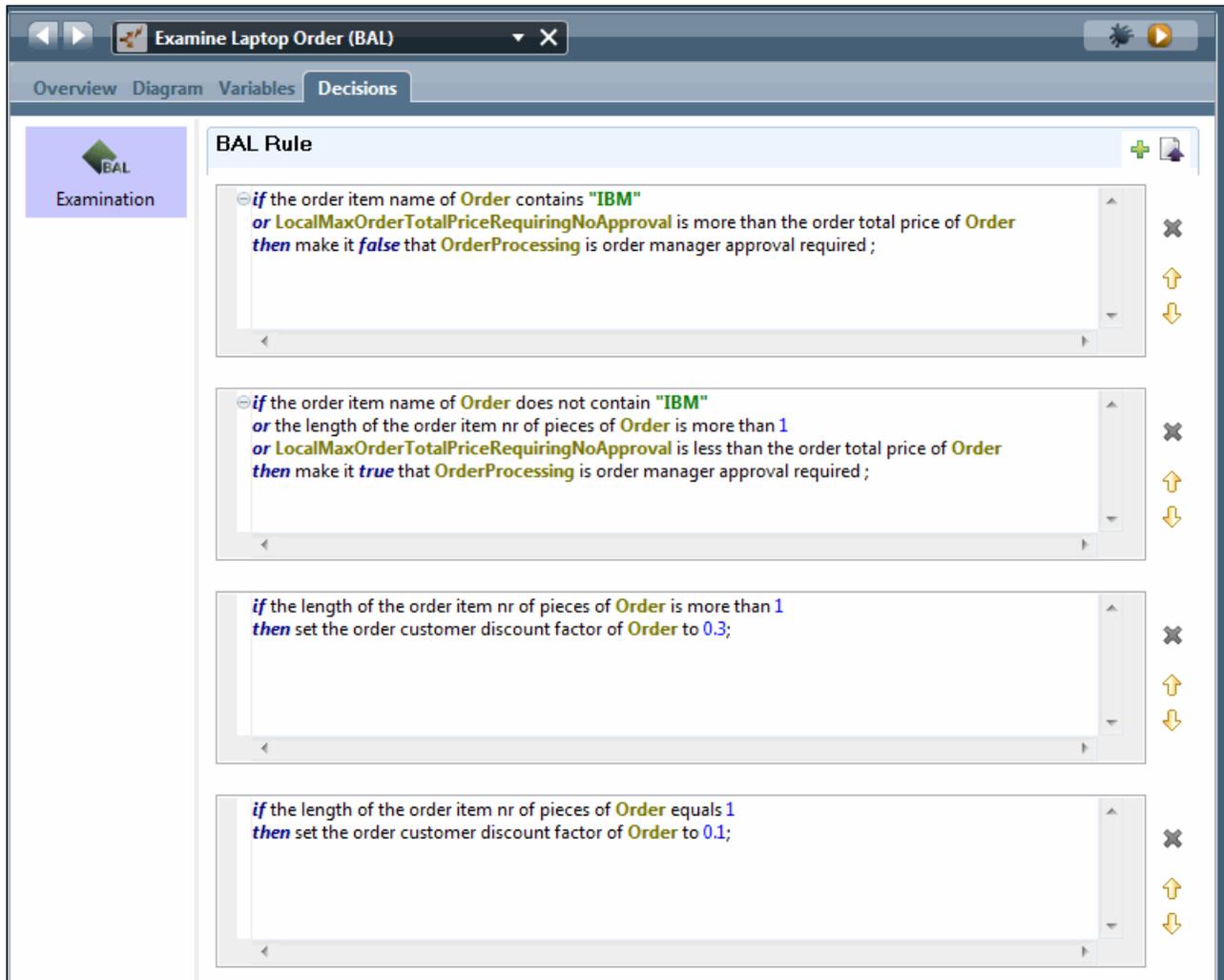

Figure 18 Rules service used as the implementation of a decision task

At run time, IBM Business Process Manager comes with a rules engine. The rules engine evaluates the rules, delivers the correct results, and uses the process engine to move to the next tasks. Often the result of a decision node is used as a variable in a BPMN gateway to decide what exit path to follow. This design separates process logic from business logic. The business logic is represented in business rules.

IBM Business Process Manager offers only a functional subset from IBM WebSphere Operational Decision Management. However, if you require additional business rules management, you can export defined rules from IBM Process Designer and import those rules into the rules studio of WebSphere Operational Decision Management, which uses the same representation of business rules. WebSphere Operational Decision Management comes with more features and functions that can help you implement a complete business rules management system. However, to become familiar with business rules, using rules services and decision tasks in IBM Process Designer is sufficient at the beginning.

When the process architect decides to use business rules in the BPD, they use decision tasks, create rules services by themselves, or reuse rules services created by others and made public to IBM Process Designer. A business activity, of the BPMN type decision node, is linked with its implementation, which is a rules service in this case.

Creating system services

The most generic system service is the general system service. You can create a general system service in IBM Process Designer by using another graphical editor. This editor has a number of different modeling objects that you can use to graphically model a service implementation.

Figure 19, shows a simple service that checks for a process variable to decide whether the service ends normally or throws an exception.
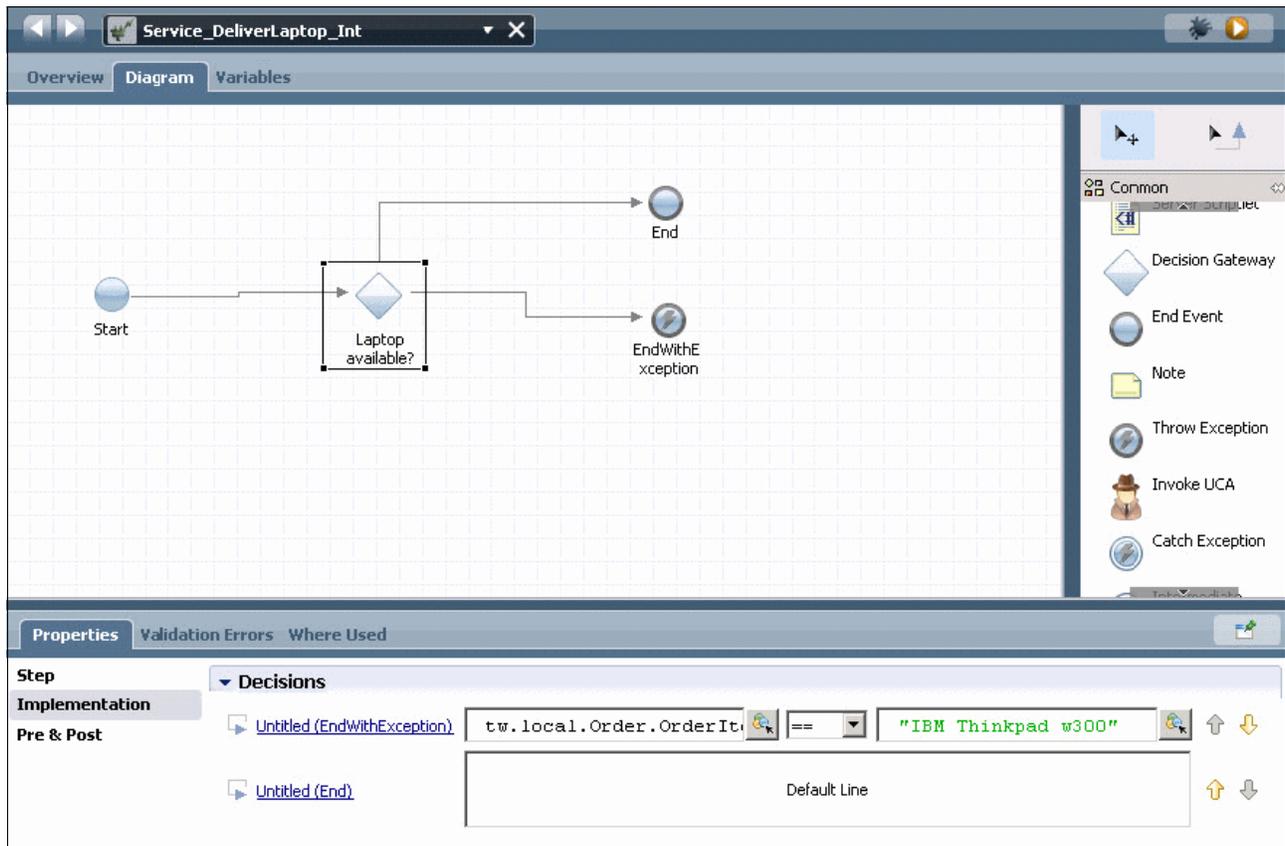

Figure 19   Creating a system service

This service looks simple, but it can become more complex. A service is limited with respect to its process logic or business logic. Dedicated modeling objects should be used in BPDs, such as subprocesses for process logic and decision nodes for business logic.

A BPMN system task used in the BPD, whether the service is simple or sophisticated, can easily and quickly be made ready for execution by assigning an implementation to it. The implementation itself can be defined in IBM Process Designer as well. Over time, many services are readily available in the library. The services, created by the process architect or provided by IT, offer shared and reusable usage in toolkits. The business activity, modeled in the BPD, assigned with its implementation services, is ready for execution.

Another type of usable system service is a web service. Web services can be used as a general system service or as a stand-alone service implementation to be assigned to a system task.

IBM Process Designer browses for and locates the WSDL URIs. It is easy to select from there an operation. A system task can be linked to a web service that provides the implementation of the BPD task, as shown in Figure 20.
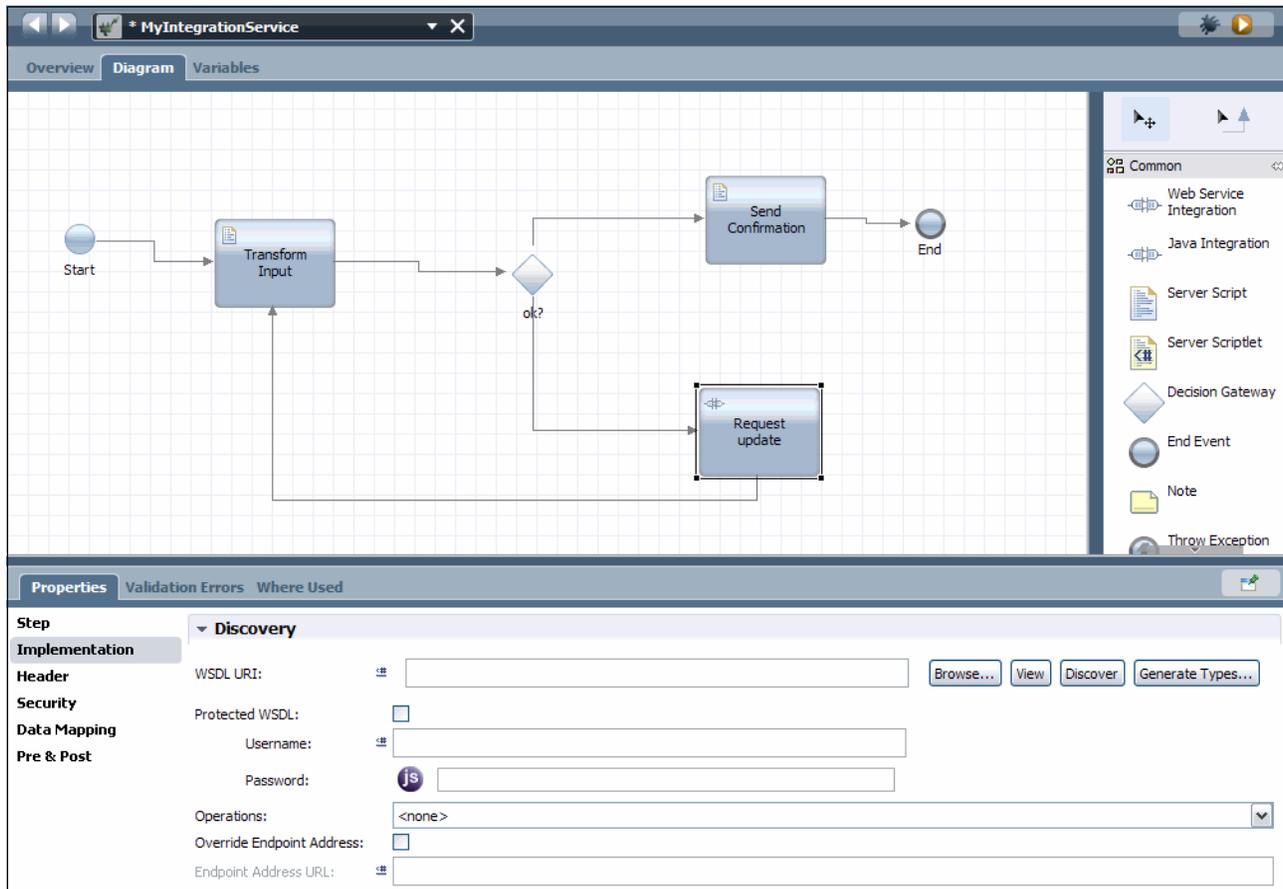

Figure 20   Using a web service in IBM Process Designer

Creating advanced integration services

If more sophisticated system integration is required, you can use *advanced integration services*. An advanced integration service is connected to the BPD at run time using Service Component Architecture (SCA). SCA is the programming model of SOA applications. SCA is a published standard describing how various modules of SOA applications work together. SCA is important for high volume and transactional business applications.

In IBM Process Designer, advanced integration services implemented on IBM WebSphere Application Server can be used to conform to the programming model of SCA. In this paper, SCA conformed business applications and services are implemented with IBM Integration Designer. IBM Integration Designer is part of IBM Business Process Manager Advanced; all other implementation types described before are available in Express and Standard Editions. In IBM Process Designer, the services, built using advanced integration services in IBM Integration Designer, can be selected as implementations of system tasks. Advanced integration services are available from a list, such as all other implementations, when selecting the implementation of a system task.

In addition, advanced integration is available between IBM Process Designer and IBM Integration Designer by using the following methods:

► An advanced integration service request can be created in IBM Process Designer that serves as an empty service template for the integration specialist that works with IBM Integration Designer. In this case, an integration specialist connects with the IBM Integration Designer workspace to the IBM Process Center.

  The integration specialist then opens the process application created by the process architect and listed in Process Center in the IBM Integration Designer workspace. The empty advanced integration service templates are then presented in IBM Integration Designer, and the integration specialist can implement the services guided by the advanced integration services implementation wizard. At that point, the following options are available to the integration specialist:

  – Select an existing implementation fragment to be used as the implementation for an advanced integration service.

  – Create a service implementation using IBM Integration Designer that includes mediation flows and BPEL processes.

► In IBM Integration Designer, a number of pre-existing and created services can be made visible to IBM Process Designer. To make services visible, the integration specialists add the services to a process application in IBM Integration Designer, which adds the services to the IBM Process Center. When that task is done, those services are available for implementation selection in IBM Process Designer. The process architect can then select them as implementations for a dedicated BPMN system task within this BPD.

When using advanced integration services, the full power of BPMN BPD and SCA-based integration technology comes together. There is clear separation among the involved roles:

► The process architect creates an empty advanced integration service that waits for its implementation by an integration specialist in IBM Integration Designer.

► The process architect uses published advanced integration service. The advanced integration service was created by an integration specialist as task implementations and synchronized between IBM Process Designer and IBM Integration Designer in the process application governed by IBM Process Center.

► The integration specialist implements the requested advanced integration services in IBM Integration Designer.

► The integration specialist publishes existing services as advanced integration services to be used in BPDs by the process architect. The process architect uses them to complete the process application for execution.

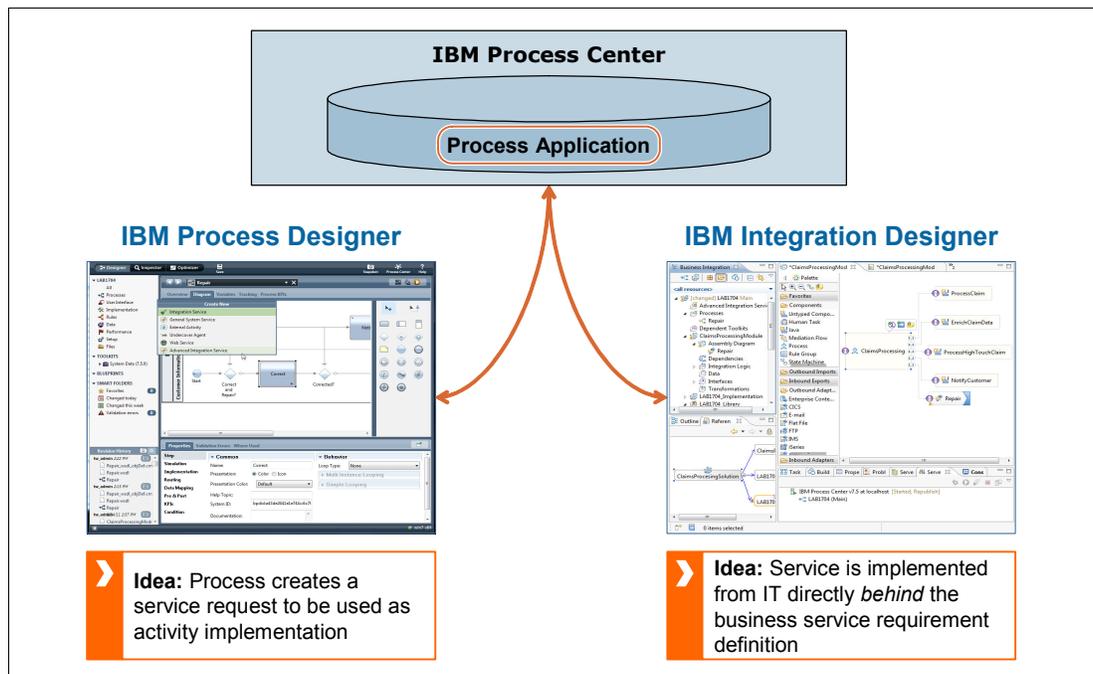In reality, all four scenarios are used in combination, as shown in Figure 21.

Figure 21 Advanced integration services merging IBM Process Designer and IBM Integration Designer

IBM Integration Designer is available only in the IBM Business Process Manager Advanced. All other service implementations are available in Standard and Express Editions.

Completing the data flow

Data is important for the business process. In the high-level process model, there is little information about the data needed for the business process input, output, and tasks that compose the business process. Business processes are modeled in IBM Blueworks Live that are coming with data objects named Order, Contract, or Customer. However, there is no detailed information, such as Order ID or Order Item. For process automation, fully specified business data objects are needed for the process input, output, and private data. This situation is also the case for the input and output data sets for the tasks. The data variables are also required for user interface services, rules services, other services, and gateways that implement the process control flow. One of the first steps when modeling business processes for execution, therefore, is to provide the correct data at each process step, and for the process itself.

In IBM Process Designer, fully qualified business data objects, either created in IBM Process Designer or imported from a business data object repository, can be managed and assigned to the BPD and its tasks. Assigning data is simple; it is more challenging to identify the specific data required of a specific task. This paper assumes that challenge is addressed.

The process architect must understand data element types and other attributes to complete the business process for automated execution.

Figure 22 illustrates a fully qualified business data object request presented and used in IBM Process Designer for private process variables.
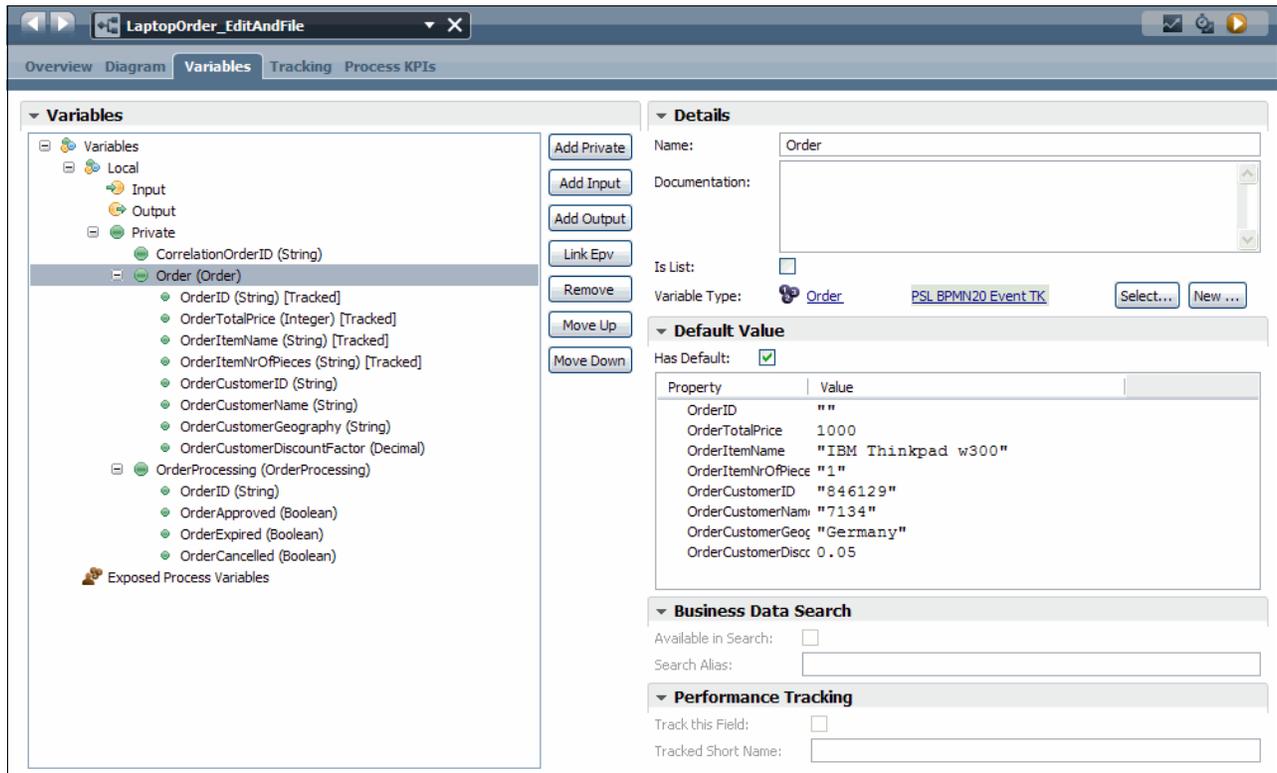

Figure 22   A fully qualified business data object request

Normally, process architects can import these business data objects that are provided and owned by the corresponding IT departments. IT creates these business data objects by teaming with line of businesses personnel that know what a contract business data object or a customer business data object needs to contain. IBM Process Designer is not a data modeling tool, so professional data modeling must be done elsewhere. BPM uses parts of that data, so the data must be made available to IBM Process Designer for BPD task and service implementations.

Next, business data objects are assigned to both the business process' input, output, and private data sections, and to the task's inputs and outputs. Different tasks can use different business data objects for their implementations. The correct data must be mapped from the process data container to the task's input and output data sets.

If the process data available is not in a format compatible for the tasks, then the data must be transformed or mediated. You can do this task in IBM Process Designer by using JavaScript or by outsourcing this task to data mediation services.

Data that is compatible but not exact or specific enough for the task's input and output creates a runtime exception. The process architect must map the correct process data into the task's input and output data set. This step, and assigning the data that specifies the task's input and output, is done on the task's property page, as shown in Figure 23.
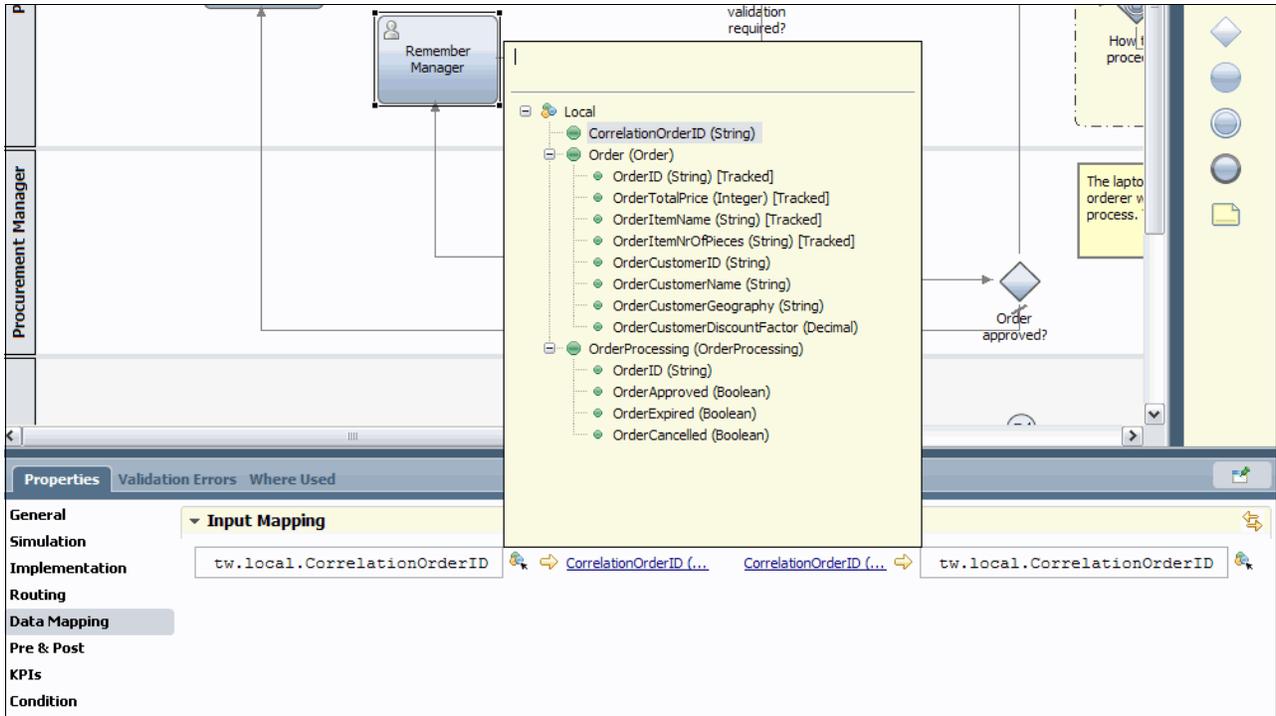

Figure 23   Data mapping from the process container to the task input

The data mapping performed by the process architect is key for the BPD to be executable. Process execution is providing the correct data to the task's implementation and receiving the data returned from the task implementation to be used further along in the process.

When all business data assignments and all required data mappings are done, the business process data flow is completed.

Completing the control flow

All the tasks have their task implementations and the input/output data correctly assigned and mapped from and to the process container.

The next step is designing a business process and defining the control flow. Depending on the data that is processed in the BPD and gathering that is continued while the process is executed, a number of different process paths can be executed. The path taken for a specific instance is specified in the control gateways when evaluating their transition conditions. Additional events can happen or are generated while the process instance is navigated.

Control flow gateways must be correctly paired, as shown in Figure 24. If this paring is not done correctly, the business process either runs into a deadlock or lacks synchronization during execution, which needs to be corrected for correct business process simulation.
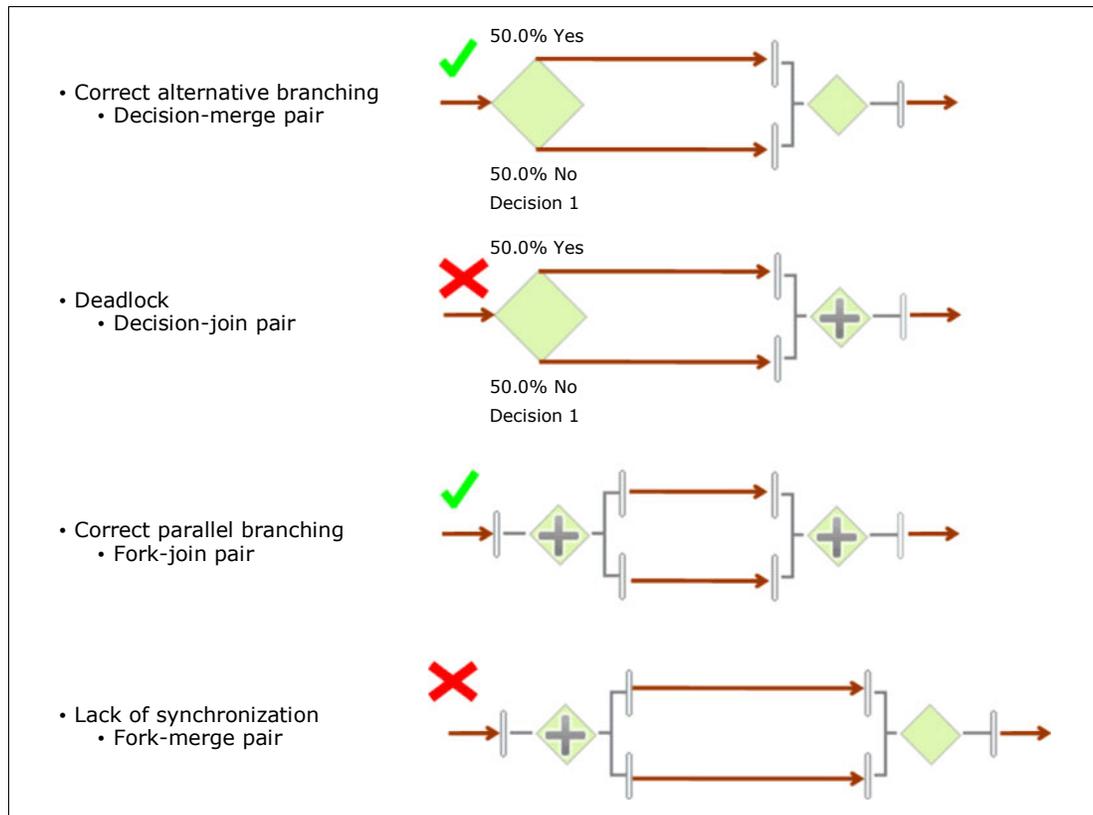

Figure 24   The correct pairing of the control flow gateways

The process architect performs the following tasks for correct control flow:

► Specifies all transition conditions for all paths and all gateways. Figure 26 on page 43 shows how a transition condition is specified.

► Verifies that all cases have at least one condition that evaluates to true. If this condition cannot be granted, the process architect adds a default path.

► Verifies that the control flow itself is error free, which results in the correct pairing of the gateways, as illustrated in Figure 24.

► Specifies loop exit conditions if loops are used.

► Correctly specifies and tests interprocess instance messages if additional events are thrown or caught. Figure 12 on page 28 shows how to specify an event gateway and the various boundary events supported in IBM Business Process Manager as of the writing of this paper.

To guarantee that the gateways are paired correctly, the process architect needs to check that all decision nodes are paired with merge nodes, and that all fork nodes are paired with join nodes, as shown in Figure 24. Even if the gateways are not paired exactly as shown in Figure 24 in IBM Process Designer, you run into errors during execution. Some examples of errors are deadlocks and paths executed twice.[8]

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[8] IBM Process Designer is less strict than IBM WebSphere Business Modeler. WebSphere Business Modeler includes a validation function that checks for correct pairing of the gateways. Using IBM Process Designer, process design guidelines are established to enforce pairing of gateways.

The process architect must understand how the gateways work, as shown in Figure 25, and what happens if the gateways are not paired correctly. Understanding the gateways is often not considered by business analysts or normally of interest in modeling levels 0 - 3.
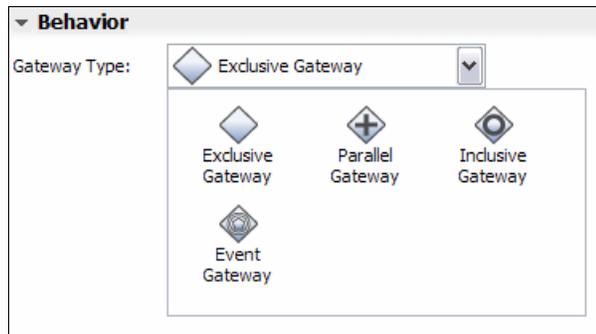

Figure 25   Available BPMN gateways in IBM Process Designer

In IBM Process Designer, the process architect can test the accuracy of the control flow when testing the BPD in the Inspector perspective. This perspective plays back the process with specified data and all transition conditions can be evaluated. This perspective is also how the process is evaluated later in production. Inspector deploys the BPDs on the Playback Server, which is an exact copy of the IBM Process Server, and is the runtime server of IBM Business Process Manager. This process includes all defined events and messages. It is important to look at the entire process, because the execution of process instances in the production environment must be stable.

To complete a BPD for automated execution, the control gateways for every outgoing path, exit, or decision must be specified, which is called a *transition condition*. Figure 26 shows how this task is done in IBM Process Designer. All process data is available and can be concatenated with an operation by selecting an operation the drop-down menu. Data can be linked to a dedicated value or another variable, which is done quickly and must be done.
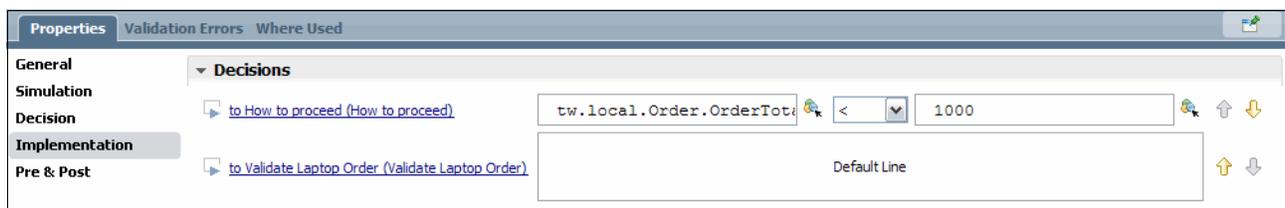

Figure 26   Gateway exit paths, also named transitions conditions

The process architect ensures that the BPD is correct from a business process execution point of view with respect to the control flow.

Completing the participant assignments

Existing users must be assigned for all user tasks so that the existing users can work on the tasks during run time. Although a user task can be implemented by a "People Service," which is a new term created in BPM, the key question is who actually can work on the task after the task is ready for execution during process navigation. In the BPD, all user tasks are all placed in "swimlanes," which have participants (known as roles) or participant groups assigned. This process, however, is still the pure process model information. For automation, you must understand what people with what user IDs are part of participants and participant groups used in the BPDs.

User IDs, passwords, and group memberships of users are normally stored in Lightweight Directory Access Protocols (LDAPs). LDAPs are commonly used registries of information that hold organizational information about users, especially in larger organizations. This information must be made known to IBM Process Server when the BPDs are executed.

IBM WebSphere Application Server, the hosting system for IBM Business Process Manager, can be configured to connect to LDAP systems and to use user data available in LDAP systems. This part of the process is normally done by the IT team and not by the process architect. Then, with another step done by IT, IBM Business Process Manager can use user information that is provided by the LDAPs connected to WebSphere Application Server.

If this configuration is all set up in the administration consoles of both IBM WebSphere Application Server and IBM Business Process Manager, the process architect can assign what existing users are part of the participants and participant groups specified in the BPDs. If no LDAP is used, users and user groups required for IBM Business Process Manager can be created in the Process Admin Console of IBM Business Process Manager, as shown in Figure 27.
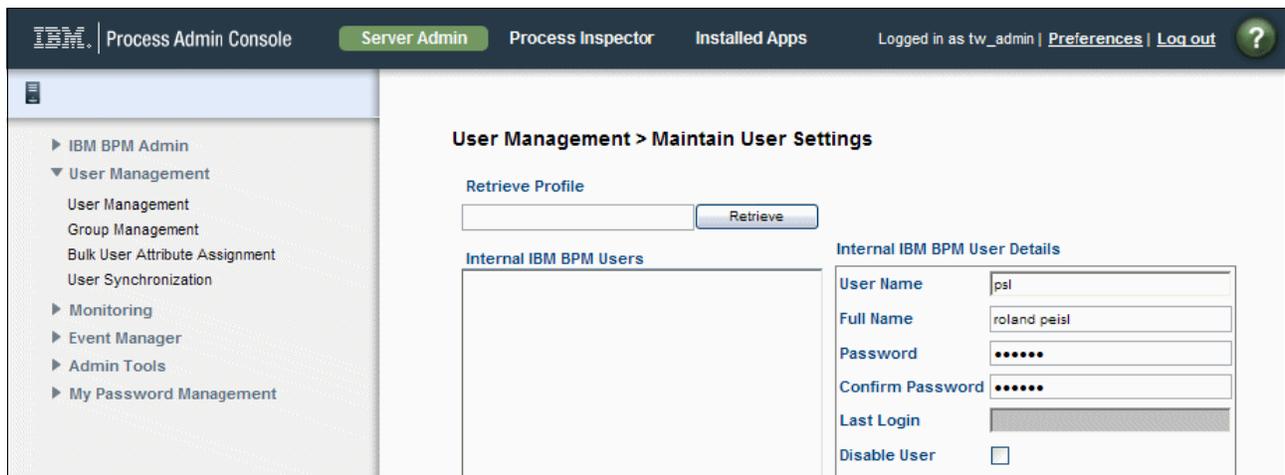

Figure 27   Adding users in the Process Admin Console

After users and user groups are available, either using LDAP or added in the Process Admin Console, these users and user groups can be assigned to the participants in IBM Process Designer. Available users, made known to the Process Admin Console, are then available to connected LDAP systems and can be selected to staff the participants defined in the BPDs, as shown in Figure 28.
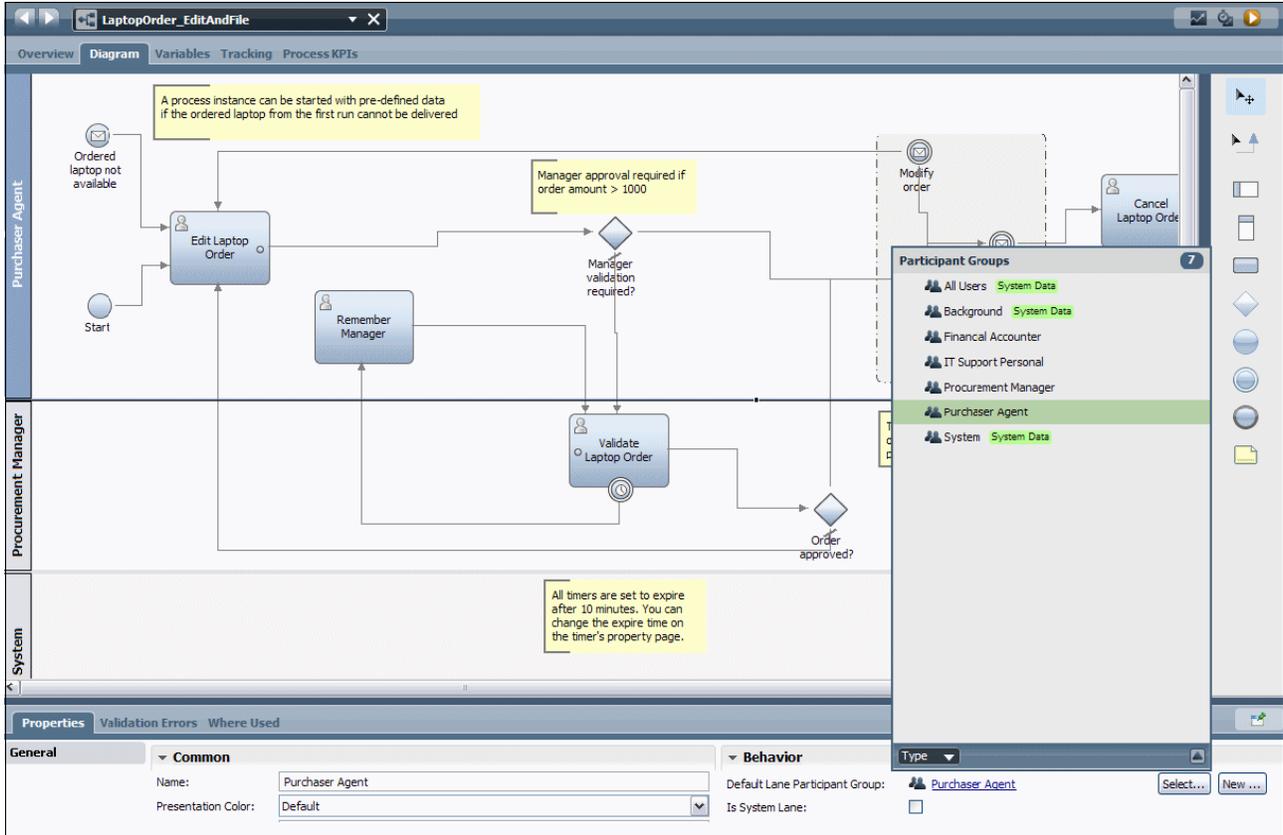

Figure 28   Selecting from available users

Now these assigned users are authorized to work on the tasks at run time. When they log on, their inbox is populated with all the tasks listed on which they are authorized to work.

To end up with an executable BPD, the process architect ensures that the following criteria are completed:

► Tasks are created.
► Tasks have assigned data sets.
► Tasks have all required data mappings.
► Tasks have assigned implementations.
► Tasks are connected using control flows.
► Control gateways are added between the tasks.
► Transition conditions are specified for the gateway exits.
► Process participants are assigned to existing users.

When the criteria are fulfilled, the BPD is ready for simulation, test, or deployment.

Simulating the process application

When the BPD is complete and all tasks have their implementation services specified, the process architect can begin simulations of a number of process instances. Process instances are created from BPDs. Numerous simulations are executed before testing, running, and monitoring the process application, Though performing simulations is optional, doing so increases your understanding of the dynamics of a business process model. This understanding is helpful in large process designs where various gateways lead to different process execution cases and where the process as a whole is not easy to oversee. Within IBM Process Designer, it is possible to select a simulation profile and specify how many process instances are to be created for the simulation run, as shown in Figure 29.

Figure 29   Selecting a simulation profile in IBM Process Designer and creating a simulation

Business process simulation is important in business process optimization. Business process simulation improves BPD in terms of the following contexts:

► Reduces process execution cost
► Accelerates execution of process instances
► Provides the minimum resources to achieve a certain performance target

It is possible to do a test run when simulating the process design and learn from the experience. Additional data, such as cost and working duration information about task level, is required for actual simulation. To configure a simulation of a process application, the process architect defines the following information after the process design is completed:[9]

► The cost of each task, which can use mathematical distribution functions

► The working time of each task, which can use mathematical distribution functions

► The path probabilities of each gateway

► The quantity of available members per participant group, which is called *capacity* in IBM Process Designer, and other options that can include cost information

► Numerous simulation profiles

► How many process instances are created for a specific simulation run

Various reports can be created. The BPD defines the tasks that experience various issues with color, depending on the selected simulation report. Figure 30 shows a BPD after running a simulation.
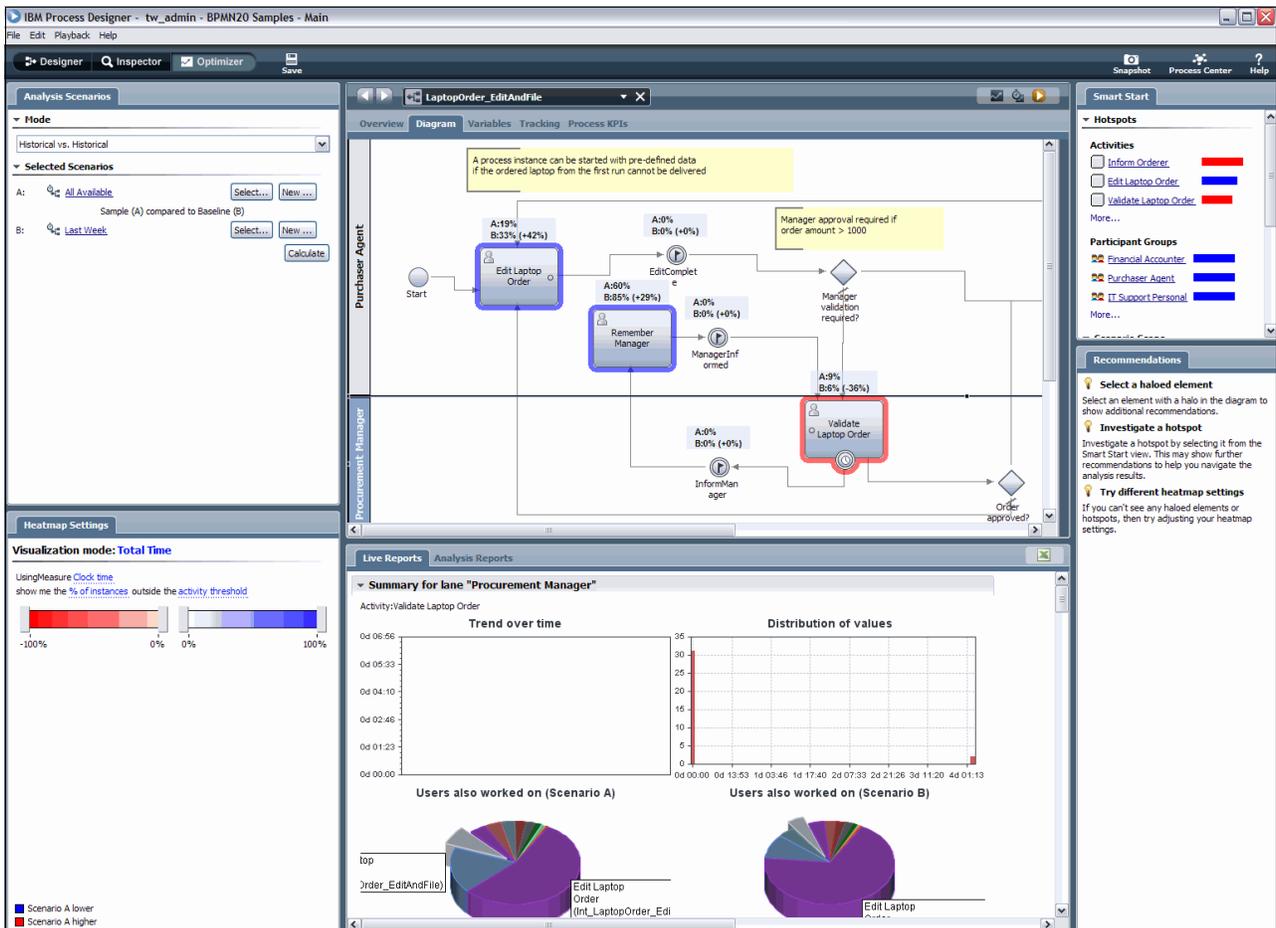

Figure 30   A BPD after a simulation was done

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[9] The service implementations for system tasks can be unassigned, because they are not executed when performing simulation runs. If they are assigned, they are ignored.

After all definitions are in place, the simulation can be executed. IBM Process Designer opens the process design in its optimizer perspective and shows the results of the simulation in various reports. Tasks are highlighted according to performance, including success, failures, tasks that come with long resource waiting times, and other issues. Various simulation evaluation reports are available, and different visualization modes highlight the most interesting issues to further optimize the process design or the resource model.

Various simulation runs can be compared with each other. The process application and all data are available in IBM Process Center. If the process application was deployed and executed on a process server, then during design time or during run time, simulation runs can be compared with actual execution data. Further analysis of the model simulation or of actual production data is used to optimize the BPD.

Simulation also serves for testing purposes. In simulation, the whole BPD is investigated to discover if all tasks are reached and if all possible process cases are executed. Other discovery areas are also vetted in simulation. The real tests are done on either the Process Center Playback Server or on a Process Server Test Environment.

Remember: Simulation is an optional task that is performed by the process architect. More data must be added to the process design and insights on cost, time, and resources to the process' reality. It takes time to identify realistic simulation scenarios. The process architect might require more help from other people, such as business analysts, or from the broader BPM team.

When it comes to BPM and business optimization on a larger scale, simulation delivers dynamic insights. These insights are more helpful in process design improvements in the overall business performance than in the technical execution performance. Simulation results can be discussed with BPM sponsors and participants because people in these roles often show business process automation improvements for cost and time reductions.

Simulation shows the path distribution for the BPD. Additionally, it shows how often various tasks are executed and how often their service implementations are called. Gathering that information depends on the path analysis that is selected. Simulation supports understanding the quantity structure of the services provided by IT and made available on the SOA platform, especially in high volume scenarios.

Simulation results help identify realistic KPI thresholds, presented in dashboards, after the BPDs are deployed to the Process Server production environment.

Defining KPIs

IBM Business Process Manager comes with built-in monitoring capabilities that write the values for elements that are selected for tracking to the Performance Data Warehouse. The Performance Data Warehouse receives data from the BPDs and creates monitoring for business process instance execution, worker and team performance, and process data variables. These monitoring capabilities are a part of the product and available with no further investment.[10]

Monitoring of a BPD is immediately enabled after the flag named *enable auto tracking* is set for a BPD. Then, on the task level, default KPIs with predefined threshold settings are presented and, if selected, aggregated at run time. The default threshold settings can be changed by the process architect, using dynamic insights gained during simulation.

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[10] Advanced monitoring is available when using IBM Business Monitor because it monitors everything that can create CEI events. If IBM Business Monitor is used, monitor models must be created with the monitor model toolkit, which is part of IBM Integration Designer.

For monitoring, default KPIs are available and are published to the internal performance warehouse if the tracking data is committed in IBM Process Designer. In IBM Process Designer, threshold settings can be redefined, and are presented during automated process execution in dashboards available in Process Portal, as shown in Figure 31.
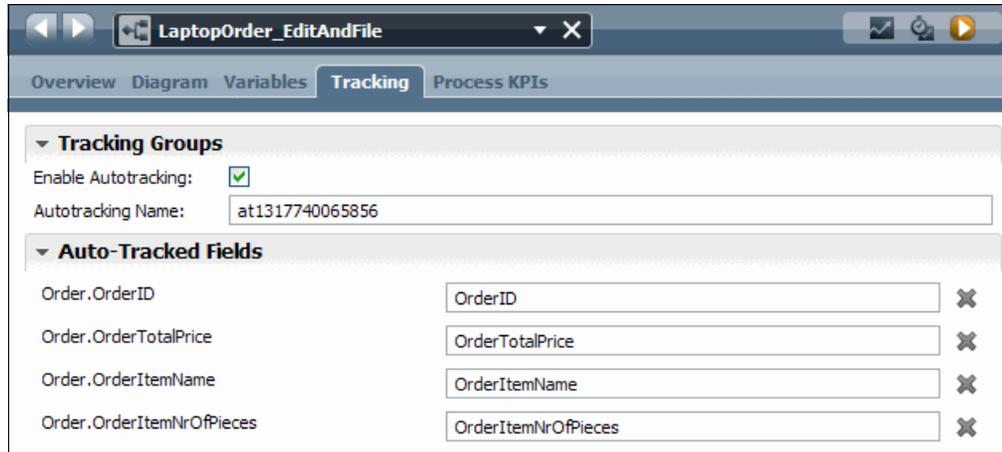

Figure 31   Default KPIs are available and are published to the internal performance warehouse

In addition to these KPIs, tracking points can be added to the process diagram to measure the execution time of specific paths in the BPDs. All custom process variables can be monitored when marking them for tracking in IBM Process Designer, as shown in Figure 32.
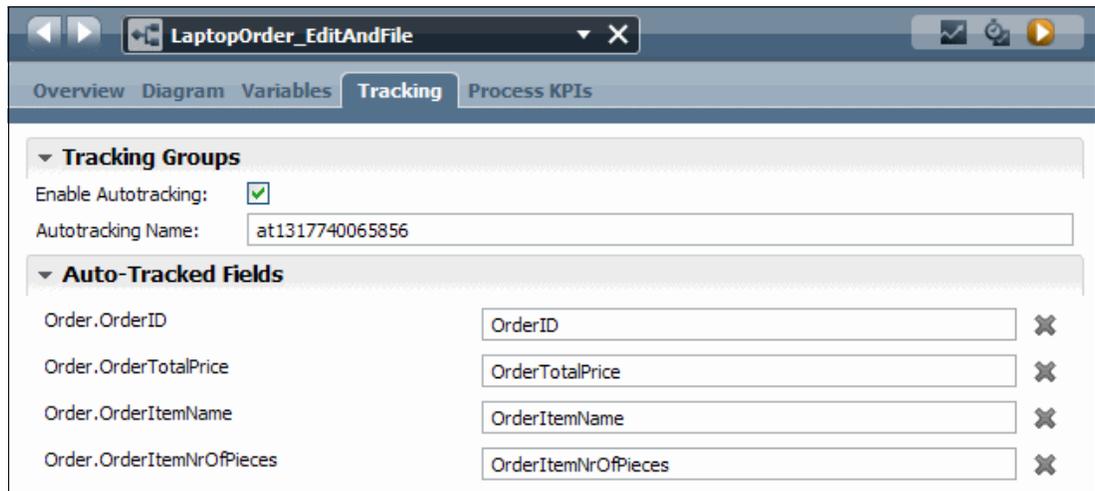

Figure 32   Monitoring process variables

Finally, at run time, all the KPIs, business metrics, and custom process variables are presented in dashboards in the Process Portal. This information includes the performance of process instances, task instances, teams, or single users. In addition, process variables can be tracked and reports generated to see actual process data.

This monitoring capability is, for many organizations, sufficient in the beginning. The process architect can use these monitoring features after the BPDs are deployed to either the Process Center Playback Server or to the production environment of Process Server.

KPIs, custom process variables, and team performances are immediately available features of Process Portal and illustrated in Figure 33. They are also a part of IBM Business Process Manager. Over time, when more process instances are executed, an increasing amount of data is collected, stored in the Performance Data Warehouse, and available for presentation. Business analysts, process owners, and line of business management define various time periods to investigate the business process production data. Report templates can be defined and then created with the click of a button. Reports can be exported for presentation to people within the organization that have no access to Process Portal.
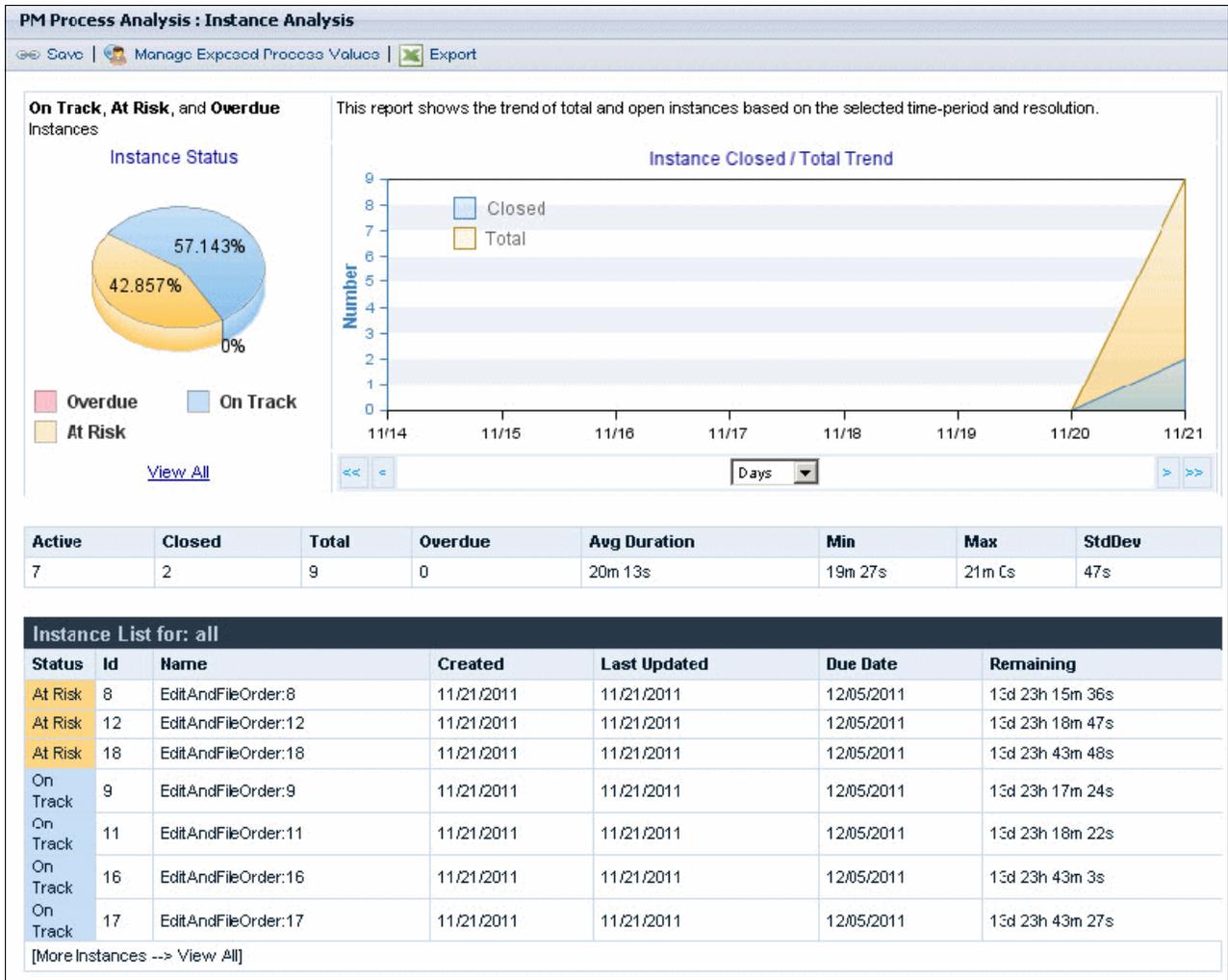

Figure 33   Process instance monitoring in Process Portal during automated execution

This monitoring is delivered as part of IBM Business Process Manager with no further investment. Monitoring business processes is simple because the process engine, underneath the surface, is tracking all execution data and does not require advanced skills from the process architect. Business organizations use monitoring heavily after seeing these details about their business processes in production. They quickly identify additional potential for further optimization and understand what additional KPIs they need to improve monitoring. This understanding continues to better map how specific business processes relate to overall business goals.

Often, business process monitoring is the real driver to invest and get started with BPM programs.

Monitoring with IBM Business Monitor: More sophisticated monitoring of BPDs and integrated back-end systems is done by IBM Business Monitor. It is a stand-alone product that can be purchased separately from IBM Business Process Manager.

Validating the process application

The process architect ensures that the BPDs and the process application contain no process modeling errors. IBM Process Designer has validation capabilities. It validates the BPDs for inconsistencies and presents those errors and warnings to the process architect, but it is the process architect who corrects the issues. When those issues are resolved, the process application is ready for testing.

IT responsibilities: Services provided by IT must be tested by IT. IT also ensures that the expected process and task volumes can be handled by the provided services and their underlying IT systems. The process architect teams with IT for testing, because testing BPDs should not affect running production environments.

IT installs IBM Business Process Manager Process Server test environments and gives the process architect access to those test environments to deploy process applications on them. The process architect can deploy the process applications to any available Process Server, but the process application is only a part of the whole solution.

IT ensures that the whole solution works as expected from a technical and operational performance point of view. The process architect completes the BPDs, the process applications composed of one or more BPDs, and a set of toolkits, but the overall solution runtime responsibility is still with the IT departments.

Testing the process application

Testing the process applications, its BPDs, and the service implementation of the tasks can be performed in IBM Process Designer by just clicking the Run button. This action deploys the process application and all of its content to the Playback Server, which is part of Process Center. The Playback Server is an exact copy of the Process Server and is used first for the test and then for the production environment. IT should set up a process server test environment to perform large overall solutions testing rather than use the Playback Server of Process Center. The process architect should find the Playback Server environment convenient and in most cases sufficient.

When designing the business process, the process architect can test a BPD, a service implementation, or a coach used in a user task implementation at any point in time. There is a Run button on almost every editor, including the process diagram editor, services editor, and coach editor. When the run button is clicked, the process application fragment is deployed to the playback server and the perspective switches to the inspector perspective.

In BPD, the Run button is at the upper right of the editor. When the button is clicked, a process instance is created immediately, and the process engine navigates to the first step where some user interaction is expected. If only system tasks exist, the implementation is executed or emulated, resulting in the automated execution of the services that are used as implementations of the system tasks.

Process applications can be tested with all its BPDs, task implementations, coaches for user tasks, services for system tasks, and business rules for decision tasks. Testing is shown in Figure 34.
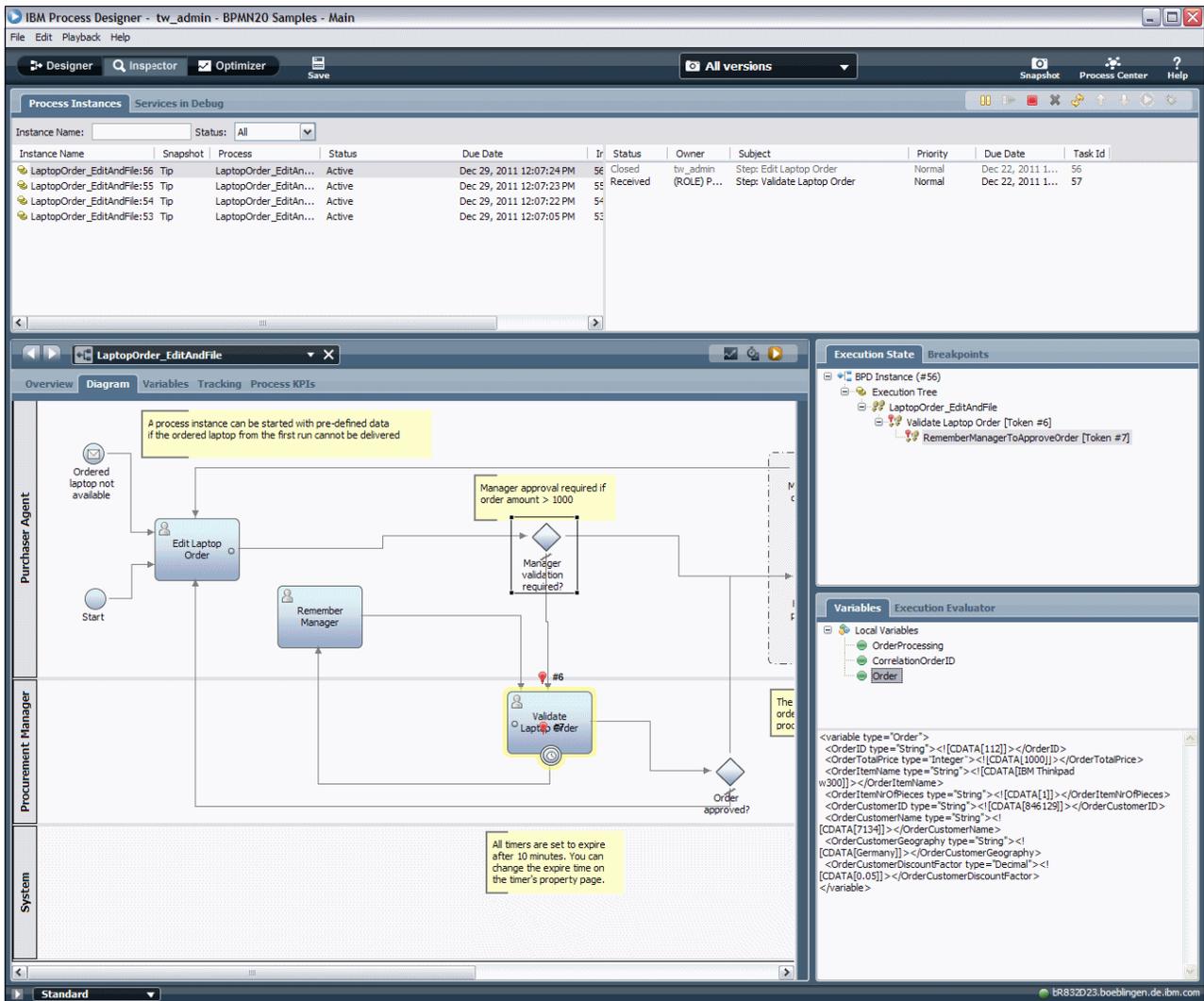

Figure 34   Testing process applications

The process architect completes the following tasks when testing a process application and working with process instances:

► Verifies that process start messages are received correctly

► Verifies that process end messages are created correctly

► Verifies the overall process error and exception handling

► Follows the control flow to see if all transition conditions are evaluated correctly

► Verifies that the tokens, created by the Playback Server and visualized in Inspector, are correct and resolved correctly to identify either deadlocks or lacks of synchronization

► Verifies the data variables, as they are changing, during the execution of the process instances

Instead of testing the process application with the Inspector perspective, the process application can be run from Process Portal, as shown in Figure 35 by using IBM Process Designer.
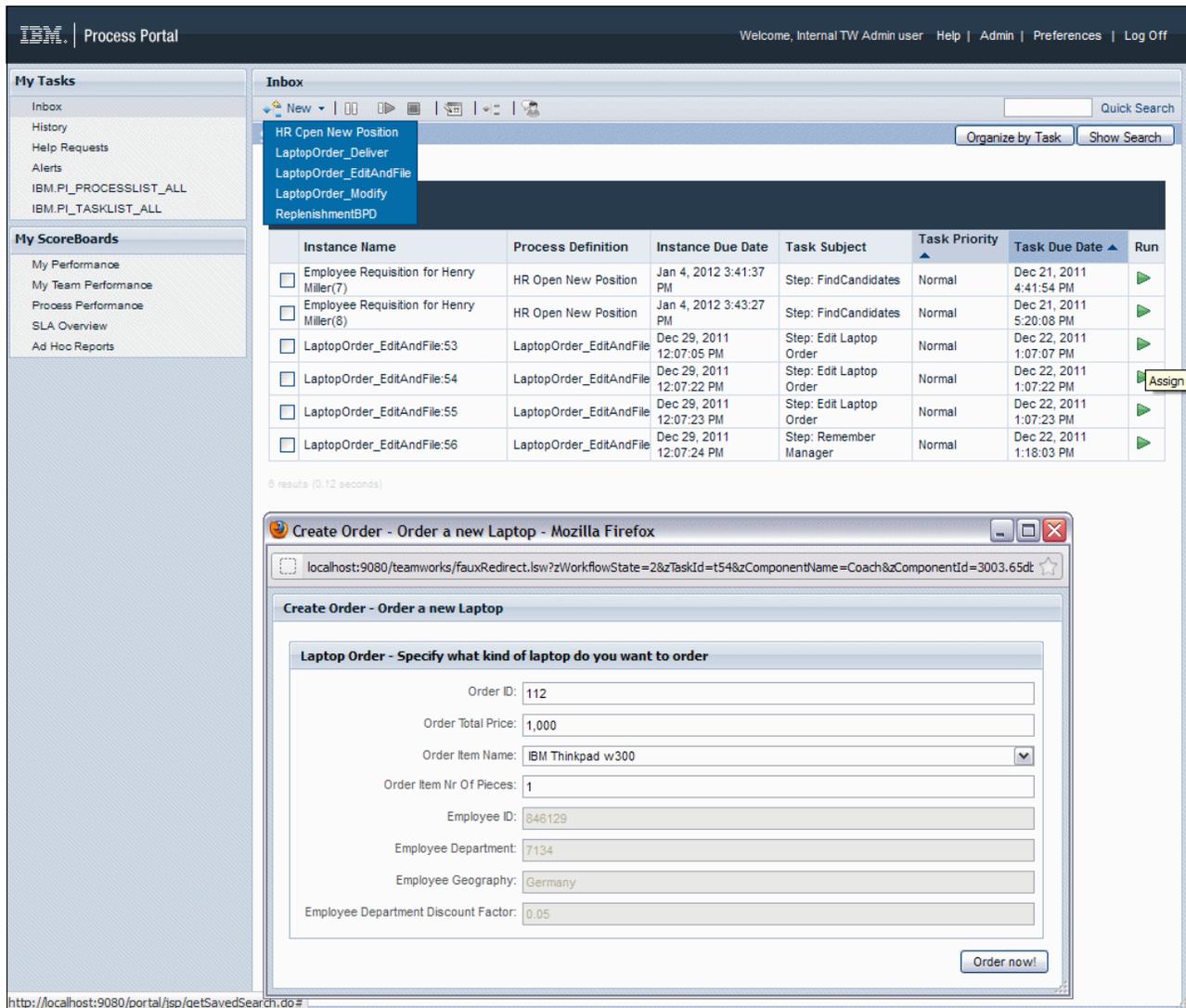

Figure 35   The process application can be run from Process Portal

The process architect verifies the following task instances:

► Data mappings are in place and work correctly.

► Task implementations are in place.

► Services, called *work*, actually process successfully. If service implementations are missing, then verify that the service results, when completed with the service emulation offered by IBM Process Designer, are used correctly for all follow-on tasks.

► Coaches and screen flows (GUIs) look as intended and work.

► Task boundary events are executed as expected.

The process architect logs out of the Inspector perspective and into the Process Portal that comes with IBM Process Manager. The Process Portal offers the best platform to perform these tests and review from the user perspective. As a part of the verification process, the process architect connects from Process Portal to the Playback Server. Process instances can be created in Process Portal from the BPDs that are modeled in IBM Process Designer. The process architect then selects to run a task instance, and the coaches, created in IBM Process Designer, are presented in a browser window. The process architect completes the task and the process engine navigates through the process instance. The process engine automatically runs system tasks or creates task instances. Task instances are sent to the inbox when a user task is about to be processed next.

In Process Portal, when the BPDs are tracked (because monitoring is enabled), the process architect can look at the scoreboards to see various business process performance aspects, as shown in Figure 33 on page 50. The Process Portal can be the target environment and the user GUI for all process participants in deployed process applications. These applications are executed in the Process Server production environment. When testing, the process application is displayed as it will look and behave in the final production environment. The process architect uses Process Portal for demonstrations of these applications to sponsors and
process workers.

When testing the process application in the IBM Process Designer Inspector perspective, additional features, such as debugging BPDs and services, are available. In the Process Designer Inspector perspective, technical insights into process execution are gained. In Process Portal, deeper understanding of the user experience is gathered. Both aspects are important, as the process architect must optimize the process applications for business performance, users, and technical functions.

These advanced test capabilities are used to continuously improve the process application. When all tests are done, the "golden" snapshot or final process application version is created. IT takes the final version and deploys it to the Process Server production environment.

More production close testing is required before deploying the process application on a production Process Server. These tests are done in a Process Server test environment instead of IBM Process Designer or IBM Integration Designer. This environment is installed and configured by IT. IT then makes it available for the process architect or process application test teams for final production. Whether the process architect runs these tests or not depends on the size of the organization.

Deploying process applications is simple, as it is all done using features of Process Center.

Deploying the process application

It is important to understand the architecture of IBM Business Process Manager Advanced, as shown in Figure 36, before deploying process applications. When IBM Business Process Manager Express or Standard Edition is used, instead of the Advanced Edition, the IBM Integration Designer is not included in the product lineup.
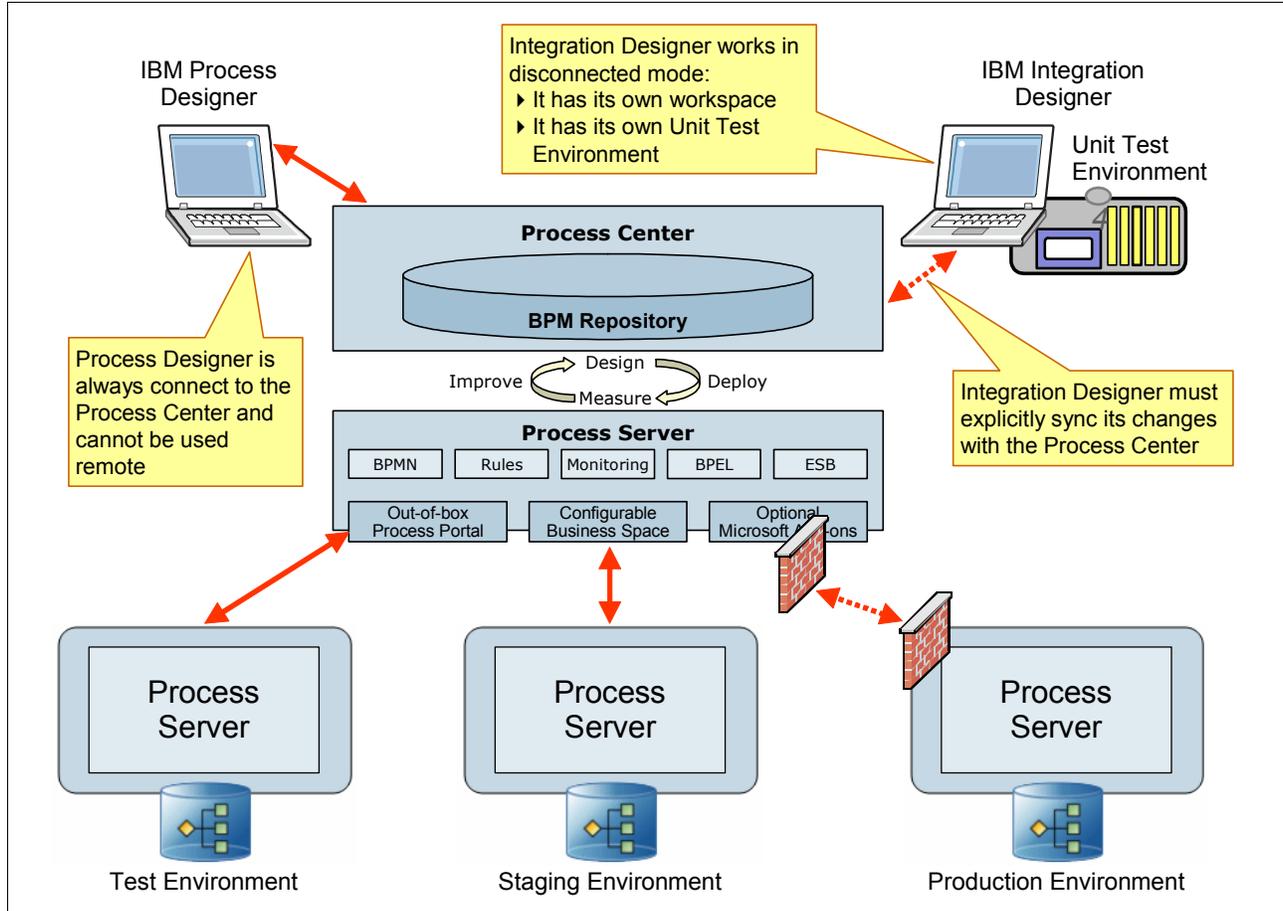

Figure 36   Architecture for test and deployment of process applications

When designing BPDs, IBM Process Designer must be connected to Process Center. Service implementations can be done offline in IBM Integration Designer.[11] A process application can be composed of BPDs designed in IBM Process Designer, and services implemented in IBM Integration Designer. When brought together in a process application, as described using the Advanced Integration Services, then IBM Integration Designer must be connected to Process Center. The implementations done in IBM Integration Designer must be made known to this specific process application. These applications are either already stored in Process Center or can be created in IBM Integration Designer within the Process Center perspective. No matter what the process application is all about, it is governed and stored in Process Center.

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[11] IBM Integration Designer is the successor of IBM WebSphere Integration Developer. It comes with all the build tools for BPEL processes, WebSphere ESB, monitor model toolkit for IBM Business Monitor, and many other tools. IBM Integration Designer includes its own Unit Test Environment to test all IBM Integration Designer implementations remote from Process Center.

No matter what a process application contains, the process architect can create a snapshot of its current state. A snapshot is a dedicated version of the process application at the exact moment when the snapshot was taken. A snapshot can be taken at any time by clicking the Snapshot button. A snapshot of the process application can include a user-defined name and a description. Additionally, a snapshot can assist in exporting and importing process applications from and to other Process Centers.

Over time, during the evolution of the process application, a number of snapshots are collected for each process application. All snapshots are governed in Process Center, and are available for redesign, test, or deployment to the execution server environment. Snapshot listing is illustrated in Figure 37.
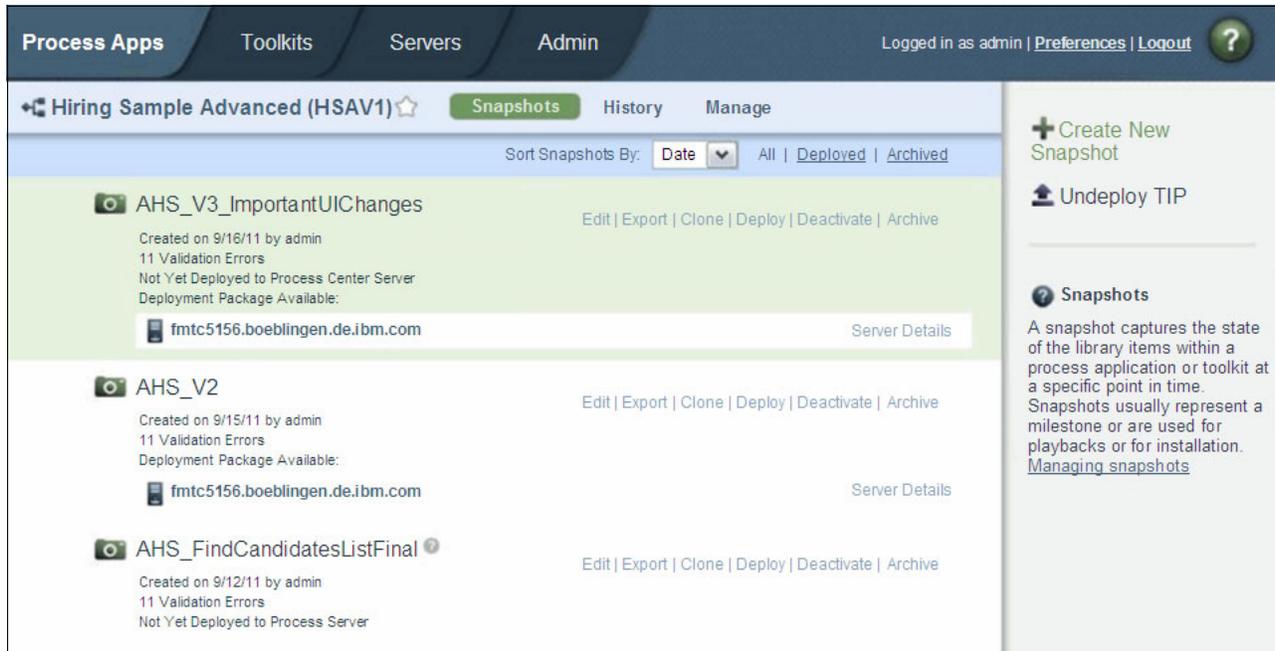

Figure 37   List of snapshots of the process application named Hiring Sample Advanced

When listing the snapshots, Process Center offers a number of commands. One command is to deploy the snapshot on an available Process Server, as multiple servers can be connected to the Process Center. These Process Servers, called *runtime environments*, are installed, configured, and provided by IT. IT might restrict the usage of some Process Servers, facilitating the deployment of applications on one server, and a test environment on another. Figure 37 shows on which server each snapshot is already deployed. By clicking Server Details, more server information is presented. For example, in a process application, when BPDs are running process instances, the number of running process instances is shown next to the server entry.

After a snapshot of a process application is deployed, the process architect logs on to Process Portal to start new process instances and to work on tasks presented in the inbox. In the runtime environment, deployed process instances, tasks, and business process monitoring look and work the same as they did in testing.

When all tests performed by the process architect, the IT team, or other groups in BPM are successful, the golden snapshot is taken. This final version of the process application is deployed to the Process Server Production Environment and accessed by process participants. This Process Server can either be directly connected to Process Center, or run behind additional firewalls to be fully protected for security reasons. When the Process Server and the Process Center are separated by a firewall, it is called *disconnected*. When in a disconnected production environment, the golden snapshot is exported from Process Center and deployed using command-line scripts

The process architect can perform all the following tasks with one tool when using the IBM Process Designer:

► The basic process design

► More advanced process design that covers assigning services to tasks and even service implementations

► Simulation and optimization

► Testing and deploying process applications to a Process Server installation

The process architect may not do all these tasks without IT. The service implementations, provided by IT, are implemented jointly by IT and the process architect. IT also provides the Process Server installation. Then, the process architect completes all the steps to either create executable BPDs or reuse BPDs from IBM Blueworks Live.

Conclusions

Remember, from the business process point of view, you must bridge the following key issues:

► Understanding the specific business goals to be implemented, the extent of the implementation of those goals, and which business processes are used to achieve the goals.

► Understanding what technical integration work is required for automated execution of these business processes, including both existing and new IT applications and IT systems.

Addressing these issues correctly is more than a technical challenge; it requires smart people that work together with smart tools bridging different expectations, goals, and needs. Business processes are key, and therefore to know as much as possible about them with a specific purpose in mind is important to all the people outlined in Figure 4 on page 7. Teamwork is critical between business and IT. Tools can help, but it is up to the people using the tools.

This paper introduced the process architect role to answer a portion of the need for smart people. People with that role are can originate from business or IT, and within the organization might have more capabilities than mentioned here. The focus is to have this role mediate between business and IT, and doing the work described in designing business processes for execution. This role provides speed and improved accuracy when transforming business process requirements into technical service implementations, leading to flexible and manageable automated business processes that run on process platforms on top of existing IT infrastructures.

Other smart people roles were identified as skilled and process-centric business analysts and business process aware IT people. These analysts or IT people can become process architects. What defines them is the ability to use tools for enhancing any process map with all the details required for BPM:

► Perform detailed business process analysis
► Directly deploy a process model for automated execution to a Process Server runtime platform provided by an organization's IT staff

For tools, this paper outlines IBM Business Process Manager, which includes the powerful BPD tool named IBM Process Designer. IBM Process Designer creates high-level process maps that can be enhanced to executable business process templates for process automation. All these features are in one tool and do not require any model transformation.

These business processes models (*BPDs*) technically are packaged in a process application. BPDs can be deployed from the BPD tool to the Process Server production environment centrally governed in IBM Process Center. High volume process applications, requiring many service implementations and service invocations at run time, are completed by IT personal. This process minimizes possible side effects to the overall operational and technical performance of these process applications. These process applications are new types of business solutions.

The process architect is right in the middle of these BPM solutions. That role transforms the business activity requirements into technical service implementation requirements and models how those services must be orchestrated and defined in the BPDs.

The role of the process architect is more important than ever for BPM programs.

Additional resources

The following resources can provide further information:

► *Scaling BPM Adoption: From Project to Program with IBM Business Process Manager*, SG24-7973
► IBM Business Process Manager V7.5 Information Center:

  http://publib.boulder.ibm.com/infocenter/dmndhelp/v7r5mx/index.jsp
► IBM Business Process Manager Community Wiki:

  http://wikilogin.lombardi.com/accounts/login/?next=http%3A%2F%2Fwiki.lombardi.com%2Fdisplay%2FDashboard%2FHOME

  This wiki is meant for all IBM Business Process Manager users and includes sample implementations, hints, and tips. It has a forum where you can discuss how to best implement specific requirements with IBM Business Process Manager.
► IBM Business Process Manager Samples:

  http://publib.boulder.ibm.com/bpcsamp/index.html

  Includes samples from IBM Business Process Manager and samples from predecessor products with detailed build and run instructions, including process application and code fragments to help you gain immediate experience.

- IBM developerWorks®:

  http://www.ibm.com/developerworks/

  IBM developerWorks is the industry-leading and award-winning technical resource and professional network for the developer community.

The author who wrote this paper

This paper was produced by a technical specialist working at the International Technical Support Organization.

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