

Course Guide

# Process Implementing with IBM Business Process Manager Standard V8.5.7 - I

Course code WB823 / ZB823 ERC 1.0



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# Course description

## Process Implementing with IBM Business Process Manager Standard V8.5.7 - I

**Duration: 5 days**

### Purpose

This course integrates training in business process management (BPM) methods and implementation with IBM Business Process Manager V8.5.7. You learn core process modeling and implementation skills, the project development approach, process model implementation fundamentals, and exceptional delivery patterns. These skills improve the speed and quality of process definition and implementation efforts.

IBM Business Process Manager is a comprehensive BPM environment that provides the visibility and insight that is required to effectively manage the business processes of an organization. The course begins with an overview of business process management, emphasizing the concepts of reuse, ease of maintenance, and high-quality development strategies. You create simple ad-hoc activities by using the web-based tools, and use the IBM Business Process Manager Web Process Designer to create a business process definition (process) from business requirements that are identified during process analysis. You learn how to make team collaboration more efficient by enabling all team members to use standard Business Process Model and Notation (BPMN) elements.

The course continues with an overview of the architecture of IBM Business Process Manager, and describes the use of process applications and toolkits within the tool. You create business objects and variables, implement gateways, and demonstrate process flow on your diagrams. You build customized user interfaces (coaches) to enable business and process data flows throughout the process model.

The course uses an interactive learning environment, with hands-on demonstrations and class activities to reinforce concepts and check understanding. Lab exercises throughout the course provide hands-on experience with BPM tasks and skills. This course is intended to be collaborative, and you can work in teams to complete class activities.

### Audience

This course is designed for project members who design and implement detailed logic, data models, and external system integrations for an executable business process definition. These roles include process owners, BPM analysts, BPM authors, BPM developers, BPM administrators, and BPM project managers.

### Prerequisites

Before taking this course, you should have:

- Practical knowledge of data structures
- Understanding of SQL syntax and JavaScript
- Basic understanding of web services
- Experience with modern programming techniques

## Objectives

- Describe why process modeling is an important phase in the BPM lifecycle
- Create structured and unstructured processes (formerly Case) using Web Process Designer
- Create ad-hoc activities by using the Process Designer
- Identify how to use Process Designer to create a process application
- List and identify the core elements that are used to create a process in the Process Designer
- Translate workflow steps into business process activities and nested processes
- Use gateways to control the process flow
- Validate that the process model meets Playback 0 goals and requirements
- Identify how intermediate events are used during the execution of a business process
- Describe the architecture of IBM Business Process Manager
- Organize process assets into toolkits
- Manage variables and data flow
- Implement timer events
- Implement gateways and routing to control process flow
- Build a business data model
- Build services and user input forms (coaches)
- Create a snapshot for deployment
- Create a decision service
- Model and implement message events
- Apply asset tags to organize artifacts
- Enhance coaches for a rich user experience and apply themes
- Implement effective error handling in processes and services

## Contents

- Introduction to business process management
- Introduction to IBM Business Process Manager and Integration with other tools
- Playback 0: Modeling the as-is business process
- Playback 0: Modeling the to-be business process

- Playback 0: Controlling process flow
- Playback 0: Building consensus
- IBM Business Process Manager architecture
- Playback 1: Controlling process flow with business data
- Playback 1: Business data, services and coaches
- Playback 1: Enhancing coaches
- Playback 2: Integrations
- Playback 3: Hardening processes and services
- Playback 3: Deploying process applications

## Curriculum relationship

This course is an update of course WB819, .

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# Agenda

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**Note**

The following unit and exercise durations are estimates, and might not reflect every class experience.

---

## Day 1

- (00:15) Course introduction
- (01:30) Unit 1. Introduction to business process management
- (01:30) Unit 2. Introduction to IBM Business Process Manager and integration with other tools
- (01:30) Unit 3. Playback 0: Modeling the as-is business process
- (01:30) Exercise 1. Playback 0: Creating a process with ad-hoc activities

## Day 2

- (02:30) Unit 4. Playback 0: Modeling the to-be business process
- (01:30) Exercise 2. Playback 0: Creating a structured process
- (01:30) Unit 5. Playback 0: Controlling process flow
- (01:30) Exercise 3. Playback 0: Controlling process flow
- (01:00) Unit 6. Playback 0: Building consensus
- (00:15) Exercise 4. Validating the process model

## Day 3

- (02:00) Unit 7. IBM Business Process Manager architecture
- (04:00) Unit 8. Playback 1: Controlling process flow with business data
- (01:00) Exercise 5. Playback 1: Controlling process flow with business data

## Day 4

- (02:15) Unit 9. Playback 1: Business data, services, and coaches
- (00:15) Exercise 6. Playback 1: Business data, services, and coaches
- (02:15) Unit 10. Playback 1: Enhancing coaches
- (01:00) Exercise 7. Playback 1: User interface design and implementation
- (01:00) Exercise 8. Playback 1: Conducting the Playback session

## Day 5

- (02:00) Unit 11. Playback 2: Integrations
- (01:30) Exercise 9. Playback 2: Integrations
- (01:30) Unit 12. Playback 3: Hardening processes and services
- (00:15) Exercise 10. Playback 3: Creating error handling for a service
- (00:30) Unit 13. Playback 3: Deploying process applications
- (00:15) Exercise 11. Playback 3: Creating a snapshot for deployment
- (00:30) Unit 14. Course summary

---

# Unit 1. Introduction to business process management

## Estimated time

01:30

## Overview

This unit explains the foundational concepts that establish the importance of process modeling. It includes a review of business process management, the business process management lifecycle, the basics of process modeling, and business process management project development. It introduces a case-study scenario that begins the in-class development of a business process definition that is based on the business requirements that are established within the process analysis - Playback zero phase of the project.

## How you will check your progress

- Review questions

## How to check online for course material updates



**Note:** If your classroom does not have internet access, ask your instructor for more information.

### Instructions

1. Enter this URL in your browser:  
<http://ibm.biz/CloudEduCourses>
2. On the wiki page, locate and click the **Course Information** category.
3. Find your course in the list and then click the link.
4. The wiki page displays information for the course. If the course has an errata document, this page is where it is found.
5. If you want to download an attachment, such as an errata document, click the **Attachments** tab at the bottom of the page.  

6. To save the file to your computer, click the document link and follow the dialog box prompts.

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Figure 1-1. How to check online for course material updates

## Unit objectives

- Define business process management (BPM)
- List and describe the phases in the BPM lifecycle procedure
- Define process modeling
- Describe Playback 0 and the achievements that are reached during this stage of project development

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Figure 1-2. Unit objectives

## Topics

- Business process management (BPM)
- About process modeling
- BPM project development
- About playbacks, specifically Playback 0
- The Hiring Requisition process

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Figure 1-3. Topics

# 1.1. Business process management (BPM)

# Business process management (BPM)

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Figure 1-4. Business process management (BPM)

Organizations often seek ways to improve their organization to increase productivity, lower costs, and increase revenues. The challenge organizations face is that change is inevitable in business because of various factors, like market dynamics. To keep up with the climate of change in business, organizations must rely on efficient and effective business processes.

Many organizations try to implement different strategies to accomplish change management of processes with little to no disruption of customer service and employee productivity. But many times, those efforts fail outright or accomplish only a portion of the process improvement because performance measurement is limited.

## What is IBM BPM?



Comprehensive change management of business processes  
that results in continuous process improvement

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Figure 1-5. What is IBM BPM?

Business process management (BPM) excels at providing a comprehensive change management of business processes, which results in continuous process improvement.

Processes are meant to evolve as the organization or external conditions change.

## Three themes

Goal	System	Results
The BPM goal is efficient and effective business processes with visibility	The BPM system is the management of people-to-people work steps, system-to-system communications, or person-to-system interactions	The BPM expected result is process improvement that brings about financial benefits and customer and employee satisfaction

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Figure 1-6. Three themes

BPM is also described with these common themes: the goal, the system, and the expected results.

All organizations have processes; however, the visibility of processes can be varied. BPM is a way to increase that visibility and hence give direction to the continued efficiency of the processes.

In true BPM, all aspects of a system are important, including human interactions. True BPM seeks to define and visualize all aspects of your process regardless of what role or system is conducting that part of the work. BPM results in continual process improvement, which provides many beneficial outcomes to the client.

## An IBM BPM vision



BPM is the means by which companies and governments improve their operations by using internal business expertise in new, scalable ways.

Improvement is achieved by directly engaging business people in the design, definition, and creation of enterprise-class process applications.



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Figure 1-7. An IBM BPM vision

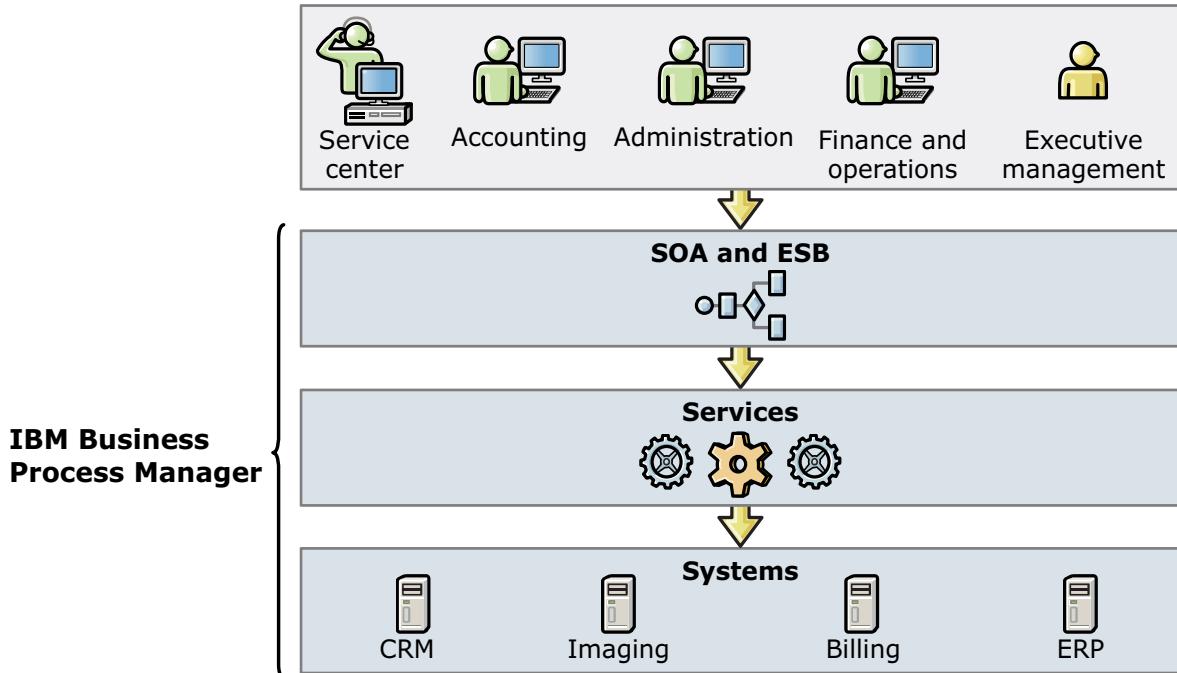
Does BPM have or even require a vision? If the ideal is to match existing core competencies and tool sets with the stated goal, system, and expected result, then the vision might be limited to only the execution of a process application build. It would also affect what a process model might look like and what it would communicate to an application development team.

What if a broader vision for BPM is the following? “BPM is the means by which companies and governments improve their operations by using internal business expertise in new, scalable ways. Improvement is achieved by directly engaging business people in the design, definition, and creation of enterprise-class process applications.”

This vision provides a wider scope for BPM in that it specifies the change not only to the business process but also to the strategies, development methods, and most importantly, the thinking in project development. BPM is a business-led solution, and any tool set that is used to implement it must support that involvement.

# IBM Training

## The BPM layer is what makes IBM Business Process Manager special



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Figure 1-8. The BPM layer is what makes IBM Business Process Manager special

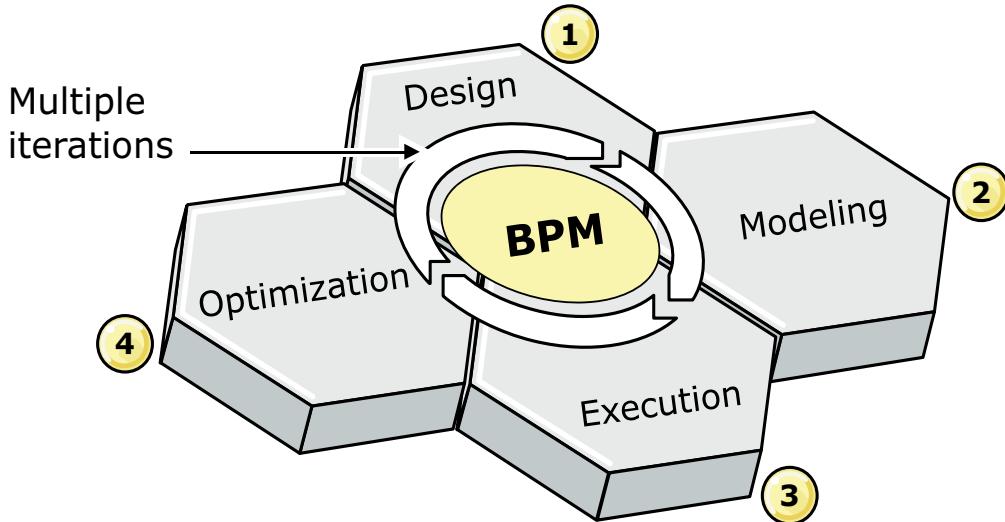
A good way to think about BPM is that it is a layer that gives you the control and visibility over the processes. IBM Business Process Manager:

- Sits between people and systems, and manages the process across those participants
- Prioritizes your work, but also gives you visibility and control
- Quickly and immediately implements changes when the process evolves and changes

The business users create and refine the process model. Developers start with the model and implement the solution to its final executable state. Every conversation revolves around a single executable model. IBM Business Process Manager doesn't have a model for development and a separate model for execution. It doesn't compile the model and then send it into another environment for execution. The single model has many advantages. It simplifies development and governance, and allows all stakeholders to discuss the BPD as an executable asset rather than just being a picture like a model you might create inside a drawing software program.

IBM Business Process Manager orchestrates the services, systems, and users in your enterprise. It can use SOA and ESB capabilities to deliver process agility and visibility with reduced implementation cycle times. Your role is to harness the power of IBM Business Process Manager to realize the organization's process improvement goals.

## IBM BPM lifecycle



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Figure 1-9. IBM BPM lifecycle

The BPM lifecycle has four phases: design, modeling, execution, and optimization.

Looking at the BPM lifecycle, it becomes apparent that opportunities are available to use the expertise of business and IT to collaborate in each phase of the lifecycle. Using this approach to BPM, the business process is stable and on target. This stability is because of the overall iterative improvement cycles in keeping up with business goals, business change, and opportunities within each phase to make critical adjustments.

Business and IT working in concert throughout the BPM lifecycle require a clear set of goals for each phase. Matched against those lifecycle phase goals are the responsibilities for each group. Clearly, the governance of the business process varies at each phase for each group, but the involvement of both ensures that the process improvement is realized.

The goals of each phase are as follows:

1. Design goals:

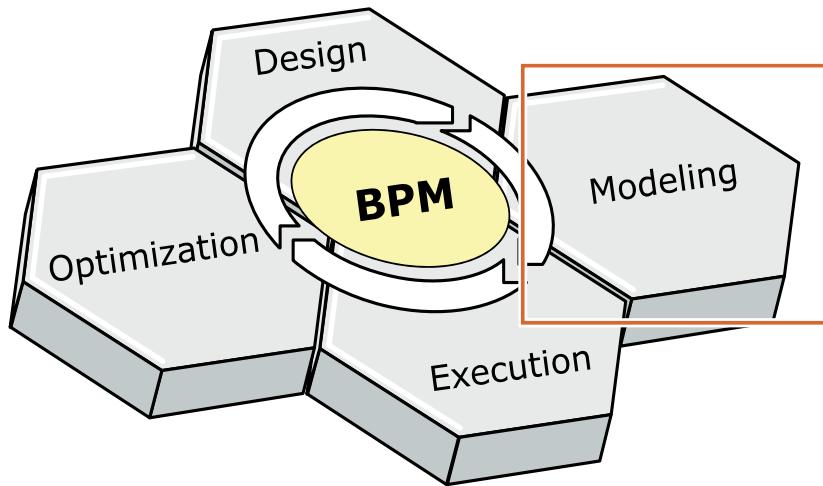
- Capture executive vision
- Process nomination
- Process prioritization
- Process discovery

- Process analysis
2. Modeling goals:
- Create a process model
  - Process adjustments
  - Process simulation
3. Execution goals:
- Implement the process model as a process application
  - Adjust business process requirements as needed
  - Deploy and monitor the process application
4. Optimization goals:
- Analyze and evaluate process performance data
  - Evaluate the business process ability to meet new business goals

After business practices or external conditions change, or the current process is no longer optimal, BPM iterates again through the lifecycle. This continual iteration allows the effective management of business processes.

A true BPM implementation tool allows these iterations to be easily applied.

## The modeling phase



- Process discovery and documentation
- Process analysis
- Simulation and adjustment

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*Figure 1-10. The modeling phase*

The first two days of the course focus on the modeling phase of the BPM lifecycle and how business and IT collaborate to create the process model. The modeling phase is more than just creation of the process model; it also requires an understanding of how to adjust the model to meet evolving business requirements. So, throughout this phase, the process model goes through continued analysis and a series of adjustments and refactoring efforts to obtain a model that can be implemented into a process application.

All the adjustments and testing allow for a process model that meets what the business expects in terms of an improved and efficient business process at the end of project development.

BPM done correctly results in business processes that are modeled, analyzed, and adjusted early and often. The BPM effort goes far beyond basically applying technology to a process to yield a changed process. Applying technology to automate a bad business process without regard to necessary analysis and adjustment efforts leads only to a more efficient, but still bad process.

## 1.2. About process modeling

## About process modeling

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*Figure 1-11. About process modeling*

An understanding of a business process is necessary before it can be modeled.

## What is a business process?



- A set of activities that takes specific inputs and converts them into specific outputs in a defined, predictable fashion

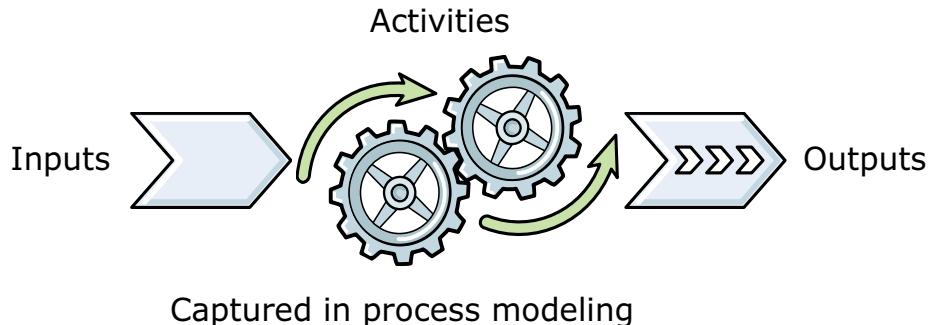
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Figure 1-12. What is a business process?

A business process is a set of tasks or activities that takes specific inputs and converts them into specific outputs in a defined, predictable fashion. Inputs typically consist of information or a set of information that triggers a set of activities in the process. Outputs are the results that the activities render.

## What is process modeling?



- Captures the ordered sequence of the business process tasks or activities

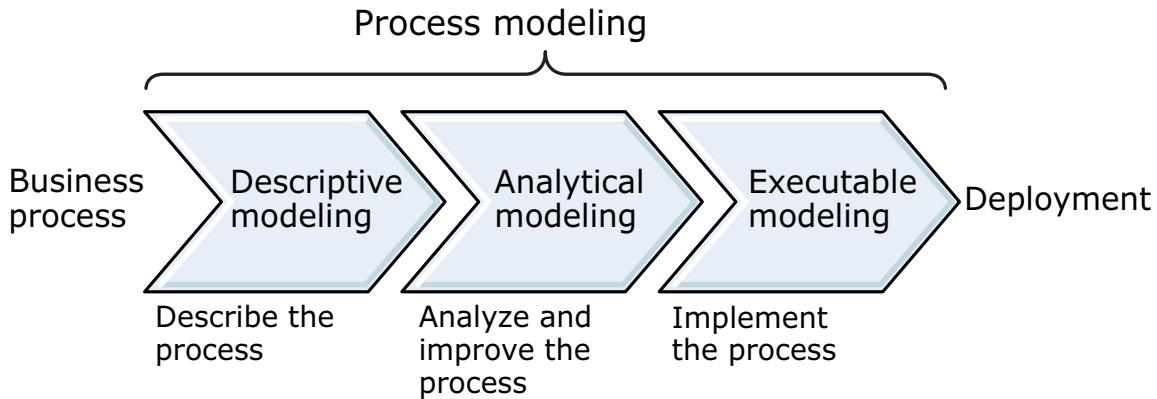
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Figure 1-13. What is process modeling?

Process modeling captures the ordered sequence of the business process tasks or activities, and the responsible roles that are conducting the activities. It also captures the conditional branching and the sequencing of the flow of work between activities, along with the supporting information from start to end.

## Three-phase approach



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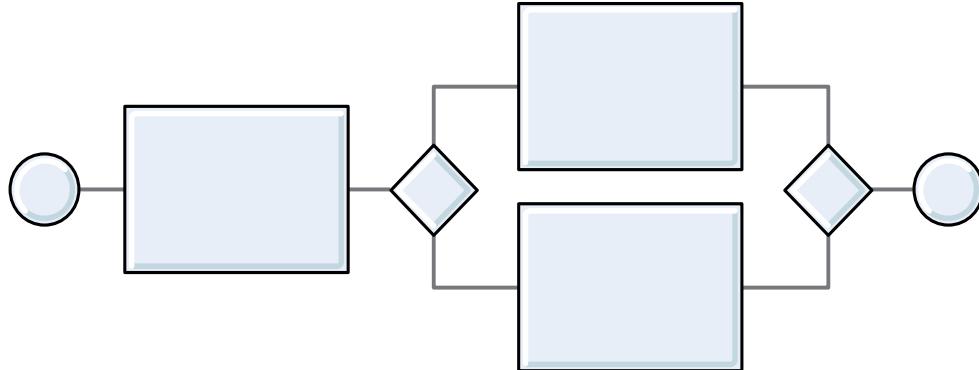
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Figure 1-14. Three-phase approach

Process modeling can be described as having a three-phase approach:

- **Phase I or descriptive modeling:** Describe the process. This high-level model provides a description of the process that is based on business requirements. The model is easily communicated across the organization.
- **Phase II or analytical modeling:** Analyze and improve the process. This analytical, more detailed modeling shows all pertinent activities and flow that are used to detail process requirements.
- **Phase III or executable modeling:** Implement the process. This model details the functional requirements to implement the executable process application.

## What is a process model?



A graphical representation, or diagram, of the business process that is universally understood and easily communicated

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Figure 1-15. What is a process model?

A good process model is a graphical representation or diagram of the business process that is universally understood. Business people understand it easily, and it is directly implemented in a business process management system (BPMS) such as IBM Business Process Manager.

For all parties to understand a process model universally, process owners, process participants (business), and the BPM development teams must easily understand each other and recognize the same concepts in the same context. IT does not need to redraw a process model to provide more clarity or a different point of view.

A good process model provides views into a process that are clearly and easily communicated in 5 minutes or less, at every level of granularity.

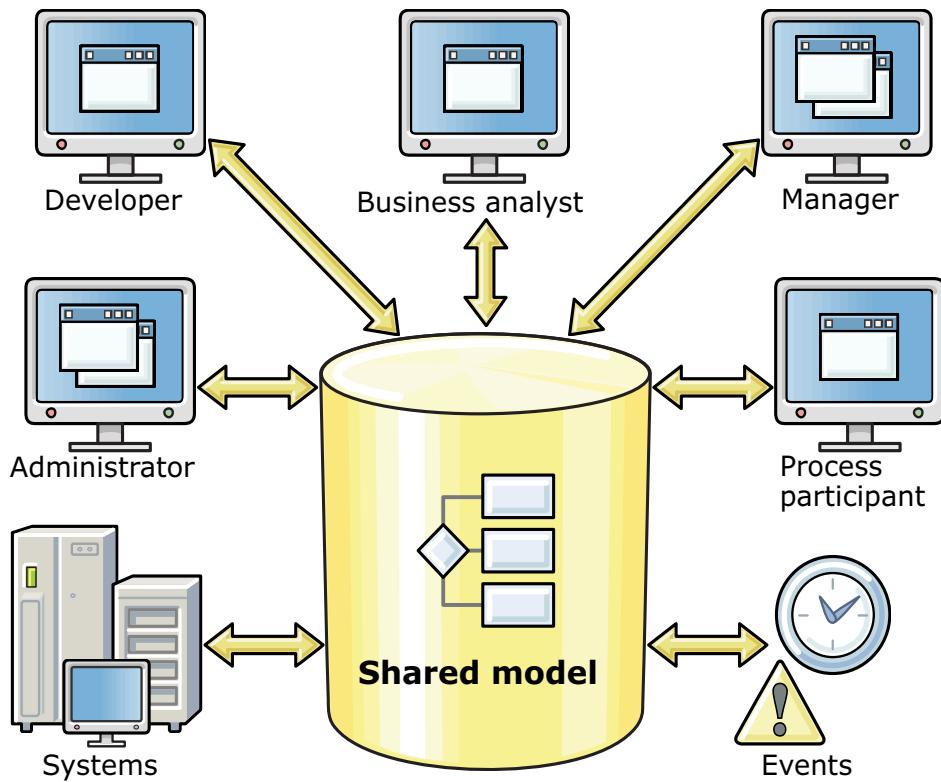
### Process model development

Now that it is established when and what must be accomplished in process modeling, the next thing is to focus on is how process modeling is accomplished in terms of development methods.

Understanding how to model a process requires comprehension of the project development methods that are used for BPM. Realize that project development strategies for process models differ from standard methods, especially when you consider the usage of process models. In standard project development, the shelf life of diagrams that are derived from requirements is only from the business hand-off to the development teams. In essence, these requirements are converted into code, and their use ends at that point.

BPM process models are different. Going back to the BPM lifecycle, notice that the process model evolves in terms of usage. The prolonged shelf life of a process model allows for the iterative BPM lifecycle because it is data-driven and not code-driven. This setting provides the stability for a process application without fear of having to start from scratch when change is needed.

## The right process model development strategy



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Figure 1-16. The right process model development strategy

IBM Business Process Manager uses a single shared environment for project design and development. All process artifacts are stored in a single shared model architecture. All parties that are involved in the effort to define, model, implement, measure, and improve the process are working from a common shared model that encapsulates all of the various components. It helps maintain the vision of bringing business and IT together.

The following list shows various people who are all using the same business process definition, or process model:

- Business analysts who are modeling the process
- The IT developers who are constructing the detailed implementation of the model
- The responsible process participants who are completing their activities in the process
- The process owner and analysts who monitor the process performance and identify improvements

The model of the process that the analysts and developers build is the same one that completes at run time. It is the same one that is used to create reports on the performance and status of the process, and the same one that is used to implement process improvements.

## 1.3. BPM project development

## BPM project development

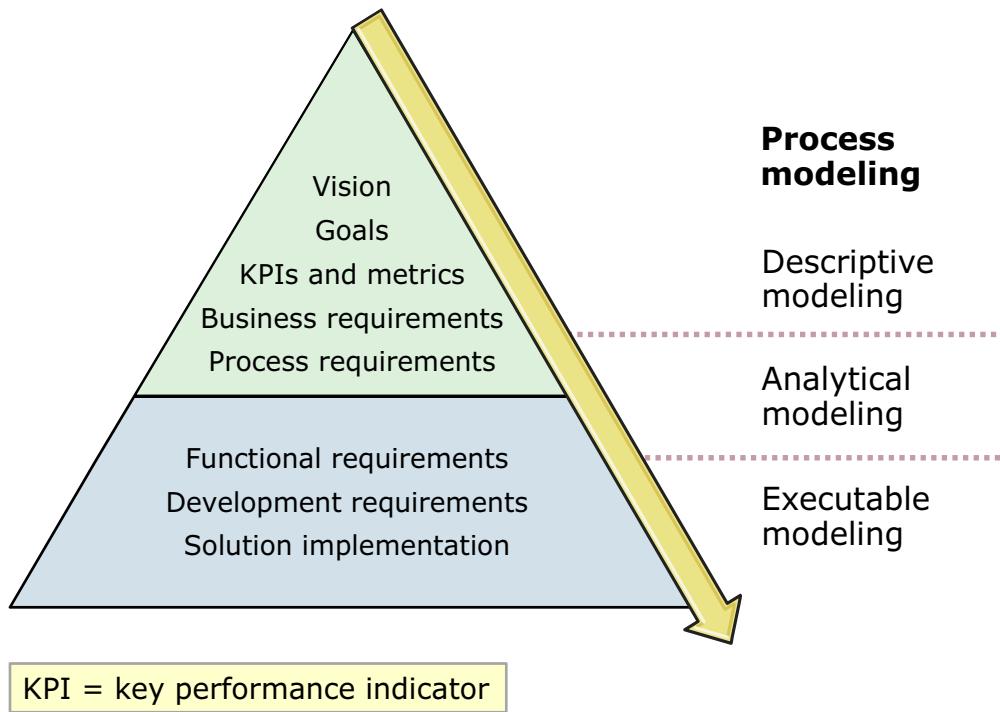
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Figure 1-17. BPM project development

The established standards and development methods typically reinforce the project development for any IT initiative. A BPM project, especially one that includes the broader vision and definitions that are provided, would not fit the typical project development standards because the key BPM project components are slightly different. This difference is because the BPM project components reinforce the process first, and the solution second. In BPM, everything is process-driven, so the development method that is used to develop process models and the eventual process application must be uniquely focused on the process needs. It is not a system that is traditionally used to develop projects.

## IBM BPM project components



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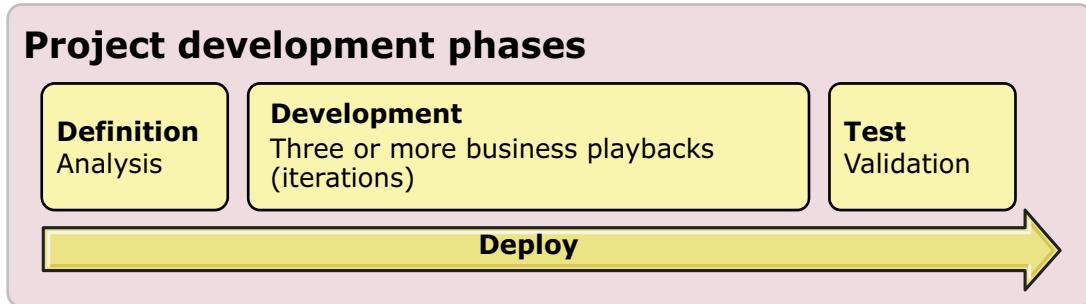
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Figure 1-18. IBM BPM project components

The top-down diagram view of the BPM components provides a quick view of how a typical BPM project development evolves. Any of these components that are missing from a project would interrupt the effective design, definition, and creation of the process application, and curtail the engagement of business people.

KPI = key performance indicator

## Project development phases



- **Definition:**
  - Discover and define the process
  - Analyze the process for improvements, model the process, and set the process performance measurement criteria
- **Development:**
  - Prepare the process application for deployment by using an iterative development with three or more playbacks
- **Test:**
  - Validate the process application performance in achieving expected business process goals in a production user environment

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Figure 1-19. Project development phases

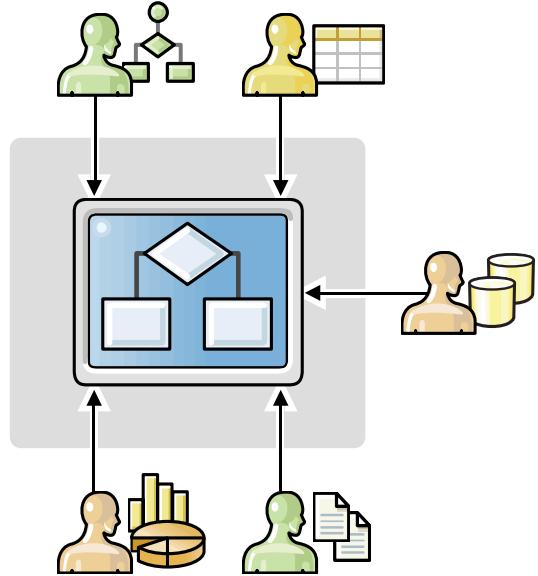
In contrast to the traditional IT application development approach stands the phased BPM project development approach that closely aligns to the overall BPM lifecycle. This approach also focuses on the BPM project components and allows for the different phases of process modeling.

The project development phases are:

- **Definition:** Discover and define the process. Analyze the process for improvements, model the process, and set the process performance measurement criteria.
- **Development:** Prepare the process application for deployment with an iterative development with three or more playbacks.
- **Test:** Validate the process application performance in achieving expected business process goals in a production or user environment.

## IBM BPM project teams

- Process sponsor
- Process owner
- BPM project manager or program manager
- Subject matter experts
  - Core process activities
- Core team members
  - Analyst
  - Developer
  - Solution architect
- Administrators
- Facilitators
  - Ad hoc member (optional)



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Figure 1-20. IBM BPM project teams

The unique phases and components of a BPM project require a specific set of project roles, including:

- **Process sponsor:** Responsible for establishing the project goals and scope, securing organizational support and resources, and ensuring alignment with organizational business goals
- **Process owner:** The person who is accountable for the successful execution of the process, knows the process from end to end at a high level, and can identify the subject matter experts
- **BPM project or program manager:** The person responsible for the success of the project
- **Subject matter experts:** People with knowledge of specific process resources, or systems
- **Core team members:** Business process management (BPM) development teams, typically including BPM analysts, BPM developers (includes integration designer developers and technical consultants), and solution architect (advanced role that can lead teams and serve as an analyst and developer)
- **Administrator:** Installs, updates, and configures the business process management system
- **Facilitator:** (optional) Typically manages the collaboration meetings for a BPM team

All of these participants work together to collaborate in the design of the process model.

## 1.4. About playbacks, specifically Playback 0

## About playbacks, specifically Playback 0

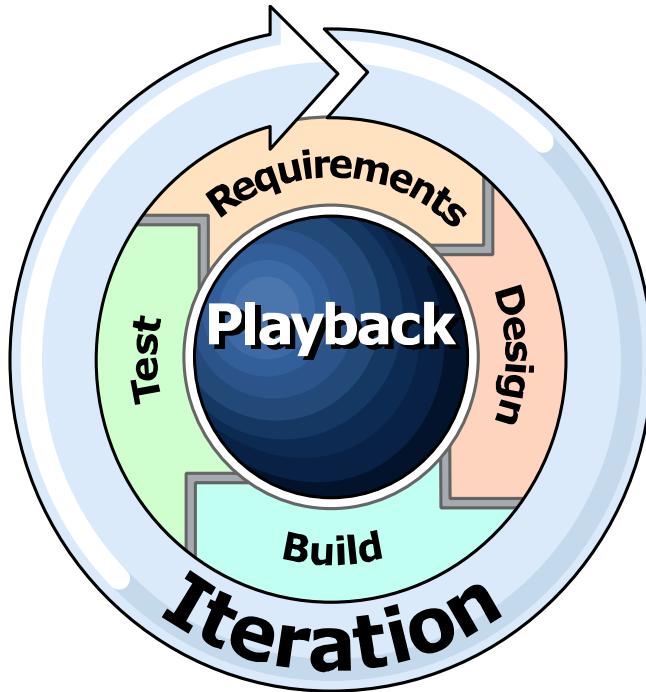
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Figure 1-21. About playbacks, specifically Playback 0

A playback between business and IT is a focused demonstration of a partially implemented process model at the designated development phase. This phase includes the goal of discussion, consensus building, collaborative improvement, and ultimate approval of the process model. Playbacks enable the iterative development of the process application.

Playbacks provide early visibility and input from the business group on process application functions. The perspective of the business group at the early stages benefits development because the business quickly identifies adjustments to requirements well before the final product is implemented. The ability to shift direction during the definition and development phase is key to reaching the ultimate BPM project target.

## Playback iterations



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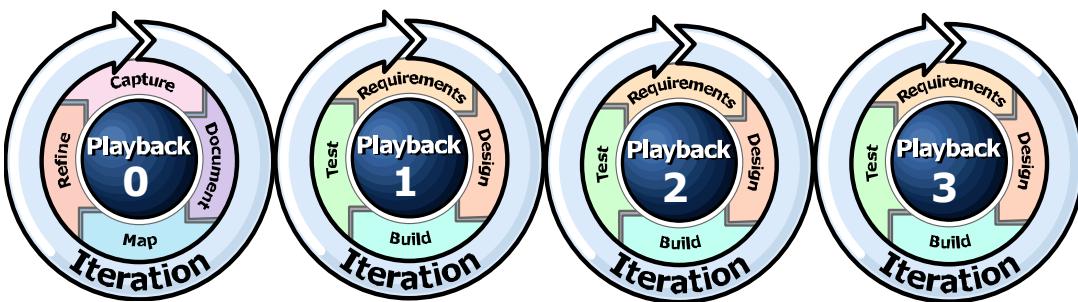
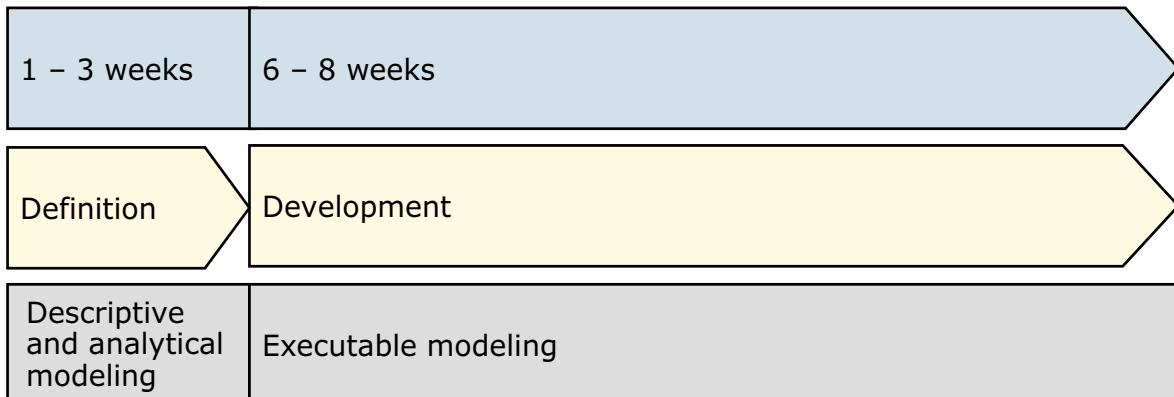
Figure 1-22. Playback iterations

Iteration of your process is one critical key for BPM success.

An “iteration” of a playback allows users to focus on a part of the overall project and validate it before moving on to the next part.

Most playbacks allow users to gather requirements, design and build solutions, and then validate (test) them. When the playback is validated, you move to the next area of focus until this part of the project is complete.

## Playback cycles



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Figure 1-23. Playback cycles

Often playbacks are conducted as themed stages. The number of actual collaboration meetings that are conducted inside of each stage can vary. Usually, multiple smaller playbacks are conducted and target individual groups with a specialized role (developers, administrators, and other roles), but these smaller playbacks build upon one another, leading to a final playback. During this final playback, make sure that you reach consensus before moving into the next stage.

This slide is an example of a project plan that contains a typical playback timeline and content of each of the playbacks. In modeling and implementation, shorter cycles than what your company might currently be accustomed to are good practices. The agile development approach with shorter cycles is critical to BPM success. Larger projects are scoped down to smaller release cycles. Creating smaller chunks for a project has many benefits, as follows:

- Overall project risk is reduced.
- Working code can be released into production in a shorter amount of time.
- Changes to the project cause less rework when releases occur on a more regular basis.

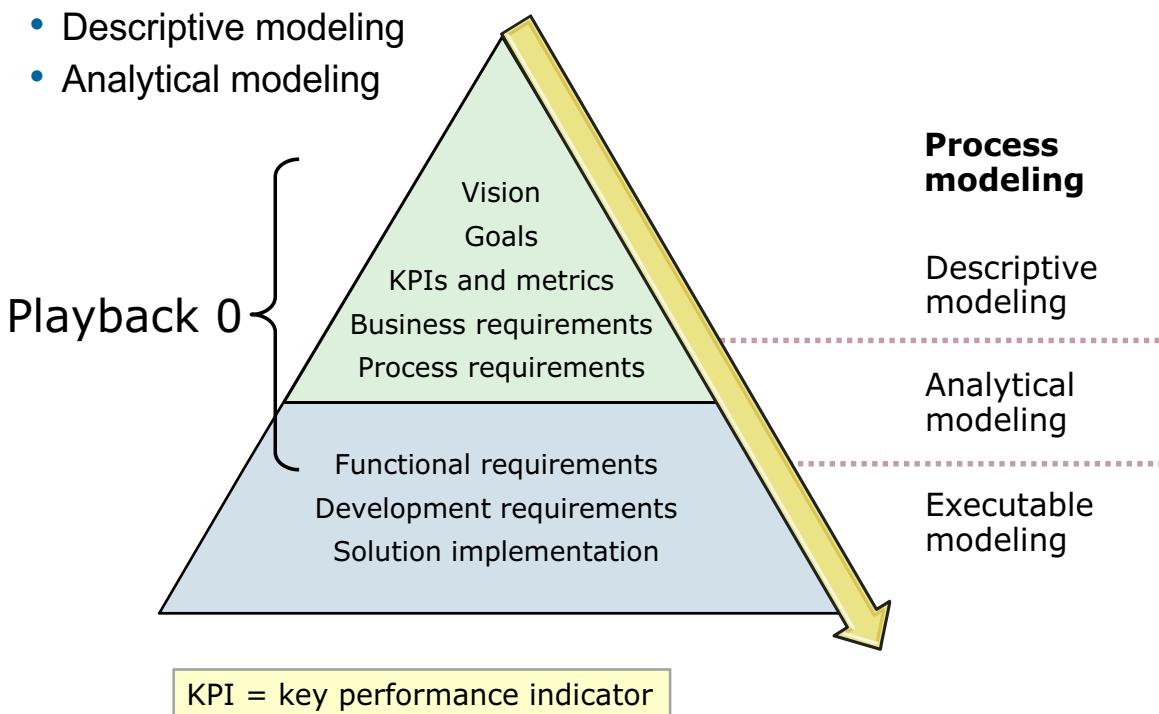
The following examples show what happens during these playbacks in the suggested project plan:

- Playback 0: Focus on high-level business process understanding and building consensus

- Process discovery, as-is model or map, process analysis, ending with a “to-be” model ready for implementation
- Playback 1: Focus on user interface design and implementation
  - Data model and process flow implementation
  - Human service or coach design, and data mapping
  - Business rules, process flow control implementation
- Playback 2: Focus on integrations
  - Creating a decision service
  - Implementing message events
- Playback 3: Focus on consolidation of the previous themes and producing an end-to-end solution
  - Handling errors in services
  - Deploying process applications

## Playback 0

- Descriptive modeling
- Analytical modeling



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Figure 1-24. Playback 0

The definition stage of project development focuses primarily on descriptive and analytical process modeling. The definition stage has a Playback 0. The goal for Playback 0 is that the concerns and achievements at this stage of project development are iterated until a final solution is reached.

The process must be discovered before it is modeled as a diagram. That requires sessions with the business process owner to uncover the particulars of the business process at a high level. As the process is defined, it is then necessary to start to analyze and create initial models if possible. Use an incremental approach from the current state to a future state business process that is accepted and agreed upon as a final “to-be” model.

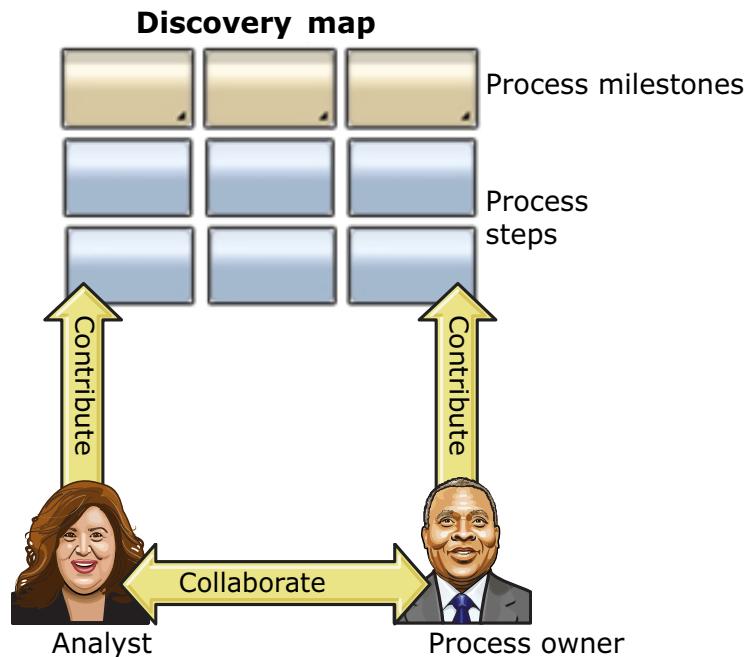
### Descriptive modeling

The descriptive modeling that is accomplished at early stages can be done with various tools, including Blueworks Live. Blueworks Live provides the “best in industry” for process modeling that is focused on process discovery and analysis. A brief introduction to Blueworks Live is in the next unit.

Early stage, or descriptive, modeling that is based on discovery and analysis has a specific outcome. Process model diagrams and documentation are refined until both the process owner (business) and the BPM team designate that the business process is completed and validated. The focus now changes from business requirements to actual process requirements.

The milestones to get to the final stage in descriptive modeling are process discovery and the as-is model.

## Playback 0: Process discovery (1 of 2)



- Document the current state of the business process
- BPM analyst, process owner, and BPM project manager

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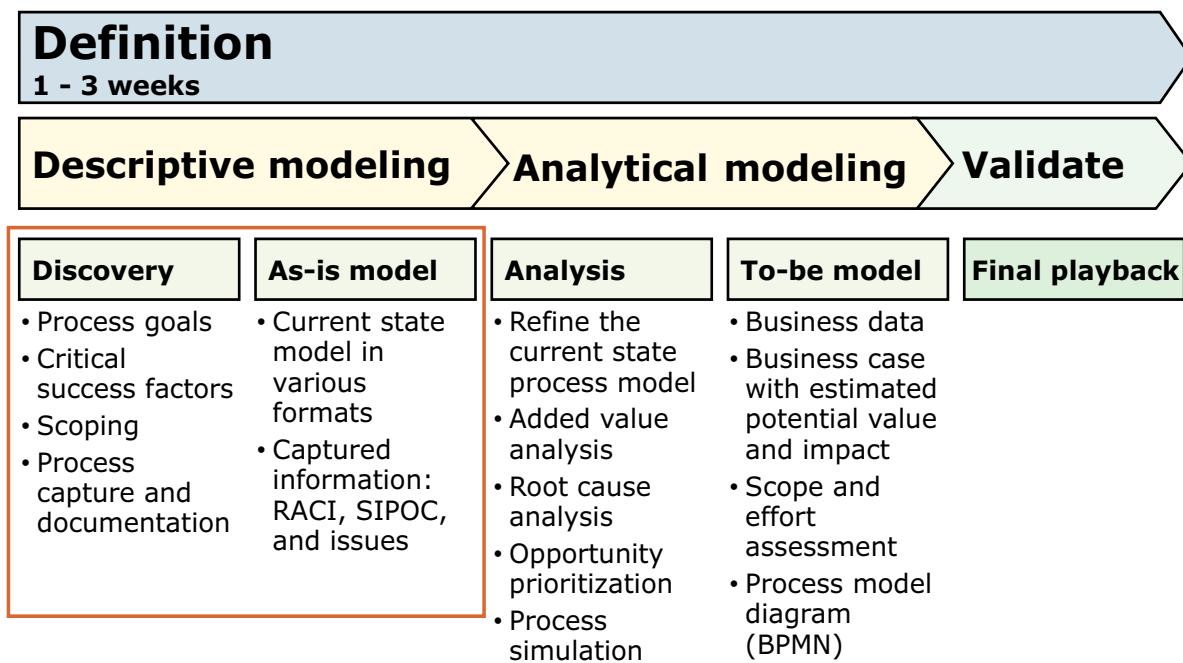
*Figure 1-25. Playback 0: Process discovery (1 of 2)*

The process discovery effort in Playback 0 allows for the capture of the initial process information that translates into the initial process model. It is typically an effort from process owners and BPM team members who want to make sure that the current state of the business process is documented. This documentation can be stored in various tools available to the team, including Blueworks Live. However, Blueworks Live has the advantage of providing connectivity to IBM Business Process Manager. With Blueworks Live, the documentation effort maintains a high level of usage, even beyond process discovery and analysis of the business process.

Agile software development places a greater value on working code than on comprehensive documentation. Although documentation is valuable, code that works is more valuable. Process discovery should attempt to capture the process as quickly and accurately as possible, but should not sacrifice project time to create documentation that does not lead to the project goals. Capturing and documenting processes inside of a tool like Blueworks Live and IBM Business Process Manager directly contribute to implementing the process.

## Playback 0: Process discovery (2 of 2)

### Playback zero



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Figure 1-26. Playback 0: Process discovery (2 of 2)

Descriptive modeling is discovering what you currently have; it is providing visibility. The aim is to document the as-is model, or what you currently do. This action provides the baseline for going forward.

#### Moving from discovery to model:

Business process discovery documentation, or mapping, with as much process detail as possible, is at times a quick process. The beginning of a process modeling effort can happen early. Therefore, the most common question when in the midst of a process discovery effort is: When do you move from process discovery to process modeling?

Several aspects must be considered to answer this question.

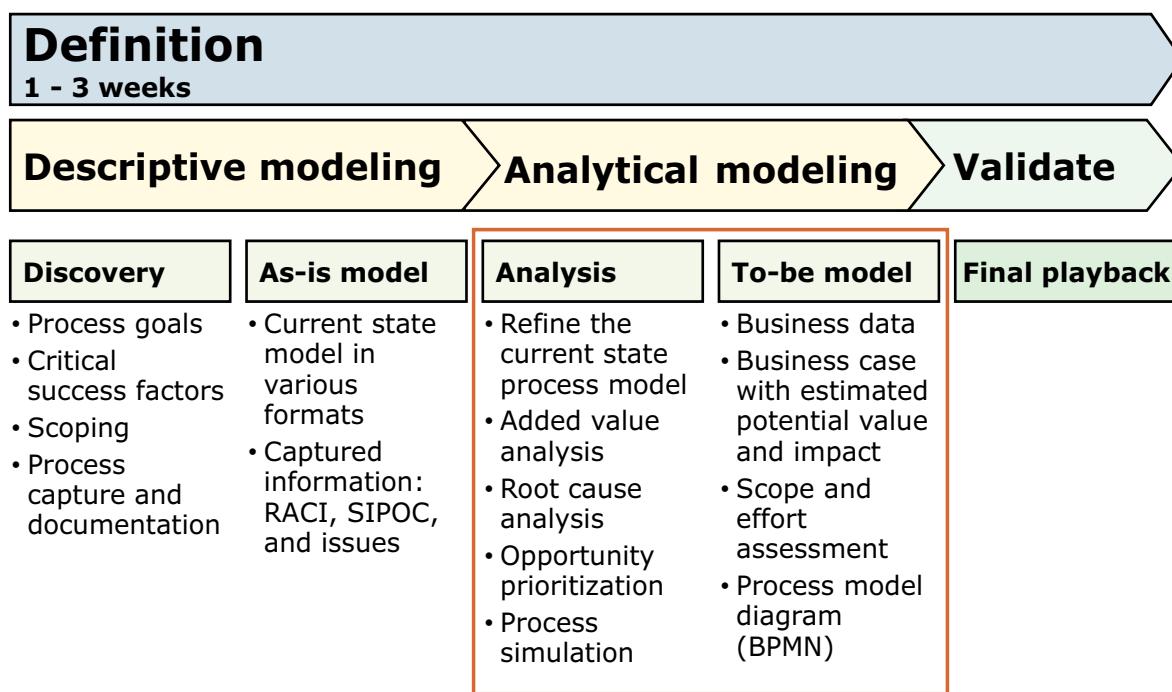
It is time to transfer to a process model when process discovery sessions exhaust all requirements to communicate the following concepts:

- What a process is
- Who is responsible for process task completions
- Who is documenting the problems within the process

Also, consider the conversations in the process discovery sessions during Playback 0 meetings. If the questions are no longer centered around “What does this process do?” and start to center around “What does this process look like?”, then the move to a process model is at hand.

## Playback 0: Process analysis

### Playback zero



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Figure 1-27. Playback 0: Process analysis

The next phase in process modeling and Playback 0 is analytical modeling. The milestones to get to the final stage in analytical modeling are analysis and the “to-be” model.

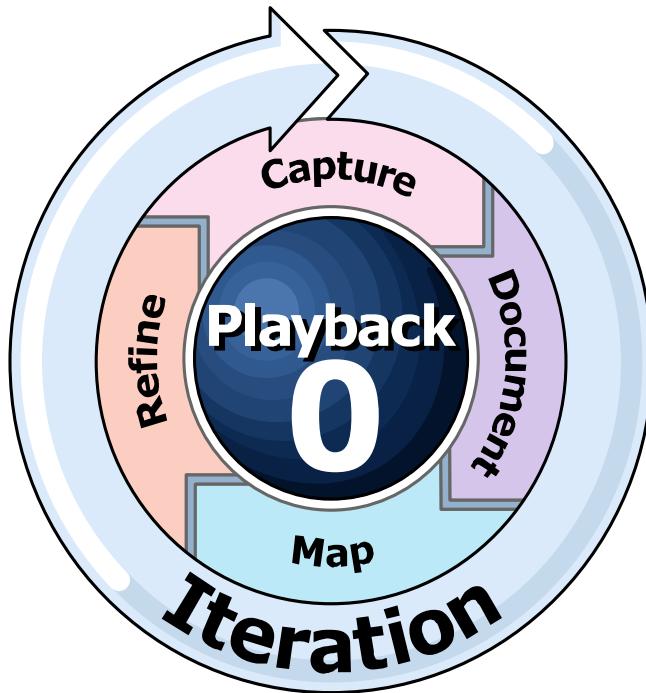
Discovery documentation is a “just the facts” effort, meaning the only thing that interests the BPM analyst and process owner is that the process in its current state is captured. A good example is the capture of process problems, or issues. During discovery, it is not important to try to solve process issues, only to document them. This action is where the next step in Playback 0 starts to take shape: process analysis.

Process analysis is when the business process is continually refined until analysis goals are reached, such as solving process issues through root cause analysis. Other process analysis goals include added-value analysis of each process activity that is captured and analysis to ensure the correct priority for improvement opportunities. With process analysis, the business requirements are vetted and the process requirements are aligned so that the “to-be” process model is ready to be finalized.

This course does not cover in detail the “how to” for process discovery and analysis. IBM Cloud Education offers courses on process analysis methods for comprehensive training on process analysis.

You might also notice that the third phase, executable modeling, is not shown here because executable modeling comes later; therefore, it is covered in the next part of the course.

## Playback 0: Iteration



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Figure 1-28. *Playback 0: Iteration*

Playback 0 has a unique set of achievements during this stage of project development. A BPM analyst handles Playback 0 when working in concert with the process owner and BPM project manager. BPM project managers need the data from Playback 0 to plan for the next project development cycles, or playback stages. The process owner is interested in the business process. The successful outcome of Playback 0 for a process owner is to have the most efficient and effective business process that is modeled for continued use in implementation.

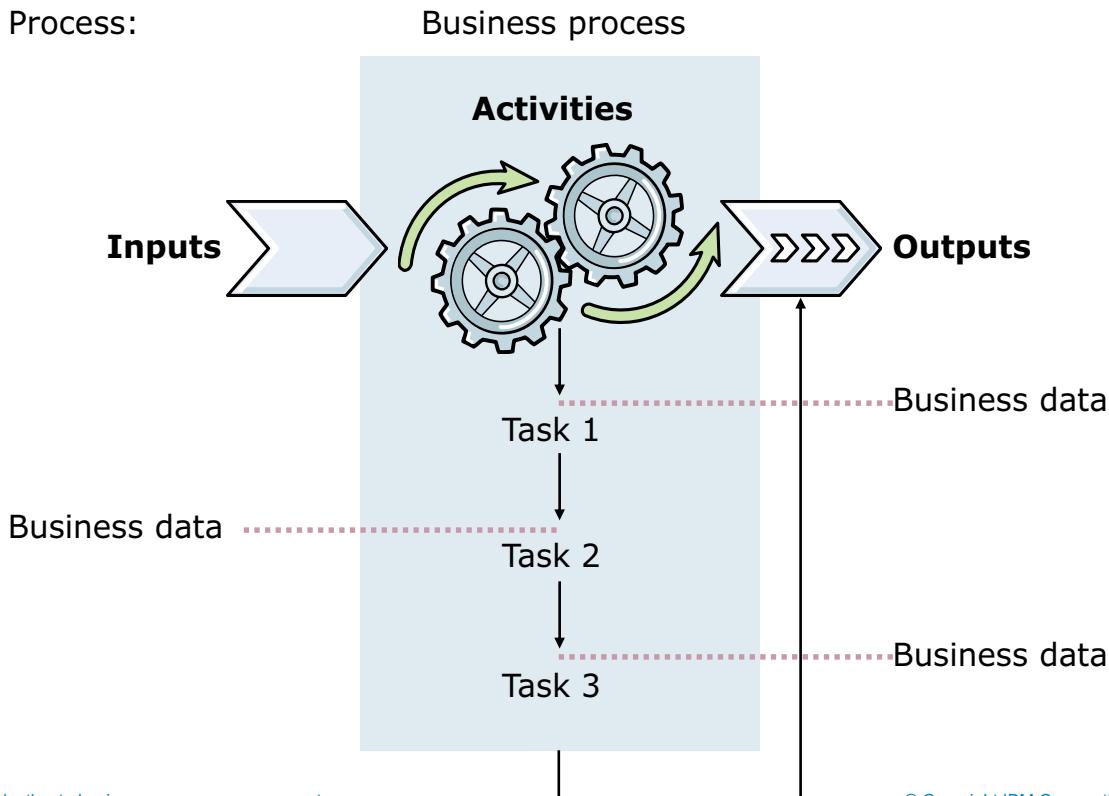
To achieve both objectives, the strategy that is used to gather Playback 0 data is the iterative phase approach of:

- **Capture:** Make sure that the business process information is shared fully
- **Document:** Refine documentation as the analysis continues because there exist more stakeholders than just the process owner
- **Map:** Create a discovery map that can clearly define the important information in an easy-to-read manner
- **Refine:** Allow for adjustment to a business process as a clear definition of the business process and process model is incrementally made

All requirements in Playback 0 are iterated, including the model that is finalized for validation. It is typical to encounter scope creep, or a broadening of the requirements to implement during this

iteration. Keep in mind the duration of the iteration and use the backlog to document those requirements that do not make this iteration.

## Business data



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Figure 1-29. Business data

Analytical modeling allows the process owner and BPM team to identify the business data that is needed for the process model. In general, business data provides the context of the process task for each responsible role for task completion. For example, if the business process is to process an insurance claim, the task verifies the claim, and the business data provides the claim type, claim number, claim description, and claim submitter.

When defining the business data for a process model, BPM teams look at the process as a whole. The question for each activity becomes: “What data does the process require to complete this task?” In the end, the process analysis produces the “to-be” process model and a business data model as well.

Business data is not implemented during Playback 0. Capture the inputs and outputs of activities or tasks in the documentation. Later in Playback 1, you implement the business data as part of the process. For now, business data is useful to conceptualize the process and to determine the following information: which activities must be part of the process, what occurs inside of the activity, what the outputs of the activity are, and what input data is necessary for the next activity.

## 1.5. The Hiring Requisition Process

## The Hiring Requisition process

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Figure 1-30. The Hiring Requisition Process

## Core requirements

- A Hiring Manager submits a hiring requisition to the HR department
- The request contains the following information:
  - Requisition number
  - Date of request
  - Requester
  - Date position available
  - Job title
  - Job description
  - Job level
  - Number of direct reports
  - Division
  - Department
  - Salary to offer
  - Bonus amount
  - Hiring Manager comments
  - New position

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Figure 1-31. Core requirements

A company is experiencing much growth and must hire many people in a short amount of time. The process that you are going to examine and model is called the Hiring Requisition process. This process covers a new job position through submission, approval, and completion so applicants can apply for the job position.

The following process requirements already went through an analysis stage and were refined. For more information about how to get to this point in your process and complete the discovery, analysis, and refinement stages, consider taking the courses on process analysis methods.

### Core requirements

- 1.1: A Hiring Manager submits a hiring requisition to the HR department. The request contains the following information:
  - Requisition number
  - Date of request
  - Requester
  - Date position available
  - Job title
  - Job description

- Job level
  - Number of direct reports
  - Division
  - Department
  - Salary to offer
  - Bonus amount
  - Hiring Manager comments
  - New position
- 2.1: If the answer to “New position” is yes, the request is forwarded to a General Manager. After the General Manager receives the request, the General Manager indicates approval or disapproval.
  - 2.2: If the request is not approved, the General Manager specifies a reason and the request is closed. If the request is approved, a salary compliance check is conducted.
  - 2.3: The Hiring Manager is notified of the General Manager’s decision after the General Manager’s approval step.
  - 2.4: When the hiring requisition is submitted, an automated system level checks for salary compliance. If the request meets salary compliance, the hiring request is automatically posted to the HR Positions database and made available for dissemination.
  - 2.5: When a request violates the established salary guidelines of the company, the HR Administrator can approve or reject the requested salary override.
  - 2.6: If the salary override is approved, the request is posted to the HR Positions database and made available for dissemination.
  - 2.7: If HR Administrators reject the requested salary, they must provide comments about the violation, add a proposed salary, and send the request back to the Hiring Manager who originated the request.
  - 2.8: When the Hiring Manager gets the request back because of a rejection, the Hiring Manager attempts to negotiate an adjusted salary or can cancel the request. If the negotiation is successful, the request is resubmitted back to the same HR Administrator.
  - 2.9: All hiring requests must be added to the HR Positions database regardless of the disposition at the end of the process during a finalization activity.
  - 2.10: The HR Administrator has 4 hours to complete the review. If the review is not completed within 4 hours, an email is sent to the HR Administrator. The email notifies the HR Administrator of the missed deadline.

## Unit summary

- Define business process management (BPM)
- List and describe the phases in the BPM lifecycle procedure
- Define process modeling
- Describe Playback 0 and the achievements that are reached during this stage of project development

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Figure 1-32. Unit summary

## Review questions

**1.** True or False:

Playbacks are based on a waterfall methodology.

**2.** True or False:

When defining the business data model for a process model, BPM teams look at the process as a whole.

**3.** What are the four phases of the IBM Business Process Manager lifecycle?

- A.** Design, Test, Action, and Deploy
- B.** Design, Modeling, Execution, and Optimization
- C.** Design, Modeling, Execution, and Monitor

**4.** What are the four stages of Playback 0?

- A.** Requirements, Document, Build, and Refine
- B.** Requirements, Design, Build, and Test
- C.** Capture, Design, Map, and Test
- D.** Capture, Document, Map, and Refine

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Figure 1-33. Review questions

Write your answers here:

1.

2.

3.

4.

## Review answers

1. False. Playbacks are based on an agile methodology.
2. True.
3. B: Design, Modeling, Execution, and Optimization
4. D: Capture, Document, Map, and Refine

---

# Unit 2. Introduction to IBM Business Process Manager and integration with other tools

## Estimated time

01:30

## Overview

This unit is an overview of IBM Business Process Manager and integration with other tools. It focuses on how to create a process application in the Process Center, provides a look at the Designer and Inspector views of IBM Web Process Designer, and introduces the Process Portal.

## How you will check your progress

- Review questions

## Unit objectives

- Describe how to use IBM Business Process Manager to accomplish process modeling goals
- Explain how to create and modify process applications in the Process Center
- Explain how to create and modify process models with the Designer view of the IBM Web Process Designer
- Describe how to validate process models with the Inspector view of the IBM Web Process Designer
- Describe the purpose of the Process Portal
- Describe the purpose and function of Blueworks Live
- Describe the integration with other tools and products

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Figure 2-1. Unit objectives

## Topics

- About IBM Business Process Manager
- The Process Center
- IBM Web Process Designer
- The Process Portal
- Introduction to BPM on Cloud

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*Figure 2-2. Topics*

## 2.1. About IBM Business Process Manager

## About IBM Business Process Manager

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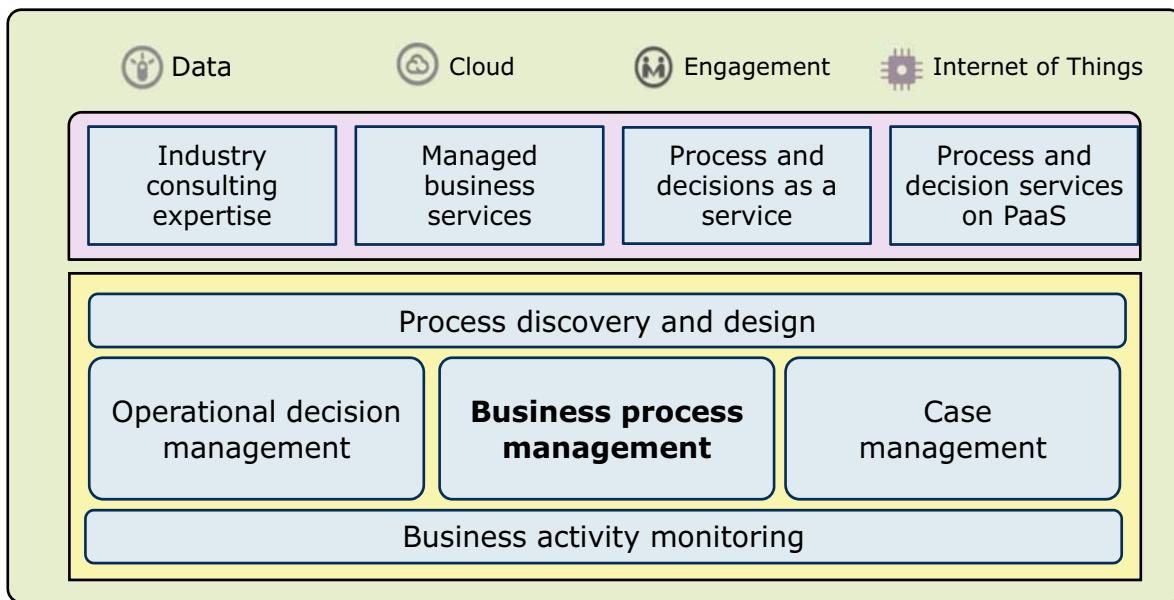
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Figure 2-3. About IBM Business Process Manager

Process modeling is a three-phase approach: descriptive, analytical, and executable. BPM toolsets strive to meet those objectives in process modeling and also to fit within the parameters of agile development and collaboration between business and information technology (IT).

## The Smarter Process suite

IBM's approach for reinventing business operations to enable greater customer-centricity while driving innovation into end-to-end processes



[Introduction to IBM Business Process Manager and integration with other tools](#)

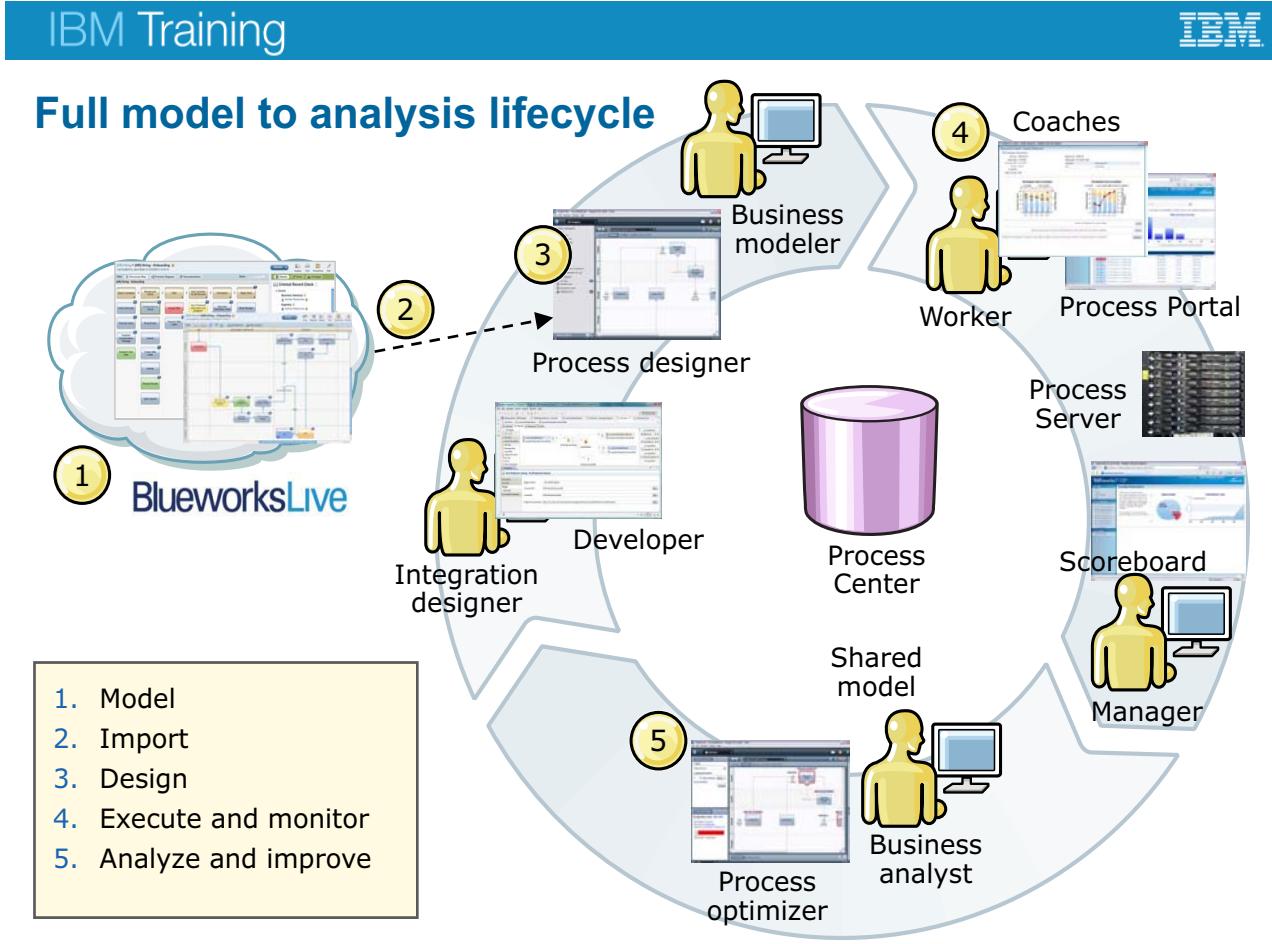
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Figure 2-4. The Smarter Process suite

Smarter Process combines real-time automation and team collaboration to ensure that tasks are completed quickly and easily.

Smarter Process integrates the control and visibility of the process lifecycle across lines of business, IT, and customers.

Smarter Process analyzes and optimizes performance and behavior to improve outcomes.



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Figure 2-5. Full model to analysis lifecycle

The analysis lifecycle is as follows:

1. **Model:** Create business processes in either Blueworks Live, a cloud-based, collaboration tool for in-process discovery, modeling, documentation, and process automation or some other tools.
2. **Import:** As soon as it is created, import the process into Process Designer for detailed design and executions. Subscribe to process changes.
3. **Design:** Add coaches, services, and other configuration objects.
4. **Execute and monitor:** As processes execute, the Process Portal provides visibility to the number of processes, what activities are overdue, and how the organization is doing against SLAs.
5. **Analyze and improve:** Process information is automatically captured, and Process Designer gives the ability to analyze the information and simulate the impact of changes.

The cornerstone of this technology approach to BPM is the concept of the “shared model”: all parties that are involved in the effort to define, model, implement, measure, and improve the process are working from a common shared platform that encapsulates all of the various components. It involves the analyst who models the process, the developers who construct the detailed implementation of it, the participants who execute the process, and the process owner and

analysts who monitor and identify improvements. They are all using the same tool, which uses the same definition of the process. The model of the process that the analysts and developers build is the same one that executes at run time. It also is the same one that is used to create reports on the current performance and status of the process, and is the same one that is used to model and simulate potential improvements. The various components are as follows:

- **Bluworks Live**

Bluworks Live is a cloud-based, collaboration tool for process discovery, modeling, documentation, and process automation.

- **Process Center**

The Process Center includes a repository for all process artifacts and provides the tools that are required to develop, deploy, and manage process applications.

- **Process Server**

Process Server is an IBM Business Process Manager runtime environment that supports running a range of business processes and integrations. By using Process Server, you can run processes as you build them.

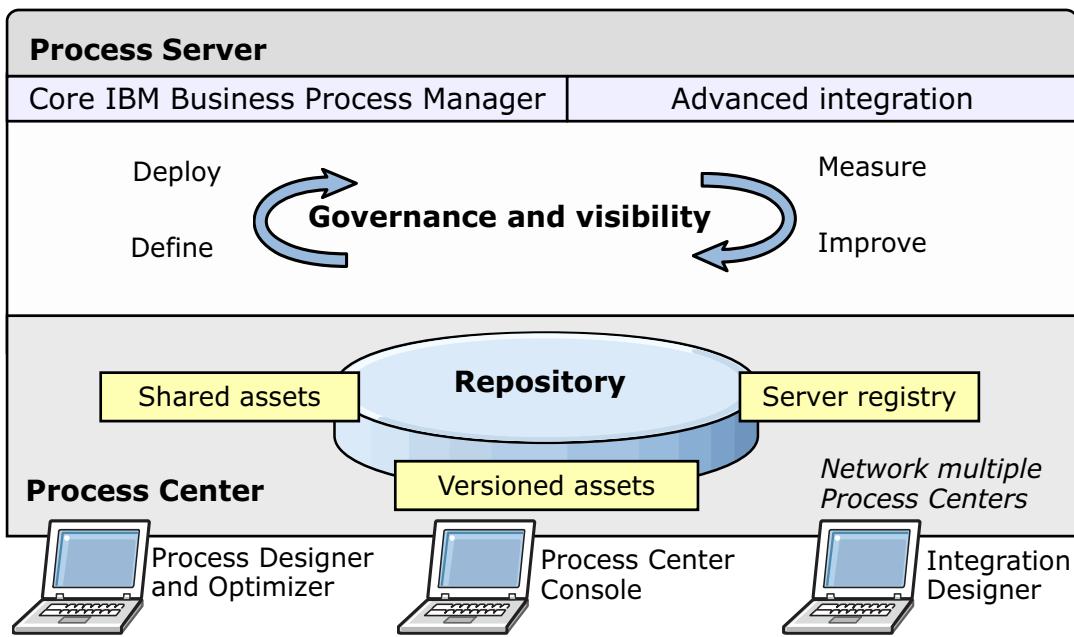
- **IBM Web Process Designer**

IBM Web Process Designer is a design-time tool that is used to develop process applications.

- **IBM Integration Designer**

IBM Integration Designer is a development environment for building end-to-end applications. It includes numerous prepackaged integration adapters to build complex automated processes.

## Product overview: IBM Business Process Manager



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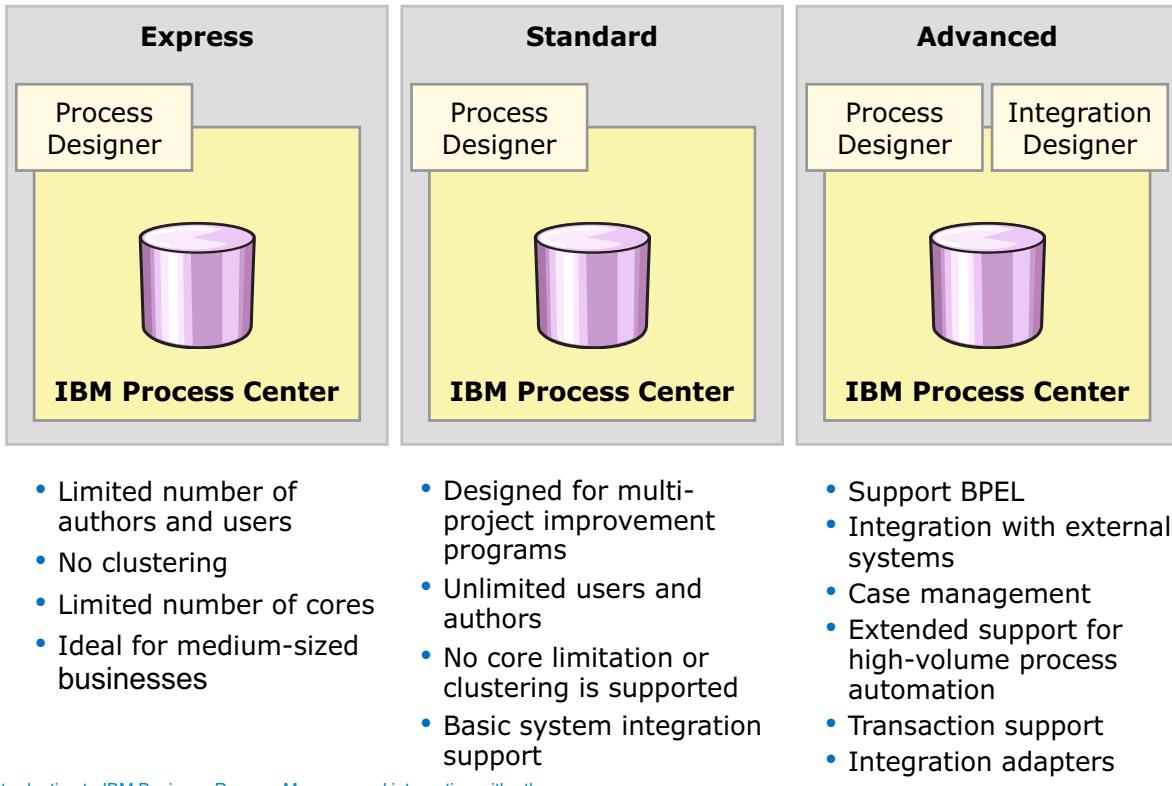
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Figure 2-6. Product overview: IBM Business Process Manager

This slide is a high-level overview of a basic IBM Business Process Manager environment.

IBM Business Process Manager brings together a number of technologies and capabilities under a single unified platform with which customers can build human-centric and system-centric business processes. It enables organizations to implement a business's process lifecycle and includes tools and runtime for process design, execution, monitoring, and optimization. A business process management environment mainly consists of a repository environment to store and develop various elements: IBM Business Process Manager artifacts, authoring tools for process developers to develop and test processes, one or more runtime environments to deploy processes, and a set of administration and monitoring tools to administer and monitor business processes.

## IBM Business Process Manager configurations



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Figure 2-7. IBM Business Process Manager configurations

IBM Business Process Manager is a single BPM environment that combines human-centric and integration-centric capabilities into a unified product. Different configurations of the product are available for different users, and satisfy different needs in the enterprise. Product configurations can be combined for collaborative authoring and network-deployed runtime environments. Three versions of IBM Business Process Manager are offered, each one building upon the capabilities of the previous one, but all maintaining the core IBM Business Process Manager product.

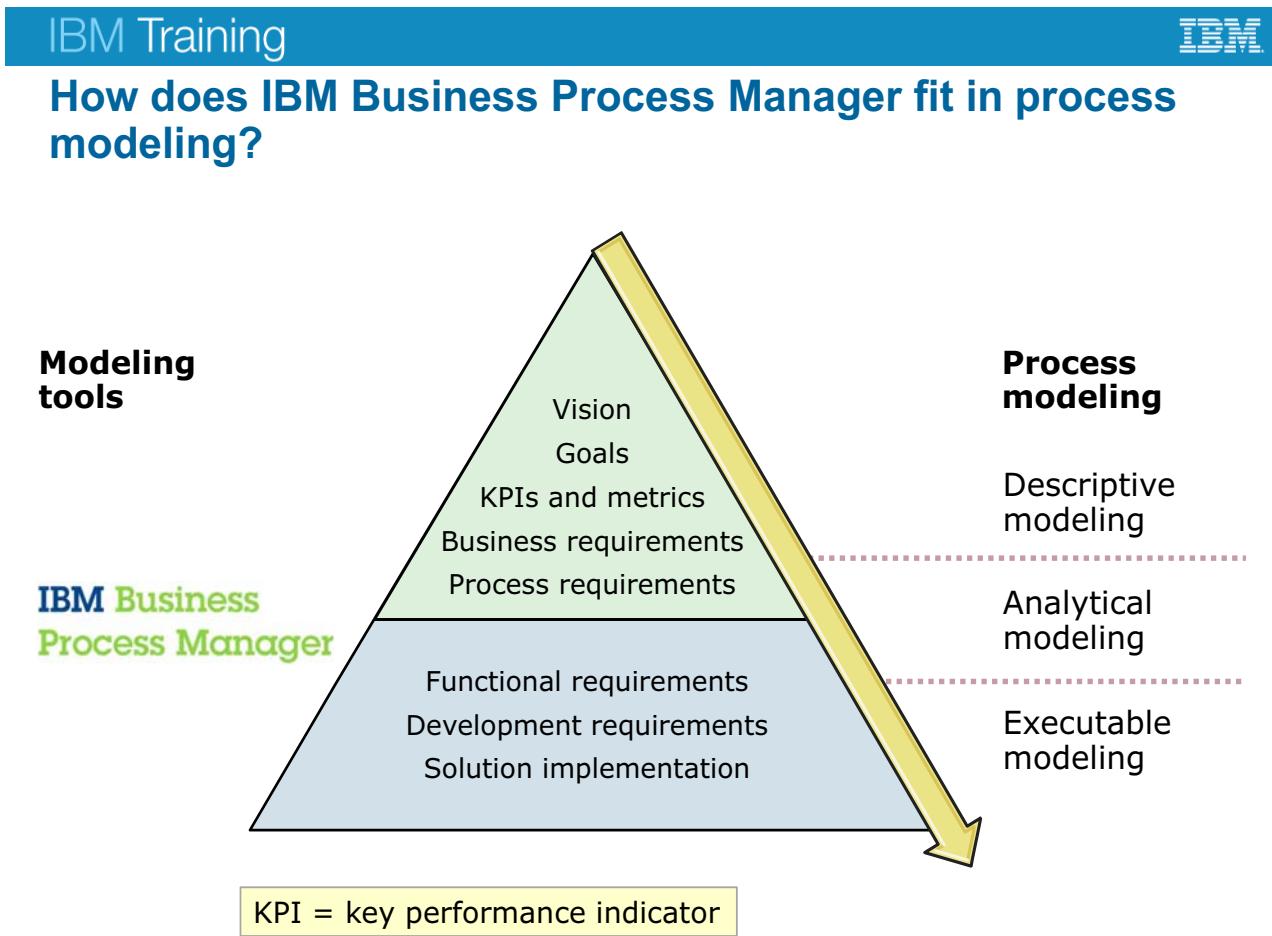
The Express configuration is limited to 200 users and 3 authors, allows only four cores in production and two cores for development servers, and is not allowed to be clustered. It comes with the core IBM Business Process Manager package that all of the configurations contain.

The Standard configuration includes all of the capabilities of the Express edition, but does not include restrictions on users, authors, or cores, and can be clustered.

The Advanced configuration includes all of the capabilities of the Standard editions, and also includes:

- WebSphere Process Server compatible execution
- Integration Designer (BPEL)
- Built-in enterprise service bus (ESB)

- Transaction support
- Integration adapters
- Flexible Business Space user interface



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Figure 2-8. How does IBM Business Process Manager fit in process modeling?

The first phases of the BPM lifecycle require a BPM team to designate business process candidates, discovery, and initial definition of the process. It is appropriate to choose the best tools to accomplish these tasks. You can use any modeling tools because IBM Business Process Manager can import anything that is compliant with BPMN 2.0. IBM also has a tool, Blueworks Live, which is used for modeling and simple execution. Blueworks Live is one of the best tools on the market for discovery and initial definition of a process. Later in the unit, you learn more about Blueworks Live.

Many times, a BPM team must change to a tool that handles the adjustments and refinement of a complicated process model on the way toward execution. Remember that it is best to think of a shared model approach to maintain a central artifact by which to modify and improve the process. This approach is where IBM Business Process Manager excels.

Business Process Manager offers the ability to efficiently handle key components of a BPM project and the three phases of process modeling. Blueworks Live was built as a process modeling SaaS tool. IBM Business Process Manager is a much more robust modeling and execution tool with the ability to integrate with external systems, customize the interfaces, and provide enterprise-class reporting and visibility into your processes. IBM Business Process Manager can import Blueworks Live processes to implement them in ways that Blueworks Live cannot.

It is important to note that the two types of tools do not have a clear demarcation where one stops and the other begins in terms of process modeling. That varies from project to project; however, both work together to engage the business and information technology (IT) sides of a business.

Both tools contain tools to model your processes. For purposes of this course, you start modeling in IBM Business Process Manager in the analytical modeling effort. Where this course starts process modeling is not where every process modeling effort begins. Typically, you complete many steps that precede analytical modeling, but because of time constraints, this course covers only a portion of modeling.

## 2.2. The Process Center

## The Process Center

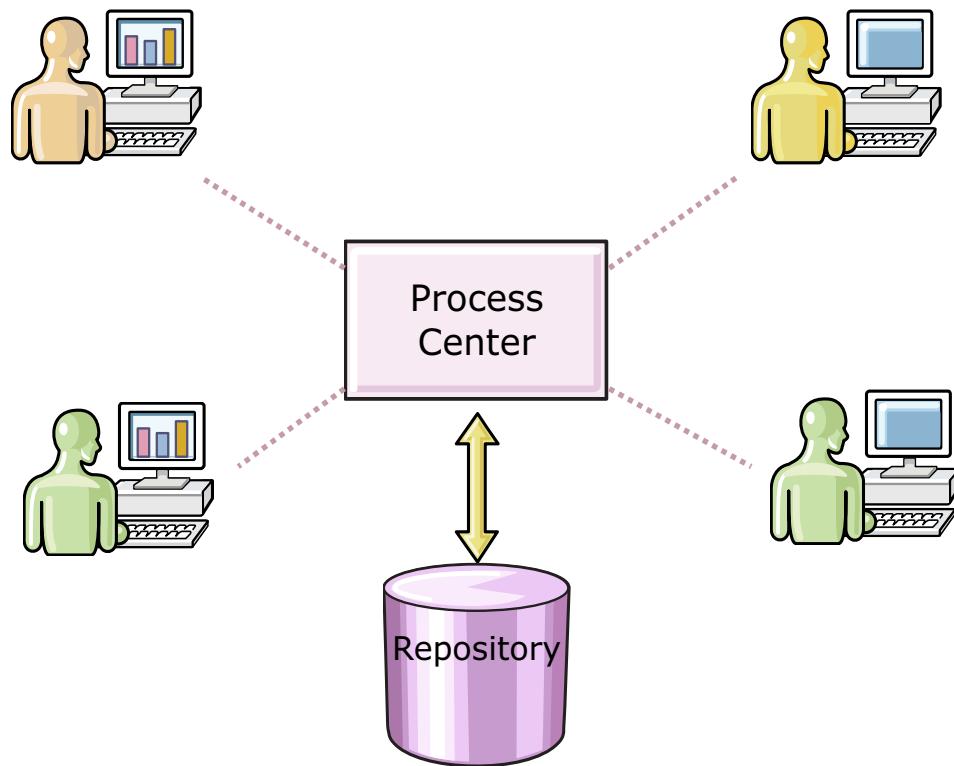
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*Figure 2-9. The Process Center*

The unique design environment of IBM Business Process Manager includes a central repository, which is called the Process Center.

## The Process Center: The center of process development



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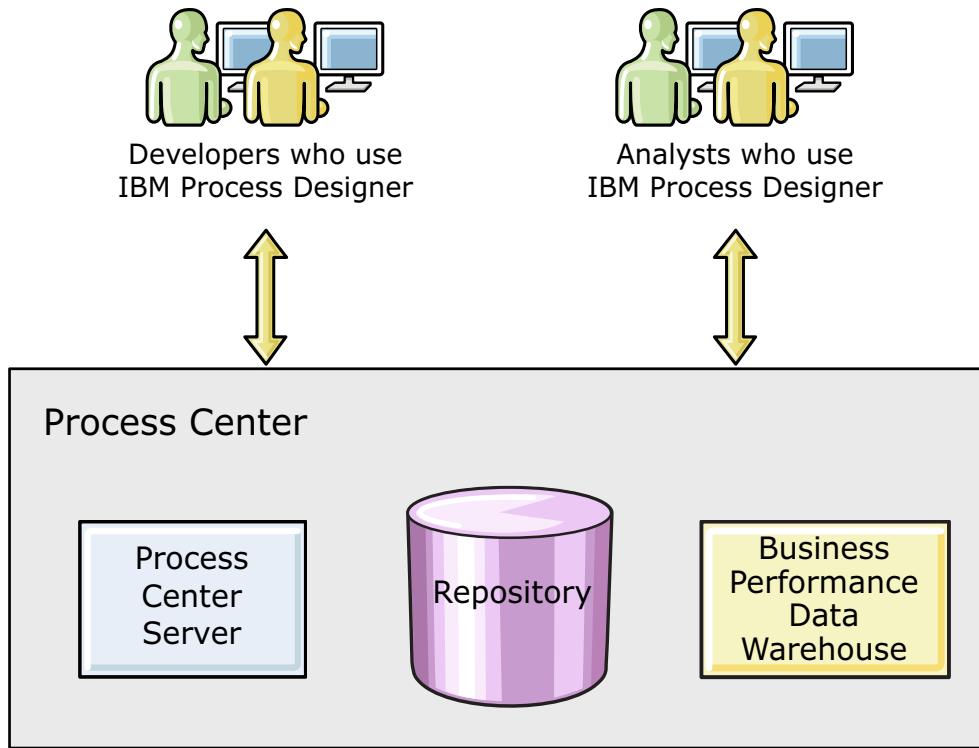
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Figure 2-10. The Process Center: The center of process development

The Process Center provides a central development environment and repository for multiple process authors who are working in IBM Process Designer. The Process Center includes a Process Center server and a Business Performance Data Warehouse, which you can use to build and run process applications. You can also use them to store process performance data for testing and playback purposes during development efforts.

Multiple authors can connect to the Process Center and concurrently view the same processes or assets.

## The Process Center: Process applications



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*Figure 2-11. The Process Center: Process applications*

The Process Center contains three components. It has the Process Center repository, which is responsible for managing the artifacts, and it has an instance of a Process Server. The Process Center can be accessed either through IBM Process Designer or through a web-based interface.

The screenshot shows the IBM Process Center console. At the top, there is a navigation bar with five items: 'Process Apps' (1), 'Toolkits' (2), 'Servers' (3), 'Admin' (4), and a 'Logout' link (5). To the right of the Admin link is a search bar. Below the navigation bar is a list of process applications. On the right side of the screen, there is a sidebar with several options, each numbered from 6 to 9. The sidebar includes links for creating a new process app, importing a process app, downloading Process Designer, downloading MobileFirst Adapter, and launching the Getting Started guide.

Number	Action
1	Process Apps
2	Toolkits
3	Servers
4	Admin
5	Logout
6	Create New Process App
7	Import Process App
8	Download Process Designer
9	Download MobileFirst Adapter
	Launch Getting Started

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Figure 2-12. The Process Center console

Process Center is a central repository for all project assets that are created in Process Designer. When multiple Process Designer clients connect to Process Center, users can share items, such as processes and services. Users can also see changes that other users make as they happen.

1. **Process Apps:** You can create, clone, and import process applications and do other maintenance tasks on the process applications.
2. **Toolkits:** You can create toolkits to enable Process Designer users to share library items across process applications.
3. **Servers:** Administrators can manage the IBM Business Process Manager servers in their environments.
4. **Admin:** Administrators can manage user access to the Process Center repository from the Process Center console.
5. **Search:** This field allows users to conduct searches on the Process Center repository.
6. **Create New Process App:** This option allows user to create a process application.
7. **Import Process App:** This option allows users to import a process application.
8. **Download Process Designer:** You can use this option to download the Process Designer installation file.

9. **Download MobileFirst Adapter:** You can use this option to download the IBM MobileFirst adapter.

## 2.3. IBM Web Process Designer

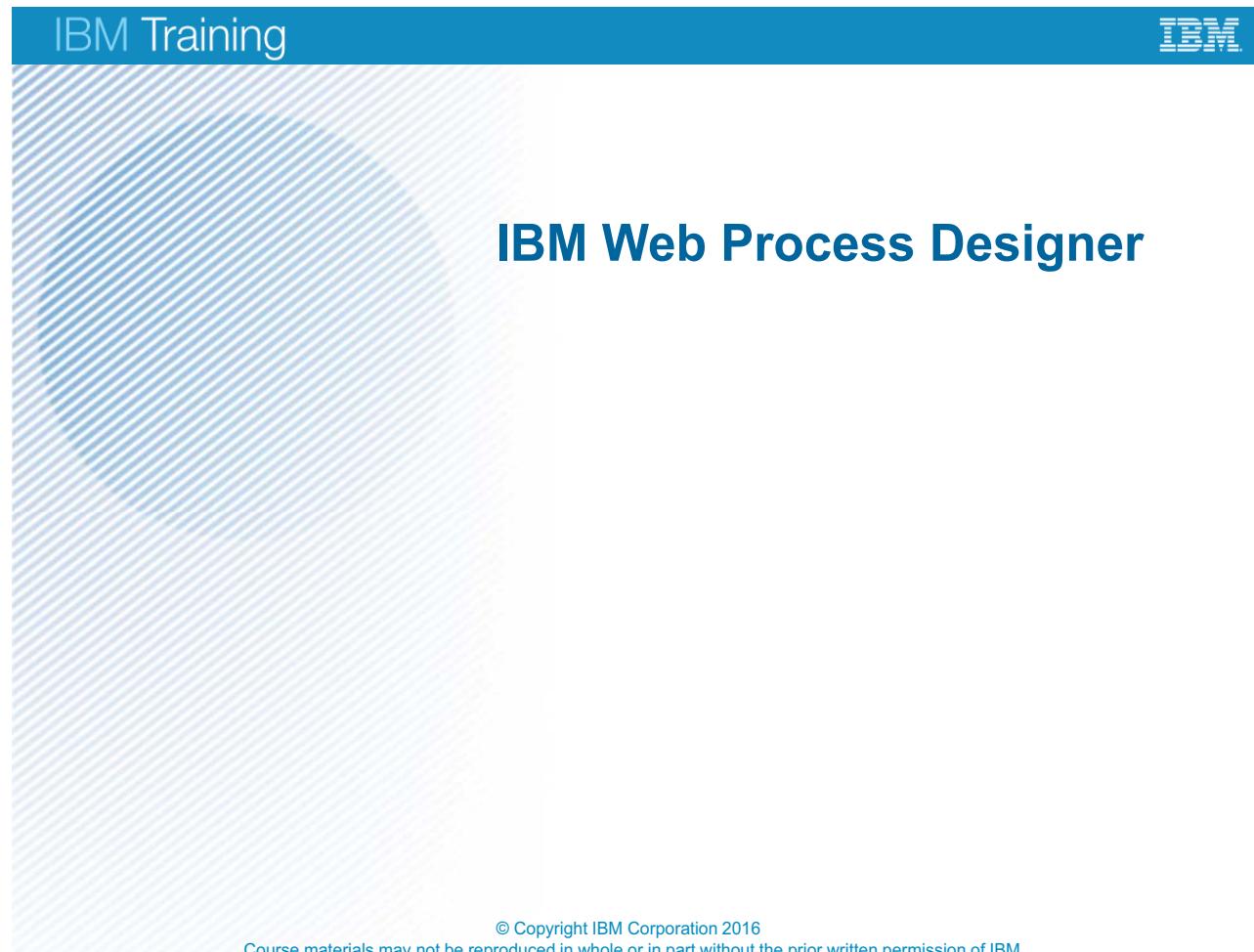
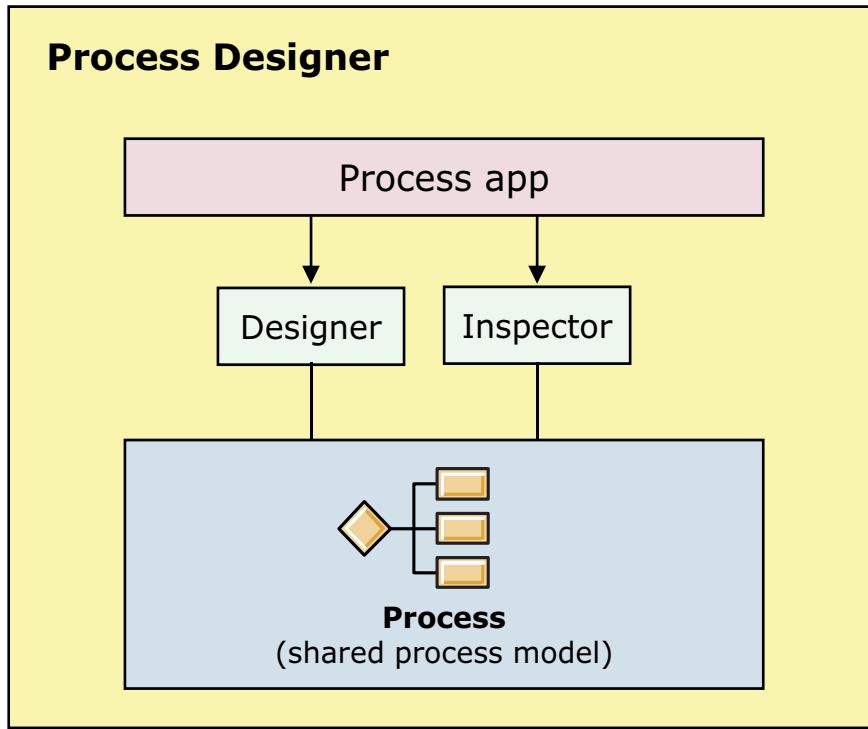


Figure 2-13. IBM Web Process Designer

After a process application is in place in the Process Center, the next step is to create and edit the business process definition that will be contained within. This step is accomplished through the IBM Business Process Manager interface: IBM Process Designer.

## IBM Web Process Designer



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*Figure 2-14. IBM Web Process Designer*

Process modeling in IBM Business Process Manager is accomplished through the IBM Process Designer views or interfaces. These interfaces allow developers or authors to create, manage, and test process models.

IBM Web Process Designer is composed of two key interfaces:

- Designer (model)
- Inspector

To access these interfaces, an author goes through the central repository, the Process Center, and opens a process app.

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## Starting the IBM Web Process Designer (1 of 2)

ProcessCenter Quick Start

Profile Management Tool

Start the deployment manager

Start the node agent

IBM Business Process Manager Quick Start

**IBM Business Process Manager Quick Start**

Manage queues and caches, and view and manage process instances for process applications.  
[Process Admin Console](#)

Work with Performance Data Warehouse queues, manage data transfer errors, and monitor overall performance.  
[Business Performance Admin Console](#)

**Process application consoles & tools**

Create, manage, share, and test high-level containers such as process applications and toolkits.  
[Process Center Console](#)

Test and administer the business user interface for completing tasks.  
[Process Portal](#)

**Documentation**

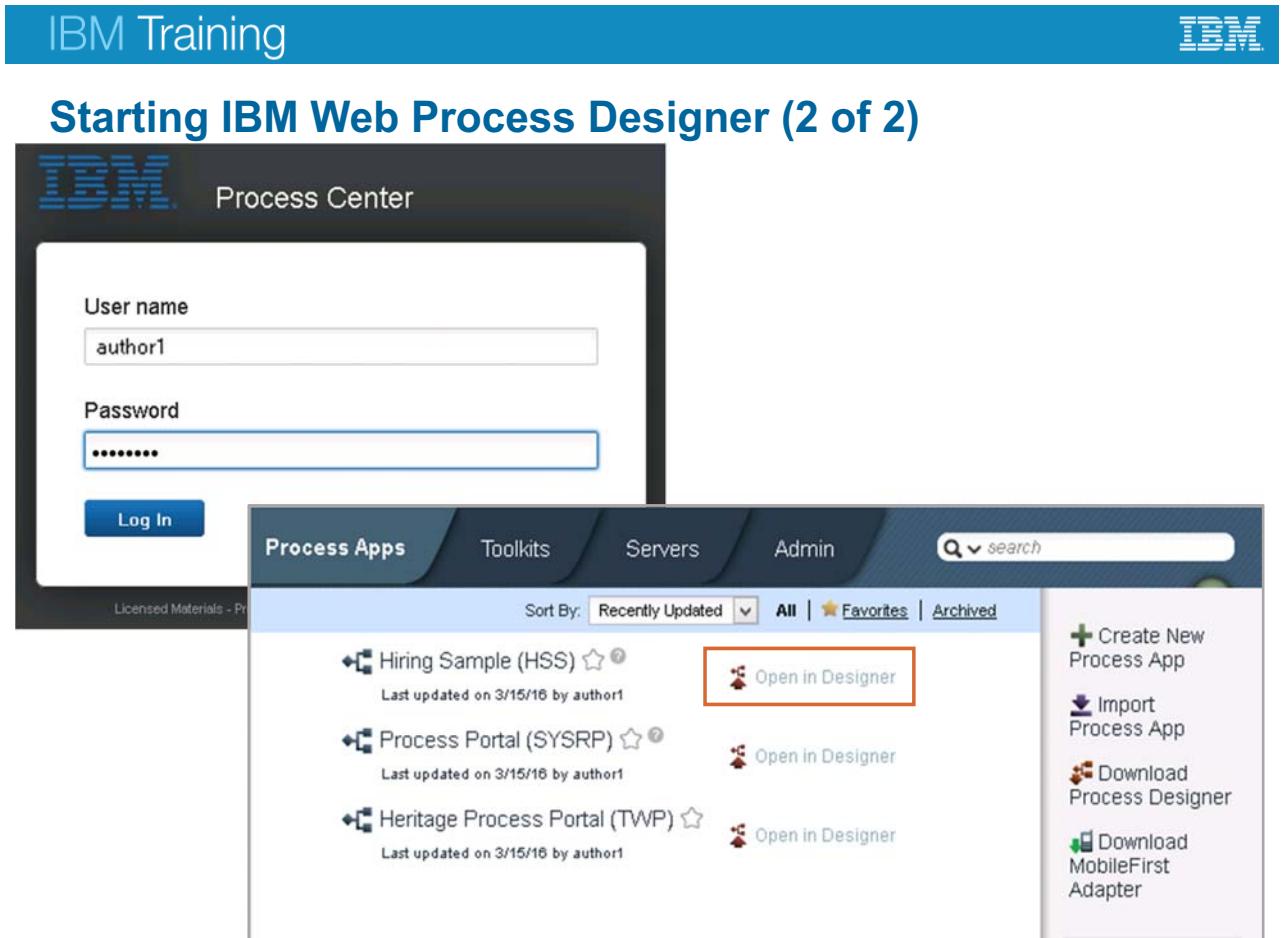
Learn about the capabilities and features of IBM Business Process Manager.  
[Knowledge Center](#)

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Figure 2-15. Starting the IBM Web Process Designer (1 of 2)

You start the IBM Web Process Designer from the Windows start menu. Before starting, ensure that the Process Center to which it connects is started. IBM Web Process Designer is basically a client to the Process Center server. If the Process Center is not running, the IBM web Process Designer displays an error message.



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*Figure 2-16. Starting IBM Web Process Designer (2 of 2)*

The Process Center window displays the list of process applications that are available. Click **Open in Designer** to open the process application.



- 1. Designer:** Provide the interface to model your processes
- 2. Inspector:** Manage and debug instances of processes
- 3. Snapshot:** Record the state of library items within a process application or track at a specific point in time
- 4. Undo:** Revert to the last state in the process
- 5. Redo:** Redo the most recent changes that were made in the process
- 6. Save:** Save your work
- 7. Process Center:** Takes you back to the Process Center
- 8. Help:** Open the IBM Business Process Manager Help system

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Figure 2-17. IBM Web Process Designer: Main toolbar

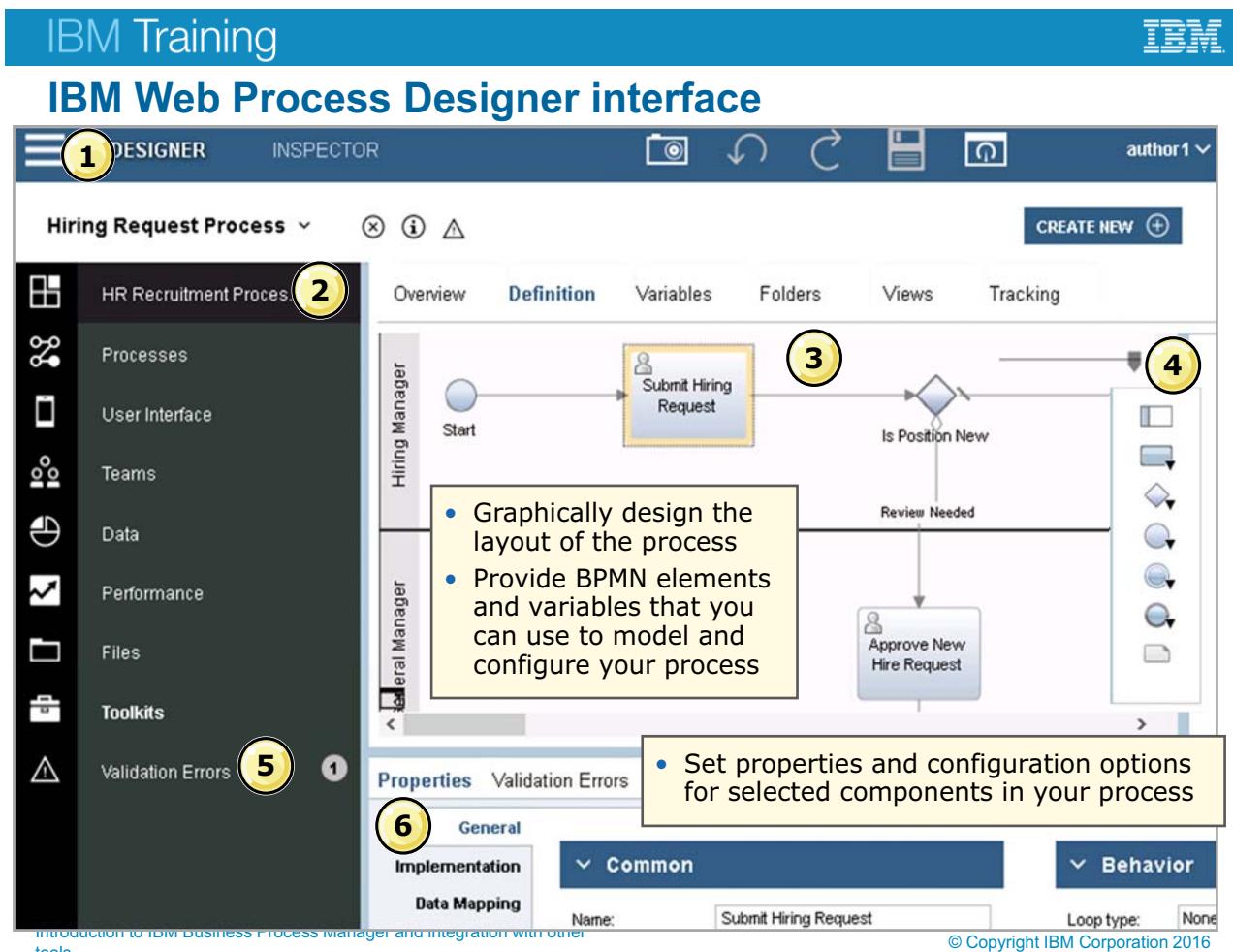


Figure 2-18. IBM Web Process Designer interface

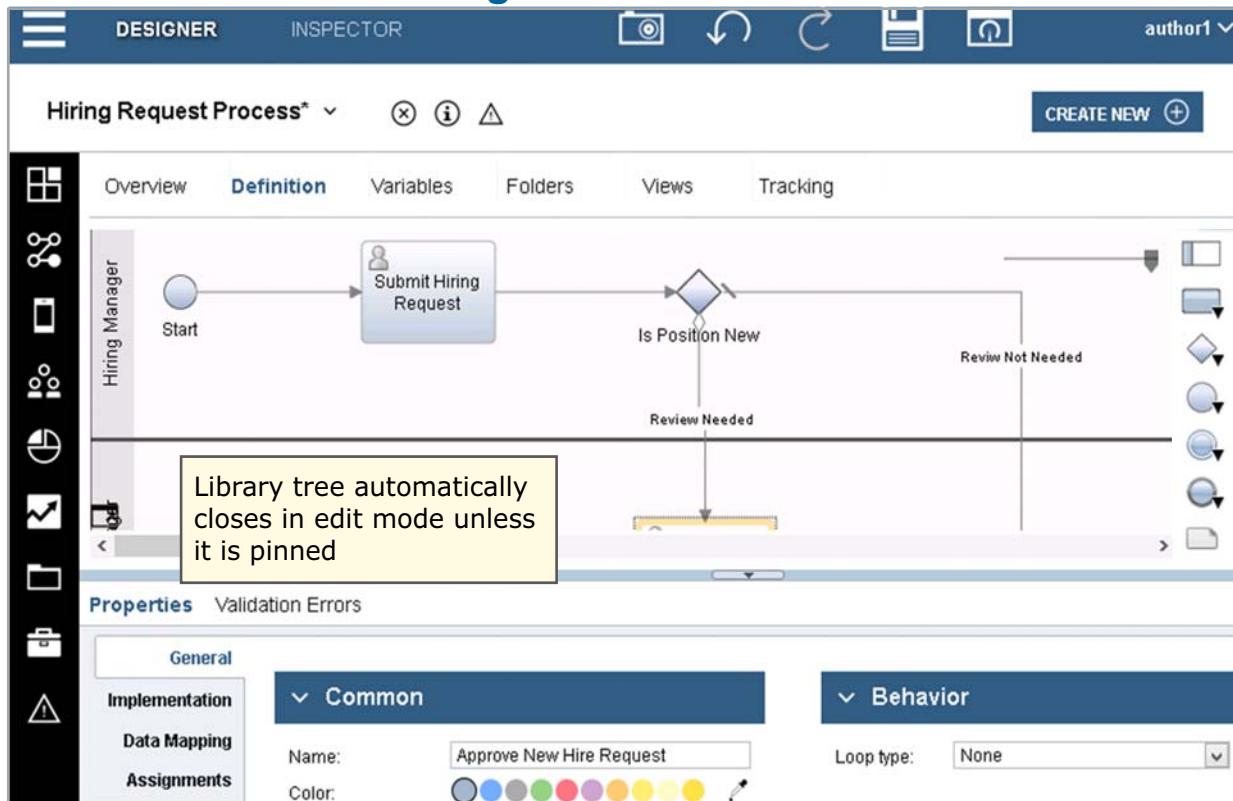
You use IBM Web Process Designer to model and implement your business processes and easily demonstrate process design and functionality during development efforts.

- Main toolbar:** Provides access to Designer, Inspector, and Process Center. The main toolbar is also where you save all open editors, take a snapshot, and view help.
- Process library:** Provides access to the library items for the current process application.
- Main canvas:** The area in which you can graphically model your process. Each process automatically includes a start event and an end event. Two default lanes are included for user and system tasks.
- Palette:** When you develop the process diagram in the Designer in IBM Web Process Designer, the tools and components are available from the palette.
- Validation Errors:** Indicates the validation errors in the process application.
- Properties:** Opens the view to set the properties and configuration options of the item that is selected on the canvas.



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## IBM Web Process Designer editor



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Figure 2-19. IBM Web Process Designer editor



## IBM Web Process Designer: Modern web interface

The screenshot shows the IBM Web Process Designer interface. At the top, there are tabs for 'DESIGNER' (highlighted with a yellow circle labeled '1') and 'INSPECTOR'. Below the tabs is a toolbar with icons for camera, refresh, save, and others. The main area shows a process named 'Hiring Request Process'. On the left, a sidebar lists categories: HR Recruitment Pr..., Processes (highlighted with a yellow circle labeled '2'), User Interface, Teams, Data, Performance, Files, Toolkits, and Validation Errors. The 'Processes' category is expanded, showing sub-options like Client-Side Human Service, Theme, Coach View, and Localization Resource. A modal window titled 'Common' (highlighted with a yellow circle labeled '3') is open, showing settings for the process. The modal includes sections for 'New', 'Expand', 'Details', 'Work Schedule', and 'Exposing'. A callout box contains the following text:

1. Inspector tab is available to debug services and processes
2. Artifacts that you can author in Web Process Designer
3. Each editor includes usability enhancements, that is, "expand folders"

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Figure 2-20. IBM Web Process Designer: Modern web interface

## 2.4. The Process Portal

## The Process Portal

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Figure 2-21. The Process Portal

The Process Portal is the main tool that business process users interact with to complete tasks and processes. Other tools, such as the IBM Business Process Manager mobile application, can also be used to complete tasks and processes.

The Process Portal also has use for project development, especially in terms of validation. BPM teams and business stakeholders want to reach consensus in the playback session to end a stage of development. When consensus is the goal, the Process Portal allows the team to view the process performance as it would function in a user environment.

This unit focuses on the Process Portal, but also presents the mobile application to show other ways that business users can run processes and tasks.



## The Process Portal (1 of 2)

The screenshot shows the IBM Process Portal interface. On the left is a sidebar with a user profile (author1), edit profile, log out, and various dashboard options: Dashboards, Work (selected), Processes, Process Performance, Team Performance, Launch (selected), Hiring Request Process, and Standard HR Open New Position. The main area is the 'Work' dashboard, which includes a search bar ('Enter search text.'), a summary box ('3 Total Open'), and a list of tasks:

- Step: Complete Hire Request  
Hiring Request Process:54  
Due: Apr 18, 2016 2:10 PM
- Step: Review Posting  
Hiring Request Process:55  
All Users  
Due: Apr 19, 2016 6:44 AM
- Step: Complete Hire Request  
Hiring Request Process:58  
Due: Apr 21, 2016 4:42 AM

Yellow circles with numbers 1 through 6 highlight specific elements: 1 (User profile), 2 (Work dashboard), 3 (Launch), 4 (Search bar), 5 (Summary box), and 6 (Task list).

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Figure 2-22. The Process Portal (1 of 2)

The Process Portal has a main page that you can use to run and manage tasks.

1. User can edit the profile and log out of here.
2. Users view their current process performance or the team's performance by selecting the tab for each dashboard.
3. You can launch your process.
4. **Search** allows users to search tasks.
5. On the Work page, **Overdue**, **On Track** and **At Risk** headings are used to separate tasks. Users manage tasks by using the menu directly to the right of the task.
6. To complete a task, click the Step and claim the task. You can use another page to complete the task.

The screenshot shows the IBM Process Portal interface for a 'Hiring Request Process:53'. The interface is divided into several sections:

- Header:** 'IBM Training' on the left and the 'IBM' logo on the right.
- Top Bar:** 'Hiring Request Process:53' and three dots on the right.
- Process Title:** 'Hiring Request Process:53' with a star icon and a circled '1'.
- Data Section:** 'Data' with a circled '2'. It displays fields: Requisition Number: [not defined], Job Title: [not defined], Department: [not defined], and Salary: [not defined].
- Documents Section:** 'Documents' with a circled '3'. It shows a document titled 'Hiring Requisition' by 'author1' at 12:17 PM, with 'Retrieved items: 1'.
- Tasks Section:** 'Tasks' with a circled '4'. It lists a task: 'Step: Submit Hiring Request' with a due date of 'March 29, 2016 1:17 PM' and 'All Users' assigned.
- Stream Section:** Shows a timeline with a gear icon, 'Created Mar 29, 2016 12:17 PM', and 'Due Mar 29, 2016 8:17 PM'. A 'Stream' button is also present.
- Activities Section:** 'Activities' with a circled '7'. It includes a 'Filter' button, 'Ready | In Progress | Completed | All' status, and two ad-hoc activities: 'Approve Hiring Request' and 'Review Salary'.
- Header Buttons:** 'REFRESH' and 'GANTT CHART'.
- Bottom Footer:** 'Introduction to IBM Business Process Manager and integration with other tools' and '© Copyright IBM Corporation 2016'.

Figure 2-23. The Process Portal (2 of 2)

The Process Portal has a Processes page that you can use to run and manage tasks, as follows:

1. The process instance with the instance ID.
2. Data flowing between the tasks.
3. Documents that are attached to the process.
4. Open and completed tasks are listed. You can claim an open task from here.
5. You can view the Gantt chart of the process.
6. The stream shows the actions that occur for this instance. You can also post a comment to the stream that appears immediately in the stream.
7. The ad hoc activities are shown under the Activities section.



## The Process Portal: Social features

The screenshot illustrates the social features of the IBM Process Portal. On the left, a task stream is displayed with a 'Stream' button highlighted by a red box. A comment box labeled 'Please approve' contains a 'Post' button, also highlighted by a red box. Below these, three task logs are shown: 'Step: Approve New Hire Request' (status: created, assigned to General Managers), 'author1 completed the Step: Submit Hiring Request task' (status: completed, audit trail available), and 'Step: Submit Hiring Request task was claimed (currently assigned to author1)' (status: claimed). On the right, a sidebar shows 'Following' and 'Mentions' sections, each with a count of 0 and a link icon. A 'REFRESH' button and a 'GANTT CHART' button are also present.

1. The Stream shows the actions that occur for this instance
2. You can also post a comment to the stream that appears immediately in the stream
3. You can view the Gantt chart for the process

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Figure 2-24. The Process Portal: Social features

The Process Portal has several social features. When completing a task, you can use a menu in the right window to access task details, the process activity stream, and experts of the task.

**Activity streams** provide a way for you to monitor and complete ad hoc actions on your “favorite” processes and tasks.

**Experts**, either predefined or discovered dynamically (by using social analytics), help you complete process tasks. An expert’s advice can be taken while working on a task. Experts can also be invited for collaborative working on tasks. Experts can be either of two types:

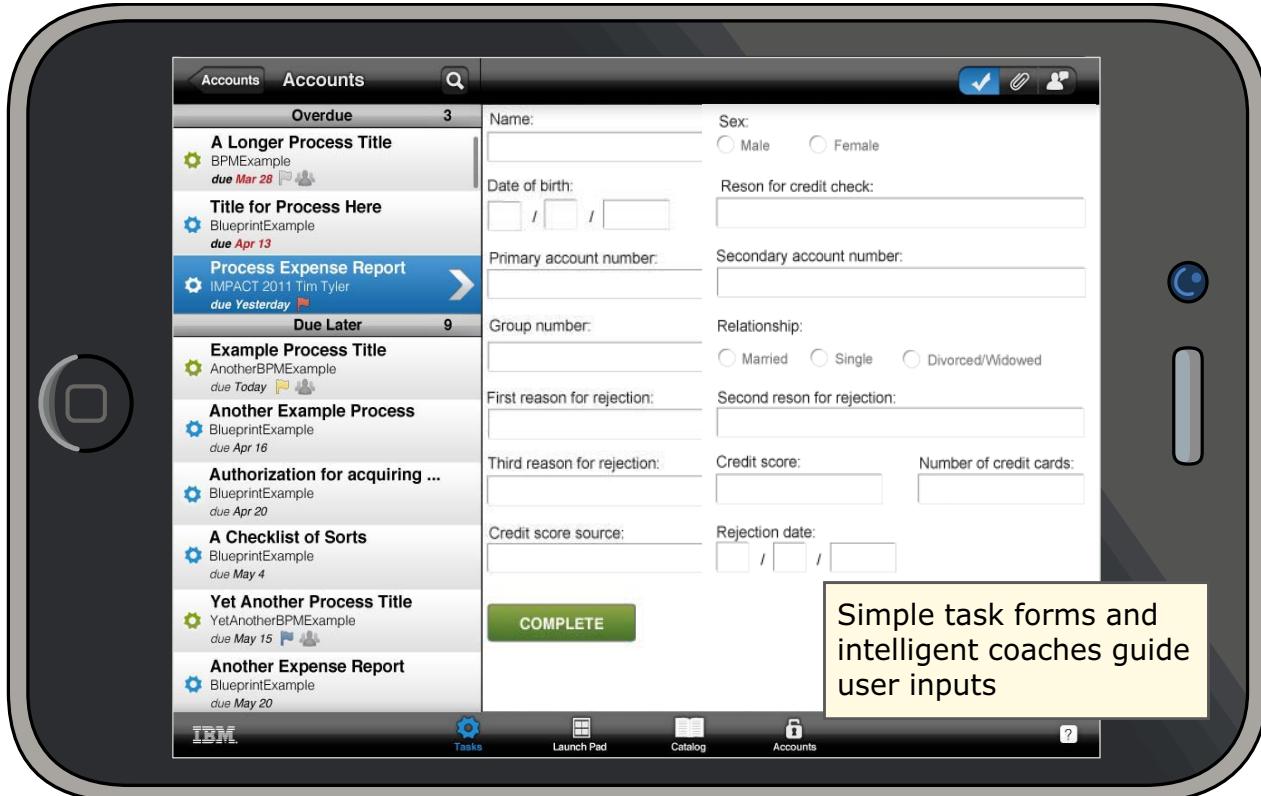
- **Experienced experts:** Experts that are discovered dynamically by using social analytics. For example, business users who claim the tasks and complete on time are discovered as experienced experts.
- **Subject matter experts:** The experts that are predefined during the process-modeling phase are shown under the “Subject Matter Experts” label.

You can use the stream to comment and post, read, and comment on what actions the process completes immediately after they occur. You can upload a photo, and each post displays your photo. You can also create an IBM Connections Integration, which enables the default Process Portal business card to be replaced with the Connections business card. Automatic system posts are designated by an icon with blue gears.

In addition to text posts, you can also post attachments and links. Mention other users by using the @ symbol and typing the first few characters of the user name.

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## The Process Portal: Mobile application



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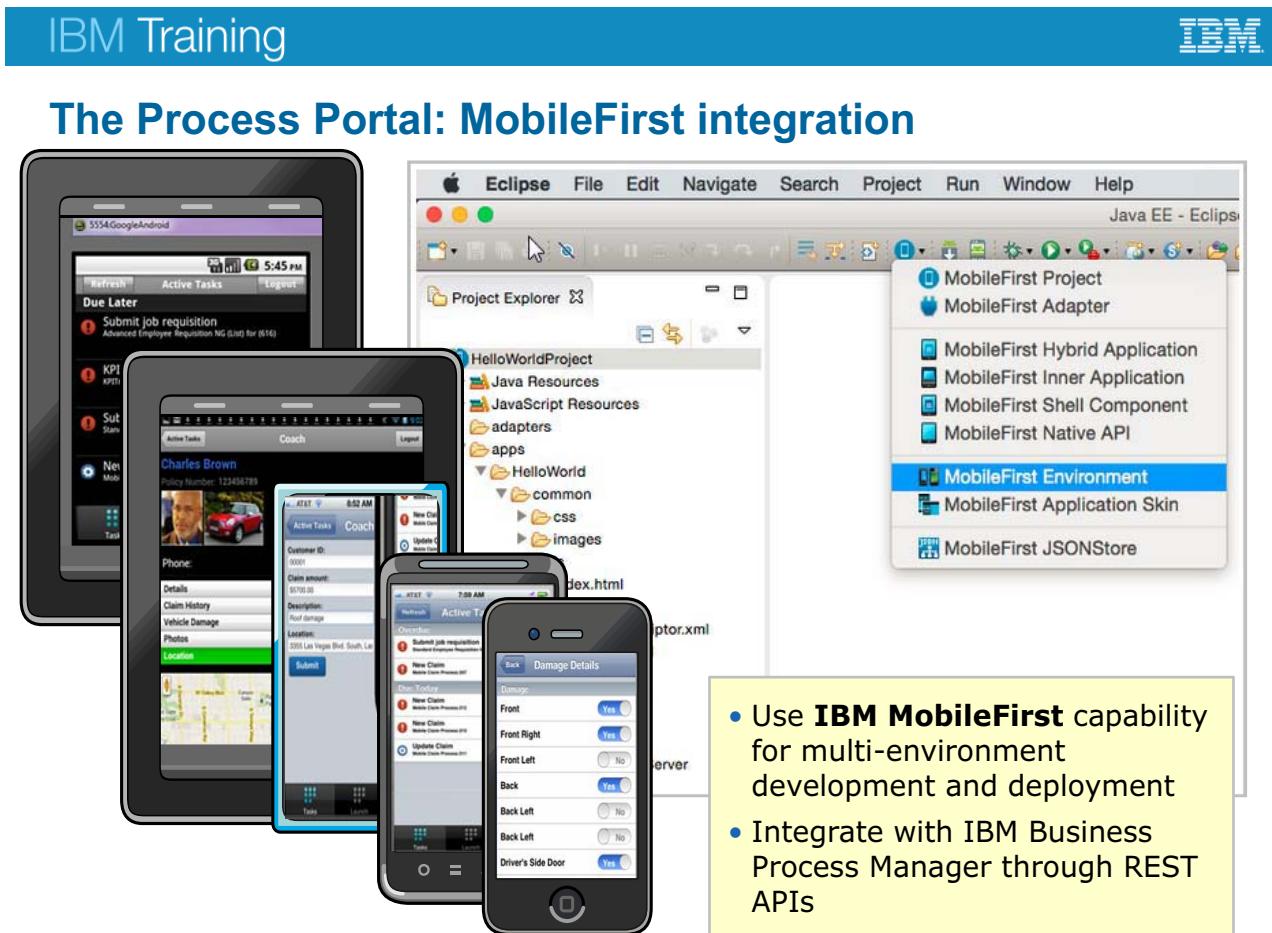
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Figure 2-25. The Process Portal: Mobile application

Sometimes the Process Portal is not used in implementation. Email, Business Space widgets, or integrated software of a company runs the Process Portal as well. Another way to run a process or task is on your Apple iPhone or Apple iPad. Coaches are displayed in the mobile format by using custom mobile-ready coach views. You learn about coach views and building coaches during Playback 1.

A mobile application is available in the Apple iTunes store to integrate with IBM Business Process Manager. With the mobile application, you can:

- Review file attachments for extra context or approval
- Attach photos to an existing task
- View and complete tasks right from your mobile device
- Start new processes remotely
- Have full on-screen assistance
- Work within a single interface to both Blueworks Live and IBM Business Process Manager applications



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Figure 2-26. The Process Portal: MobileFirst integration

To develop the Business Process Manager mobile apps with IBM MobileFirst Platform Foundation, BPM users can activate, work on, and complete process tasks that use their mobile devices.

Mobile application developers can use IBM MobileFirst Platform Foundation to enable mobile applications to access IBM Business Process Manager process applications. The IBM Business Process Manager adapter for MobileFirst solution consists of two adapters that provide access to the IBM Business Process Manager REST APIs on the IBM Business Process Manager server.

The generic and application-specific adapters are deployed on the MobileFirst server and provide a common way for applications that run on mobile devices to invoke REST APIs on IBM Business Process Manager servers. The mobile applications do not invoke the REST APIs directly. Instead, they invoke the procedures within the MobileFirst adapters. The adapter serves as a gateway that mediates the communication and access of the mobile applications to the IBM Business Process Manager back-end server. It translates the procedure call from the mobile applications into the REST API invocation, receives the results from the IBM Business Process Manager server, and then passes the response back to the mobile applications.

The Sample Mobile Coaches Toolkit, which is found on the IBM Business Process Manager wiki page, includes over 15 coach views for creating coaches that are optimized for devices.

The IBM Business Process Manager Mobile Application requires no additional software from the IBM Business Process Manager installation. Developers are able to use their existing BPM skill set

and use coaches to develop high-performing, stylish mobile applications for users to complete their tasks. IBM MobileFirst uses device services that are based on HTML, and is cross-environment, so developers build one page that is cross-compatible for all mobile devices.

For more information on IBM MobileFirst, consider taking the IBM Education course VW330G: *Foundations of Mobile Computing and IBM MobileFirst*.

## 2.5. Introduction to BPM on Cloud

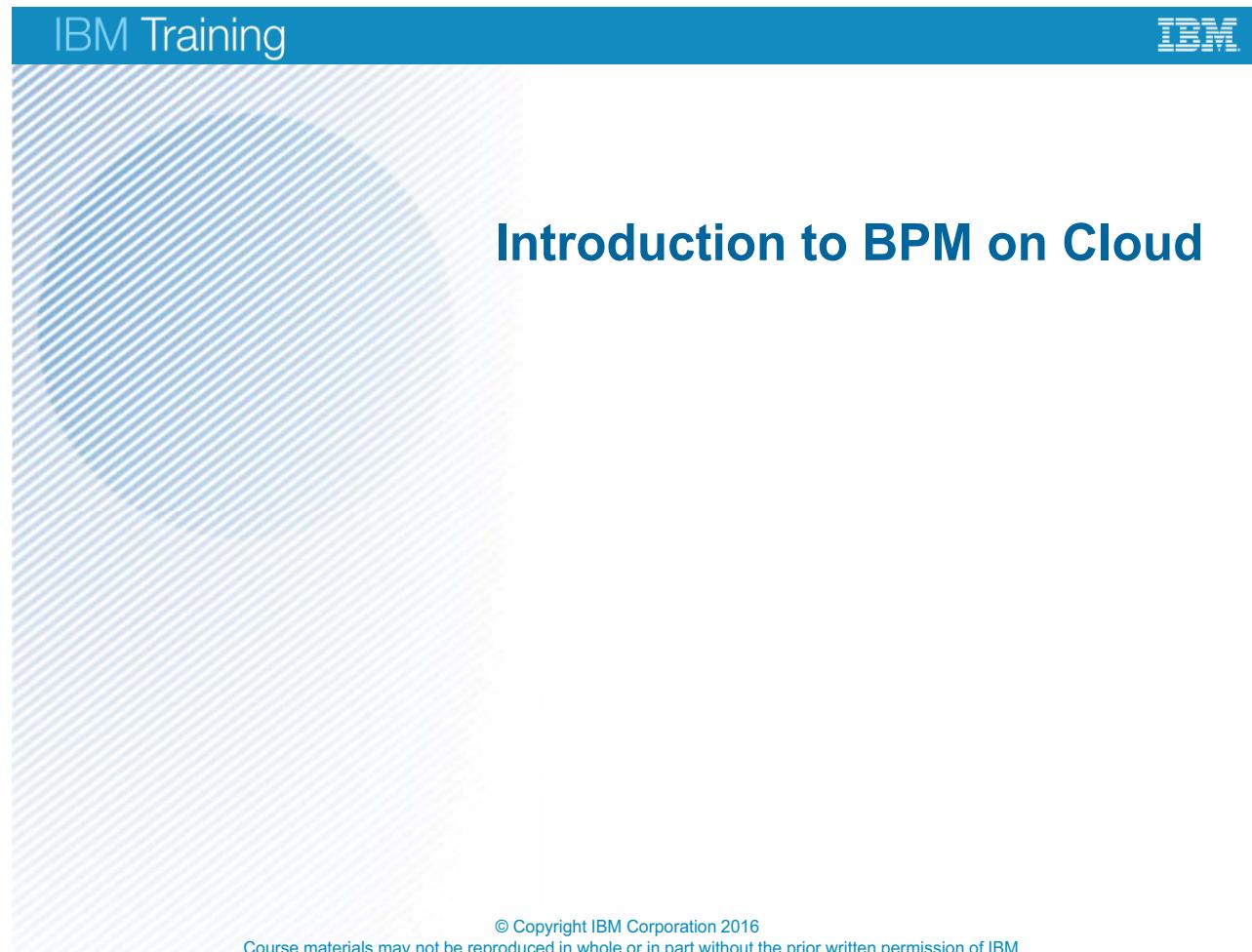


Figure 2-27. *Introduction to BPM on Cloud*

## Introduction to IBM Business Process Manager on Cloud

- Enterprise-grade IBM Business Process Manager cloud service for development, testing, and production
- Cloud-based, collaborative, and role-based environment
  - Capture, automate, and manage frequently occurring, repeatable rules-based business decisions
- Ready-to-use development, test, and production environments are available
- Monthly subscription plans
- Available exclusively on IBM Cloud infrastructure
  - As of 2015, over 25 data centers are available worldwide
- Managed by IBM
- Artifacts that are created with IBM Business Process Manager on Cloud are compatible with IBM Business Process Manager on-premises product
- Free 30-day trial available (see Appendix A)

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Figure 2-28. Introduction to IBM Business Process Manager on Cloud

IBM Business Process Manager on Cloud is a subscription-based business process management (BPM) cloud service.

IBM Business Process Manager on Cloud provides a full lifecycle IBM Business Process Manager environment that includes development, test, and production – with tools and runtime for process design, execution, monitoring, and optimization. It is designed to enable business users to get started with process improvement quickly without the need to build and maintain an IT infrastructure.

For more information on IBM Business Process Manager on Cloud, see Appendix A.

## BPM on Cloud customer focus: Manage and automate decisions

### IBM manages:

- Uptime
- Monitoring
- Backup
- High availability
- Disaster recovery
- Updates
- Maintenance



### Customers manage:

- Application development
- Application integration
- Application support



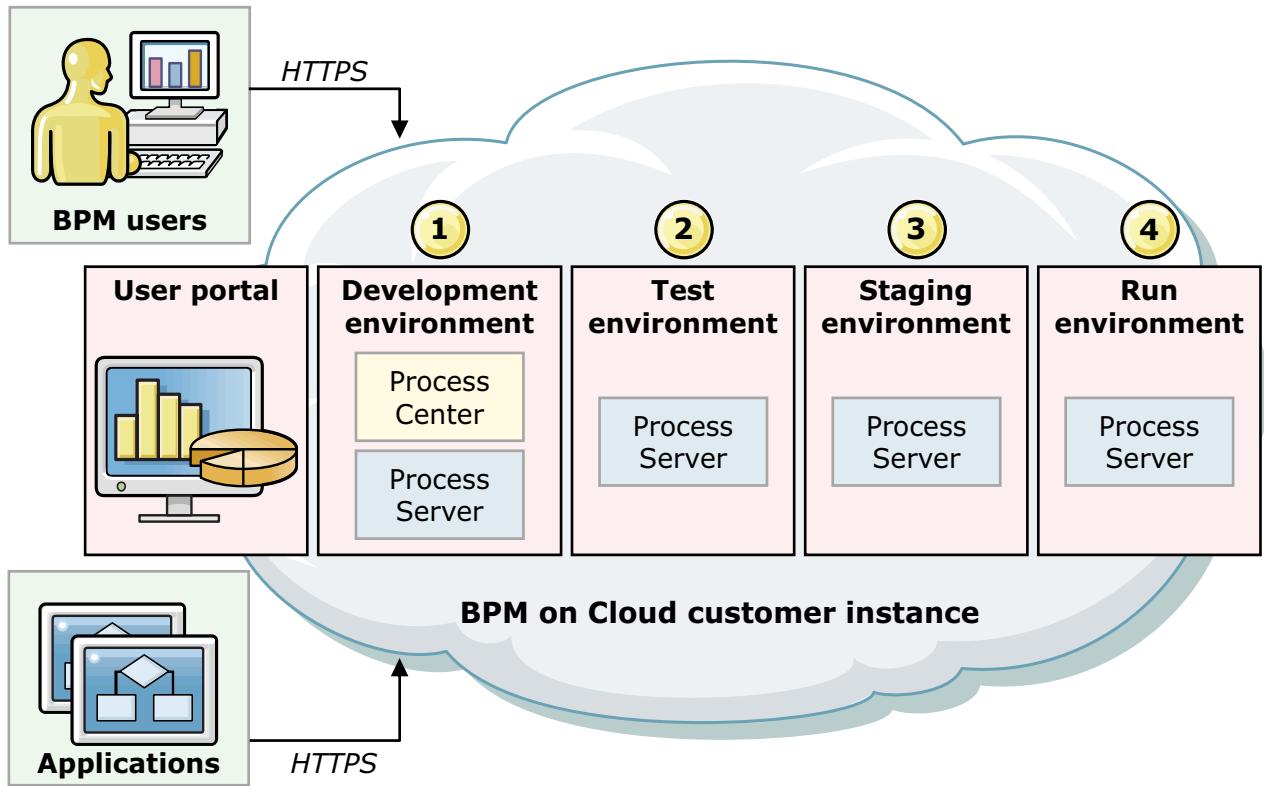
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Figure 2-29. BPM on Cloud customer focus: Manage and automate decisions



## IBM BPM on Cloud: Four runtime environments



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Figure 2-30. IBM BPM on Cloud: Four runtime environments

IBM BPM on Cloud provides four runtime environments for process development:

1. Development
2. Test
3. Staging
4. Run

In this diagram:

- **BPM users** include developers, business analysts, business users, and rule authors who access the Process Designer, Rule Designer, and the other various user consoles.
- **Applications** are applications that call services.

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**IBM Business Process Manager on Cloud user portal**

**Development Environment**

Process Center	REST UI	Process Portal
<p>Install and run process applications, store performance data, and manage running instances of process applications on the Process Center servers.</p> <p><a href="#">Launch</a> <a href="#">More info</a></p> <p>Available Downloads (2)</p> <ul style="list-style-type: none"> <li>IBM® Process Designer</li> <li>IBM® Integration Designer</li> </ul>	<p>Prototype IBM BPM REST resources and their associated parameters</p> <p><a href="#">Launch</a> <a href="#">More info</a></p>	<p>Collaborate on tasks and view the progress of individuals, teams, and processes on</p> <p><a href="#">Launch</a> <a href="#">More info</a></p>
<p>Tech Preview: Responsive Federated Portal</p> <p>Technical demonstrations of Responsive Federated Portal and Responsive Coach Toolkit as a sample</p>	<p>Business Process Choreographer Explorer</p> <p>Monitor and manage BPEL processes. The BPC Explorer provides a number of views that show process and task metadata</p>	<p>Business Rules Manager</p> <p>Manage business rules</p>

**Access from home page to an array of tools in the four environments**

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*Figure 2-31. IBM Business Process Manager on Cloud user portal*

## Demonstration

This demonstration covers the following topics:

- Navigate the design and inspector of IBM Web Process Designer
- Explore the Process Portal

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Figure 2-32. Demonstration

This demonstration is stored as the `demo1.mp4` file that is in the `C:\labfiles\demo` folder.

### **Navigation and function of the Inspector perspective of IBM Process Designer:**

1. Explain that one of the powerful aspects of IBM Web Process Designer is that all process diagrams can be run immediately after they are completed.
2. Show the two perspective tabs above the library on the upper left of the screen (Designer and Inspector tabs).
3. You are using the default Designer perspective, but now demonstrate the Inspector perspective. Click **Inspector** to select the Inspector perspective.
4. The process diagram is moved to the lower-left window. Click the run process icon in this window.

### **Process Portal navigation:**

1. Open the Process Portal from the windows menu or the desktop icon.
2. Log on to the portal with your IBM Process Designer credentials.
3. Explore parts of the designer interface and library menu.

**Process Portal task completion:**

1. Click a task to claim and run the task.
2. Click **Yes** to claim the task.
3. Complete the web form or coach to complete the task.

## Unit summary

- Describe how to use IBM Business Process Manager to accomplish process modeling goals
- Explain how to create and modify process applications in the Process Center
- Explain how to create and modify process models with the Designer view of the IBM Web Process Designer
- Describe how to validate process models with the Inspector view of the IBM Web Process Designer
- Describe the purpose of the Process Portal
- Describe the purpose and function of Blueworks Live
- Describe the integration with other tools and products

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Figure 2-33. Unit summary

## Review questions

### 1. True or False:

The Process Center provides a central development environment and repository for multiple process authors who are working in IBM Process Designer.

### 2. What are the three phases of process modeling?

- A. Descriptive modeling, analytical modeling, and executable modeling
- B. Data modeling, analytical modeling, and executable modeling
- C. Descriptive modeling, analytical modeling, and monitor modeling
- D. Descriptive modeling, functional modeling, and executable modeling

Write your answers here:

1.

2.

## Review answers

1. True.
2. A: Descriptive modeling, analytical modeling, and executable modeling.

---

# Unit 3. Playback 0: Modeling the as-is business process

## Estimated time

01:30

## Overview

In this unit, you learn how to create a structured process application, which might include ad hoc activities. Creating the process model is part of the effort within Playback 0.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Create a process application
- Model a process
- Describe pool and lanes

Playback 0: Modeling the as-is business process

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Figure 3-1. Unit objectives

## Topics

- Creating a process application
- Modeling a process
- Pool and lanes

Playback 0: Modeling the as-is business process

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Figure 3-2. Topics

## Key concepts in this unit

- **Business process definition (BPD)**: A process diagram or model in IBM Process Designer
- **BPMN**: A notation standard (Business Process Model and Notation)
- **Pool**: A BPMN element that represents the entire business process
- **Lanes**: A team or a responsible role of the process task
- **Activity**: Represents a single task that a process participant accomplishes from start to end
- **Flow objects**: Represent either process task assignments or process controls
- **Nested process**: Series of processes that are connected at a high level to child definitions

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*Figure 3-3. Key concepts in this unit*

## 3.1. Creating a process application

## Creating a process application

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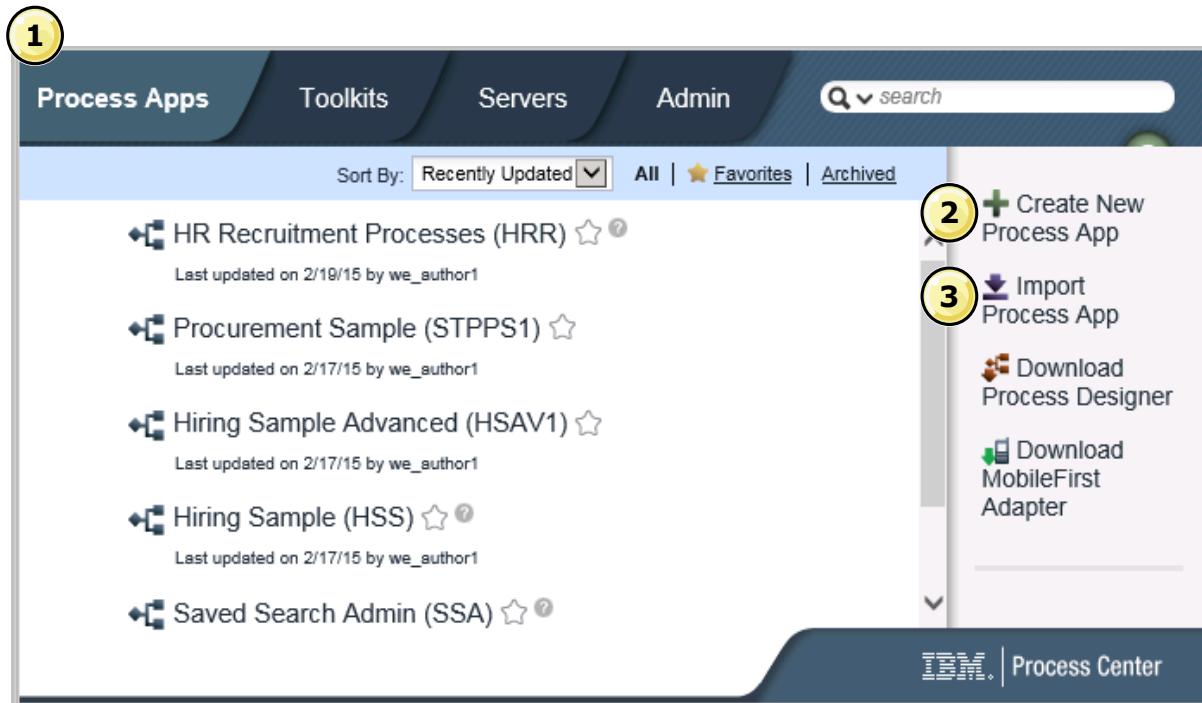
Figure 3-4. Creating a process application

Creating the process model, in this case a process since you are using IBM Web Process Designer, is part of the effort within Playback 0. Naturally, modeling does not stop with creation of the process model, but continues on through iterations until the business process reflects the specified improvements and adjustments. For this reason, the shift from descriptive modeling to analytical modeling happens to produce the process model that is deemed worthy of implementation.

It begins with the creation of the process model.

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## Process application: The Process Center



[Playback 0: Modeling the as-is business process](#)

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Figure 3-5. Process application: The Process Center

Process Center is a central repository for all project assets that are created in Process Designer. When multiple Process Designer clients connect to Process Center, users can share items, such as processes and services. Users can also see changes that other users make as they happen.

1. **Process Apps:** You can create, clone, and import process applications and do other maintenance tasks on the process applications.
2. **Create New Process App:** Users can use this option to create a process application.
3. **Import Process App:** Users can use this option to import a process application.

## Creating a process application

- A process application is a container for process models and their supporting implementations, and it is stored in the repository
- Process applications contain some or all of the following artifacts:
  - One or more processes
  - References to toolkits
  - The services that are required to implement activities or integrate with other systems, including Advanced Integration services
  - One or more tracks
  - Service Component Architecture (SCA) modules and libraries (authored in IBM Integration Designer)
  - An IBM Business Monitor model for monitoring business performance
  - Any other items that are required to run the process

[Playback 0: Modeling the as-is business process](#)

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*Figure 3-6. Creating a process application*

A process application is a container for process models and their supporting implementations; it is stored in the repository. After the artifacts are authored or otherwise created, they are assembled into a process application.

## Process application tip, snapshots, and tracks

- Any changes to a process application are saved to the Process Center repository at the tip
- Tip is the current working version of the process application
- Use playback sessions on the tip to instantly test and manage the current working version of the process application
- Tip is a special snapshot
  - The only type of snapshot in which you can change contents
  - It runs only on the Process Center server
  - Cannot install a tip on a Process Server
- Each process application has a single track called Main
  - Allows parallel development on a process application
  - Create extra tracks to keep changes isolated

[Playback 0: Modeling the as-is business process](#)

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*Figure 3-7. Process application tip, snapshots, and tracks*

Any changes that you make to a process application are dynamically saved to the Process Center repository at the tip, which is the current working version of the process application. You can use playback sessions on the tip to instantly test and manage the current working version of the process application.

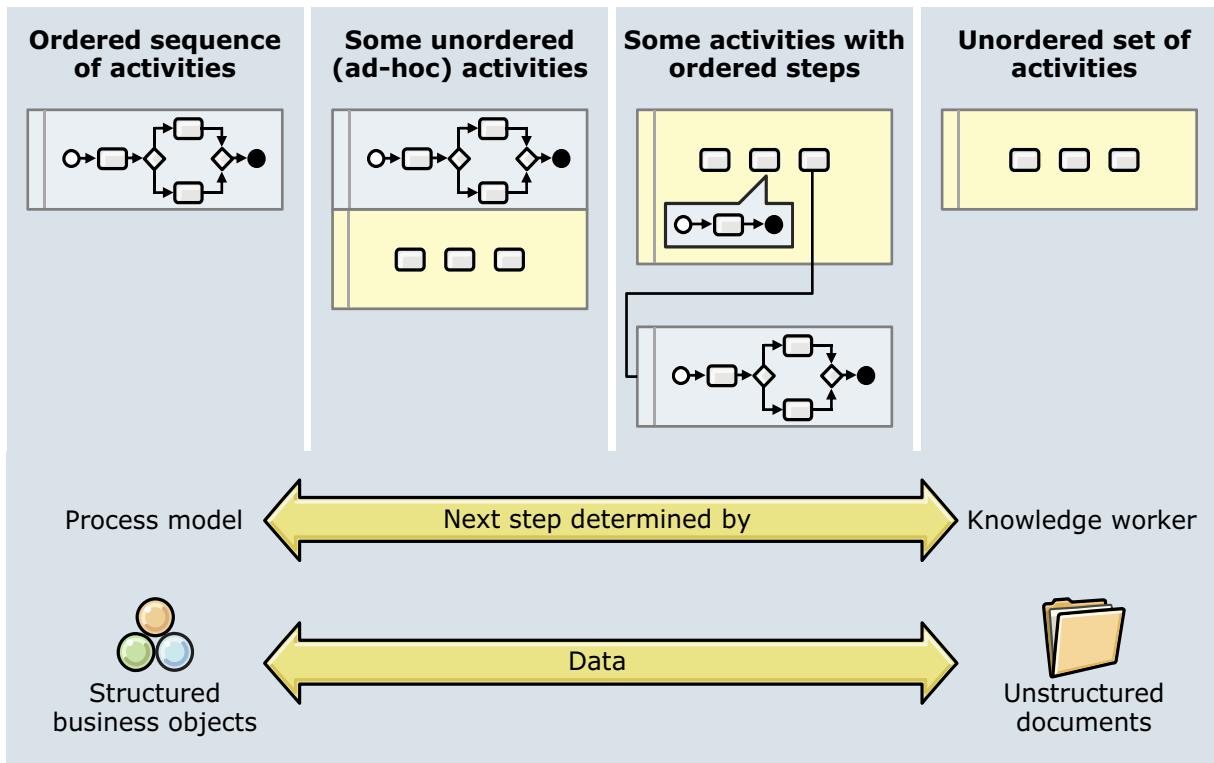
The process application remains at that tip level until you decide to create a snapshot, which records the state of library items within a process application or track at a specific point in time. Typically, you take a snapshot whenever you are ready to test the integration or want to install the process application on a Process Center server or a Process Server for development, test, staging, or production.

The tip is a special snapshot; it is the only type of snapshot in which you can change contents, but you can run it only on the Process Center server. You cannot install a tip on a Process Server.

By default, each process application has a single track, called Main. If you want to allow parallel development on a process application, you can create more tracks. These optional subdivisions in the process application keep changes isolated. For example, imagine that your company is in the midst of rebranding; during this transition, the current process applications must be maintained while new versions are being developed based on the updated corporate identity. In this situation, one team might be making minor fixes on the current version of a process application (in the Main

track). At the same time, another team is building a new version of the process application in a separate track.

## The process spectrum



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Figure 3-8. The process spectrum

IBM BPM now supports a broader spectrum of process types. They include structured process, ad hoc, basic process with ordered steps, and basic process with unordered set of activities.

## 3.2. Creating a process model

## Creating a process model

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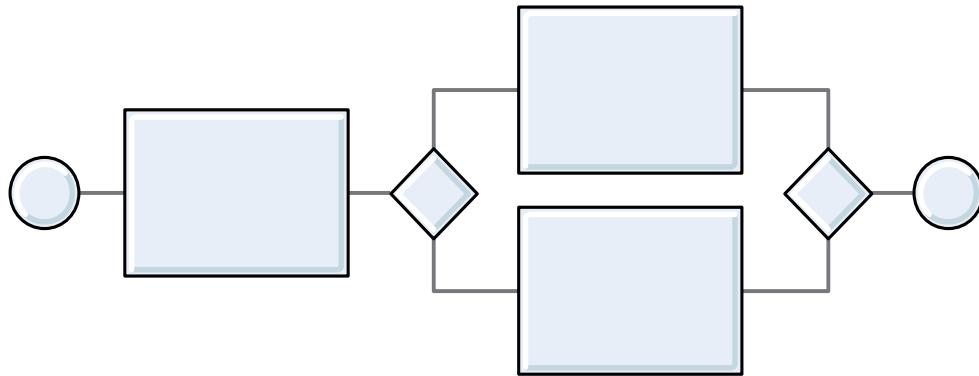
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Figure 3-9. Creating a process model

Creating the process is part of the effort within Playback 0 that uses the IBM Web Process Designer. Naturally, modeling does not stop with creation of the process model, but continues on through iterations until the business process reflects the specified improvements and adjustments. For this reason, the shift from descriptive modeling to analytical modeling happens to produce the process model that is deemed worthy of implementation.

It begins with the creation of the process model.

## Creating the initial process model



- When creating a process model during discovery of the business process, the process model should reflect only the captured data
- The process model should ignore solutions for process problems until analytical modeling
- The process model is agile enough for continued adjustments, so the focus is to have the expected order of process tasks reflected in the model first

[Playback 0: Modeling the as-is business process](#)

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*Figure 3-10. Creating the initial process model*

To understand how to create a process model that is incrementally adjusted through the playback sessions of the business process, follow these guidelines:

- If creating a process model during discovery of the business process, a good practice is to have the process model reflect only the captured data.
- It is a good practice to delay solving process issues until analytical modeling. During discovery, the focus is on capturing the process.
- The process model is agile enough for continued adjustments, so focus on the expected order of process tasks reflected in the model first.

## Automation

- Not the first order of business in process modeling
- Should follow a natural development path from an analysis of the business process issues
- Merely automating a business process provides the opportunity to make a bad business process more efficiently bad

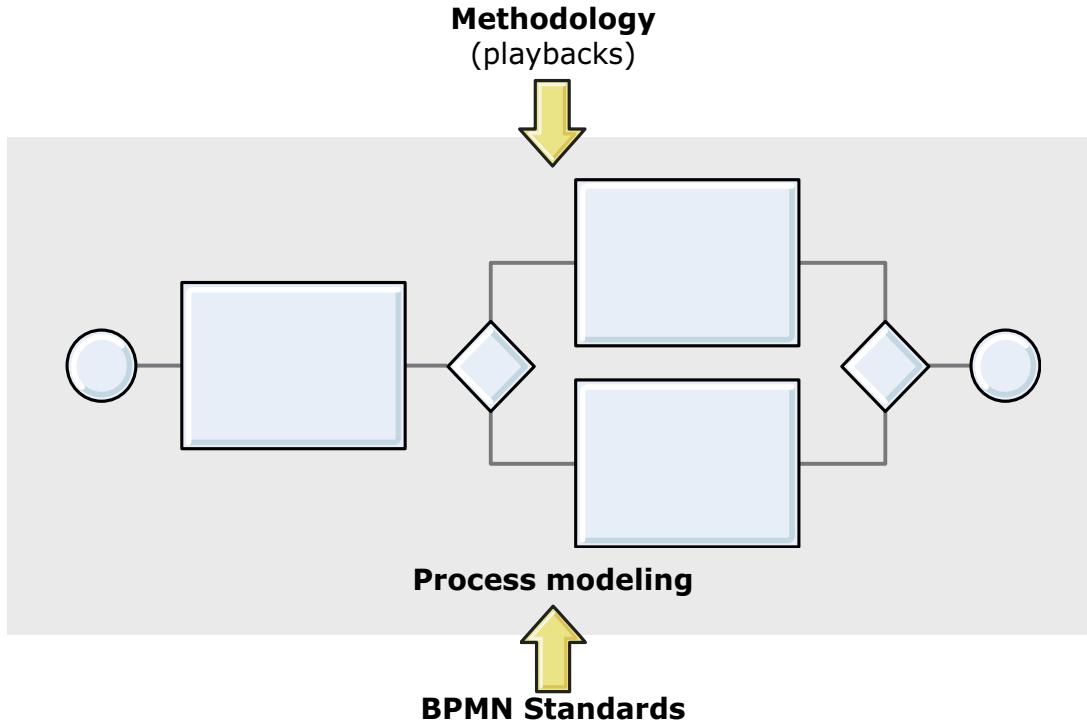
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*Figure 3-11. Automation*

Give careful attention to the focus of the initial process model. Many times, organizations erroneously believe that BPM is about adding technology solutions to process problems. Soon after the initial sessions to document the business process, the decision to automate process tasks is prematurely made. Automation certainly is a good thing in BPM; however, it is not the first order of business at this early stage. Allow the analytical modeling effort to designate opportunities to automate tasks. It happens naturally as the iterations on the process model provide opportunities to adjust and improve the business process.

## Where to start



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Figure 3-12. Where to start

As described earlier, process modeling captures the ordered sequence of activities within a process along with supporting information from start to end. In modeling, the business process is framed with a workflow model to reflect component activities, the roles that are conducting those activities, conditional branching, and the sequencing of the flow of work between activities. In IBM Web Process Designer, this workflow model is called a process, but is also sometimes called a process diagram.

To translate process requirements that are documented in the discovery sessions into a process model, the BPM team must understand how to use the best methods and standards available. Not only is it necessary to translate requirements, they must be translated correctly so that everyone clearly understands the process model.

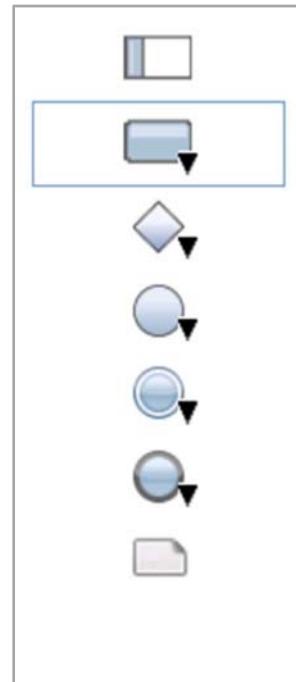
Where a BPM team starts is by adhering to the standards that are used in process modeling, Business Process Model and Notation (BPMN).

Concurrent to using BPMN to model the business process, a BPM team also uses a development method that works best to collaborate on modeling with business and IT. This development method is called playbacks. IBM Business Process Manager uses the playback to assist project development and BPMN V2.0 as the model standard.

## About BPMN

- The standard flow chart-based notation for defining business processes
- Creates a standardized bridge for the gap between business process design and process implementation
- IBM Business Process Manager's Process Designer uses several core elements from BPMN
  - Pool
  - Lane
  - Event
  - Activity
  - Gateway

**IBM Web Process Designer element palette**



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Figure 3-13. About BPMN

To communicate this model clearly within your organization, apply a notation standard. This notation is known as Business Process Model and Notation or BPMN.

BPMN is used so that everyone who is involved can interpret and understand the model. Throughout development, many different parties are involved in modeling. Every stakeholder, from the least technical to the most technical, understands the model to provide valuable feedback and continuously improve the process.

BPMN also allows a way to compact your process definition. Many of the symbols represent ideas, so symbols allow for a more concise and smaller model than drawing a diagram without BPMN.

BPMN has many benefits, but most importantly, BPMN creates a standardized bridge for the gap between the business process design and process implementation. This single notation is agreed upon among multiple BPM vendors for the benefit of the user community.

IBM Process Designer uses several core BPMN elements:

- Pool
- Lane
- Event
- Activity

- Flow
- Gateway

IBM implements and interprets these elements to have specific meanings and terminology in the IBM Process Designer product. For definitions of the BPMN specification, see the BPMN Specification document version 2.0 from the Object Management Group.

The element palette of IBM Web Process Designer is shown in the slide image. These items correspond to BPMN elements and are used in modeling a process.

A BPMN standards group, which is called Object Management Group, is an international, open membership, not-for-profit technology standards consortium. For more information, go to the Object Management Group website at: <http://www.omg.org>

## Unstructured (ad hoc) activity



- An ad hoc activity has no input flows
- Starts as required by knowledge workers or according to predefined preconditions, rather than by a predefined process flow

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Figure 3-14. Unstructured (ad hoc) activity

An ad hoc activity has no input flows and is started as required by knowledge workers or according to predefined preconditions, rather than by a predefined process flow. Such activities can be required or optional, and they can be defined as repeatable or to run at most once.

Do not add any input or output flows to the ad hoc activity. If you add any flows to the activity, the activity is no longer unstructured. The Activity Behavior section is displayed only for unstructured activities that have User Task, Subprocess, or Linked Process implementations.

To run the instance of the process, you need a path from the Start event to at least one activity and then to the End event. With this simple process, you can have any number of ad hoc activities.



## Unstructured (ad hoc) activity: Implementation

- Ad hoc activity implementation
  - User, system, decision task
  - Subprocess
  - Script
  - Linked process
  - Event subprocess

User Task

Subprocess

Script

**Properties** Validation Errors

**General**

**Implementation**

**Data Mapping**

**Preconditions**

**Assignments**

**Pre & Post**

**Tracking**

**Activity Type**

Type: User Task

**Implementation**

Implementation: Default Responsive Human Service Responsive Coaches Select... New...

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Figure 3-15. Unstructured (ad hoc) activity: Implementation

A simple dialog box is used to specify the behavior of the activity, including preconditions for enabling the activity. Ad hoc activity implementation can mainly be of following types:

- User task
  - Single user interaction (human service)
- Subprocess
  - Embedded within the process
- Linked process
  - Separately authored process



## Unstructured (ad hoc) activity: Behavior

**Properties Validation Errors**

**General**

**Implementation**

**Data Mapping**

**Preconditions**

**Assignments**

**Pre & Post**

**Tracking**

**Common**

Name: Unwired Activity

Color:

Documentation:

**Behavior**

The activity runs even though it does not have an inbound flow

How is the activity started?

Automatically by the system

Manually by the user

Does the activity have to be completed?

Yes. The activity is **required**

No. The activity is **optional**

Repeatable. The activity can be invoked multiple times (i)

Hidden. This is a background activity that users will not see

**Ad hoc activity behavior**

- Automatic or manual
- Required or optional
- Repeatable
- Hidden

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Figure 3-16. Unstructured (ad hoc) activity: Behavior

## Unstructured (ad hoc) activity: Behavior

- Activity start
  - Invoked automatically by the process
  - Invoked manually by the user
- Activity completion
  - Required (must be invoked at least once)
  - Optional
- Repeatable
  - Can run only once
  - Can be invoked multiple times
- Precondition
  - A document is filed in the process
  - A variable is changed
  - A precondition expression is met
  - No precondition event for this activity



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Figure 3-17. Unstructured (ad hoc) activity: Behavior

Ad hoc activity preconditions are as follows:

- Document filed
  - Optionally combined with boolean expression
  - Evaluated each time that a document is filed
- Variable changed
  - Specified list of variables that are monitored
  - Optionally combined with boolean expression
  - Evaluated each time that a variable value changes
- Boolean expression only
  - Evaluated at case start and each time a variable value changes

### 3.3. Pool and lanes

## Pool and lanes

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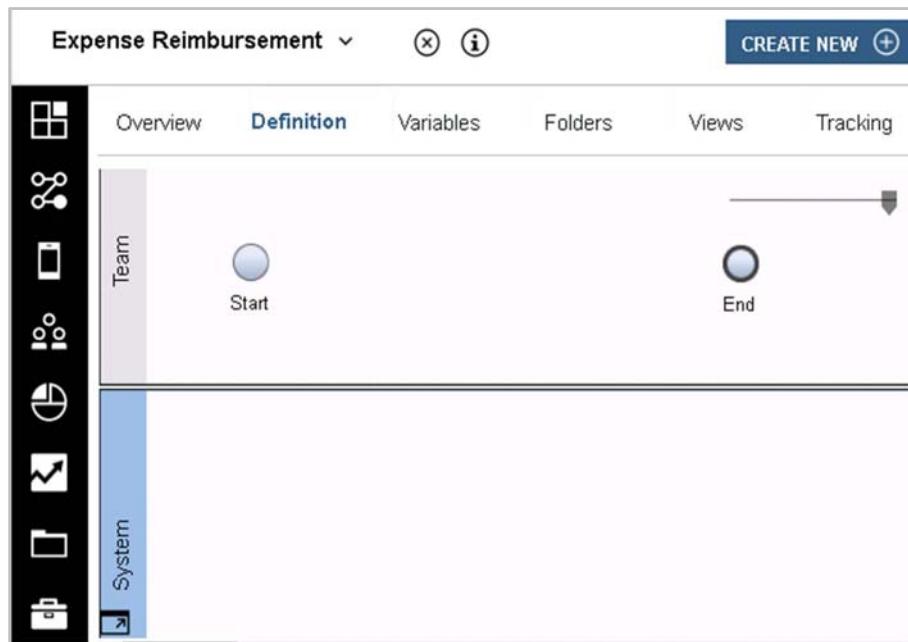
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Figure 3-18. Pool and lanes

The discovery and analysis session provides details about the business process that can be converted into BPMN process model elements. These elements can be used in conjunction as a diagram that describes the business process and later runs the process application. This section deals with two specific elements: pools and lanes.

In IBM Web Process Designer, the default setup for newly created process is one pool and two lanes. One lane represents a team and the other a system lane.

## Pool



- A graphical element that is called a pool contains each process
- The name of the pool is the same as the name of the process

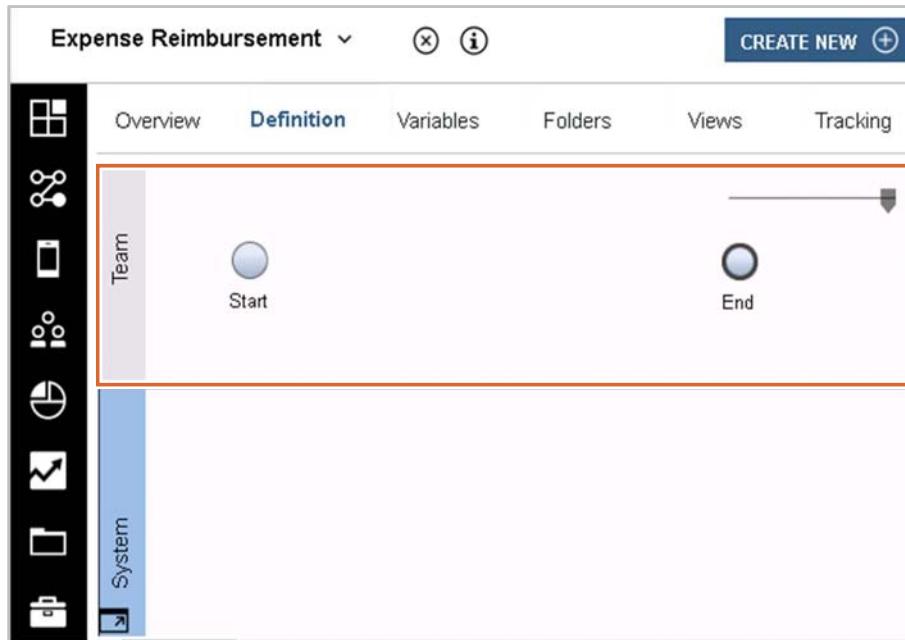
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Figure 3-19. Pool

A process that you model in IBM Web Process Designer includes the default IBM Web Process Designer pool, which consists of two default lanes. In essence, the pool is the BPMN element that represents the entire business process. The pool is the only element that is not found in the element palette and does not have properties, but it is the default setup for all models that are created in IBM Web Process Designer.

## Lanes



- Contained in each pool are lanes
- The top lane is a **team** lane and the bottom lane is a **system** lane

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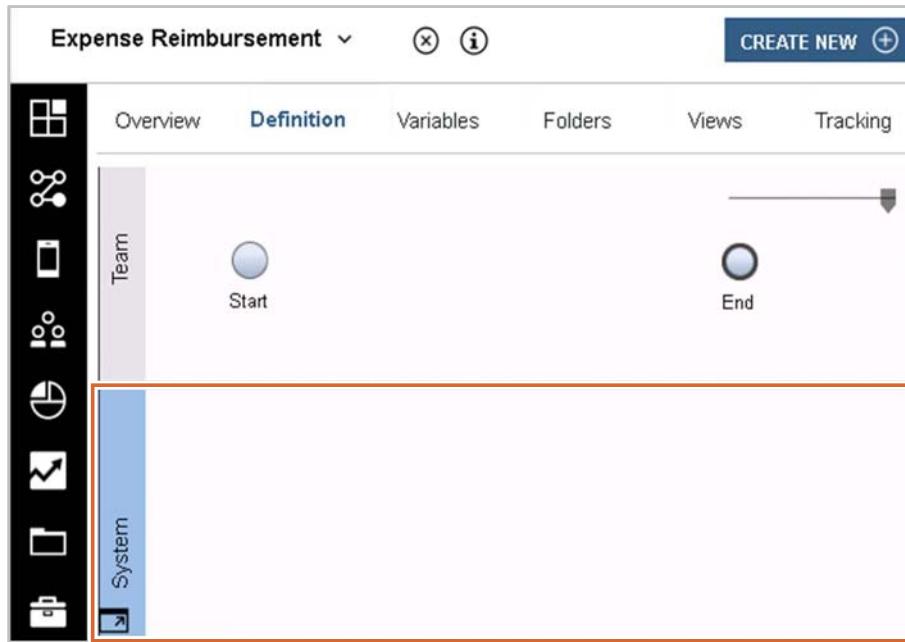
Figure 3-20. Lanes

Each lane represents a team, and the process task responsible role is detailed in the discovery and analysis session. Lanes provide context for a process model as each lane contains a series of activities that are assigned to a specific team member or events that transpire in the process. Activities and events are covered in more detail in the other sections of this unit.

To obtain the details for the team during discovery and analysis, user stories help determine which teams are responsible to conduct specific process tasks. Each of these teams is assigned to a lane when you model the process. It is important to remember that a team is a role, and not a person, in a process model.

The analogy of a swimming pool is a perfect description, as the pool with the associated lanes visually represents swimlanes in a pool. Swimmers are thought of as the teams who are swimming the length of the pool, completing tasks in their lane.

## System lane



- Lanes can also be assigned to systems, and automated tasks are often in the designated system lane

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Figure 3-21. System lane

When the time comes to define process tasks that are automated, the process model needs a way to communicate with automated tasks. A process participant who is assigned to a lane is not always a responsible human role. Process participants who are assigned to lanes can also be systems.

For example, the discovery and analysis session might find that a system, rather than a human role, completes a certain set of process tasks such as conducting a background check on a loan. IBM Process Designer has a specific default lane to contain these sorts of automated tasks: the system lane. During the initial process model build, tasks that are automated are represented as part of the system lane.

Further automation of process tasks is designed when the process is improved and validated through the iterative playback project development. This iterative development can mean system lane movement and rearrangement to indicate where efficiency is found for the entire business process.

## Unit summary

- Create a process application
- Model a process
- Describe pool and lanes

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*Figure 3-22. Unit summary*

## Review questions

1. True or False:

Lanes can also be assigned to systems, and automated tasks are often in the designated system lane.

2. \_\_\_\_\_ is a container for process models and their supporting implementations, and it is stored in the repository.

- A. Process application
- B. Pool
- C. Activity
- D. Team

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Figure 3-23. Review questions

Write your answers here:

1.

2.

## Review answers

1. True
2. A: Process application

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Figure 3-24. Review answers

## Exercise 1

Playback 0: Creating a process with ad hoc activities

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Figure 3-25. Exercise 1

## Exercise objectives

After completing this exercise, you should be able to:

- Start IBM Business Process Manager
- Create a process application by using Web Process Designer
- Create the foundation for a structured process by adding the appropriate lanes to the default pool
- Create a process
- Add ad hoc activities to the team lanes

[Playback 0: Modeling the as-is business process](#)

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*Figure 3-26. Exercise objectives*

---

# Unit 4. Playback 0: Modeling the to-be business process

## Estimated time

02:30

## Overview

After the process model is created, modeling continues through iterations until the business process reflects the specified improvements and adjustments. To produce the final process model for implementation, the shift from descriptive modeling to analytical modeling is needed. This unit provides an overview of Blueworks Live, which is an IBM tool that is used primarily for modeling and analysis of processes. The unit also covers the core notation elements that are used in Web Process Designer, and the categories of activities like processes and nested processes that contain process tasks.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Describe the purpose and function of Blueworks Live
- List and describe the core notation elements that are used in IBM Web Process Designer
- Examine a defined workflow from detailed process requirements and identify the interrelated process activities and the roles that are responsible for completing them
- Decompose activities into processes and nested processes that contain process tasks
- Create a process, nested process tasks, and responsible roles

Playback 0: Modeling the to-be business process

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Figure 4-1. Unit objectives

## Topics

- About Blueworks Live
- Creating a process model
- Flow objects
- Nested process

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*Figure 4-2. Topics*

## 4.1. About Bluemix Live

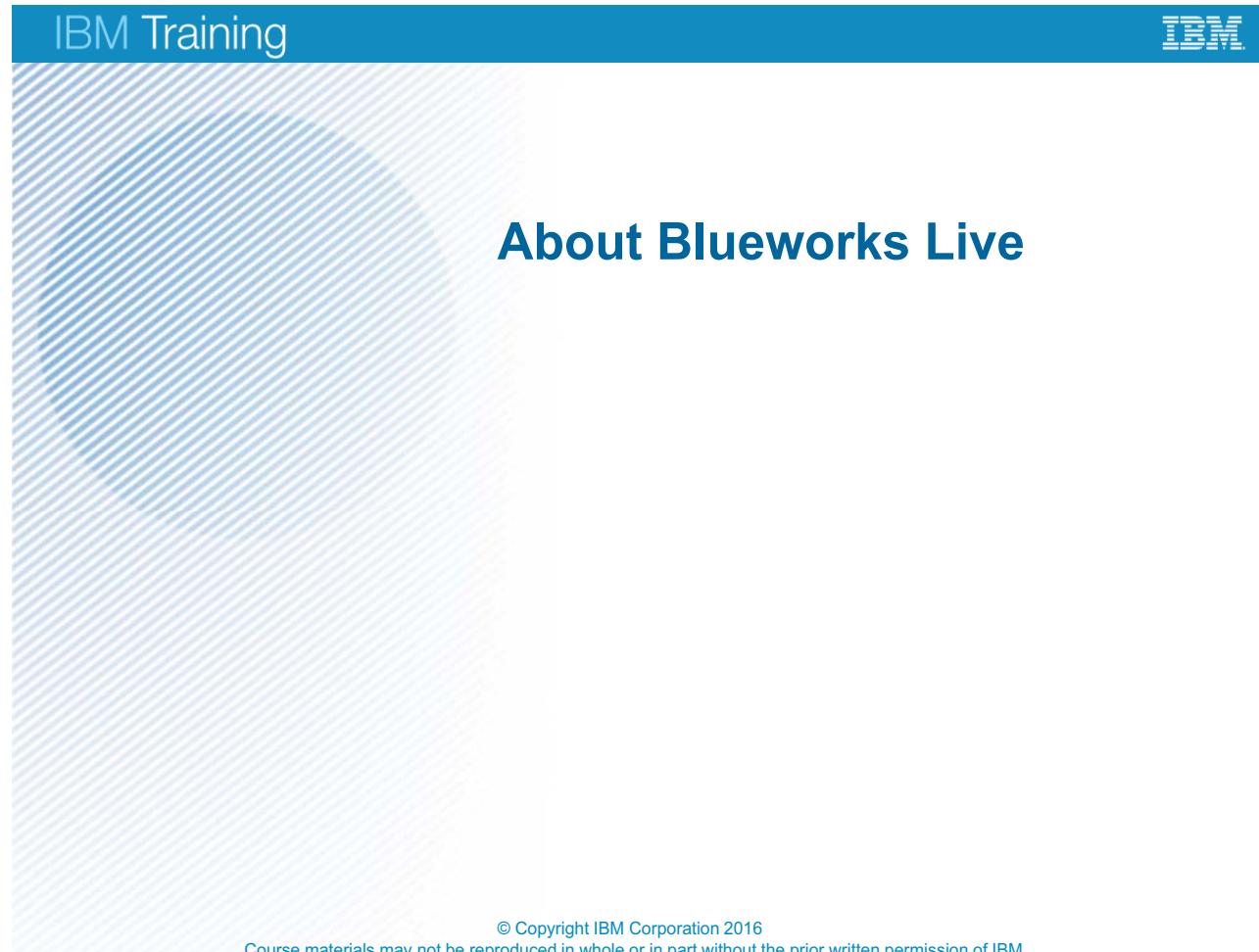
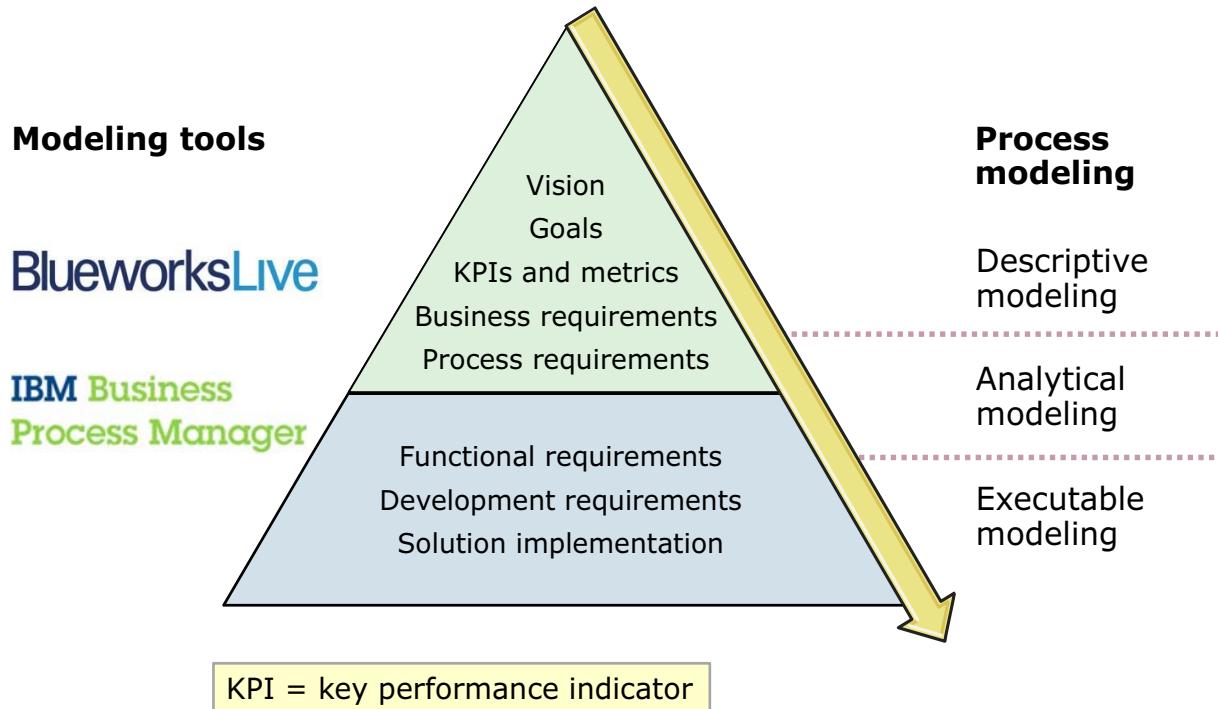


Figure 4-3. About Blueworks Live

Earlier in the unit, you initially learned about Blueworks Live as an IBM tool used primarily for modeling and analysis of processes. In this topic, the tool and a few of its capabilities are explored.



## How does Blaworks Live fit in process modeling?



Playback 0: Modeling the to-be business process

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Figure 4-4. How does Blaworks Live fit in process modeling?

Blaworks Live is one of the best in market tools for discovery and initial definition of a process.

Often the pattern is that a company creates models and completes process analysis in Blaworks Live and then moves processes into IBM Business Process Manager for implementation and integration with different systems.

As mentioned before, it is important to note that these two tools do not have a clear demarcation where one stops and the other begins in terms of process modeling. That varies from project to project; however, both work together to engage the business and IT sides of a business.



## Blueworks Live and SaaS

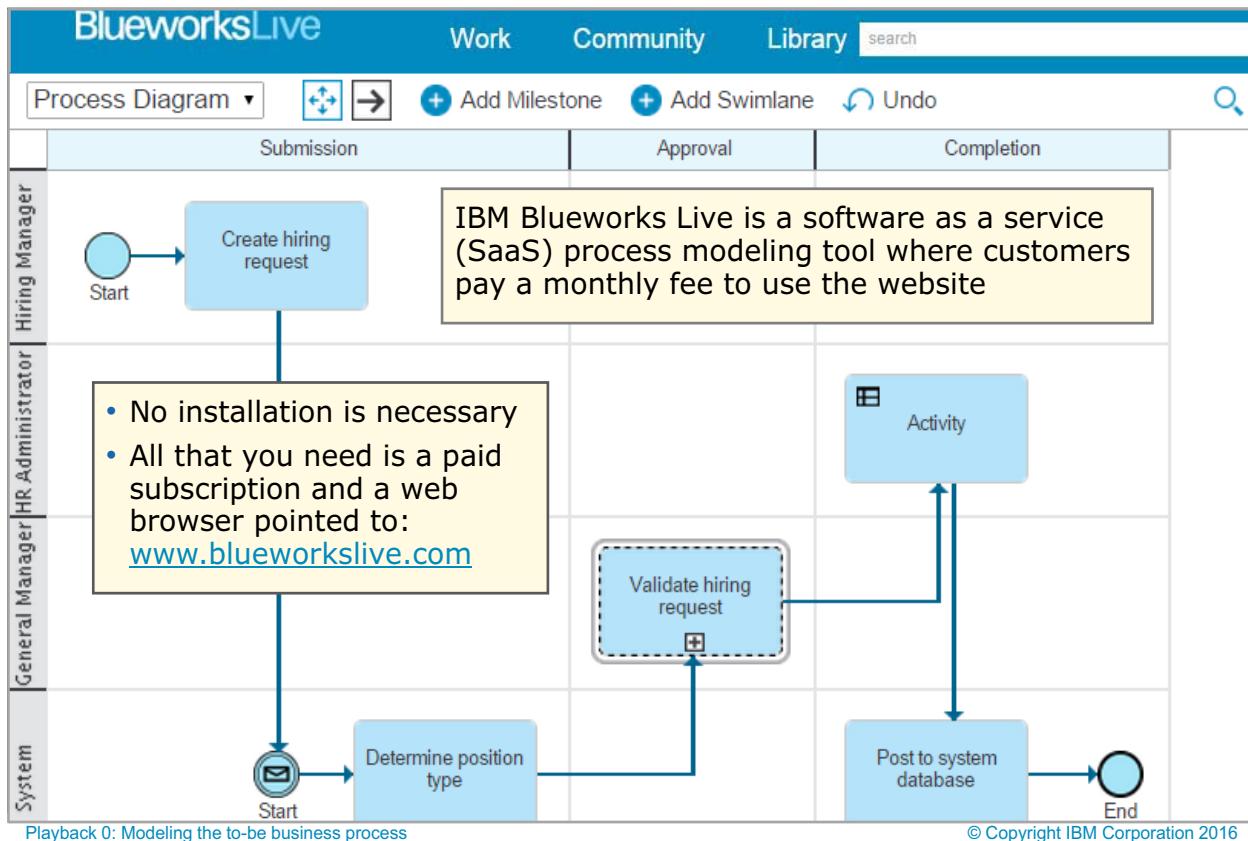


Figure 4-5. Blueworks Live and SaaS

IBM Blueworks Live is a software as a service (SaaS) tool where customers pay a monthly fee to use the website. It is frequently updated and improved based on user comments and requests. No installation is necessary. All that is needed is a paid subscription and web browser pointed to: [www.blueworkslive.com](http://www.blueworkslive.com)

Blueworks Live is different from many other IBM products because it is sold as software as a service, or SaaS. Customers pay a monthly fee to subscribe to the service.

Every 8 – 12 weeks, a new release of Blueworks Live is completed. Many times, the developers rely on suggestions from the customer community to create and add new features. When the new release contains updates, you do nothing; your software is automatically updated.

Blueworks Live requires only an internet connection and web browser to get started with modeling. Product installation and maintenance hassles are not an issue. It is a quick way to start mapping your processes and can be used for running small, simple processes.

Although IBM Blueworks Live is used as an example in the unit slides for modeling and analyzing your processes, you can also use other third-party modeling tools for process modeling.

## Decision discovery with Blueworks Live

Use Blueworks Live to discover and document the decisions within business processes

- Decisions can be modeled graphically so that users can compose, view, and collaborate on decision diagrams
- Key characteristics of decisions can be captured, and the decision logic is documented by using decisions tables
- Changes to decisions can be tracked, and previous versions of decisions restored
- Decisions of interest can be easily located, along with the business processes that are using those decisions
- You can share decision documentation by printing decision diagrams, exporting decision information to MS Word and MS Excel, and sharing links to decisions

Playback 0: Modeling the to-be business process

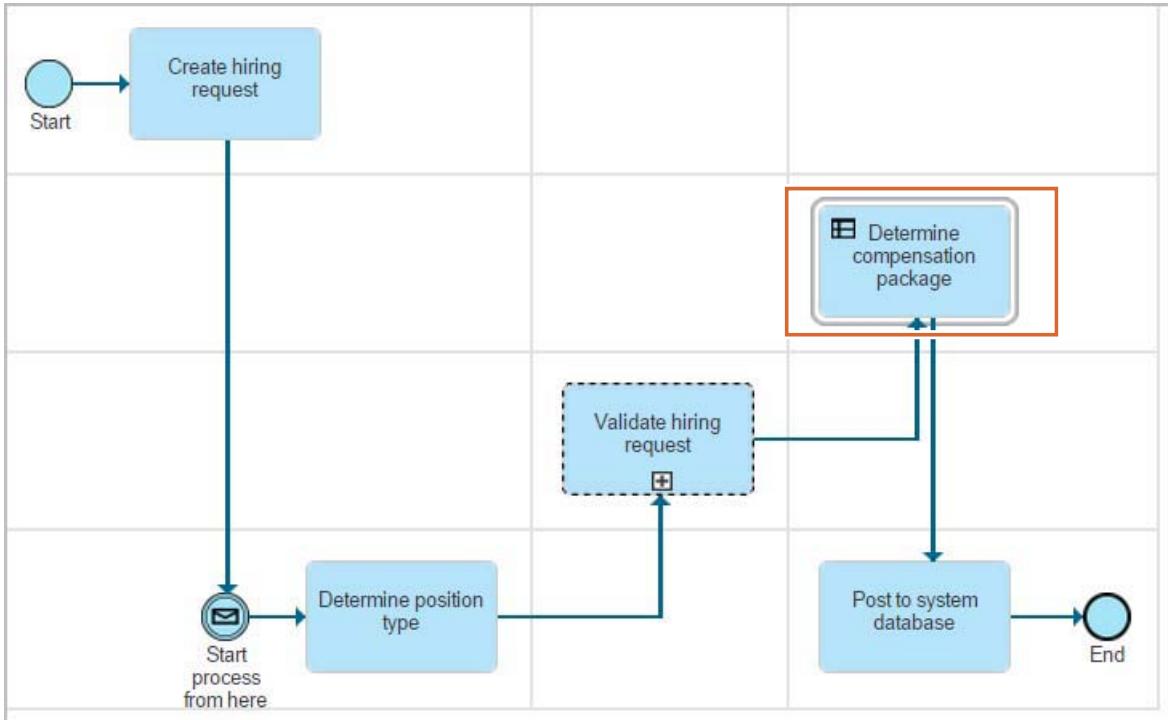
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Figure 4-6. Decision discovery with Blueworks Live

In addition to the process discovery and design capabilities of Blueworks Live, it also features decision discovery and design capabilities. IBM Blueworks Live has many collaborative and social features for modeling and completing processes. The product has real-time editing, where you can view others' changes as they happen. A version history is also available if you must revert to a past version or undo changes.

Many social features such as streams, commenting, messaging, and sharing are available to connect people to get the best process model possible.

## Decisions within business processes (1 of 2)



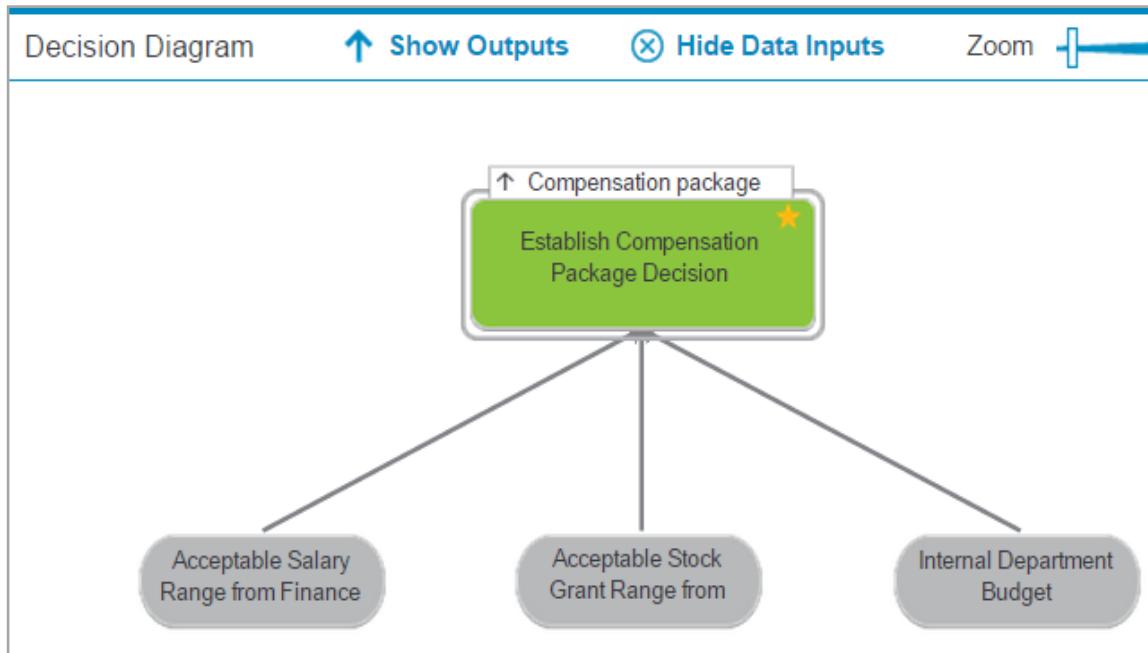
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Figure 4-7. Decisions within business processes (1 of 2)

In Blueworks Live, a decision is associated with a *decision task* in the process diagram. A decision task is equivalent to a *Business Rule Task* in BPMN 2.0, and uses the same graphical notation and icon. You can also document many of the key decision characteristics explicitly in Blueworks Live.

## Decisions within business processes (2 of 2)



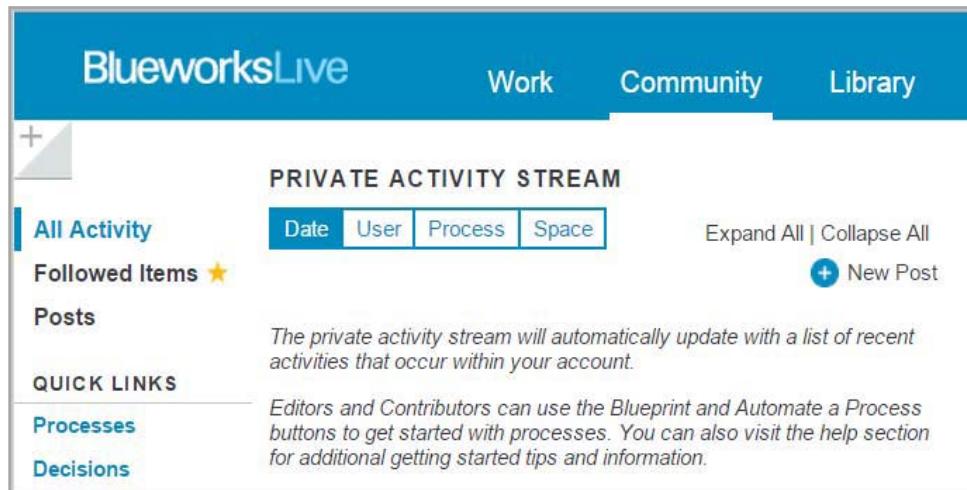
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Figure 4-8. Decisions within business processes (2 of 2)

## Collaborative and social modeling

- Real-time editing: Collaborate with others on the same model and see their changes in real time
- Private and public IBM Business Process Manager streams to see what is happening around you
- See who is online to send messages and share processes
- Comment on another user's processes



The screenshot shows the BlueworksLive interface with a blue header bar containing the logo and navigation tabs: Work, Community, and Library. Below the header is a sidebar with a plus sign icon and sections for 'All Activity' (which is selected), 'Followed Items' with a star icon, and 'Posts'. A note states: 'The private activity stream will automatically update with a list of recent activities that occur within your account.' To the right of the sidebar is a main content area titled 'PRIVATE ACTIVITY STREAM' with tabs for Date, User, Process, and Space. There are buttons for 'Expand All' and 'Collapse All', and a 'New Post' button. A note below the tabs says: 'Editors and Contributors can use the Blueprint and Automate a Process buttons to get started with processes. You can also visit the help section for additional getting started tips and information.'

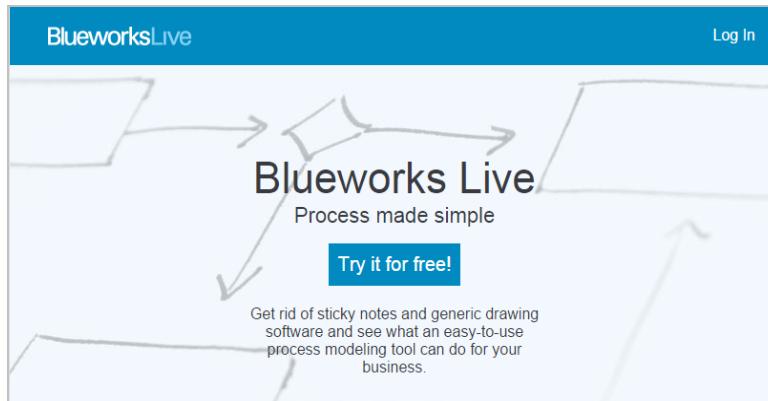
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Figure 4-9. Collaborative and social modeling

## IBM Blaworks Live: Trial and education offerings

- Try the full version of IBM Blaworks Live for 30 days without charge
  - Sign up at <https://www.blaworkslive.com>



- IBM Blaworks Live self-paced virtual classes:
  - ZB031 Process Discovery and Modeling in IBM Blaworks Live
  - ZB030 IBM Blaworks Live Account Administration
- IBM Blaworks Live distinguishes between four types of licenses: Editors, Contributors, Viewers, and Community, which needs to be licensed separately and does not come as part of the IBM Business Process Manager product license

Playback 0: Modeling the to-be business process

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*Figure 4-10. IBM Blaworks Live: Trial and education offerings*

Blaworks Live distinguishes between four types of licenses: Editors, Contributors, Viewers, and Community with the following capabilities:

- Editors are able to:
  - Create and modify processes and decisions
  - Publish processes and decisions
  - Automate processes
  - Manage spaces
  - Use the analyze and playback features
- Contributors are able to:
  - Add comments to processes and decisions
  - Participate in process automation
- Viewers are able to:
  - View published processes and decisions
  - Viewers can follow the link to open published process in Blaworks Live

- Viewers can review process and decision details: discovery map, process diagram and process documentation
- Community users can:
  - View the Community tab
  - Perform the role of account administrator

## Using IBM Blaworks Live and IBM BPM (1 of 3)

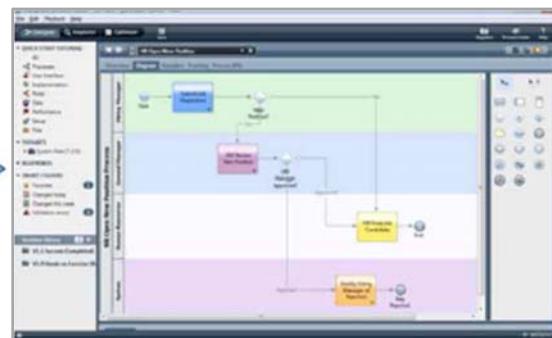
### BlaworksLive



The simplest way to get started with IBM BPM

Process Discovery  
"Modeling for Documentation"

### IBM Business Process Manager



The quickest way to deliver robust process applications

Process Implementation  
"Modeling for Execution"

Playback 0: Modeling the to-be business process

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Figure 4-11. Using IBM Blaworks Live and IBM BPM (1 of 3)

A business programmer can use the integration between IBM Blaworks Live and IBM BPM to implement the models that business analysts define. A business programmer already knows that the models accurately reflect the business needs of the user because business analysts established that when they used IBM Blaworks Live for process discovery. So now the business programmer can focus on quickly implementing those models in Process Center and Process Designer, by subscribing to the processes discovered in IBM Blaworks Live.



## Using IBM Blueworks Live and IBM BPM (2 of 3)

**HR RECRUITMENT PROCESS**

- All
- Processes
- User Interface
- Teams
- Implementation
- Decisions
- Data
- Performance
- Setup
- Files

**TOOLKITS**

- System Data (8.5.7.0)
- Hiring Requisition Toolkit (8.5.7.0)
- Responsive Coaches (8.5.7.0)
- Content Management (8.5.7.0)

**BLUEWORKS LIVE PROCESSES**

**SMART FOLDERS**

- Favorites
- Changed today
- Changed this week
- Validation errors

**Process App Settings**

Overview Environment Servers

Subscribe to Blueworks Live Processes

**Log in to Blueworks Live**

The Blueworks Live website is <https://www.blueworkslive.com>.

Email address:

Password:

Remember my email address

[Learn more](#)

**IBM BPM provides features to integrate process implementation in IBM BPM with process discovery in IBM Blueworks Live**

- Add the subscription to Blueworks Live processes from IBM Process Designer client application

Playback 0: Modeling the to-be business process

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Figure 4-12. Using IBM Blueworks Live and IBM BPM (2 of 3)

You can add a subscription to the IBM Blueworks Live processes by clicking the (+) plus sign next to the IBM Blueworks Live Processes section in IBM Process Designer client application.



## Using IBM Blueworks Live and IBM BPM (3 of 3)

- After subscribing, you can locate your subscriptions in the library items in IBM Process Designer application
- After a process is imported, you still need to implement it

**Note:**

- In this course, you are not using Blueworks Live
- In this course, you use Web Process Designer to model your processes

The screenshot shows the Blueworks Live interface with a sidebar containing categories like HIRING PROCESS, TOOLKITS, and BLUEWORKS LIVE PROCESSES. The main area displays a list of process definitions under 'Business Process Definitions' and 'Human Service'. Each entry includes a small icon, the name of the process, and a 'Blueworks Live' status indicator.

Category	Definition	Type
Business Process Definitions	Hiring - Onboarding	Blueworks Live
	Hiring - Orientation CD Gen...	Blueworks Live
Human Service	Hiring - Onboarding_Accep...	Blueworks Live
	Hiring - Onboarding_Comp...	Blueworks Live
	Hiring - Onboarding_Create...	Blueworks Live
	Hiring - Onboarding_Crimi...	Blueworks Live
	Hiring - Onboarding_Crimi...	Blueworks Live
	Hiring - Onboarding_Drug S...	Blueworks Live
	Hiring - Onboarding_Establi...	Blueworks Live
	Hiring - Onboarding_Infor...	Blueworks Live
	Hiring - Onboarding_Input ...	Blueworks Live
	Hiring - Onboarding_Input ...	Blueworks Live

Playback 0: Modeling the to-be business process

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Figure 4-13. Using IBM Blueworks Live and IBM BPM (3 of 3)

IBM Business Process Manager provides features to integrate process *implementation* in IBM BPM with process *discovery* in IBM Blueworks Live. As soon as a business analyst completes the process discovery phase, the process requirements are quickly delivered to IBM Business Process Manager. They can be implemented as a process by a business programmer by using IBM Web Process Designer.

In this course, you are not using Blueworks Live. You model your processes by using IBM Web Process Designer.

To learn Blueworks live, you can enroll to IBM Blueworks Live self-paced virtual classes:

- ZB031: *Process Discovery and Modeling in IBM Blueworks Live*
- ZB030: *IBM Blueworks Live Account Administration*

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## 4.2. Flow objects

## Flow objects

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Figure 4-14. Flow objects

At this stage of diagramming a business process, an author considers flow objects for the model. Flow objects in a process model are in the lane for teams because they represent either process task assignments or process controls. In this course, you are not examining every type of event, activity, or gateway available in IBM Web Process Designer. Instead, you learn the most commonly used types of flow objects and your specific needs for modeling your first process. The remainder of this unit and the upcoming units cover the different types of flow objects as modeled by using the IBM Business Process Manager Web Process Designer.



## Events: Start events

The screenshot shows the 'Definition' tab of the IBM Web Process Designer interface. On the left, there's a sidebar with 'Team' and a 'Start' icon highlighted with a red box. To the right is a main workspace with an 'End' node. Below the workspace is a callout box containing the text: 'Four types of start events can be selected in the Properties tab'. The 'Properties' tab is open, showing sections for General, Implementation (selected), Data Mapping, Pre & Post, and Tracking. Under 'Implementation', a section titled 'Start Event Type' is expanded, showing five options: 'None' (selected), 'Message', 'ECM Content', and 'Document', all enclosed in a red box.

Playback 0: Modeling the to-be business process

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Figure 4-15. Events: Start events

Events are control flow objects for a process model. Just like the definition of an event in everyday life, an event is something that occurs during a process. Events have three categories: start events, intermediate events, and end events. In the initial process model, it is important to have a start event and an end event. You focus on start and end events in this unit and revisit intermediate events in a later unit.

A circle that is encompassed by a single line represents a **start event**. Start events trigger the initiation of the process through a manual or automatic input. Authors describe the input in the properties tab documentation box that is provided for the element.

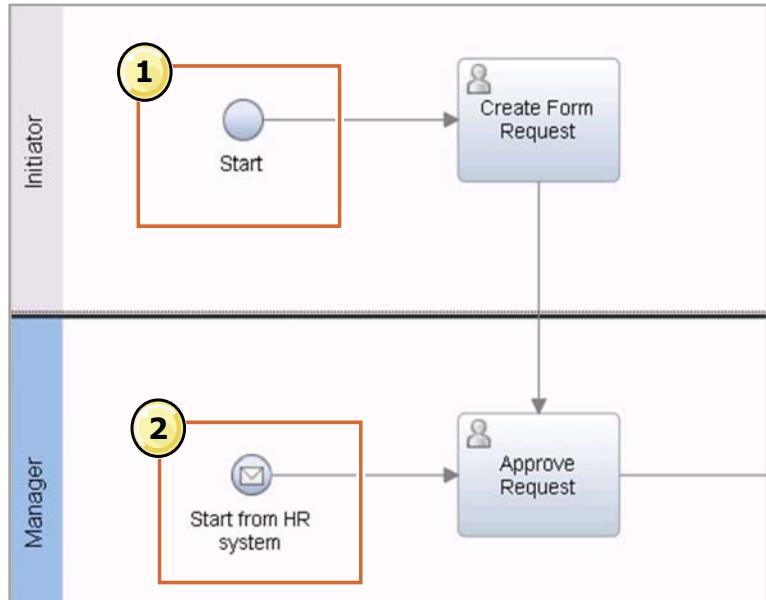
IBM Web Process Designer has four types of start events: none, message, content, and document. This course focuses only on the first two, none and message:

- **None:** Use the none implementation option when you want to enable process participants to start a process manually from the IBM Process Portal. Or, use this implementation option when you intend to use a process as a linked process from another higher-level process.
- **Message:** Use the message implementation option when you want an incoming message to start a process or an event subprocess.

The content and document event types are covered in the next course, WB824: *Process Implementing with IBM Business Process Manager V8.5.7 – II.*

## Events: Multiple start events

- 1** Only one “none” start event is allowed per process



- 2** To add a second start event to a process, you must use a message or content start event  
— This example shows a message start event

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Figure 4-16. Events: Multiple start events

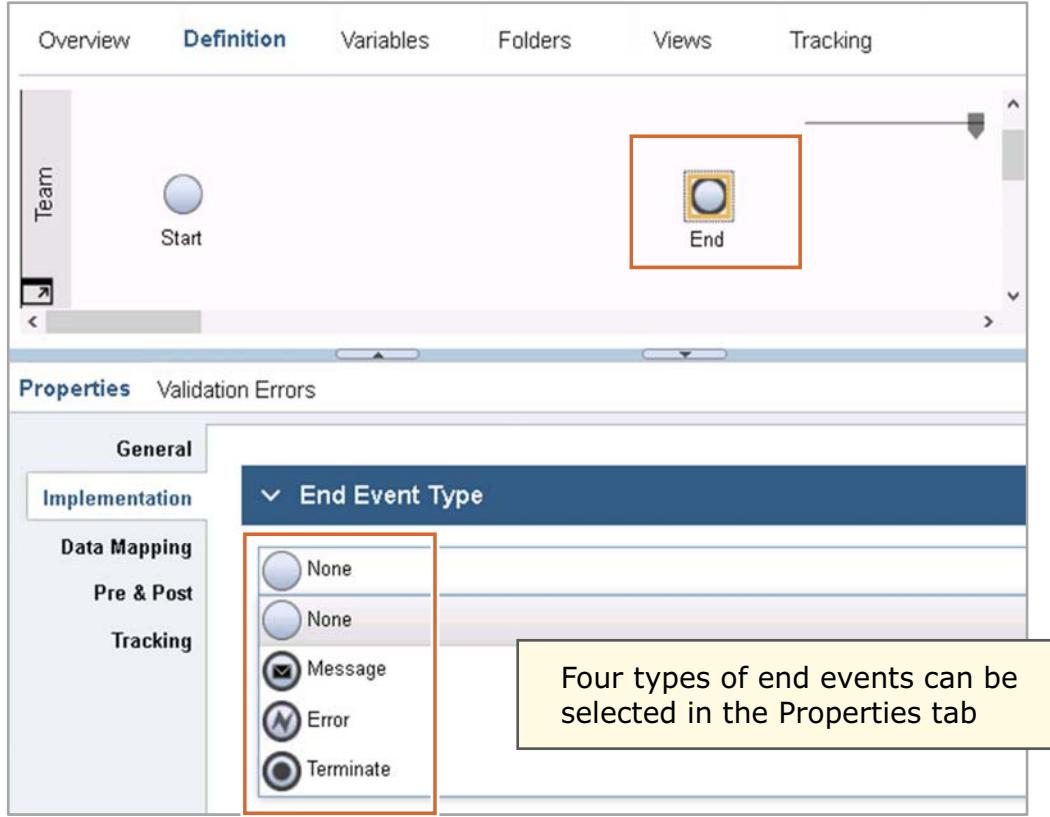
The two types of start events that are used most often are **none** and **message**.

1. **None:** The **none** event can be called a standard start event and is represented as a circle that does not have an internal marker. In a process, you can have only a single standard start event. If you try to model more than one standard start event, the process does not run and alerts you to the error. Creation of a process gives you one standard start event by default. When any user that “launches” or creates an instance of this process from the Process Portal, the process starts from the none event type. Other start event types create instances of the process through other methods (messages, events, document and content uploads).
2. **Message:** Another type of start event is **message**. This start event is represented as a start event with an internal marker of an envelope. Message start events start a process when an external signal is received.

For example, suppose that your company wants its employee onboarding process to start when a new employee record is created in the HR system. When a new record is created, the HR system sends an event to IBM Business Process Manager. IBM captures that event and starts the follow-on events for the process. You can have more than one message start event for a business process definition.



## Events: End events



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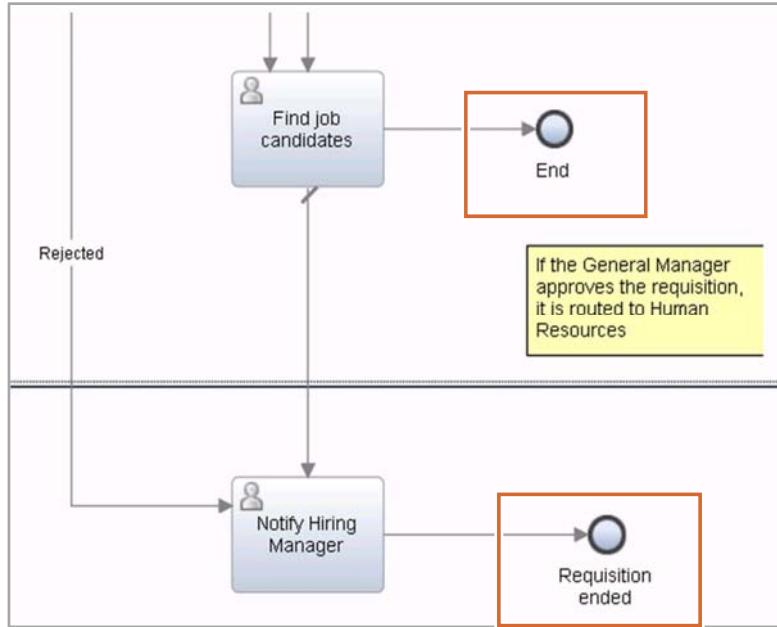
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Figure 4-17. Events: End events

An end event is represented as a circle encompassed by a dark thick single line. End events are reached in a process when a final decision from all activities or a partial set of activities is reached.

End events have four types: none, message, error, and terminate.

## Events: Multiple end events



- This process has two none end events: **End** and **Requisition ended**
- When you have more than one none end event, each should have a unique name

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Figure 4-18. Events: Multiple end events

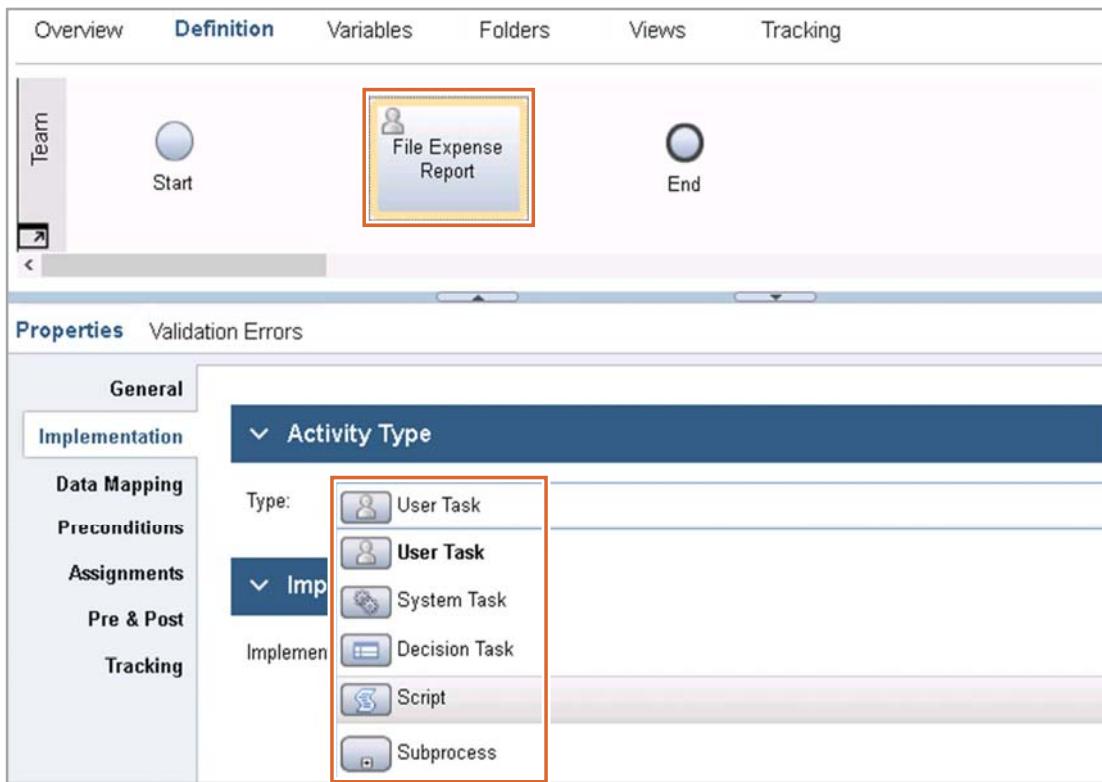
The type of end event that is used most often is the **none** end event.

This type of end event can also be called a standard end event, and is represented as a dark circle that does not have an internal image. Unlike standard start events, you can have multiple standard end events. Thus, any process can have a single standard start event, and one or multiple standard end events. Creation of a process gives you one standard end event.

Multiple end events can improve understanding of the business process flow. An end event can signify the end of a process instance, or if it is a process that is linked by another process, the end event signifies the end of the subprocess, and the flow continues from the end event. In this regard, you can connect process flow that comes from multiple end events to a parent process that contains this process as a linked process.



## Activity: Task types (1 of 2)



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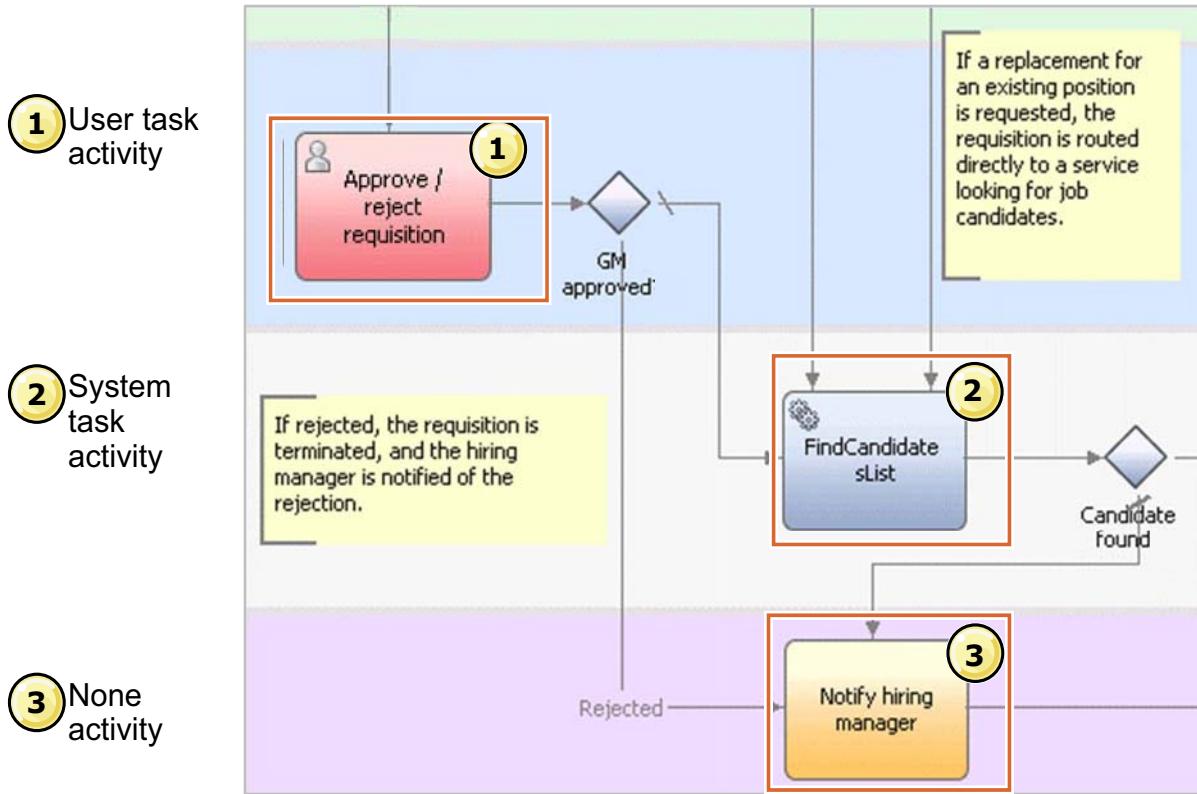
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Figure 4-19. Activity: Task types (1 of 2)

In a process, you can change the activity type by selecting the activity, clicking the **Properties > Implementation > Activity Type** section, and choosing the type of activity from the menu.

The activity that is highlighted in the process is a task that is assigned to a team. The icons that are used for none and the other task-type activities are highlighted in the Properties tab.

## Activity: Task types (2 of 2)



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Figure 4-20. Activity: Task types (2 of 2)

There are several task types, as follows:

- **None:** An activity of type **none** has no implementation, and is represented as a rounded corner rectangle with no icons or symbols.

This activity can be useful when initially modeling if you are unsure of the implementation of an activity or its type because of vague requirements or because you are currently analyzing the model. As the model evolves, the activity type can be changed to something more specific. This type is not displayed by default, so you select it in the implementation section if it is something that you would like to use.

The stage of modeling in the example process lends itself more towards defining types as you already have specific requirements.

- **Task activities:** All task activities have an icon in the upper left corner of the activity to indicate their type.

The four types of task activities are user task, system task, decision task, and script (task).

User and system tasks are the more common types of task activities that are used for modeling. A decision task is used in another course unit during implementation of the process. Scripts are also used during implementation of the process model.

- **User tasks:** A user task is represented as an activity with a human or person icon in the upper-left corner.

User tasks are selected when a user or human starts or completes an activity. One example of a user task is that an employee fills out an expense report and submits it for compensation. If you drag an activity from the palette to a non-system team lane, you automatically get a user task activity in your process.

- **System tasks:** A system is represented as an activity with two gears in the upper-left corner.

System tasks are selected when an automated system or service completes an activity. One example is a payment of an expense. When the expense is approved, you might want a system to go through steps to process and automatically pay the employee. If you drag an activity from the palette to the system lane, you automatically get a system task activity.

## Process modeling guidelines in IBM Web Process Designer

- A process diagram or model is called a process in IBM Web Process Designer
- In general, a process should be as simple an abstraction as you can make it
  - A highly conceptual process is resilient to change
- Make sure that you use the Documentation area in the Properties tab for each element in IBM Web Process Designer to include important requirement notes

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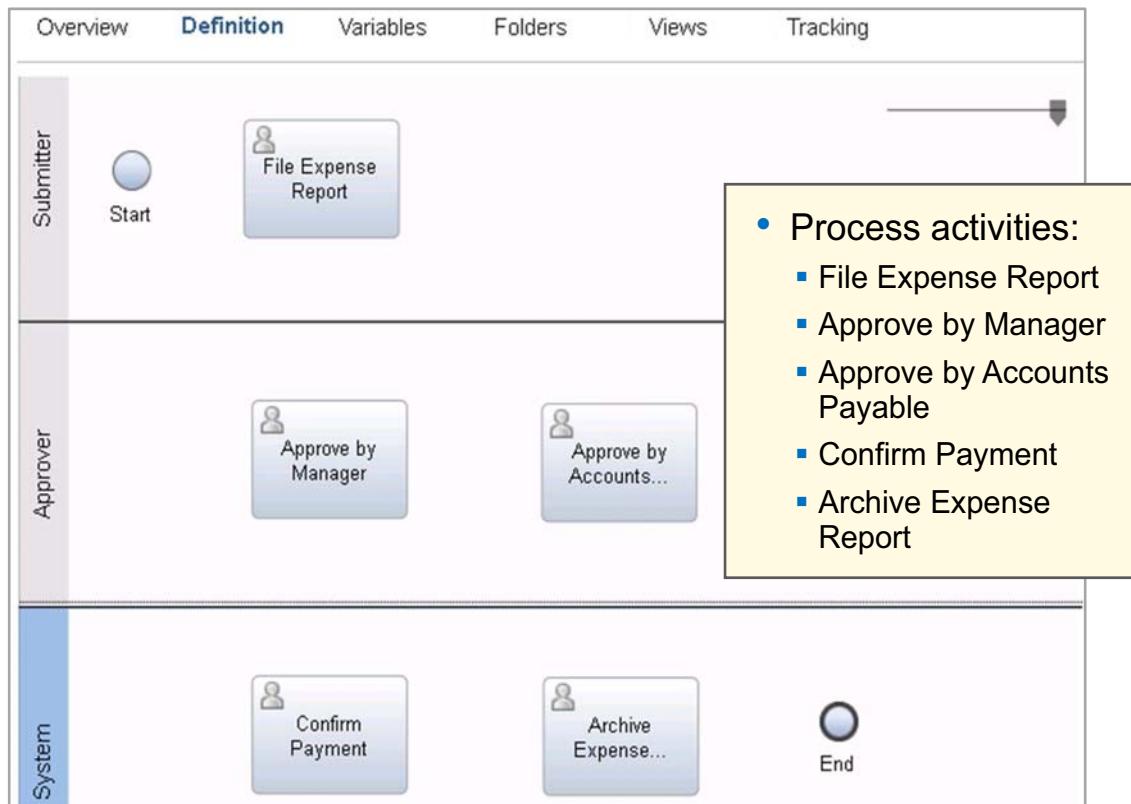
Figure 4-21. Process modeling guidelines in IBM Web Process Designer

When modeling in IBM Web Process Designer, remember the guidelines that are shown in the slide.

The next sections describe some of the core elements and explain how IBM Web Process Designer uses them to create the initial process model.



## Example process: Expense reimbursement



Playback 0: Modeling the to-be business process

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Figure 4-22. Example process: Expense reimbursement

### Modeling task activities

Process documentation provides details on the teams in a business process and also the work they do. It is important to note that the information is primarily captured and in some instances, analyzed for value. However, more change can happen after it is represented in a process model. The information is also work-related and not necessarily conducive to process model needs until translated. It requires more comprehensive work from the process author to model process activities for teams correctly and to create a process model that is not too complicated to communicate the business process effectively.

An important guideline is that in general, it is a good practice to create a process that is as simple an abstraction as can be modeled. A highly conceptual process is resilient to change.

To create the simple abstraction process model, authors go through a series of changes to the activities. When the initial process model with these refined activities and process flow is in place, BPM analysts continue to analyze the process with the process owner for process improvements and appropriate automation opportunities. Finally, a stable process model can be implemented.

What is important to remember is that a good process model typically has an activity that represents a single task, which a single process team accomplishes. The next section covers a nested process and how an activity can also represent multiple activities or tasks effectively in a process model.

## Translating business process work steps into activities

### Example business process work steps:

- ***Expense reimbursement***

1. Enter expenses
2. Scan receipts and attach
3. Submit for review and approval
4. Manager approval
5. If rejected, resubmit
6. Accounts payable approval
7. If rejected, resubmit
8. Submit for payment
9. Confirm receipt of payment
10. Transfer records to archive

Playback 0: Modeling the to-be business process

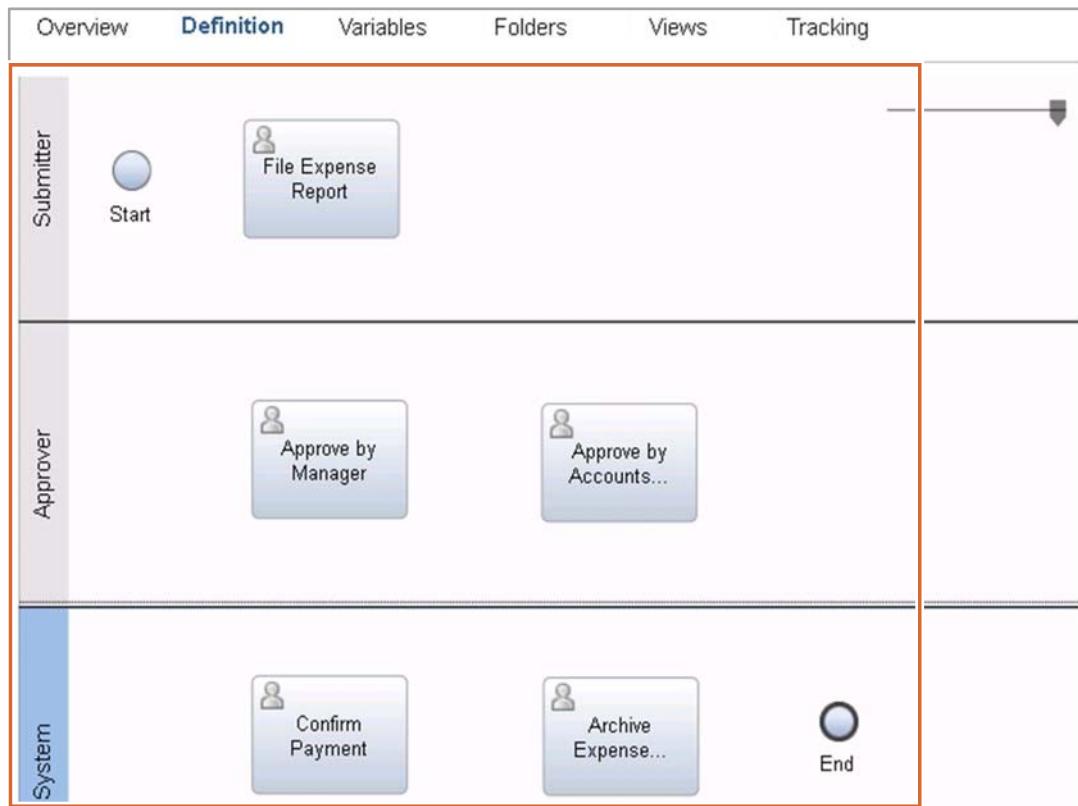
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Figure 4-23. Translating business process work steps into activities

Capturing the process information does not necessarily mean that the work steps that are captured are filtered into logical units of work. It depends on the depth of work that captures and documents the data. The better the process discovery, the more easily the work steps get translated into the process model activities. Some of the steps must be conducted together to enable the entire unit of work to be completed.

This slide shows an example of work steps that are captured for the expense reimbursement process.

## How was this translation accomplished?



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Figure 4-24. How was this translation accomplished?

Revisit the initial process model with the activities from the work steps. Can you tell how the translation was done?

Remember, the process has the activities File Expense Report, Approve by Manager, Approve by Accounts Payable, Confirm Payment, and Archive Expense Report.

## Translation of business process work steps into activities

	<b>Expense Reimbursement (example business process)</b>	<b>Activity</b>
1.	Enter expenses	File expense report (participant: Submitter)
2.	Scan receipts and attach	
3.	Submit for review and approval	
4.	Manager approval	Approve by manager (participant: Approver)
5.	If rejected, resubmit	
6.	Accounts payable approval	Approve by accounts payable (participant: Approver)
7.	If rejected, resubmit	
8.	Submit for payment	Confirm payment (participant: System)
9.	Confirm receipt of payment	
10.	Transfer records to archive	Archive expense report (participant: System)

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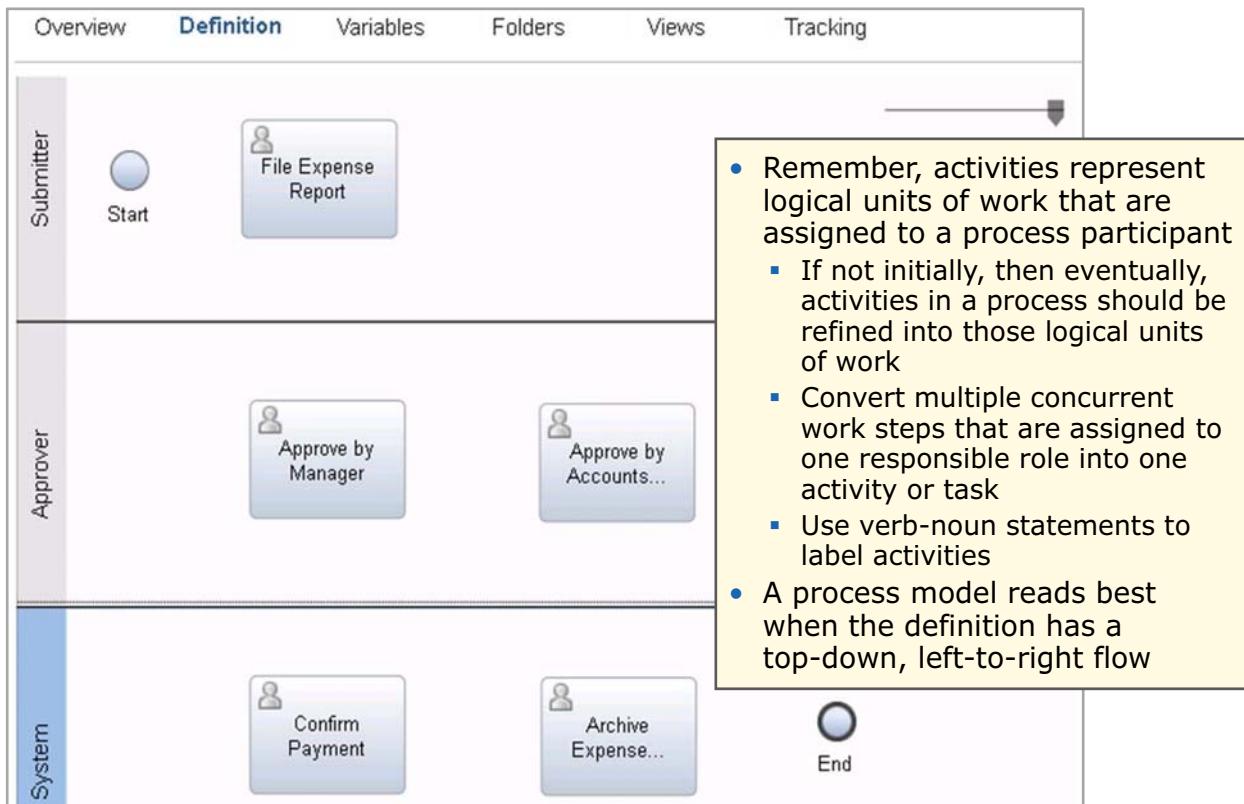
Figure 4-25. Translation of business process work steps into activities

The expense reimbursement process shows how different tasks are changed into work units and modeled as activities. Each activity represents a single task that a process participant accomplishes from start to end. The identification of the activity involves the identification of the individual units of work that are being conducted.

Some of the steps must be conducted together to enable the complete unit of work to be completed. For example, the submitter completes all the steps, such as Enter expenses, Scan receipts and attach, and Submit for review and approval, to file an expense report.



## Guidelines for modeling activities



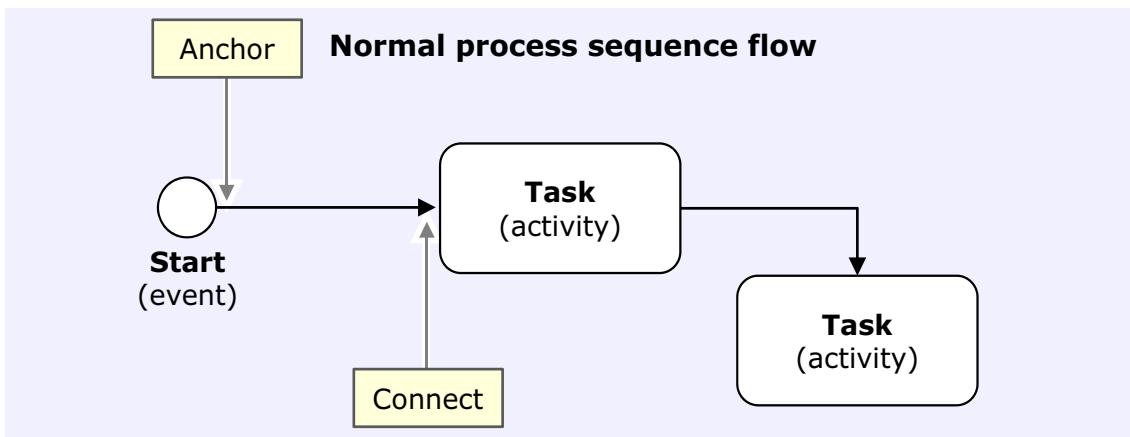
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Figure 4-26. Guidelines for modeling activities

When modeling activities in IBM Web Process Designer, follow the guidelines that are shown on the slide.

## Connecting flow objects



- Hover over the flow object to see a flow that emerges out from the control point on the edge of the flow object
- Then, drag the sequence flow to the next flow object and release on the target anchor point
- Using the general rule of top-down, left-to-right flow, connect flow objects from left to right or bottom to top on the flow objects
- This action helps keep the process model simple and the flow lines from crossing

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Figure 4-27. Connecting flow objects

Now that the flow objects are added to the process model, it is necessary to provide the basic control and flow for these activities. The connection between flow objects represents the control or flow in all of the team and system lanes.

This type of diagramming provides communication of how the process flows from one activity to another and who does those activities. The method to accomplish this step in IBM Web Process Designer is as follows:

1. Hover over the flow object to see a flow that emerges out from the control point on the edge of the flow object.
2. Then, drag the flow to the next flow object and release on the target anchor point.
3. Using the guideline of top-down, left-to-right flow, connect flow objects from left to right or from top to bottom on the objects. This rule helps with the simplicity of the process model and helps to keep flow lines from crossing.

Because it is the early stage of process model, it is necessary to communicate only the expected flow of the process from the start event to one activity, to another, and to the end event. As the process model is analyzed and adjusted, the process flow is modified to express the nuances of alternative flow.

In the next unit, you learn the alternative process flow more comprehensively.

## 4.3. Nested process

## Nested process

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Figure 4-28. Nested process

The last category of activities that are used in IBM Web Process Designer is the nested process category.

Activities that are gleaned from process documentation are not always going to be tasks that effectively communicate the business process in a simple manner. To judge communication simplicity and effectiveness of the process model, many users use the following guideline:

Clearly and easily communicate processes in 5 minutes or less at any level of granularity.

## Activity: Nested process



The BPMN element representation of an activity that is a nested process is a rectangle with rounded corners and a (+) plus sign in a square at the center

- Decomposition helps provide details for a business process with a series of processes that are connected at a high level to child definitions (nested processes)
- Activities are decomposed into nested processes until single tasks are represented

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Figure 4-29. Activity: Nested process

### Decomposition

To achieve a level of effective communication of the process model, authors use decomposition to judge whether they are at simple abstractions of the model with single logical units of work for activities. Decomposition is basically showing details for a business process with a series of process model definitions that are connected at high level to child definitions.

In essence, a flow object activity is also used as a container of a child definition, which in turn can have activities that also contain child definitions. When the activities within the child definition represent logical units for work or tasks for each activity, decomposition is no longer necessary.

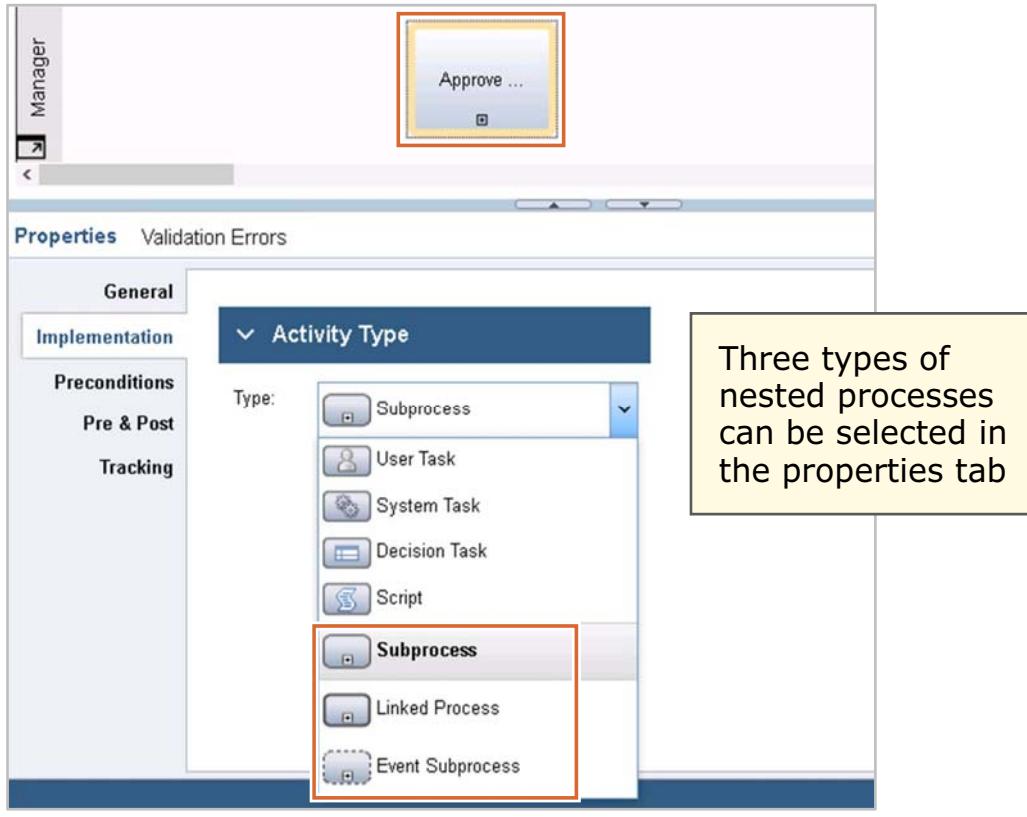
Child definitions in process models are called nested processes.

### Is decomposition always necessary for process modeling?

Decomposition is necessary only if the process model is too complex to communicate the details of the business process, and the activities do not necessarily equal logical units of work. If the process documentation produced the information that led to a simplified process, it would not be necessary to decompose.



## Activity: Nested process types (1 of 2)



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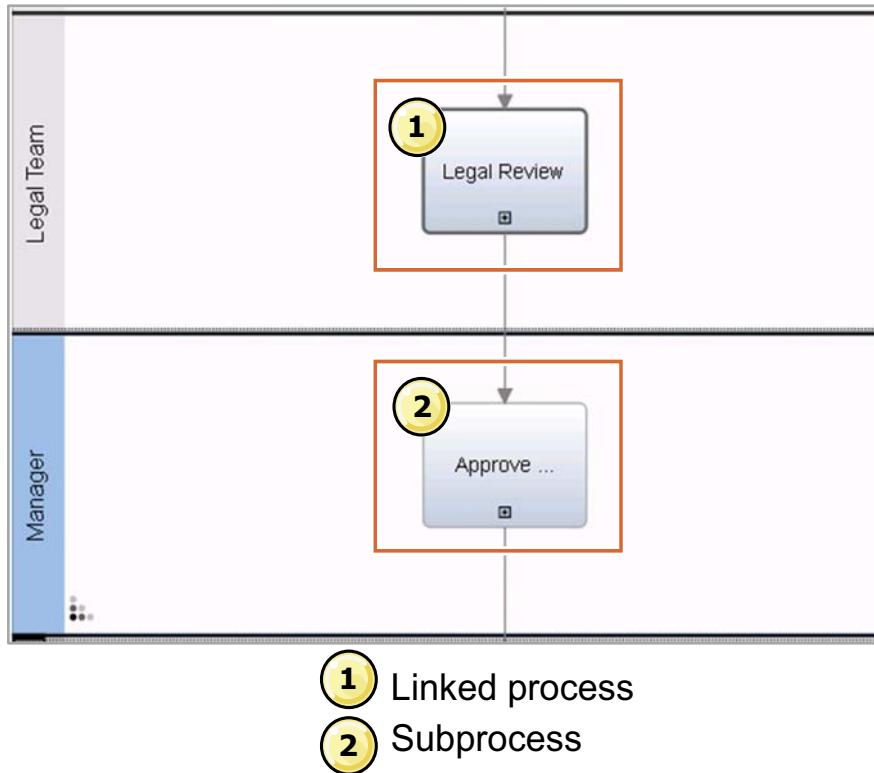
Figure 4-30. Activity: Nested process types (1 of 2)

All nested process activities indicate their type in two different ways. They have a plus sign with a square symbol in the center to indicate that they are a nested process and not a task-type activity. Also, each type of nested process activity has a distinct activity outline to further designate its type.

The three types of nested process activities are subprocess, linked process, and event subprocess.

The first two, subprocess and linked process, are more common than the event subprocess, which is a specific case. You focus on the first two in this course.

## Activity: Nested process types (2 of 2)



- 1 Linked process
- 2 Subprocess

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Figure 4-31. Activity: Nested process types (2 of 2)

### 1. Linked process:

A linked process is an activity with a plus sign and square in the center, and a dark bold line encompasses the activity.

This type of process might be thought of more as separate from the original process than as a subprocess. Think of two processes that are linked when using this type of nested process. You can reuse this type of process in many different parent processes. An example might be a legal review that can be used in several different insurance claims processes. If your legal review is the same in an auto insurance claim and in a property insurance claim, you would want to choose a linked process for the legal review.

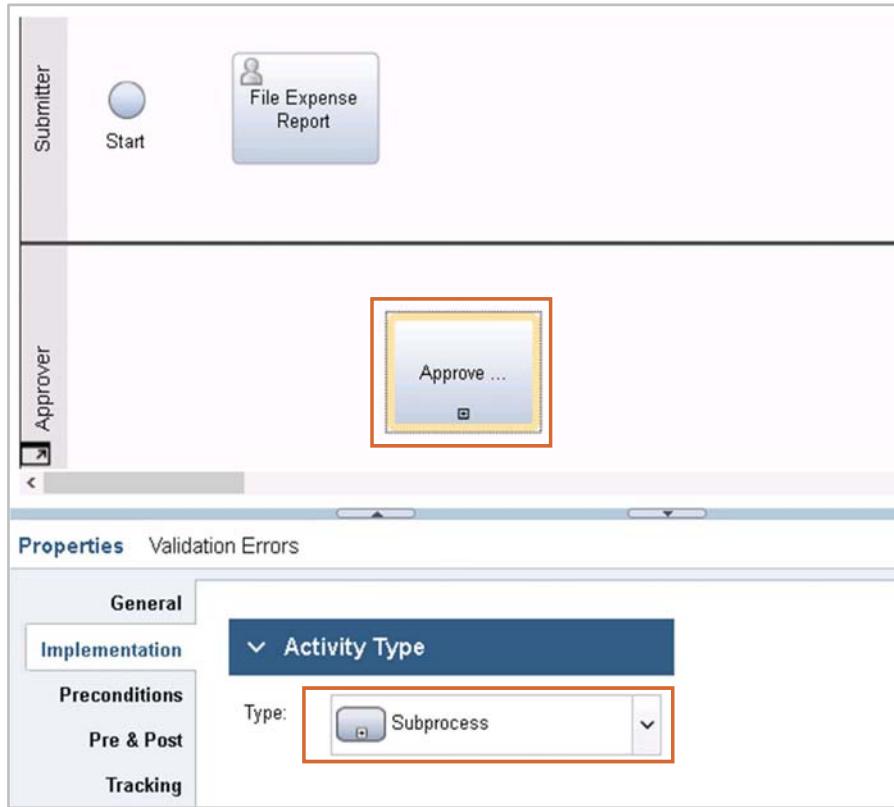
### 2. Subprocess:

A subprocess is an activity with a (+) plus sign and square in the center, and a normal single line encompasses the activity.

This type of nested process can be thought of as a subset of the original process. Sometimes, you might hear it called an embedded process. You cannot reuse this type of nested process, so think of reuse when choosing this type of nested process. If at any time the nested process might be reused in another process, then choose a linked process instead.

You can think of a subprocess as hiding several activities from view so you can achieve your goal of communicating your process in 5 minutes or less. Subprocesses also work well with the parent data model to pass along data values. Data and data models are explained in more detail in a later unit in this course that deals with implementation of the process model.

## Subprocess example (1 of 2)



Playback 0: Modeling the to-be business process

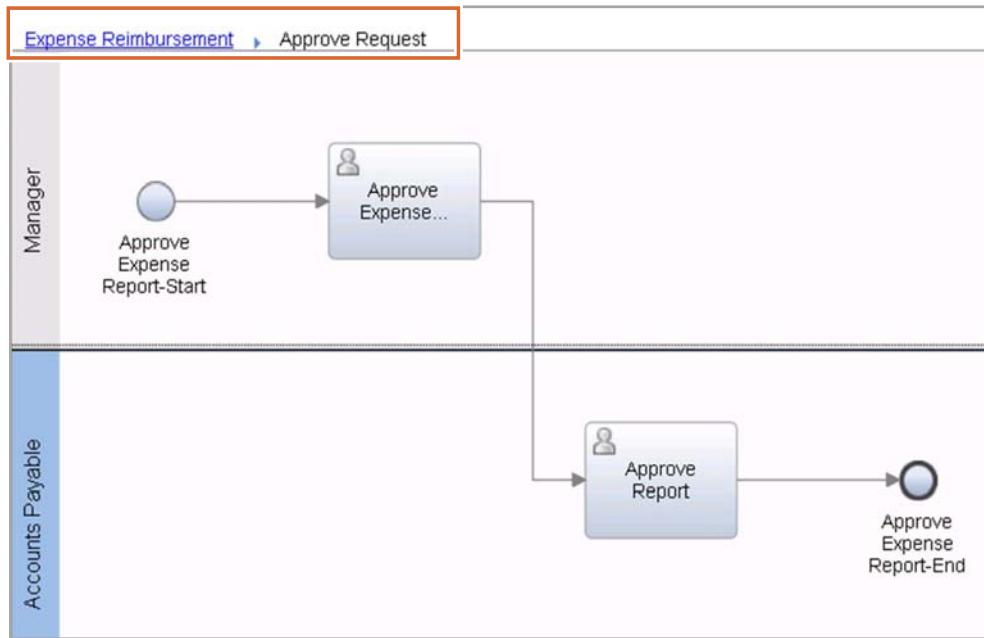
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Figure 4-32. Subprocess example (1 of 2)

Notice that instead of two approval tasks, there is now one nested process activity to represent the logical unit of work: Approve Expense Report.

After consulting with the business, it is determined that this process is unique, and it is not reused. For this reason, it is a subprocess type of activity. After renaming the activity, select the activity and choose **Subprocess** from the **Properties > Implementation > Activity Type** section.

## Subprocess example (2 of 2)



- A subprocess has breadcrumb navigation back to its parent process
- The start, end, and activities in a subprocess must have unique names

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Figure 4-33. Subprocess example (2 of 2)

When you double-click the activity, the subprocess shows. Then, create the model for the subprocess, copying the former activities. Notice the breadcrumb trail at the top so you can go back to the top-level process.

In the second process, the teams are narrowed down to two. Notice that the system lane does not exist in the nested process.

## Demonstration

This demonstration covers the following topics:

- Creating a process
- Modeling teams
- Model task-type activities and events
- Nested processes and decomposition

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*Figure 4-34. Demonstration*

This demonstration is stored as the `demo2.mp4` file that is in the `C:\labfiles\demo` folder.

### Create a process:

1. Open the appropriate process application in IBM Web Process Designer.
2. Hover over the **Processes** library heading and click **+**.
3. Select **Process** from the option.
4. Type the name and click **Finish**.

### Model lanes:

1. Drag the lane icon from the element palette to add the necessary participant lanes to the two default lanes (participant and system) provided.
2. Click the lane and change the lane name on the properties tab to correctly model the teams.

### Model task-type activities and events:

1. Drag activities and place them in the participant lanes in the correct flow of the process.
2. Name the activities with a verb-noun naming convention.
3. Change the type of activity in the implementation section, if necessary.

4. Add any events to the participant lanes.
5. Connect the flow objects (events and activities) from top to bottom and from left to right.

**Model and decompose a nested process:**

1. Combine any initial workflow steps into process model tasks when necessary.
2. Decide whether you need a subprocess or a linked process.
3. Nest any business process definitions as needed.

## Unit summary

- Describe the purpose and function of Blueworks Live
- List and describe the core notation elements that are used in IBM Web Process Designer
- Examine a defined workflow from detailed process requirements and identify the interrelated process activities and the roles that are responsible for completing them
- Decompose activities into processes and nested processes that contain process tasks
- Create a process, nested process tasks, and responsible roles

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Figure 4-35. Unit summary

## Review questions

1. True or False:  
Automation is the first order of business in process modeling.
2. True or False:  
BPMN is a standard flow chart-based notation for defining business processes.
3. \_\_\_\_\_ represents a single task that a process participant accomplishes from start to end.
  - A. Process
  - B. Pool
  - C. Activity
  - D. Lane
4. \_\_\_\_\_ are control flow objects for a process model.
  - A. Pools
  - B. Lanes
  - C. Events
  - D. Task

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Figure 4-36. Review questions

Write your answers here:

- 1.
- 2.
- 3.
- 4.

## Review answers

1. False. Merely automating a business process provides the opportunity to make a bad business process more efficiently bad.
2. True.
3. C: Activity
4. C: Events

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Figure 4-37. Review answers

## Exercise 2

### Playback 0: Creating a structured process

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Figure 4-38. Exercise 2

To accomplish the task of creating a process in IBM Web Process Designer, the process must have a process application to contain it. Using the Process Center, an author first creates a process application with all the appropriate information to enable creation of a process.

The Hiring Requisition process owner provided detailed information about the process and its current state to the BPM analyst, who in turn documented the information and the process for improvement. This step completed the process discovery and initial analysis, and now the process model can be created.

To accomplish the task of creating the initial process model, you complete it with a pool, lanes, and flow objects such as activities, events, and nested processes. Take the information that is provided in Unit 1 on the outcome of the process discovery and initial analysis, and translate that into a process. Your first task is to create a business process definition and name it according to naming conventions.

The Hiring Requisition process owner provided detailed information about the process and its current state to the BPM analyst, who in turn documented the information and the process for improvement. This step completed the process discovery and initial analysis, and now the process model can be created.

To accomplish the task of creating the initial complete process model, take the information that is provided in the exercise scenario and translate that into a process. In this activity, your task is to model and name the teams.

In this exercise, add the activities in the appropriate lanes and use sequence flow to connect the activities. Be sure to model the happy path (critical path) first. You learn about gateways and alternative flow in the next unit.

Complete decomposition on your process and create subprocesses or linked processes where you see opportunities for them.

## Exercise objectives

After completing this exercise, you should be able to:

- Create a nested process
- Create the foundation for a process by adding the appropriate lanes to the default pool
- Translate business process workflow steps that are documented in the process discovery and analysis into process model tasks
- Model the expected process flow for the initial process model
- Decompose business process workflow steps that are documented in the process discovery and analysis into process model tasks
- Create a subprocess or a linked process

---

# Unit 5. Playback 0: Controlling process flow

## Estimated time

01:30

## Overview

This unit covers the modeling of process flow, sequence flow, tokens, gateways, and intermediate events.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Describe process sequence flow and the runtime use of process tokens
- List and describe gateways as they are used in IBM Web Process Designer
- Explain how to evaluate conditions for a process gateway
- Model gateways in a process
- List and describe intermediate event types that are used in IBM Web Process Designer
- Model a business process escalation path with an attached timer intermediate event

[Playback 0: Controlling process flow](#)

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*Figure 5-1. Unit objectives*

## Topics

- About process flow
- About tokens
- About gateways
- Intermediate events

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Figure 5-2. Topics

## Key concepts in this unit

- **Process flow:** Encompasses both the normal, expected process path to completion, and alternative process paths that might occur with different process conditions or business rules
- **Tokens:** Describe how the process flows when the process is run
- **Gateways:** Used to control the flow of a process
  - Split, join, exclusive, inclusive, and parallel
- **Intermediate events:** An event that takes place between a start and an end event in the process
  - Sequence flow intermediate events: Message, content, timer, and tracking
  - Boundary (attached) intermediate events: Error, message, content, and timer

Playback 0: Controlling process flow

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Figure 5-3. Key concepts in this unit

## 5.1. About process flow

## About process flow

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Figure 5-4. About process flow

Comprehensive process models have one thing in common: they communicate process flow well. Process flow encompasses both the normal, expected process path to completion, and alternative process paths that might occur with different process conditions or business rules. To understand how to communicate both kinds of process flows in the process model, it is important to understand what types of sequence flow exist in process modeling and how to implement gateways.

## Normal sequence flow



Playback 0: Controlling process flow

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Figure 5-5. Normal sequence flow

### What is sequence flow?

Sequence flow is considered to be part of a category of connecting objects. These objects connect each element on the diagram to indicate the order in which elements are conducted.

Normal sequence flow is the simplest example of sequence flow: the connection of two flow objects. A plain arrow represents a normal sequence flow. It is the type of flow that was used when you connected elements in the last unit.

With normal sequence flow, the business process progresses to the next step in the process as soon as the first step is completed.

## Conditional sequence flow



- BPMN standards use a small diamond with an arrow to represent the conditional sequence flow
- IBM Process Designer does **not** show a small diamond with an arrow for the conditional sequence flow
  - It looks the same as a normal sequence flow in the process

[Playback 0: Controlling process flow](#)

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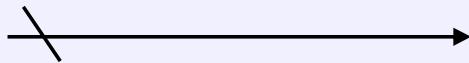
*Figure 5-6. Conditional sequence flow*

Conditional sequence flow is associated with gateways. Conditional expressions are evaluated to determine which path the flow is going to take. The difference between normal and conditional sequence flows is that conditional flows are not automatically followed; the condition must be met first.

The number of conditional flows that are followed is determined according to the type of element that is used and the requirements of the instance that is being processed.

An arrow with a diamond at the start of the arrow represents a conditional sequence flow.

## Default sequence flow



- A plain arrow with a backslash at the beginning of the flow line
- A default sequence flow is required and is automatically created when a conditional sequence flow exists
- The default sequence flow indicates a processing path to follow when none of the conditions on the conditional sequence flows are true
- The default sequence flow ensures that there is at least one processing path (the default path) for the business process to follow

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Figure 5-7. Default sequence flow

When using conditional sequence flow in IBM Process Designer, a default flow is required. The default flow indicates a processing path to follow when none of the conditions on the conditional flows are true. It allows at least one path of processing (the default path) for the business process to follow.

This type of sequence flow has a slash added to the beginning of the flow line. You notice when you draw sequence flows to and from certain elements that the slash immediately shows.

## 5.2. About tokens

## About tokens

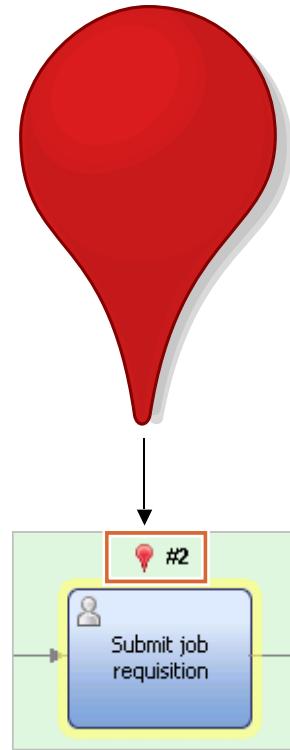
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Figure 5-8. About tokens

Tokens are used to describe how the process flows when the process is run.

The indication of a token on a step identifies the location of active processing steps of that business process.

## What is a token?



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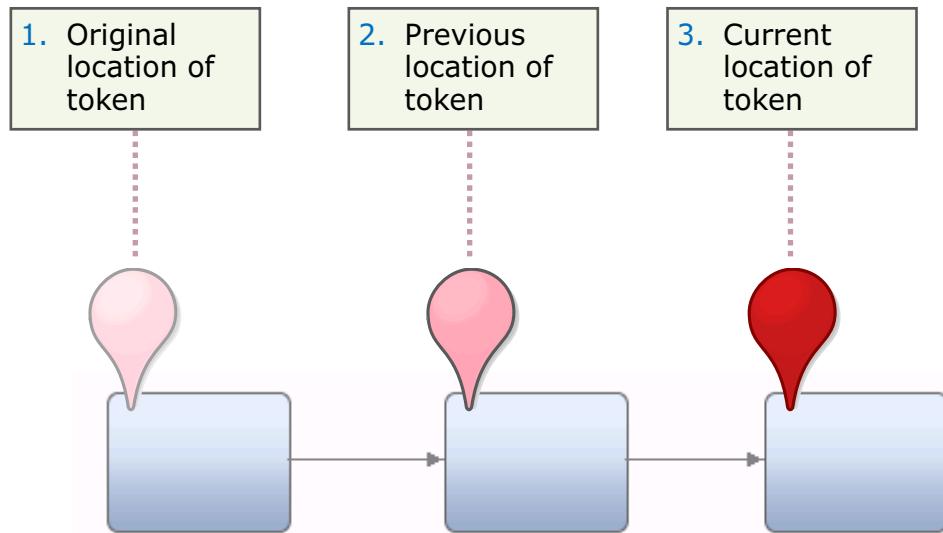
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Figure 5-9. What is a token?

A token is used in two ways:

- To display to developers, designers, and business the task it is completing.
- To help in understanding the flow through a business process, which is based on the type of gateway that is chosen at the design stage and different use case scenarios. Tokens can help to determine whether the correct gateway is selected based on the business requirements.

## Traverses the flow objects

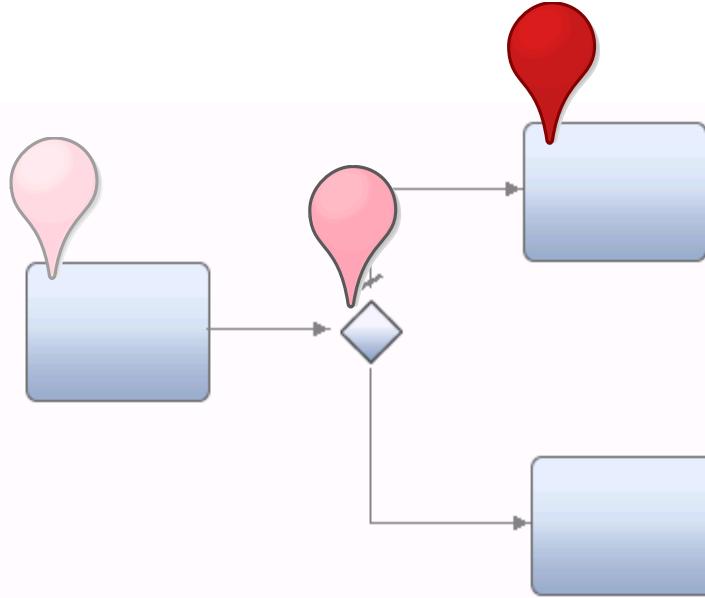


Note: The different shades of the token that you see in this course are for class illustration purpose, and only the current location of the token displays in the process in the tool

*Figure 5-10. Traverses the flow objects*

Here is an example of serial processing along with the explanation for the placement of the token. As each step is completed, a token identifies the next step that is required until the path of processing reaches an end event. In this case, the third step is active, which shows the red token on that step. The two previous steps are completed in order, and the lighter colored tokens are emphasizing that fact.

## Diverted through alternative paths



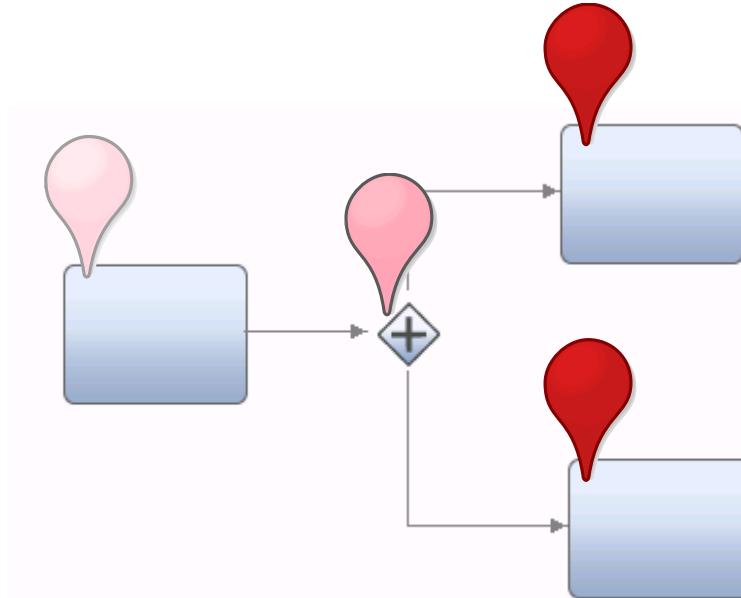
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Figure 5-11. Diverted through alternative paths

Tokens can help in the understanding and identification of a particular path of processing that an instance takes. In this slide, you see that by tracking how the token gets diverted through alternative paths, the sequence flow that the use case requires is definable.

## Split into parallel paths



- A parallel gateway is used here, and is covered later in this unit

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Figure 5-12. Split into parallel paths

In many situations, more than one step within a business process can be active. The token allows the identification of all active steps of a business process. Each active step within the business process is highlighted or shown with a token. Here you can see that after the token passed through the gateway, the business conditions required that two steps of the business process must be run concurrently.

## 5.3. About gateways

## About gateways

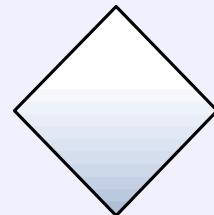
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Figure 5-13. About gateways

Often, a gateway is used to control the flow of a process.

## Represented as a diamond



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*Figure 5-14. Represented as a diamond*

A gateway is represented as a diamond.

## Can be thought of as a question



Is loan approved

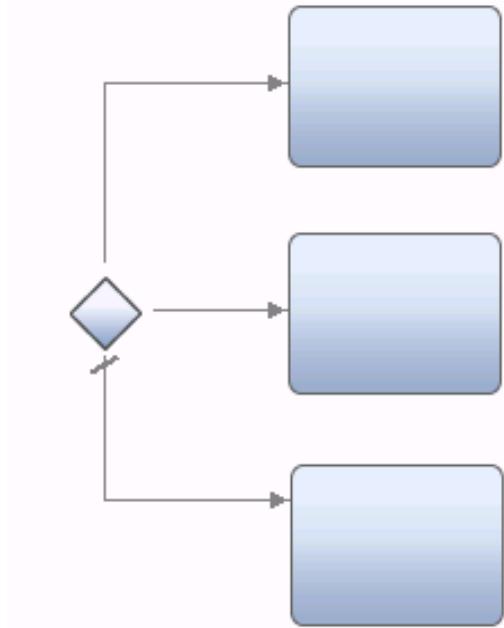
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*Figure 5-15. Can be thought of as a question*

Often, a gateway is representative of a question that is asked at a particular point in a process. When you label the gateway, you automatically assume that the label is a question, so the question mark at the end of the question is implied.

## Has a defined set of alternative answers



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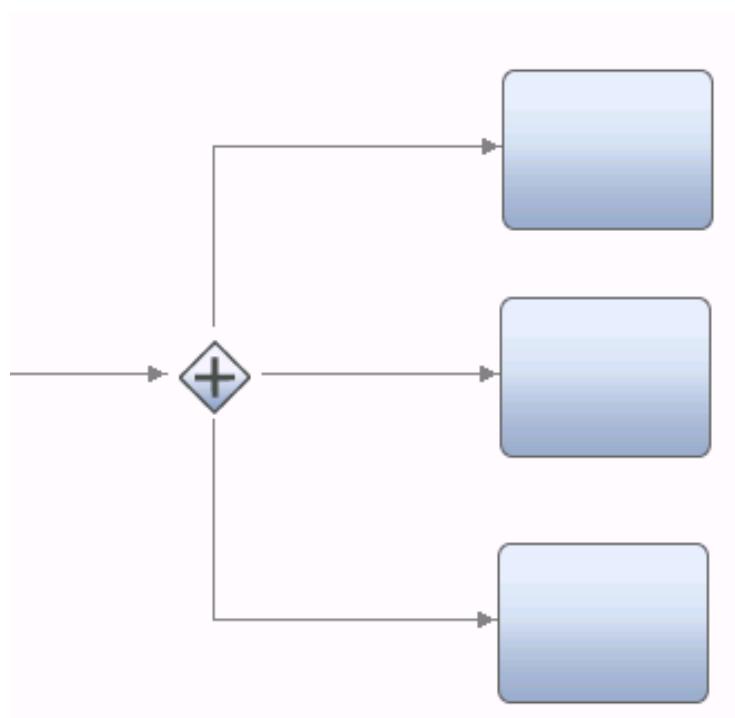
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Figure 5-16. Has a defined set of alternative answers

The question has a defined set of alternative answers. All of the answers can be thought of as gates that are keeping the process from continuing until a valid answer is provided for the question.

Gateways control the divergence and convergence of sequence lines, determining branching and merging of the paths that a process can take.

## Two distinct modes: Split



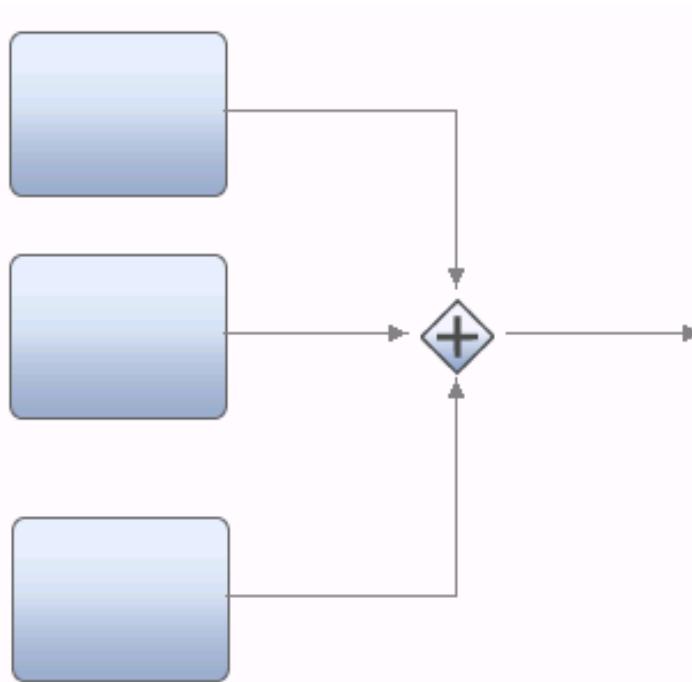
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Figure 5-17. Two distinct modes: Split

Typically, gateways have two distinct modes. One mode is that a gateway can split an incoming path into multiple outgoing paths. It is known as a split.

## Two distinct modes: Join



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Figure 5-18. Two distinct modes: Join

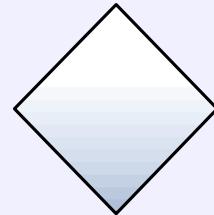
The second mode for a gateway is that it can merge multiple incoming paths into one outgoing path. It is known as a join.

In IBM Process Designer, an exclusive gateway is not used to join multiple tokens. Inclusive and parallel gateways allow for joins to be used.

When using gateway splits and joins, keep in mind the following information:

- Gateway splits allow for activities to occur at the same time.
- In some situations, an action or actions must not proceed until a set of previous activities are completed. An example of this gateway is a summary task of the results of previous actions.
- For this example situation, you need an accompanying join to make the process work in a simple, sensible manner. It also makes the process diagram easy to understand by various audiences.
- A good rule to remember is that when modeling splits and joins, you have one token into the process and one token out of the process.

## Exclusive: Diamond shape with no internal marker



Exclusive  
gateway

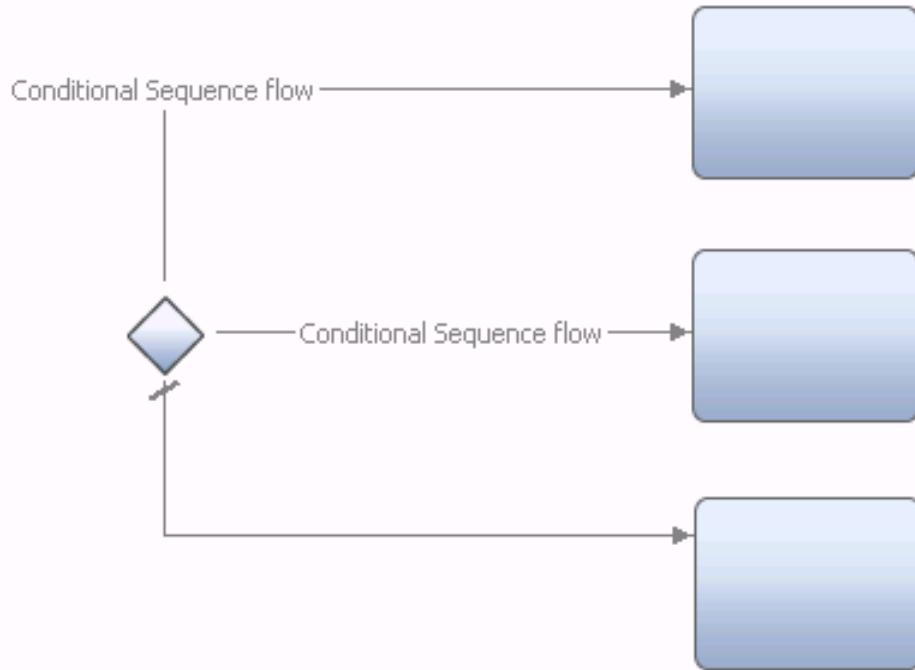
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Figure 5-19. Exclusive: Diamond shape with no internal marker

The first type of gateway you examine is the exclusive gateway. This gateway is sometimes called an XOR gateway. If you want to send the process flow along only one of the available sequence flows, use an exclusive gateway.

## Exclusive: One or more outgoing conditional sequence flows



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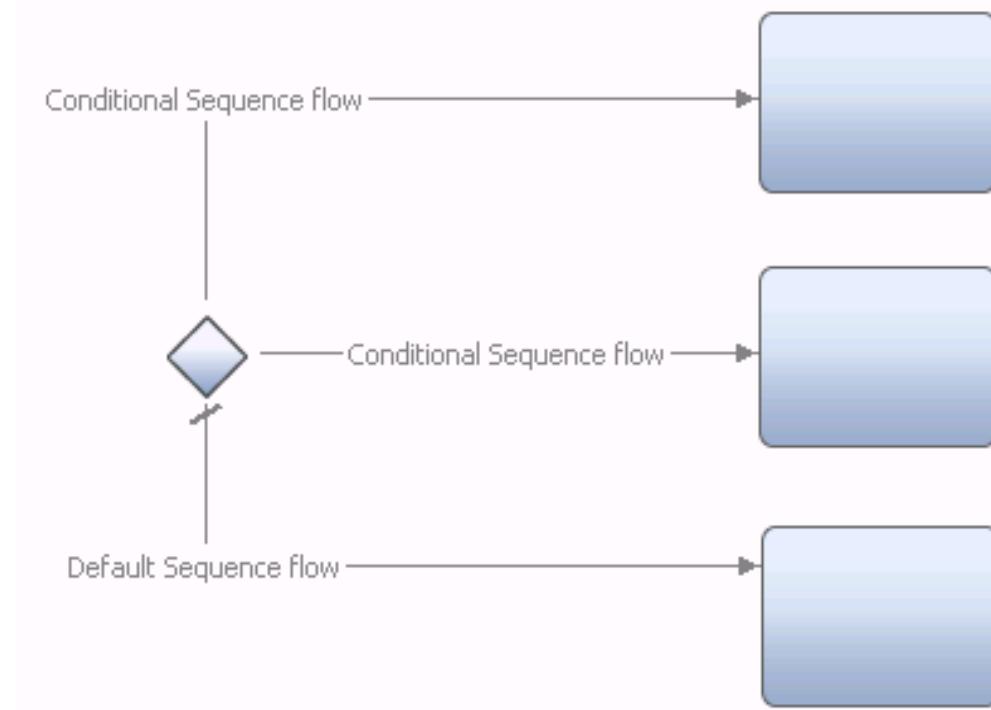
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Figure 5-20. Exclusive: One or more outgoing conditional sequence flows

Outgoing sequence flow conditions are evaluated from top to bottom as defined in the properties tab of the gateway.

- It is a good practice to model exclusive gateways so that only one outgoing sequence flow condition can be true.
- After a business process condition is met, that conditional sequence path is followed, and evaluation of subsequent outgoing sequence flow conditions stops.
- If no conditions are met, the default processing path is followed.

## Exclusive: Default sequence flow



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Figure 5-21. Exclusive: Default sequence flow

Because this gateway uses conditional sequence flow, an outgoing default sequence flow (a line with no condition) must be modeled with exclusive gateways. It allows the process to proceed even if none of the conditions on the conditional processing paths evaluate to true.

## Process narrative

### Submit auto damage claim:

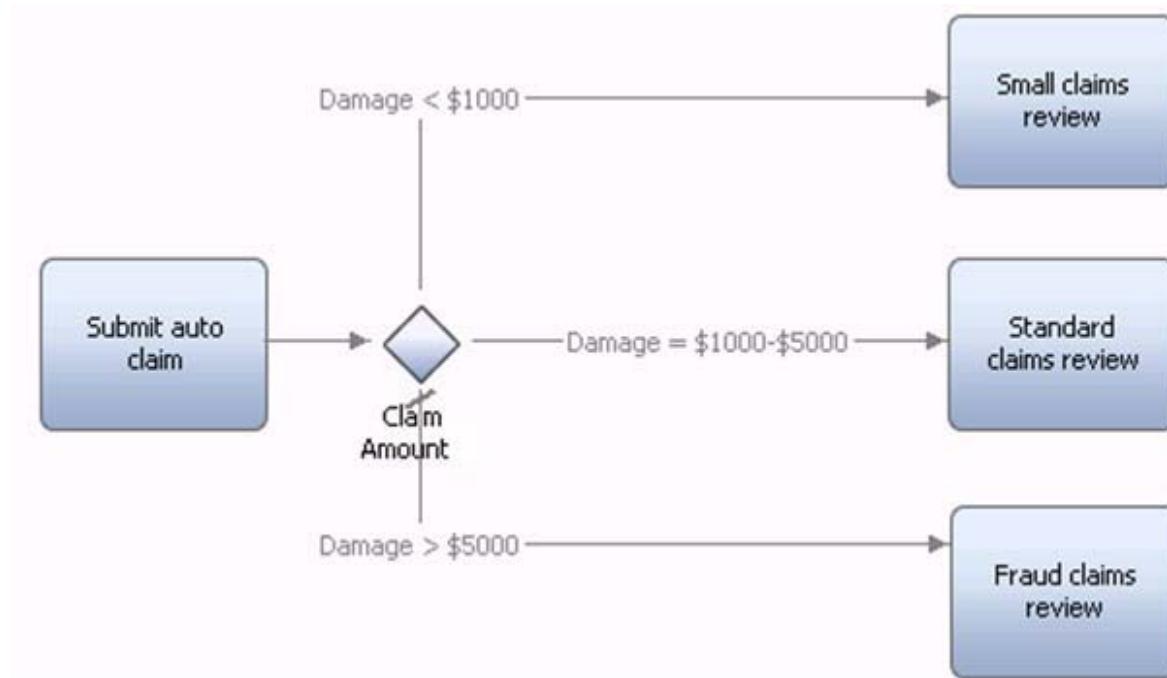
- If claim amount is less than \$1000, conduct a small claims review
- If claim amount is \$1000 to \$5000, conduct a standard claims review
- If claim amount is greater than \$5000, conduct a fraud claims review

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Figure 5-22. Process narrative

## Submit auto claim example (1 of 6)



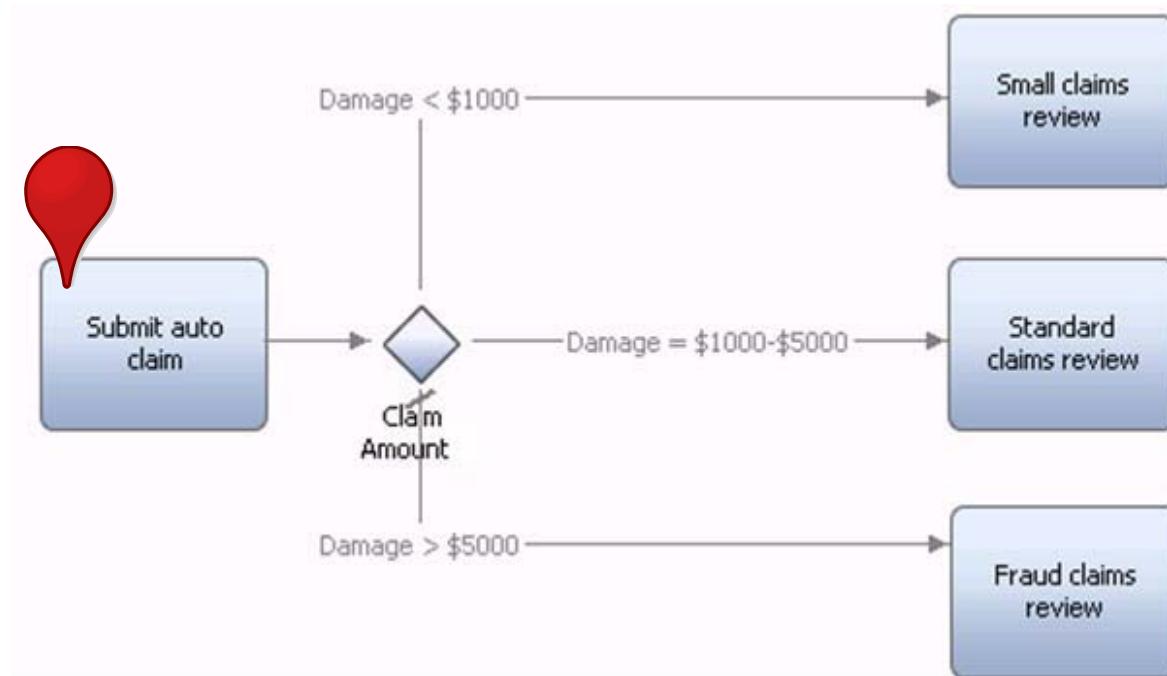
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Figure 5-23. Submit auto claim example (1 of 6)

This example has an exclusive gateway. The activity labels are not all verb-noun pairings. Sometimes the available space is not enough for a full name. If it happens this way during your modeling, the key is to make sure that your labels communicate the process clearly.

## Submit auto claim example (2 of 6)



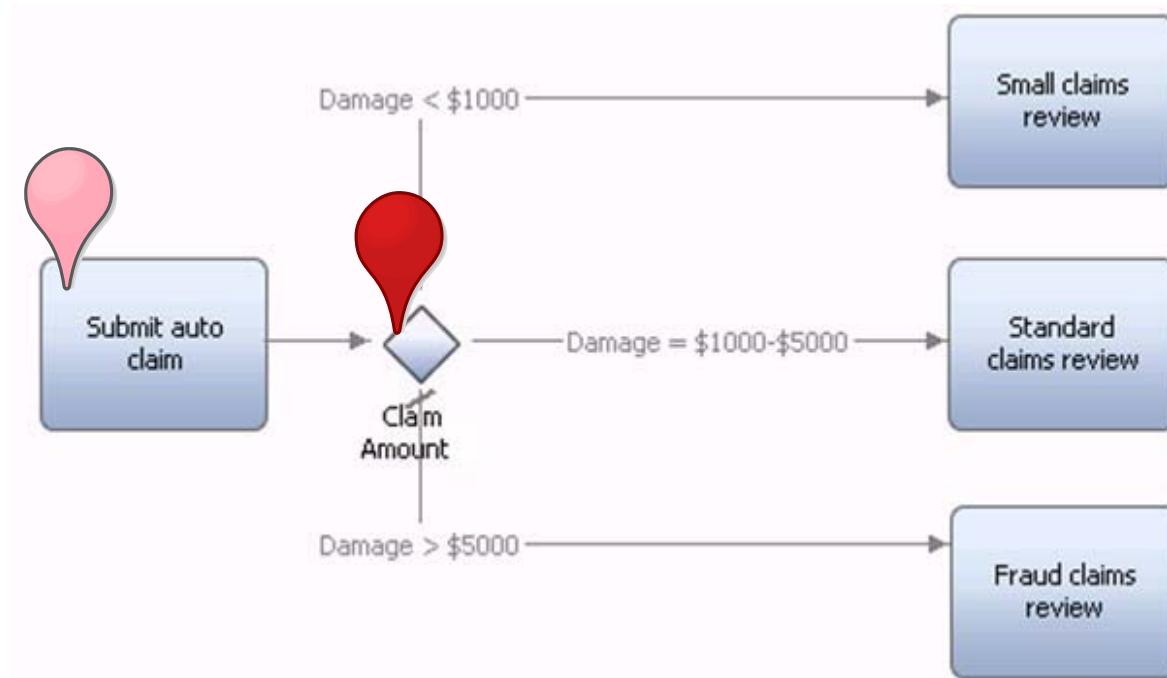
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Figure 5-24. Submit auto claim example (2 of 6)

This diagram shows an example with tokens.

## Submit auto claim example (3 of 6)



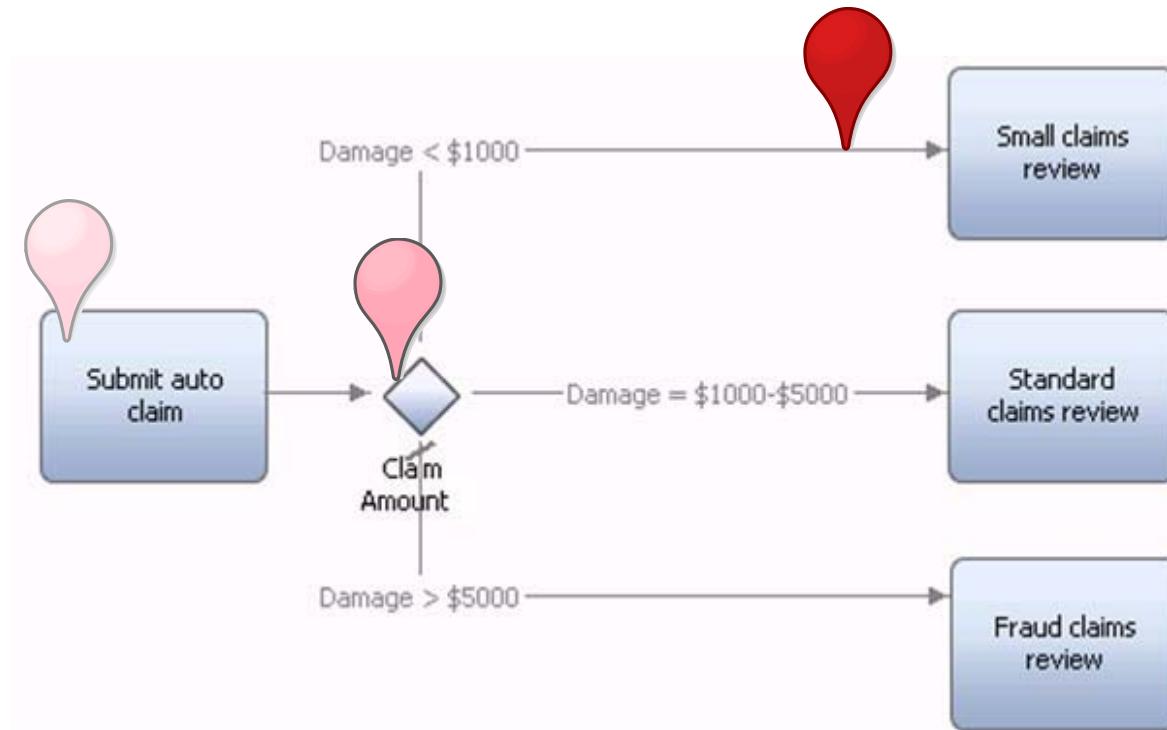
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Figure 5-25. Submit auto claim example (3 of 6)

The lighter tokens show where the token was. These lighter tokens are shown to further understanding and are not part of the software. The red token indicates where the token is. When the user submits the auto claim, the token flows to the decision gateway. The logic in the decision gateway examines the claim amount, and the token moves to the appropriate flow, depending on the rules that are embedded in the gateway.

## Submit auto claim example (4 of 6)



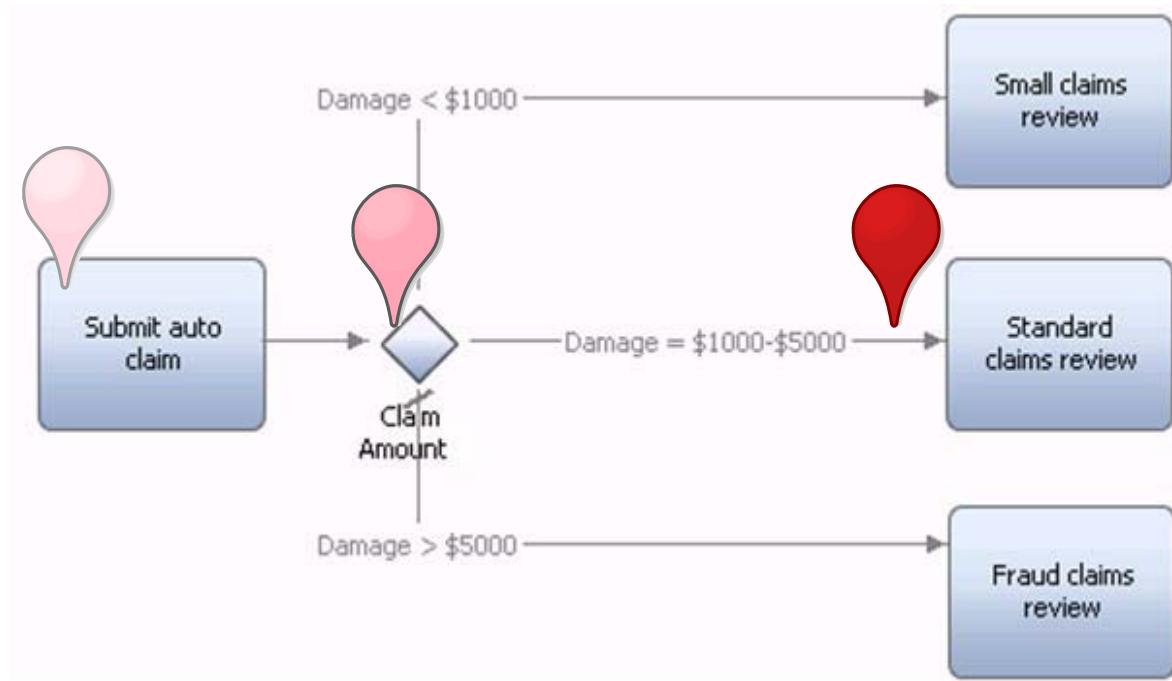
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Figure 5-26. Submit auto claim example (4 of 6)

This path is taken if the claim is under \$1000.

## Submit auto claim example (5 of 6)



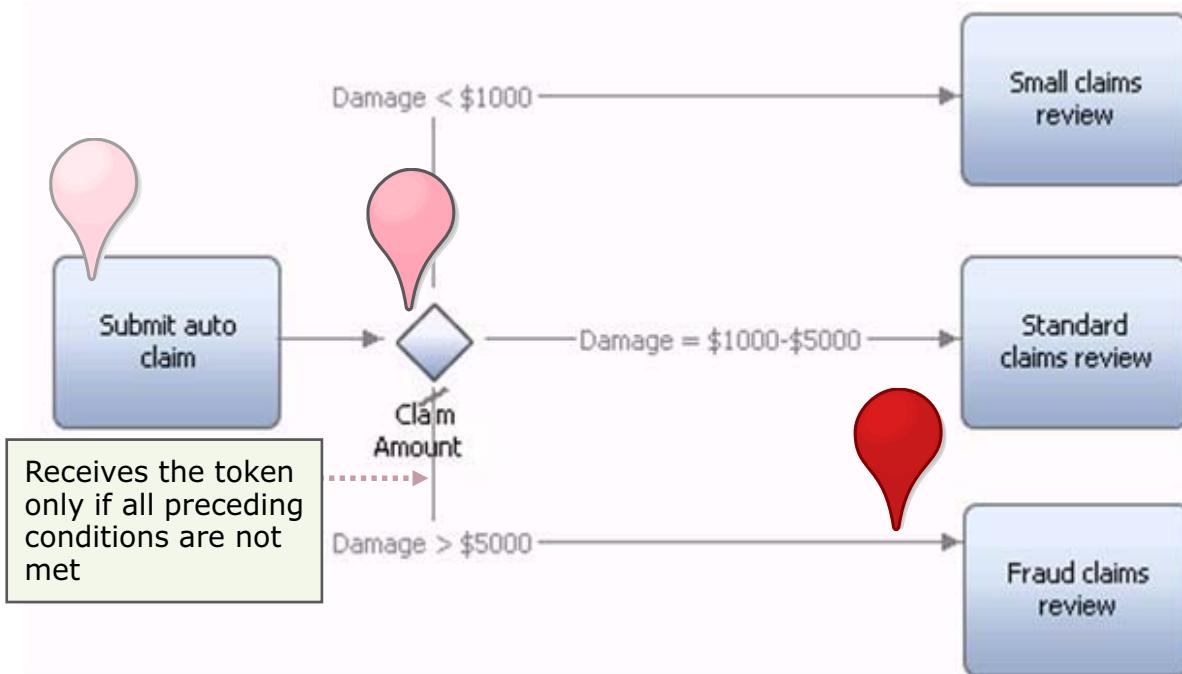
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Figure 5-27. Submit auto claim example (5 of 6)

This path is taken if the claim is between \$1000 and \$5000.

## Submit auto claim example (6 of 6)



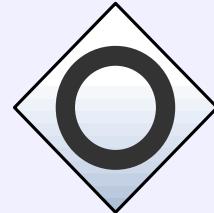
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Figure 5-28. Submit auto claim example (6 of 6)

The default sequence flow is taken if the rest of the conditions are not met. Even though the flow is labeled as `Damage > $5000`, the gateway evaluates only the top two conditions. When none of the conditions evaluate to true, the default sequence flow is followed.

## Inclusive: Diamond shape with an internal circle



Inclusive  
gateway

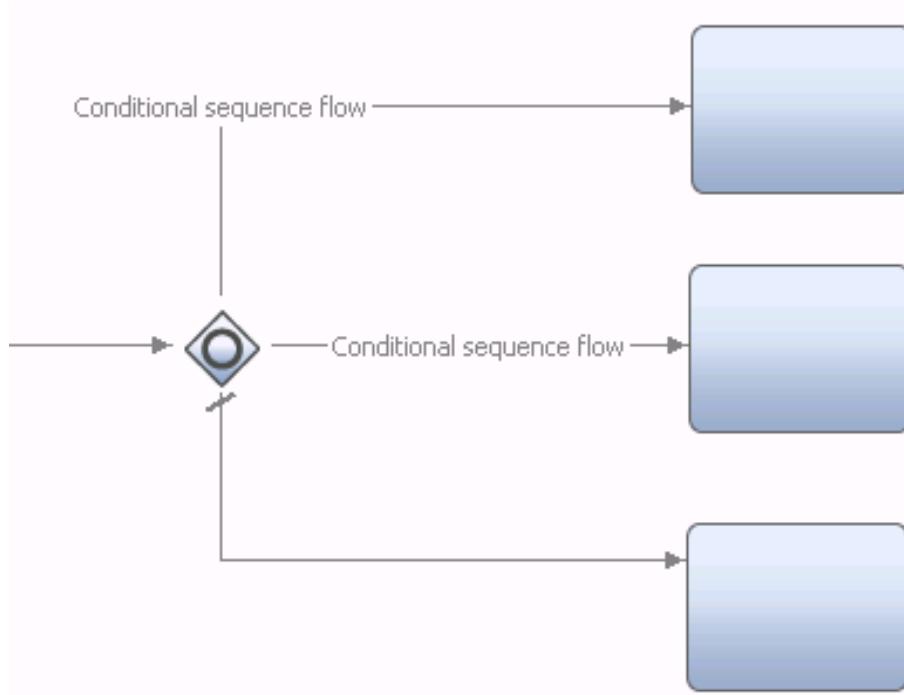
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Figure 5-29. Inclusive: Diamond shape with an internal circle

The next type of gateway is the inclusive gateway. This gateway can be used as either a split or a join. To distinguish the usage, it is called the inclusive split gateway or inclusive join gateway.

## Inclusive split: One or more outgoing conditional sequence flows



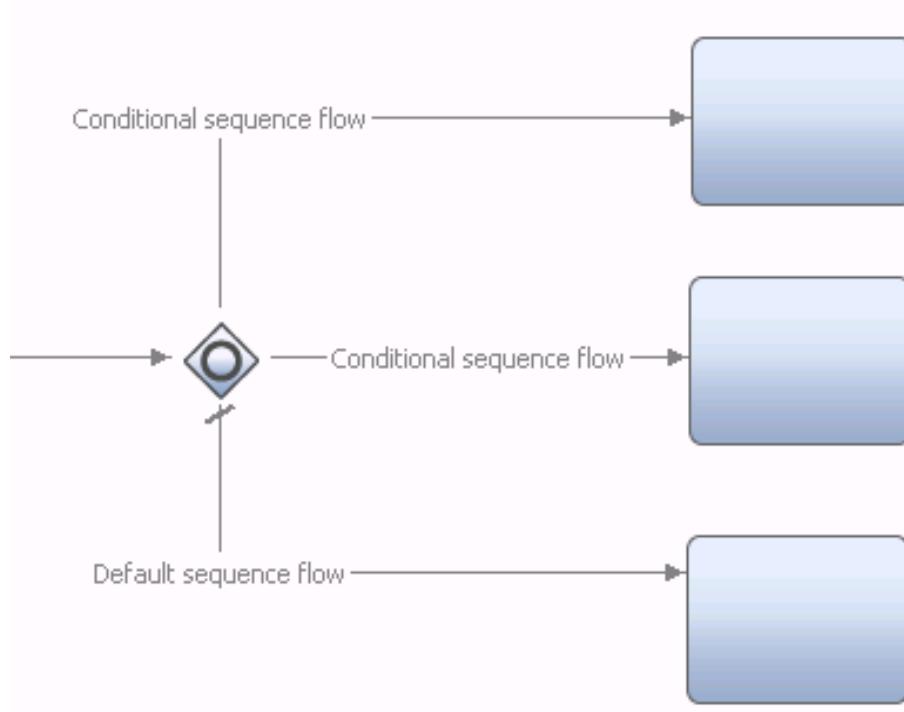
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Figure 5-30. Inclusive split: One or more outgoing conditional sequence flows

A gateway that is used to move the process flow along one or more conditional sequence flows is called an inclusive split gateway. Each conditional sequence flow is evaluated in turn, and each one that evaluates to true is followed. This type of evaluation means that the inclusive split can cause parallel processing to occur within a business process.

## Inclusive split: Default sequence flow



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Figure 5-31. Inclusive split: Default sequence flow

This type of gateway also uses conditional sequence flow so an outgoing default sequence flow (a line with no condition) must be modeled with conditional gateways. The default sequence flow is followed only if none of the preceding conditions are true.

While both exclusive gateways and inclusive splits evaluate conditions, they behave differently. The exclusive gateway allows a process to take only one of the available paths, while an inclusive split can allow it to take one or more conditional paths. The default sequence flow works the same in both gateways; the default sequence flow is followed only if **all** of the conditional sequence flows evaluate to false.

The same inclusive gateway also has a join function, and it is called an **inclusive join gateway**. It can be used to bring together multiple processing paths and “join them together.” This gateway is useful when a previous gateway caused parallel processing paths to occur in the business process, and they are now required to be joined to be able to complete a common business activity.

The inclusive join has the following capabilities:

- Any number of incoming sequence flows can be modeled.
- The inclusive join is able to determine which of these sequence flows are live.
- After all live incoming sequence flows reach the inclusive join, the outgoing sequence flow is followed.

- The inclusive join is able to determine whether an incoming sequence flow is no longer live and no longer waits for it.

## Process narrative

### Building damage report process:

- When damage occurs to the building, the facilities manager must submit a damage report
- If fire damages the building, the fire department must be notified
- If the amount of damage is greater than \$5000, the insurance agent must be notified
- The building manager must always be notified

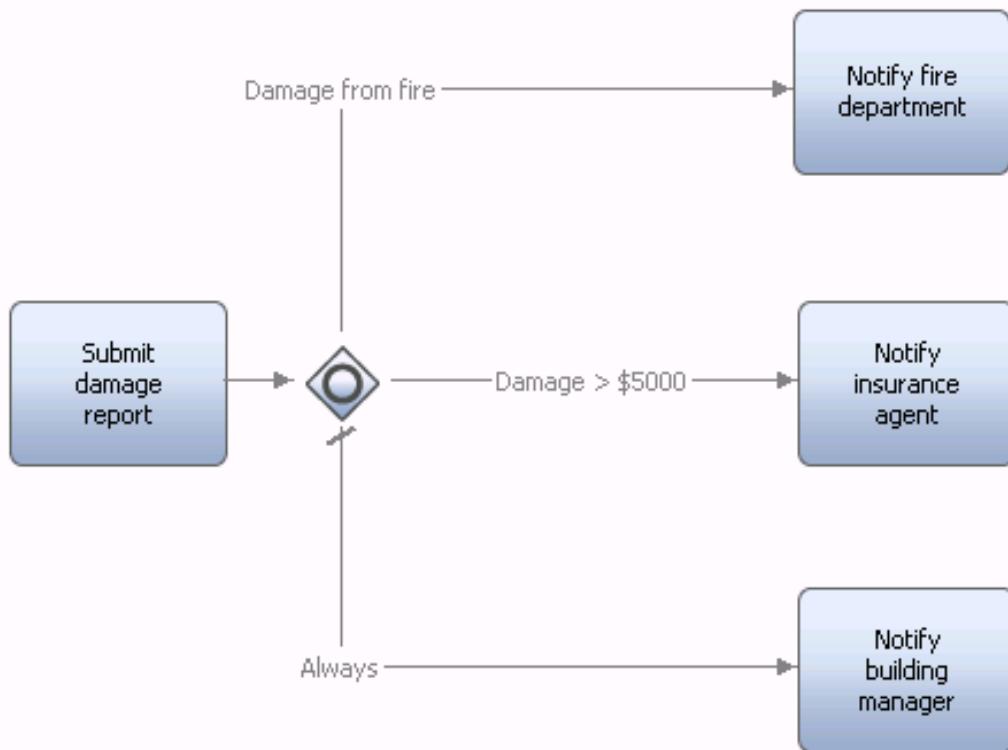
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*Figure 5-32. Process narrative*

You can try modeling the narrative by using BPMN.

## Damage report example (1 of 8)



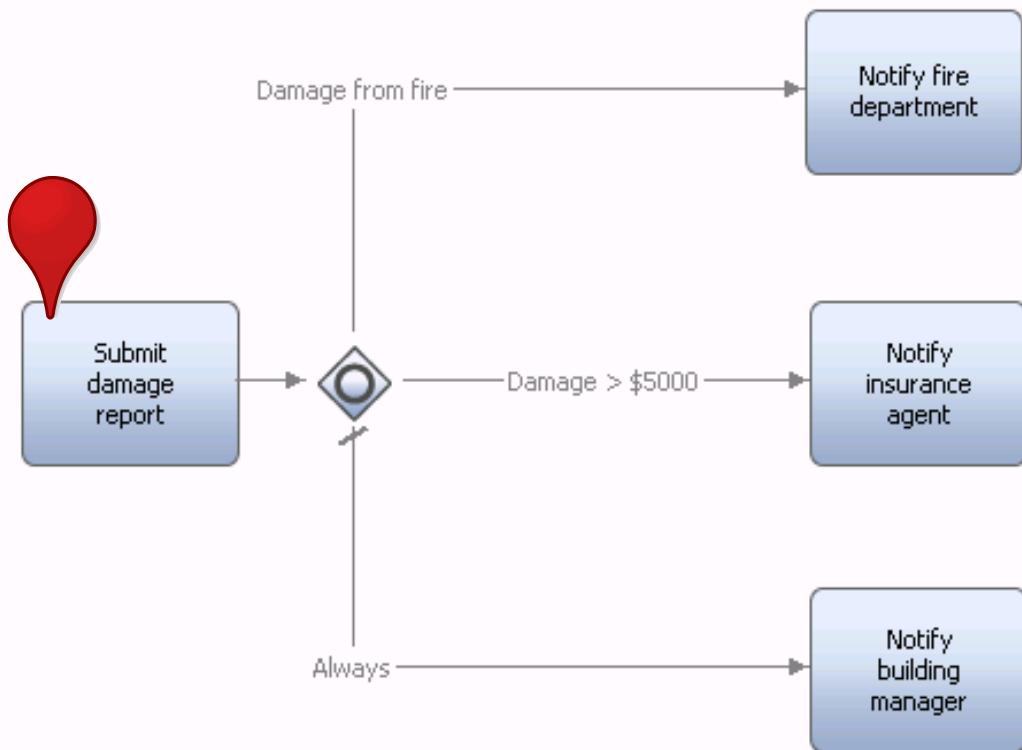
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Figure 5-33. Damage report example (1 of 8)

Consider this example of the model with the inclusive gateway.

## Damage report example (2 of 8)



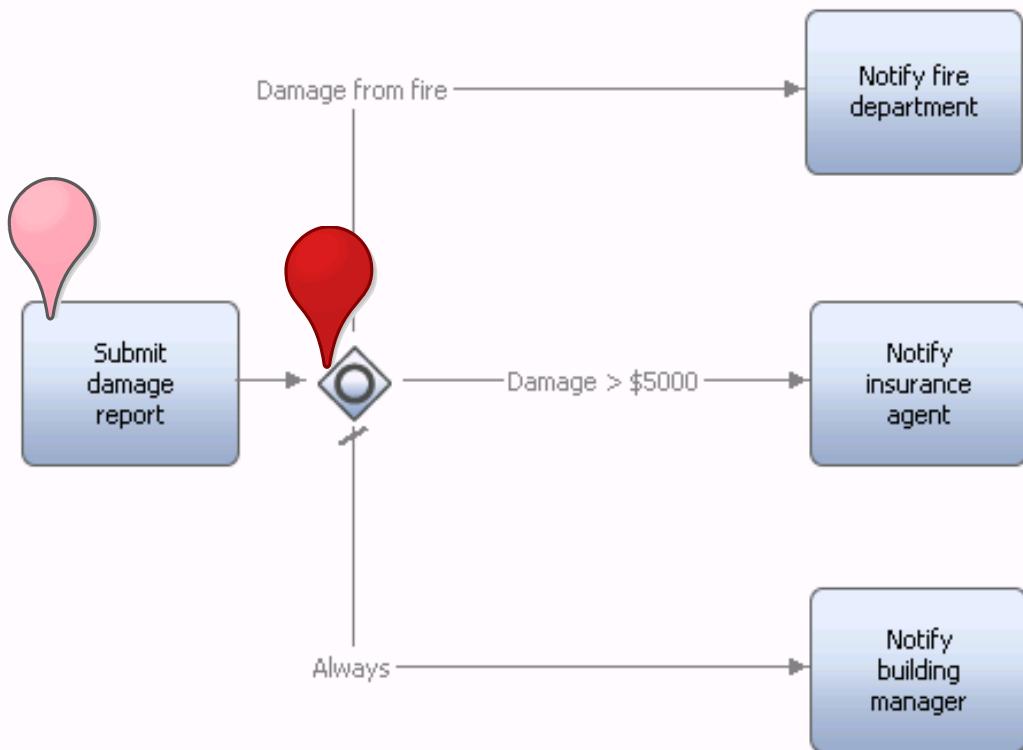
Playback 0: Controlling process flow

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Figure 5-34. Damage report example (2 of 8)

Follow the tokens.

## Damage report example (3 of 8)



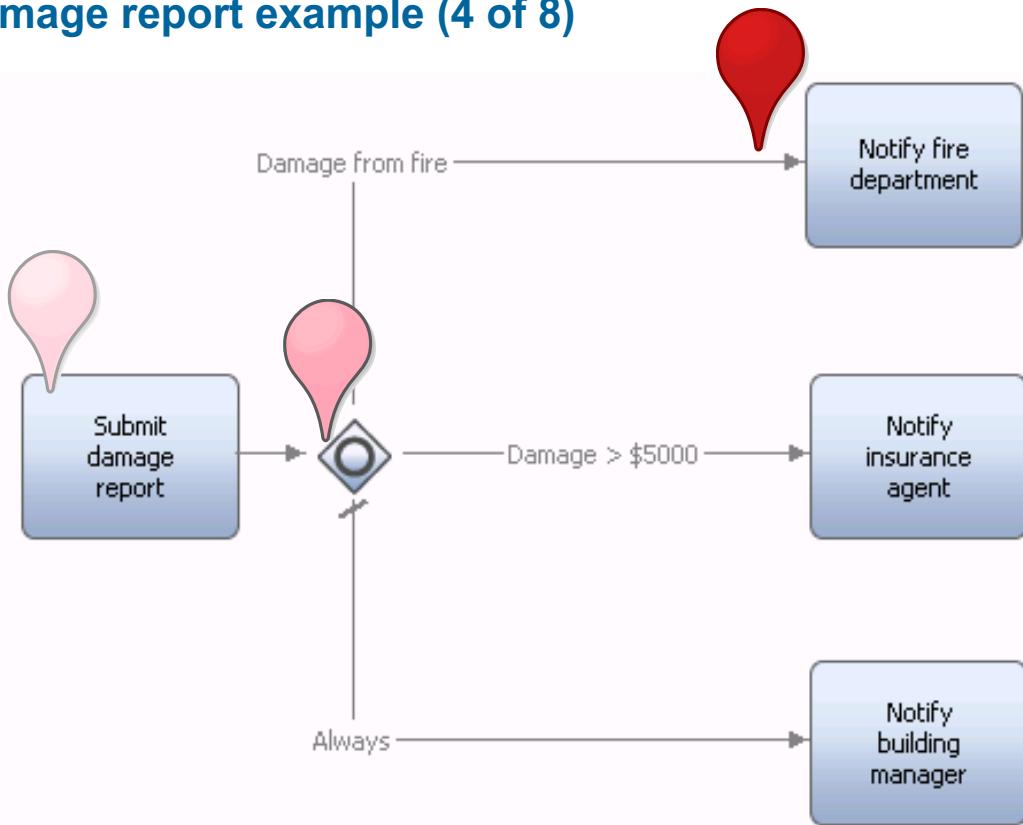
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Figure 5-35. Damage report example (3 of 8)

Now the token is at the gateway.

## Damage report example (4 of 8)



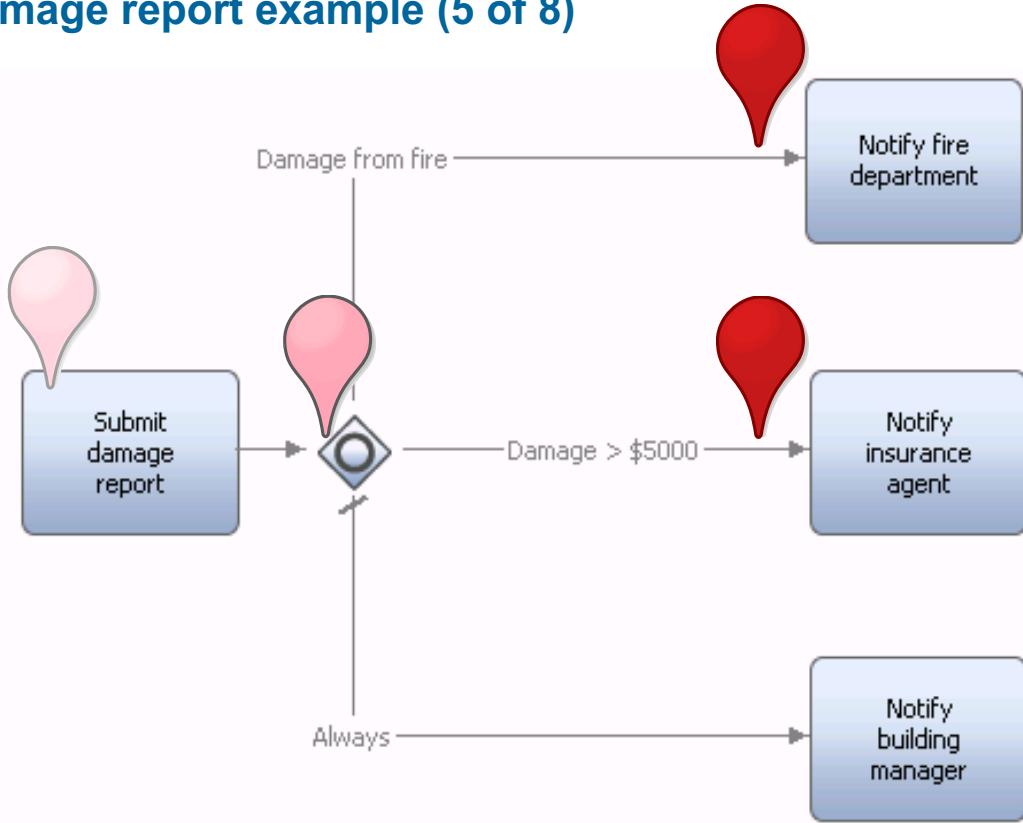
Playback 0: Controlling process flow

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Figure 5-36. Damage report example (4 of 8)

The token takes the path if the damage is from the fire only. In this case, the second condition is not met because the damage is under \$5000.

## Damage report example (5 of 8)



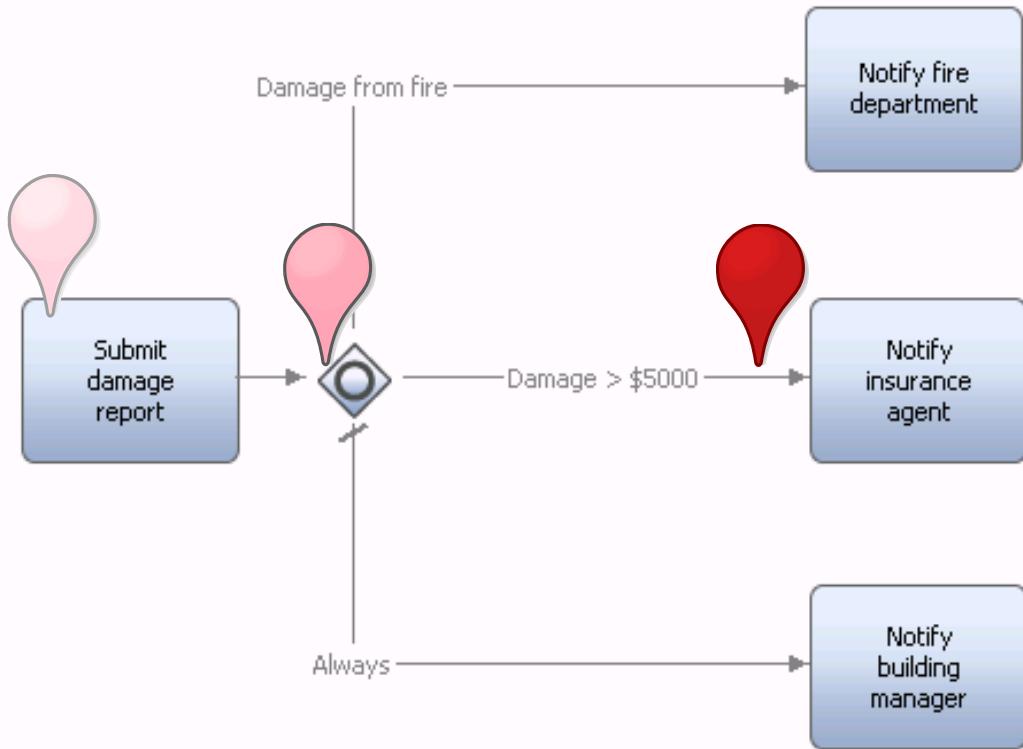
Playback 0: Controlling process flow

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Figure 5-37. Damage report example (5 of 8)

The token meets both conditions if the damage is from fire and the damage is over \$5000. In this case, the fire department and insurance agent are notified.

## Damage report example (6 of 8)



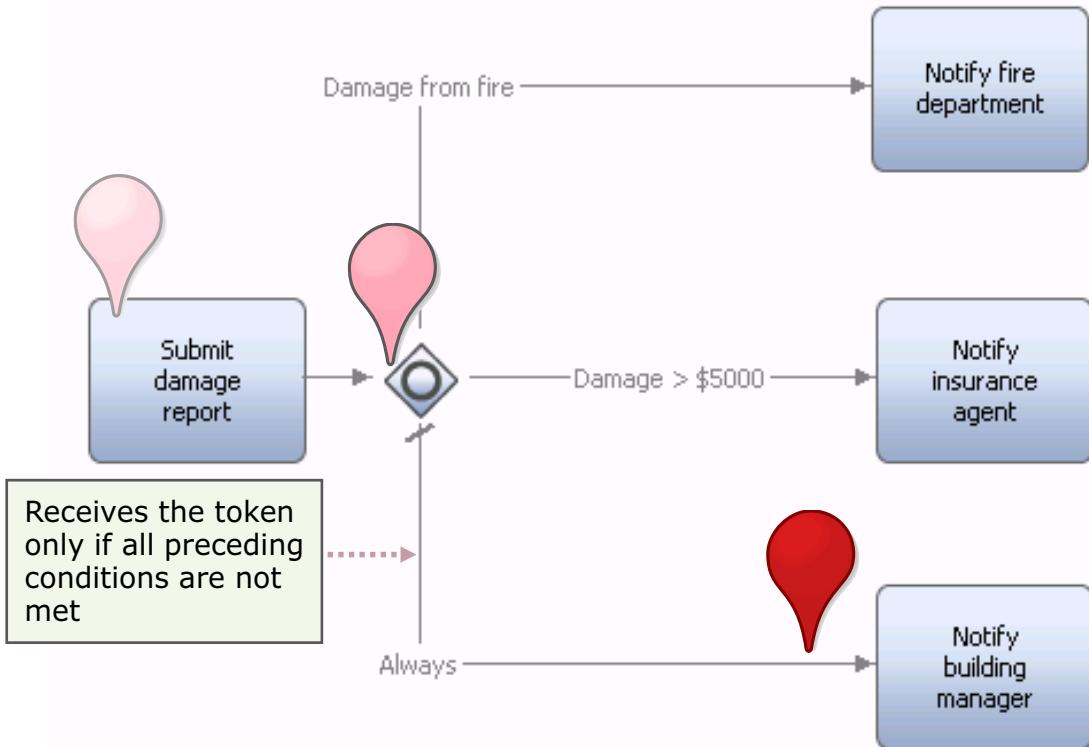
Playback 0: Controlling process flow

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Figure 5-38. Damage report example (6 of 8)

The token can also meet the condition of damage over \$5000 and be non-fire damage.

## Damage report example (7 of 8)



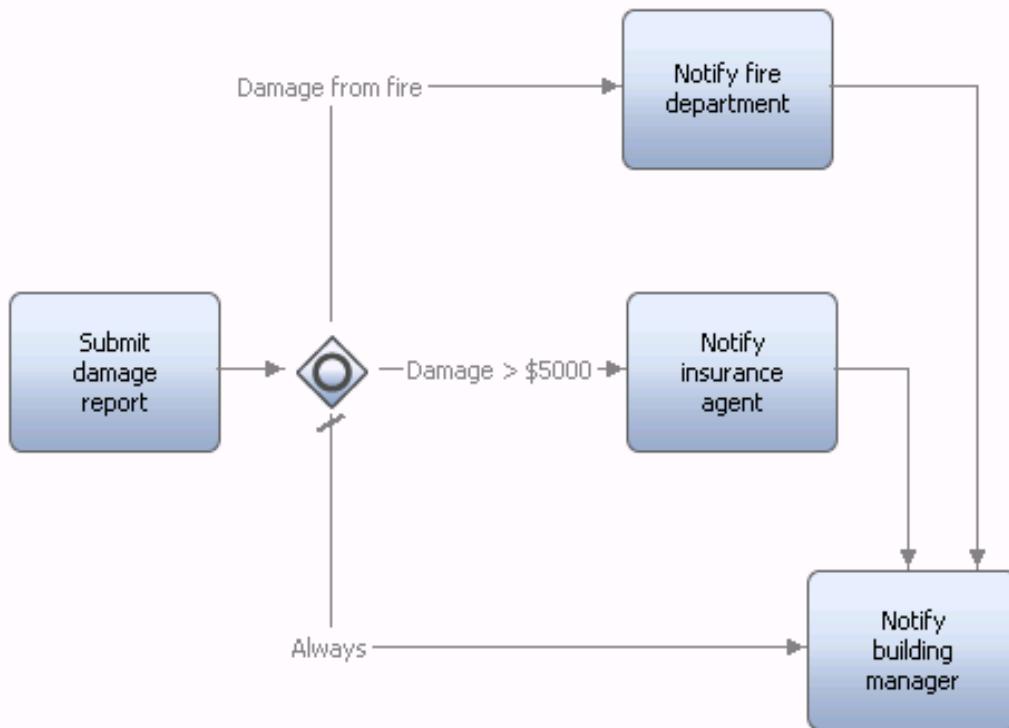
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Figure 5-39. Damage report example (7 of 8)

The token can also go through the default path as none of the other conditions are met.

## Damage report example (8 of 8)



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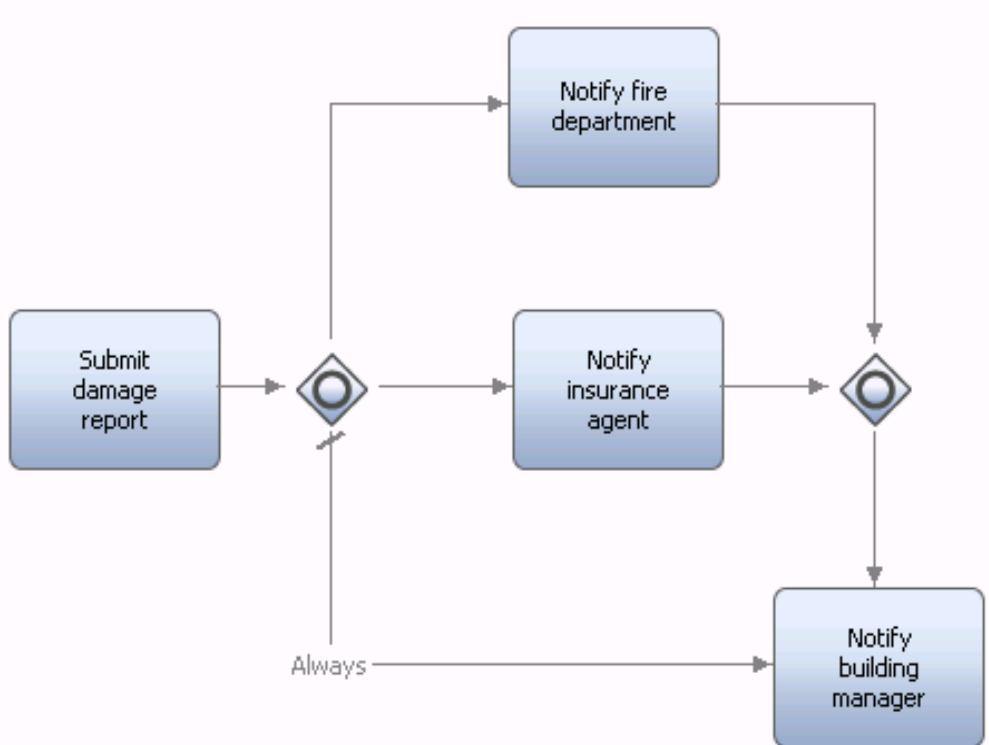
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Figure 5-40. Damage report example (8 of 8)

With this pattern change, you can now be sure that the building manager is notified any time damage occurs to the building.

However, one more potential problem is still there. Can you spot it?

## Inclusive join example



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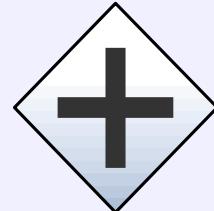
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Figure 5-41. Inclusive join example

There is the potential of notifying the building manager twice. You can fix this potential problem with one more pattern change.

To solve this issue, add a join to the diagram. Even if two tokens arrive at the join, only one token arrives at **Notify building manager**.

## Parallel gateway: Diamond with an internal plus



Parallel  
gateway

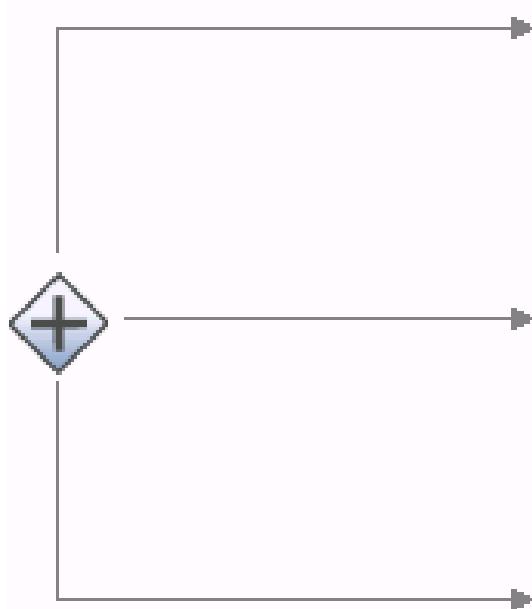
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Figure 5-42. Parallel gateway: Diamond with an internal plus

The next type of gateway is a parallel gateway (AND). The split mode is called a parallel split, and the join is a parallel join.

## Parallel split: No conditional or default flows



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Figure 5-43. Parallel split: No conditional or default flows

**Parallel split gateways** are used to direct the process flow along every sequence flow in parallel. Parallel split gateways have no conditional or default flows; every exiting sequence path is followed.

A parallel gateway also has a join capability, and it is called a **parallel join gateway**. Similar to an inclusive join, situations might occasionally occur in which the business criteria caused multiple sequence flows to be followed in parallel, and the business criteria now needs the sequence flow to be joined.

The parallel join has the following capabilities:

- Any number of incoming sequence flows can be modeled.
- After all incoming sequence flows reach the parallel join, the outgoing sequence flow is followed.
- The parallel join is unable to determine whether an incoming sequence flow is no longer live. Care must be taken when designing the parallel join to ensure that all sequence flows reach it. Do not use a parallel join if you cannot be sure that all incoming sequence flows are followed for every instance likely to be processed.

## Process narrative

### New hire onboarding process:

- On the first day of employment, employees must complete the HR new hire forms

### Then, they must:

- Apply for a security badge
- Requisition a computer
- Apply for a network ID and email address

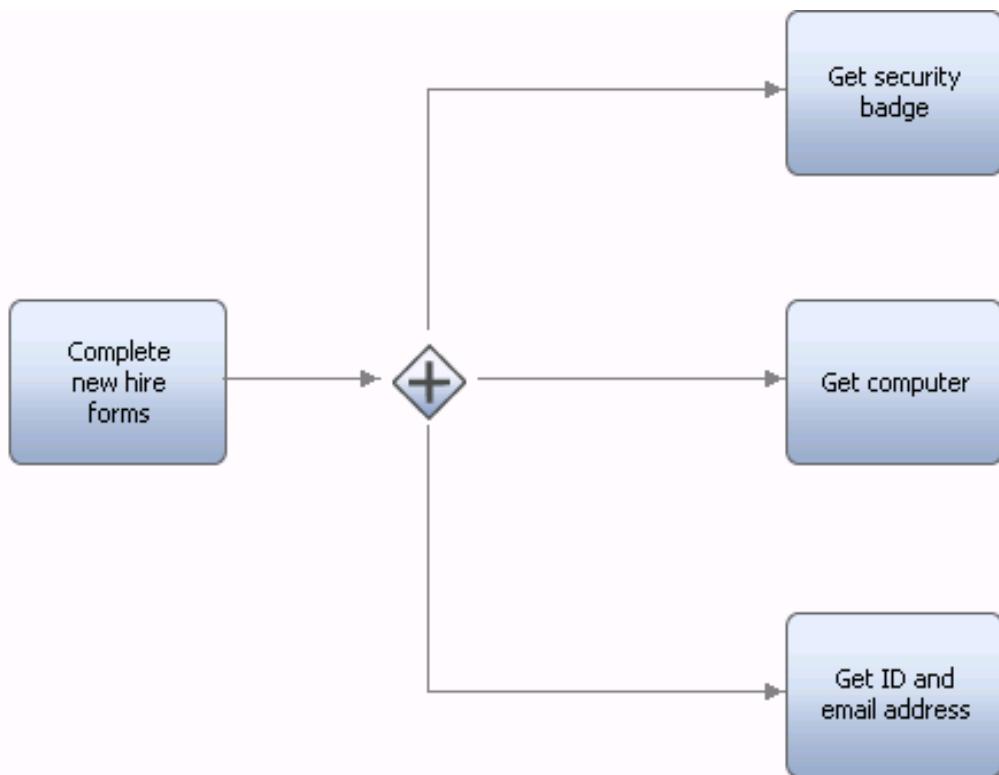
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*Figure 5-44. Process narrative*

You can try creating the model by using this process narrative.

## New hire onboarding example (1 of 4)



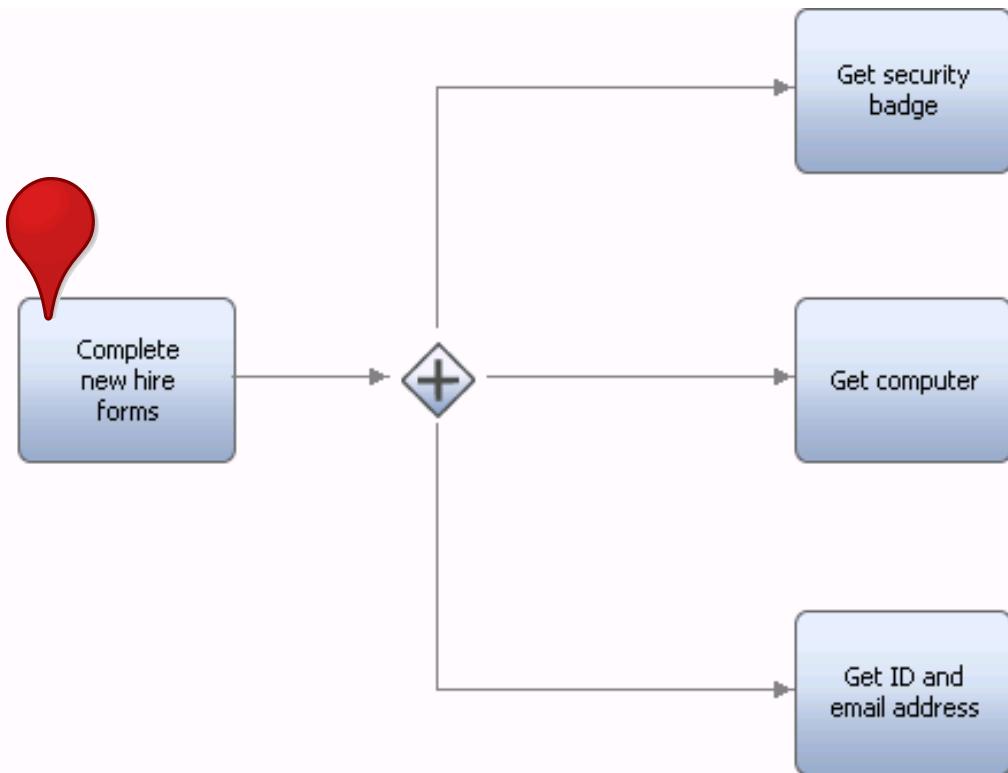
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Figure 5-45. New hire onboarding example (1 of 4)

This example has a parallel split gateway.

## New hire onboarding example (2 of 4)



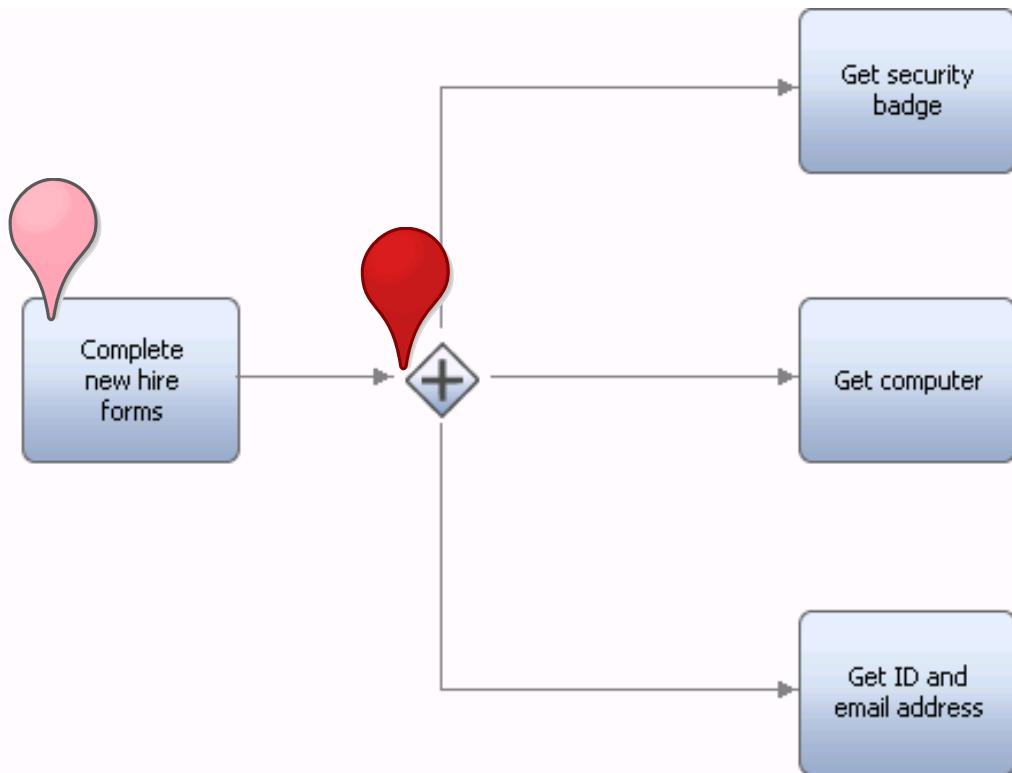
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Figure 5-46. New hire onboarding example (2 of 4)

This example uses tokens.

## New hire onboarding example (3 of 4)



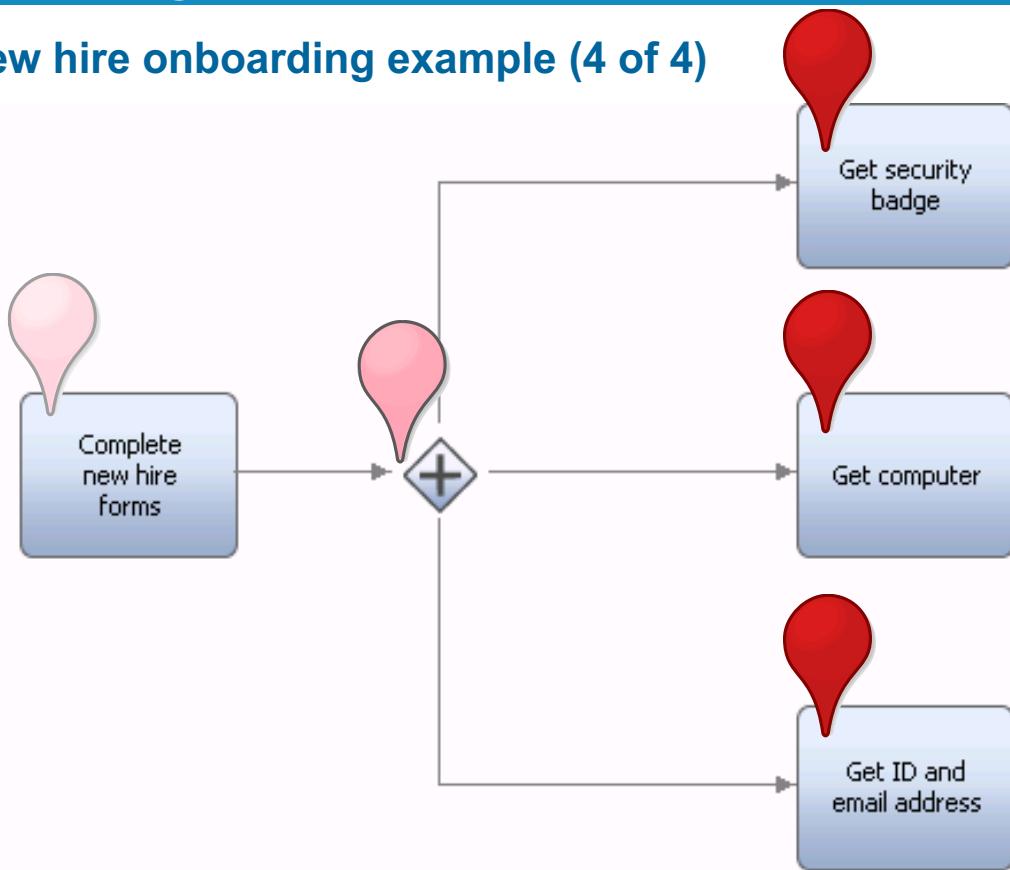
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Figure 5-47. New hire onboarding example (3 of 4)

The token is now on the gateway.

## New hire onboarding example (4 of 4)



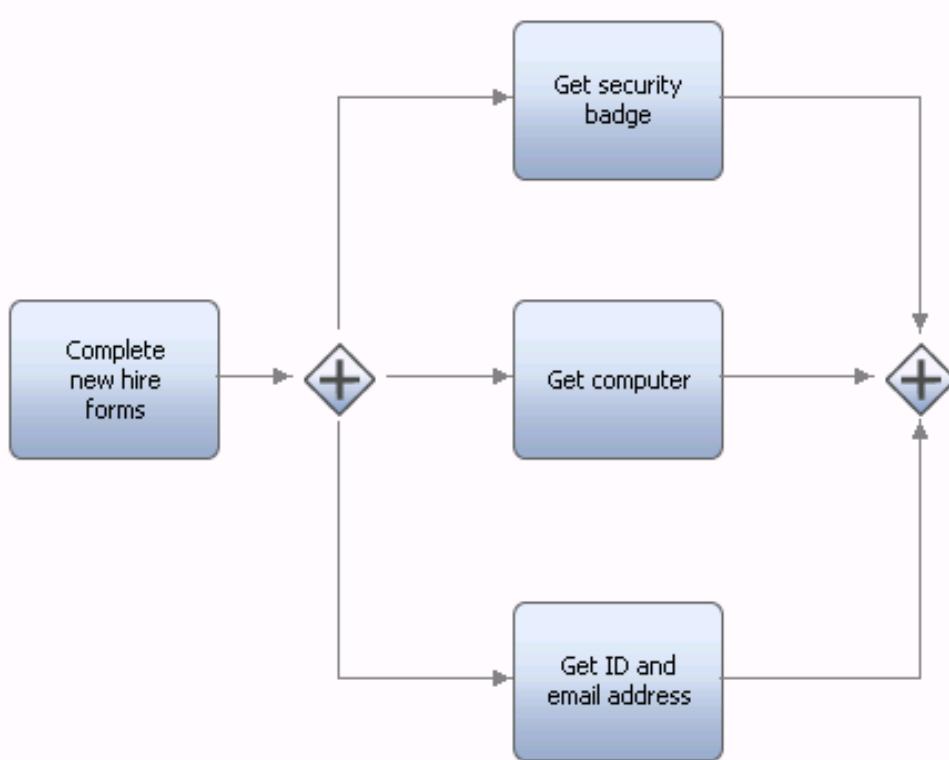
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Figure 5-48. New hire onboarding example (4 of 4)

There are no conditions on the lines of a parallel split, so all paths are taken at the same time.

## Parallel join



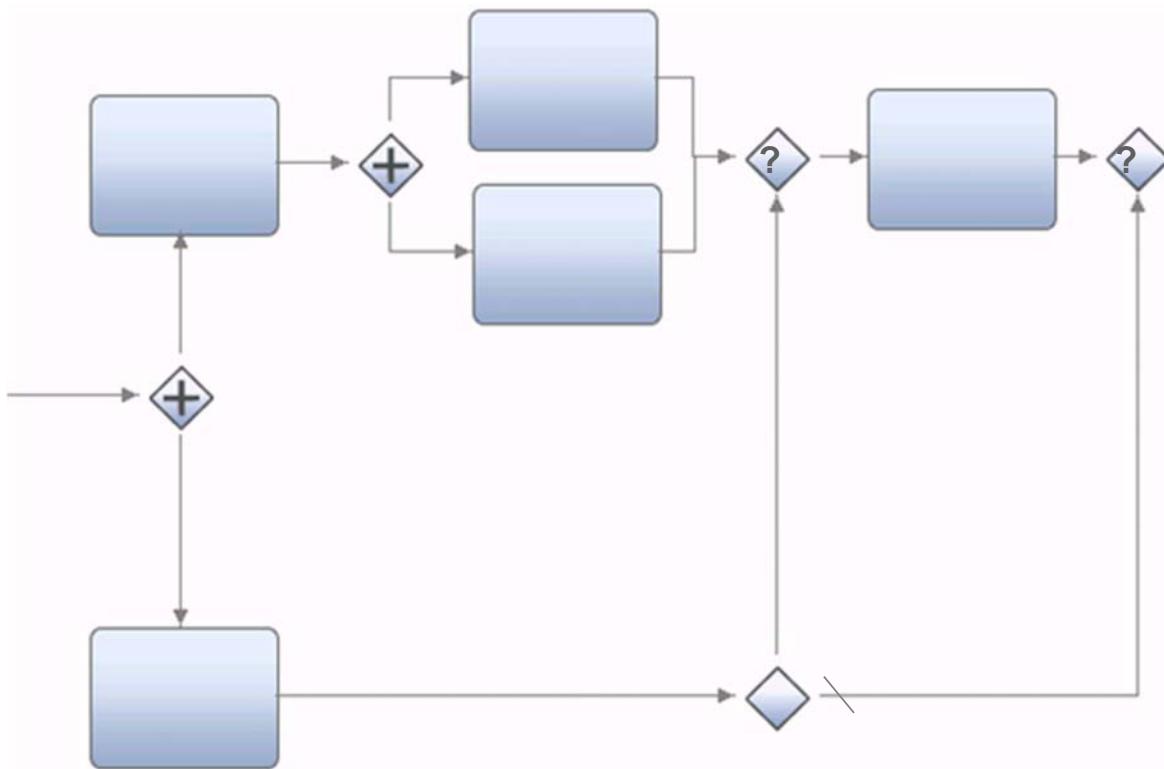
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Figure 5-49. Parallel join

After all the tasks are completed, you must consider how the rest of the flow is going to occur. Adding a join to your diagram is a good practice. In this case, a parallel join is used to “collect” all the tokens before moving further down the process. Consider what happens when the join is an inclusive, exclusive, or parallel join.

## Name the gateway



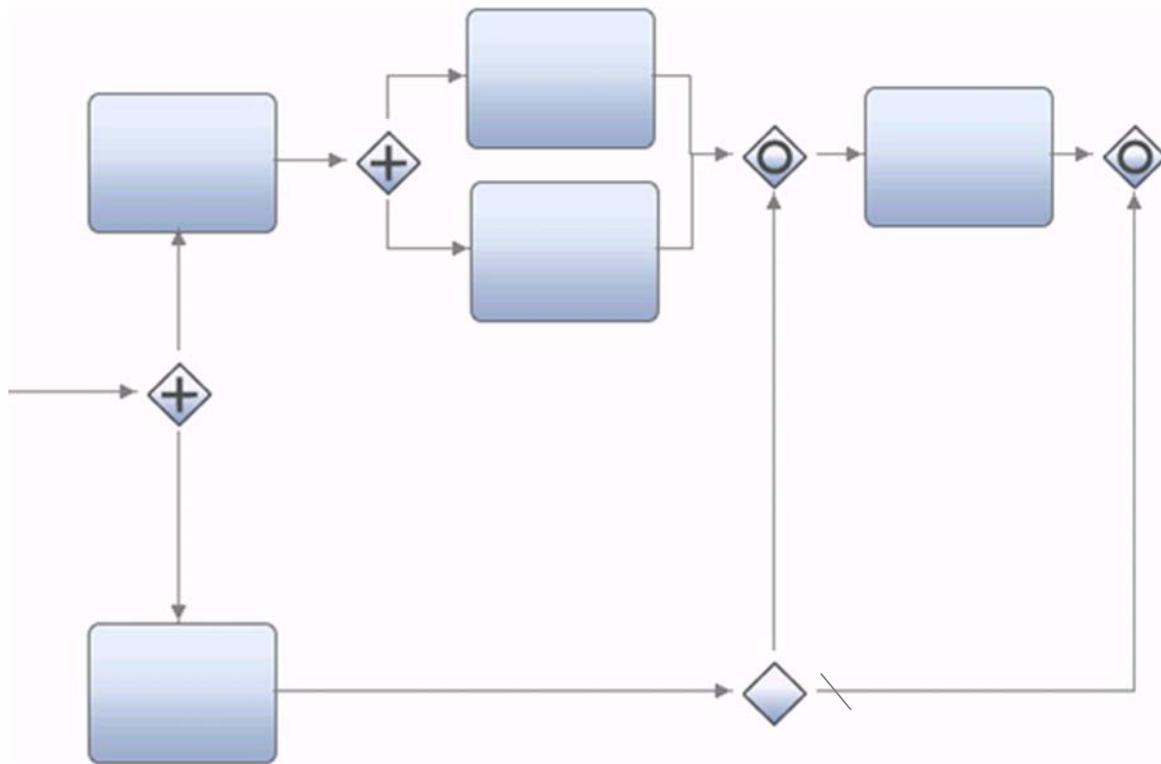
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Figure 5-50. Name the gateway

Joins are flexible in BPMN. Can you name the type of gateway that would be used at each of the question marks?

## Name the gateway solution



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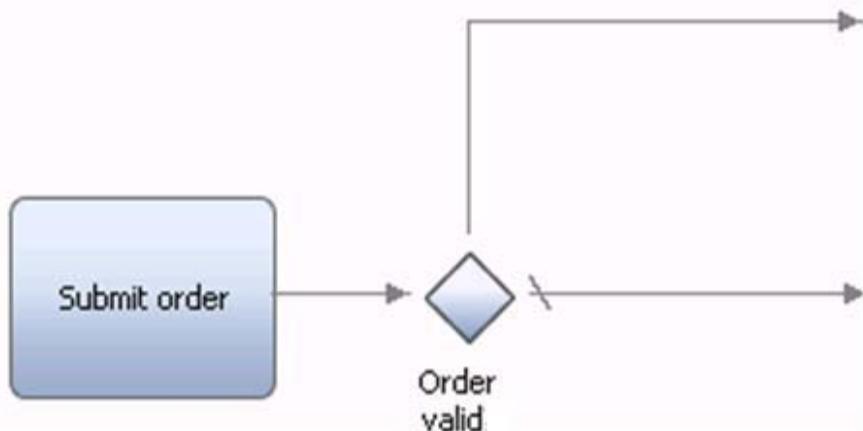
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Figure 5-51. Name the gateway solution

Both are inclusive joins.

The path at the bottom of the design has an exclusive gateway after the activity. Because only one of the paths can be followed, you do not know until run time which path is taken. Only an inclusive join can determine which paths are live, so it does not wait for a path that never completes.

## Evaluating conditions: Decision logic in the outgoing sequence flow



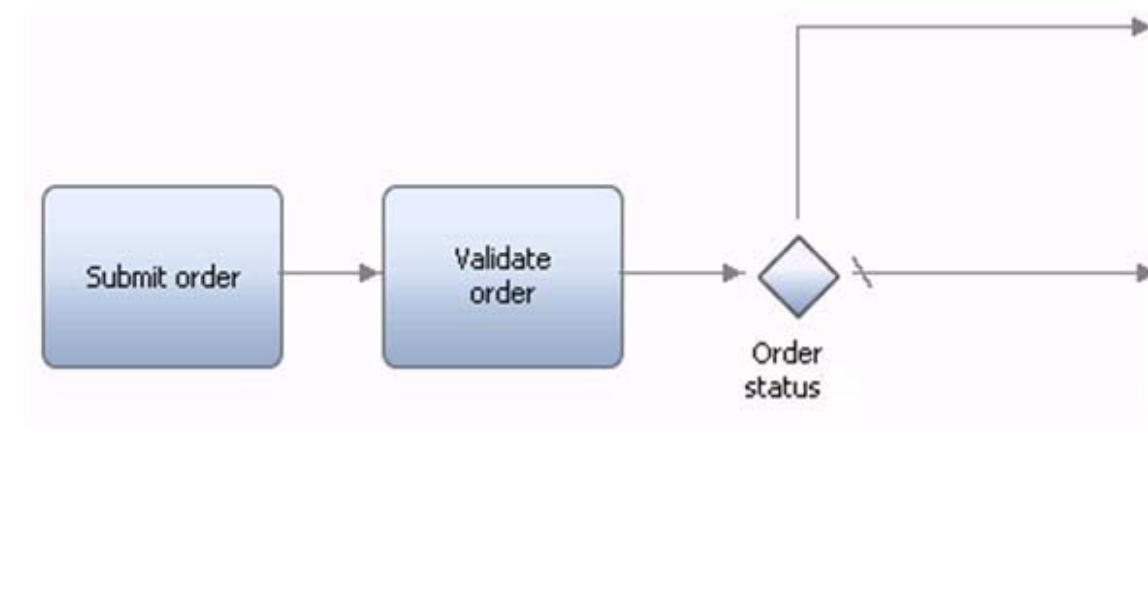
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Figure 5-52. Evaluating conditions: Decision logic in the outgoing sequence flow

Both exclusive and inclusive gateways use conditions. These gateways allow the evaluation of these conditions to determine whether they are true or false. If the conditions are simple expressions of process data, you can put the decision logic in the outgoing sequence flows of the gateway.

## Evaluating conditions: Externalized decision logic



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Figure 5-53. Evaluating conditions: Externalized decision logic

If the conditions are not simple expressions of process data, the good practice is to externalize the decision logic to make it independent of the process model.

Use an activity before the gateway to decide what path to take. Then, use the outgoing sequence flows from the gateway to route the flow based on the decision, as shown in the diagram. This method is the most explicit way to model decision logic used by a gateway.

Gateways can also use a rule service or decision service as part of the implementation of the gateway. This approach has the advantage that it eliminates the creation of a system lane activity on the process to provide the logic for the gateway. The disadvantage is that the logic is hidden from implementers who maintain the code. Both approaches are effective, but it is up to the implementer to decide which approach works best for the organization.

More on implementing the decision service is covered in the Unit 11 of this course.

## 5.4. Intermediate events

## Intermediate events

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Figure 5-54. Intermediate events

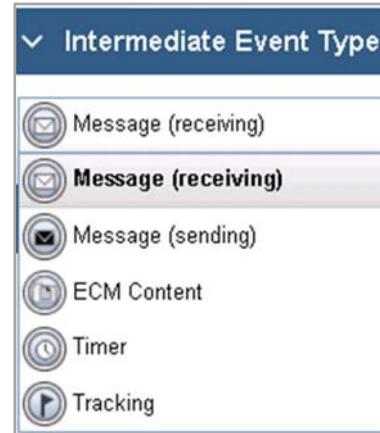
If an event takes place between a start and an end event in the process, it is called an intermediate event.

The intermediate event is designated by a double-lined circle, and an internal marker specifies the type of intermediate event that is taking place.

## Intermediate events

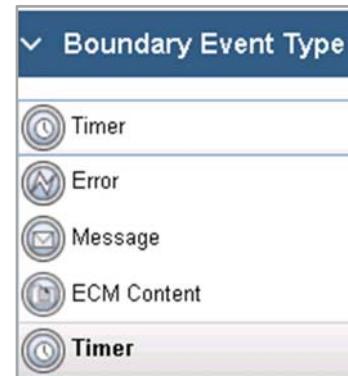
- Four types of sequence flow intermediate events:

- Message
- ECM Content
- Timer
- Tracking



- Four types of boundary (attached) intermediate events:

- Error
- Message
- ECM Content
- Timer



Playback 0: Controlling process flow

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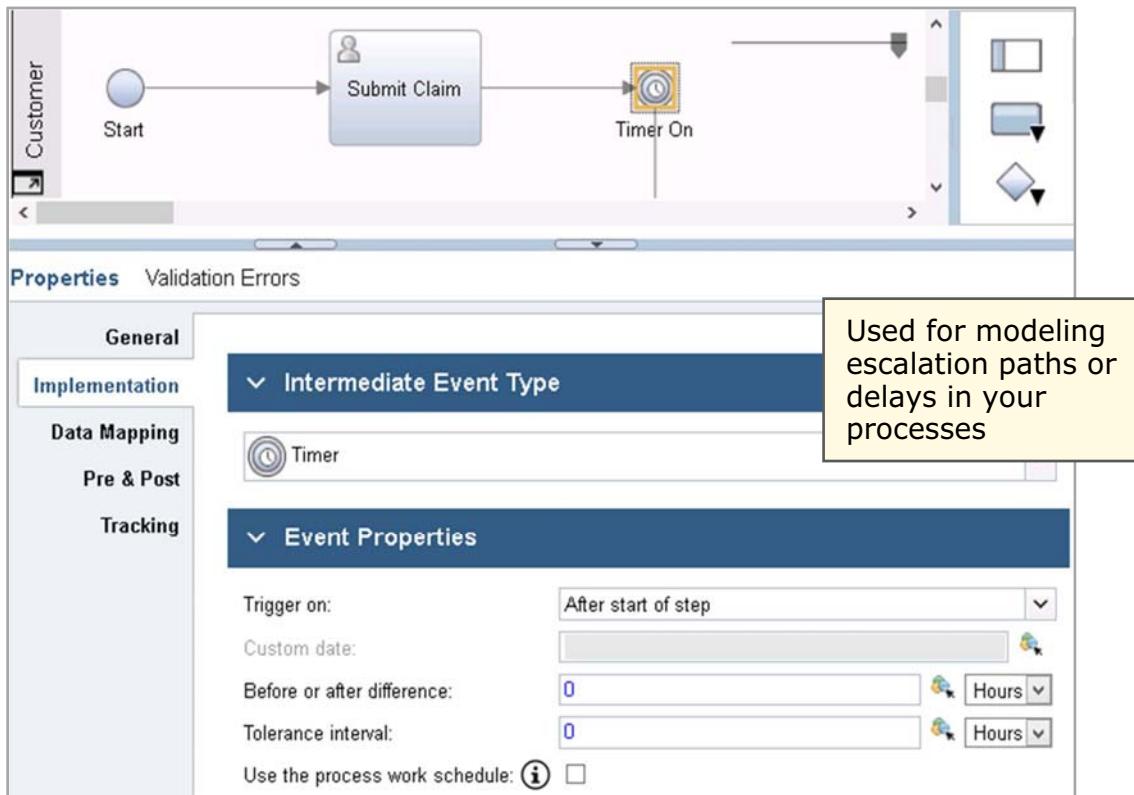
Figure 5-55. Intermediate events

**Intermediate events** have the following characteristics:

- The four main types of sequence flow intermediate events are message, content, timer, and tracking.
- The four main types of boundary (attached) intermediate events are error, message, content, and timer.
- Intermediate events are drawn as a double circle with an internal marker that identifies the type of event.
- All intermediate events behave the same way; they respond to a specific event. However, the implementation of each intermediate event, whether attached or sequence flow, differs.



## Intermediate events: Timer



Playback 0: Controlling process flow

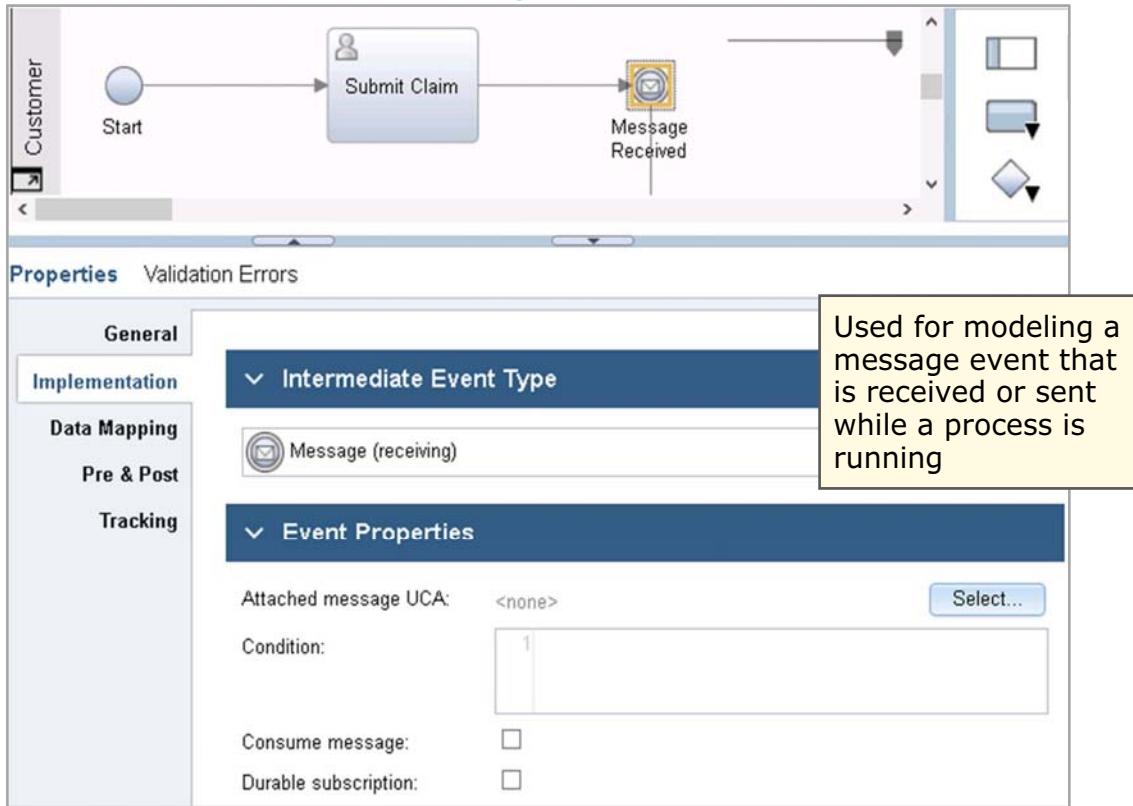
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Figure 5-56. Intermediate events: Timer

A timer intermediate event is used to model escalation paths or delays in a process. By using a timer intermediate event, developers can specify a time interval after or before which some activity is conducted.



## Intermediate events: Message



Playback 0: Controlling process flow

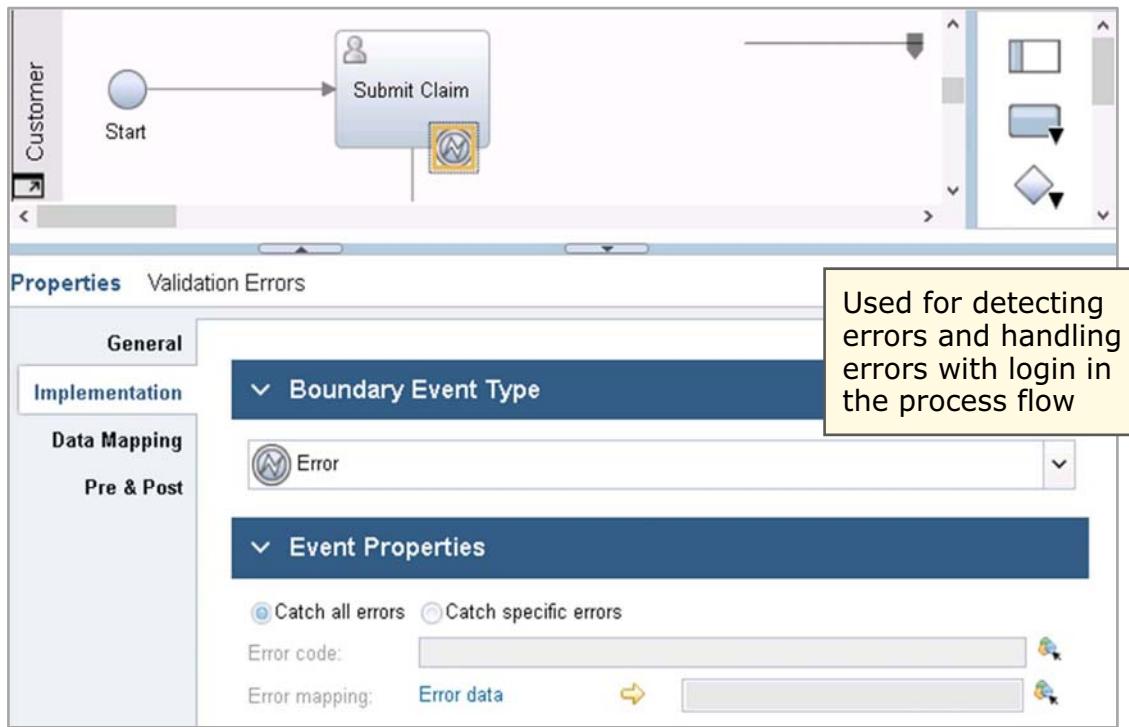
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Figure 5-57. Intermediate events: Message

A message intermediate event is used to model a message event that is received or sent while a process is running. For the sequence flow message intermediate event, a light envelope receives a message, and a dark envelope sends a message. When the message intermediate event is attached to an activity, the event receives messages but does not send messages.



## Intermediate events: Error



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Figure 5-58. Intermediate events: Error

Use the intermediate event to detect errors and to handle errors with login in the process flow.

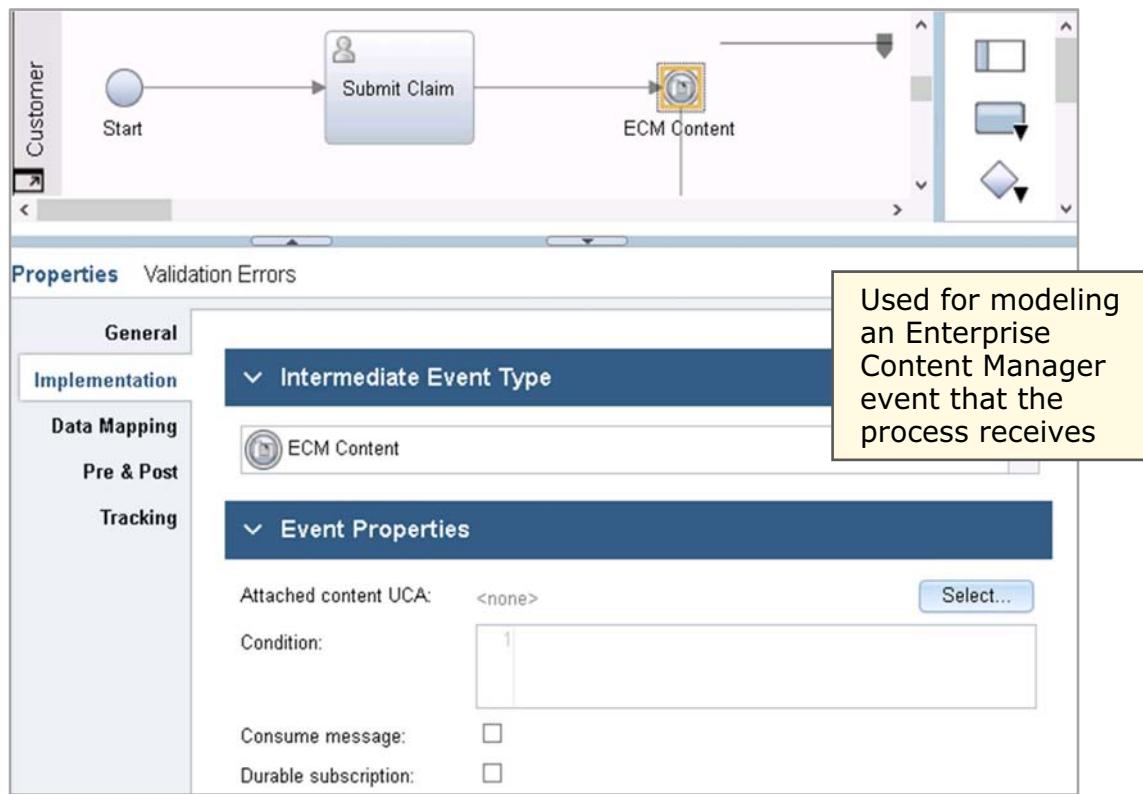


### Important

The Error implementation option is available for events that are attached to activities. Error intermediate events are not used in sequence flow.



## Intermediate events: Content



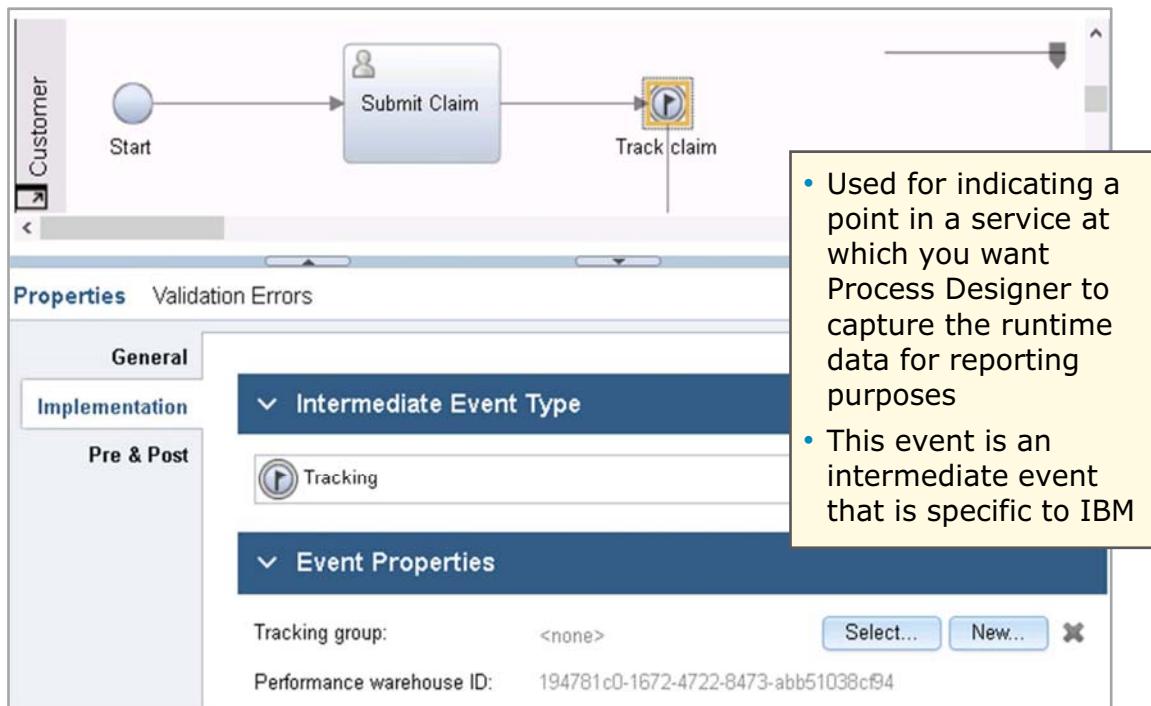
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Figure 5-59. Intermediate events: Content

Use the Content implementation option to model an Enterprise Content Manager event that is received. The Content implementation option is available for events that are included in the process flow and events that are attached to an activity.

## Intermediate events: Tracking



[Playback 0: Controlling process flow](#)

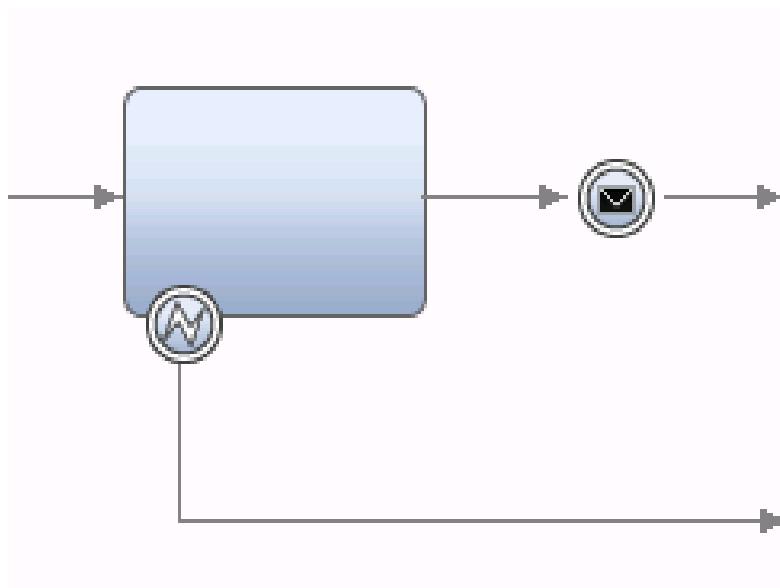
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Figure 5-60. Intermediate events: Tracking

The tracking intermediate event is used to indicate a point in a service at which you want IBM Process Designer to capture the runtime data for reporting purposes.

A tracking intermediate event is a sequence flow implementation. This event is an intermediate event that is specific to IBM Business Process Manager.

## Attached and sequence flow intermediate events



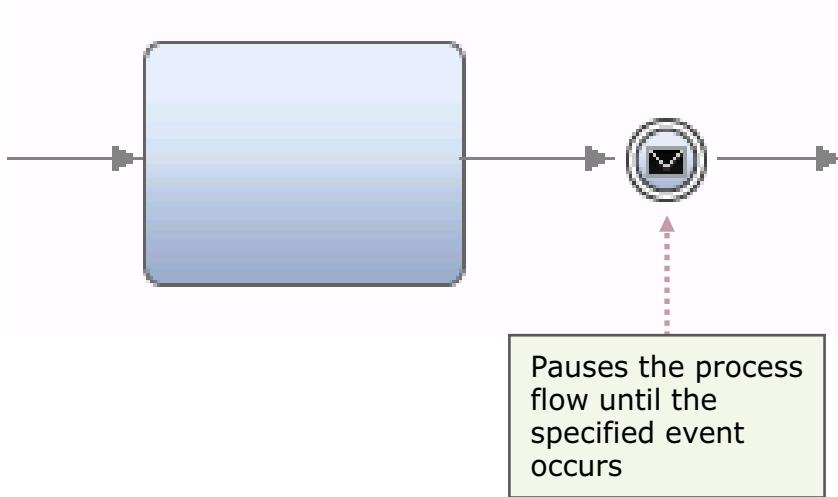
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Figure 5-61. Attached and sequence flow intermediate events

Intermediate events can be in sequence flow or attached to the boundary of an activity. All intermediate events, except for tracking intermediate events, are processed the same way in IBM Process Designer.

## Sequence flow intermediate event



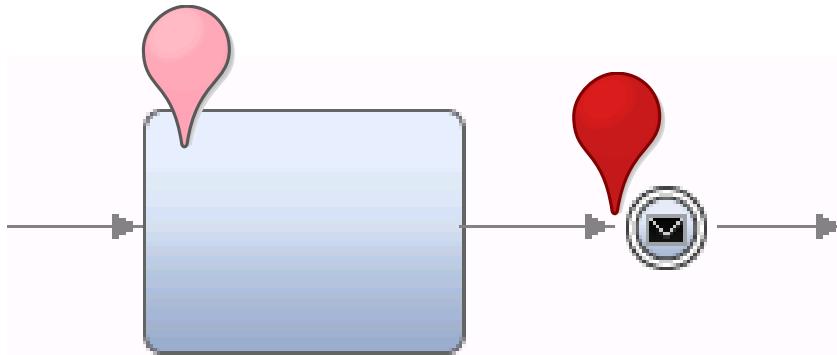
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Figure 5-62. Sequence flow intermediate event

An intermediate event in the sequence flow pauses the process until the specified event takes place.

## Process stops until an intermediate event occurs



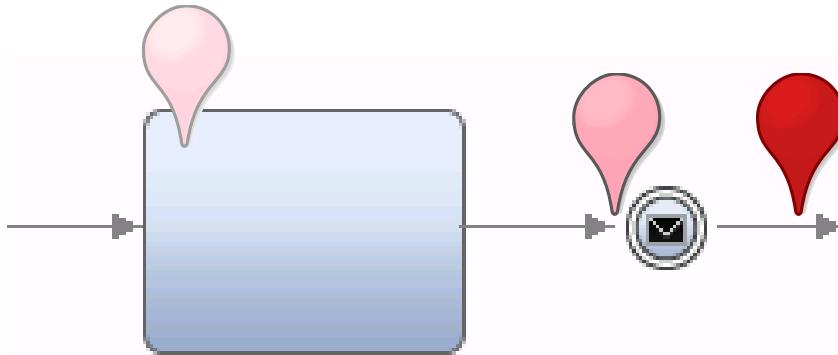
Playback 0: Controlling process flow

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Figure 5-63. Process stops until an intermediate event occurs

The token stops at the intermediate message event.

## Process continues on sequence flow when an intermediate event completes



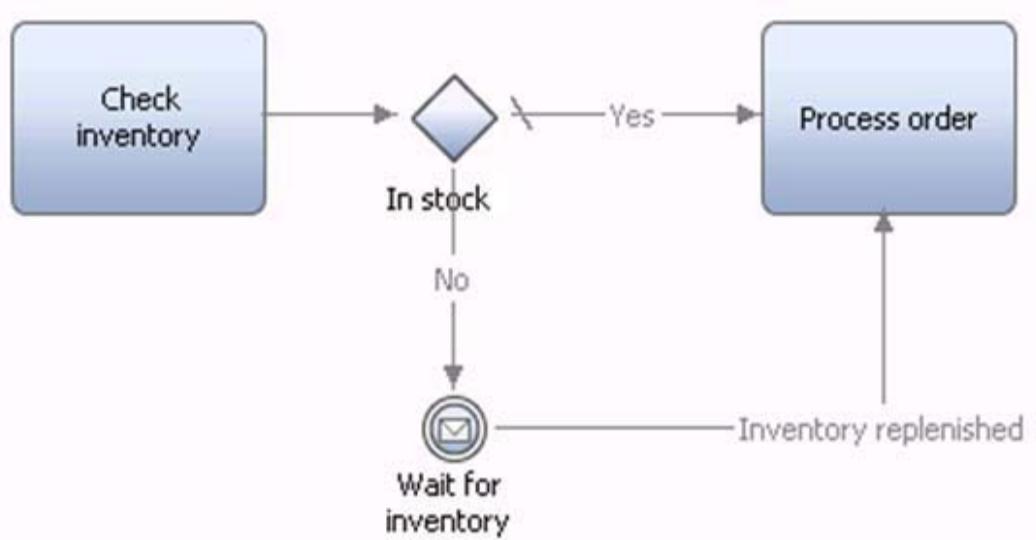
Playback 0: Controlling process flow

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Figure 5-64. Process continues on sequence flow when an intermediate event completes

When the specified event occurs, the process flow continues along the normal sequence flow.

## A common requirement (1 of 5)



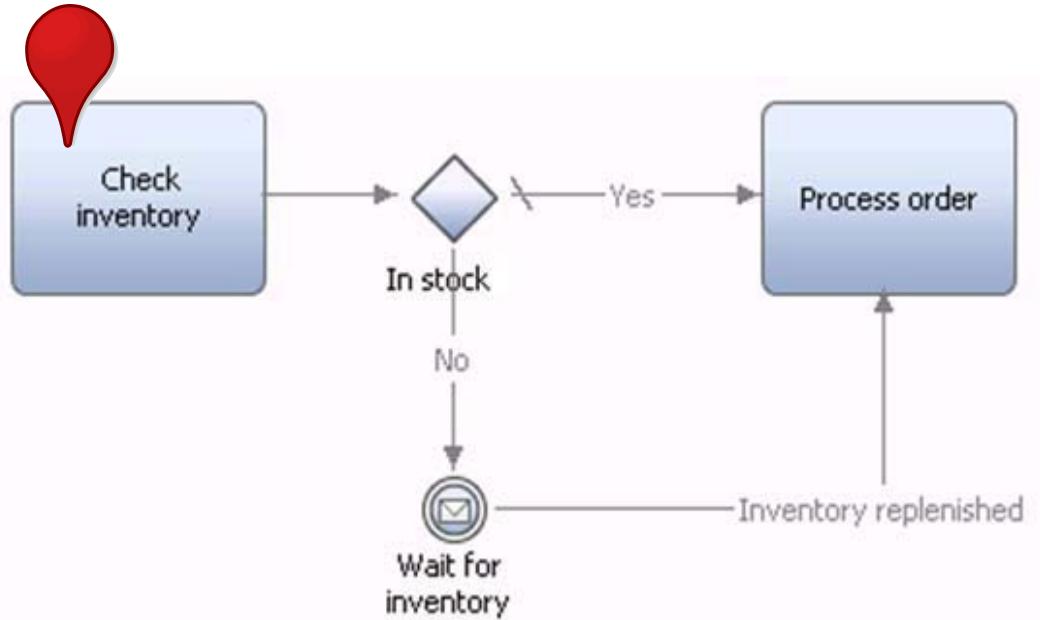
Playback 0: Controlling process flow

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Figure 5-65. A common requirement (1 of 5)

This example shows the inventory requirement model. When someone places an order, check inventory and see whether it is in stock or out of stock. If it is in stock, process the order. If it is not in stock, wait for replenishing of the inventory before processing the order.

## A common requirement (2 of 5)



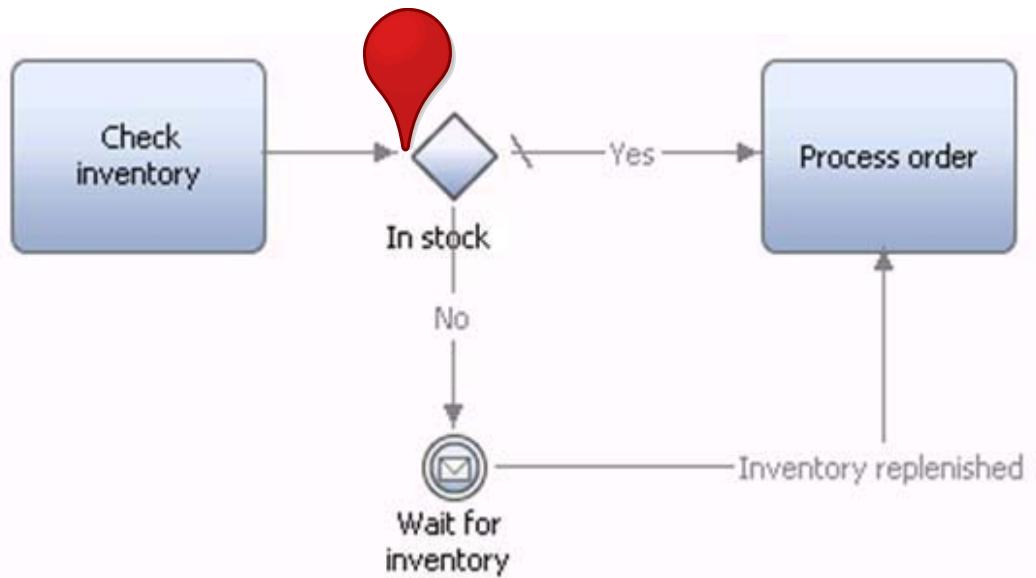
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Figure 5-66. A common requirement (2 of 5)

Follow the token again.

## A common requirement (3 of 5)



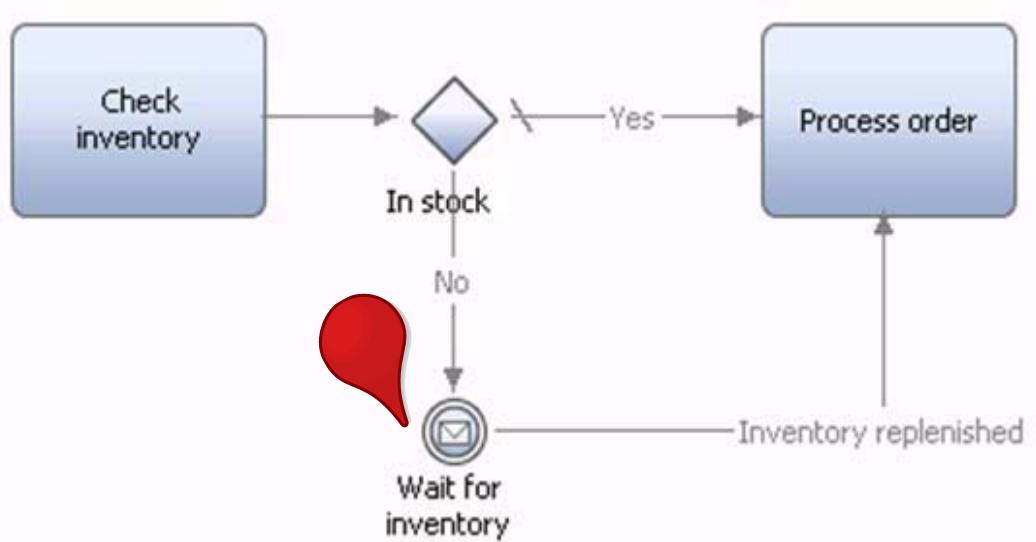
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Figure 5-67. A common requirement (3 of 5)

The token is on the gateway, and the inventory is not in stock.

## A common requirement (4 of 5)



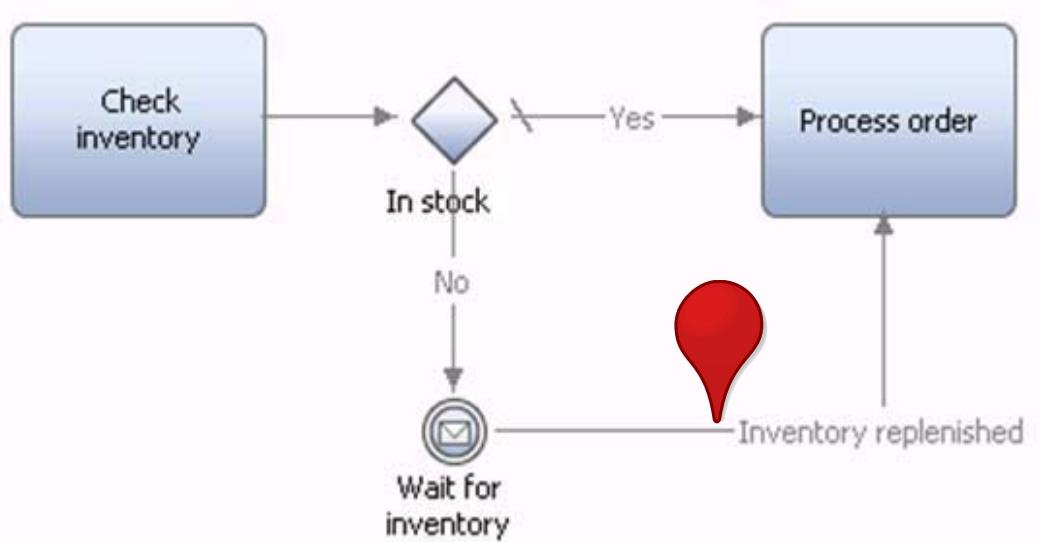
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Figure 5-68. A common requirement (4 of 5)

The token stops on the intermediate event.

## A common requirement (5 of 5)



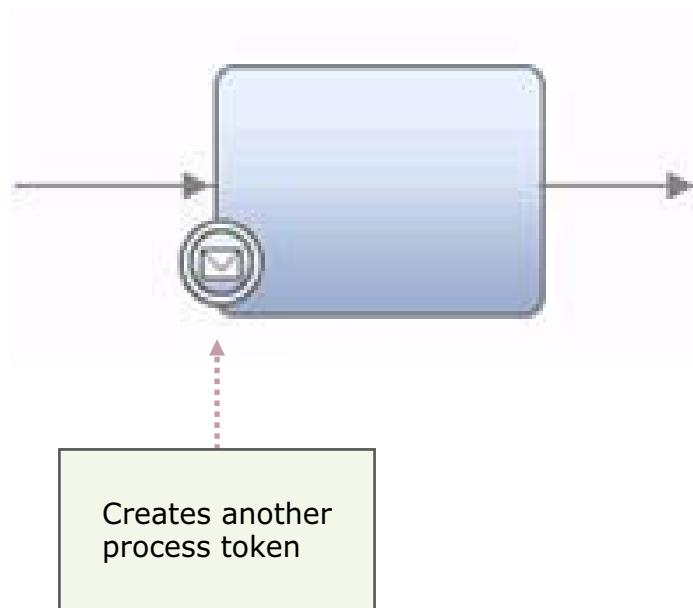
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Figure 5-69. A common requirement (5 of 5)

The process is paused while the token is on the event, and then the process continues again after the **Wait for inventory** event takes place.

## Attached intermediate event



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Figure 5-70. Attached intermediate event

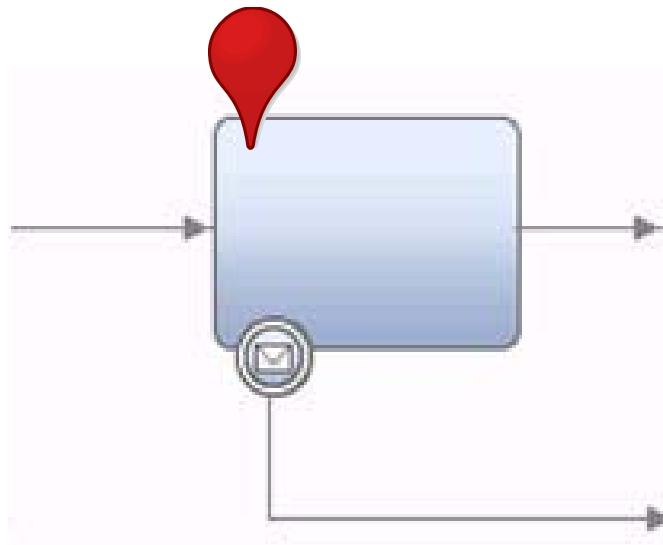
An intermediate event that is attached to the boundary of an activity produces a separate token. If the specified event takes place while the activity is active, the intermediate event distributes the token along the outgoing sequence flow. After it occurs, you can specify whether to create parallel or an alternative process flow.



### Note

An intermediate tracking event has a different behavior and does not conform to these behaviors.

## Process flow reaches an activity



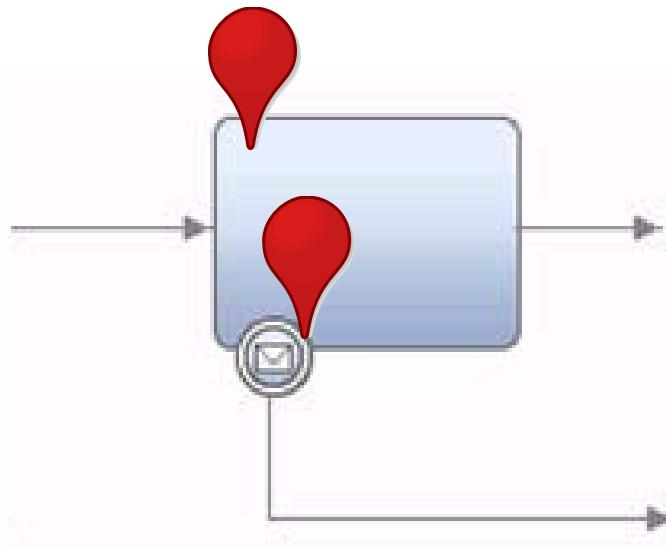
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Figure 5-71. Process flow reaches an activity

Follow the token. Here the process flow reaches the activity.

## Attached intermediate event generates a separate token



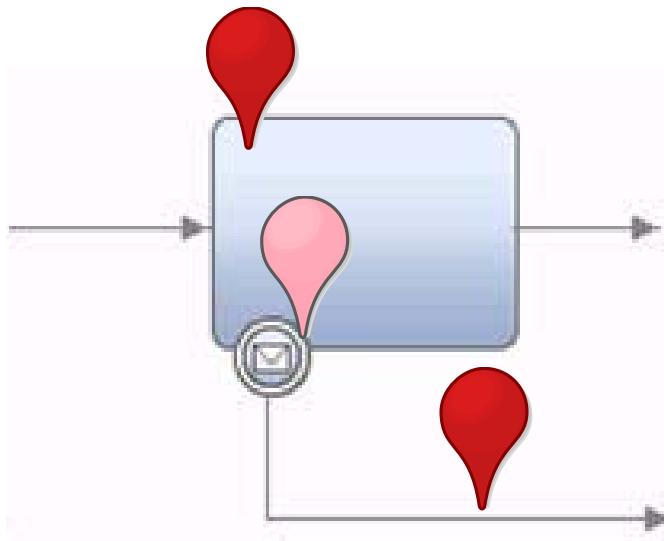
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Figure 5-72. Attached intermediate event generates a separate token

The attached intermediate event generates a separate token.

## Attached intermediate event can create a parallel flow



Playback 0: Controlling process flow

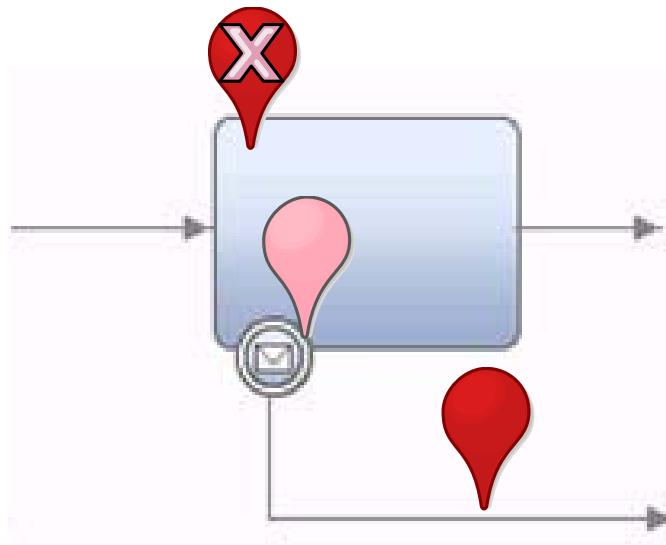
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Figure 5-73. Attached intermediate event can create a parallel flow

Two things might happen:

- One option is that the attached intermediate event can create a parallel flow, and both tokens continue.
- The second option is shown on the next slide.
- The third option is that the token on the activity completes before the message is received, and the activity consumes the event token before moving down the process flow.

## Attached intermediate event can close an activity



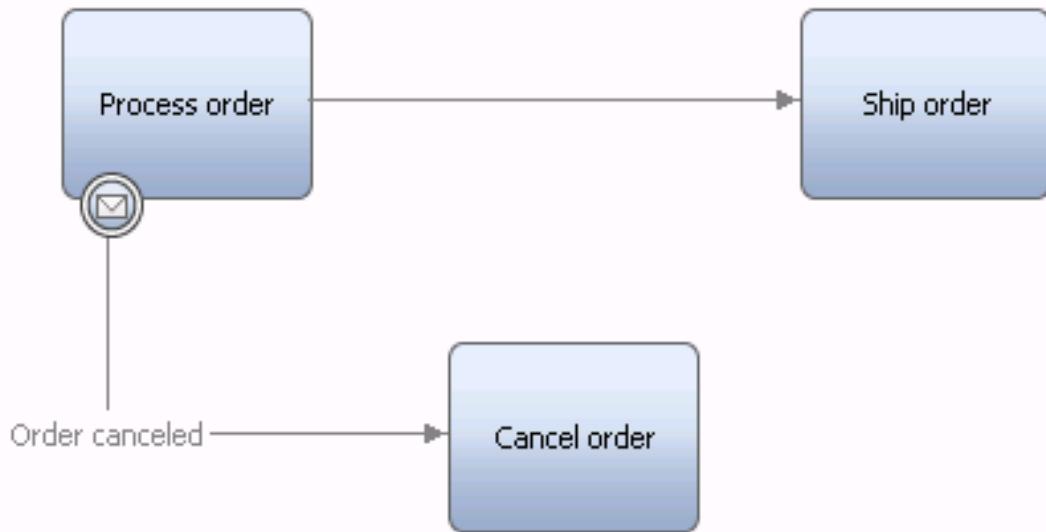
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Figure 5-74. Attached intermediate event can close an activity

Another option is that the attached intermediate event can be defined to close an activity. The token on the activity is consumed, and one token continues down an alternative path.

## Attached intermediate event example (1 of 4)



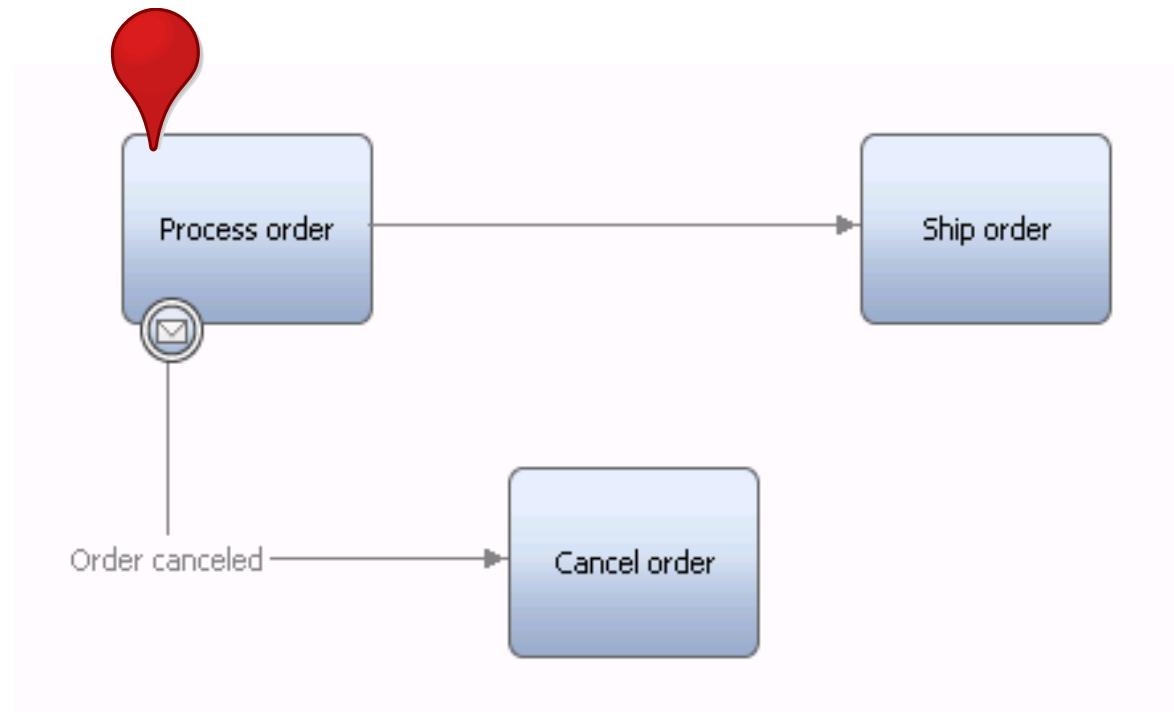
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Figure 5-75. Attached intermediate event example (1 of 4)

This slide is an example process for an attached intermediate event.

## Attached intermediate event example (2 of 4)



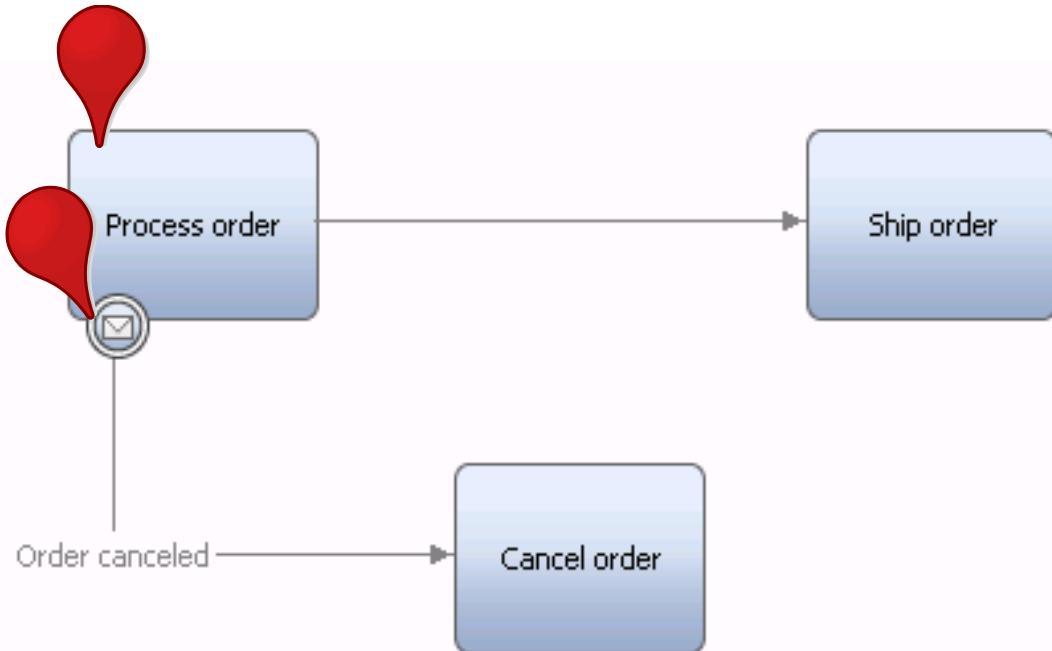
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Figure 5-76. Attached intermediate event example (2 of 4)

The token starts on the **Process order** activity.

## Attached intermediate event example (3 of 4)



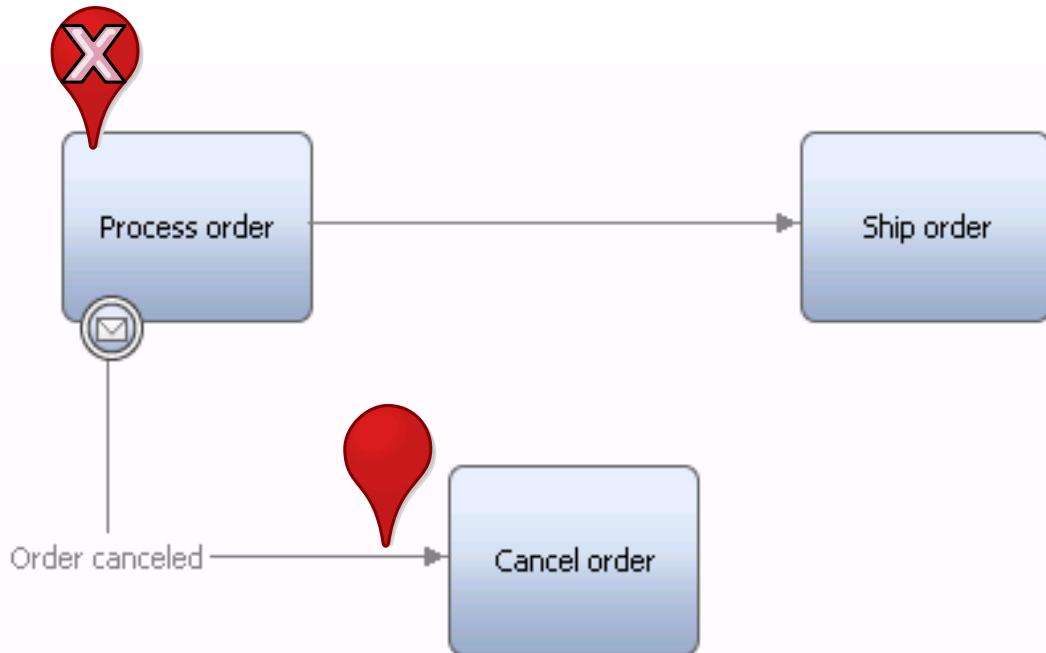
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Figure 5-77. Attached intermediate event example (3 of 4)

Intermediate events can also be attached to the boundary of an activity.

## Attached intermediate event example (4 of 4)

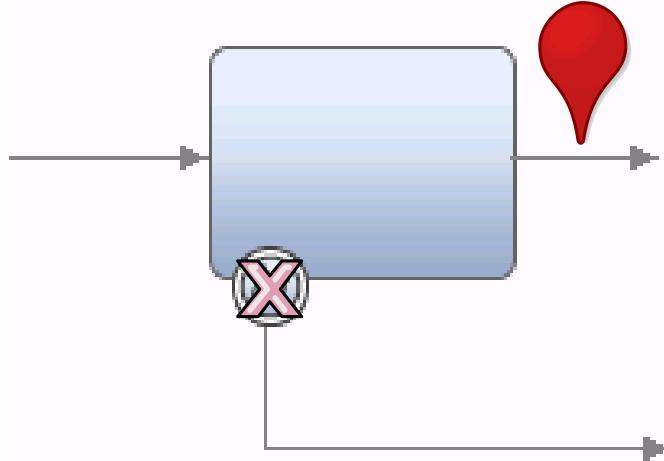


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Figure 5-78. Attached intermediate event example (4 of 4)

The intermediate event is defined to close the activity, so only one token continues to **Cancel order**.

**Attached intermediate event is active only when the activity it is attached to is active**

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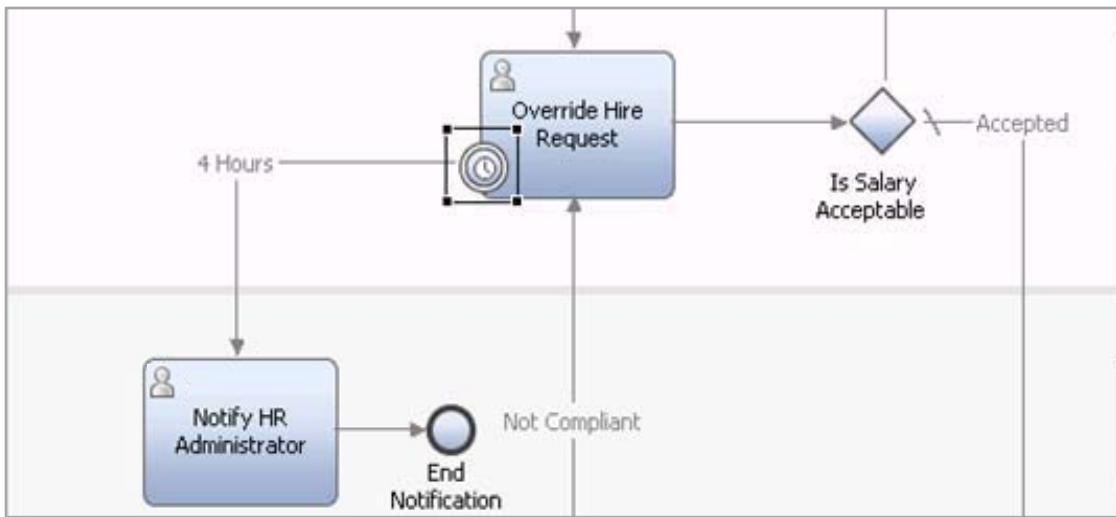
*Figure 5-79. Attached intermediate event is active only when the activity it is attached to is active*

The event is no longer active when the process activity is not active.

The tracking event has a particular way of working. As already mentioned, it is used to capture runtime data for reporting purposes. Tracking events can be placed only on process flows and not attached to activities. After the flow reaches a tracking event, it does not “pause” the process, but instead causes the capturing of runtime data at the event. Multiple tracking points can be placed within a process to capture different data at different points and different “snapshots” of data at various points. For more information, see the IBM Business Process Manager help file.

## A way to model an escalation

- Use an attached intermediate event
- Activity takes longer to complete than a defined amount of time
- The attached intermediate event triggers an escalation, which follows the path from the attached intermediate event to an escalation activity



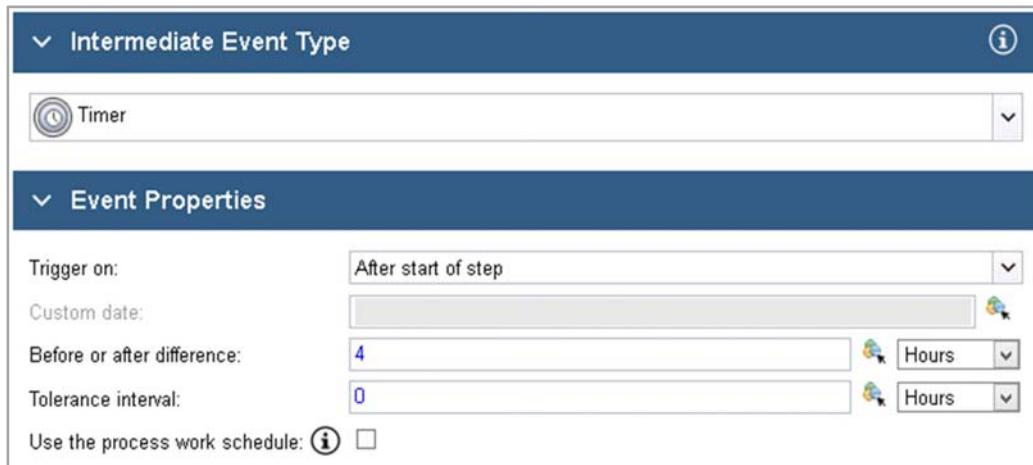
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Figure 5-80. A way to model an escalation

## Timer intermediate event

- Allows a process to wait explicitly, or react to the passing of time
- Time interval can be based on system time, a due date, or a custom time



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Figure 5-81. Timer intermediate event

A timer intermediate event has the following characteristics:

- Allows a process to wait explicitly, or react to the passing of time
- Time interval can be based on system time, a due date, or a custom time
- Example: A traffic citation process (pay the fine activity) where if someone does not pay a traffic ticket within 30 days, a citation is issued

## Demonstration

This demonstration covers the following topics:

- Create gateways
- Create intermediate events

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Figure 5-82. Demonstration

This demonstration is stored as the `demo3.mp4` file that is in the `C:\labfiles\demo` folder.

**Creating gateways** proceeds as follows:

1. Drag the gateway symbol from the element palette to the process.
2. Name the gateway.
3. Select the type of gateway you want in the **Properties > General** menu.
4. Using the sequence flow tool, click to anchor the flow line from an activity, and then click to connect the flow line to a gateway in the process.
5. Using the sequence flow tool, click to anchor the flow line from a gateway, and then click to connect the flow line to an activity in the process.
6. To add a label to the sequence flow line, select the line in your process and then edit the Name property value. Make sure that you select the **Name Visible** check box to see it in the process.
7. If no conditional diamonds are on your sequence flow lines or if the wrong sequence flow is displayed with the default flow identifier, do not be concerned. The conditional and default flow identifiers are corrected during implementation.

**Creating intermediate events** proceeds as follows:

1. Drag the intermediate event component from the element palette to the process.
2. If an attached timer intermediate event is needed, place the element in the boundary of the chosen activity.
3. Name the event according to naming conventions.
4. If a sequence flow intermediate timer event is needed, place the element in the sequence flow that you want in the process.
5. Select the event and change the type in the implementation section, if needed.
6. If modeling an escalation, place an activity from the element palette into the process, where the participant responsible for the escalated task is located.
7. Use the sequence flow tool from the element palette to connect the attached intermediate event to the activity and modify the process flow.

## Unit summary

- Describe process sequence flow and the runtime use of process tokens
- List and describe gateways as they are used in IBM Web Process Designer
- Explain how to evaluate conditions for a process gateway
- Model gateways in a process
- List and describe intermediate event types that are used in IBM Web Process Designer
- Model a business process escalation path with an attached timer intermediate event

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*Figure 5-83. Unit summary*

## Review questions (1 of 2)

1. True or False:

A gateway that merges multiple incoming paths into one outgoing path is known as a split.

2. Which of the following sequence flows indicates a processing path to follow when none of the conditions on the conditional flows are true?

- A. Default
- B. Normal
- C. Conditional

3. A gateway that is used to move process flow along one or more conditional sequence flows is called an \_\_\_\_\_ gateway.

- A. Inclusive split
- B. Exclusive split
- C. Inclusive join
- D. Exclusive join

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Figure 5-84. Review questions (1 of 2)

Write your answers here:

1.

2.

3.

## Review questions (2 of 2)

4. True or False:  
Exclusive gateways should be modeled so that only one outgoing sequence flow condition can be true.
5. After all incoming sequence flows reach the \_\_\_\_\_, the outgoing sequence flow will be followed.
  - A. Exclusive join
  - B. Parallel split
  - C. Parallel join
6. Which of the following list can be used to model escalation paths or delays in your business process definition?
  - A. Message intermediate events
  - B. Timer intermediate events
  - C. Error intermediate events
  - D. Tracking intermediate events

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Figure 5-85. Review questions (2 of 2)

Write your answers here:

4.

5.

6.

## Review answers

1. False. The gateway that merges multiple incoming paths is known as a join.
2. A: Default.
3. A: Inclusive split.
4. True.
5. C: Parallel join.
6. B: Timer intermediate events.

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Figure 5-86. Review answers

## Exercise 3

### Playback 0: Controlling process flow

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Figure 5-87. Exercise 3

The Hiring Requisition process owner provided detailed information about the process and its current state to the BPM analyst, who in turn documented and analyzed the information. The process model was started, complete with some normal sequence flow. Some decomposition was there to make the process model as succinct as possible, which means that the model has subprocesses.

Your activity responsibility is to add all the gateways necessary to model the flow control for the process in the Hiring Requisition process, which includes the nested process.

Your activity responsibility is to accomplish the task of adding all the timer intermediate events that help satisfy newly identified requirements for the Hiring Requisition process. It encompasses process flow control and more activities that are based on conditions that non-human interactions set.

## Exercise objectives

After completing this exercise, you should be able to:

- Add gateways to a process
- Model the appropriate sequence flows for each gateway
- Add a timer intermediate event to a process based on business requirements
- Model an escalation path in a process with IBM Web Process Designer
- Document details for the implementation team

[Playback 0: Controlling process flow](#)

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*Figure 5-88. Exercise objectives*

---

# Unit 6. Playback 0: Building consensus

## Estimated time

01:00

## Overview

A validation is accomplished through a review session with all business stakeholders, business users, and the BPM development team. This unit describes the Playback 0 validation goals and requirements, explains how to validate that a process model meets the goals and requirements, and describes how to reach consensus on the process model.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Describe the Playback 0 validation goals and requirements
- Validate that a process model meets Playback 0 goals and requirements

Playback 0: Building consensus

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*Figure 6-1. Unit objectives*

## Topics

- Playback 0: Validation phase
- Reaching consensus on the process model

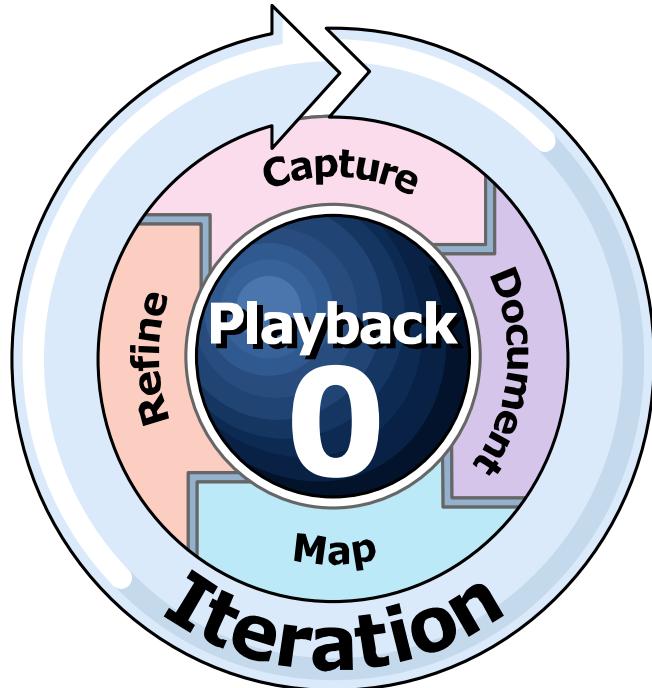
Playback 0: Building consensus

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Figure 6-2. Topics

## Key concepts in this unit

- **Playback 0: Building consensus:** A validation that is accomplished through a review session with all business stakeholders, business users, and the IBM Business Process Manager development team



Playback 0: Building consensus

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Figure 6-3. Key concepts in this unit

## 6.1. Playback 0: Validation phase

## Playback 0: Validation phase

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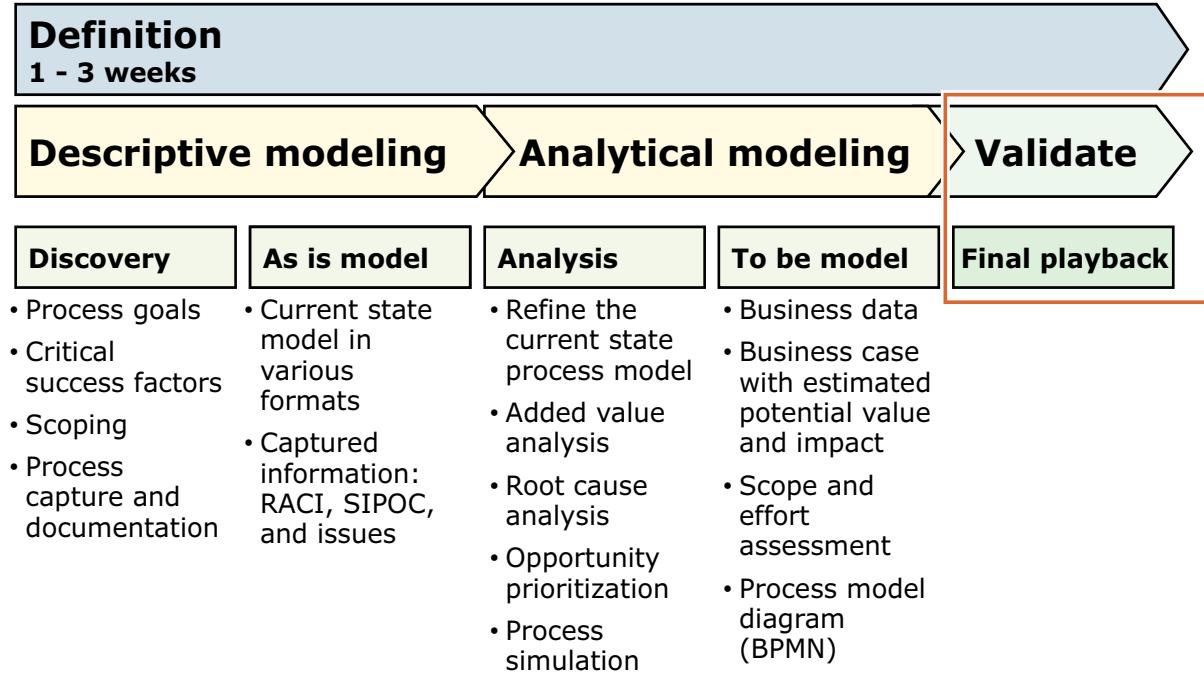
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Figure 6-4. Playback 0: Validation phase

In Playback 0, documentation and process analysis set the correct framework for the process model creation, process automation, and process activity value analysis to gain efficiencies, visibility, and effectiveness for the business process. The entire Playback 0 stage typically takes 1 – 3 weeks to complete.

## Playback 0 validation

### Playback zero

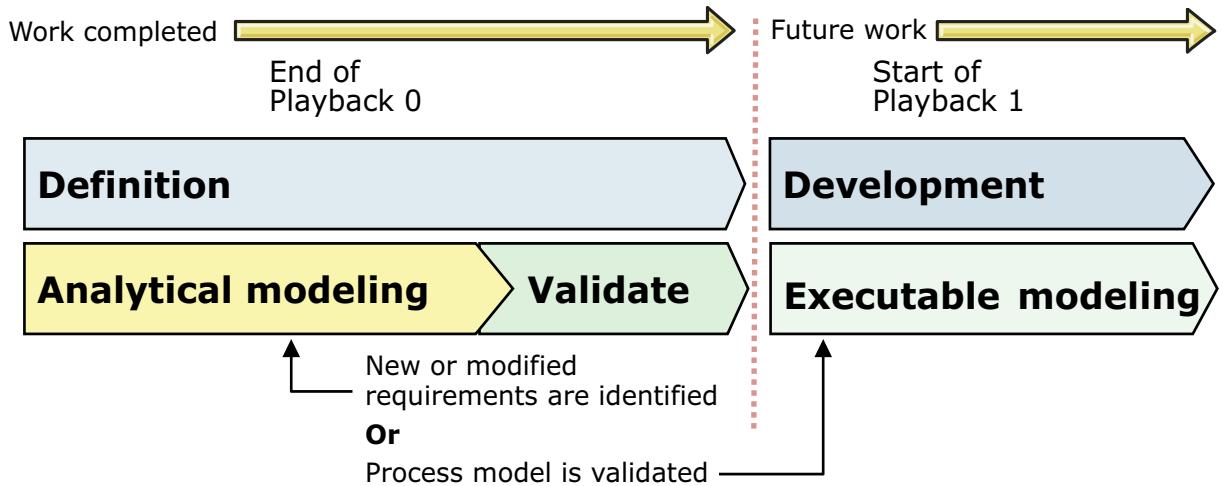


Playback 0: Building consensus

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Figure 6-5. Playback 0 validation

## How validation works



- Playback 0 validation is accomplished through a review session with all business stakeholders, business users, and the IBM BPM development team
- Validation leads to the switch from analytical modeling to executable modeling
- More refinement to process requirements can continue through the framework of the next series of implementation playbacks in process implementation

Playback 0: Building consensus

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Figure 6-6. How validation works

The work that is done in Playback 0 is reflected in the adjusted process model of the business process, and now it can be implemented as a process application. To ensure that the business process is the right candidate to implement, it is necessary to have consensus that Playback 0 reached the final goal. This consensus is known as Playback 0 validation.

Playback 0 validation is accomplished through a review session that includes attendance of all business stakeholders, business users, and the BPM development team. The validation leads to the switch from analytical modeling to executable modeling. If the validation is complete and the process model is approved, then any additional refinement to process requirements can continue through the framework of the next series of implementation playbacks in process implementation.

At times a validation playback session might discover requirements that were missed, or new requirements are introduced. This situation is not uncommon in BPM; the one thing that is certain is that requirements change. For this reason, a process model must be flexible enough for change; and BPM provides the best system to manage change, which results in continuous process improvement.

## 6.2. Reaching consensus on the process model

## Reaching consensus on the process model

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Figure 6-7. Reaching consensus on the process model

During the Playback 0 stage of project development, multiple playback sessions are held. In fact, these sessions typically have a themed approach for within the three-week time frame. The BPM team can establish the best course of action to take for playbacks within the Playback 0 development. The strategy to handle each of these themed playbacks is through iteration.

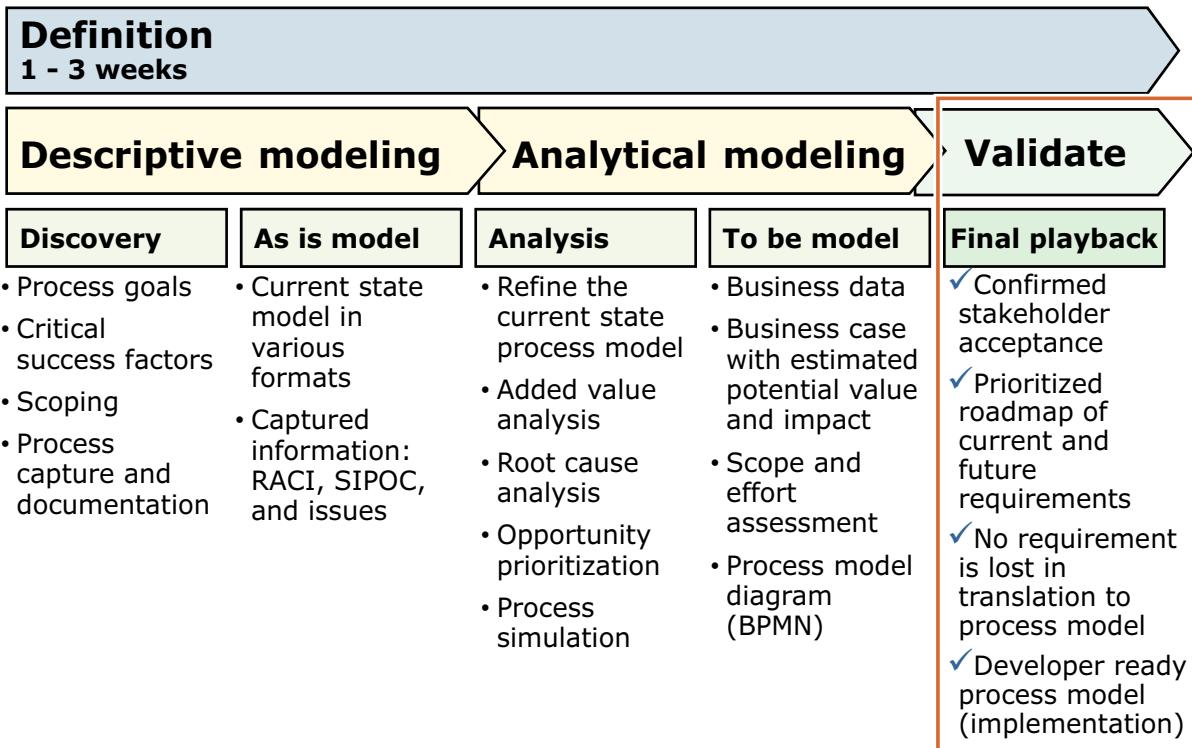
These sessions take 60 – 90 minutes, and must include important decision makers for the specific playback achievement that is reached. Many organizations select a project sponsor or a senior business user to conduct the playback so that they have buy-in for the project. The session also requires business users to fully understand the development phase end products, thus increasing the tie between the IT and business stakeholders. The following list contains some examples of themed playbacks for Playback 0:

- Process discovery playback
- Initial (as-is) process model or discovery map playback
- Conceptual design (process application or report mock-up designs) playback
- Measurement and visibility playback
- Validation playback

None of these examples are meant to be the exact themes a BPM team must use; that varies from organization to organization. However, make sure the themes match work that is done during this stage of project development. What is important is the last playback session: validation of the business process and process model.

## Validation goals

### Playback zero



Playback 0: Building consensus

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Figure 6-8. Validation goals

Having a final process model that is ready for implementation means that the BPM team is ready to validate the business process along with the business groups, such as stakeholders and users.

Process analysis, process adjustment, and process modeling have all come together in the short three-week cycle to enable the final session for this stage of project development. This stage is when consensus is reached on the following conditions:

- The process model is ready for implementation.
- No requirements are lost in the translation effort.
- If the business stakeholders still change the requirements, it is time to evaluate the best roadmap to implement those requirements into the model, up to and including just before the validation agreement is obtained.

Playback 0 validation is conducted with the process inside the Web Process Designer tool. On the condition that everyone in the room can view the process, any tool can be used to show the process. The objective is to review all process flow, normal and conditional, and model specifics such as participants, activities, and process control.

## Unit summary

- Describe the Playback 0 validation goals and requirements
- Validate that a process model meets Playback 0 goals and requirements

Playback 0: Building consensus

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*Figure 6-9. Unit summary*

## Review questions

1. True or False:

Playback 0 validation is accomplished through a review session with all business stakeholders, business users, and the IBM BPM development team.

2. Validation leads to the switch from \_\_\_\_\_ modeling to \_\_\_\_\_ modeling.

- A. Data . . . deployment
- B. Analytical . . . validation
- C. Analytical . . . executable

3. The objective of \_\_\_\_\_ is to review all process flow, normal and conditional, and model specifics, like participants, activities, and process control.

- A. Playback 0 validation
- B. Analytical modeling
- C. Descriptive modeling
- D. Definition

Playback 0: Building consensus

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Figure 6-10. Review questions

Write your answers here:

1.

2.

3.

## Review answers

1. True
2. C: Analytical to executable
3. A: Playback 0 validation

Playback 0: Building consensus

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Figure 6-11. Review answers

## Exercise 4

### Validating the process model

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Figure 6-12. Exercise 4

The Hiring Requisition process owner provided detailed information about the process and its current state to the BPM analyst, who in turn documented the information. This stage completed the process discovery stage. The initial process model was built and then analyzed for improvement.

Your activity responsibility is to conduct a final process model validation, and then take the feedback and refine your process.

You first walk through the playback with your instructor and then break into groups to implement the additional process requirements.

#### New process requirements:

During Playback 0, the vice president mentions some recent issues with several job postings that contain wording that violates a new set of hiring laws. To address this issue, the vice president suggests that a lawyer reviews every job post. The lawyer checks for legal compliance (and edits if necessary) at some point before the job opening is released and posted to the public.

## Exercise objectives

After completing this exercise, you should be able to:

- Validate that the business process reflects the intended requirements
- Implement the requirements with Playback feedback and new process requirements as input

---

# Unit 7. IBM Business Process Manager architecture

## Estimated time

02:00

## Overview

IBM Business Process Manager is a comprehensive and consumable business process management environment that provides visibility and management of your business processes. It includes tools and a runtime environment for process design, execution, monitoring, and optimization. It is designed to enable process owners and business users to engage directly in the improvement of their business processes.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Describe IBM Business Process Manager product components
- Describe the relationship between IBM Process Center and the runtime environments
- Identify the integrations with other IBM products

## Topics

- IBM Business Process Manager Standard architecture overview
- Integration with other IBM products

## Key concepts in this unit

- **Process Center:** An application that is running on WebSphere Application Server that helps developers create business processes and reusable components in a collaborative environment
  - The Process Center is used when a developer runs playback sessions to demonstrate working code
  - It allows administrators to install and run processes on the Process Servers in test and production environments when process consensus is met
  - You can run and test processes as you build them on the Process Center
- **Process Server:** Provides a runtime environment that supports a range of business processes, service orchestration, and integration capabilities
- **Business Performance Data Warehouse:** Collects and aggregates process data from processes that run on the Process Servers

## 7.1. IBM Business Process Manager architecture overview

## IBM Business Process Manager architecture overview

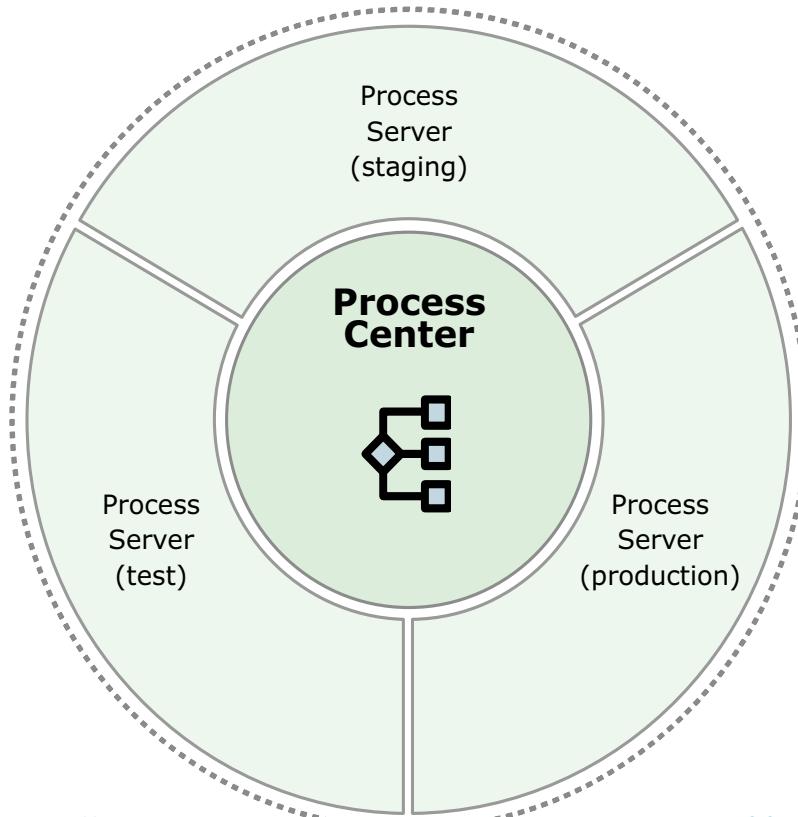
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Figure 7-4. IBM Business Process Manager architecture overview

This unit is an introduction to the architecture of the typical IBM Business Process Manager Standard installation. To learn more about server configuration and administration, IBM Education offers more in-depth classes on IBM Business Process Manager administration and WebSphere administration.

## The Process Center: The center of the development effort



IBM Business Process Manager architecture

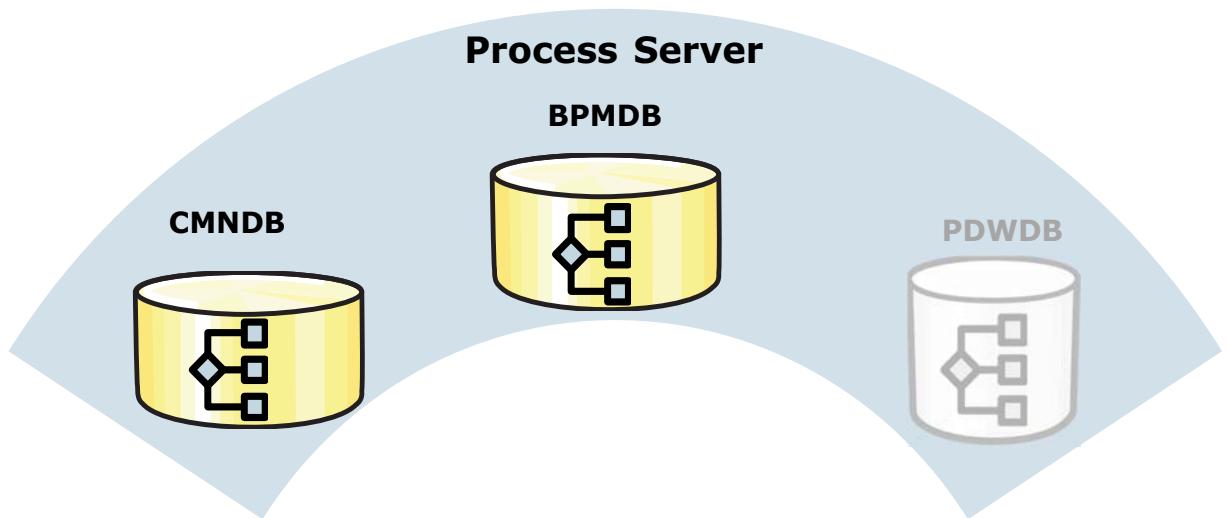
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*Figure 7-5. The Process Center: The center of the development effort*

You now return to the center of the development effort, the Process Center. The Process Center not only is the center of the development effort, but also provides governance over the entire lifecycle of a business process. It includes the central repository for multiple process authors who work with process application artifacts. You can see that the different Process Servers surround the Process Center. The Process Center is where process applications are created and stored, whereas the Process Servers (also called runtime environments) are where those process applications are tested and processes are executed. When the development effort reaches a milestone, a process application is installed on a Process Server to test, stage, or move into a production environment.

This topology is similar to a hub and spoke deployment configuration, where all development occurs inside the Process Center and then the assets are deployed out to each environment.

## The Process Server databases



IBM Business Process Manager architecture

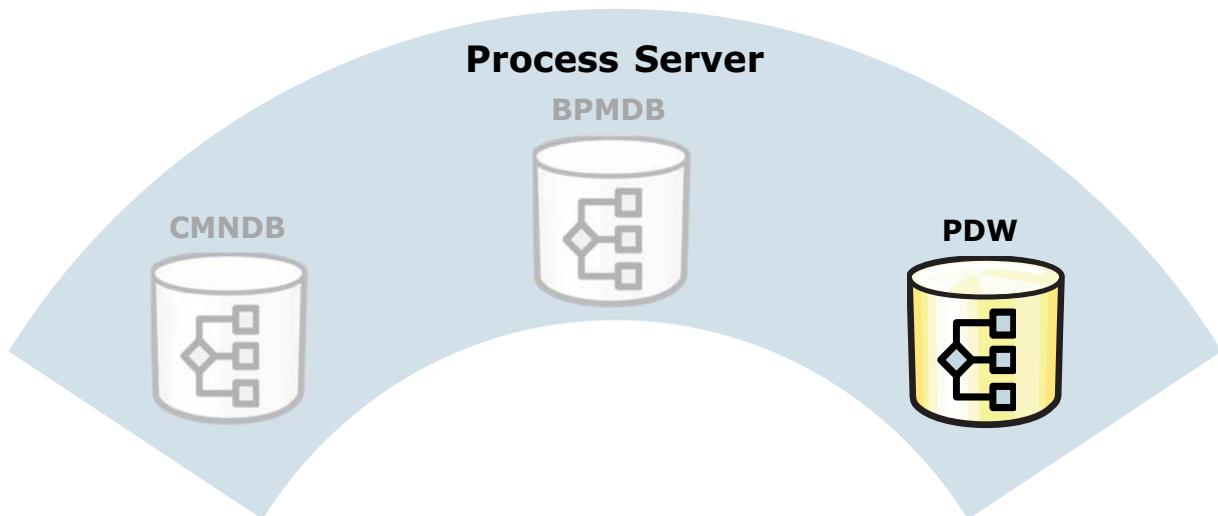
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Figure 7-6. The Process Server databases

Every Process Server contains a common database (CMNDB), BPM database (BPMDB), and Business Performance Data Warehouse database (PDWDB). Both the BPM database and the common database contain the tables that the server uses to store the process artifacts and execute the processes, along with all the other requirements to run the server. The system might need to be queried for data about in-flight instances, and this data comes from these tables. Do not query the tables directly, as the schema might change from version to version. IBM BPM provides a robust set of JavaScript and REST APIs to retrieve the data from these databases.

Although the data in these databases might contain business data about the process, these databases should not be considered a business data system of record. You should persist the business data to an enterprise system of record during or after the process is complete.

## The Performance Data Warehouse



IBM Business Process Manager architecture

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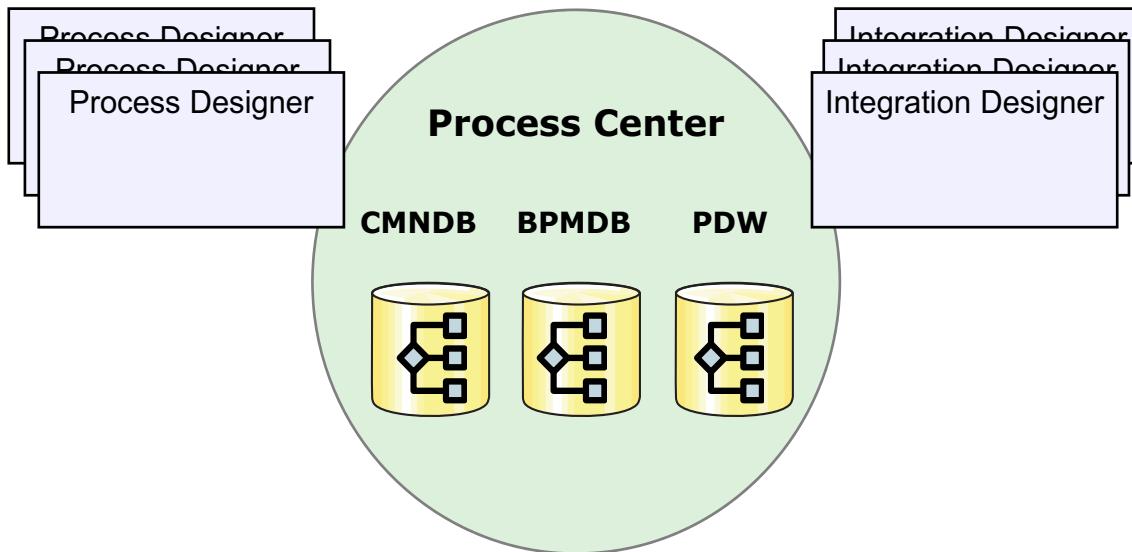
*Figure 7-7. The Performance Data Warehouse*

The Performance Data Warehouse collects performance data that represents key business events and metrics when processes are run in the development environment. You can use this collection to examine reports and data in development before a process is tested or put into production. It acts as a system of record for all production process data of an organization. The typical configuration contains a Performance Data Warehouse, which is run as a service on the Process Server. For some high-demand organizations, the Performance Data Warehouse can be configured to run on a separate node or cluster to meet the performance needs of the environment as configured by WebSphere.

The Performance Data Warehouse uses the process model to correlate the business events in real time and aggregate raw performance data into a single database view for reporting and auditing. This database is the system of record for process data for the organization. Developers can create queries against the Performance Data Warehouse database to retrieve information on process performance. Information on total time or average time for a process to complete, and the percentage of processes that follow a certain flow, can be retrieved from the Performance Data Warehouse database.

IBM Business Process Manager automatically installs a Dashboards toolkit for developers to create quick reports with the data from the Performance Data Warehouse. However, third-party reporting packages and environments can integrate with the Performance Data Warehouse to extract process metrics for their own reporting needs.

## The Process Center: A unique Process Server



IBM Business Process Manager architecture

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*Figure 7-8. The Process Center: A unique Process Server*

Every Process Center is a Process Server with more capabilities. The Process Server manages and runs all process model definitions in the development environment. It also stores the versions and history for process development and deployment. The Process Server is an application server that is running on WebSphere, and it can run on a single node or cluster to meet the performance requirements of the environment as configured by WebSphere.

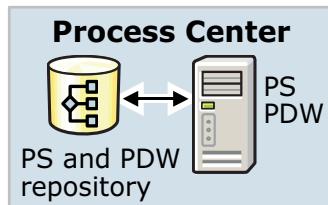
The Process Server relies upon a database to store the data for process instances, similar to the runtime environments. The Process Center also uses database tables to store and version the process development assets that developers create by using the Process Designer. Because the development occurs on the Process Center, it is sometimes called the development environment.

You created a process application and business process definitions in the first part of the course. The Process Center is where developers now create the toolkits, rules, integrations, and services to implement the processes that were built in Playback 0. Complex process interactions like timers, message events, and error handling are part of the development effort and are implemented in the Process Center.

The Process Center contains an integrated Process Server, which you can use to run and debug processes as you build them. When you are ready, you can install and run those same processes on the Process Servers in your runtime environments.

The Business Performance Data Warehouse component collects and aggregates process data from processes that run on the Process Servers. You can use this data to improve your business processes. You can use the Process Admin Console to manage the Process Servers in your runtime environments (development, test, staging, production) and the Process Server that is part of the Process Center.

## Architecture: Process Center



IBM Business Process Manager architecture

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*Figure 7-9. Architecture: Process Center*

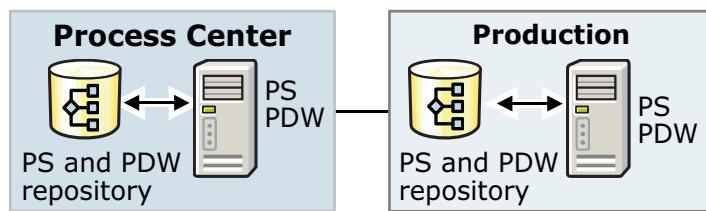
The following diagram illustrates a typical IBM Business Process Manager Standard configuration. The architecture centers around the Process Center, which consists of the Process Server and the Performance Data Warehouse. Process application, BPD, service, coach, and integration development occurs on the Process Center.

In some cases, a single Process Center server is not enough. Many factors affect scaling and topology:

- Team structure (teams can own and manage one or more projects)
- Security
- Geography
- Sheer volume of process applications and toolkits
- Sheer volume of developers
- Intensity of developer's playback activity

The Process Center can be configured as a stand-alone server, or can be clustered in a way that is similar to the other Process Servers. Process Centers can also be federated so development assets that are stored in multiple Process Centers can be shown in a single Process Designer.

## Architecture: Process Servers



IBM Business Process Manager architecture

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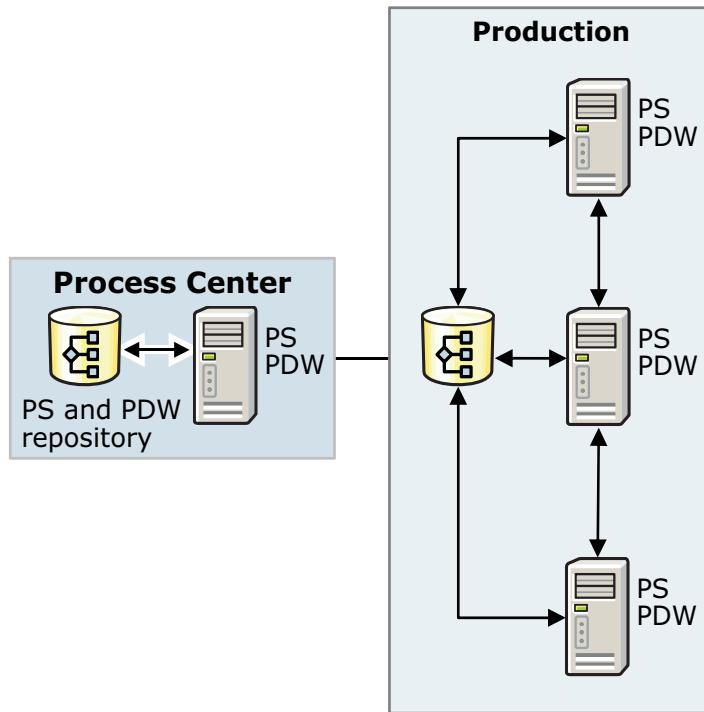
Figure 7-10. Architecture: Process Servers

Each Process Center environment and each Process Server environment is built on a WebSphere cell. Each IBM Business Process Manager Process Server contains resources for running and completing installed processes that are deployed from the Process Center. The Process Server provides a single BPM runtime environment that can support a range of business processes, service orchestration, and integration capabilities.

You can use the integrated Process Server within the Process Center to run processes as you build them. When you are ready, you can install and run those same processes on a Process Server.

Similar to the Process Center, each runtime environment or Process Server has its own Process Server and Performance Data Warehouse components. The Process Center is just a unique Process Server that can design process applications and can deploy those assets to the Process Servers.

## Architecture: Scaling to meet performance demands



IBM Business Process Manager architecture

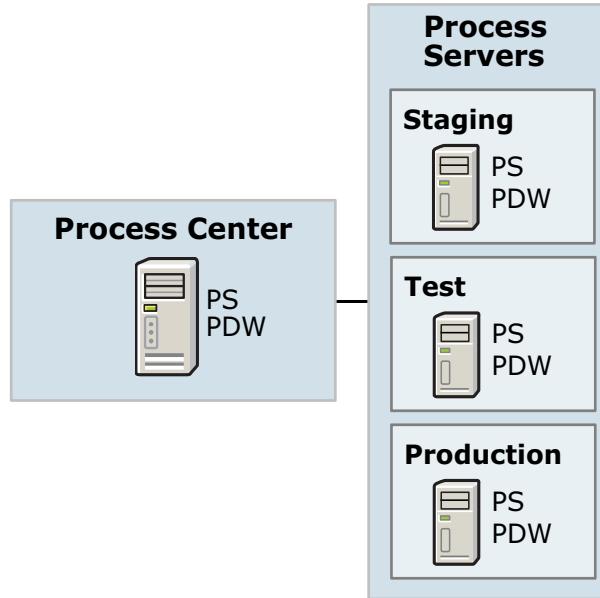
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Figure 7-11. Architecture: Scaling to meet performance demands

IBM Business Process Manager has numerous ways to scale to meet performance demands. Process Servers can meet performance demands through vertical scaling, horizontal scaling, and federating more Process Servers.

Each environment can be set up as a cluster of servers with its associated database. IBM Business Process Manager supports horizontal clustering of servers by adding extra servers to the cluster. IBM Business Process Manager also supports vertical scaling and clustering by adding more nodes and resources (memory and processors, for example) to each individual server. The database for each environment can also be clustered in the same way. The clustering needs of each environment are based on the performance requirements. For assistance with determining the scaling requirements for your installation, contact your IBM representative.

## Architecture: Multiple Process Servers



IBM Business Process Manager architecture

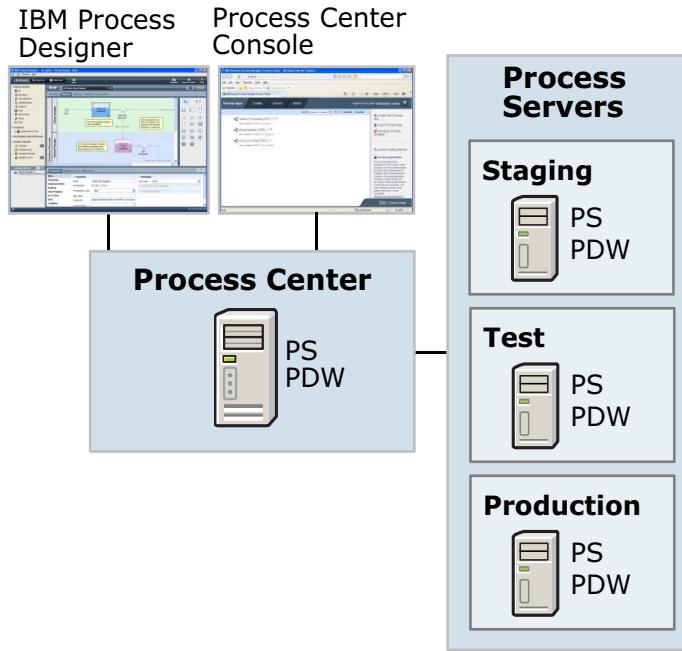
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Figure 7-12. Architecture: Multiple Process Servers

You can have a number of Process Servers within your enterprise, depending on your business needs. Each environment runs independently from each other. Each environment can have unique instances that are run in the environment, can connect to different endpoints for integrations, and can be customized as necessary for that particular environment. Typically these environments are designated as development (the Process Center), staging, test, or production, but they can be used for any other type of environment as required.

The Process Center pushes all the process development assets on the Process Center to the different Process Servers in a “hub and spoke” deployment approach.

## Architecture: Process Center tools



IBM Business Process Manager architecture

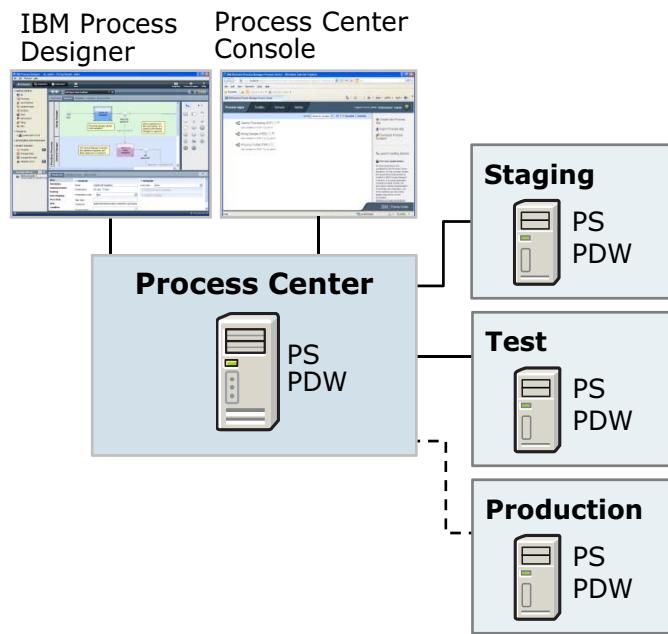
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Figure 7-13. Architecture: Process Center tools

The Process Center has two tools unique to this environment. IBM Process Designer is an application that is installed on a client computer that connects to the Process Center, and developers use this tool to create services and other configurations. The web Process Designer is a web application that can be launched from the Process Center and is used to model and implement processes.

The Process Center Console is a web application that is used for Process Center administration.

## Architecture: Deploying process applications



— Online installation      - - - - Offline installation

IBM Business Process Manager architecture

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*Figure 7-14. Architecture: Deploying process applications*

When the development is complete, a developer or administrator copies assets from the Process Center to a Process Server. This task is commonly called installing or deploying a snapshot to a Process Server. If an internet connection exists between the environments, this deployment can be done through the Process Center console by an administrator with permissions. This deployment is completed over a secure connection.

Many clients isolate the production server from the development servers, so no physical connection exists between servers. In this situation, an installation package is created from the Process Center, and the snapshot must be physically deployed and installed on the Production server.

## Installing process applications on a Process Server

- The developer creates a snapshot (version) of the process application that contains all the development assets and toolkit dependencies
- The process application is installed or deployed by using the Process Center Console
  - Correct permissions are required for a user to deploy to a Process Server
- Deployment services and a governance process can be used to control the deployment process
- When existing instances of a process exist on a Process Server, careful consideration must be given to the migration of those instances

*Figure 7-15. Installing process applications on a Process Server*

To deploy assets to a Process Server, developers must first create a snapshot of the process application. Snapshots record the state of library items within a process application or track at a specific point in time. You can create snapshots in the Process Center Console or in the Designer view. Snapshot management, such as installing, exporting, and archiving, is done in the Process Center Console. More information about creating snapshots is covered in Unit 7.

When the snapshot is created, it must be exported or deployed to the Process Server through the Process Center Console. By default, the following access to the process application is required for each type of environment:

- Administrative access to install to Process Servers in production environments
- Write access to install to any non-production Process Server
- Read access to install to Process Servers in development environments

You can create a governance process that reacts to the status change of a snapshot. The System Governance toolkit (TWSYSG) contains the machinery that is required to build a governance process. The toolkit has integration services for installation and snapshot status, undercover agents (UCAs), and governance business objects.

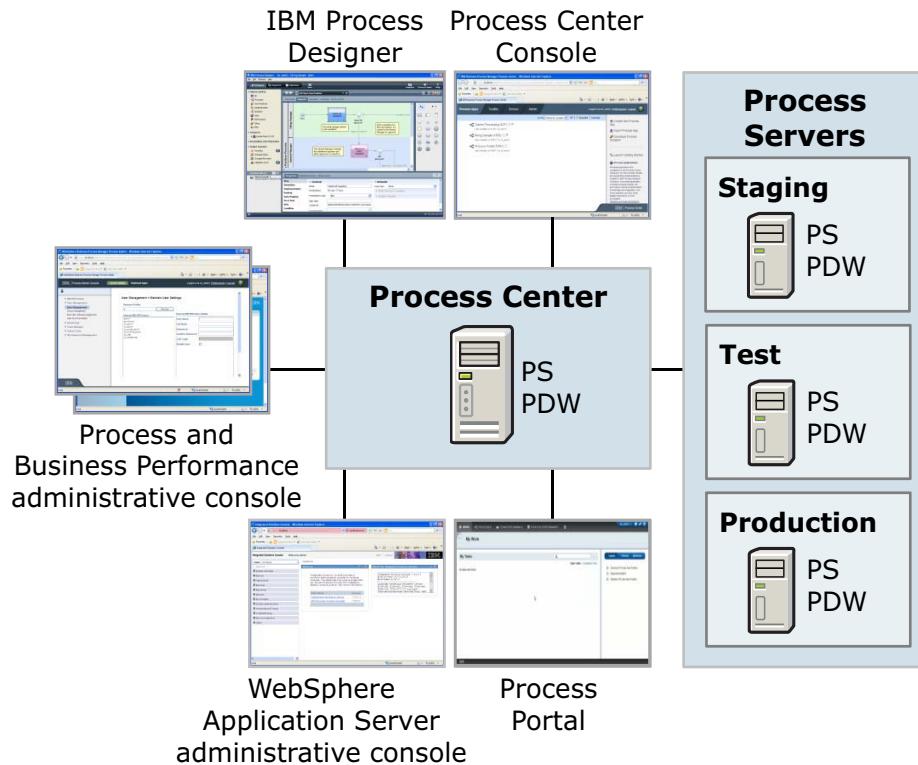
When a snapshot of a process application or toolkit is created or when the status of a snapshot changes, a message event is triggered. If no governance process is in place, the message goes

nowhere. If a governance process is bound to the snapshot event, the governance process is triggered and you can use it to track status changes. A new process instance of the governance process starts whenever a snapshot is created or the status of the snapshot is changed. You can see the status changes by opening the Inspector in IBM Web Process Designer and selecting the Process Instances tab. You can also use Process Portal on the Process Center server to work with governance process instances.

When a Process Server has existing instances of a process on it, careful consideration must be made to the migration of those instances.

To learn more about server configuration and administration, IBM Education offers classes on IBM Business Process Manager administration and WebSphere administration.

## Architecture: Administrative consoles



IBM Business Process Manager architecture

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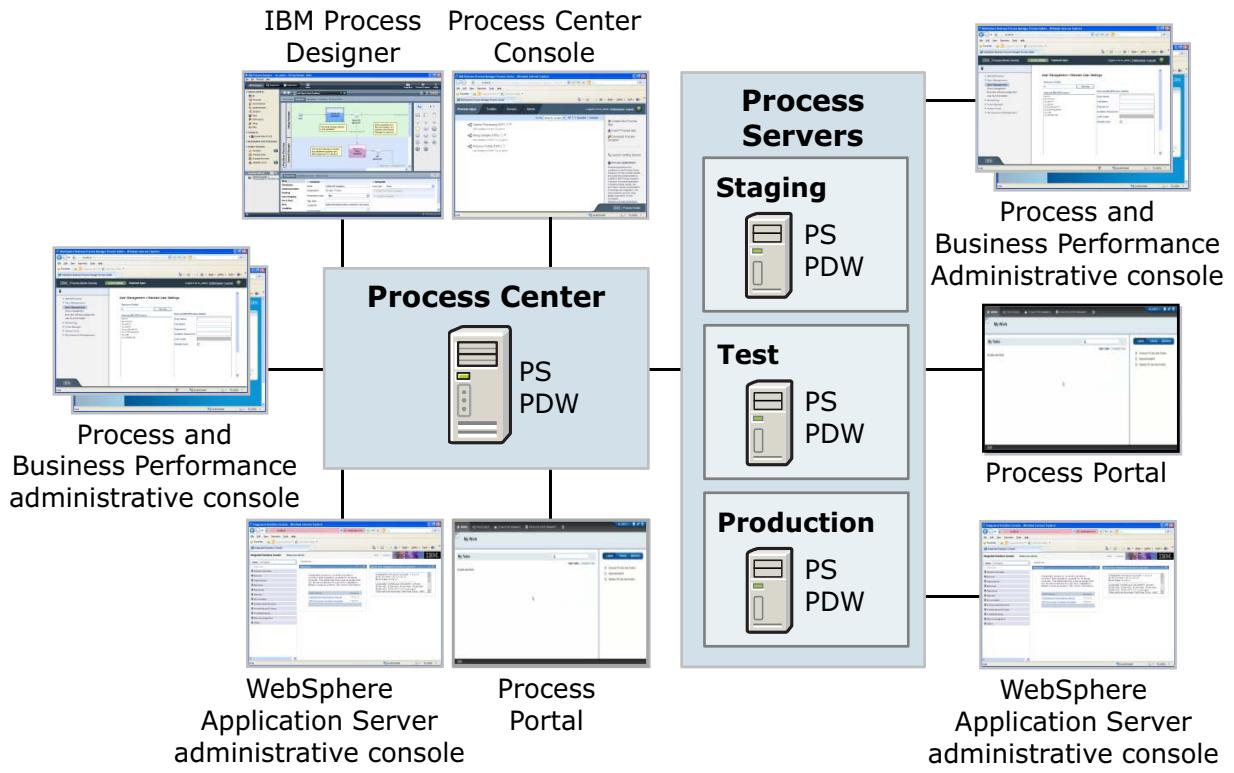
Figure 7-16. Architecture: Administrative consoles

The Process Center also uses three web applications to interact with the Process Center. Administrators use the Process, Business Performance, and WebSphere Application Server administrative consoles to configure the server.

The Process Portal allows users to create and work on the tasks that are assigned to them. Because users interact exclusively with the portal and not the Process Designer, process playbacks are conducted with the Process Portal. The IBM Process Designer tools are designed for developing and debugging processes and services, and are not used for playbacks.



## Architecture: Process Server tools



IBM Business Process Manager architecture

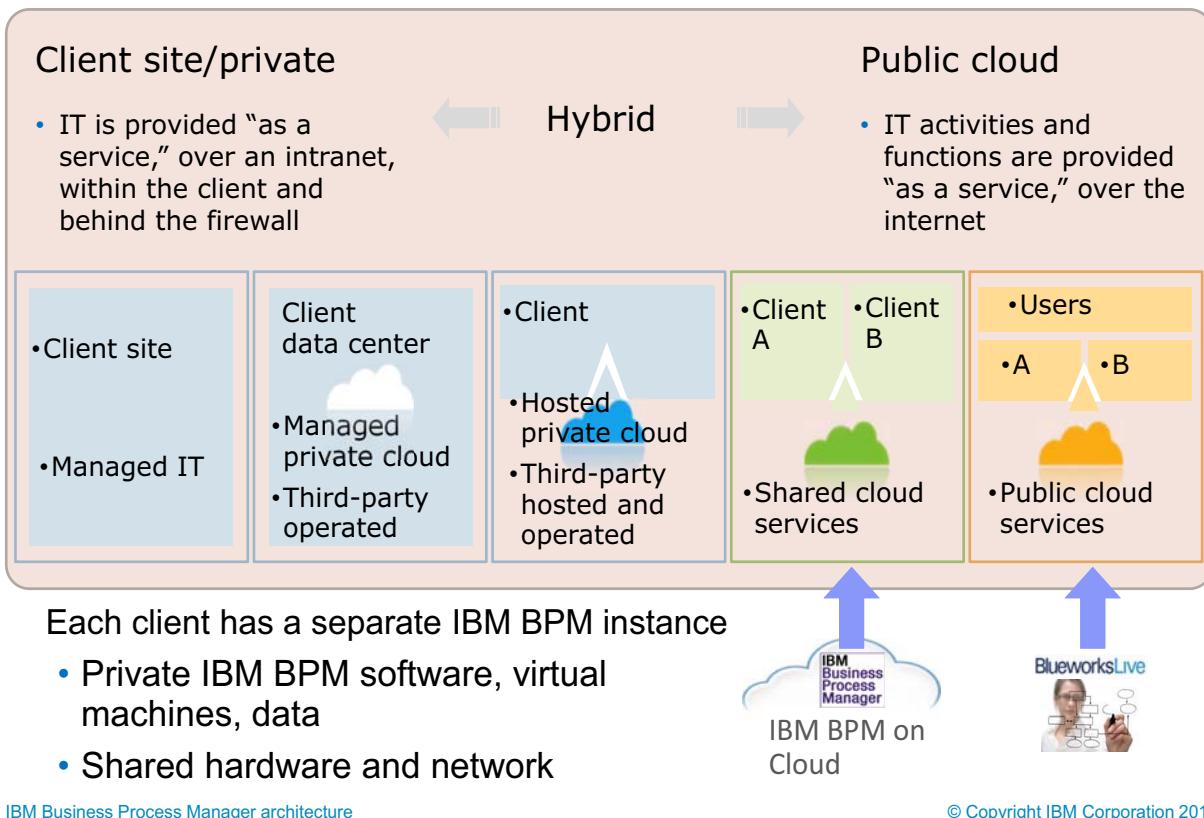
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Figure 7-17. Architecture: Process Server tools

Process Servers each contain their own set of these applications (Process and Business Performance administrative console, WebSphere Application Server administrative console, and the Process Portal). These web applications are dedicated to the server that they are associated with.

Users use the runtime Process Portal to work on their process tasks and create instances of the processes necessary to do their jobs. For example, testers use the test environment to create process instances and to see the tasks that are assigned to them. The test environment is independent of the production environment, which can have a different version of the process with production tasks that are running on that server.

## IBM Business Process Manager on Cloud



IBM Business Process Manager architecture

Figure 7-18. IBM Business Process Manager on Cloud

Getting started with a BPM project or rolling out a BPM program requires investment. This investment is in setting up and configuring a set of BPM environments in which to develop, test, execute, and improve upon those business processes that are being automated. The challenge of getting the right environments ready to go can be tackled in many ways.

The traditional approach to setting up environments for IBM Business Process Manager is to install and configure these environments on locally owned hardware or a locally managed virtualization platform. This approach usually involves reading an IBM Redbooks publication or acquiring the service skills and helping to do the installation and configuration. In some cases, it is preceded by acquiring the compute resources and getting them available and running.

The SaaS approach is at the other end of the spectrum, and in the world of IBM BPM, this approach is called IBM BPM on Cloud.

In the middle ground between the traditional approach and the full SaaS approach, you find the world of PaaS. For IBM BPM, PaaS means patterns. Specifically, it means patterns for PureApplication Systems or patterns that work in the context of PureApplication Service on Softlayer. IBM also supports IBM Cloud Orchestrator with the IBM Business Process Manager Pattern.

By using IBM Business Process Manager in the cloud, it means that:

- Full environments can be set up in a few hours with a minimal set of inputs required.
- These environments can be customized to meet specific local requirements.
- These environments can be managed and evolved in a simplified and consistent way.

## 7.2. Integration with other IBM products

## Integration with other IBM products

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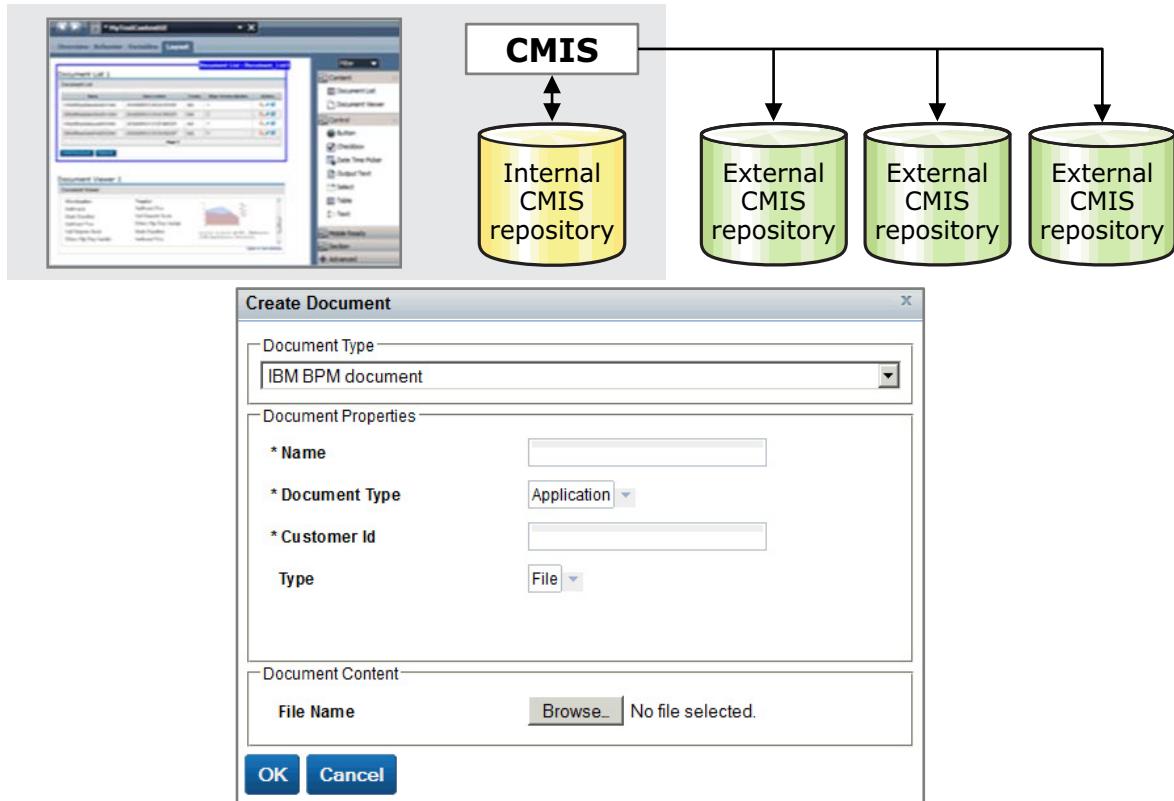
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Figure 7-19. Integration with other IBM products

IBM Business Process Manager integrates with other IBM products natively through the Process Designer and the BPM REST operations. By configuring your Process Center and Process Servers, you can use the power of numerous IBM tools to provide robust process capabilities.

# IBM Training

## Integrating BPM and Enterprise Content Management



IBM Business Process Manager architecture

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Figure 7-20. Integrating BPM and Enterprise Content Management

Enterprise Content Manager systems manage documents of different types, such as records, images, and web pages, throughout their lifecycle. You can access and update such documents from a business process inside IBM Business Process Manager by using special Enterprise Content Manager operations in services such as an integration service or a client-side human service.

The integration with Enterprise Content Manager systems is based on Content Management Interoperability Services (CMIS). CMIS is an open standard that the Organization for the Advancement of Structured Information Standards (OASIS) administers. CMIS defines an abstraction layer for controlling diverse document management systems and repositories by using web protocols. As a result, seamless integration is possible between IBM Business Process Manager and Documentum, IBM Content Manager, FileNet Content Manager, SharePoint, or any other JCR-compliant repository.

An internal CMIS repository, which is known as the BPM document store, supports an embedded Enterprise Content Manager and uses consistent access mechanisms for integrating to it. As a result, documents, images, or any other files can be associated with process instances even if your organization does not currently use an Enterprise Content Manager system.

Enterprise Content Manager events can trigger content start and intermediate events. For Enterprise Content Management integration, predefined types, services, and events are available. These types and services are contained in the Content Management (SYSCM) toolkit.

For more information on IBM Business Process Manager and Enterprise Content Management:  
[http://www.ibm.com/developerworks/bpm/bpmjournal/1312\\_mcelroy/1312\\_mcelroy.html](http://www.ibm.com/developerworks/bpm/bpmjournal/1312_mcelroy/1312_mcelroy.html)

**IBM Training**

**IBM Business Process Manager and IBM Business Monitor**

Generate a default monitor model for your process application from the Process Designer

IBM Business Process Manager architecture

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Figure 7-21. IBM Business Process Manager and IBM Business Monitor

IBM Business Monitor is a comprehensive business activity monitoring software that:

- Provides an up-to-date view of your business performance
- Provides predictions for you to act on before problems occur
- Processes business events and data with personalized business dashboards
- Calculates key performance indicators (KPIs) and metrics
- Can collect events and data from a wide variety of sources

IBM Business Process Manager contains native capabilities to visualize process performance, but Business Monitor provides a robust tool that can monitor IBM Business Process Manager and other sources.

You can use the IBM Process Designer to generate a default monitor model for your process application. A dashboard is automatically generated for the monitor model, and it shows up in the Business Space Manager page in a web browser. You can also create your own dashboard for viewing monitored data.

You can integrate IBM Business Monitor with IBM Business Process Manager to provide business monitoring capability for your process applications. Business authors who use IBM Process Designer to define a BPMN process application can specify IBM Business Monitor tracking

definitions for the process application without having to use a separate tool. If IBM Business Monitor is installed, its tracking definitions (part of a monitor model) are updated when you update tracking definitions inside the Process Designer or when process applications are deployed to the runtime environments.

For more information about IBM Business Process Manager and IBM Business Monitor:

[http://www.ibm.com/support/knowledgecenter/SSFPJS\\_8.5.7/com.ibm.wbpm.main.doc/kc-homepage-bpm.html](http://www.ibm.com/support/knowledgecenter/SSFPJS_8.5.7/com.ibm.wbpm.main.doc/kc-homepage-bpm.html)

The screenshot shows the IBM Decision Center interface. At the top, there's a blue header bar with the text "IBM Training" on the left and the "IBM" logo on the right. Below the header is a main title: "IBM Business Process Manager and IBM Operational Decision Manager (1 of 2)". The main content area is titled "loanvalidation-rules-multivoc > main > grade (v1.0)". On the left, there's a table with columns: "Yearly repayment", "Corporate score", "Grade", and "Message". The table rows define rules for loan grades based on repayment and score ranges. To the right of the table is a sidebar with sections for "Properties" and "Stream". The "Properties" section shows the rule was created by "rtsAdmin" about 2 days ago, has a status of "New", and is grouped under "Group". The "Stream" section is currently empty.

Yearly repayment	Corporate score	Grade	Message
[0, 10000[	$\geq 900$	A	Very low risk loan
[0, 10000[	[600, 900[	A	Very low risk loan
[0, 10000[	[300, 600[	B	Low risk loan
[10000, 30000[	$\geq 900$	A	Very low risk loan
[10000, 30000[	[600, 900[	B	Low risk loan
[10000, 30000[	[300, 600[	C	Average risk loan

**if**  
all of the following conditions are true :  
- ( the yearly repayment of 'the loan' is at least 10000 and less than 30000 )  
- ( the corporate score in 'the loan report' is at least 600 and less than 900 ),  
**then**  
set the grade of 'the loan report' to "B";  
in 'the loan report' add the message "Low risk loan";

IBM Business Process Manager architecture

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Figure 7-22. IBM Business Process Manager and IBM Operational Decision Manager (1 of 2)

IBM Operational Decision Manager (ODM) complements IBM Business Process Manager products to empower businesses to automate, manage, and improve the decision cycle in the face of growing complexity and change. IBM Process Designer supports rich rule authoring and execution features that are based on paradigms that are familiar to Operational Decision Manager users. Authoring features include the Business Action Language (BAL) for authoring if-then rules in the Intellirule Editor.

Although IBM Business Process Manager provides limited rule creation capabilities, IBM Operational Decision Manager might be used for other systems outside of IBM Business Process Manager, and can provide a dedicated rules engine to the organization.

IBM Process Designer users can export a rule project that contains the rules that implement a process task. The exported rules thus move from a process-centric lifecycle and governance model to the Operational Decision Manager methodology and lifecycle. IBM Process Designer and Integration Designer also include wizards to easily integrate existing business rule applications into business processes.

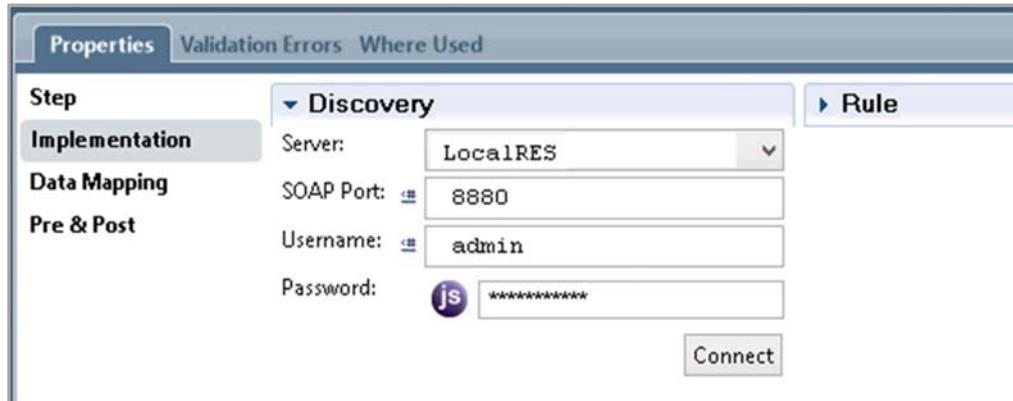
IBM Operational Decision Manager (ODM) complements the IBM Business Process Manager products to empower businesses to automate, manage, and improve the decision cycle in the face of growing complexity and change.

For more information about IBM Business Process Manager and IBM Operational Decision Manager, see “Best practices for designing and implementing decision services, Part 2: Integrating IBM Business Process Manager and IBM Operational Decision Management,” at:

[http://www.ibm.com/developerworks/bpm/bpmjournal/1212\\_boyer2/1212\\_boyer2.html](http://www.ibm.com/developerworks/bpm/bpmjournal/1212_boyer2/1212_boyer2.html)

IBM Training 

## IBM Business Process Manager and IBM Operational Decision Manager (2 of 2)



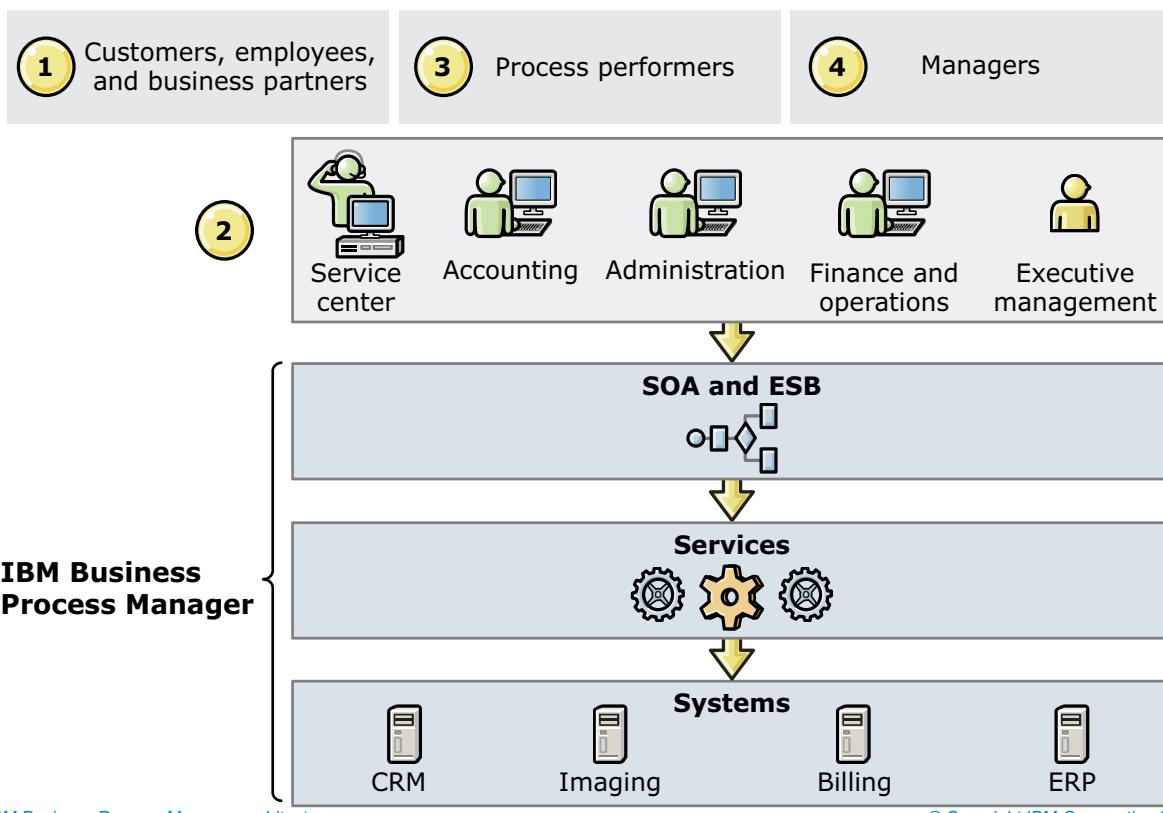
IBM Business Process Manager architecture

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Figure 7-23. IBM Business Process Manager and IBM Operational Decision Manager (2 of 2)



## IBM Business Process Manager and IBM MobileFirst



IBM Business Process Manager architecture

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Figure 7-24. IBM Business Process Manager and IBM MobileFirst

Mobile Smarter Process helps organizations to reinvent how business is done by using Mobile technologies. As stated in the first part of the course, MobileFirst integration provides new context, new ways of engagement, and new methods of gathering input for processes. Now process participants can use mobile capabilities to interact with the process wherever they are. All of these new capabilities create more interactions than ever before. Although these interactions add value, they must be harnessed to accomplish an end goal. IBM Mobile Smarter Process combines market-leading offerings from IBM Smarter Process suites and IBM MobileFirst Platform offerings.

The illustrated process provides these advantages:

1. Customers, employees, and business partners want to interact with the organization by using their device of choice to instantiate a process or check on the status of a process they previously started. For example, in an insurance company scenario, by instantiating a claim, customers start a process that can use their device for various purposes: geolocation information available on their device, device services such as the camera to take a picture of a damaged car and upload it, and the information that is stored in multiple back-end systems.
2. A process can involve many different roles to complete it. Smarter Process uses coaches or forms that streamline the activities of the process performers and work across any mobile devices with different form factors. A Mobile Smarter Process allows for process performers to use social collaboration to deliver a better customer experience. Integration with multiple

back-end systems might be necessary to complete the process that uses service-oriented architecture (SOA).

3. If the process requires human input, it can send a notification to the appropriate people and they can always be reached through their mobile devices. The business process is not going to be hindered because of someone not having access to a website or not being logged in.
4. Processes do not always occur as planned. As the global economy, the global workforce, and mobility expand, it is even more important to give managers process visibility and agility to make quick decisions. It is good to unleash the benefits of IBM Mobile Smarter Process with IBM Business Process Manager and IBM MobileFirst Platform changes. Otherwise, organizations risk losing customers. A Mobile Smarter Process gives managers the visibility and agility they need to use their device of choice for making fast adjustments to improve performance.

In summary, this simple example shows these advantages:

- Mobile extends the reach of a business process beyond the traditional channels to where the knowledge workers (customers, employees, business partners, managers) are. Knowledge workers always have access to the business process, and the business process can reach them when required. For example, if the process requires an approval, a notification is sent to the approver's mobile device to alert them that the process is waiting for their approval.
- By adding mobility to the smarter process, Mobile Smarter Process allows managers to gain instant visibility. In this way, they can adapt to changes in the market by making faster adjustments and quicker decisions on a device of their choice. The mobile smarter process has constant access to decision makers, and decision makers can always interact with the business process.

## Unit summary

- Describe IBM Business Process Manager product components
- Describe the relationship between IBM Process Center and the runtime environments
- Identify the integrations with other IBM products

IBM Business Process Manager architecture

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*Figure 7-25. Unit summary*

## Review questions

**1. True or False:**

By default, a developer must have administrative access to install Process Servers in production environments.

**2. Every Process Server contains which databases?**

- A. Process Application, Event Manager, and Performance
- B. MobileFirst, Business Monitor, and Enterprise Content Management
- C. Common, IBM BPM, and Performance Data Warehouse

**3. When attempting to deploy a process application, what must be created that records the state of library items within a process application or a track at a specific point in time?**

- A. Database
- B. Library
- C. Process model
- D. Snapshot

Write your answers here:

1.

2.

3.

## Review answers

1. True
2. C: Common, IBM BPM, and Performance Data Warehouse
3. D: Snapshot

---

# Unit 8. Playback 1: Controlling process flow with business data

## Estimated time

02:00

## Overview

This unit describes how to manage the variables and data flow. It covers the implementation of the intermediate timer event, gateways, and routing tasks.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Describe the differences between process flow data and business flow data
- Add variables to a process
- Implement gateways to control process flow
- Describe teams and process lanes
- Implement routing for tasks
- Assign an expert group to an activity
- Expose a process application to a team

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*Figure 8-1. Unit objectives*

## Topics

- Managing variables and data flow
- Implementing the intermediate event: Timer
- Implementing gateways
- Routing tasks

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Figure 8-2. Topics

## Key concepts in this unit

- **Playback 1: Controlling process flow:** To demonstrate that the process is following the correct flow out of the gateways, the developer sets the value of the process flow variables
- **Flow data:** Data elements that decision points use on process and service diagrams, and are used to determine the next paths to take
- **Business data:** Provides the context of the activity to all participants and what it is that they are working on
- **Variables:** Capture the business data that the activities use in a business process definition
- **Timer:** Intermediate event that is implemented per the business requirements
- **Team:** Represents the groups of users in your enterprise that can be assigned a task in a swimlane or assigned directly to an activity

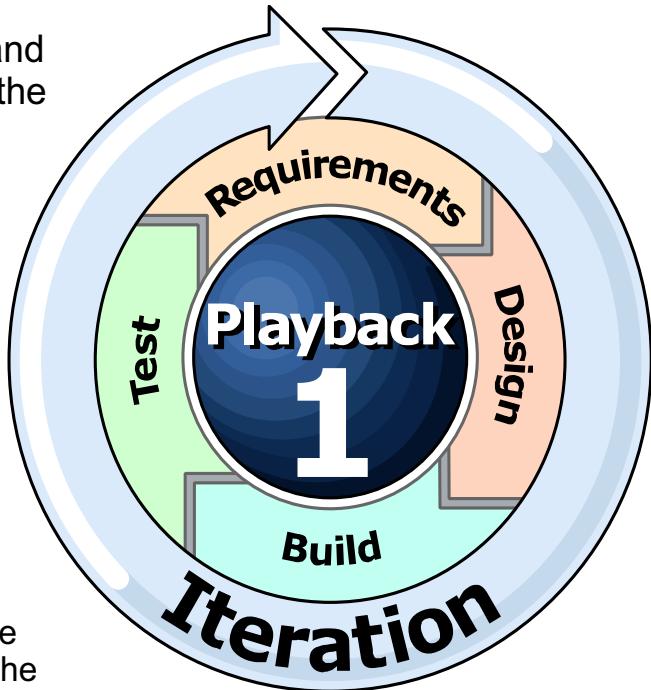
Playback 1: Controlling process flow with business data

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Figure 8-3. Key concepts in this unit

## Playback 1: Controlling process flow

- Set the process flow variables and watch the process follow along the correct path on your decision gateways
- Gather all the process stakeholders
- Validate the process that was created
  - Demonstrate that the process is following the different paths that are flowing from the exclusive gateways on the processes
  - Demonstrate that the tasks are being assigned and created in the Portal inbox corresponding with the correct lane and assignment settings



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Figure 8-4. Playback 1: Controlling process flow

To demonstrate that the process is following the correct flow out of the gateways, the developer sets the value of the process flow variables.

It is important to gather all the process stakeholders to validate the process that was created, and to verify that it meets the business needs outlined in Playback 0. Verify that the process works as modeled and as expected. Set the process flow variables and watch the process follow along the correct path on the decision gateways.

- Demonstrate that the process is following the different paths that are flowing from the exclusive gateways in the processes.
- Demonstrate that the tasks are being assigned and created in the Process Portal inbox that corresponds with the correct swimlane and assignment settings.

If it is necessary to change the high-level process, the project development team can move back and redo Playback 0. After they receive buy-in that the model meets the goals of the current release, the project development team is ready to move on to next stage of Playback 1.

## 8.1. Managing variables and data flow

## Managing variables and data flow

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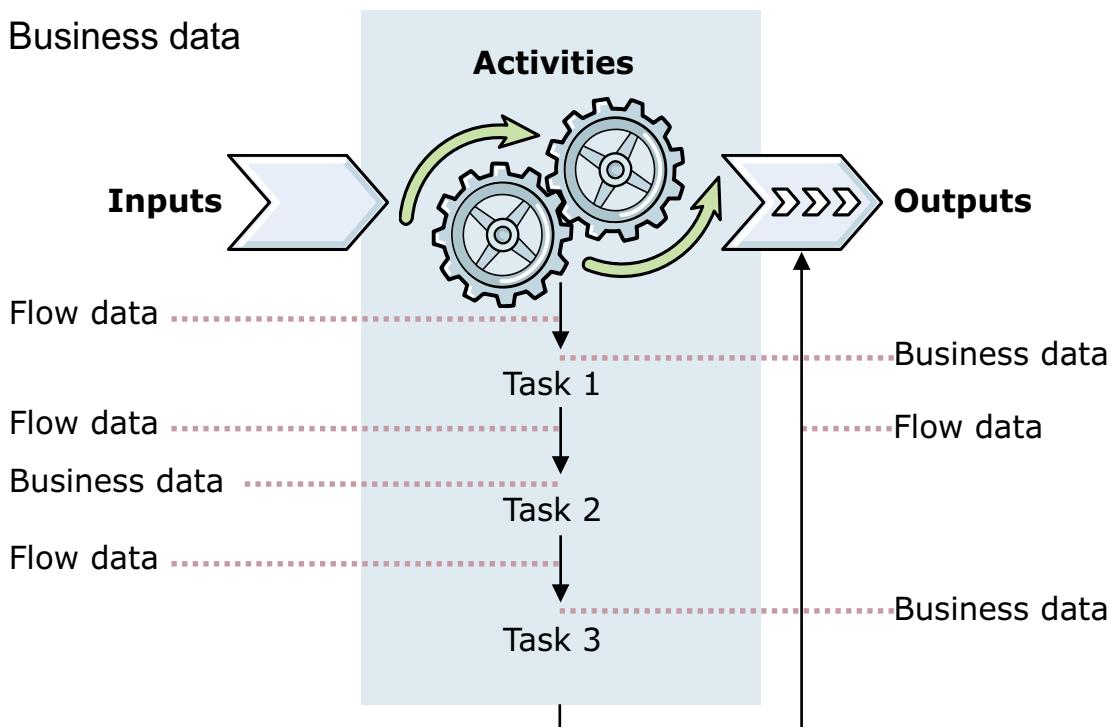
Figure 8-5. Managing variables and data flow

Data flow and management is an essential part of working with services and processes. As part of Playback 1, developers create process data variables to control and demonstrate the process flow. Later in the next stage of Playback 1, developers create business data variables for their processes.

Variables represent the data that provides the business and process context to a running process. Using variables, the business process passes the data from one process step to another. This passage is called the data flow.

## Two types of process data

- Flow data
- Business data



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Figure 8-6. Two types of process data

To distinguish the different types of data that flow through the process, you can categorize data into two different types of process data: business data and flow data.

## What is flow data?

- Data that is used to determine:
  - Which activities to complete
  - Who should complete each activity
  - The time an activity is due or when an activity should be escalated

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Figure 8-7. What is flow data?

Flow data moves the process along. The most obvious examples of flow data are the data elements that decision points use on process and service diagrams. When a token is at a decision gateway, the value of each of the data elements is used to determine the next paths to take.

Flow data elements go beyond just the data that is needed to drive process decision points. Flow data includes all of the following categories:

- Data that is used to determine which activities to complete
- Data that is used to determine who completes each activity
- Data that is used to determine when an activity is due or when an activity is escalated

Flow data must be identified early on in the implementation process. Generally, by the end of this stage of Playback 1, your flow data is identified and implemented. Flow data gets the right activities to the right participants at the right time. Without flow data, the process cannot work.

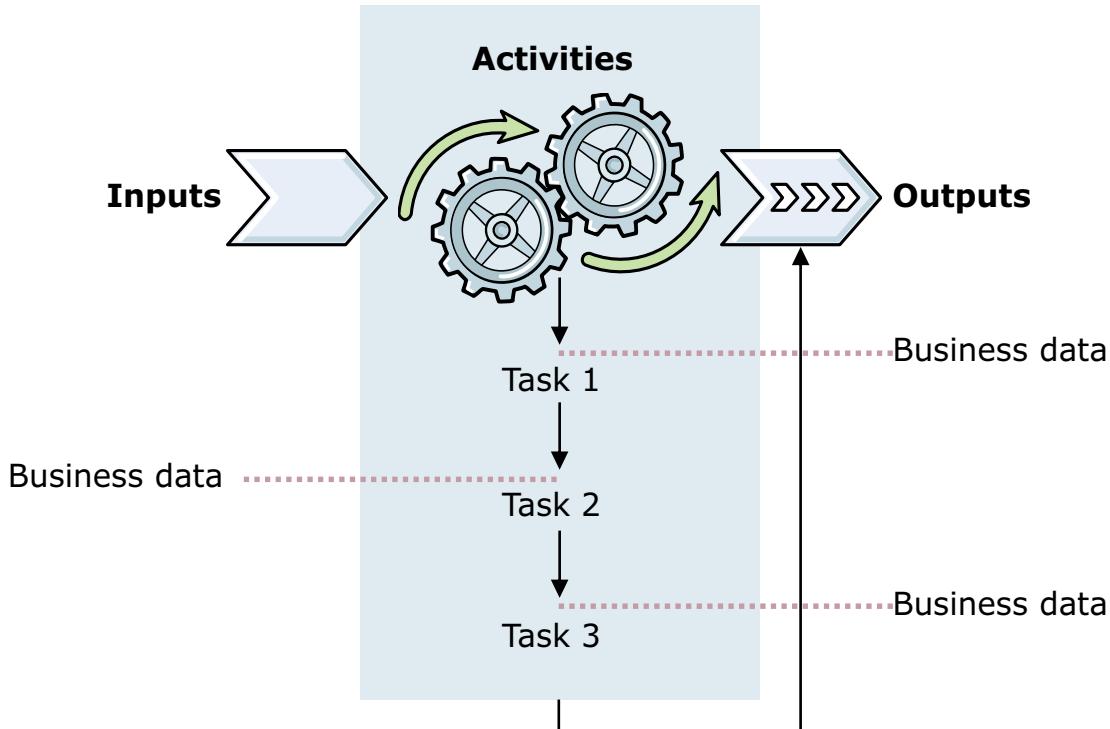
The set of flow data elements often overlaps the set of business data elements, but as developers you want to break them out. Changes to the set of flow data elements are changes to the process definition itself. Any changes to the business data variables are insulated from the process flow data variables.

Many flow data elements are gathered directly from the participants, but others must be retrieved from external sources. Common sources for flow data elements include LDAP repositories, SQL data sources, and web services. Flow data variables map and share data with the variables from external sources, but the flow data variables themselves are separate and distinct.

Flow data elements are initialized as soon in a process instance as possible. You can use this action to somewhat predict the future path of a process instance.

## What is business data?

- Business data provides the context of the activity to each participant



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Figure 8-8. What is business data?

The business data is a bit more problematic to define than the flow data. In general, the business data provides the context of the activity to each participant. The data is used to make it clear to participants what it is that they are working on.

For example, customer service representatives know (based on the activity that was assigned) that they are working on an insurance claim. From the business data, the representatives can tell which claim they are working on by claim type, claim number, customer, and claim description.

## Business objects, variables, and data mapping

- Business objects
  - In Process Designer, business objects are complex objects that are created from simple business objects or other complex business objects
  - Define the business data
- Variables
  - Instantiate business objects that activities use in a business process definition or by steps in services, such as integration services or human services
  - Capture and store the business data
  - Each has its own type and scope
  - Must be declared before you can start to use them
- Data mapping
  - In Process Designer, you set the input and output data mapping to pass variables to an activity or a step
  - You must set the input and output mapping for each activity in a process
  - Map variables in the parent process to the variables received and generated by nested processes and services

Playback 1: Controlling process flow with business data

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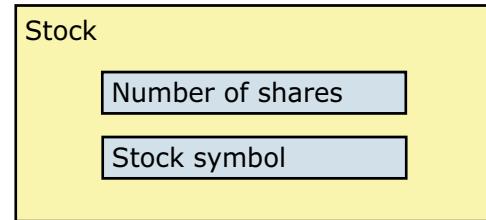
*Figure 8-9. Business objects, variables, and data mapping*

More on data mapping is covered in the next unit.

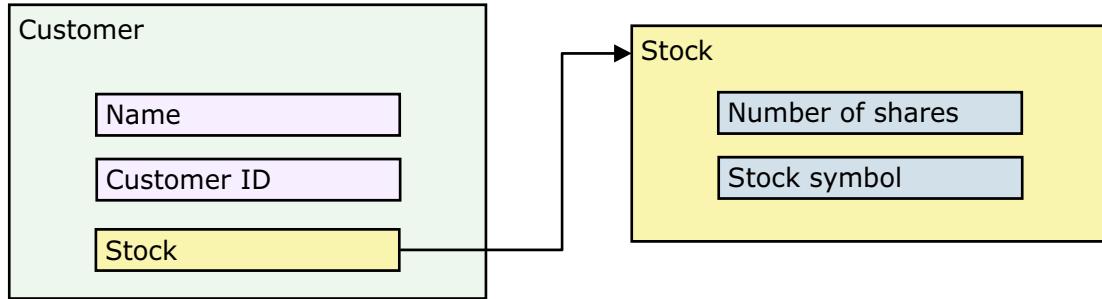
## Business objects

- Supports two types of business objects: simple and complex

- Simple business objects
  - Composed only of scalar properties



- Hierarchical business objects
  - Composed of attributes that reference nested business object definitions



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Figure 8-10. Business objects

In the Process Designer, business objects are complex objects that are created from simple business objects or other complex business objects.



## Example of business objects and variables

**Business Object**

Type:

Business Object

- Candidate
- Person**
- Position
- Qualifications
- Requisition

**Business Object**

Name: Person

Modified: author1 (Mar 15, 2016, 7:03:26 PM)

Documentation:

**Variables**

- Variables
  - Local
    - Input
      - employeeId (Integer)
    - Output
      - employeeInfo (Person)
        - lastName (String)
        - firstName (String)
        - supervisor (String)
        - startDate (Date)
        - payLevel (String)
        - payType (String)
        - notes (String)

**Parameters**

Parameters

- lastName (String)
- firstName (String)
- supervisor (String)
- startDate (Date)
- payLevel (String)
- payType (String)
- notes (String)

**Business object defines the type**

**Variable is the instantiation of the business object**

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Figure 8-11. Example of business objects and variables



## Create the business objects in the lab exercise

- You create few business objects during the lab
- Example of business object
  - HiringRequisition
- Hiring Requisition business object create some parameters
  - For example:

```
requisitionNumber (String)
dateOfRequest (Date)
requester (String)
```

The screenshot shows a software interface for creating a business object named "HiringRequisition". The top bar has a close button and an info icon. The main area is titled "Business Object" with a "Common" tab selected. A "Parameters" section is expanded, showing a tree view of parameters and their types. The parameters listed are:

- requisitionNumber (String)
- dateOfRequest (Date)
- requester (String)
- datePositionAvailable (Date)
- hiringManagerComments (String)
- position (Position)
  - jobTitle (String)
  - jobDescription (String)
  - jobLevel (String)
  - numDirectReports (Integer)
- compensationDetails (CompensationDetails)
  - salaryToOffer (Decimal)
  - bonusAmount (Decimal)
- departmentDetails (DepartmentDetails)

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Figure 8-12. Create the business objects in the lab exercise

## Example of data mapping

- Variables define the inputs and outputs of an activity
- Use data mapping to move data that is stored in variables that are defined at the process-level into and out of the activity



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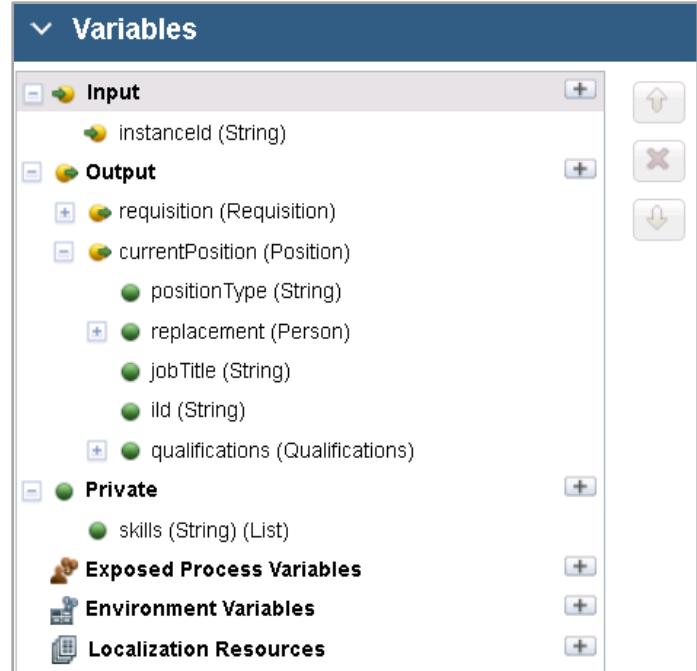
Figure 8-13. Example of data mapping

In this example, the Submit Hiring Request activity has one input and two output variables. At the process level, you map the `tw.local.requisitionDetails` variable to the input variable for the human service, and map the two output variables from the service to the process variables.

More on data mapping is covered in the next unit.

## Declaring three kinds of variables

- Input: Defines the variables that are passed into the current process or service
- Output: Passes variables out of the process or service to a parent process or service
- Private: Any variables that are not passed in or out of the process or service



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Figure 8-14. Declaring three kinds of variables

Variables in a process or service can be declared as three kinds:

- Private variables refer to values that the current process or service needs, but which the parent process or service does not know or need. The value of a private variable can still be of interest to any nested processes or nested services.
- Input variables refer to values that you can pass into the current process or service.
- Output variables store values that are passed out from a process or service to a parent process or service.

## Standardizing variable names

- Create variable names that begin with a lowercase letter
  - Capitalize the first letter when creating a variable type (business objects), but use camel case for the instantiation of the variable (for example, `employeeId`)
  - Camel case refers to a word or string of letters that has no space and has an uppercase letter in a position other than the first letter
- If the variable name you choose consists of only one word, spell that word in all lowercase letters
- If the variable name consists of more than one word, capitalize the first letter of each subsequent word
- Variable names are case-sensitive

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Figure 8-15. Standardizing variable names

To standardize variable names, create variable names that begin with a lowercase letter. This good practice makes it easier to distinguish between a variable and its variable type, which begins with an uppercase letter as a good practice.

Capitalize the first letter when creating a business object, but use camel case for the variable instantiation. For example, the variable `employeeId` uses a lowercase first letter to signify that it is an instance of a business object type `Integer`, which starts with an uppercase letter. The standard business object types (`Date`, `String`, `Integer`, and other types) all follow this same naming convention.

If the variable name you choose consists of only one word, spell that word in all lowercase letters. If the variable name consists of more than one word, capitalize the first letter of each subsequent word. For example, a variable that contains an employee ID number has the variable name `employeeId`.

Variable names are case-sensitive.

## Understanding namespaces

Namespace	Description
tw	The top-level namespace
tw.local	Access and update process-local and service-local variables
tw.system	System features and functions
tw.object	Used to initialize complex IBM Business Process Manager objects

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Figure 8-16. Understanding namespaces

All variables in IBM Business Process Manager are JavaScript objects. IBM Business Process Manager uses namespaces to organize these objects, and their functions and methods. An example of some of the methods is shown in the chart.

## 8.2. Implementing the intermediate event: Timer

## Implementing the intermediate event: Timer

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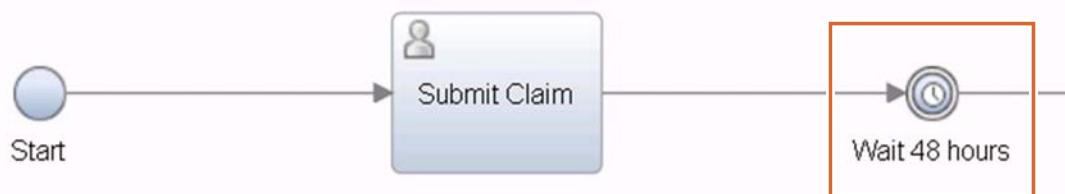
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Figure 8-17. Implementing the intermediate event: Timer

Although you modeled timer events in Playback 0, you have no control over the functions of the timer. In this topic, the timer is implemented to fire according to the business requirements.

## Timer intermediate event

- Use a timer intermediate event to specify a time before or after an activity occurs
- Timer intermediate events, which are used to model escalation paths or delays in the process, can occur either between activities or attached to an activity



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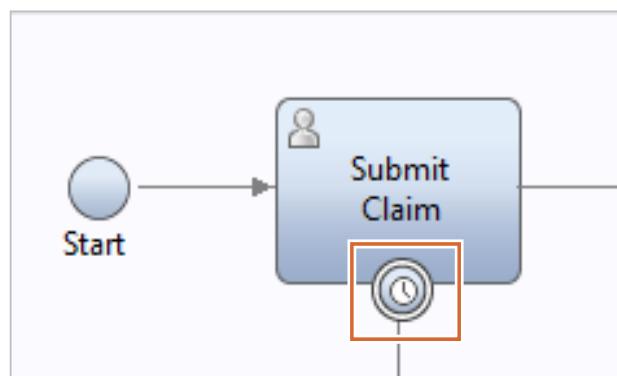
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Figure 8-18. Timer intermediate event

Use a timer intermediate event to specify a time before or after an activity occurs. Timer intermediate events are used to model escalation paths or delays in the process.

## Attached timer intermediate event

- When a running process instance reaches an activity with an attached timer intermediate event, a timer starts
- The interval for the timer is calculated according to the configuration that you specify in the implementation properties for the timer intermediate event
- When the specified interval elapses, the process follows the path from the attached timer intermediate event to the subsequent activity



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Figure 8-19. Attached timer intermediate event

Timer intermediate events, which are used to model escalation paths or delays in the process, can occur either between activities or attached to an activity.

## Timer intermediate event implementation (1 of 2)

Implementation details:

- **Trigger On:** Specifies when a timer event should start
- **Custom Date:** Use JavaScript to calculate and specify a date
- **Before/After Difference:** Amount of time
- **Tolerance Interval:** Specifies an extra delay if work is in progress
  - Measures only one time
- **Use the activity work schedule:** Limits the timer activity to the period specified

Two options are available only when configuring an attached timer event:

- **Interrupt activity:** Closes the attached activity after time elapses
- **Repeatable:** Resets the timer to countdown again after time elapses

A business process definition developer implements an inline, or sequence, timer intermediate event through the Implementation tab in the properties section of the component. The implementation details are:

- **Trigger On:** Specifies when timer event should start.
- **Custom Date:** Use JavaScript to calculate and specify a date.
- **Before/After Difference:** Amount of time to wait before allowing the token to continue on the flow line.
- **Tolerance Interval:** Specifies an extra delay if work is in progress and it is measured one time. For example, if users accept a task during the delay, they are allowed the tolerance time to complete the task before the token continues on the sequence flow line.
- **Use the process work schedule:** Limits the timer activity to the period specified.

## Timer intermediate event implementation (2 of 2)

Intermediate Event Type 

Timer 

Event Properties 

Trigger on: After start of step 

Custom date:  

Before or after difference: 0  Hours 

Tolerance interval: 0  Hours 

Use the process work schedule: 

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Figure 8-21. Timer intermediate event implementation (2 of 2)

## 8.3. Implementing gateways

## Implementing gateways

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Figure 8-22. Implementing gateways

Any gateway that is modeled in Playback 0 is functional (that is, processes would flow down a path). To control the path that is taken, the developer implements the decision logic that the gateway uses.

## Implementing a gateway

The screenshot shows a configuration panel for a decision gateway. At the top, a blue header bar has a dropdown arrow and the text "Decisions". Below this, under "Review Needed:", there is a condition expression: "tw.local.isNewPosition == "1"" with a dropdown arrow and three small icons (a globe, a magnifying glass, and a double-headed arrow). To the right of this expression are three small icons: a globe, a downward arrow, and an upward arrow. Under "Default flow:", the value "Review Not Needed" is listed with a dropdown arrow to its right.

- Define conditions that control whether a path is followed during the running process
- Test the newly functioning gateways with the process inspector

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*Figure 8-23. Implementing a gateway*

During the playback process, it is necessary to demonstrate each path that can be taken, but the logic on how that decision is reached is implemented in a later playback.

When you specify the implementation for a gateway, you define conditions that control whether a path is followed during the running process. After creating the rules and integrating the data, make sure that you test your newly functioning gateways with the process inspector.

A good practice for Playback 1 is to avoid the use of Boolean (true or false) variables to implement exclusive gateways to accommodate more flows that might be added in the future. Use simple variables (String, Integer) to drive all your exclusive gateways. Developers can then set the default value of the process variables and show the different paths that are taken during Playback 1. Document the gateway logic to help in troubleshooting the process later.

## 8.4. Routing tasks

## Routing tasks

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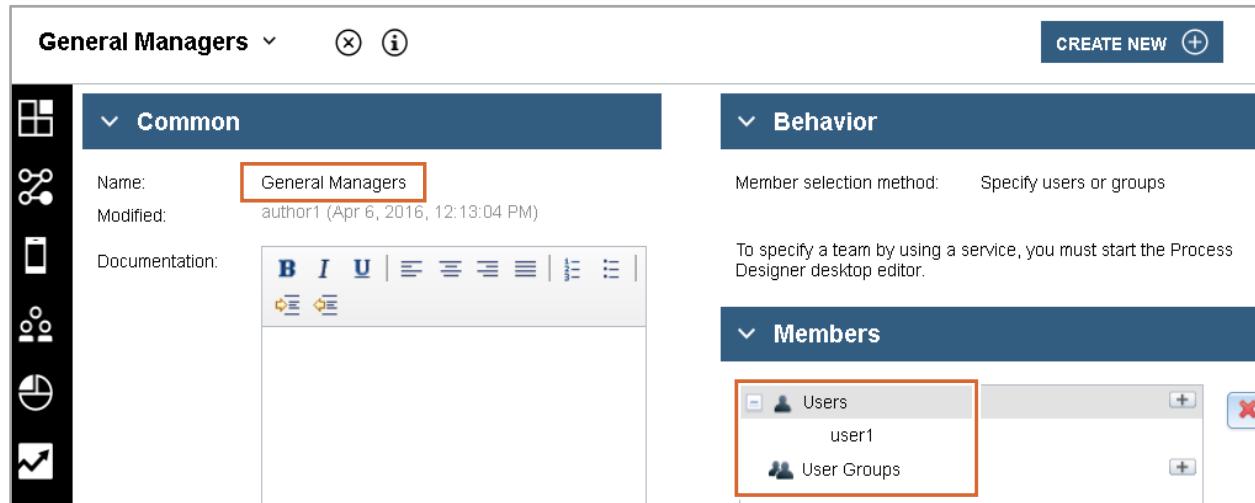
Figure 8-24. Routing tasks

This stage of Playback 1 completes the goal of getting the right tasks to the right people at the right time. Variables were built, and those variables were used to drive decision gateways. When a task is created for a process participant to complete an activity, the system assigns the task to the right individual who can complete the work.

In this topic, teams are introduced and then process routing or assignment is examined.

# IBM Training

## Creating a team



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Figure 8-25. Creating a team

A team represents the groups of users in your enterprise that can be assigned a task in a swimlane or assigned directly to an activity. To create a team and add users to that group:

- In the Designer view, click the (+) plus sign next to Processes and select **Team** from the list of components.
- In the new Team window, enter a name and click **Finish**.
- IBM Business Process Manager Designer displays the property settings for the team.
- Enter the required information in the Team property interface.

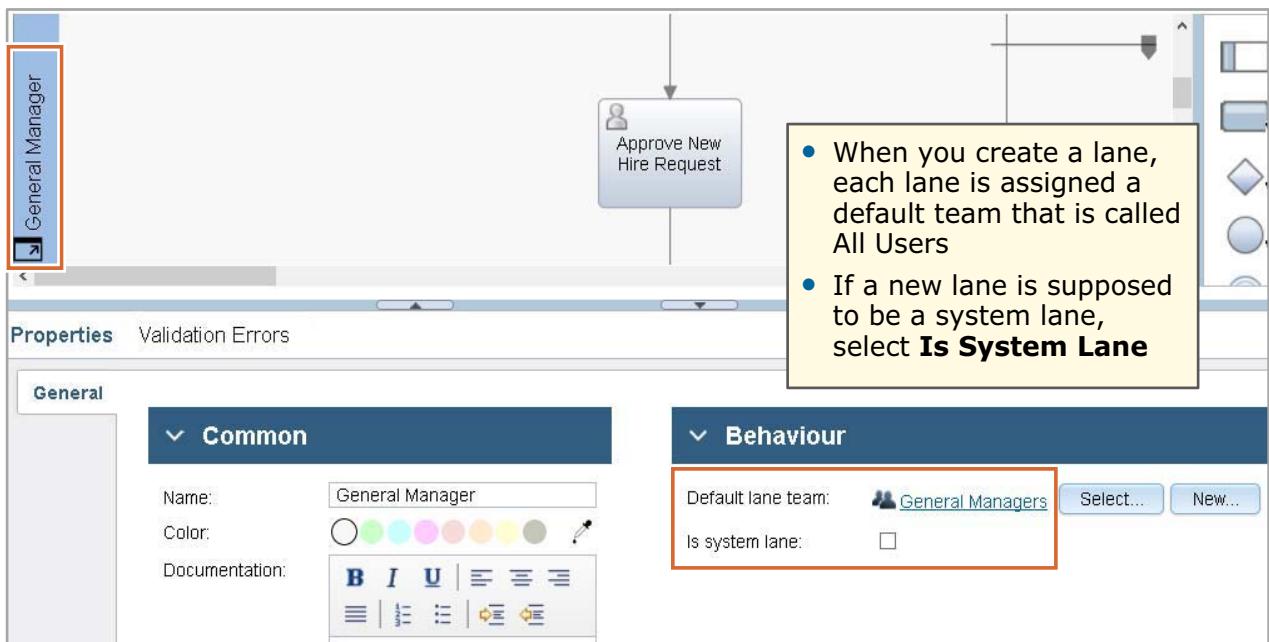
The IBM Process Designer Team interface is used to assign members to a team. Because the different Process Server environments can have other requirements to assign members, system administrators can make the team assignments with the administrative screens on the various environments.

To learn more about server configuration and administration, IBM Education offers classes on IBM Business Process Manager administration and WebSphere administration.



## Team and team members

- A team contains the users or participants who complete the runtime activities that are modeled in each lane



Playback 1: Controlling process flow with business data

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Figure 8-26. Team and team members

A team contains the users who complete the runtime activities that are modeled in each lane. Team lane assignments ensure that any activities that are not routed to a specific user have an automatic default assignment.

### Creating lanes:

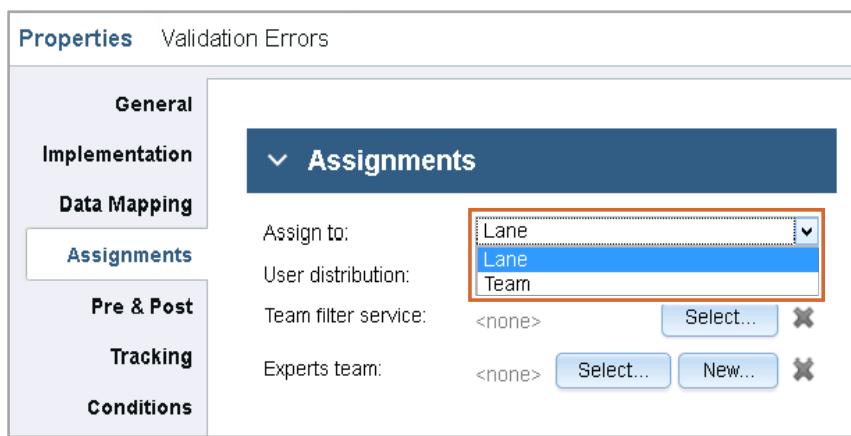
When you create a lane, each lane is assigned a default team that is called All Users. This default group contains all of the users of IBM Business Process Manager to allow for testing of your processes. If a new lane is a system lane, select **Is System Lane** and add the System team in the Behavior section. System lanes are shaded a different color so that they can be easily recognized.

### Subscribing to a Bluworks Live process:

If you subscribe to a Bluworks Live Process with preassigned team lanes and no matching teams exist, IBM Business Process Manager creates a team for each lane. IBM Business Process Manager automatically attaches the team to the corresponding lane.

## Routing activities

- For any activity with a service (task) implementation, you can designate the users who should receive the runtime task by using the Assignments option in the property tab of the activity
  - This implementation designates whom to route or assign the activity to and how it should be distributed
- By default, **Assign to** is set to Lane
- The two lane assignment selections are Lane and Team
- User distribution** is most commonly set to None or Last User



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Figure 8-27. Routing activities

### Routing activities:

Developers might not want an activity to go to the default team, or they might need a more dynamic solution.

For any activity with a service (task) implementation, developers use the Assignments option in the property tab of the activity to designate the users who receive the runtime task. Developers control how the runtime task is distributed to designated teams and members.

To assign a task, developers select the activity that they want, and then select the assignments section to display the assignment properties for that activity.

### Routing options:

The options available in routing allow the developer to designate whom to route the activity to (**Assign To** menu) and how it is distributed (**User Distribution** menu).

#### Assign to:

By default, **Assign to**: is set to **Lane**, indicating that tasks are assigned to the team for that lane. The two most commonly used lane assignment selections are:

- Lane**: Routes the runtime task to the team that is assigned to the lane in which the selected activity is placed.

- **Team:** Routes the runtime task to any team that the developer wants to designate the task to. This assignment overrides the default team that is bound to the lane. This function provides a dynamic layer of routing for a particular task in a process.

### User distribution:

By default, **User Distribution** is set to **None**, meaning that no specific team member distribution is applied to the routed task. The task is assigned to the pool of potential team members, allowing individual members to acquire tasks that are assigned to the pool. The **Last User** setting routes the runtime task to the team member who completes the activity that immediately precedes the selected activity in the lane. Set this option for the first activity in the lane when the process is launched from the process portal and the activity is the first activity after the start event. In this case, the runtime task is routed to the user who started the process.

Other advanced user distributions available in IBM Business Process Manager allow the system to assign tasks to individual team members. In practice, **User Distribution** is most commonly set to **None or Last User**.

This course covers only the most common routing options that are used. The more complex routing options are covered in detail in the Implementation II course and in IBM Process Designer technical documentation.

## Team filter service

- Are used to filter down a team to a subset team
- The new filtered down subset team is returned as a Team object



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Figure 8-28. Team filter service

### Routing activities:

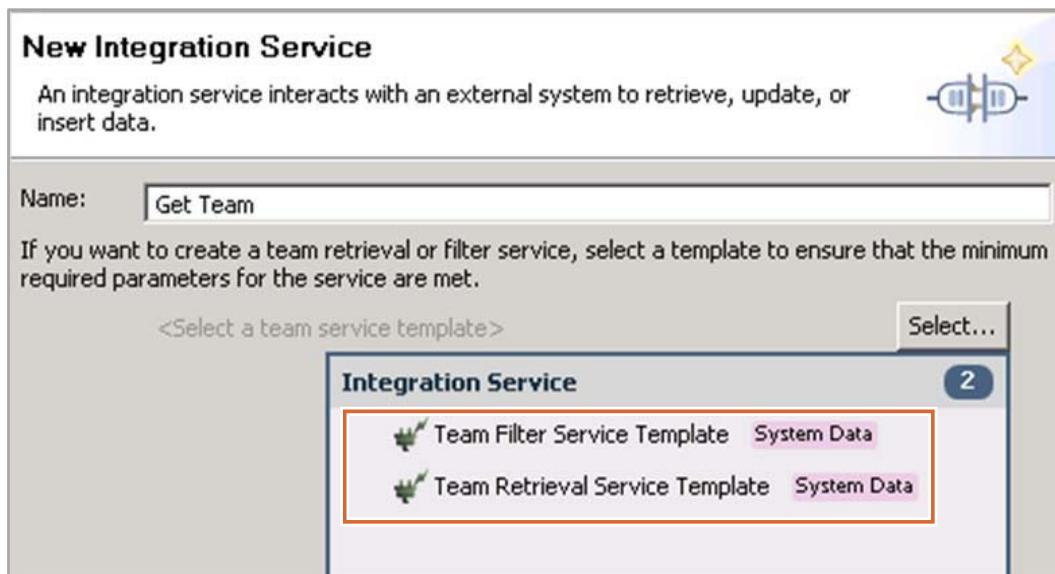
Sometimes a developer does not want the whole team to be assigned to a task, but rather a subset of the team. A developer creates team filter services to implement assignment policies. The team filter service takes the initially resolved team as a parameter and then returns the filtered team as a Team object. If necessary, the developer can add extra input parameters that are required to filter the team.

For example, to implement a separation of duties policy, the developer must remove the user who completed the previous activity from the list of users who can complete the next activity. In that case, the filter service needs an input parameter for the user ID in the service that is set to be removed from the input team.

For example, the developer creates a “High claim value” team filter for insurance claims that are above a certain threshold amount. These claims are for certain types of insurance claim representatives. This filter uses an input parameter `claimValue` to filter out any users who are not qualified to work high-value claims. These types of dynamic routing techniques are covered in more detail in the Implementation II course.

## Team retrieval and filter service templates

- Team retrieval and filter services are used to dynamically determine who is eligible to complete a task
- The templates ensure that the minimum required parameters are met



Playback 1: Controlling process flow with business data

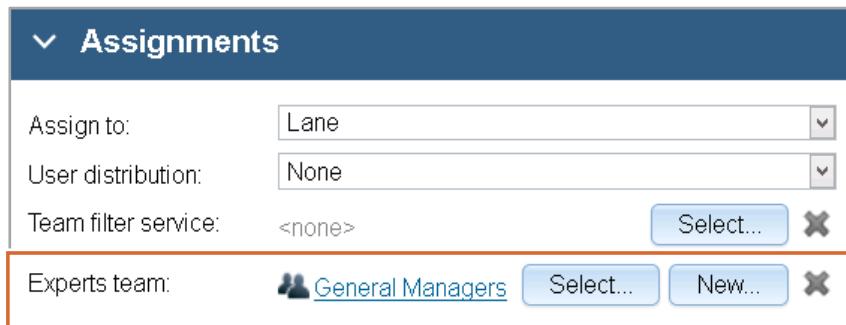
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Figure 8-29. Team retrieval and filter service templates

Developers use the team retrieval service and the team filter service to dynamically determine who is eligible to complete activities. These services take parameters from environment variables to influence the team selection. Developers select a template for the team retrieval and team filter service when they create an integration service. Using the templates ensures that the minimum required parameters for the services are met. Integration services are covered in more detail later in this course.

## Identifying expert users for an activity

- Business users who are working with your process applications can collaborate or request assistance from a set of expert users who are associated with a particular task or activity
- This list of experts is displayed in the Experts panel in the Process Portal environment
- An expert group can be explicitly identified by using the **Experts Team** selection in the Assignments menu in Process Designer



[Playback 1: Controlling process flow with business data](#)

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Figure 8-30. Identifying expert users for an activity

Business users who are working with the process applications can collaborate or request assistance from a set of expert users who are associated with a particular task or activity. This list of experts is displayed in the Experts panel in the Process Portal environment.

An activity must be associated with a human service before it can be assigned experts.

The experts who are listed for an activity are defined in two ways:

- Users who completed this activity in the past, which is based on historical analysis. This list is limited to a small group of users who completed the activity most frequently.
- Users belonging to a team, which is explicitly specified as an expert group for this activity.

To explicitly specify a group of experts for an activity:

- Open the business process diagram in IBM Process Designer and select the activity.
- Go to the **Assignments** tab in the Properties view.
- Specify the relevant team in the **Expert Team** field. If developers did not already create a team to identify the experts for this task, they can create a team to use.

Your BPM administrator can configure the teams at run time to ensure that the correct set of users are identified as experts for the activity in the Process Portal.

## Demonstration

This demonstration covers the following topics:

- Declare variables and business objects
- Implement intermediate event timer
  - Implement timer events
  - Outline the differences between inline and attached timer event details
- Implement gateways
- Define teams and routing

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*Figure 8-31. Demonstration*

This demonstration is stored as the `demo5.mp4` file that is in the `C:\labfiles\demo` folder.

### **Understanding variable types:**

1. Make sure that the **Variables** tab is selected in the process.
2. Add your variable as output, input, or private.

### **Standardizing variable names:**

1. Provide a suitable name and select the appropriate type (String, Boolean, or other types).

### **Review implementing a timer intermediate event:**

1. Select the timer intermediate event in the process.
2. Click the **Implementation** menu.
3. View the timer event details.

### **Implement a gateway in IBM Business Process Manager:**

1. Select a gateway from the process.
2. Select the **Implementation** section and create conditions to express the required business rules.

3. Change the default line flow if necessary.

**Establishing routing for activities:**

1. Select a **Team** lane.
2. Select an activity.
3. Select the **Assignment** section from the Properties tab.
4. Select the appropriate **Assign To:** and **User Distribution** menus to meet business requirements.
5. Assign an expert group to the activity.

## Unit summary

- Describe the differences between process flow data and business flow data
- Add variables to a process
- Implement gateways to control process flow
- Describe teams and process lanes
- Implement routing for tasks
- Assign an expert group to an activity
- Expose a process application to a team

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Figure 8-32. Unit summary

## Review questions

1. What are the three types of variables?
2. What two options are available only when configuring an attached timer event?
3. When the assign to routing is set to Lane and distributed to Last User, if the activity is the first activity in a lane in a top-level process, then to whom is the task assigned?

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*Figure 8-33. Review questions*

Write your answers here:

- 1.
- 2.
- 3.

## Review answers

1. Private, input, and output.
2. Interrupt activity closes the attached activity after time elapses, and repeatable resets the timer to countdown again after time elapses.
3. The runtime task is routed to the user who started the process.

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Figure 8-34. Review answers

## Exercise 5

### Playback 1: Controlling process flow with business data

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Figure 8-35. Exercise 5

Complete Exercise 5, Playback 1: Controlling process flow, in the exercise guide.

## Exercise objectives

After completing this exercise, you should be able to:

- Create simple variables in a process
- Implement timer intermediate events in a process
- Implement gateways for a process
- Implement routing for an activity

---

# Unit 9. Playback 1: Business data, services, and coaches

## Estimated time

02:15

## Overview

This unit explains the goal of this playback: to demonstrate the data flows from one coach to another and from one task to another inside the process. All data is bound on the coaches, and if the same data is shared across multiple tasks, playback participants can track the data when it moves through the various activities.

## How you will check your progress

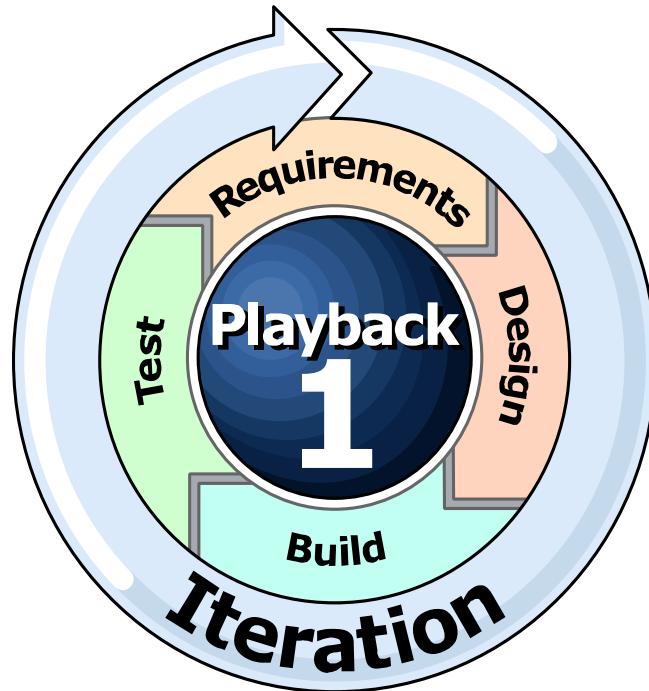
- Review questions and lab exercises

## Unit objectives

- Build a business object
- Initialize a complex object and a list
- Build a service in the IBM Process Designer application
- Use coaches to define and implement guided user interactions
- Implement a service for an activity in a process
- Map variables between a nested service and an activity in the overlying process
- Describe the object methods

## Playback 1: Business data and services

- The goal is to demonstrate data flows from one coach to another, and from one task to another inside the process
- All data is bound on the coaches, and if the same data is shared across multiple tasks, playback participants can see the data move through the different activities



Playback 1: Business data, services, and coaches

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Figure 9-2. Playback 1: Business data and services

The goal is to demonstrate data flows from one coach to another, and from one task to another inside of the process. All data is bound on the coaches, and if the same data is shared across multiple tasks, playback participants can track the data when it moves through the different activities.

## Topics

- Creating a data model
- Building services
- Building coaches
- IBM Process Designer client application
- Implementing services in a process

Playback 1: Business data, services, and coaches

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Figure 9-3. Topics

## Key concepts in this unit

- **Playback 1: Business data and services:** To demonstrate data flows from one coach to another, and from one task to another inside of the process
- **Business objects:** Are used to represent the business data that is relevant in the context of your business process
- **Coach:** The user interfaces for human services
- **Services:** Made up of steps that define what happens when service (task) activities are triggered in a process
- **Data mapping:** Is used to map the input and output variables of the service to variables in the process so that runtime variable values can be passed to and from the service

Playback 1: Business data, services, and coaches

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Figure 9-4. Key concepts in this unit

## 9.1. Creating a data model

## Creating a data model

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*Figure 9-5. Creating a data model*

Until now, simple variables are implemented to drive process flow. Process flow data is only part of the data necessary for the process to function correctly. Much of the process flow data is derived from or dependent upon business data. In this playback, the project development team defines the business data model for the process.

## Defining the business object data model

- Business objects are used to represent the business data that is relevant in the context of your business process
- Create a data model that accurately reflects the business data and its structure
  - Do not be influenced by existing logical or physical data models
- Loosely couple your business objects
  - You can use the ESB capabilities of IBM Business Process Manager Advanced or an adapter translator service to map your data model elements to an external system data model

Playback 1: Business data, services, and coaches

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*Figure 9-6. Defining the business object data model*

Business objects are used to represent the business data that is relevant in the context of your business process. Create a data model that accurately reflects the business data and its structure. Do not allow existing web pages, existing systems, coaches, web services, database tables, or other influences to affect the development of your process business objects that belong in your data model.

It is best to loosely couple your business objects from the external sources and use either IBM Business Process Manager Advanced or an internal service to map business objects to other schema. That way any changes to external variable structures do not affect your data model, and vice versa. Changes can be made in the adapter or translator, limiting the changes necessary for the designer library artifacts.

## Building a complex business object

**HiringRequisition** X i

**CREATE NEW** (+)

**Business Object**

- > Common
- ▼ Parameters

**Behavior**

Definition type: Complex type

Shared object:

**Parameters**

- requisitionNumber (String)
- dateOfRequest (Date)
- requester (String)
- datePositionAvailable (Date)
- hiringManagerComments (String)
- position (Position)
- compensationDetails (CompensationDetails)
- departmentDetails (DepartmentDetails)
- recruitingDetails (RecruitingDetails)

**Advanced Properties**

- When the system data toolkit or other business objects do not match the specifications, create a custom business object
- Create rules about complex data that is nested or hierarchical

Playback 1: Business data, services, and coaches

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Figure 9-7. Building a complex business object

When the System Data toolkit types or the other business objects do not match the project specifications, you can create custom business object types. In IBM Business Process Manager, you can use a base business object type or define a new complex structure to create a custom business object type. You can create rules about complex data that is nested, or hierarchical. Data that is referenced within the text of a rule is not limited to simple object types such as `String`, `Integer`, or `Date`. You can also create complicated rules with nested object structure.

## Building the data model

After you define the data, organize your data into different logical units:

- Some organization is obvious, but other data is more difficult to organize
- Look to existing data models in your company for ideas
- Example of a business object: A structure that contains multiple elements, all pertaining to the same “subject,” which is what the structure represents

The screenshot shows the IBM Data Modeler interface. On the left, the 'Parameters' panel lists various data elements under the 'Parameters' category. One element, 'requisitionNumber (String)', is selected and highlighted in grey. On the right, the 'Parameter Properties' panel displays detailed information for this selected parameter. The properties shown are:

- Name: requisitionNumber
- List:
- Variable Type: String System Data [Select...](#) [New...](#)
- Documentation: A rich text editor with bold (B), italic (I), underline (U) buttons, and alignment tools.

Playback 1: Business data, services, and coaches

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Figure 9-8. Building the data model

When data is defined, organize the data into different logical units. An example might be a street address, city, and state that become a unit that is called **address**. Some organization is obvious, but other data is more difficult to organize. Look to existing data models in the organization for ideas. However, it is not necessary for these models to match what is specified. These models can be starting points for a robust data model solution.

An example of a business object is a structure that contains multiple elements all pertaining to the same subject. This subject is what the structure represents (for example, a name and phone number would be relevant to a customer identification).



## Standardizing the variable naming convention

- Business objects begin with an uppercase letter
- If the business object consists of more than one word, capitalize the first letter of each word
- Variables and business objects are case-sensitive
- In this example, the `position` variable uses the business object type `Position`

The screenshot shows the 'Business Object' definition for 'HiringRequisition'. The 'Parameters' section is expanded, listing several variables:

- requisitionNumber (String)
- dateOfRequest (Date)
- requester (String)
- datePositionAvailable (Date)
- hiringManagerComments (String)
- position (Position)** (highlighted with a red box)
- jobTitle (String)
- jobDescription (String)
- jobLevel (String)
- numDirectReports (Integer)
- compensationDetails (CompensationDetails)
- salaryToOffer (Decimal)
- bonusAmount (Decimal)

Playback 1: Business data, services, and coaches

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Figure 9-9. Standardizing the variable naming convention

Business objects begin with an uppercase letter. Adopt this convention to differentiate variables from business object types. If the business object consists of more than one word, capitalize the first letter of each word. In the example that is provided on screen, the `position` variable uses the business object type `Position`. Variables and business objects are case-sensitive.



## Refactoring

- Limited refactoring support for the following cases:
  - Business object rename in processes and services
  - Business object attribute rename in processes and services
  - Local variable rename in the specific process and related services



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Figure 9-10. Refactoring

With time, applications change and business objects, their attributes, and variables might be renamed. However, many parts of a business process might reference or have a dependency on a business object, an attribute, or a variable so that renaming can produce unexpected results. Refactoring can help to solve this problem, and is described as follows:

- **Refactoring business objects:**

To rename a business object, you right-click the business object that is in the process application library in the **Data** category list. You then rename the business object.

- **Refactoring business object attributes:**

Business objects are themselves composed of other variables called attributes. To rename a business object attribute, select the attribute in the **Parameters** list for the business object. Change the name in the **Name** field.

- **Refactoring limitations:**

- JavaScript codes in coaches are not updated.
- To be listed as selectable for refactoring, the business processes or services must reference the business object with the variables or variable fields that are found in the **Variables** tab.

Property names are not updated when the square bracket notation is used; for example, in the following code, `firstname` would not be updated:

```
customer['firstname'] = "John"
```

- **Rename variables:**

Variables are found within a business process or a service. In other words, renaming a variable does not affect another business process or service. However, renaming a variable can affect a reference to it within the same business process or service. To rename a variable, you click the **Variable** tab and select the variable to rename. Change the name in the **Name** field.

## Complex objects and lists

- You can declare any variable to be a list, or an array, of a business object type
  - Instead of containing only one instance of the type declared (String, Date, or Integer), your variable holds many of the same business object types
- All complex business objects and all lists (arrays) must be initialized before you use them in a process or service
  - If your business object type includes elements that are themselves complex business object types other than the simple types, then you must initialize them before you use them
  - You must also initialize lists before you use them, by using `.listOf`



Playback 1: Business data, services, and coaches

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Figure 9-11. Complex objects and lists

When declaring **lists**, developers can declare any variable to be a list, or an array, of a business object type. This statement means that instead of containing only one of the types declared (String, Date, Integer), the business object holds many of the same business object types. Therefore, if developers want to create a business object that contains multiple integers, they create a private list variable of type `Integer`.

To create a variable list, select the **Is List:** check box, and the list object will add the `(List)` designator after the variable type in the variable.

## Initializing complex objects and lists

- All complex business objects and all lists (arrays) must be initialized before you use them in a process or service
- Before using a complex business object, initialize it by using a script like the following script:

```
tw.local.requisition=new tw.object.Requisition();
```

- You must also initialize lists before you use them, by using `.listOf`

```
tw.local.yourStringList = new tw.object.listOf.String();
```

- Then, you add elements to the list:

```
tw.local.yourStringList[0] = "First Element";
```

**or**

```
tw.local.yourStringList.insertIntoList(
    tw.local.yourStringList.listLength, "First Element");
```

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Figure 9-12. Initializing complex objects and lists

In IBM Business Process Manager, all complex business objects and all lists (arrays) must be initialized before they are used in a process or service. If the complex business object or list is not initialized, the process receives runtime errors, or notices that the coach controls to which the business objects are bound do not behave as expected.

Before implementing a complex business object, create a script like the following to initialize it:

```
tw.local.requisition=new tw.object.Requisition();
```

In the preceding script, the name of the variable that is being initialized is `tw.local.requisition`. The name of the complex business object type is `Requisition`.

If a business object includes nested complex business objects, then you must initialize the nested business objects before they are used.

You also initialize lists before you use them with `.listOf`. This command works for simple and complex business object types. If a variable is a list of `Strings`, initialize it by creating a script:

```
tw.local.yourStringList = new tw.object.listOf.String();
```

Then, add elements to the list:

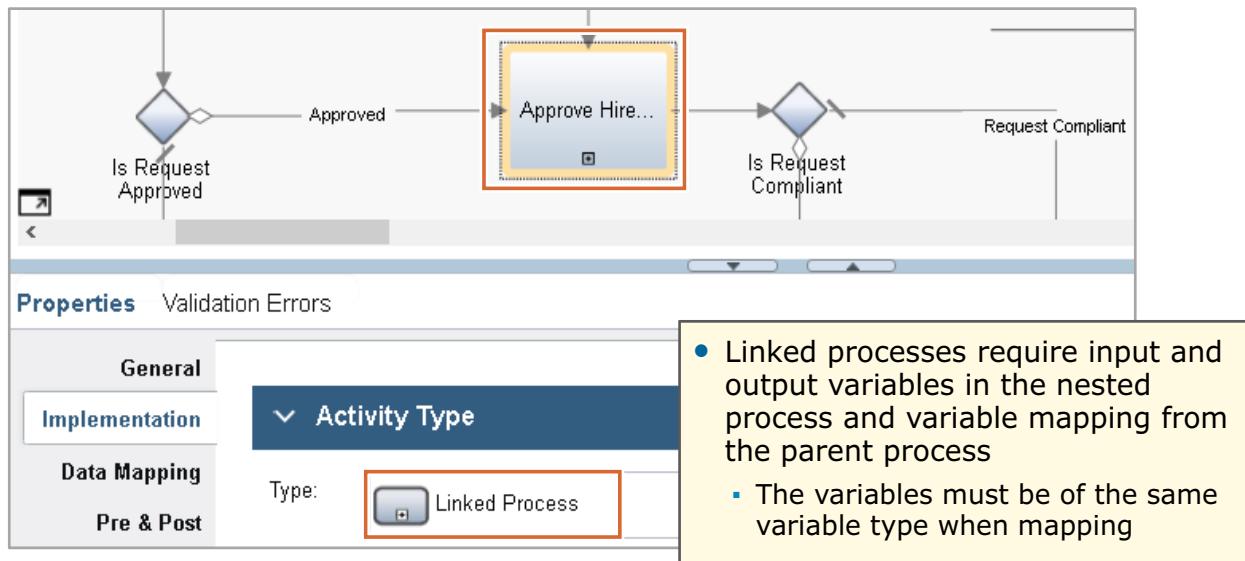
```
tw.local.yourStringList[0] = "First Element";
```

Or:

```
tw.local.yourStringList.insertIntoList(tw.local.yourStringList.listLength, "First  
Element");
```

## Nested processes and variables

- A subprocess has access to the data of the parent process
  - Data mapping is not required to pass data into or out of the subprocess
  - You can also declare private variables within the subprocess that are not visible to the parent process



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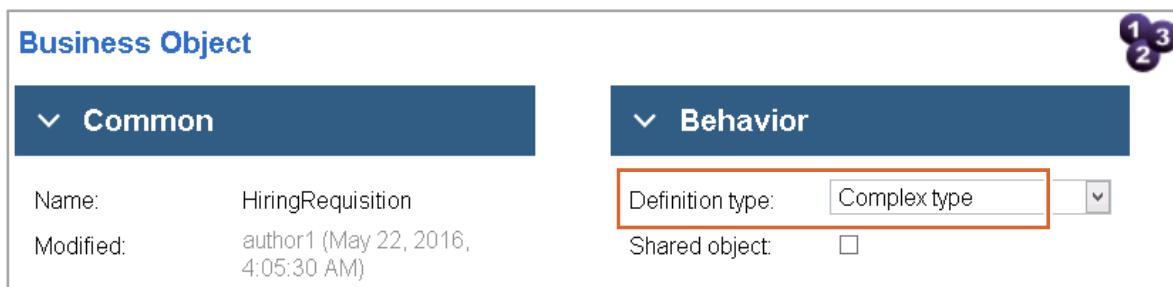
Figure 9-13. Nested processes and variables

Carefully consider how variables are passed from the parent process to other processes when using nested processes. Subprocesses, event subprocesses, and linked processes handle variables differently.

- A subprocess has access to the data of the parent process, and data mapping is not required to pass data into or out of the subprocess. However, you can also declare private variables within the subprocess that are not visible to the parent process.
- Event subprocesses are just a special type of subprocess, and variables that are defined in the parent process are accessible by the subprocess. Instead of being a step in the process as part of the process flow, event subprocesses are triggered because of an event that occurs in the parent process.
- Linked processes require developers to create input and output variables in the nested process and to map variables from the parent process to the linked process. The variables must be of the same variable type when mapping. This input and output variable declaration allows the data value to pass successfully from one process to another.

## Sharing a complex business object

- Custom business objects in a process application are available for all processes and services included in the process application
- Share custom business objects across process applications through toolkits
- If the business object and its values must be accessible to other instances at run time, check the shared object check box in the Behavior section of the Business Object interface
  - Shared business objects apply only to a complex type
  - The data within a shared business object is shared between business processes and tasks



Playback 1: Business data, services, and coaches

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Figure 9-14. Sharing a complex business object

When a custom business object is created in a process application, that object is available for all processes and services included in the process application. To share a custom business object across process applications, create or store the custom object in a toolkit. Then, create a dependency on that toolkit from the process applications that require the variable.

The **Shared Object** check box of the business object and its values must be accessible to other instances at run time. The business object becomes a shared object. Shared business objects apply only to a complex structure type. The data within a shared business object is shared between business processes and tasks.

A shared business object uses database resources. The data within a shared object is persisted to the database when the shared object is created. The business process or task is persisted to the database when the JavaScript method `save()` is applied to the shared business object.

## 9.2. Building services

## Building services

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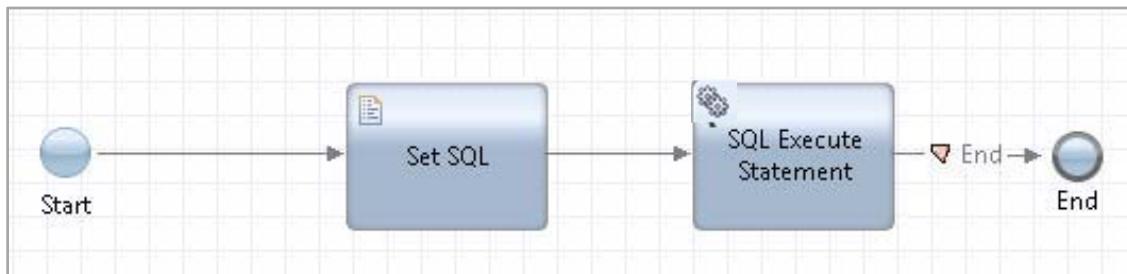
Figure 9-15. Building services

After modeling the business process, it is time to think about these processes as sets of interactions. The goal of this playback involves building interactions.

These interactions represent a critical piece of business process management (BPM). Instead of focusing solely on the chains of activities with their sets of inputs and outputs, think about the protocols and agreements that are made between the users.

Services provide a strategy for choreographing these protocols and agreements. Choreography is an abstract notion of process. It is used to describe the interactions of collaborating entities, each of which can have its own internal orchestration (modeling) processes.

## What are services?



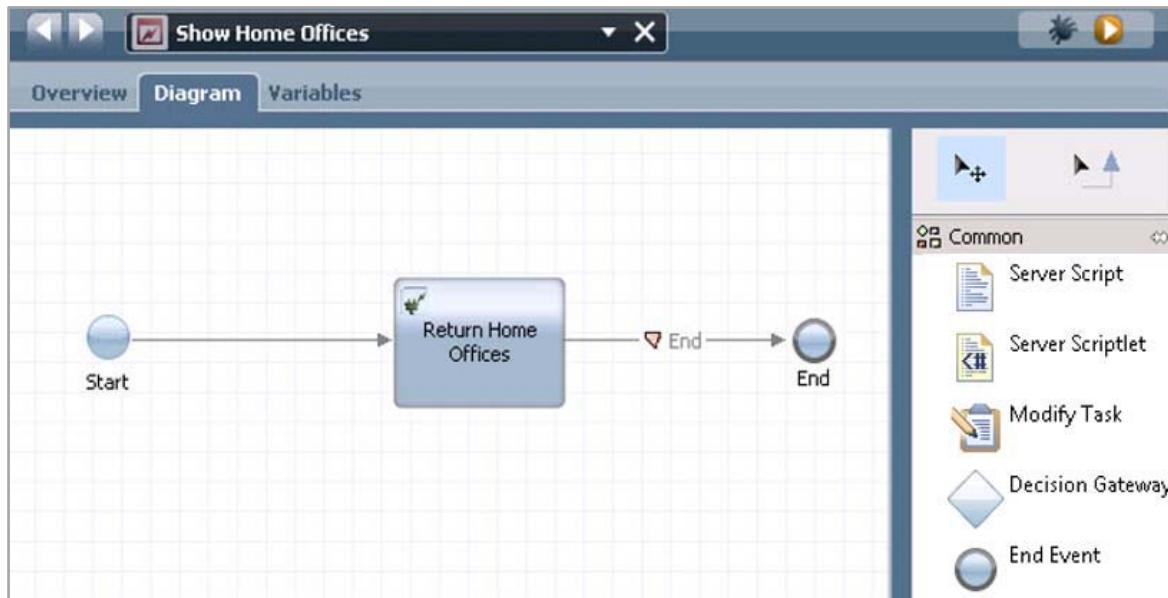
Playback 1: Business data, services, and coaches

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Figure 9-16. What are services?

Services are made up of steps that define what happens when service (task) activities are triggered in a process. Each step enables the service to do a different job, from integrating with an external data source to generating HTML forms that are called coaches.

## Creating services



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Figure 9-17. Creating services

IBM Process Designer is where you build reusable services that implement the activities in your process definitions. Services differ from processes in that they have no lanes. The service palette is customized with what items you can use to build the service. For example, in this playback, you are examining human services. A coach can be added only to a human service. Also, for a web service, a service modeler and palette are not required. Consult the appendix of this guide for a detailed service chart.

The following types of services can be modeled in IBM Process Designer client application:

- General system service
- Integration service
- Decision service
- Web service
- Ajax service
- External implementation
- Decision service

When creating a service, developers give them human-readable names. They use spaces between the words so other developers can understand what this service does. Name the service after the

activity that the service does so developers can identify its function without having to open the service in IBM Process Designer application.

**Process data in services:** Services use business objects and variables just as processes use business objects and variables. Remember, these objects (variables) can be declared as private, input, or output. Private variables are values that are seen only within the service; they are also available to any nested services. Input variables are mapped to values that you can pass into the current service. Output variables are mapped to values that you can pass out from this service to a parent process or service.

## 9.3. Building coaches

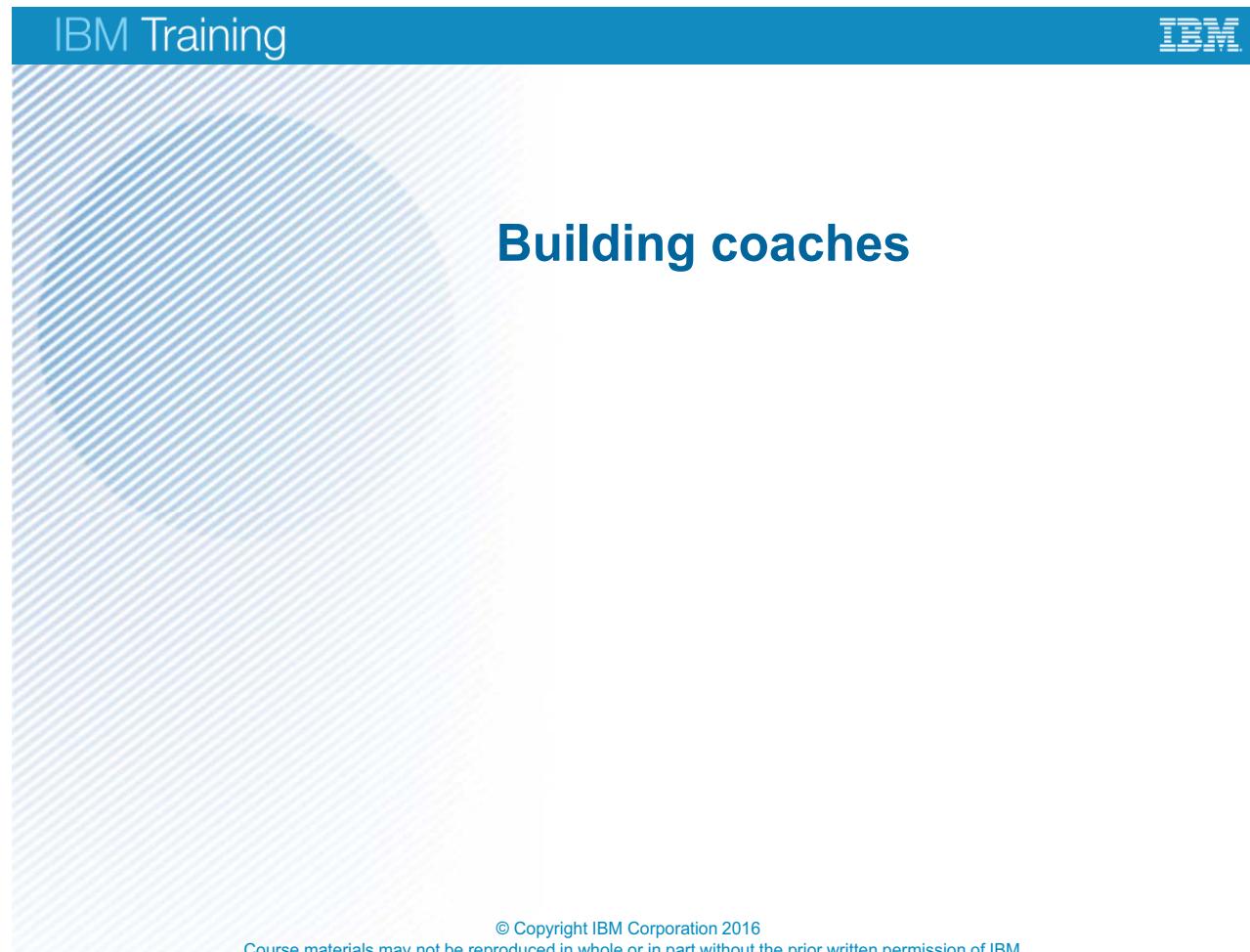


Figure 9-18. Building coaches

A human service presents a web form for a process participant to interact with. This web form in IBM Business Process Manager is an HTML page that is called a coach. This topic covers the fundamentals of building coaches, and enables developers to create coaches in a short amount of time.

During this part of the playback, developers do not look to alter the appearance or add any extra functions to their coaches. Developers concentrate on creating forms that can be filled out and ensuring that data is posted back to the server. The process gathers all the necessary data from the users in the process to complete the overall process.

## Coach overview

- Coaches are the web-based user interfaces that provide process-related data to Process Portal users and collect input from those users
- Coaches are implemented in the client-side human services, which manage the flow from one coach to another
- Two types of user interface are available for human services:
  - Task completion
  - Stand-alone services (dashboard, a startable service, or a URL service)
- Coaches provide a way for team members to input business and process data into the process in a dashboard or task completion
- Coaches provide a wizard-like approach for team members to complete their tasks
- The coach is rendered in a browser for the business user when the coach service (the process activity of the participant) is run
- Similar to building processes and services, developers use a WYSIWYG interface to build coaches by dragging objects from a coach view and widget palette onto the coach designer canvas

[Playback 1: Business data, services, and coaches](#)

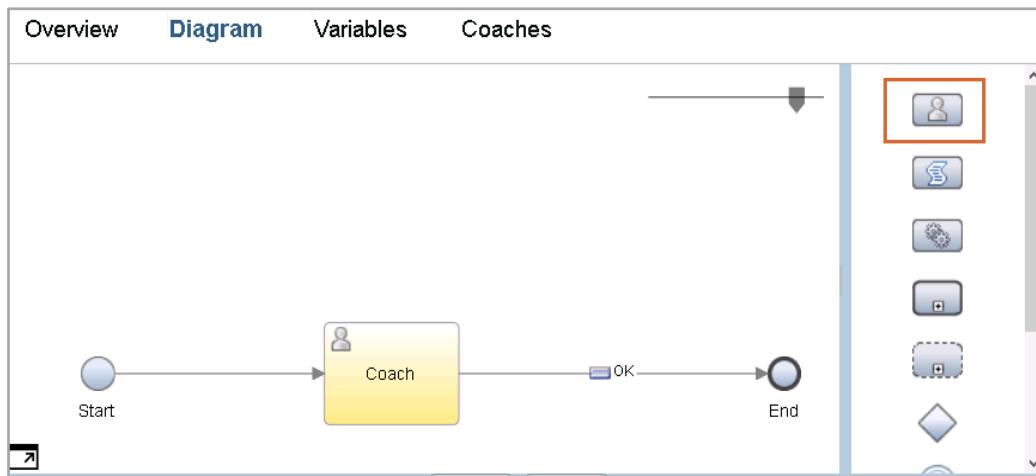
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Figure 9-19. Coach overview

Coaches are the user interfaces for human services. There are two types of user interfaces for human services: task completion and stand-alone services. A task completion user interface implements a specific activity within a process instance. It has access to the details of that process instance. A stand-alone service can be a dashboard, a startable service, or a URL service. A dashboard is a stand-alone user interface that users can run at any time. Users can access dashboards through the Process Portal. A startable service can be started in Process Portal at any time, whereas a URL service can be invoked directly through the URL.

## Build user interface for human services using coaches

- To build the user interface for human services in Web Process Designer, you use coaches
- Coaches can contain coach views
  - A coach view is a reusable unit that you use in coaches and other coach views
- A coach view generally defines the user interface for a particular type of data, giving you the potential to customize the user interface by specifying the configuration options



Playback 1: Business data, services, and coaches

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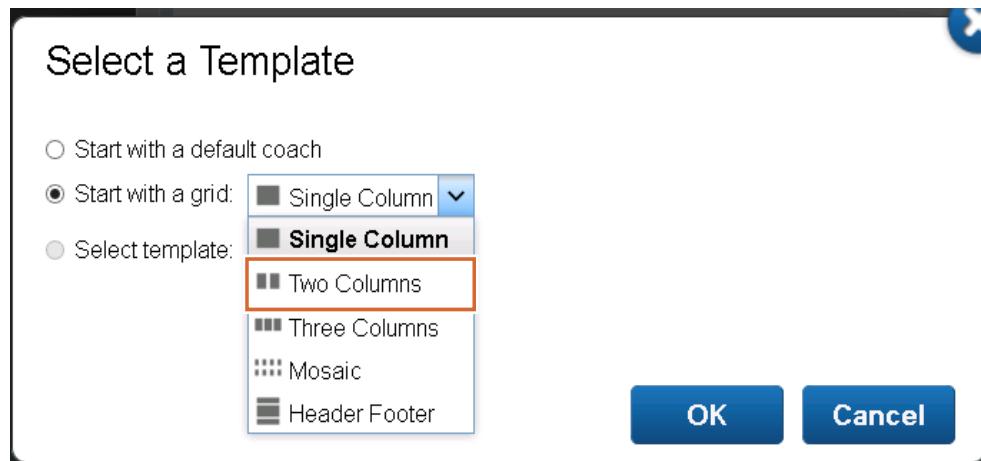
Figure 9-20. Build user interface for human services using coaches

You can also use coach views to lay out other coach views. Two types of coach views are available:

- **Responsive coach views:** The coach views are provided in the Responsive Coaches and Process Portal toolkits, and can be used to model process applications that can run on multiple device types, such as mobile and desktop devices. All the coach views in the responsive toolkits are suitable for use on both desktop and mobile devices, and are built by using new technologies, such as AngularJS and Bootstrap.
- **Non-responsive coach views:** IBM Business Process Manager contains non-responsive coach views based on Dojo that are deprecated.

## Laying out a coach or coach view by using the grid layout

- You can lay out a coach or coach view by using cells in a grid
- A grid is a container that is 12 units wide
  - The actual width of each unit is variable and depends on the screen size
- Within a grid, you can have containers and cells
  - A container groups related cells
  - Cells are placeholders for content



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Figure 9-21. Laying out a coach or coach view using the grid layout



## The coach designer interface



Playback 1: Business data, services, and coaches

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Figure 9-22. The coach designer interface

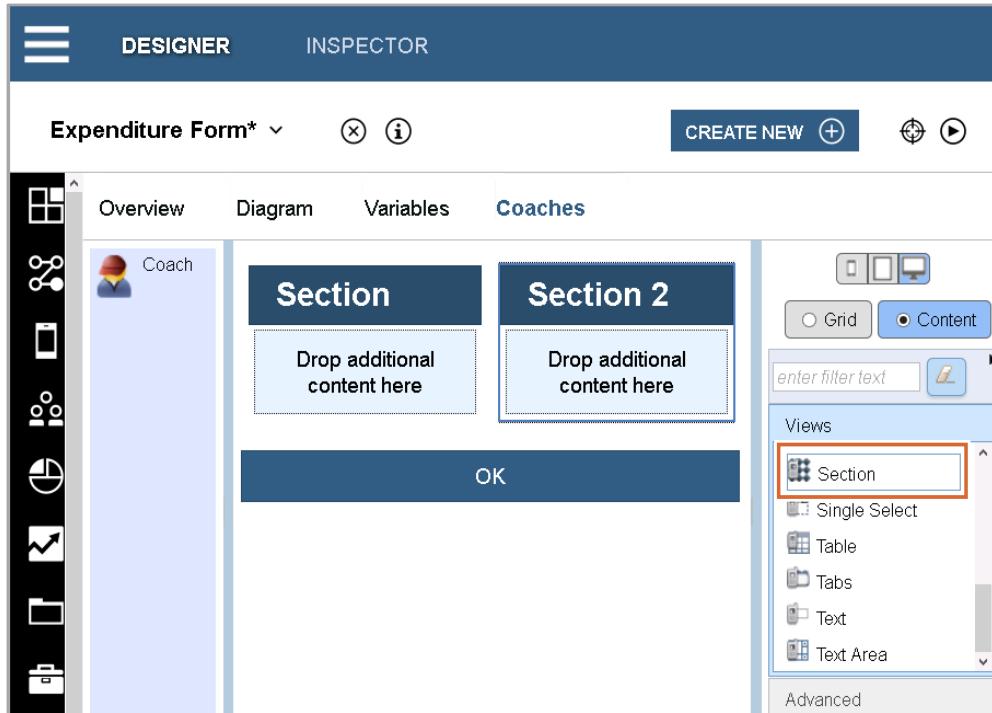
Coaches are web-based forms or dashboards that a developer builds for business users to complete the tasks or follow process or task performance metrics that are assigned to them at run time. All development occurs inside a web browser, so developers have a “what you see is what you get” (WYSIWYG) view of the rendering of the coach.

Coaches are made up of coach views and controls. The coach view provides the user interface elements and layout for the coach through sections and controls. Each coach view can contain one or more coach views, which creates a parent-child relationship between these coach views. At run time, the parent coach view is rendered as a `<div></div>` tag that contains a nested `<div></div>` tag for each child coach view. Each coach view also has a binding function to use data values from a business object, CSS code to control its visual layout, and JavaScript to define its behavior. More information on coach views is covered later in the course.

To access a section or control for the coach designer canvas, the developer selects the **View** tray palette on the right side of the interface. View contains all the coach view sections and controls in the Process Designer library and toolkits. Each coach view is arranged in the category that is assigned to it, either through a tag or as a general section or control. The other default tray palettes are **Advanced** and **Variables**. Advanced is a control that provides JavaScript, CSS, or custom HTML elements to customize the coach. Variables are directly tied to the data model for the business process definition.



## Sections



- Sections contain a group of sections or controls, or both (other coach views)

Playback 1: Business data, services, and coaches

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Figure 9-23. Sections

Coach views that are sections contain a group of sections or controls or both (other coach views). Sections control the layout of your controls after they are rendered in the browser. The controls are made of HTML `div` and `span` sections. Drag the horizontal or vertical sections onto the coach designer canvas from the **Sections** category in the **View** tray palette, and then add the nested sections or controls to these sections. A tabs section is also used to group similar sections. All the sections can be nested within each other.



## Controls

The figure consists of three side-by-side screenshots of the IBM Business Process Manager Coach Designer interface:

- Left Screenshot:** Shows the "Views" section of the Coach Designer. At the top, there are two radio buttons: "Grid" (unselected) and "Content" (selected). Below them is a search bar labeled "enter filter text" with a magnifying glass icon. The main area is titled "Views" and contains a list of control types: Button, Checkbox, Date Time Picker, Decimal, Image, Integer, Multiple Select, Output Text, Radio Buttons, Section, Single Select, Table, and Tabs. A "Stock" button is located at the top right of this list. Below the list are sections for "Advanced" and "Variables".
- Middle Screenshot:** Shows the "Views" section again, identical to the left screenshot.
- Right Screenshot:** Shows the "Variables" section of the Coach Designer. At the top, there are two radio buttons: "Grid" (unselected) and "Content" (selected). Below them is a search bar labeled "enter filter text" with a magnifying glass icon. The main area is titled "Variables" and contains a tree view of variables:
  - Input:** jobTitle (String), salary (Integer), department (String), RequisitionNumber (RequisitionNumber)
  - Output:** jobTitle (String), salary (Integer), department (String), RequisitionNumber (RequisitionNumber)
  - Private:**

Playback 1: Business data, services, and coaches

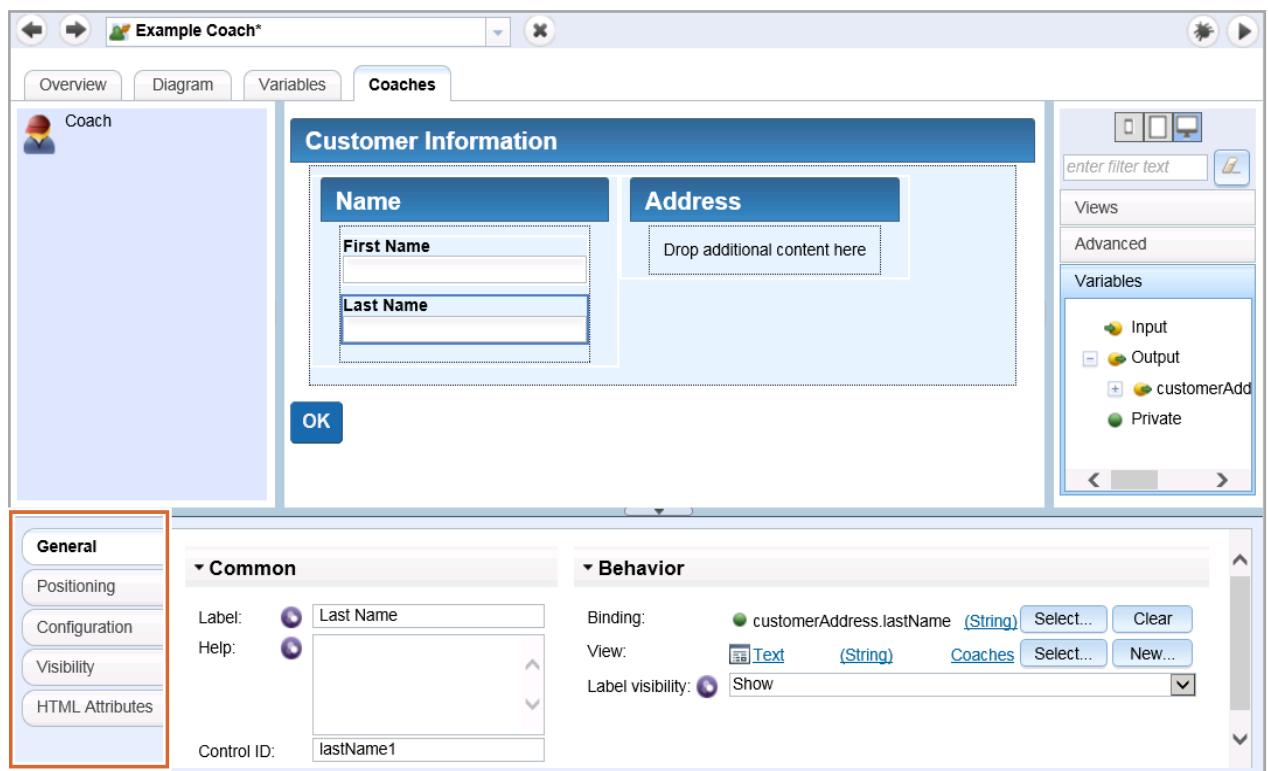
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Figure 9-24. Controls

Controls are objects (or widgets) that are placed directly on the coach designer canvas or in sections on the canvas. Controls are coach views that include buttons, check boxes, input boxes, date time pickers, select controls, and other standard HTML objects. Also, they include a mobile ready set of control objects that are formatted for a mobile environment. Although the standard objects cover most of a developer's needs, IBM Business Process Manager allows developers to customize the controls. Controls are customized by using a custom HTML block on the coach designer that includes JavaScript, CSS, or custom HTML elements. When the controls are laid out, it is easy to copy and paste them into a coach view to share with other coaches across your process application or other installations. The Advanced tray palette Custom HTML object in the coach is used to create this customization.



## Coach view object settings



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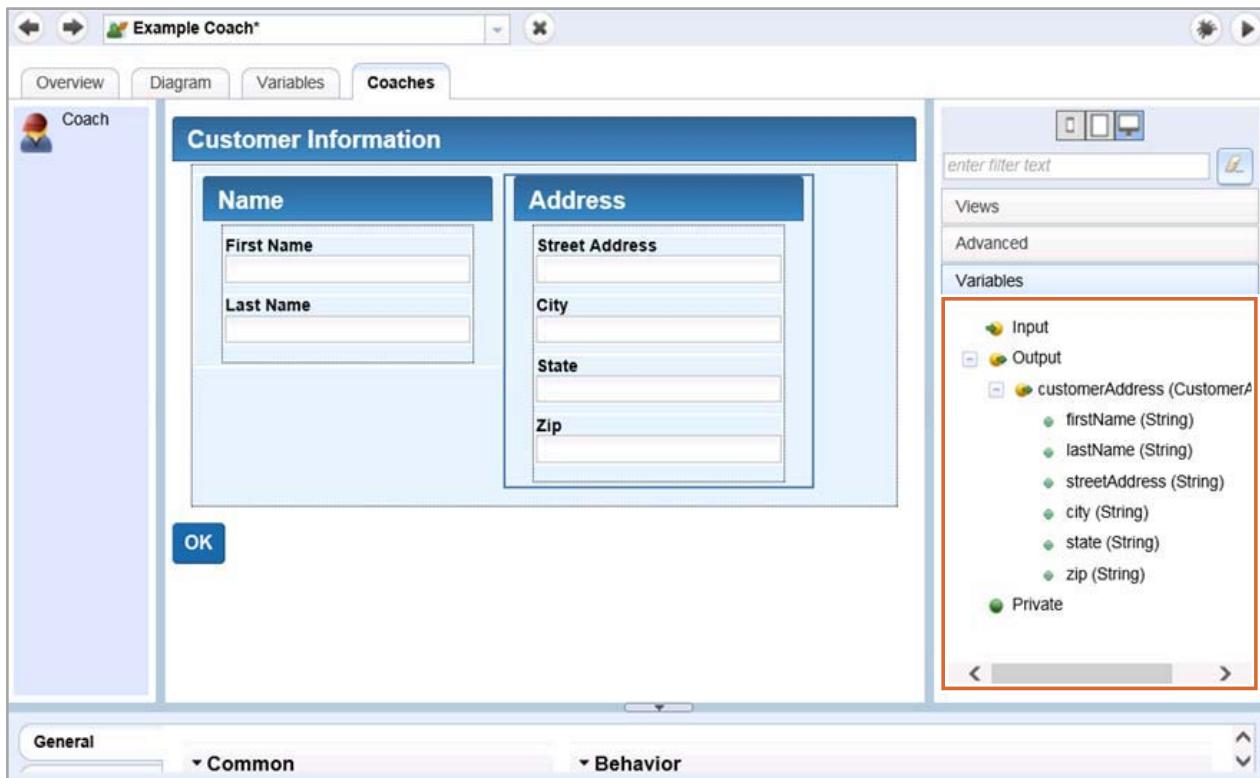
Figure 9-25. Coach view object settings

Coach view objects, whether sections or controls, contain settings for use in the coach. The property settings are separated into five categories:

- **General:** Describes the common properties of the object, such as the control ID, and the behavior, such as binding and label visibility
- **Positioning:** Sets the padding, margins, height, width, and overflow of the objects on the canvas
- **Configuration:** Allows developers to modify the configuration attributes of an object
- **Visibility:** Sets the visibility of the object through a variable value, a rule, or a script
- **HTML attributes:** Allows developers to add classes and attributes to the HTML objects that are rendered in the browser



## Adding controls from server-side variables



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Figure 9-26. Adding controls from server-side variables

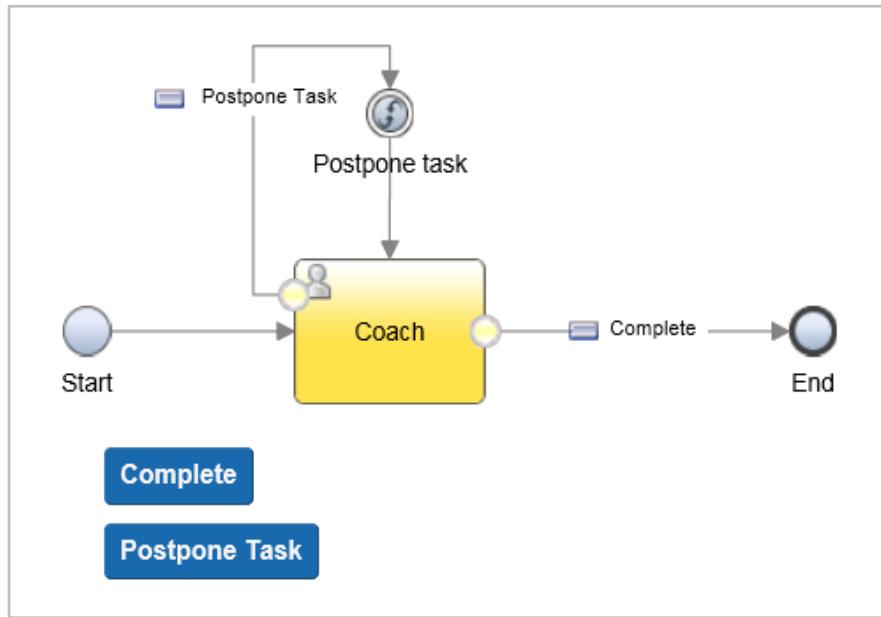
Developers can use a quick and easy way to add controls to a coach bound to server-side variables. The first step is to make sure that the simple and complex variables (input, private, or output) are defined in the service.

When creating a coach, developers see that the variables that are defined for the service are listed on the right side. Drag the variables onto the coach designer canvas, and controls are created and bound automatically to the variable. The developer can drag the individual elements of a variable or the entire variable.

If the output of this coach controls the process flow, add the process flow variables necessary to control the process directly on the coach. They look like input boxes when running the coach, and when doing a playback, developers enter the process flow data into that input box to control the gateways.

In this playback, the project team plans to implement a rule service or some other logic to drive process flow based on the business data that is obtained on this coach. In this case, the actual process flow variables that are used to control the gateway are added to the coach during this playback. Input the expected results of the logic in the input box of the coach when conducting a playback.

## Buttons and sequence flow



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Figure 9-27. Buttons and sequence flow

Next, the developer needs the ability to submit the coach to the server and move the service along. Buttons allow the form to post the data back to the server from the client. Developers model services, such as saving progress or retrieving external data, after the user fills out some form data.

After developers add the number of buttons that they want to the coach, sequence flow is connected in the service diagram. Each button requires drawing a new line in the diagram as each button item corresponds to one line or flow.

In the slide, a line was sequence flowed from the coach to the end event as the coach has a button that is called **Complete**. Another button, **Postpone Task**, is going to an intermediate postpone event.



## Setting screen size

The screenshot displays two versions of a "Customer Information" screen. The left version is in "Small" mode, showing a compact layout with "Name" and "Address" sections. The right version is in "Large" mode, showing a more detailed layout with "First Name", "Last Name", "Street Address", "City", "State", and "Zip" fields. Both screens have "Complete" and "Postpone Task" buttons at the bottom. To the right is a palette with screen size selection controls (Small, Medium, Large) and a list of UI components including Button, Checkbox, Date Time Picker, Decimal, Image, Integer, Multiple Select, Output Text, Radio Buttons, and Section.

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Figure 9-28. Setting screen size

Use the controls above the palette to see your coach in a different screen size. The settings resize the coach to match three different formats: small, medium, and large. These resolutions approximate the resolutions for mobile devices, tablets, and desktop displays.

Screen size settings are as follows:

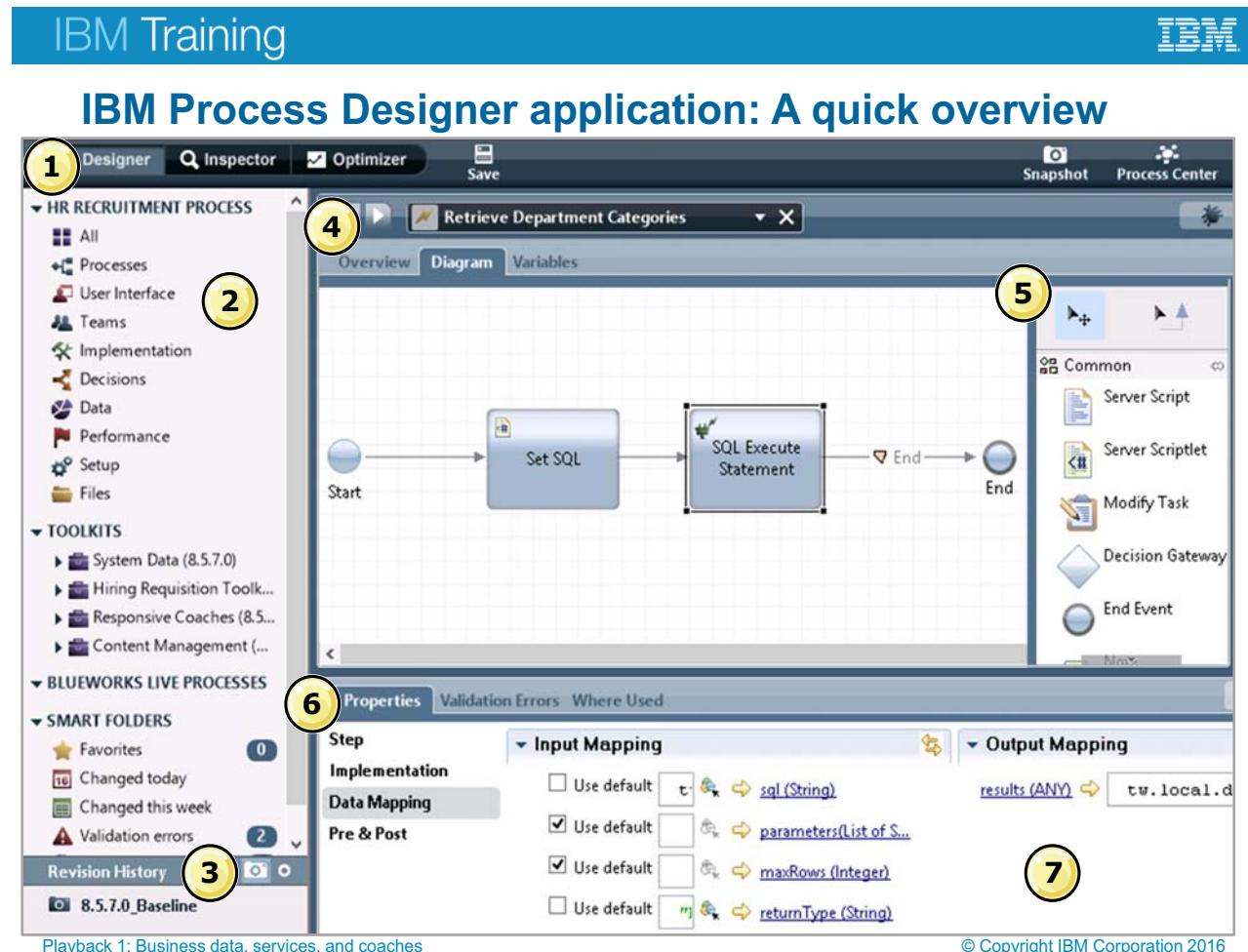
- **Small:** 640 pixels or less
- **Medium:** 641 – 1024 pixels
- **Large (default):** More than 1024 pixels

## 9.4. IBM Process Designer client application



Figure 9-29. IBM Process Designer client application

Until now, simple variables are implemented to drive process flow. Process flow data is only part of the data necessary for the process to function correctly. Much of the process flow data is derived from or dependent upon business data. In this playback, the project development team defines the business data model for the process.



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Figure 9-30. IBM Process Designer application: A quick overview

You use Process Designer to model and implement your business processes and easily demonstrate process design and functionality during development efforts.

1. **Main toolbar:** Provides access to Designer, Inspector, Optimizer, and Process Center. The main toolbar is also where you save all open editors, take a snapshot, and view help.
2. **Process library:** Provides access to the library items for the current process application.
3. **Revision History/Snapshot Catalog:** Shows the revision history or the snapshots that are captured for the process.
4. **Main canvas:** The area in which you can graphically model your process. Each business process definition (process) automatically includes a start event and an end event. Two default lanes are included for user and system tasks.
5. **Palette:** When you develop the process diagram in the Designer in IBM Process Designer, the tools and components are available from the palette.
6. **Properties:** Opens the IBM Business Process Manager Help System.
7. **Connection status:** Indicates the strength of the connection to the Process Center Server.



## IBM Process Designer application: Main toolbar



- **Designer:** Provide the interface to model your processes
- **Inspector:** Manage and debug instances of processes
- **Optimizer:** Simulate and analyze your processes
- **Save:** Save your work
- **Snapshot:** Record the state of library items within a process application or track at a specific point in time
- **Process Center:** Takes you back to the Process Center
- **Help:** Open the IBM BPM Help system

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Figure 9-31. IBM Process Designer application: Main toolbar



## IBM Process Designer application: Library interface

**HIRING SAMPLE**

- All
- Processes
- User Interface
- Teams
- Implementation
- Decisions
- Data
- Performance
- Setup
- Files

**TOOLKITS**

- System Data (8.5.7.0)
- Responsive Coaches (8.5.7.0)

**BLUEWORKS LIVE PROCESSES**

**SMART FOLDERS**

**Revision History**

Responsive Hiring Sample v8570

- **Hiring Sample:** Name of the process application
  - Process libraries for the process application
  - Provide access to the library items for the current process application
  - Create and edit library items
- **Toolkits:** Share library items across process applications, and assist developers in organizing their assets
- **BlueWorks Live Processes:** Subscribe to Blueworks Live processes in Process Designer
- **Smart folders:** Arrange library items in smart folders for quick and easy access
- **Revision History:**
  - Revert to a previous version of a library item
  - Create snapshots from previous points in time

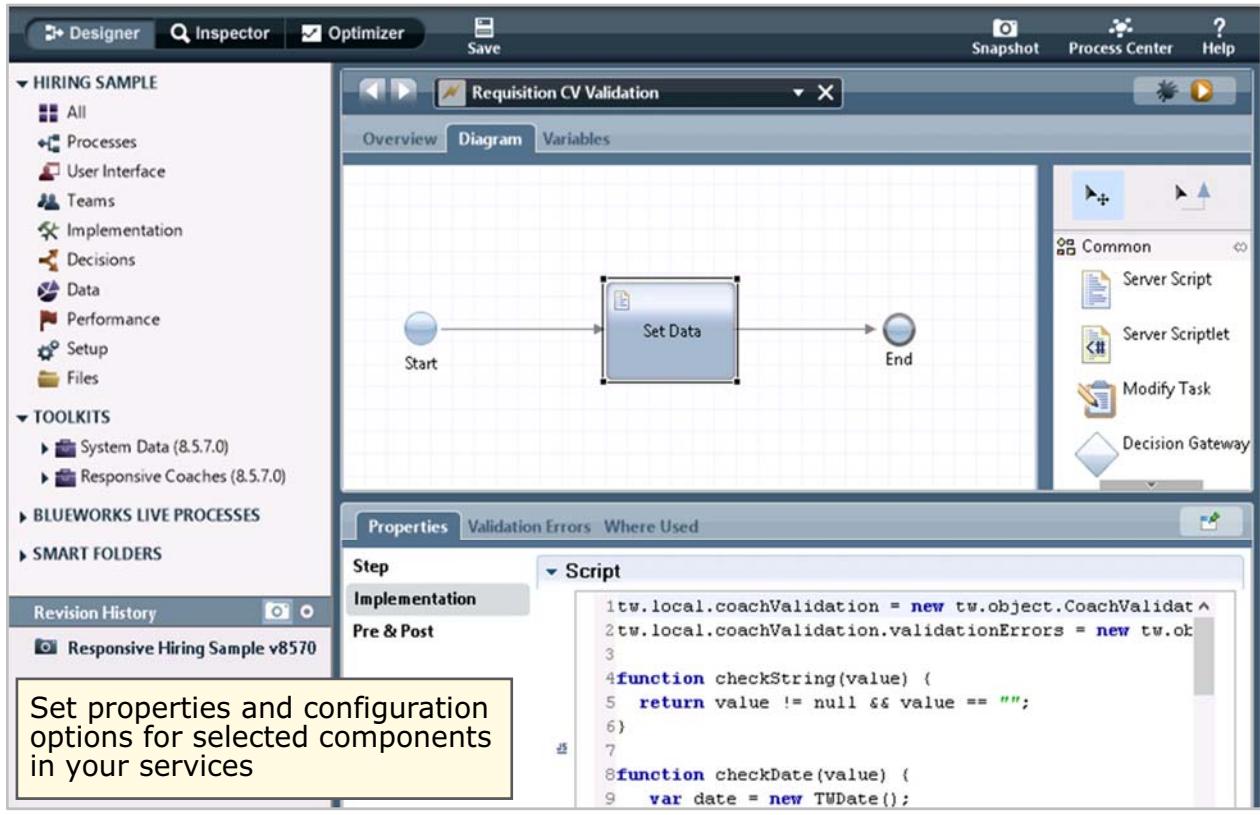
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Figure 9-32. IBM Process Designer application: Library interface

# IBM Training

## IBM Process Designer application: Properties view



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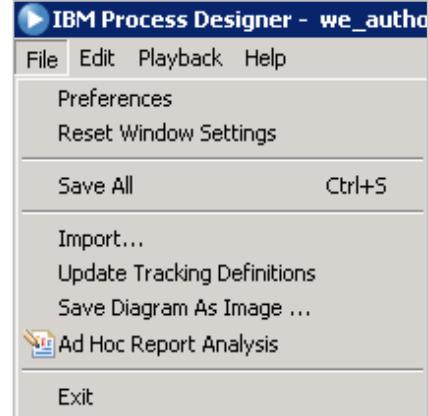
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Figure 9-33. IBM Process Designer application: Properties view

You use Process Designer client application to implement services. You select the component in the **Properties > Implementation** section, you set the properties and configuration options.

## IBM Process Designer application: File menu

- **Preferences:** Settings to control the appearance and functions of the editors and interfaces
- **Reset Window Settings:** Reset to the default perspective settings
- **Save All:** Save all unsaved changes
- **Import:** BPMN 2.0 files that are exported from Blueworks Live or from another product
- **Update Tracking Definitions:**  
Sending tracking definitions to Performance Data Warehouse
- **Save Diagram As Image:** Supported image formats are SVG, JPEG, PNG, and TIFF
- **Ad hoc Report Analysis:** Reports to analyze business data that is specific to your processes
- **Exit:** Exit and close the tool



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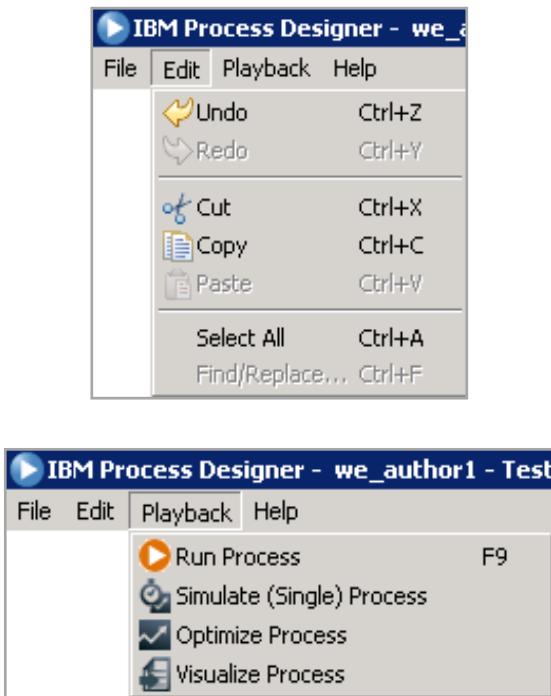
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Figure 9-34. IBM Process Designer application: File menu

BPMN is Business Process Model and Notation.

Some of these options (including Update Tracking Definitions) can be done only by using the Process Designer client application.

## IBM Process Designer application: Edit and Playback menus



- **Edit menu**
  - Basic window operations
- **Playback menu**
  - **Run Process:** Run and debug processes with the Inspector
  - **Simulate Process:** Simulate your processes to understand how well your process models perform
  - **Optimize Process:** Run historical analyses with IBM Business Process Manager Optimizer to measure and improve the efficiency of your processes
  - **Visualize Process:** Create a visual representation of a selected business process diagram

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Figure 9-35. IBM Process Designer application: Edit and Playback menus



## IBM Process Designer application: Help menu



- **Getting Started:** This overview describes how to begin with all of the tools that are available with Process Designer
- **Help:** Starts a web browser for the IBM Knowledge Center where you can search for help topics
- **Key Assist:** This menu shows the keyboard navigation of the tool
- **About IBM Business Process Manager:** Shows the current version, build ID, and build date of the tool

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Figure 9-36. IBM Process Designer application: Help menu

## 9.5. Implementing services in a process

## Implementing services in a process

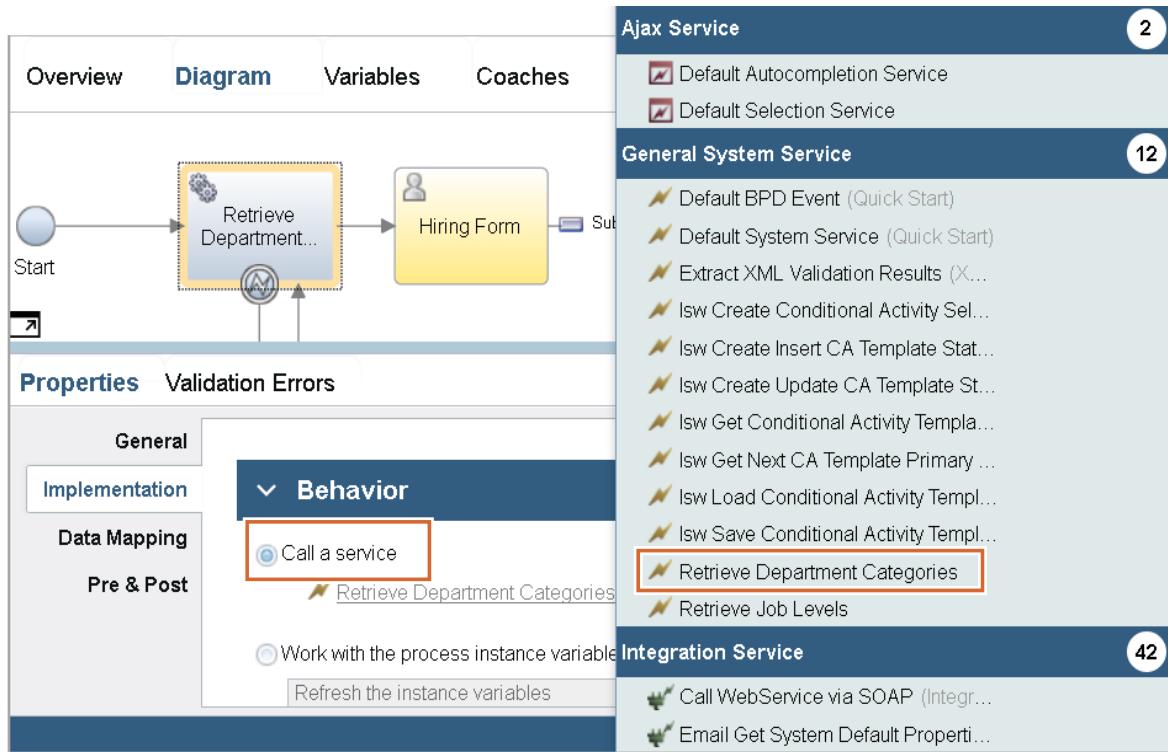
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*Figure 9-37. Implementing services in a process*

In this topic, the activities are implemented with the artifacts that were previously built.



## Implementing services



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Figure 9-38. Implementing services

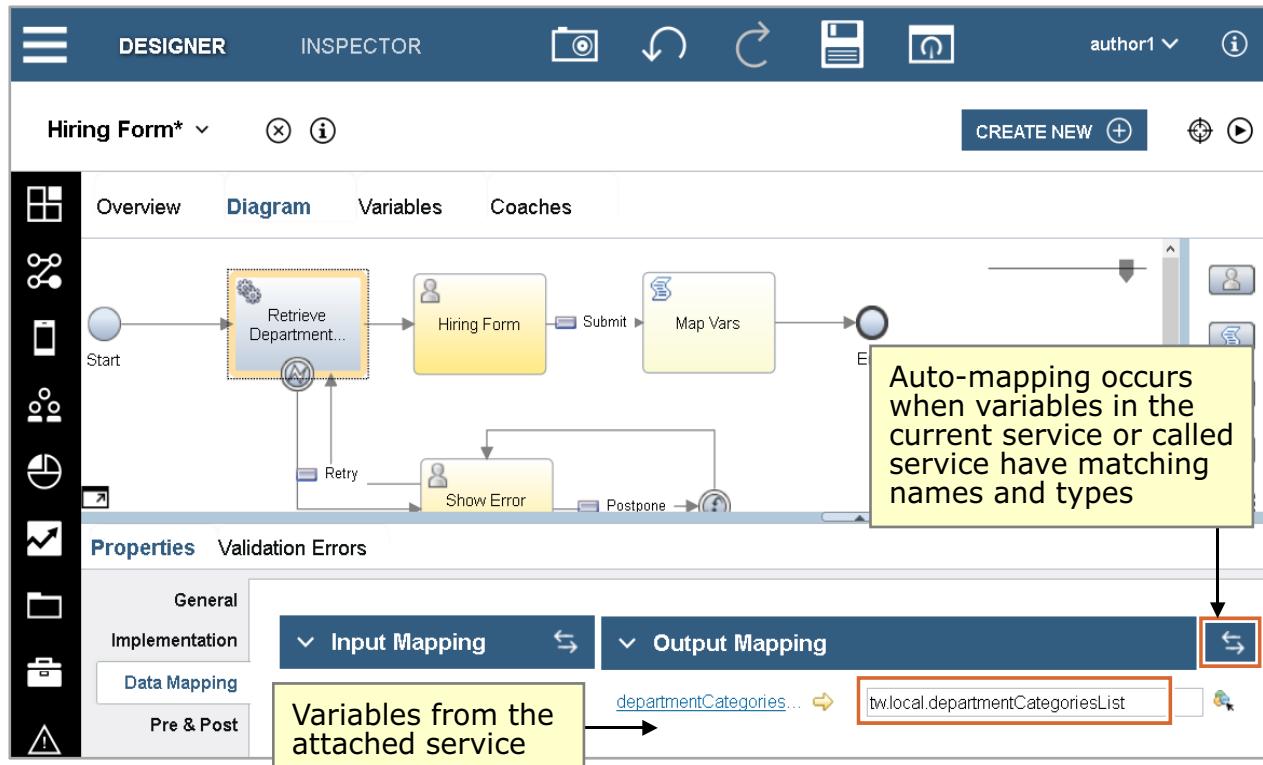
When developers first add an activity to a lane in a process, it has default functions. To specify what happens when an activity is triggered at run time, you must attach a service. Services are attached in the **Implementation** section in the **Properties** tab of an activity.

## Business objects, variables, and data mapping

- Business objects
  - In the Process Designer, business objects are complex objects that are created from simple business objects or other complex business objects
  - Define the business data
- Variables
  - Instantiate business objects that activities use in a business process definition or by steps in services, such as integration services or human services
  - Capture and store the business data
  - Each has its own type and scope
  - Must be declared before you can start to use them
- Data mapping
  - In Process Designer, you set the input and output data mapping to pass variables to an activity or a step
  - You must set the input and output mapping for each activity in a process
  - Map variables in the parent process to the variables received and generated by nested processes and services

# IBM Training

## Data mapping



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Figure 9-40. Data mapping

Data mapping is used to pass the values of variables between an activity (task) in a process and a service. When you attach a service to an activity, the **Data Mapping** section must be populated with the input and output variables of that service. The **Data Mapping** section is used to map the input and output variables of the service to variables in the process so that runtime variable values can be passed to and from the service. Variables are automatically mapped to the process variables, or they are manually specified.

## Mapping input and output data for an activity or step

- Data mapping sets the input and output map to pass variables to an activity or a step
- Requires a set of declared variables and an activity, or a service that contains a set of declared variables and a step
- The activity or step must implement a service or linked process, which also contains a set of declared variables
- Set the input and output mapping for each activity in a process
- The subprocesses and services that implement the activities generate variable values
  - These variable values map to the variables from the main process
- Auto-mapping works only when variable names and types match exactly
- Always use an identical name and data type for a set of input and output variables that are passed in, processed, and then passed back

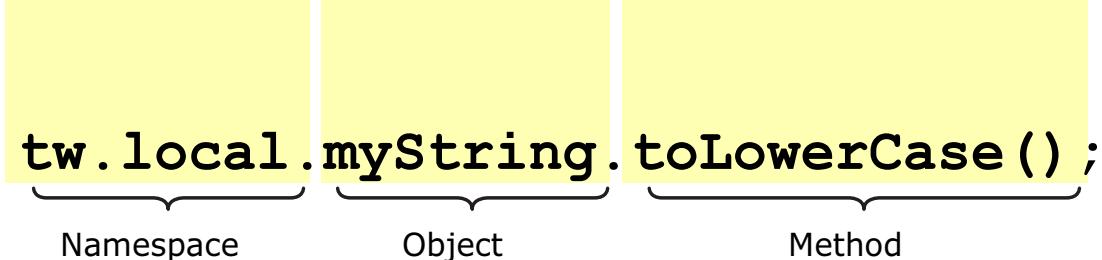
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Figure 9-41. Mapping input and output data for an activity or step

**Restriction:** Mapping input and output data is applicable only if the client-side human service is used within a process. If the client-side human service is used for a dashboard, data mapping is not applicable.

## Understanding object methods



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Figure 9-42. Understanding object methods

JavaScript methods corresponding to the object type are available with the standard syntax.

For example, the JavaScript method `toLowerCase` can be called on an object of type String. In this example, the results of the call are used to convert the value of `tw.local.myString` to all lowercase.

## Demonstration

This demonstration covers the following topics:

- Create a data model
  - Building a complex business object
  - Building a data model
  - Standardizing the business object naming convention
  - Initializing complex objects and lists
- Build services
  - Types of services
  - Process data in services
- Implement services
  - Implementing services
  - Data mapping
  - Understanding object methods
  - Running and debugging processes

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*Figure 9-43. Demonstration*

This demonstration is stored as the `demo6.mp4` file that is in the `C:\labfiles\demo` folder.

### Creating an object type:

1. Create a business object from the **Data** menu of the library.
2. Provide an appropriate name for the new type.
3. Select the appropriate definition type.
4. If complex, add parameters to the object type to identify the data structure. The parameters can be any number of simple objects and other complex types.

### Creating a business object:

1. Make sure that the **Variables** tab is selected in the process or service.
2. Add your variable as output, input, or private.
3. Provide a suitable name and select the appropriate `objectType` (`String`, `Boolean`, or other types) or select a custom type.
4. Variables can be identified as an array of the business object type (simple or complex) by selecting the `Is List` option.

**Creating a service and declaring variables:**

1. Create a service that is named after the activity to which the service is implemented.
2. Define the necessary variables with the appropriate scope.

**Implementing a service for an activity:**

1. Select the activity in the process.
2. In the **Properties > Implementation** menu, select the appropriate implementation type.
3. Change the properties of the implementation as the business requirements dictate.
4. In the **Properties > Data Mapping** section, map each of the input and output variables of the service to the appropriate process variables.

**Running and debugging services:**

1. Open a human service.
2. Click the run button and view the coach.
3. Click the debug button and view the debugger information and the variables that are being populated.

**Running and debugging processes:**

1. Open the process.
2. Click the run button to create an instance.
3. View the debugger information available in the Process Inspector.

## Unit summary

- Build a business object
- Initialize a complex object and a list
- Build a service in the IBM Process Designer application
- Use coaches to define and implement guided user interactions
- Implement a service for an activity in a process
- Map variables between a nested service and an activity in the overlying process
- Describe the object methods

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Figure 9-44. Unit summary

## Review questions

**1.** True or false:

Capitalize the first letter of object types. Use a camel case data type for a variable when creating an instance of the object (for example, employeeId).

**2.** Coaches are made up of what two types of components?

**3.** How do you define what should occur in order for a participant to complete an activity?

- A. Services
- B. Gateways
- C. Lanes

Figure 9-45. Review questions

Write your answers here:

- 1.
- 2.
- 3.

## Review answers

1. True. This naming convention makes it easier to identify whether a business object is the object type or an instance of the object.
2. Sections and controls. Sections control the layout of your controls after they are rendered in the browser. Controls include buttons, check boxes, input boxes, date time pickers, select controls, and other standard HTML objects.
3. A. Services define what happens when users try to complete their activity or when the system must run an activity in a process. Services are attached to an activity from the Implementation section in the Properties view.

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Figure 9-46. Review answers

## Exercise 6

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Figure 9-47. Exercise 6

Complete Exercise 6, Playback 1: Business data and services in the exercise guide.

## Exercise objectives

After completing this exercise, you should be able to:

- Determine and organize data when provided with a written process
- Add business objects and object types
- Create a client-side human service
- Add variables and business objects to a process application
- Create and configure a coach to obtain process participant input
- Model a coach by using the concept of grids
- Add coach controls to control process flow
- Create a client-side human service and coach for the General Manager review activity
- Implement an activity by attaching a service and mapping data

---

# Unit 10. Playback 1: Enhancing coaches

## Estimated time

02:15

## Overview

This unit covers how to build coaches and then enhance them. Coach views are reusable assets that can be shared with multiple coaches or even multiple process applications. The unit covers how to validate the process flow and use toolkits.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Create tabs on a coach
- Enhance coaches and apply a theme
- Create a coach view
- Validate process flow

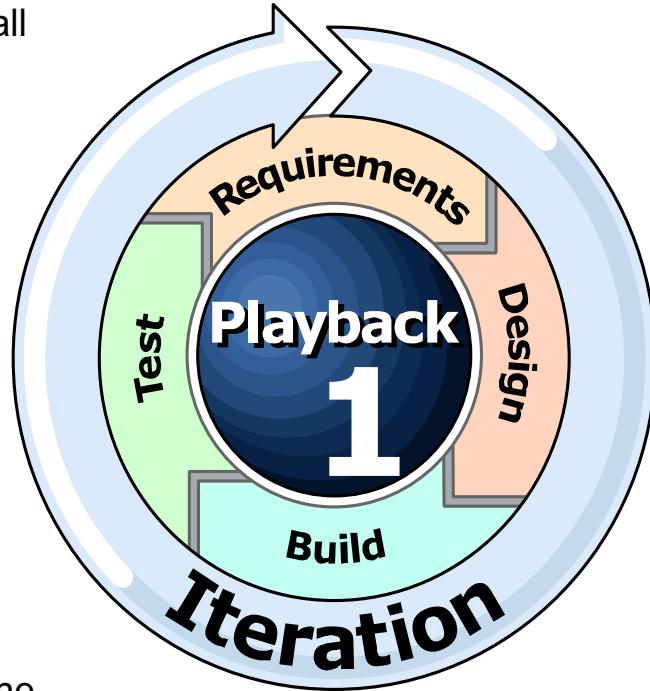
Playback 1: Enhancing coaches

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*Figure 10-1. Unit objectives*

## Playback 1: Enhancing coaches

- It is your chance to show off all the new features that you built into your coaches
- Demonstrate how each coach looks to the different participants in your process
- This playback garners intense scrutiny
- Before you enter this playback session, make sure that no regression errors occur
- Ensure that all the coaches are functioning correctly, and that this playback shows off the good results



Playback 1: Enhancing coaches

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*Figure 10-2. Playback 1: Enhancing coaches*

This stage of the playback is your chance to show off all the new features that you built into your coaches. Log on to the process portal and demonstrate how each coach looks to the different participants in your process. This playback garners intense scrutiny. Before you enter this playback session, make sure that no regression errors occur; ensure that all the coaches are functioning correctly and this playback shows off the good results.

Business users always demand heavy user interface (UI) requirements. Traditionally, it is a struggle between developers and project management. By debating the compromises to the UI, consensus can be built around what is necessary to help participants complete their tasks in the least amount of time in the process. Compare this approach to spending a tremendous amount of time to create a complex UI screen, which might hold little business value.

To ensure that you are ready for this stage of the playback:

- **Log on to the process portal:**
  - Log on to the process portal. The URL is: `http://<server URL:port>/ProcessPortal`
- **Run a task:**
  - View the coach.
  - Demonstrate the tabs.

## Topics

- Enhancing coaches
- Coach views
- Theme support
- Validate process flow

Playback 1: Enhancing coaches

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*Figure 10-3. Topics*

## Key concepts in this unit

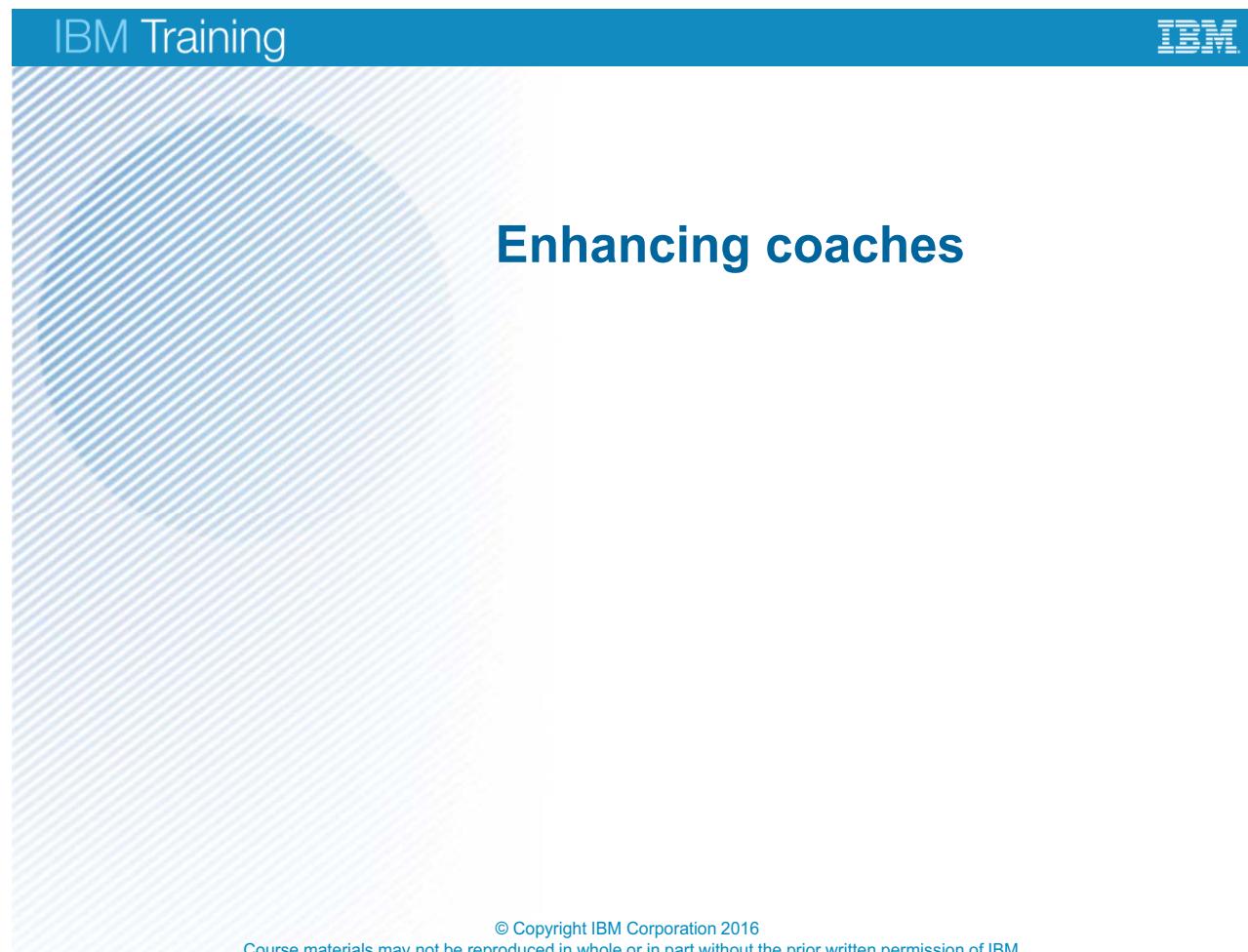
- **Playback 1: Enhancing coaches:** Show off all the new features that you built into your coaches
- **Coaches:** The user interfaces for human services, and composed of HTML, JavaScript, and CSS
  - The three elements control the content, functions, and presentation of every web page
- **Theme:** Theme determines the global appearance of a page
  - The purpose of theme is to ensure visual consistency
  - Themes affect the navigational structure, the banner, the colors, fonts, and other visual elements of a page
- **Coach view:** Reusable asset that can be shared with multiple coaches or even multiple process applications

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*Figure 10-4. Key concepts in this unit*

## 10.1. Enhancing coaches



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Figure 10-5. Enhancing coaches

After modeling the basic coaches and ensuring that the data is flowing in the process, it is time to revisit the coaches that were created during this playback. Now is the opportunity to add functions, interaction, stylization, menus to select from, and all the other user interface enhancements necessary for users to complete their tasks.

This portion of the playback usually receives the highest scrutiny, so take enough time to meet the business requirements, but balance this time with the overall project timelines. Avoid adding extra functions when it does not provide value. This unit focuses on using controls that are included in the IBM Business Process Manager coach toolkits. HTML, JavaScript, and CSS are used to enhance the stock coaches; but if these stock controls do not meet your needs, feel free to create your own by using coach views.

Now is not the time to cause a regression error. Because you verified the data flow, make sure that you do not break something that was working previously.

## Basics of coach enhancement

- Coaches are made of three things:
  - HTML controls the content of the page (divs, spans, inputs, and other tags)
  - JavaScript controls the interactive functions of the page
  - Cascading stylesheets (CSS) control the visual style of the page
- All of the following tasks can be accomplished:
  - Build custom HTML elements and controls
  - Match a corporate color scheme or existing website layout through custom CSS
  - Alter control or page functions with JavaScript
- Any page requirement can be fulfilled
  - If it can be built and shown in a browser, it can be done with a coach

[Playback 1: Enhancing coaches](#)

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*Figure 10-6. Basics of coach enhancement*

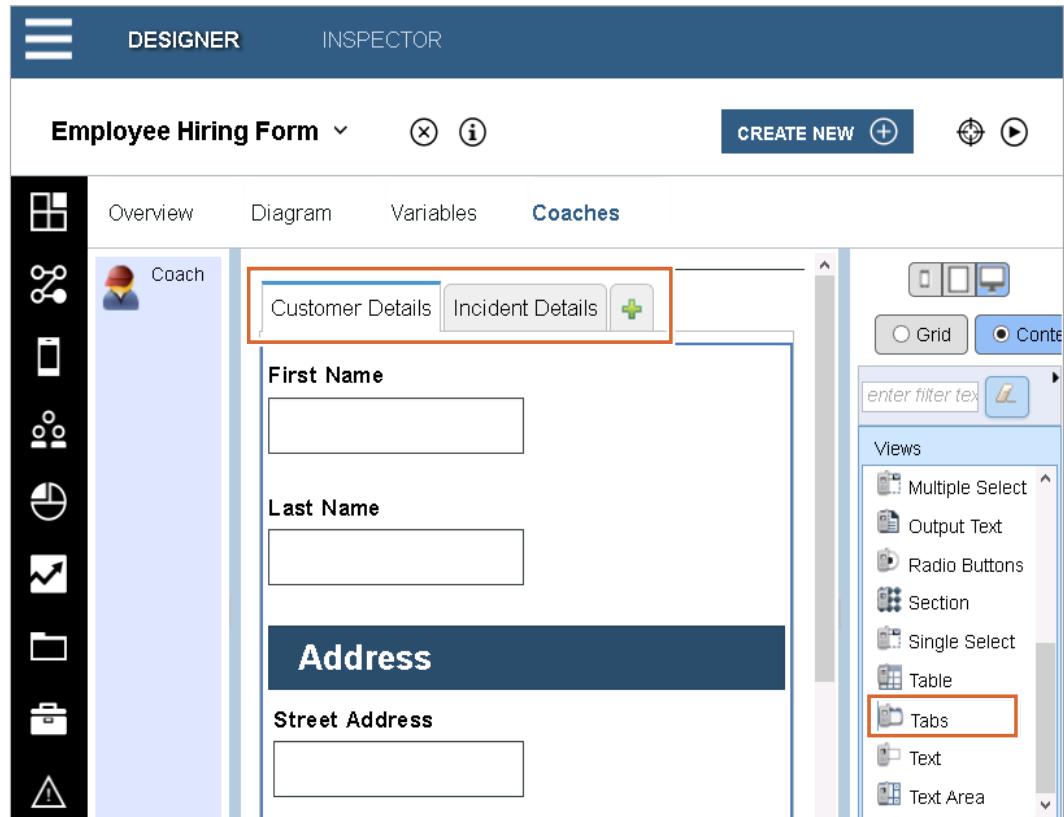
Coaches use the same technology as any web development environment to serve web content to users. Coaches are composed of HTML, JavaScript, and CSS. The three elements control the content, functions, and presentation of every web page. All three elements are contained in coach views, the widget components that are used in coach designer to create a final web form or dashboard. Coach views are covered in more detail later in the unit.

Coaches are made of HTML divisions (divs) and spans, which control the structure of the page. Controls and labels are inside these elements. The stock JavaScript and CSS files are linked through <include> elements in the HTML. Although the coach views in coaches come preinstalled with CSS and JavaScript to control the stock functions, any modification from the stock can be accomplished. That includes creating custom HTML controls from scratch, creating custom stylesheets, and changing or adding JavaScript functions.

Some organizations might be hesitant to use coaches because they are unaware of the capabilities, but the use of coaches to create a web page has no limitations. If it can be built and shown in a browser, it can be done with a coach. The advantage is that the rapid application development tools allow developers to create the web page quickly, and connecting data to the fields on the page is much quicker than using external web pages. Other considerations like security, sessions, cookies, and the back-end considerations are taken care of for the coach developer.

# IBM Training

## Coach tabs



Playback 1: Enhancing coaches

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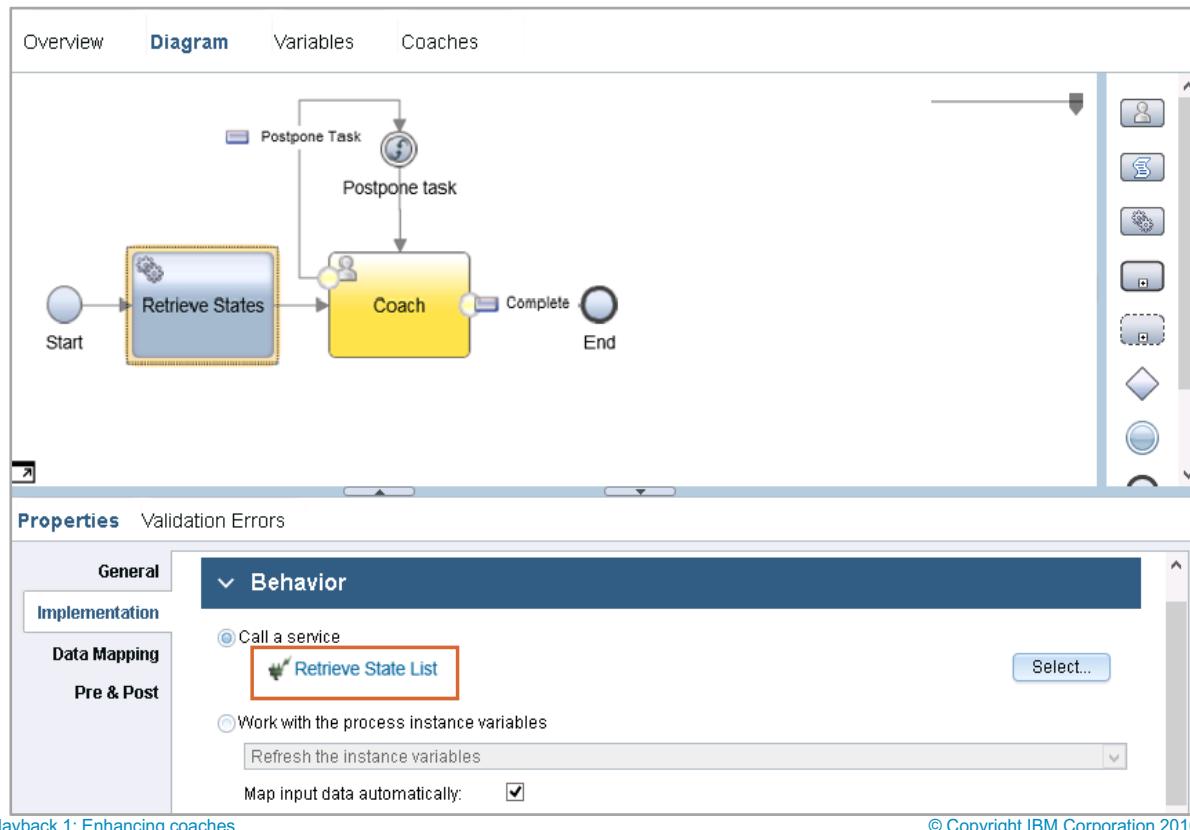
Figure 10-7. Coach tabs

Large coaches have numerous disadvantages. The first might be that the performance of the coach might be affected. The user might become confused or overwhelmed when working with such a large amount of data. Similar fields that are near each other might not provide a user enough contextual information about what information is included in the inputs. By grouping similar data into tabs and providing a wizard-like interaction with the forms that the user must complete, the coaches become more useful and the overall user experience is improved.

**Tabs** can be added to any coach. Creating a tabbed coach is easy. Drag a tabs control onto the coach designer canvas from the **View** tray palette and move the existing sections into the individual tabs. All of the show and hide JavaScript functions are provided to the developer through the tab coach view control.



## Implementing a select control (1 of 2)



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Figure 10-8. Implementing a select control (1 of 2)

You can use a select control to limit input values in a specific control. Until now, a user was able to insert any type of data into an input box. One way to standardize the input data is to provide options for a user to choose from. A user can choose among many different options from a list of choices on a coach. The intent is to limit the values that a user can input for a certain control. The solution that is provided in IBM Business Process Manager is to use the select control that is provided in the Responsive Coaches Toolkit. This default control is a setup that uses an Ajax service with specific inputs and outputs to feed the list in the control object. To learn more about Ajax services and advanced coach views and coach design, sign up for the *IBM Business Process Manager Implementation Level 2* course.

Another common approach is to provide a selection of options for the user to choose from. The control itself is bound to a variable, similar to any input. The selection data can come from a list that is retrieved from a database.

The easiest way to accomplish a select control in a coach is to store the dynamic data in a list of String or a list of NameValuePair. In the previous step, the coach retrieves the data with an SQL integration service that was created in playback and saves the data in a list object.

Drag the integration service onto the palette and hook up the flows. Map the output of the integration service to a local variable. The variable feeds the control on the coach.



## Implementing a select control (2 of 2)

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Figure 10-9. Implementing a select control (2 of 2)

The next step is to identify the input control that was created in playback that must be changed into a select control. At times, by using a toolkit that comes from other developers, the implementation is quicker. The default select control is easily configured to show the list of options to a user. As a developer, you have plenty of options to choose from, including building your own coach view select control. Coach views are explained in more detail later in this unit.

To accomplish this change, in the **View:** option, the developer clicks **Select** to choose the **Single Select** control from the system toolkit to replace the default **Text** view. The image on the palette changes to reflect the new look of the select box.



## Configuring the select list

The screenshot shows the IBM Coaches application interface. At the top, there are tabs: Overview, Diagram, Variables, and Coaches (which is selected). On the left, there's a vertical toolbar with icons for Overview, Diagram, Variables, and Coaches. The main workspace displays three input fields: 'City' (text box), 'State' (select dropdown), and 'Zip' (text box). To the right of the workspace is a sidebar with sections for Views (containing 'Button' and 'Stock' options), Advanced, and Variables. Below the workspace, the 'Properties' tab is selected in the bottom-left corner. In the 'Configuration' section of the properties panel, the 'Selection list:' field is set to 'stateList[] (NameValuePair)' and has a red box around it. The 'Selection service:' field is set to 'Default Selection Service' with a checked checkbox, also highlighted with a red box. Other configuration fields include 'Selection service input text:', 'Display name property:', 'Value property:', and 'Disable sorting:'. Buttons for 'Select...' and 'Clear' are available for each configuration item.

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Figure 10-10. Configuring the select list

The final step is to set what values are displayed to the user in the control, and what values are stored in the bound variable when the user makes the selection. The binding on the **Properties > Configuration** tab sets the list that users can select from. When users select their choice, the selection is a member of the type of variable that is configured as the binding variable. The variable is stored in the Selected item variable.



### Note

If the binding is a list of NameValuePair, the Selected item must be a simple NameValuePair variable. If the binding is a list of String, the Selected item must be a simple String variable.



## Adding dependent visibility to a coach field

The screenshot shows the IBM Coach interface. The main view displays a form with fields for describing an incident and a checkbox for witnesses. To the right is a sidebar with various controls. At the bottom, the 'Properties' panel is open for the 'Witness Names' field, specifically the 'Visibility' tab. A dropdown menu is open, showing options like 'Same as parent', 'Required', 'Editable', etc., with 'Required' being the selected option.

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Figure 10-11. Adding dependent visibility to a coach field

### Set the visibility of a coach view control when editing it in a coach.

A common situation on a coach is when a field or control must show or hide, depending on another field. Right now, all the fields are visible by default (Same as parent), but a developer can show or hide individual fields with the visibility selector in the **Visibility** menu. Every setting in the visibility selector is different when assigning a value to a control option.

- **Required:** The coach view is editable and also has a decorator that indicates to users that they must enter or set a value.



#### Important

Setting the **Visibility** property to **Required** does not validate whether a user enters or sets a value. A developer must provide code that does this checking, for example, by implementing a validation service or script for the coach that contains the coach view.

- **Editable:** Users see the coach view and add or edit values in the coach view or otherwise interact with it.
- **Read only:** Users cannot edit the value of the variable.

- **Hidden:** Users cannot see the coach view. The generated HTML still contains the **DOM** node for the coach view, and the space is maintained for the element on the screen. The parent coach view reserves space in the layout to display the coach view when it becomes visible.
- **None:** Users cannot see the coach view. The None value is the visibility of the coach view on screen and not whether users can see it in the HTML source. The section exists inside the DOM, but the area is not reserved for the elements, and if the element becomes visible, the other elements shift to create space for this element.

To illustrate the difference between Hidden and None, suppose that you have a vertical section with three text inputs. If you set the middle field to **Hidden** visibility, the section displays empty space where the middle field would be if it were visible. If you set the middle field to **None** visibility, the section collapses the space between the upper and lower fields. If the middle field becomes visible, the lower field moves down to make room for the middle field.



## Setting dynamic visibility through a script

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Figure 10-12. Setting dynamic visibility through a script

What if the visibility depends on the input of a different field? You can meet this dependent visibility function by using the script option and inserting a variable. Most coach controls allow a variable to be used instead of the selection from a selector box.

To create dependent visibility, you first add a coach view control on the coach designer canvas that holds the visibility string value that is bound to the visibility control. Then, select the control that the show or hide function is applied to, and bind the visibility variable to a visibility string field value.



### Note

The different sources for visibility that are available for a coach view control are not available when a text control is embedded in a coach view. A developer gets the different visibility sources only when the control is on the actual coach designer canvas.



## Using a visibility rule

- Set visibility rules for either a variable value or a team membership
- Add as many rules as necessary to set the condition for visibility
- The last condition provides a default when no condition is met in the rule

The screenshot shows the IBM Coach interface with the 'Coaches' tab selected. A visibility rule is being configured for the question 'One or more witnesses to incident?'. The 'Source' dropdown is set to 'Rule' (highlighted with a red box). The 'Set to' dropdown is set to 'Same as parent'. The 'Otherwise' dropdown is set to 'None'. The 'Properties' and 'Validation Errors' tabs are visible at the bottom.

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Figure 10-13. Using a visibility rule

A visibility rule set has one or more rules and a default value for when no rules apply. The rules have an **OR** relationship. The order of the rules is important because the coach view uses the visibility value of the first rule that applies. The developer determines whether the first rule in the rule set is based on a variable value or on a team membership and then selects **Variable** or **Team**. The default value for the rule set is a selected value in the **Otherwise** field.

For a variable, the format of the rule is *visibility variable condition value*. To create a visibility rule that is based on a variable value:

- For **visibility**, set the value for the visibility in the **Set to** field if the rule applies.
- For **variable**, click **Select** and then select the variable that is defined in the human service that determines when the visibility value applies.
- For **condition**, select the type of comparison that is used on the variable value.
- For **value**, enter the variable value that triggers the application of the visibility value.

For a team, the format of the rule is *visibility membership team*. To create a visibility rule that is based on team membership:

- For **visibility**, set the value for the visibility in the **Set to** field if the rule applies.
- For **membership**, select the membership type of the user in the team.

- For *team*, select the team that the user belongs to.

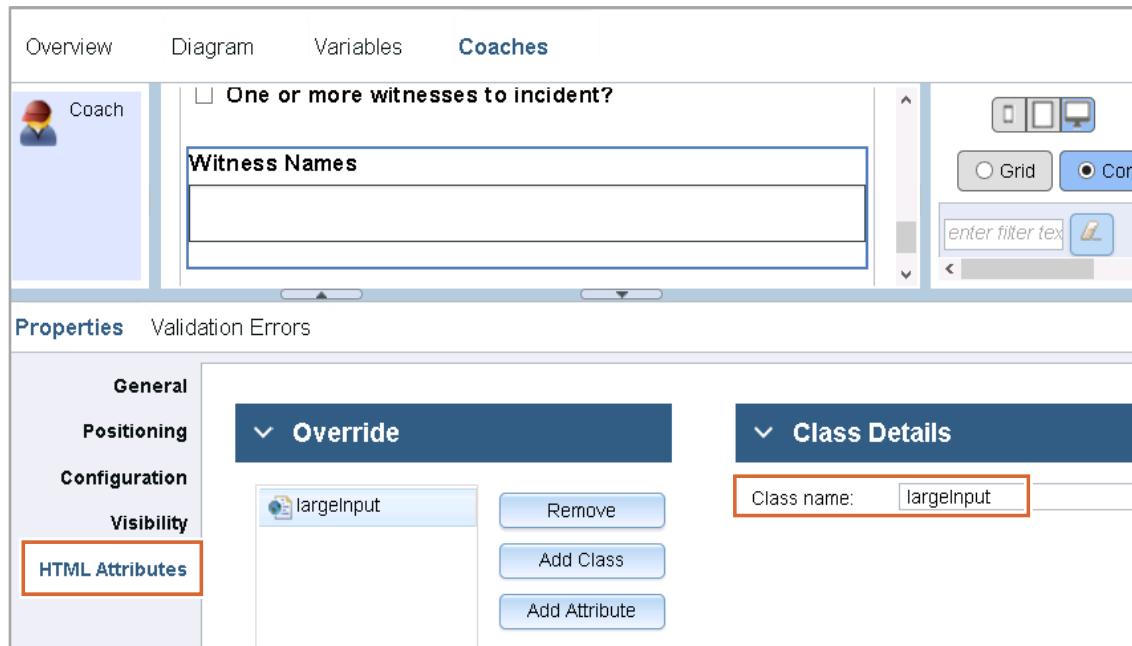
To add extra variable values or team memberships to a rule, click the plus icon on the right.

Subsequent clicks add a variable value or team membership for each click. If a rule has multiple variables or team memberships, they have an **AND** relationship with each other. That is, all of them must be true for the rule to apply.



## HTML attributes

- A section in the Properties tab where developers override styles for a specific coach view instance



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Figure 10-14. HTML attributes

**HTML Attributes** is where developers override styles for a specific coach view instance. Overriding a style consists of:

- An HTML class attribute in each coach view instance that a developer wants to specifically style
- A corresponding CSS rule for that class attribute



### Important

Do **not** use the following names as CSS class names in your HTML source code because they are reserved names:

- CoachView
- ContentBox

Like JavaScript code, HTML code features syntax highlights.

## 10.2. Coach views

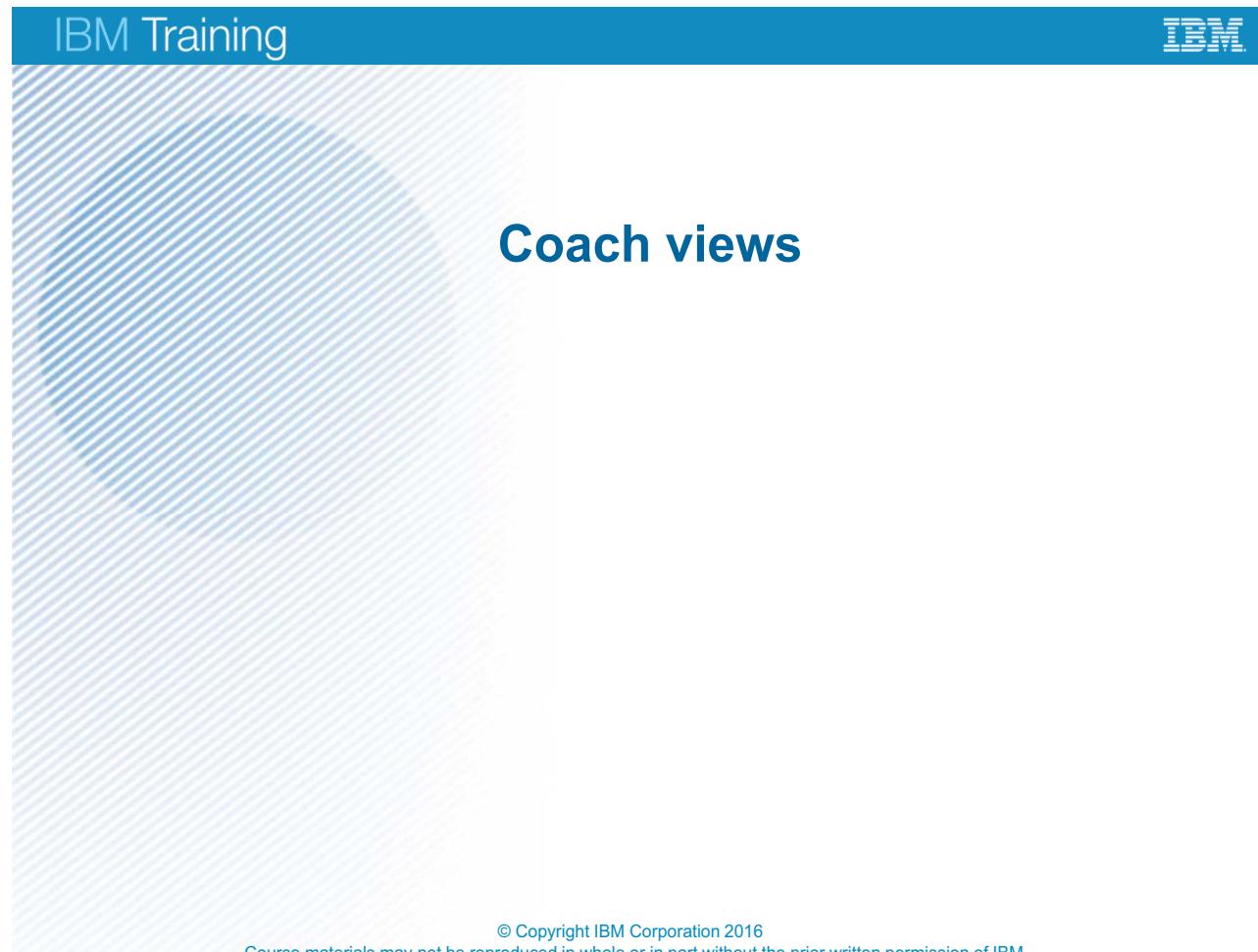


Figure 10-15. Coach views

Coach views are reusable sets of user interface (widgets or controls) that users can use to interact with a business object or service. Coach views consist of one or more other coach views, data bindings, layout instructions, and behaviors. Coach views are stock (included, not customized) or custom controls or dashboards. IBM Business Process Manager provides the stock controls, which are coach views, and they are found in the **Control** category or in the **Section** category on the **View** tray palette of the coach designer. Custom coach views are controls or dashboards that a developer creates or that other programs or companies provide. In terms of use, IBM Business Process Manager treats stock and custom coach views identically.

This topic covers how to create custom coach views.

## Coach views

- Coach views are reusable assets that can be shared with multiple coaches or even multiple process applications
- Coach views and coaches can share parts of their user interface with other coach views and coaches
- In general, create highly reusable coach views in toolkits and more specialized coach views in process applications
  - If the coach view is in a toolkit and then someone edits it, the changes apply to all instances of the coach view in all applications that use that toolkit
  - You cannot directly edit the definition of the coach view from within the parent coach or coach view
  - Instead, you must first open the coach view definition before you can change it

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*Figure 10-16. Coach views*

Coach views are reusable assets (or coach controls) that can be shared with multiple coaches or even multiple process applications. For example, after developers apply the CSS classes and achieve the style that they want for a coach, they can create a custom coach view. By moving the class into a coach view, the class can now be a shared asset.

Because coach views are reusable, coach views and coaches can share parts of their user interface with other coach views and coaches. For example, suppose that you create a coach with a coach view that contains a set of address fields. If you create a second coach that needs address fields, you can reuse the coach view from the first coach. In both cases, the coach is using an instance of the coach view. You can edit the properties of each instance independently. For example, changing the label of one coach view instance does not change the label of the other. Both instances of the coach view use a reference to point to the coach view definition. This approach means that if the coach view definition changes, you can see that the change is reflected in the instances of the coach view.

You can create a coach view in the process application or in a toolkit. In general, you create highly reusable coach views in toolkits and more specialized coach views in process applications. Choosing the process application means that you can reuse it only within the process application. However, it also means that if someone edits the coach view, the changes apply to the instances of the coach view in the process application. If the coach view is in a toolkit, when someone edits it, the changes apply to all instances of the coach view in all applications that use that toolkit. Because

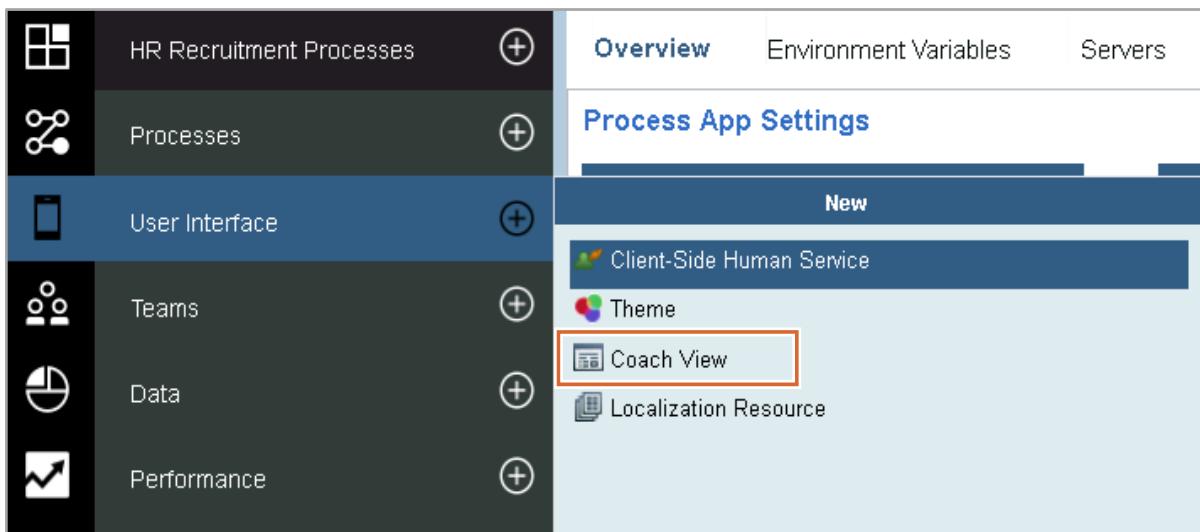
editing a coach definition can affect many instances, be careful in your changes. For example, deleting a content box in the coach view definition means that coaches or coach views that contain instances of that coach view cannot display the content.

You cannot directly edit the definition of the coach view from within the parent coach or coach view. Instead, you must open the coach view definition first before you can change it.



## Create a coach view

- Create a coach view through the User Interface category in the library



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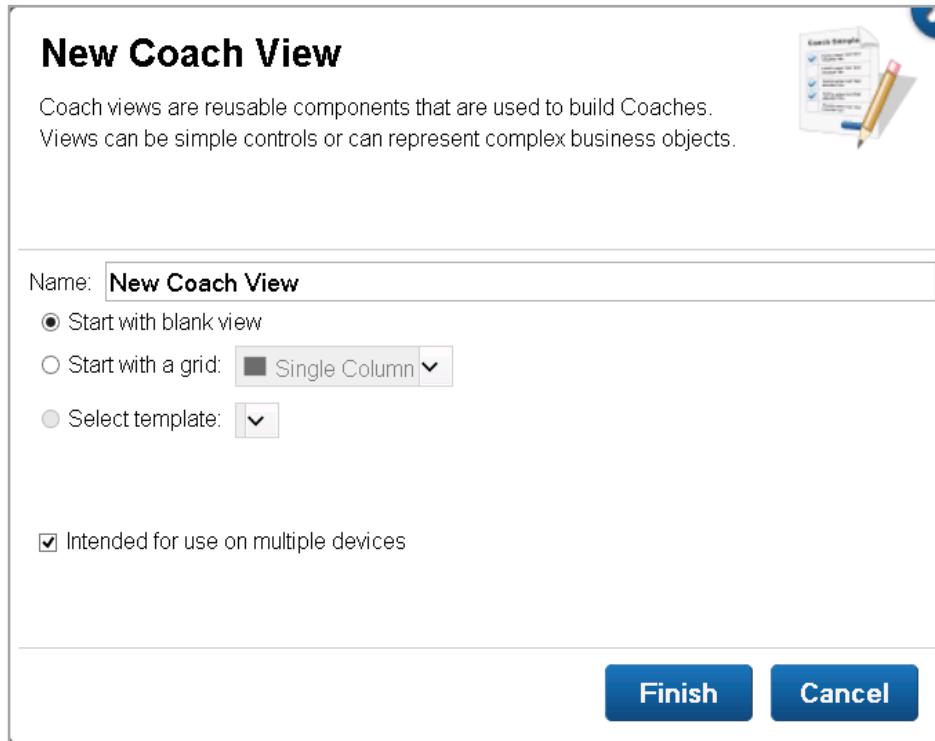
*Figure 10-17. Create a coach view*

To create a custom coach view, the developer clicks the (+) plus icon next to the User Interface category in the library in the Web Process Designer. After naming the coach view, the developer is directed to the coach view definition page.

You can also create a coach view in the client-side human service designer.

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## Create a coach view



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Figure 10-18. Create a coach view

Templates are an ideal way to create a standardized look across multiple coach views.

A template is a coach view that someone marks as being usable as a template in its Overview page. Users can then select the template when they are creating coach views. The new coach views have the content of the template as base content to which the users can then add content. For example, you create a coach view that has the company logo and name in a banner area and a content box as a placeholder for other content. When you use this coach view as a template, you can then select it when you are creating another coach view. In the new coach view, the banner area is defined in the template along with an area for content. Other users can also use the template when they are creating coach views, and the template provides a consistent look across the new coach views. Because templates are coach views, you can also drop them onto coaches. For example, if you have a template that has a common banner, you can drop it onto a coach so that the coach has the common banner.

The screenshot shows the 'Coach view definition page' in the IBM Business Process Manager interface. At the top, there's a blue header bar with the 'IBM Training' logo on the left and the 'IBM' logo on the right. Below the header, the title 'Coach view definition page' is displayed in a large, bold, dark blue font. Underneath the title, there's a navigation bar with four tabs: 'Overview' (which is highlighted in orange), 'Behavior', 'Variables', and 'Layout'. The main content area is divided into several sections: 'Common' (containing fields for Name, Modified, Tags, and Documentation with a rich text editor preview), 'Usage' (checkboxes for Can Fire Boundary Event, Use as a Template, Supports a Label, Prototype-level event handlers, and Intended for use on multiple devices), 'Preview' (fields for Palette Icon, Layout Image, Use URL binding, and Preview Label Position), and 'Advanced Preview' (indicated by a button). The entire interface has a clean, modern design with a light gray background.

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Figure 10-19. Coach view definition page

When developers create a coach view or open an existing coach view to edit it, they see the following sections available:

- **Overview**

This page displays the coach view name, information about the coach view, the images that are used to represent the coach view during design time, and how the coach view is used. You can also tag your coach view to make it easier to find in the library and on the palette.

- **Behavior**

This page displays the scripts and CSS files that are contained in the coach view. The Behavior page is also where you define event handler code. The event handlers are the entry points for the code of the coach view. While the coach view might reference supporting JavaScript files, the event handlers contain the functions that the IBM Business Process Manager framework calls.

- **Variables**

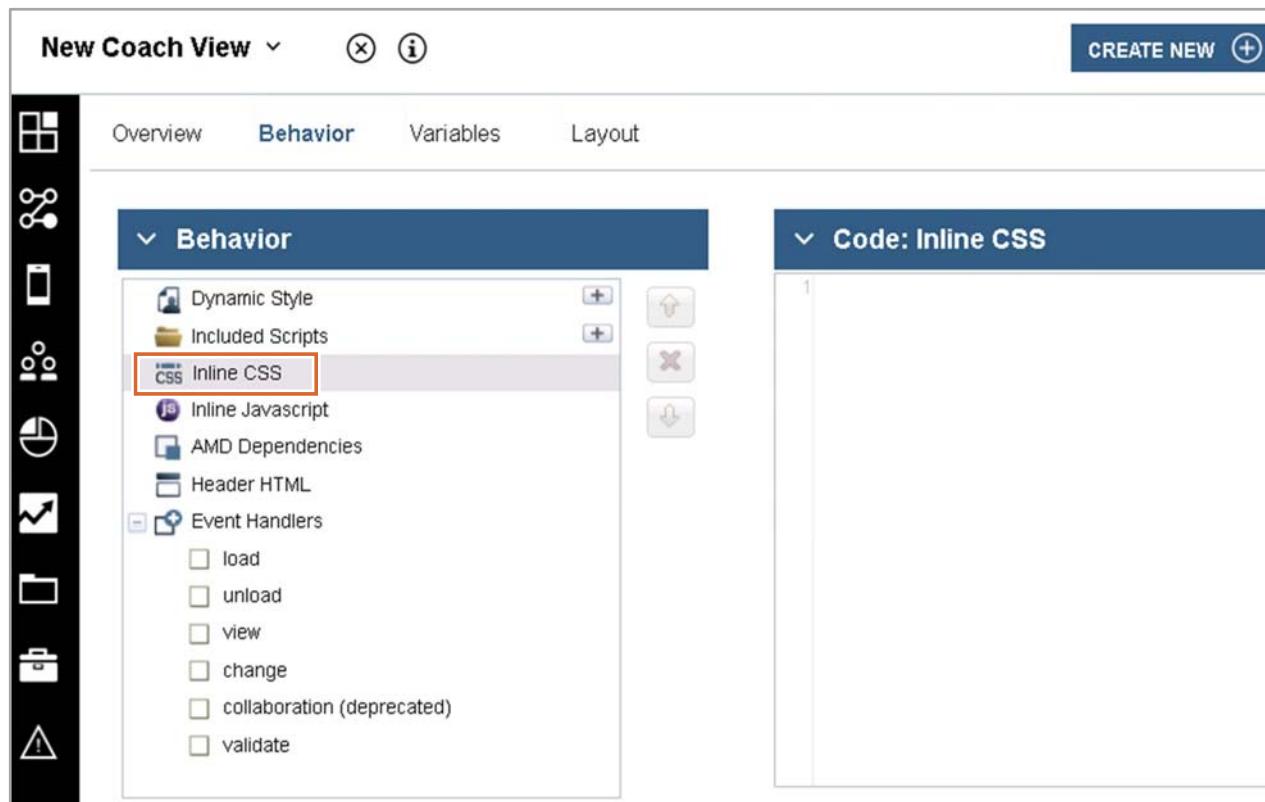
This page displays the business data binding, configuration options (which includes Ajax services), and localization resources that are available to the coach view or what the coach view uses.

- **Layout**

This page displays the coach views and controls that are contained within the coach view and their relative positions. The layout page also displays the palette, which contains items that you can add to the coach view. These items consist of coach views, which are categorized with tags, advanced items, and variables.

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## Defining coach view behavior



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Figure 10-20. Defining coach view behavior

In the Behavior section of the coach view definitions, you include reusable scripts or add inline JavaScript or CSS code to the coach view. You can also define events.

To define the behavior for the coach view in the Behavior page, you add existing script files from the library through the Included Scripts section. You add CSS code and JavaScript to the coach view definition through the Inline CSS and Inline JavaScript sections. In general, you include scripts for reusable code and the inline options for JavaScript and CSS code that is not reusable.

## Responsive Coach view (1 of 2)

- A set of controls for designing applications that can be run on multiple device types, such as mobile and desktop devices
- All the coach views in the Responsive Coaches toolkit are suitable for use on both desktop and mobile devices
- The controls in the Responsive Coaches toolkit (SYSRC) are based on the following technologies:
  - AngularJS V1.4.6
  - Bootstrap V3.3.0
  - (Angular) UI Bootstrap V0.13.4
  - Hammer.JS V2.0.4
  - Modernizr V2.7.0

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Figure 10-21. Responsive Coach view (1 of 2)

For more information about the responsive coach view, see the following IBM Knowledge Center page:

[http://www.ibm.com/support/knowledgecenter/SSFPJS\\_8.5.7/com.ibm.wbpm.ref.doc/topics/c\\_litec\\_ntrols.html?lang=en](http://www.ibm.com/support/knowledgecenter/SSFPJS_8.5.7/com.ibm.wbpm.ref.doc/topics/c_litec_ntrols.html?lang=en)

## Responsive Coach view (2 of 2)

- Avoid mixing other user interface technologies when you use Responsive Coaches controls in the same coach
- Each control consists of a coach view that points to a specific set of files:
  - An HTML file that contains the code that defines the user interface, data, and label that the control uses
  - A controller JavaScript file that loads the module and creates watchers for the configuration options of the control
  - Image files to represent the control on the palette and on the canvas
  - A preview JavaScript file that shows a preliminary view of the coach view when it is dropped on the coach editor palette
  - The control can also have other files such as a CSS file for styling or localization files, but these additional files are optional

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Figure 10-22. Responsive Coach view (2 of 2)

## 10.3. Theme support

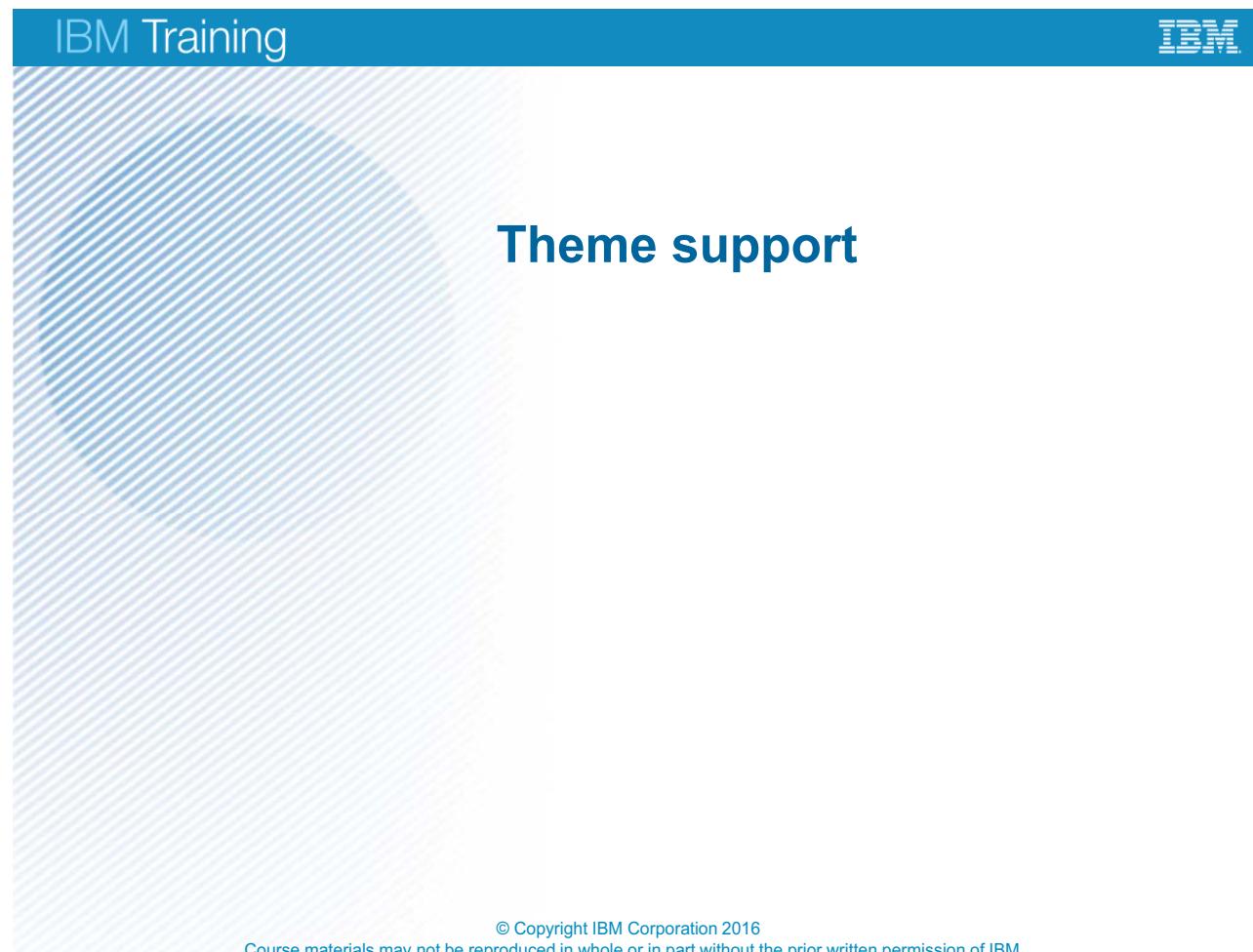


Figure 10-23. Theme support



## Create custom theme

- A theme consists of a set of theme definitions, dynamic stylesheets, and generated CSS that you can apply to a process application or toolkit
- A new process application, by default, uses the **BPM Theme**
- BPM theme contains all of the definitions that the IBM Business Process Manager responsive controls use
- Theme support is based on an open source CSS precompiler called **LESS**
- An Admin command can be used to update the appearance of a deployed process app without changing and redeploying the process app

The image contains two side-by-side screenshots of the IBM Web Process Designer interface.
 The left screenshot shows the main toolbar with icons for save, undo, redo, and other functions. Below the toolbar, there's a dropdown menu labeled "author1" and a help icon. In the center, there's a "CREATE NEW" button with a plus sign, followed by three small circular icons. The main workspace is currently empty.
 The right screenshot shows a "New" dialog box. It lists several project components: "Process", "Client-Side Human Service", "Theme" (which is highlighted with a red box), "Coach View", "Localization Resource", and "Team". The "Theme" option is clearly visible and selected.

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Figure 10-24. Create custom theme

To create a theme:

1. In the Web Process Designer, click **Create New** and select **Theme**, or in the library, click the (+) plus sign in the User Interface category and then select **Theme**.
2. In the New Theme window, type the name of the new theme.
3. Select whether you want to copy an existing theme from the current project or dependent toolkit or import a theme. After you click **Finish**, the editor opens the new theme.
4. In the theme editor, assign values to theme variables. The value can be a specific value, a formula, another variable, or a combination of these types. For example, `@bpm-neutral: #586464` defines the value to a specific color while `@bpm-link-color: @bpm-color-primary;` defines the value with the value of another variable. In the Design page, change the value for one or more variables.



## Create custom theme

- Use the BPM Theme as your starting point to create a custom theme and to use any of the responsive controls in your process application
- Extend your theme by adding custom variables and modifying the BPM variables

A screenshot of a dialog box titled "New Theme". The dialog has a light gray background with a dark gray header bar. At the top right is a small graphic of three overlapping circles in red, green, and blue. The main area contains the following elements:

- A descriptive text: "A theme sets the visual style of the coaches within a process application or toolkit. A theme can also apply to a portal in Process Portal."
- A "Name:" label followed by a text input field containing "Company Theme".
- A radio button group:
  - Copy an existing theme
  - Import a theme file
- A dropdown menu showing "BPM Theme (System Data)" with a small arrow indicating it's a dropdown.
- A "Browse..." button next to a text field showing "No file selected."
- At the bottom right are two buttons: "Finish" and "Cancel".

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Figure 10-25. Create custom theme

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## WYSIWYG Theme Editor: Create and edit theme (1 of 3)

**DESIGNER**   **INSPECTOR**

Company Theme ▾   **Edit LESS format source**   **CREATE NEW** **(+)**

Overview   **Design**   **Source**

Base Settings

@bpm-neutral-darkest	#0d1111	[Color Swatch]
@bpm-neutral-darker	#2d3737	[Color Swatch]
@bpm-neutral-dark	#3c4646	[Color Swatch]
@bpm-neutral	#586464	[Color Swatch]
@bpm-neutral-light	#6d7777	[Color Swatch]
@bpm-neutral-lighter	#c8d2d2	[Color Swatch]
@bpm-neutral-lightest	#dfe9e9	[Color Swatch]
@bpm-color-primary	#ff80ff	[Color Swatch]
@bpm-color-info	#c0e6ff	[Color Swatch]
@bpm-color-success	#c8f08f	[Color Swatch]
@bpm-color-warning	#fde876	[Color Swatch]
@bpm-color-alert	#ad1625	[Color Swatch]
@bpm-color-alert-light	#ffd2dd	[Color Swatch]
@bpm-body-bg	#a9d8d6	[Color Swatch]

**Section**

**Switch**

**Checkbox**

**Two-Button Radio**

**Radio buttons**

**Primary Button**

**Alternate Button**

**Success Button**

**Info Button**

Font family: @bpm-label-font-family  
Font size: @bpm-font-size-base  
Font weight: @bpm-label-font-weight  
Font color: @bpm-label-text-color  
Background color: @bpm-body-bg

Item 1

Instant feedback shows the effect of style changes on all Responsive Coach views that are included with the product

author1 author1

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Figure 10-26. WYSIWYG Theme Editor: Create and edit theme (1 of 3)

Many variables have a swatch that you can click and then choose a value from a picker. The example controls update to display the new values. If you hover over a control, you can see the specific variables that affect that control and its current values.



## WYSIWYG Theme Editor: Create and edit theme (2 of 3)

- Many variables also have a swatch that you can click and then choose a value directly from a picker

The screenshot shows the WYSIWYG Theme Editor interface. On the left is a sidebar with icons for Overview, Design (which is selected), and Source. Below the sidebar is a table of theme variables under 'Base Settings'. The last row in the table is highlighted with a red box. To the right of the table is a color picker dialog titled 'Color'. The dialog includes a 'Basic colors' palette, a large color preview, and a 'Custom colors' section. At the bottom of the dialog are color sliders for Hue, Sat, Green, Lum, and Blue, and buttons for OK, Cancel, and Add to Custom Colors. A callout box points to the color swatch in the table, with the text: 'Use color palette to select the preferred color'.

Variable	Value	Color Swatch
@bpm-neutral-darkest	#0d1111	
@bpm-neutral-darker	#2d3737	
@bpm-neutral-dark	#3c4646	
@bpm-neutral	#586464	
@bpm-neutral-light	#6d7777	
@bpm-neutral-lighter	#c8d2d2	
@bpm-neutral-lightest	#dfe9e9	
@bpm-color-primary	#325C80	

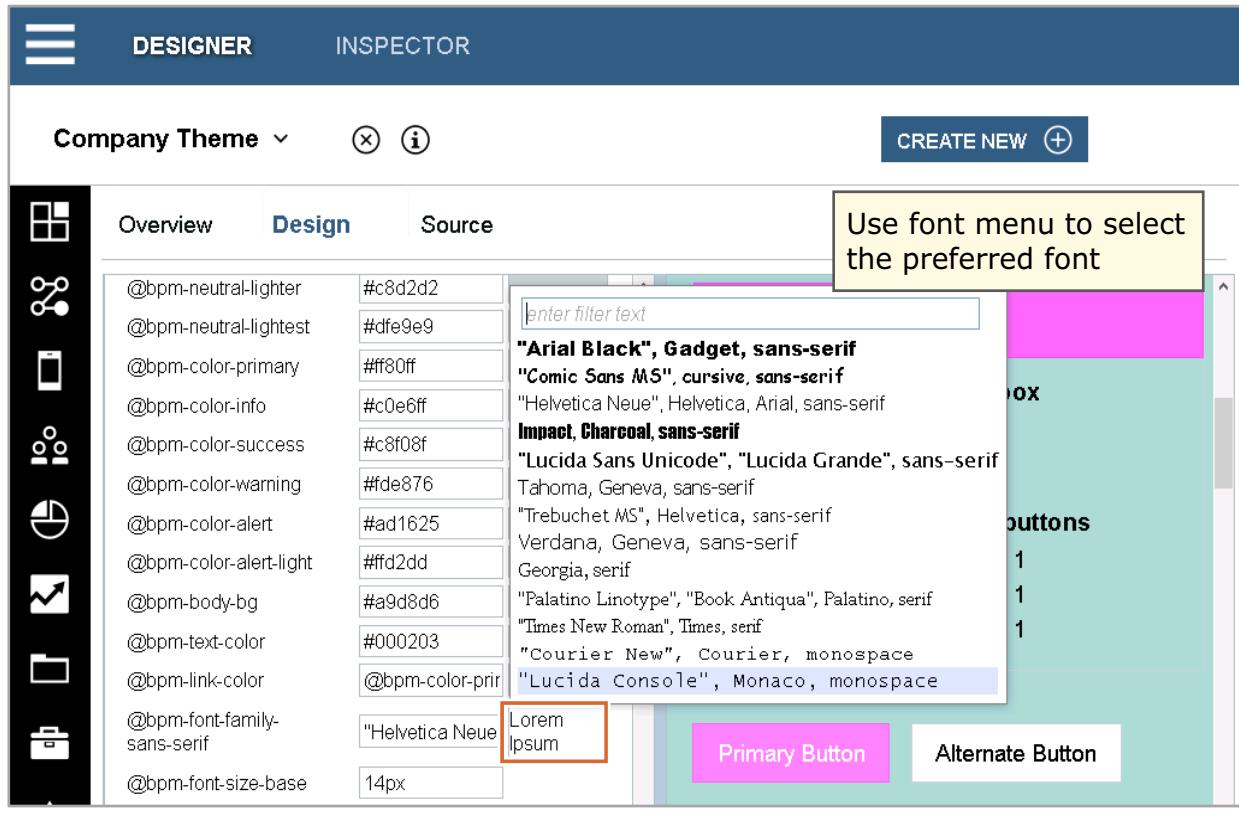
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Figure 10-27. WYSIWYG Theme Editor: Create and edit theme (2 of 3)

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## WYSIWYG Theme Editor: Create and edit theme (3 of 3)



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Figure 10-28. WYSIWYG Theme Editor: Create and edit theme (3 of 3)



## Applying custom theme to process apps

**DESIGNER**    **INSPECTOR**

**Process App Settings** ▾    Viewers: author1, ...    **CREATE NEW**

**Overview**    Environment Variables    Servers

**Process App Settings**

**Common**

Name: HR Recruitment Processes  
Documentation:   
Contains HR processes that are used for recruitment.

**Exposed Items**

The following items can be started by authorized users.

**Processes**  
The team specified in **Expose to start** can start these instances in Process Portal.  
 Hiring Request Process

**Client-Side Human Services**  
The team specified in **Expose to start** can start these instances in Client-Side Human Services.  
<none>

**Coach Designer Settings**

Theme: **Select...**

**Select Library Item**

Type: **Select Library Item**

Theme:

- BPM Theme
- Company Theme **Select...**
- My Theme

• Theme is set in Process App Settings tab of a Process App or Toolkit  
• The theme setting affects all coach views, including the coach views that come from included toolkits

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Figure 10-29. Applying custom theme to process apps

If you change back to using the BPM Theme, the same coach reverts to the default BPM Theme colors.

## Demonstration

This demonstration covers the following topics:

- Build coaches
- Create a custom theme
- Apply custom theme

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*Figure 10-30. Demonstration*

This demonstration is stored as the `demo7.mp4` file that is in the `C:\labfiles\demo` folder.

## 10.4. Validating process flow

## Validating process flow

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Figure 10-31. Validating process flow

This playback is your chance to demonstrate everything that was created thus far: process flow variables that drive decision gateways, tasks that are created and assigned to the right teams, and correct task routing. This playback also demonstrates that the process is following the correct path.

## Expose a process to a team

- Create an instance of the process before you demonstrate it
- Create an instance of a process application to a team (All Users) by using **Expose to start**
  - Click the Overview Tab on the Process App
  - For **Expose to start**, choose a team

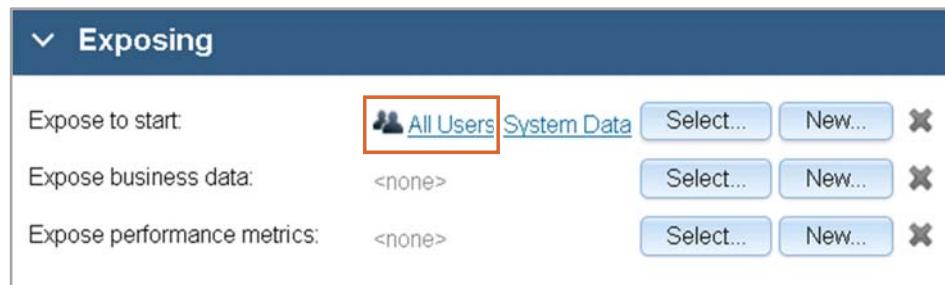


Figure 10-32. Expose a process to a team

Before developers demonstrate the process, they create an instance of the process. This task is accomplished when they expose the process application to a team. A developer verifies the exposure settings on the Process App Settings Overview page. This menu has other functions that pertain to process applications and the processes and services that are contained within.

- Go to the **Overview** tab of the process, and next to the **Expose to start** option, click **Select** to select a team that has access to start this process.
- The quickest way to demonstrate the process is to expose the process to the **All Users** team so any participant with a valid account can start the process.

## Demonstration

This demonstration covers the following topics:

- Create a toolkit
- Add dependency to the toolkit

Playback 1: Enhancing coaches

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*Figure 10-33. Demonstration*

This demonstration is stored as the `demo4.mp4` file that is in the `C:\labfiles\demo` folder.

## Unit summary

- Create tabs on a coach
- Enhance coaches and apply a theme
- Create a coach view
- Validate process flow

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Figure 10-34. Unit summary

## Review questions

1. Coaches consist of what three things?
2. A new process application, by default, uses the \_\_\_\_\_ Theme.
3. Theme support is based on open source CSS precompiler called \_\_\_\_\_.
4. True or False: A deployed process app can get an updated appearance without changing and redeploying the process app.

Playback 1: Enhancing coaches

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Figure 10-35. Review questions

Write your answers here:

- 1.
- 2.
- 3.
- 4.

## Review answers

1. HTML, JavaScript, and CSS
2. BPM
3. LESS
4. True

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*Figure 10-36. Review answers*

## Exercise 7

- Playback 1: User interface design and implementation

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Figure 10-37. Exercise 7

Complete Exercise 7, Playback 1: User interface design and implementation, in the exercise guide.

## Exercise objectives

After completing this exercise, you should be able to:

- Create tabs on a coach
- Change the appearance of a coach by applying a custom theme
- Change the coach layout for a mobile format

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*Figure 10-38. Exercise objectives*

## Exercise 8

Playback 1: Conducting the Playback session

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Figure 10-39. Exercise 8

Complete Exercise 8, Playback 1: Conducting the playback session, in the exercise guide.

## Exercise objectives

After completing this exercise, you should be able to:

- Log on to the Process Portal
- Create an instance of a process
- Demonstrate that the process follows the various paths modeled
- Create a toolkit
- Create a dependency on a toolkit

Playback 1: Enhancing coaches

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*Figure 10-40. Exercise objectives*

---

# Unit 11. Playback 2: Integrations

## Estimated time

02:00

## Overview

This unit covers how to create a decision service, implement message events, apply asset tagging, and access and manipulate external data. You learn about exposed process variables (EPVs) and environment variables (ENVs).

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Explain how to create a decision service
- Create a message start event
- Create an enabling service
- Describe how to create and configure an undercover agent (UCA)
- Describe how to start a process with a message start event
- Organize assets with favorites, tagging, and smart folders
- Define the basic function of an integration service
- Identify the components of the IBM Business Process Manager integration architecture
- Describe how integration components interact with services
- Configure and define integration services for outbound integration
- Describe the differences between an environment variable and an exposed process variable

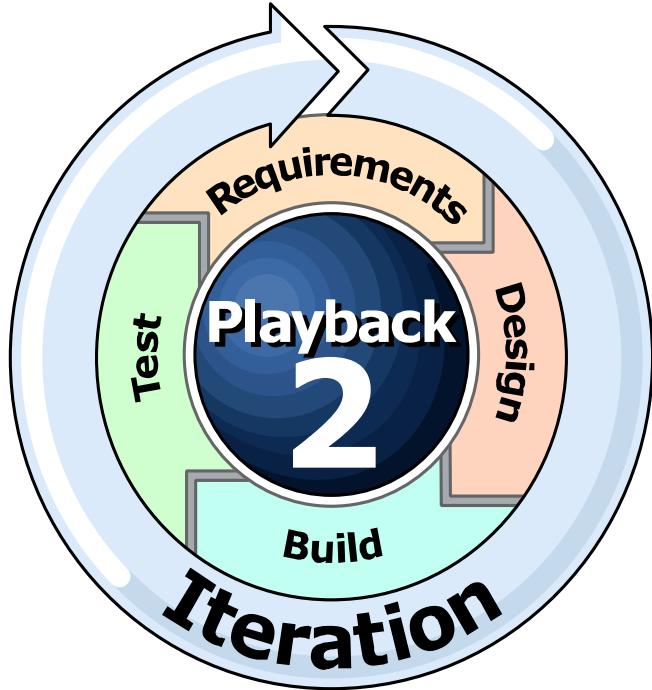
Playback 2: Integrations

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Figure 11-1. Unit objectives

## Playback 2: Integrations

- The goal is to demonstrate “real data, real time”
- Show the business rule logic and show tasks that are being created as a result of the decision service
- Demonstrate message events in the process that affect process flow
- Implement the integrations that are created in Playback 1: Building coaches to enable coach functions



[Playback 2: Integrations](#)

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Figure 11-2. *Playback 2: Integrations*

The goal is to demonstrate “real data, real time.” Log on to the process portal and demonstrate any integrations that your process depends on. Show the business rule logic and show tasks that are being created as a result of the decision service. Demonstrate message events in the process that affect process flow. Some of the integrations that are created in previous playbacks enable coach functions. Those integrations are demonstrated in the next playback.

When this development phase is complete, some external services for this playback might be incomplete. Continue to use mock data services to enable your processes and services, but focus the playback presentation on those integration endpoint services that are still not available. All artifacts to enable the integration are already created in the library, and a quick switch of flow is all that is necessary when the new integration is enabled.

## Topics

- Creating a decision service
- Implementing message events
- Applying asset tagging
- Accessing and manipulating external data
- Exposed process variables (EPVs) and environment variables (ENVs)

Playback 2: Integrations

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Figure 11-3. Topics

## Key concepts in this unit

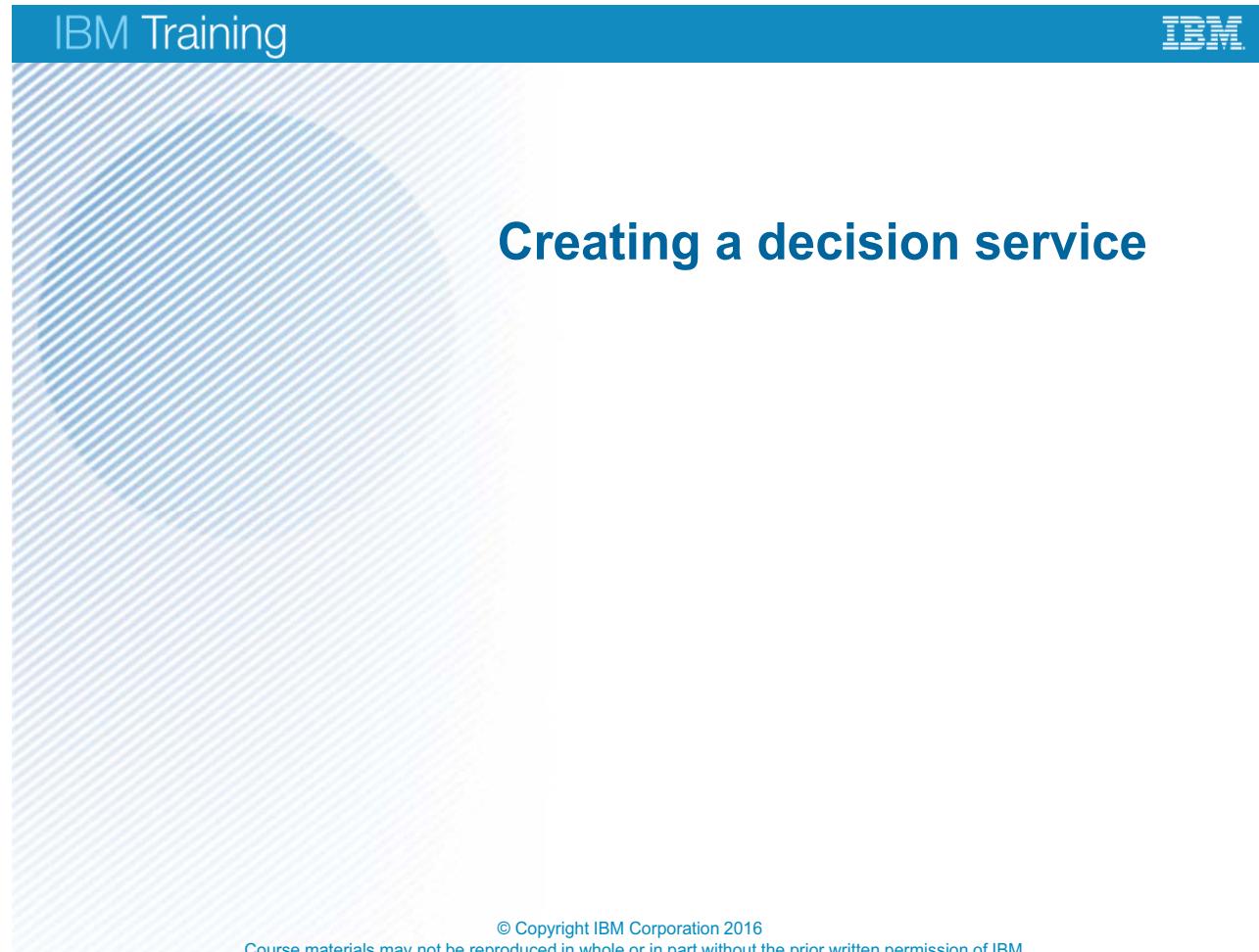
- **Playback 2: Integration:** To demonstrate “real data, real time”
- **Decision service:** Specify a decision or condition in a business rule to determine which process implementation is started
- **Message event:** A listener that the incoming message triggers, and it runs a task or set of tasks
- **Undercover agent:** An interface to accept incoming messages that triggers and runs a task or set of tasks
- **Exposed process variable (EPV):** Allows business users to modify the value of a variable

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Figure 11-4. Key concepts in this unit

## 11.1. Creating a decision service



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Figure 11-5. Creating a decision service

Developers build a decision service when they want a decision or condition in a business rule to determine which process implementation is started. For example, when a certain condition evaluates to true, IBM Process Designer implements the associated activity or action.

IBM Process Designer supports business analysts and business users who create business rule authoring tasks, who are rule designers rather than programmers. Business rule designers can express business logic with rule syntax that resembles natural human language. This rule syntax is called **Business Action Language (BAL)**, which is a declarative language that relates business concepts to business data and actions.

Business rules are an expression of business policy in a form that business users can understand and a rules engine can interpret. Business rules formalize a business policy into a series of if-then statements.

## Building a decision service (1 of 2)

- Business rules are included in a process by adding a decision service to the process
- Add a decision service to a process application when the actions that should take place in your process depend upon one or more conditions
- Build your rule hierarchy so that rule conditions are ordered from most complex to least complex
- Create a final condition that is a catch-all rule
  - This rule is necessary if you cannot verify that the variable you want to modify in the rule is going to be set before running the process that triggers the decision service
- Consider encapsulating your rules in a single-function decision service
  - Encapsulating your rules makes the service available to any other part of the process application that needs the same rule logic

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Figure 11-6. Building a decision service (1 of 2)

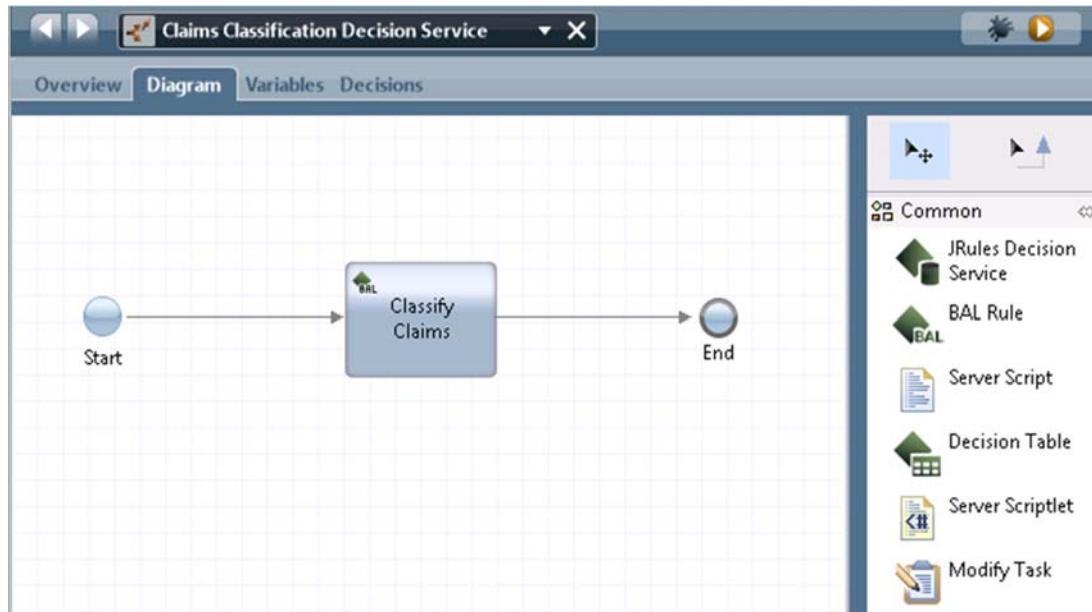
Business rules are included in a process by adding a decision service to the business process definition. Add a decision service to a process application when the actions that take place in the process depend upon one or more conditions. For example, if an employee holds the position of director and submits a meal expense for more than \$250, then a rule is created and a variable is set in the rule. A rule such as `approvalRequired` routes the process sequence flow into a specific approval activity.

When building a decision service, follow these guidelines:

- Build the rule hierarchy so that the rule conditions are ordered from most complex to least complex.
- Create a final condition that is a catch-all rule. This rule is necessary if the team cannot verify that the variable that they want to modify in the rule is set before running the process that triggers the decision service.
- Consider encapsulating the rules in a single-function decision service that allows the service to be available to any other part of the process application that needs the same rule logic.



## Building a decision service (2 of 2)



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Figure 11-7. Building a decision service (2 of 2)

In the library pane, click the (+) plus sign next to the Decisions category in the library to create a decision service. A decision service contains one or more components. Components have three types:

- **BAL Rule:** Use the rule editor in this component to author business rules with Business Action Language (BAL), a natural language technology.
- **JRules Decision Service:** IBM Business Process Manager integrates the IBM Operational Decision Manager with the JRules Decision Service component. You can use this rule component to connect to and implement rule applications that are available on a JRules Rule Execution Server.
- **Decision Table:** The Decision Table component contains a rule table. Each row in the rule table represents a Boolean condition that evaluates to true or false at run time. When a rule evaluates to true, the JavaScript expression that you provide as the rule action is run.

## Adding a BAL rule

- The Business Action Language (BAL) rule component:
  - Provides a rule editor that allows rule designers to author business rules with natural language technology
  - Requires no programming expertise to create business rules
  - Is easier for people to read and understand



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Figure 11-8. Adding a BAL rule

The Business Action Language (BAL) rule component provides a rule editor that allows rule designers to author business rules with natural language technology. Using natural language instead of JavaScript to author rules means that no programming expertise is required to create business rules, and the rules are easier for people to read and understand.

Create the service with the necessary input, private, and output variables. The Decisions tab at the top is where the author creates the rule with the service variables.

Add rules with the (+) plus sign at the top of the screen, and remove rules with the X next to the condition to delete. Move the rules up and down with the arrows to the right of the corresponding rule.



## Building a BAL rule

The parts must be defined in the following order:

1. Definitions (optional)
2. If
3. Then
4. Else (optional)



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Figure 11-9. Building a BAL rule

The developer uses the BAL rule editor to build rules, add rule parts, statements, and fragments, and replace placeholders with variables and values. Use the completion menu in the editor to insert or edit constants, values, parts, or fragments of rule statements. While creating or editing rules, the editor highlights errors to help you identify and resolve problems in the rules.

A business rule is composed of some or all of the following parts. The parts must be defined in the following order:

1. Definitions part (optional)
2. If part
3. Then part
4. Else part (optional)

Use the **Content Assist** box whenever possible. It provides a developer multiple options to choose from to build the rules. If developers get stuck, they press Ctrl+Space to open the menu and read through the suggestions and the descriptions of the options available.

## 11.2. Implementing message events

## Implementing message events

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Figure 11-10. Implementing message events

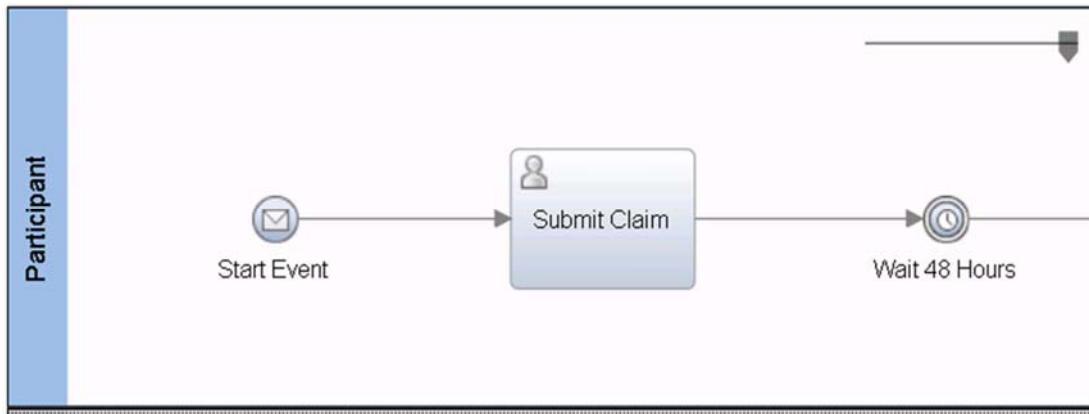
Events can occur at all points of a business process, and they affect the business process flow. Thus, a major part of implementing business processes is knowing how to handle and react to a dynamic event like a message event. These dynamic message events are internal or external to the process. IBM Business Process Manager provides two components, message events and undercover agents (UCAs), to model and complete these dynamic interactions at run time. The result is that a process application has an interface to accept incoming messages (undercover agents) and a listener (message event) that the incoming message triggers to run a task or set of tasks.

In Business Process Model and Notation (BPMN), a message generally signifies any signal from outside the process. Like all intermediate events, the message intermediate event can be used in a sequence flow or attached to an activity.

UCAs and messaging are topics that take time to understand. This topic is intended to introduce you to messaging. To obtain a deeper understanding of messaging, consider taking the *Implementing with IBM Business Process Manager Level II* course.

## Message event introduction

- Would a timer event similar to the Wait 48 hours event that is shown here, create instances of a process?
- How do you create instances of a process on a regular timed interval?



[Playback 2: Integrations](#)

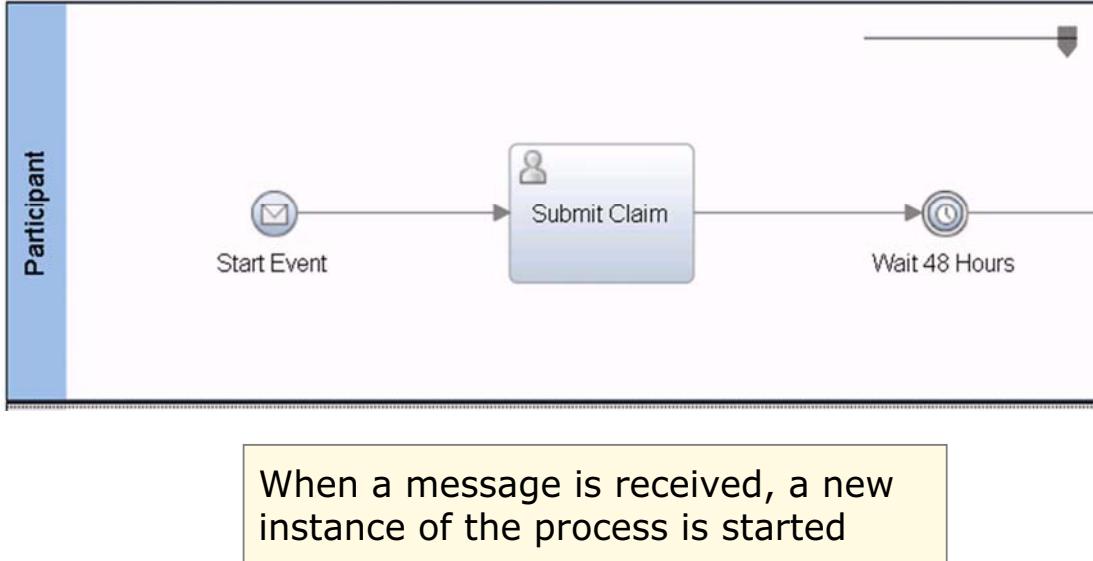
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Figure 11-11. Message event introduction

The project team already implemented a timer event, but what happens if a certain process requires creation of instances on a regular time interval? Because a timer event cannot create instances (it is an intermediate event, not a start event), they must look to another solution. That need can be met with a start message event and a time-elapsed undercover agent (UCA).

In this example, a participant (a manager) is required to submit a monthly claim for the group expenses. The system generates a generic claim shell for the manager to complete, and the manager must complete the claim before it is submitted. Developers cannot use the intermediate timer event to create instances, so they must turn to the time-elapsed undercover agent.

## Message start events



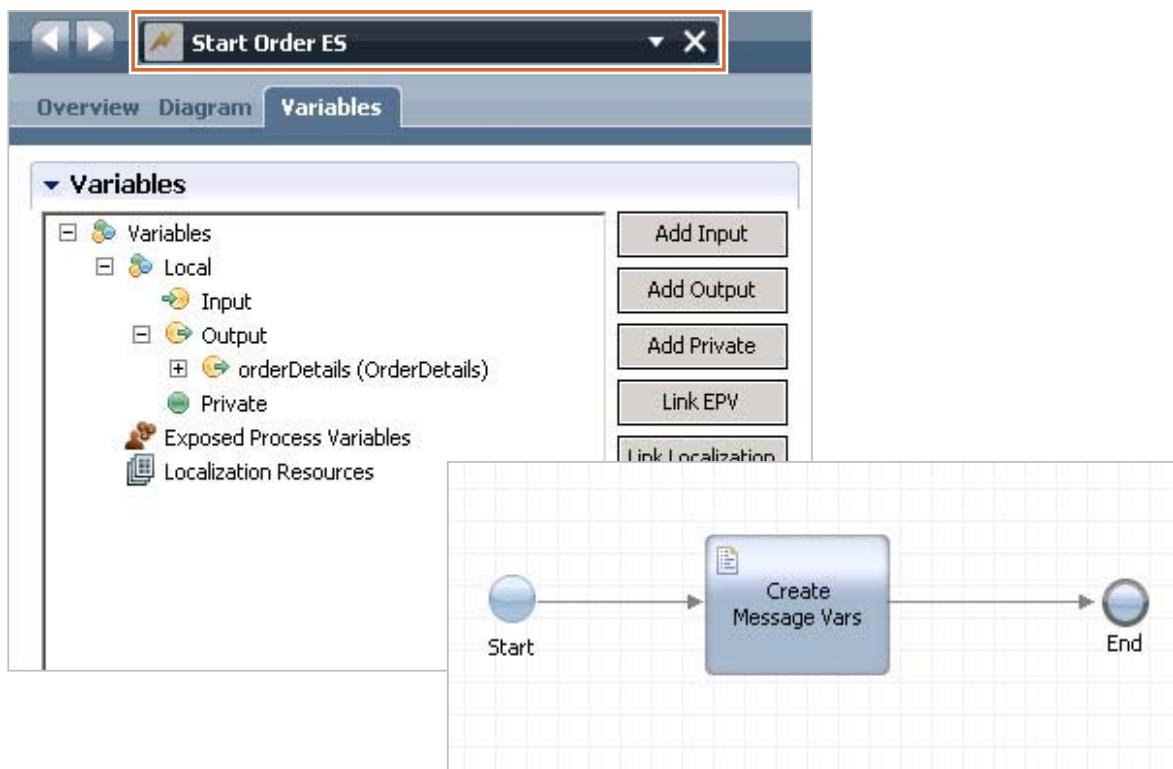
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Figure 11-12. Message start events

When a message start event receives a message (specifying that an incoming message is to start a process at run time), an instance of the business process definition is created. A unique process instance ID is assigned to it. The message start event functions the same as a regular start event, but a user does not create the process instance through the Process Portal. A message event creates the instance.

## Creating an enabling service



Playback 2: Integrations

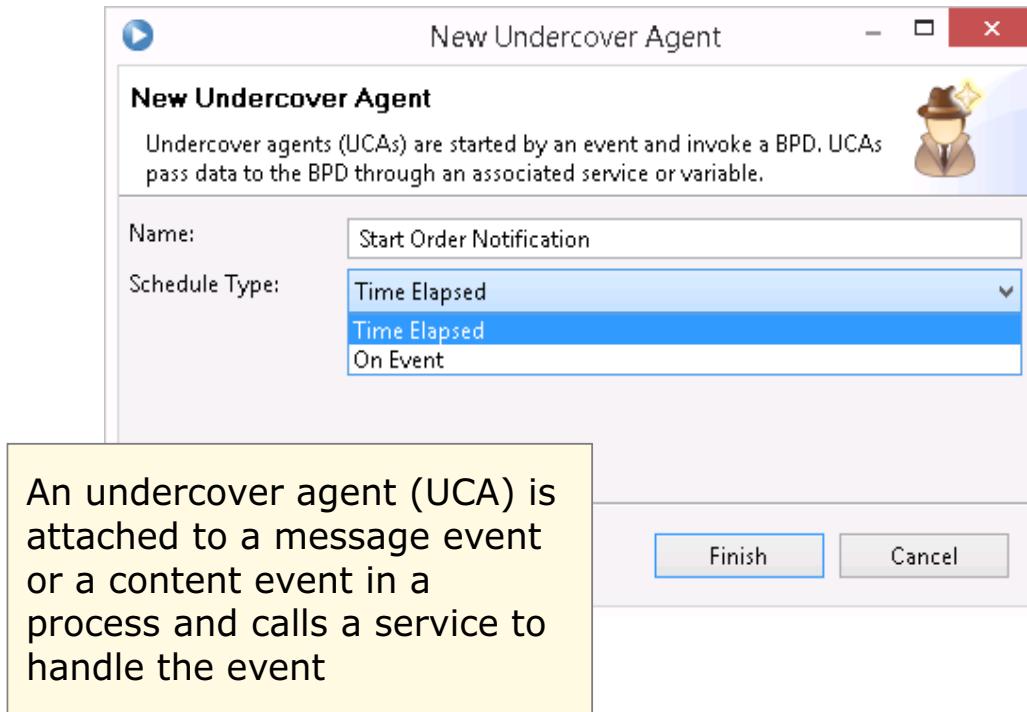
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Figure 11-13. Creating an enabling service

To implement a start message event, the first step is to create an enabling service. This service is a simple generic system service; but to distinguish the enabling service from other generic services, add an `ES` suffix to the name. If variables are required for the process, this service must create the output variables. The output of the enabling service defines what data is sent as part of the message payload. Outputs of the enabling service are optional. Also, a coach cannot be part of the enabling service.

For this example, you created an output that is called `orderDetails` of type `OrderDetails`, and you created the data with a server script inside the enabling service. After you create the enabling service, use it when you create the undercover agent.

## Creating an undercover agent (UCA)



[Playback 2: Integrations](#)

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Figure 11-14. Creating an undercover agent (UCA)

The next step is to create the UCA. The schedule type has two settings: Time Elapsed and On Event. Select the **Time Elapsed** option to create instances of a process on a set schedule. Click **Finish** to complete the creation of the UCA.

- **On Event:** Invokes a particular service as the result of an incoming or an outgoing message event
- **Time Elapsed:** Invokes a service as the result of a message event that occurs on a regular schedule

An undercover agent is started as a result of an event. For example, when a message event is received from an external system, an undercover agent is needed to start the appropriate service in response to the message. When an undercover agent runs, it starts an IBM Business Process Manager service or a process in response to the event. When you include a message event or a content event in a process, you must attach an undercover agent to the event. For example, when a message event is received from an external system, an undercover agent is needed to trigger the message event in the process in response to the message.

More in-depth coverage of the **On Event** UCA is included in the *Implementing with IBM Business Process Manager Level II* course.



## Configuring a time elapsed undercover agent (UCA)

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Figure 11-15. Configuring a time elapsed undercover agent (UCA)

When the UCA artifact is created, the team sees the undercover agent settings in the UCA interface:

1. The team uses the **Details** section to select the attached enabling service that was created in the last step.
2. The attached service is listed, and the output variables of the enabling service are listed in the **Parameters Mapping** section as an output of the UCA. The output data of the UCA is sent as part of the message payload.
3. At the bottom of the settings interface, developers create the time schedule that the UCA fires in the **Time Schedule** section. When the **Enabled** check box is selected in the **Details** section, the UCA is now active and is following the time schedule.

When the UCA fires, the enabling service runs, and the output of the enabling service is passed as part of the message payload. Any message events that are listening to this UCA then react to the message.

Time elapsed UCAs are also run on demand by clicking **Run now**.



## Implementing message start events

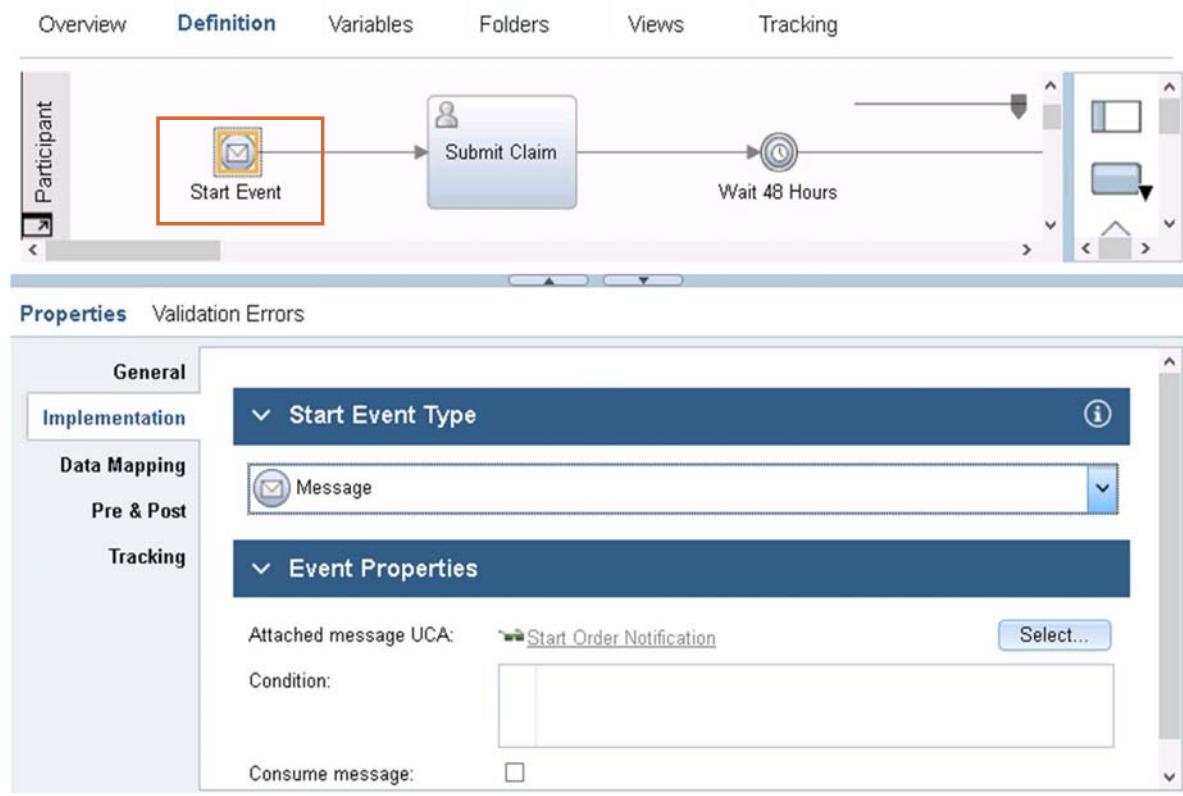


Figure 11-16. Implementing message start events

The final step is to implement the start event on a process.

When implementing message start events, the following configuration settings are configured for the start message event to work properly:

- **Attached UCA**

Undercover agents (UCA) are used to send and receive messages.

- **Condition**

Occasionally, developers must set conditions on the processing of incoming messages. If the condition that the developers specify evaluates to true, the message is accepted and processing continues; otherwise, it is stopped. Because the message condition is evaluated before the message values can be passed to the input variables of the process definition, the message values are passed to the condition in a special namespace, `tw.message`. If the message condition evaluates to true, the values are passed from the `tw.message` namespace to the process input variables.

- **Consume message**

Developers configure message events to consume messages. If they do, when a message is delivered to a running process, the message consumes the first message event in the process

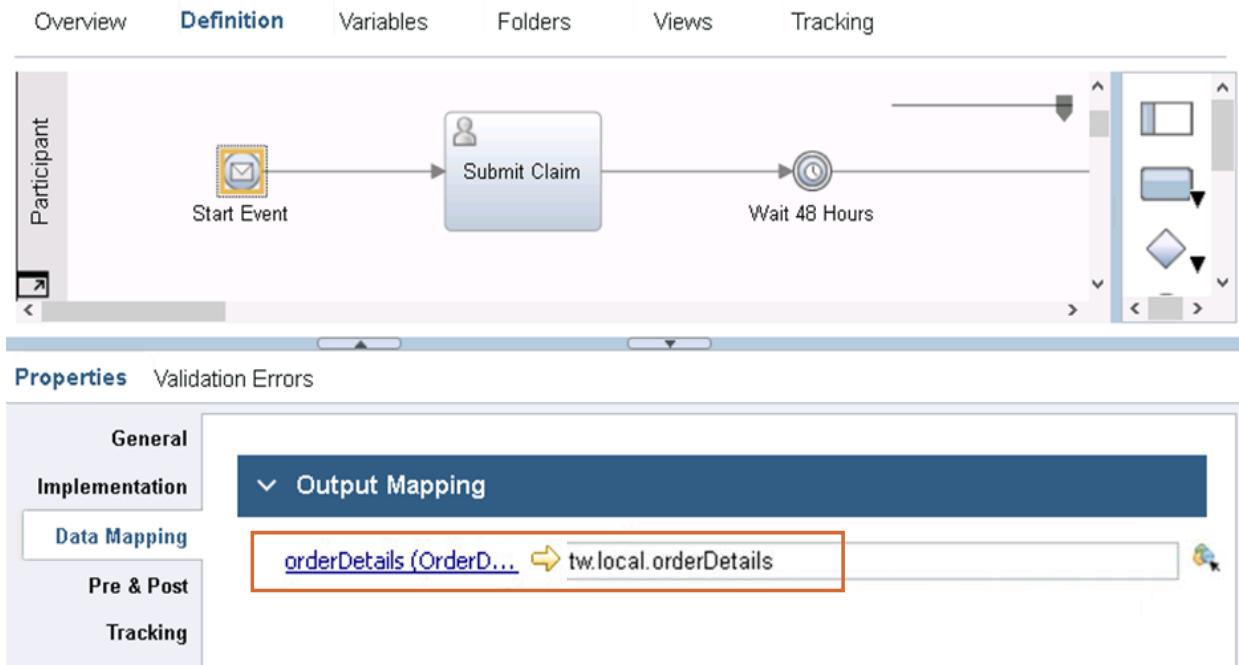
that can accept it. The UCA that is attached to the message event determines the consumption. When a message is consumed, the message cannot be processed again if the execution of the process instance loops back and reaches the same message event listener or listeners. If a new instance of the message is delivered to the process instance, this message is available for consumption again, and the message event accepts it.

- **Durable subscription**

With durable subscription, an incoming message can be delivered to the message event when the token reaches the message event in the future. This option is not available for message start events.

# IBM Training

## Mapping message start event variables



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Figure 11-17. Mapping message start event variables

The final step is to map the outputs of the start message event to the variables in the process. Again, the variables that come from the start event are defined as outputs in the enabling service as part of the UCA message.

## 11.3. Accessing and manipulating external data

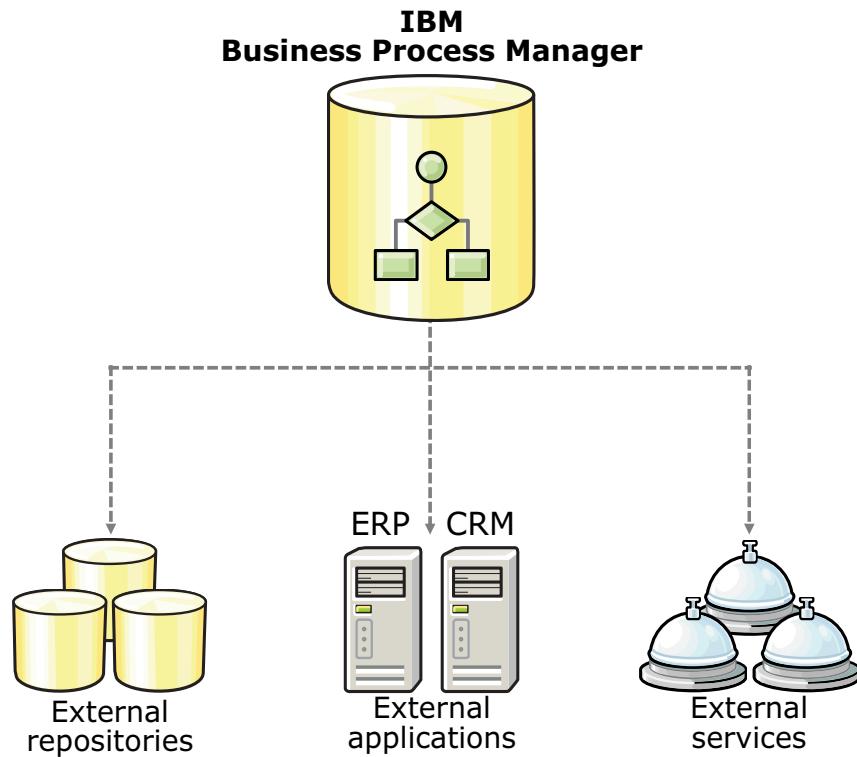
## Accessing and manipulating external data

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Figure 11-18. Accessing and manipulating external data

A major concern of any enterprise system is its integration capability with other systems. For example, the project team wants users to choose from a list of products available from a web service. Focus on integrating with other systems in this playback. When the team wants to integrate, use an integration service. Integration services are in the library in the Implementation category. The integration framework allows interaction with existing applications, Enterprise Content Managers, ERPs, CRMs, web services, and external data sources with a number of protocols.

## Integrating with other systems



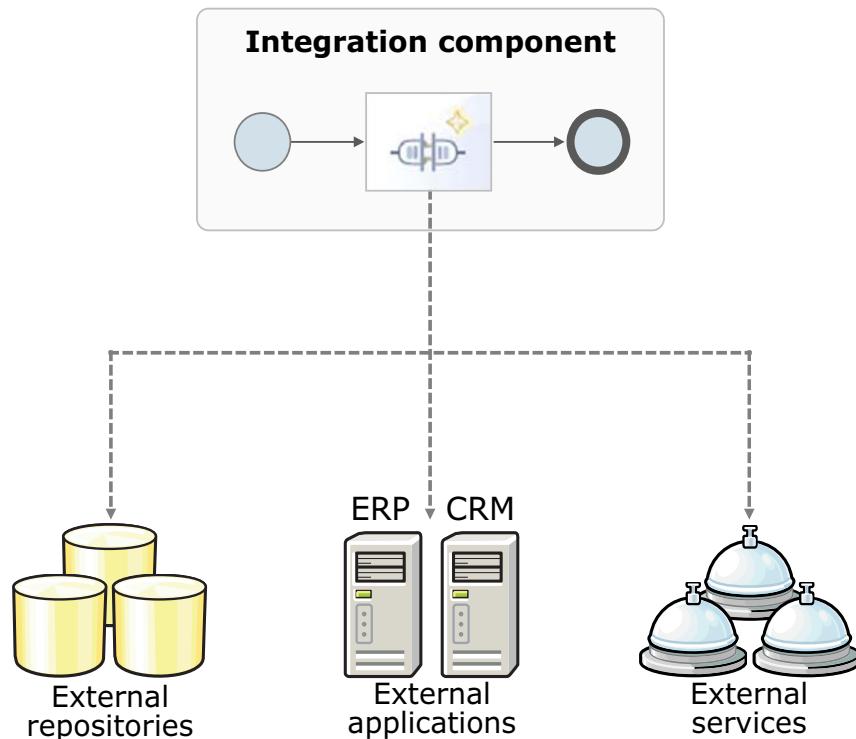
Playback 2: Integrations

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Figure 11-19. Integrating with other systems

When integrating with other systems, consider the fact that IBM Business Process Manager supports outbound and inbound integration. When communicating with an outside system like an enterprise resource planning (ERP) or customer relationship management (CRM) system to retrieve, update, or insert data, it is known as an outbound integration.

## Integration services



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Figure 11-20. Integration services

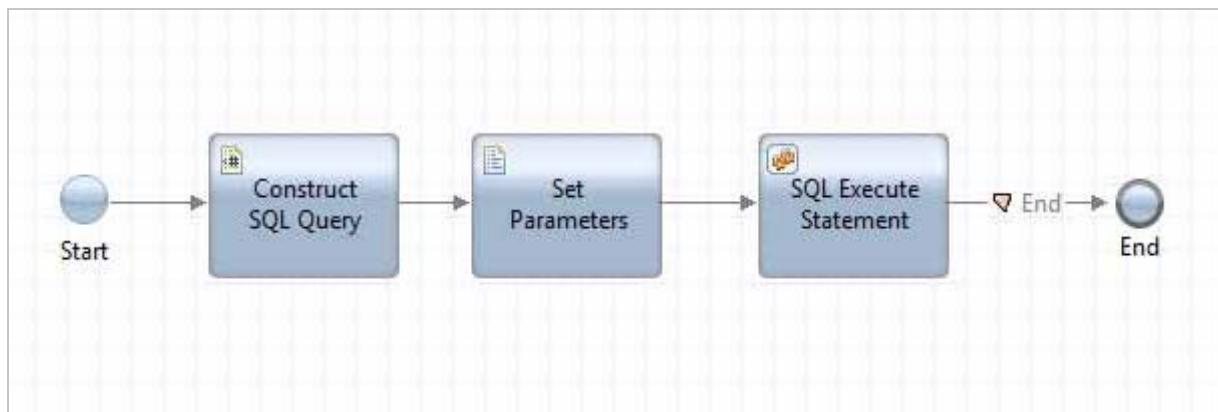
Most outbound integrations involve calling out to data sources and web services. In considering what type of integration component to build, think about the available integration methods and protocols:

- Web service integrations tend to be easy to build and are useful, especially when you are not passing volumes of information.
- Java integrations are robust because they are built in Java, and sometimes you can find existing Java connections to existing systems.

When you message other systems, you do so with an integration service and a Java or web service integration component. The integration components handle the lowest level of communication to the outside application or data source.

## Using integration service components

- An integration service calls the web service or Java integration component, which in turn calls the external application
- The integration service output data (usually XML) comes from the integration component, not the raw external application output data



[Playback 2: Integrations](#)

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Figure 11-21. Using integration service components

You can add an integration service to multiple general system services, or even use it in the same service more than one time to produce different data from different sources.

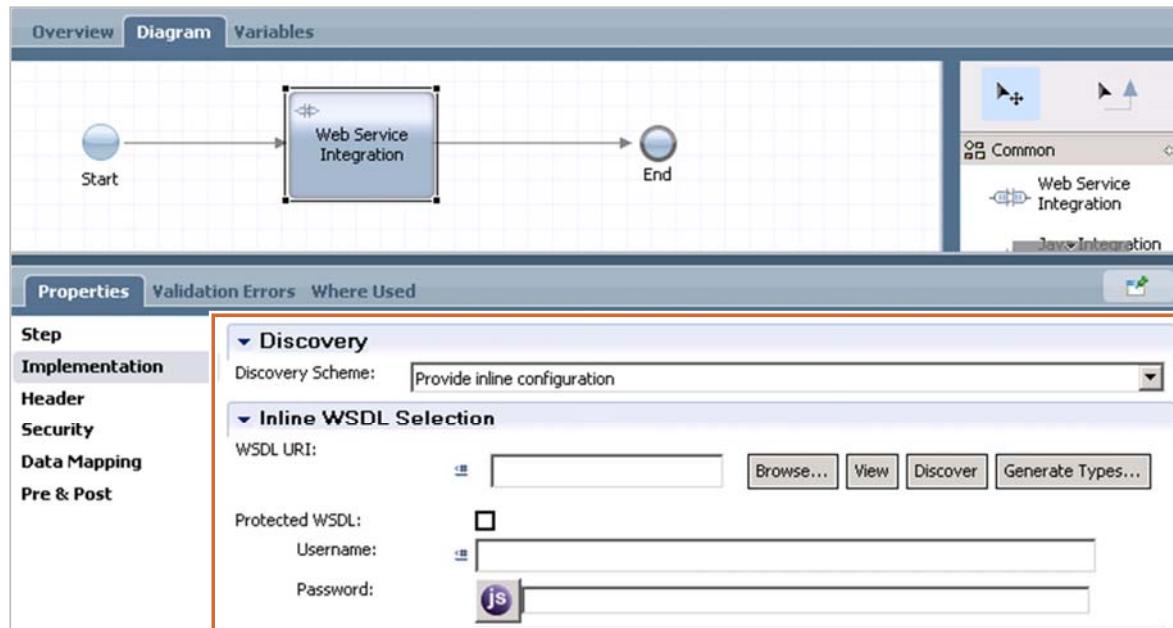
When you run an integration service at run time, it calls the web service or Java integration component, which in turn calls the external application.

The integration service does not show the output from the external application. It shows the output from the integration component. That output is usually XML.

Do not load large results all at one time. Instead, break up those activities into chunks (IBM Business Process Manager loads the entire query result into memory). You can also use one of the other query methods that allow for a cursor-style database interaction. For some use cases, it makes sense. Make sure that you use appropriate indexing.

## Integration component for a web service

- The web service integration component is an implementation of SOAP
- It discovers the ports and parameters from the WSDL document



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Figure 11-22. Integration component for a web service

This integration component is built with the Apache Axis Web Service Client framework, which is an implementation of SOAP. Outbound web service integration components use the SOAP connection to message web services by discovering the ports and parameters from the WSDL document.

The outbound web service integration component hides the complexity of the underlying WSDL, SOAP request, and SOAP response. It also converts the inputs into the appropriate XML and the outputs into the appropriate variables.

When designing the data to pass in and out with web services, avoid circular references in data structures. They do not map correctly to the WSDL that is necessary to define the web service.



## Web services

- Create an inbound web service to provide a way for an external system or application to call into IBM Business Process Manager

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Figure 11-23. Web services

A web service (inbound) provides a way for an external system or application to call into IBM Business Process Manager. The method for accomplishing this integration is to create and publish a web service endpoint so that external applications can initiate a particular IBM Business Process Manager service or set of services. The service starts the operation on the endpoint. By starting a SOAP call, external applications can call the web service.

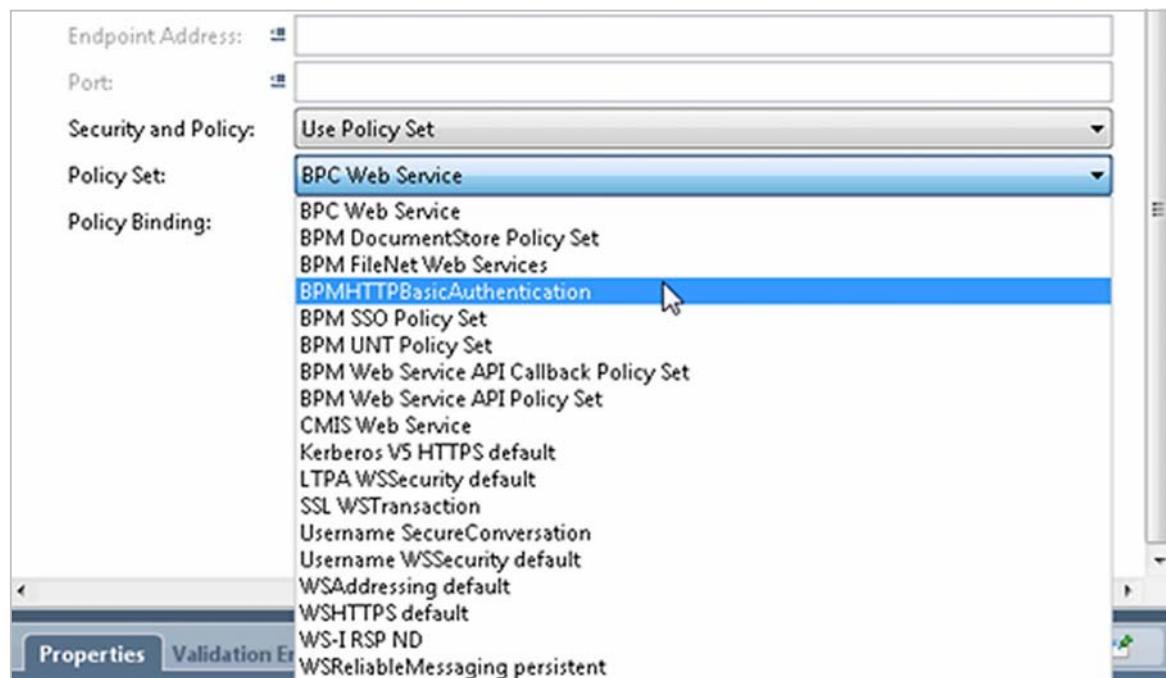
All operations that are exposed on a web service are exposed as request/response operations. Even an operation that is bound to a service that has no outputs is exposed as a request/response operation with no output. One-way operations are not supported.

In the Behavior section, the web service provides the WSDL URI. The **Protected** check box adds user name and password security to an operation in the web service. The Target namespace scheme menu list provides options for setting the target namespace.

The Security and Policy section allows developers to configure a policy set and a policy binding with the web service. A system administrator configures the server before completion of an integration.

## Policy set support for web services

- In the Security and Policy section of the Server Locations heading in the Server Details



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Figure 11-24. Policy set support for web services

In IBM Business Process Manager, the Security and Policy determine the type of security that developers use for the web service. In terms of the **Use Policy Set**, this selection means that a policy set is used to define the configuration and security requirements for the web service.

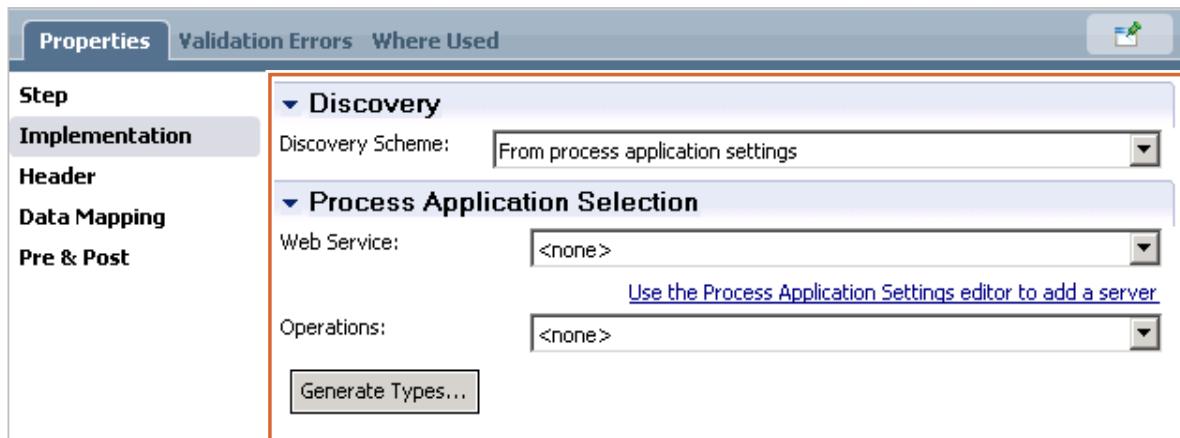
When the **Use Policy Set** is selected, developers select the actual **Policy Set**. Policy Set specifies the name of the application policy set. Developers click **Select** to choose the policy set. The list that they see depends on the policies available on the server. Some default application policy sets include: `WSHTTPS default`, `WSAddressing default`, and `Username WSSecurity default`. Developers can also create extra application policy sets in the WebSphere Application Server administrative console. Clearing a policy set also removes the policy binding.

The next selection is the **Policy Binding**. The **Policy Binding** specifies the name of the general client policy set binding, which contains system-specific configuration parameters like user name and password information. Developers click **Select** to choose the policy binding. The list that they see depends on the policy set bindings available on the server. Default policy set bindings include `client sample` and `client sample V2`. Developers also create extra policy set bindings in the WebSphere Application Server administrative console. Clearing removes the policy binding.



## Simple configuration of inbound web service details

- Developers specify environment-specific information in the Process App settings (Server tab)
- These server settings are treated as environment variables
- In IBM BPM, web services configuration becomes part of the server settings



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Figure 11-25. Simple configuration of inbound web service details

Developers specify server-specific information in the Process Application settings. These server settings are treated as environment variables. More detail on environment variables is covered later in this unit. When all the server details are defined, developers can select the process application settings in the **Discovery** section of the web service integration component implementation. By selecting **From process application settings**, they choose the web service that is defined for the server and the operations and security settings.

## SOAP header support for inbound and outbound web services

SOAP headers are supported through:

- SOAPHeaders and SOAPHeader presupplied types
- JavaScript variables:
  - `tw.system.header.soap.request` (inbound SOAP request)
  - `tw.system.header.soap.response` (outbound SOAP response)
- System automatic usage of JavaScript variables:
  - Setting of inbound request and outbound response variables
  - Reading of inbound response and outbound request variables

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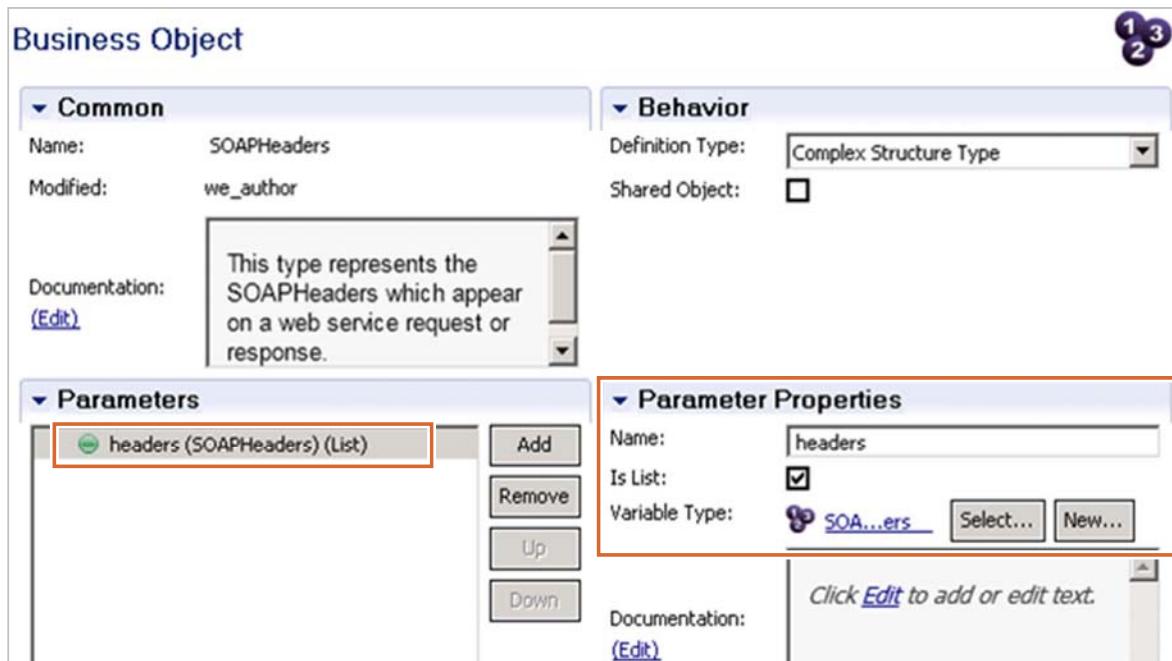
Figure 11-26. SOAP header support for inbound and outbound web services

In IBM Business Process Manager, the Process Designer supports setting SOAP headers in an outbound web services call and allows passing in SOAP headers through inbound web services. IBM Business Process Manager provides SOAP header support through three mediums:

- Presupplied SOAPHeaders and SOAPHeader types
- JavaScript variables:
  - `tw.system.header.soap.request` (inbound SOAP request)
  - `tw.system.header.soap.response` (outbound SOAP response)
- System automatic usage of JavaScript variables:
  - Setting of inbound request and outbound response variables
  - Reading of inbound response and outbound request variables

## SOAP header variable types in the system toolkit

- SOAPHeaders and SOAPHeader types that the system toolkit supplies



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Figure 11-27. SOAP header variable types in the system toolkit

SOAP headers are used to communicate application-specific context information within SOAP request and response messages. This context information can be anything that developers must send along with the web service operation parameters. An implicit SOAP header is one that is not defined in the web service WSDL document. As part of the outbound web service integrations, developers add implicit SOAP headers to the web service request messages and retrieve SOAP headers from response messages. IBM Business Process Manager provides both `SOAPHeaders` and `SOAPHeader` variable types in the system toolkit.



## Java integration component

The screenshot shows a process editor interface. At the top, there are tabs: Overview, Diagram, and Variables. The Diagram tab is selected. Below the tabs is a process flow diagram on a grid. It starts with a blue circle labeled "Start", followed by a rectangular step labeled "Java Integration" with a small gear icon above it, and ends with a blue circle labeled "End". Arrows connect the "Start" node to the "Java Integration" step and the "Java Integration" step to the "End" node.

- Quick integration with most third-party Java APIs
- Add your own custom-built JAR files either directly in the process application or with a toolkit

**Properties**   **Validation Errors**   **Where Used**

Step	Discovery
<b>Definition</b>	Java Class: <a href="#">org.totalBeginner.tutorial.Book</a>
<b>Data Mapping</b>	Method: <code>String getAuthor()</code>
<b>Pre &amp; Post</b>	Translate JavaBeans: <input type="checkbox"/>

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Figure 11-28. Java integration component

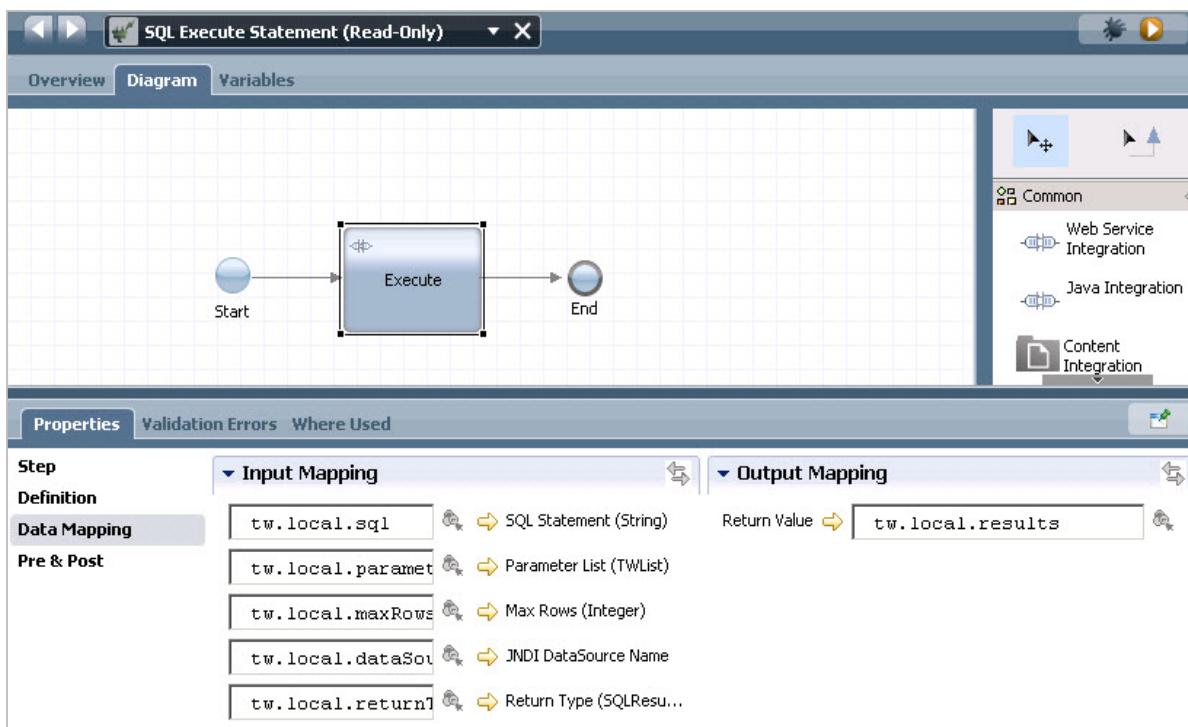
As the name implies, the Java integration component allows quick integration with any Java API by calling a class method with reflection. This extensible integration framework can interface with most third-party Java APIs, allowing it to support many integration scenarios.

A single Java integration component can reference, or call, only one method of the class. To call a different method within the class, developers must create an integration service with a separate Java integration component. Before creating an integration service with a Java integration component, the Java class and method must be present in the library. By default, the classes in the Java package are available in the `integration.jar` file, which is included in the **System Data** toolkit.

Developers add their own custom-built JAR files either directly in the process application or with a toolkit. JAR files included in a toolkit can be shared between process applications.



## Prebuilt integration services



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Figure 11-29. Prebuilt integration services

IBM Business Process Manager contains several prebuilt integration services that already contain integration components. These integration services support common database interactions, including support for parameterized queries. In addition, these services can automatically map query results directly into a specified variable type.

One example is the integration service that is named SQL Execute Statement.

Use the SQL Execute Statement integration service to develop implementations to:

- Read existing data from a database
- Update existing data in a database
- Write new data to a database

To use an SQL integration service in an implementation, you can:

- Select an SQL integration service as the implementation for an activity
- Nest an SQL integration service in another service by dragging it from the library to the diagram of the parent service

## Advanced Integration service

- An Advanced Integration service (AIS) is used to call a service that is implemented in IBM Integration Designer from a process (a system task) or another service (a nested service)
- A collaboration between a business user who is working with IBM Process Designer and an integration developer who is working with IBM Integration Designer
- An implementation of a user task or a system task
- Use the information in authoring services in IBM Integration Designer to continue developing your Advanced Integration service
- Add services, service-related functions, BPEL processes, or monitor models

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*Figure 11-30. Advanced Integration service*

An Advanced Integration service is a collaboration between a business user who works with IBM Process Designer and an integration developer who works with IBM Integration Designer.

For example, your business process might need a list of computer parts in your warehouses in Canada. Checking with an integration developer, you realize that a service is being built in Integration Designer to query the Canadian warehouses and return an inventory list of the computer parts available. You might create an Advanced Integration service that would use this Integration Designer service as an activity in your business process.

Note: Advanced Integration services are available only with IBM Business Process Manager Advanced.

See the article from IBM DeveloperWorks, “Best practices when using IBM Integration Designer and IBM Process Designer together” at:

[http://www.ibm.com/developerworks/websphere/bpmjournal/1106\\_taylor/1106\\_taylor.html](http://www.ibm.com/developerworks/websphere/bpmjournal/1106_taylor/1106_taylor.html)

As suggested in this article, collaborate before defining your Advanced Integration service. For example, since you might want to share this and other Advanced Integration services with many business processes, you can select a toolkit to contain all your Advanced Integration services. To do this task, you must be in the IBM Process Designer desktop editor.

To create services, you must have access to a process application or toolkit in the Process Center repository. Users who have administrative rights to the repository control access to process applications and toolkits.

For more information, see “Managing access to the Process Center repository” at the IBM Knowledge Center page:

[http://www.ibm.com/support/knowledgecenter/SSFPJS\\_8.5.7/com.ibm.wbpm.admin.doc/topics/managinglib\\_users.html](http://www.ibm.com/support/knowledgecenter/SSFPJS_8.5.7/com.ibm.wbpm.admin.doc/topics/managinglib_users.html)

## 11.4. Exposed process variables (EPVs) and environment variables (ENVs)

## Exposed process variables (EPVs) and environment variables (ENVs)

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Figure 11-31. Exposed process variables (EPVs) and environment variables (ENVs)

Business objects and variables were covered earlier in this course in terms of the data model for the process application. Two other kinds of data elements are available: the exposed process variable (EPV) and the environment variable (ENV).

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## Environment variables (ENVs)



The screenshot shows the 'DESIGNER' tab selected in the top navigation bar. Below it, the 'Process App Settings' dropdown is open, showing 'Viewers: author1, ...'. A 'CREATE NEW' button with a plus sign is visible. The main content area has tabs for 'Overview', 'Environment Variables' (which is selected and highlighted in blue), and 'Servers'. Under 'Environment Variables', there is a table with columns: Key, Default, Development, Test, Stage, and Production. One row is present: 'TrainingDB' under 'Key' and 'jdbc/TrainingDB' under 'Default'. To the right of the table are two buttons: a green plus sign for adding new rows and a red minus sign for deleting them.

- Each process application and toolkit that is created in the Process Center repository includes environment variables
- The project team sets these environment variables to ensure that the process implementations are using correct values, whatever environment they deploy to or whatever change occurs at run time in the environment

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Figure 11-32. Environment variables (ENVs)

IBM Business Process Manager has the capacity to define environment variables. Each process application and toolkit that is created in the Process Center repository includes environment variables. The project team sets these environment variables to ensure that the process implementations are using correct values, whatever environment they deploy to or whatever change occurs at run time in the environment. For example, suppose that your process includes an implementation that requires the port number for an external application. With an environment variable, you can set the port number for each environment in which the process runs. If the process is running on a test environment, it might have a different port number than if the same application were running on a production environment. Developers can specify a default value and a value for each type of Process Server. Environment variables have a limitation of four environments (plus a default value). If you need more than four environments, use an exposed process variable for each environment needed.

Name environment variables by starting with lowercase letters and separating different words with periods. Thus, `connector.version` is an acceptable name for an environment variable.



## Exposed process variables (EPVs)

EPVs allow business users to modify the value of a variable that is exposed in the Process Portal without providing access to IBM Process Designer

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Figure 11-33. Exposed process variables (EPVs)

Another variable type that is used in processes and services is an exposed process variable (EPV). EPVs allow business users to modify the value of a variable that is exposed in the Process Portal without providing access to IBM Process Designer. If business users have the required authorizations, they can also log on to the process administrative console and change the value of an EPV.

## EPV versus environment variable comparison (1 of 2)

	<b>EPV</b>	<b>Environment variable</b>
Value can be changed in the Portal by business users	Yes	No
Can be scheduled to change value in the future	Yes	No
Environment-specific values	Same value for all environments initially, but it can be set independently with the Process Server administrative console	Different values for each environment, set from the IBM Process Designer

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Figure 11-34. EPV versus environment variable comparison (1 of 2)

This chart is a quick comparison of the EPV and the environment variable.

## EPV versus environment variable comparison (2 of 2)

	<b>EPV</b>	<b>Environment variable</b>
Environment cap	None	4 + 1 (default)
Casting	Must always be cast to a type (String, Integer, or other types)	Always String type, but can be cast again
Scope	EPVs must be "linked" everywhere they are used	Can be referenced anywhere in the same process app without a local declaration

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Figure 11-35. EPV versus environment variable comparison (2 of 2)

This chart is a continuation of the comparison of the EPV and the environment variable.

## 11.5. Applying asset tagging

## Applying asset tagging

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Figure 11-36. Applying asset tagging

When library artifacts are created, there is a constant necessity to organize assets throughout the development cycle. Favorites, tagging, and smart folders can be used to provide quick access to all of your assets.



## Creating favorites

The screenshot shows two panels. The left panel is a sidebar titled 'SMART FOLDERS' containing categories like Favorites (marked with 1), Changed today (16), Changed this week, Validation errors (1), Public, Revision History, and Baseline. The right panel is a 'Processes' library view. It has a header 'Type' set to 'Processes'. Below it, a section titled 'Business Process Definitions' shows five assets: Hiring Approval Process, Order Notification, Order Processing (marked with a yellow star), Order Reconciliation, and Order Shipment. The 'Order Processing' asset is highlighted with a yellow star.

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*Figure 11-37. Creating favorites*

When organizing assets, be aware that IBM Business Process Manager offers several ways to organize the library assets. Many of these concepts are already familiar to developers.

When creating favorites, any asset can be marked for quick access by marking it as a favorite. All of these assets automatically show up in the smart folders category favorites in the lower-left corner. Select the star next to any asset to mark it as a favorite.



## Tagging library items

The screenshot shows the IBM BPM interface. On the left, there's a sidebar with various categories: HR Recruitment Processes, Processes, User Interface, Teams, Data, Performance, Files, Toolkits, and Validation Errors. The 'Processes' category is currently selected. In the main area, under 'Processes', there are five items listed: Approve Hire Request, Approve Request, Expense Reimbursement, Hiring Request Process, and Process1. A context menu is open over the 'Process1' item, with 'Tags' highlighted. To the right of the menu, a list of tags is displayed, including Data, Database, Integration, Mail, Optimizer, Public, Quick Start, SLAs, Stock, UCA, Users, Work Schedule, XML, and a 'New...' option.

Playback 2: Integrations

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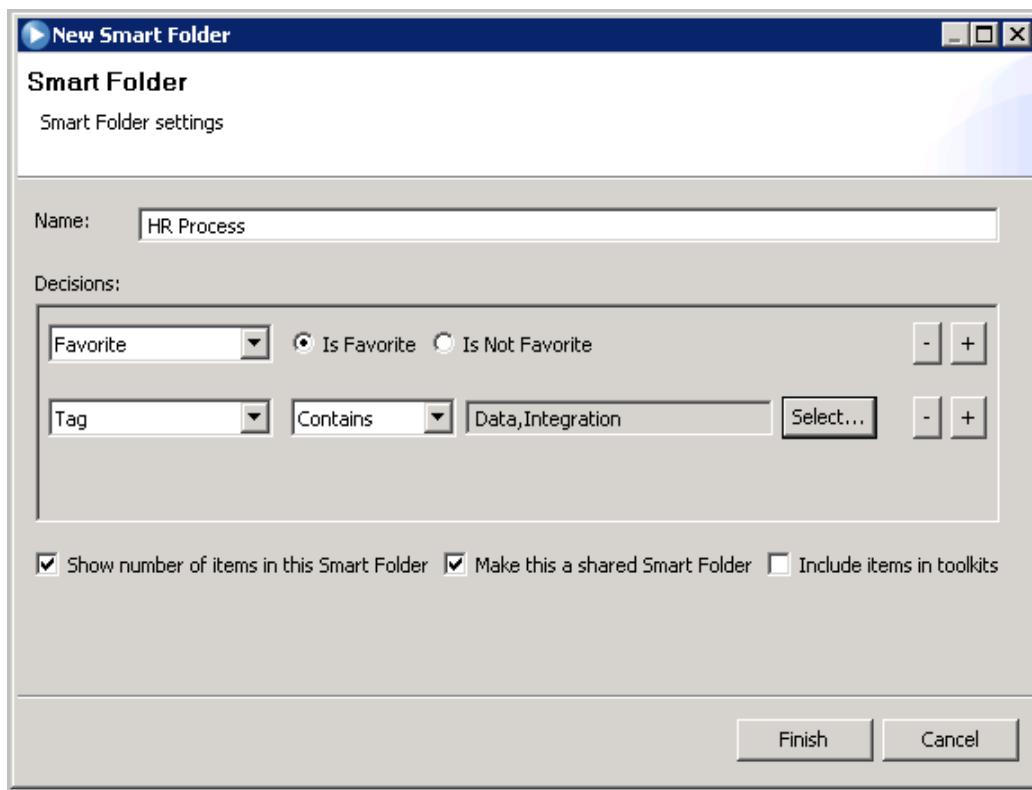
Figure 11-38. Tagging library items

When tagging library items, many of the library assets fall into categories. Developers can use a predefined set of tags or create their own tags for groups of items. After developers tag a set of items, they can view them by asset type or by tagged items.

Right-click an asset and click **Tag** to tag an item. To view by Tag, click the **Type** menu and then click **Tag**.



## Smart folders



Playback 2: Integrations

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Figure 11-39. Smart folders

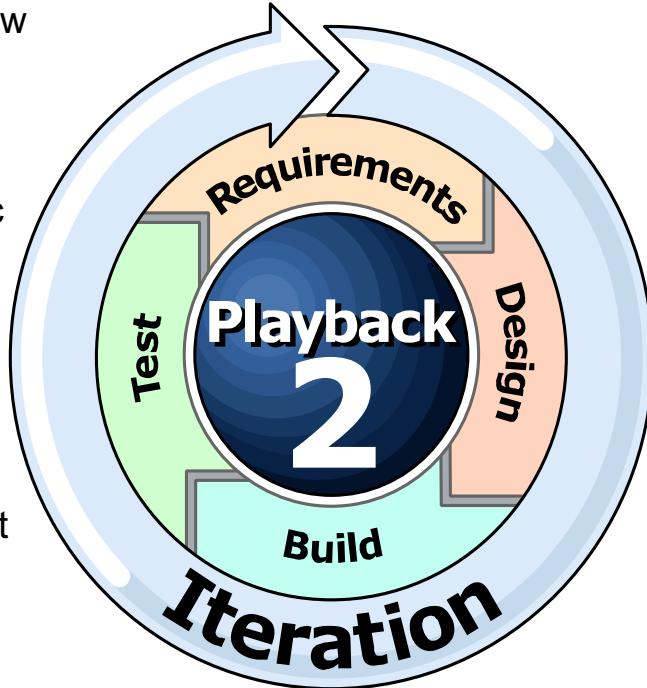
Assets are also organized into viewing folders. Some smart folders are already included by default. For example, **Changed Today** includes all assets that are changed in the current day by any user that can access the process application.

Smart folders work by creating rules to organize assets. Developers include library items that are based on the presence of a particular tag, creation date, item type, or other groupings. Using a smart folder does not move the library assets into folders, but provides developers a different way to categorize and view the current assets.

The smart folder decisions evaluate the rules from top to bottom. If no rules match existing library items, the smart folder is empty. A few smart folder ideas that are good practices for an organization are top-level business processes, UCAs, web services, utility services, process wrappers, task services, and data access services. Share your smart folders that are standard; they are probably helpful to other designers. In some cases, the library already organizes your items. For instance, it already has a folder for human services so you would not create a smart folder for coach services.

## Playback 2: Integrations

- Playback 2: Integration is now ready
- The goal is to demonstrate “real data, real time”
- Show the business rule logic and show tasks that are being created as a result of the decision service
- Demonstrate message events in the process that affect process flow
- Some of the integrations that are created in Playback 1: Building coaches to enable coach functions



Playback 2: Integrations

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Figure 11-40. Playback 2: Integrations

Playback 2: Integrations is now ready. The goal is to demonstrate “real data, real time.” Log on to the portal and demonstrate any integrations that your process depends on. Show the business rule logic and show tasks that are being created as a result of the decision service. Demonstrate message events in the process that affect process flow. Some of the integrations are created in Playback 1 to enable coach functions. Those integrations are demonstrated in the next playback.

When this development phase is complete, some external services for this playback might be incomplete. Continue to use mock data services to enable your processes and services, but focus the playback presentation on those integration endpoint services that are still not available. All artifacts to enable the integration are already created in the library, and a quick switch of flow is all that is necessary when the new integration is enabled.

To ensure that you are ready for Playback 2: Integrations:

- **Log on to the portal:**
  - Log on to the Process Portal. The URL is: `http://<server URL:port>/portal`
- **Complete a human activity:**
  - Complete the coach.
  - Click **OK** when the coach is displayed.

- **Demonstrate the result of a decision service:**

- Show tasks that are being created and process flow changes depending on the result of a decision service.

## Unit summary

- Explain how to create a decision service
- Create a message start event
- Create an enabling service
- Describe how to create and configure an undercover agent (UCA)
- Describe how to start a process with a message start event
- Organize assets with favorites, tagging, and smart folders
- Define the basic function of an integration service
- Identify the components of the IBM Business Process Manager integration architecture
- Describe how integration components interact with services
- Configure and define integration services for outbound integration
- Describe the differences between an environment variable and an exposed process variable

Playback 2: Integrations

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Figure 11-41. Unit summary

## Review questions

1. What does the acronym “BAL” stand for?
2. True or False? The three main steps required to implement a start message event are:
  - Create the enabling service (which defines the payload of the message)
  - Create the UCA
  - Attach the UCA to the start message event.
3. What smart folder automatically contains all the artifacts that have stars attached to them?
4. Where is the first place you should look if you want to create an outbound integration to a SQL database?
5. Which variable type is designed to allow business users to modify the value of a variable without providing them access to the IBM Process Designer?

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Figure 11-42. Review questions

Write your answers here:

- 1.
- 2.
- 3.
- 4.
- 5.

## Review answers

1. **Business Action Language.** Using natural language to author rules, instead of JavaScript, means that no programming expertise is required to create business rules, and the rules are easier for people to read and understand.
2. True
3. Attaching a star to an artifact makes it a favorite and puts it in the favorites smart folder.
4. The system data toolkit contains numerous integration services that you can drag easily into your service. For example, there are almost 20 different SQL integration services in the system data toolkit.
5. The exposed process variable (EPV) is designed for business users to change values of business data in real time and without providing a login to the IBM Process Designer.

## Exercise 9

### Playback 2: Integrations

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Figure 11-44. Exercise 9

Complete Exercise 9, Playback 2: Integrations, in the exercise guide.

## Exercise objectives

After completing this exercise, you should be able to:

- Create a decision service
- Create and configure a UCA
- Start a process with a message start event
- Use tagging to organize assets
- Query a database to obtain information and populate a list variable
- Create environment variables (ENVs) and exposed process variables (EPVs)
- Change a text control to a single select control

---

# Unit 12. Playback 3: Hardening processes and services

## Estimated time

01:30

## Overview

Playback 3 is the final Playback. The goal of this Playback is to demonstrate what happens when your process encounters an error, and how that error is handled. This unit covers error handling patterns that are used in your process application, conveying general principles for error handling without having to demonstrate every instance.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Catch an error in a process and service

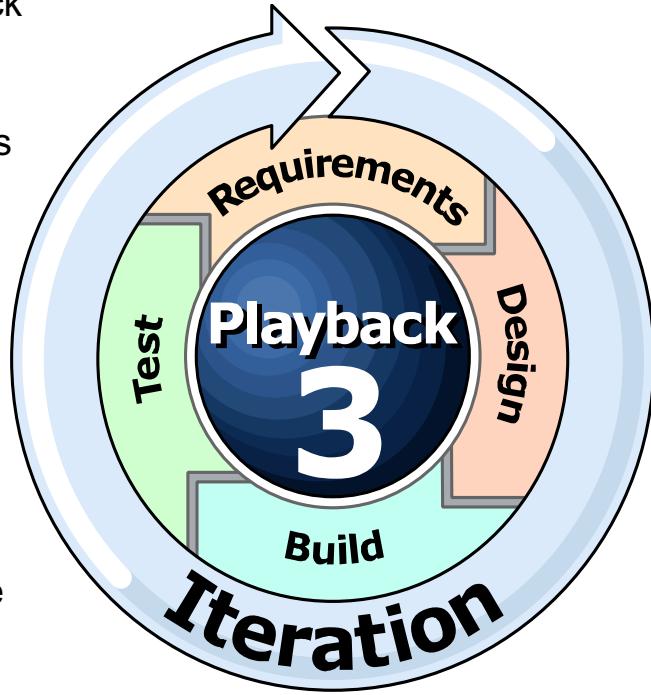
Playback 3: Hardening processes and services

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Figure 12-1. Unit objectives

## Playback 3: Hardening processes and services

- Playback 3 is the final playback
- The goal of this playback is to demonstrate what happens when your process encounters an error, and to demonstrate how that error is handled
- Consider demonstrating the different error handling patterns that are used in your process application
- Conveys the general principles that are used for error handling without having to demonstrate every instance of error handling in your process app



[Playback 3: Hardening processes and services](#)

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Figure 12-2. Playback 3: Hardening processes and services

The goal of this playback is to demonstrate what happens when your process encounters an error, and to demonstrate how that error is handled. Demonstrating error handling might take some test harnesses to generate the errors internally.

Because your processes and the sheer number of artifacts that are created might be large, demonstrating all of the error handling can be overwhelming. Consider demonstrating the different error handling patterns that are used in your process application so stakeholders have a good idea of the general way errors are handled when they occur. It conveys the general principles that are used for error handling without having to demonstrate every instance of error handling in your process app.

## Topics

- Handling errors in a process
- Handling errors in services

Playback 3: Hardening processes and services

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Figure 12-3. Topics

## Key concepts in this unit

- **Playback 3: Hardening processes and services:** This stage of the playback demonstrates what happens when your process encounters an error, and how that error is handled
- **Error handling in process:** Attach an error intermediate event to an activity and connect that event to an error handling flow or activity
- **Error handling in services:** Use error intermediate events to catch errors, and use error end events to throw errors

Playback 3: Hardening processes and services

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Figure 12-4. Key concepts in this unit

## 12.1. Handling errors in a process

## Handling errors in a process

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Figure 12-5. Handling errors in a process

When modeling error handling as part of your business processes, developers discover errors with error intermediate events or event subprocesses, and they can cause errors with error end events.

## Using error events to handle errors

- When you develop an application in IBM BPM, build error handling into processes and services as follows:
  - To detect errors
  - To specify how errors are thrown and caught in your runtime environment
  - To recover in a predictable manner
- Three types of error events are possible:
  - Error end events in processes and services that throw errors
  - Error intermediate events in processes and services that catch errors
  - Error start events in process event subprocesses that catch errors
- Assign error codes and error data to errors that are thrown by the error end events

[Playback 3: Hardening processes and services](#)

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Figure 12-6. Using error events to handle errors

To catch errors by using error intermediate events, select an error code from a list of previously defined errors and map the error data to a variable. The error intermediate events are boundary events, which are intermediate events that are attached to the boundary of an activity. Each boundary event can be triggered only while the activity is running, interrupting the activity. From the web Process Designer to the Process Designer client application, you can use an error intermediate event that is attached to the boundary of an activity. This error intermediate event catches specific errors and error data from a linked process, a subprocess, or a service.

Another way to catch errors is by using error intermediate events in services that catch all errors. When building services, you can attach an error intermediate event to the boundary of a step to catch all errors for the step. You can use an error intermediate event as part of the service flow. You use it to catch all errors that steps of the service flow raise that are not handled through an error intermediate event at the boundary of the step.

You also can catch errors by using error event subprocesses in processes. In the subprocess, you use an error start event that catches errors if the start event is triggered.

However you decide to catch errors, designate the error behavior for the events on the Properties tab in your diagram. Under Implementation, go to the Error Properties section to designate the following error handling behavior:

- Catch all errors or specific errors. To catch specific errors, you can select the error code, map the error data, or both, as described in the following bullets.
  - Filter the specific errors that are caught by selecting an error code from a list of all thrown errors for the linked process, subprocess, or service.
  - Map the error data into a variable by selecting an error mapping variable that was previously defined on the Variables tab.

Important: If the error code changed, make sure to select the variable again so that it is mapped properly.

If multiple error events are defined to catch errors for an error that is thrown in a linked process, subprocess, or service, the precedence rules determine the catching event. The precedence is in the order that they are listed in the Error event components table.

Errors are caught in the following order in your runtime environment:

1. The boundary events catch errors that the attached activity raises, as described in the following table.
2. If no error boundary event handles the error, and a subprocess is in a process or in an unattached intermediate error event in a service, errors are caught in the error event subprocesses. This process is described in the following table.
3. If no error event subprocess handles the error in an event subprocess, linked process, or service, errors are propagated to the next level.

## Handling errors in a process

Process events	Description
Error intermediate event at the boundary of an activity	<ul style="list-style-type: none"> <li>Catches specified errors or all errors</li> <li>Provides error handling logic for errors that the attached activity raises</li> </ul>
Error event subprocess that starts with an error start event	<ul style="list-style-type: none"> <li>Catches specified or all errors</li> <li>Error handling logic for errors that are raised in activities of the process</li> <li>Subprocesses, or event subprocesses that directly contain an error event subprocess, are provided</li> </ul>
Error end event	<ul style="list-style-type: none"> <li>Use to throw an error to parent processes</li> </ul>

[Playback 3: Hardening processes and services](#)

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Figure 12-7. Handling errors in a process

The following considerations apply when you handle errors in a process:

- Catching errors with error intermediate events**

For processes, you can attach an error intermediate event to an activity and connect that event to an error handling flow or activity.

To determine whether to use error immediate events, consider the following points:

- If an error occurs while a process is running an activity with an attached error event at the boundary, the process flows along the sequence line that is attached to the error event. Errors are handled in the flow and then proceed with the normal processing.
- Error intermediate events must be attached to an activity.
- You can have multiple error events for an activity, but only one catches the error.
- Consider specifying the error data to catch specific errors, filtering on the error code for the types of errors that are caught, and mapping to a variable after the errors are caught. When all errors are caught, or if only an error code is specified, the error data is captured in an XMLElement in the `tw.system.step.error` variable.

- Catching errors with error event subprocesses**

An event subprocess is a specialized type of subprocess that is not part of the normal sequence flow of its parent process. An error event subprocess is an event subprocess that contains an error start event. The event subprocess does not connect with sequence flow and runs only if the start event in the event subprocess is triggered. You can use error event subprocesses to handle errors in your process.

To determine whether to use error event subprocesses, consider the following points:

- Define a readable process by locating the error event in the event subprocess instead of defining it in the process.
- To reuse the error-handling flow for multiple tasks in your process, use event subprocesses. To reuse an error-handling flow with attached events, you must attach an intermediate event for each of the tasks and then connect those events to the error-handling flow.
- Define data objects that you can access only from within the event subprocess. You can define only those data objects that belong to a subprocess. The parent process is not cluttered with unnecessary variables.

- **Throwing errors**

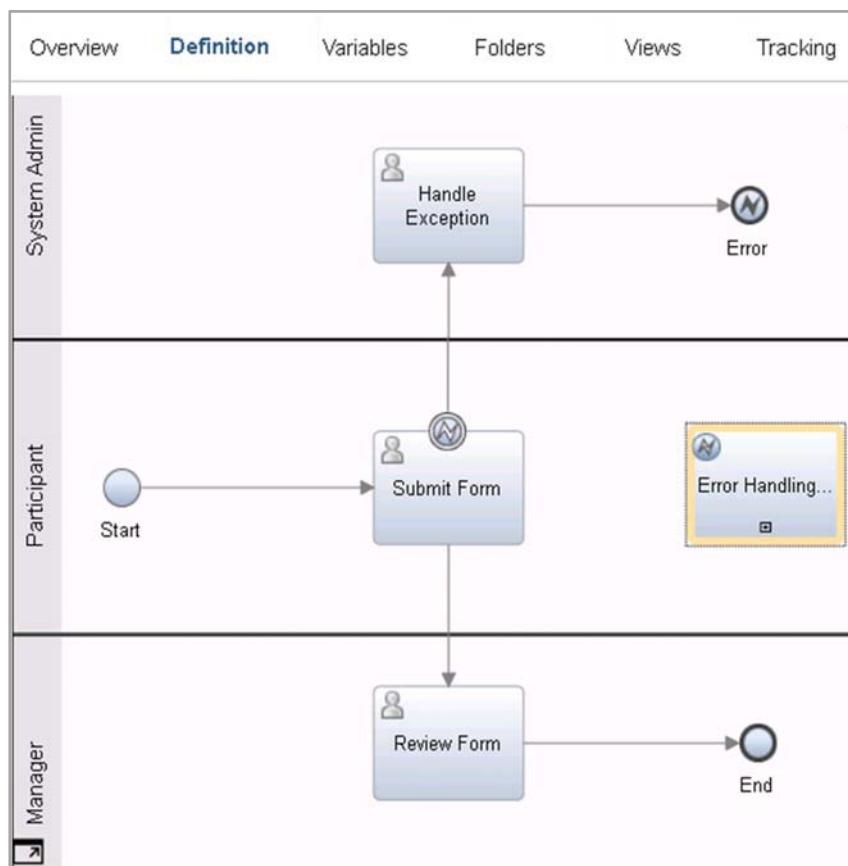
You can use an error end event in your process to specify an error code and map to an error type on errors that are thrown from the flow of a process or a service.

When working with either error events or event subprocesses, think about whether errors can be handled immediately, and normal processing can continue, or if another error can be thrown at another level. Then, implement error handling from the bottom up. In other cases, it might be more efficient and readable if a subprocess can be reused. Build each linked process and service so that errors can be captured and corrected. If a correction is not possible at the lowest level of the implementation, you can allow the error to move up a level. Do not include an error event to rethrow the error to the calling service or process, as shown in the following section.

## Catching errors

Errors are caught in the following order in your runtime environment:

1. The boundary events catch errors that the attached activity raises
2. If the subprocess is in a process or in an unattached intermediate error event in a service, errors are caught in the error event subprocesses
3. Errors are propagated to the next level



Playback 3: Hardening processes and services

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Figure 12-8. Catching errors

Use error events to specify how errors are thrown and caught in your runtime environment.

You can assign error codes and error data to errors that the error end event throws.

Errors are caught in the following order in your runtime environment:

- The boundary events catch errors that the attached activity raises.
- If the subprocess is in a process or in an unattached intermediate error event in a service, errors are caught in the error event subprocesses.
- Errors are propagated to the next level.

Specifying the variable name in the mapping controls filtering by error data type. If a mismatch occurs between the type of variable and the error data type displayed on the **Properties** tab, the variable and its type determine the behavior.

## 12.2. Handling errors in services

## Handling errors in services

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Figure 12-9. Handling errors in services

Processes that you develop in IBM Business Process Manager include integrations with external systems, server scripts, and other complex implementations. Anticipate potential system exceptions and create the components that are required to handle those exceptions when they occur. For example, if a process includes an integration with a database system, that database might not be available when each new instance of the process runs. So, when you develop the integration in IBM Business Process Manager, you must build in exception handling to detect errors and recover in a predictable manner.

You can build error handling capabilities into both processes and services with the available exception components.

Exception handling is a topic that is explored with system administrators, developers, and other interested stakeholders to plan what actions are taken when dealing with errors.

## Catching errors in services

Service component	Description
 Error intermediate event that is attached to the boundary of a step	<ul style="list-style-type: none"> <li>• Listens for exceptions from the service component to which it is attached</li> </ul>
 Error intermediate event as part of the service flow	<ul style="list-style-type: none"> <li>• Errors in the steps of the service flow and errors that are missed in the error intermediate event that is attached to an activity are caught</li> <li>• This event can have only outbound links</li> </ul>
 Throw exception	<ul style="list-style-type: none"> <li>• Use to purposely throw an error and end processing</li> <li>• You might, for example, use a Throw Exception component if you return too many rows from a database (over a limit that is normal and would bog down the server)</li> </ul>

Playback 3: Hardening processes and services

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Figure 12-10. Catching errors in services

For services, you can use error intermediate events to catch errors, and you can use error end events to throw errors.

To determine whether to use error events in your services, consider the following points:

- You must attach error intermediate events to steps in your service.
- Include error intermediate events in the service flow so that they can act as global error handlers in the service.
- Determine whether errors can be handled immediately, and normal processing can continue, or if another error can be thrown at another level. Then, implement error handling from the bottom up.
- Use an error end event to throw a specific error. You can specify an error code and error data for the error.
- Consider specifying the error data to catch specific errors. For example, you might filter on the error code for the types of errors that are caught and map the error code to a variable after the errors are caught. When all errors are caught, or if only an error code is specified, the error data is captured in an `XMLElement` in the `tw.system.error` variable.

When building services that include integrations with external systems or other implementations, use error intermediate events when it is possible to handle errors in the steps in the service. Be sure to include the appropriate logic and an error end event in your service to throw errors when they still exist after attempts to handle them. Throwing the errors ensures that the errors are passed to parent processes and services and can be handled at a higher level.

## Client-side human services: Throwing errors by using error end events (1 of 2)

- For errors that are thrown from the flow of a client-side human service, use error end events to end the processing of a service flow at a specified step
- To throw a specific error, do the following steps:
  - Set the properties of the error in the Implementation tab of the error end event
  - Specify the error code and map the error data to a specified variable

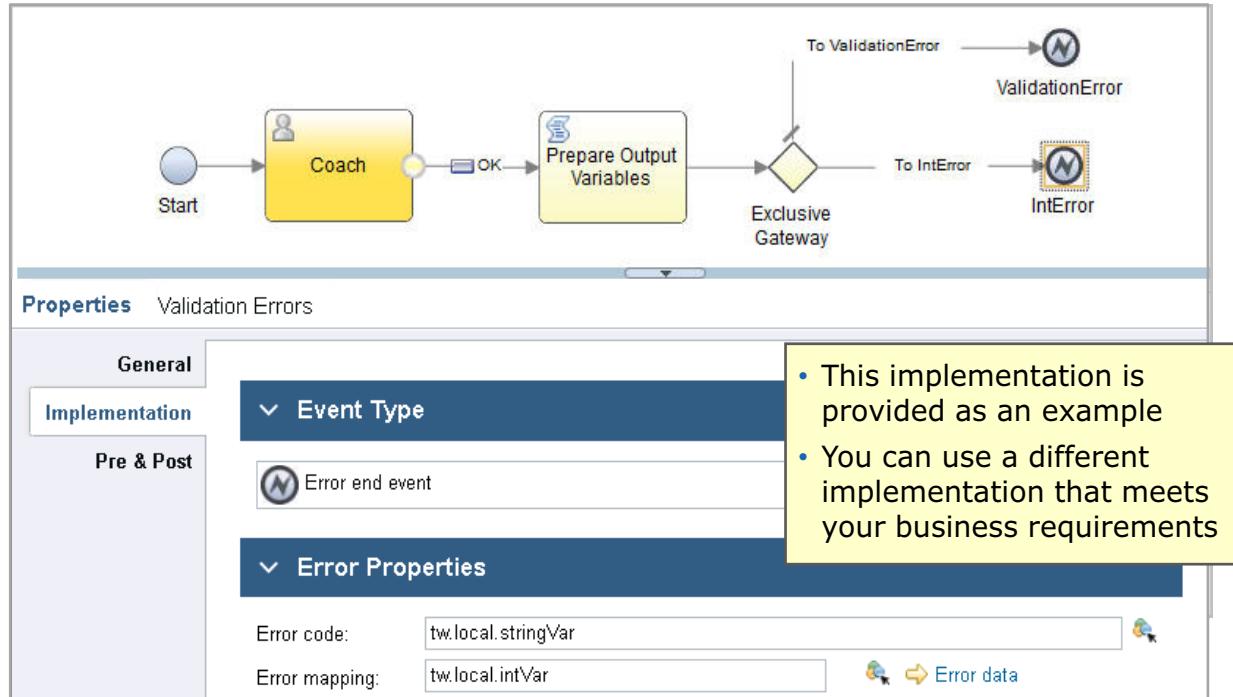
Playback 3: Hardening processes and services

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Figure 12-11. Client-side human services: Throwing errors by using error end events (1 of 2)

IBM Training IBM

## Client-side human services: Throwing errors by using error end events (2 of 2)



Playback 3: Hardening processes and services

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Figure 12-12. Client-side human services: Throwing errors by using error end events (2 of 2)

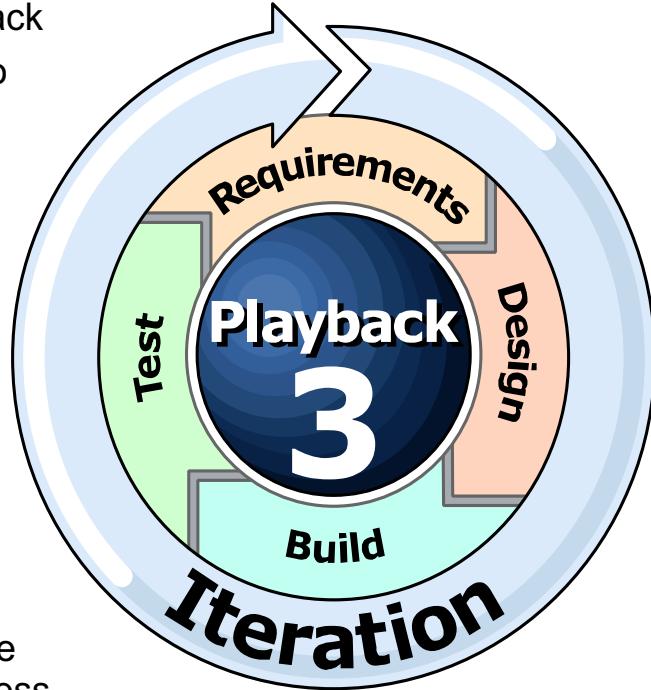
To add an error end event to the client-side human service, do the following steps:

1. Open Web Process Designer.
2. Open the client-side human service that you want to work with.
3. In the Diagram view, drag an end event onto the canvas.
4. Select the end event, and in the Implementation tab, under Event Type, select **Error end event**. The end event changes into an error end event.
5. In the Implementation tab, under Event Properties, click the Error code picker to select a local variable and specify the error code for the error to be thrown. The error code expression must evaluate to a string value at run time. The error code might be defined as a string literal (for example, "ErrorCode1"). If so, the code is included in the list of defined errors that can be caught when creating an error intermediate event to catch the error in a process. Click the Error mapping picker to map the error data to an error mapping variable that was previously defined on the Variables tab.
6. Optional: To define multiple error end events that can have different error handling logic for different errors, iterate through steps 3 – 5. For each error end event, use different error codes or error data to differentiate between the different kinds of errors.

7. In the diagram, connect each error end event to the logic that you want to run when the error occurs. If you have multiple error end events, connect each one to the error handling logic that applies. The following example shows a client-side human service that uses a coach to display an error message to the user. The coach uses a variable validation script, which is connected to two different error end events with an exclusive gateway.

## Playback 3: Hardening processes and services

- You arrived at the final playback
- The goal of this playback is to demonstrate what happens when your process encounters an error, and to demonstrate how that error is handled
- Consider demonstrating the different error handling patterns that are used in your process application
- Conveys the general principles that are used for error handling without having to demonstrate every instance of error handling in your process application



[Playback 3: Hardening processes and services](#)

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Figure 12-13. Playback 3: Hardening processes and services

You arrive at the final playback. The goal of this playback is to demonstrate what happens when your process encounters an error, and to demonstrate how that error is handled. Demonstrating error handling might take some test harnesses to generate the errors internally.

Because your processes and the sheer number of artifacts that are created might be large, demonstrating all of the error handling can be overwhelming. Consider demonstrating the different error handling patterns that are used in your process application so stakeholders have a good idea of the general way errors are handled when they occur. It conveys the general principles that are used for error handling without having to demonstrate every instance of error handling in your process app.

Consider adopting some of the practices from a community-developed toolkit that is called the **General Exception Handling Toolkit (GEX)** on the IBM Business Process Manager wiki. This toolkit can be a starting point toward your own organizational error handling framework.

To ensure that you are ready for Playback 3:

1. **Log on to the portal**
  - Log on to the portal. The URL is: `http://<server URL:port>/portal`
2. **Show error handling**

3. Run the service.
4. Demonstrate the error handling capabilities that are built into the service.

## Unit summary

- Catch an error in a process and service

Playback 3: Hardening processes and services

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*Figure 12-14. Unit summary*

## Review questions

1. When an error occurs in an activity in a process, which takes the highest precedence in catching the error?
  - A. An event subprocess in the same process as the activity
  - B. A flow that is exiting the activity and going to an error end event
  - C. An attached error intermediate event
  
2. What are the types of error events that can be modeled in services?
  - A. Error message event
  - B. Error intermediate event
  - C. Error end event
  - D. Error start event

[Playback 3: Hardening processes and services](#)

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*Figure 12-15. Review questions*

Write your answers here:

1.

2.

## Review answers

1. C. Boundary events take first precedence.
2. Error intermediate event and error end event.  
The error intermediate event can be attached to a step or can be placed on the palette to catch errors globally inside the service.

[Playback 3: Hardening processes and services](#)

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*Figure 12-16. Review answers*

## Exercise 10

Playback 3: Creating error handling for  
a service

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Figure 12-17. Exercise 10

## Exercise objectives

After completing this exercise, you should be able to:

- Harden a service with a catch exception component

Playback 3: Hardening processes and services

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Figure 12-18. Exercise objectives

---

# Unit 13. Playback 3: Deploying process applications

## Estimated time

00:30

## Overview

This unit explains how to create a snapshot for deployment.

## How you will check your progress

- Review questions and lab exercises

## Unit objectives

- Explain how to create a snapshot for deployment

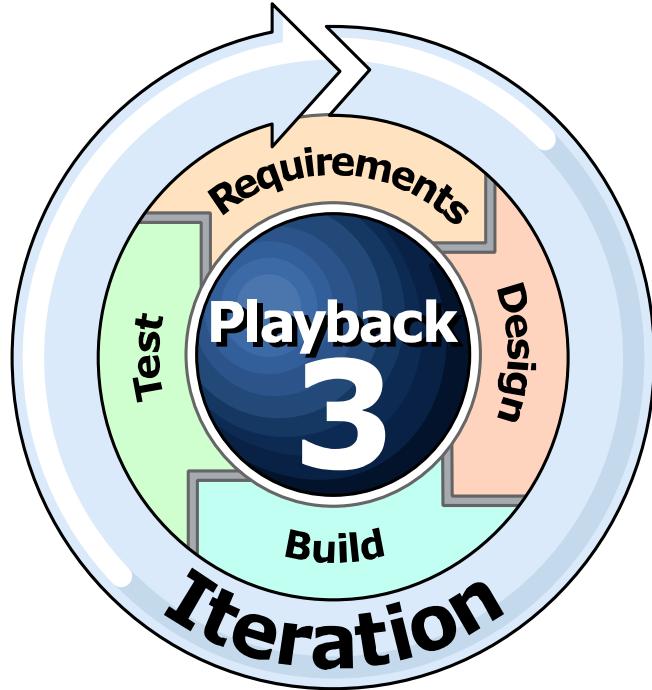
Playback 3: Deploying process applications

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*Figure 13-1. Unit objectives*

## Playback 3: Deploying process applications

- Playback 3 is the final playback
- The goal of this playback is to create a snapshot for deployment



Playback 3: Deploying process applications

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Figure 13-2. Playback 3: Deploying process applications

You arrived at the final playback. The goal of this playback is to create a snapshot for deployment.

# IBM Training

## Creating snapshots: IBM Web Process Designer

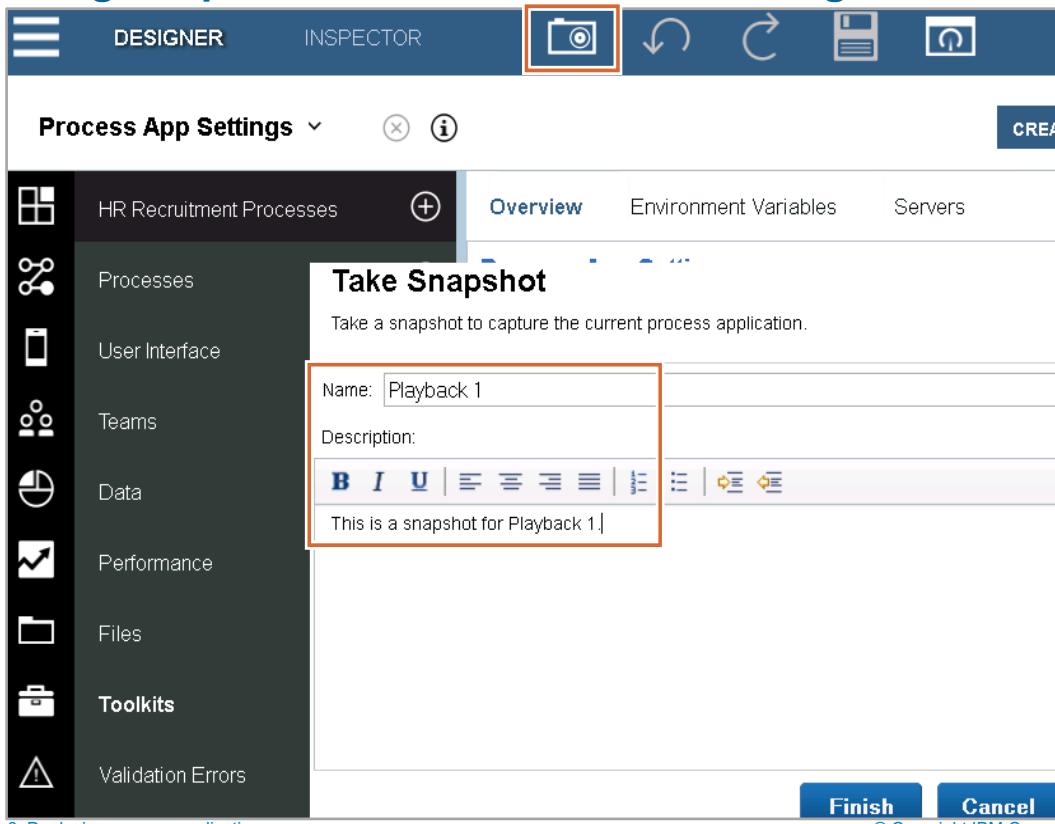


Figure 13-3. Creating snapshots: IBM Web Process Designer

Project teams use snapshots to capture and record a process application at a specific point in time in the development cycle. Snapshots are often taken to use during playbacks or at other phases in development.

The team compares different snapshots and reverts to previous snapshots as needed during development. For example, suppose a developer fixed a problem with a service and took a snapshot at that point. Then, a different developer made several more changes to the same service and took a new snapshot. The project manager can compare the two snapshots to determine which changes were made when and by whom. If the project manager decides that the additional changes to the service are not worthwhile, the project manager can revert to the snapshot of the original fix.

Snapshots are also used for installing or moving applications from the development Process Center to other environments, such as testing or production.

### **Creating snapshots:**

A snapshot is created in IBM Process Designer with the button in the upper-right corner or in the Process Center process application management interface.

The screenshot shows two views of the IBM Process Center interface. The top view shows the main navigation bar with tabs for 'Process Apps' (highlighted with a red box and yellow circle 1), 'Toolkits', 'Servers', and 'Admin'. A search bar is on the right. Below the navigation is a list of process applications: 'HR Recruitment Processes (HRR)' (highlighted with a red box and yellow circle 2), 'Hiring Sample (HSS)', and 'Process Portal (SYSRP)'. To the right of the list is a sidebar with options: 'Create New Process App', 'Import Process App', 'Download Process Designer', and 'Download MobileFirst Adapter'. The bottom view shows the 'Process Apps' tab selected. It displays the same list of applications. The 'Snapshots' tab (highlighted with a red box and yellow circle 3) is selected. On the right, a sidebar shows the 'Create New Snapshot' option (highlighted with a red box and yellow circle 4). Below the sidebar, there is a 'Snapshots' section with a brief description: 'A snapshot captures the state of the library items within a process'.

Figure 13-4. Creating snapshots: Process Center

To create a snapshot of a process application in the Process Center, the developer completes the following steps:

1. Click the Process Apps tab to access the process application repository.
2. From the repository, click the process application to get to the management interface.
3. In the process application management interface, click the **Snapshots** tab.
4. From this interface, click the **Create New Snapshot** option on the right to create a snapshot for the process application.

Any snapshot that is created for a process application is listed in the snapshot list for the process application in both the Process Center and the Process Designer for the application.

## Guidelines for using snapshots

- Snapshots can take up large amounts of space in a database
  - Agree on intervals in your organization and take snapshots at agreed-upon milestones
- Define a meaningful naming convention for snapshots and use that naming convention for all projects
- Work closely with IBM Business Process Manager administrators to come up with a snapshot deployment and activation plan

Playback 3: Deploying process applications

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Figure 13-5. Guidelines for using snapshots

This demonstration is stored as the `demo10.mp4` file that is in the `C:\labfiles\demo` folder.

The following list contains some guidelines for using snapshots for a process application:

- Snapshots can take up large amounts of space in a database, so create snapshots that are targeted to important phases in development. Agree on intervals in your organization and take snapshots at agreed-upon milestones.
- Define a meaningful naming convention for snapshots and use that naming convention for all projects.
- Work closely with IBM Business Process Manager administrators to come up with a snapshot deployment and activation plan. Administrators and developers with administration privileges are the team members who can deploy snapshots to other environments.

## Unit summary

- Explain how to create a snapshot for deployment

Playback 3: Deploying process applications

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Figure 13-6. Unit summary

## Review questions

1. Which two tools can developers use to create a snapshot of a process application?

Playback 3: Deploying process applications

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*Figure 13-7. Review questions*

Write your answers here:

1.

## Review answers

1. Snapshots can be created by using IBM Process Designer or the Process Center console.

Playback 3: Deploying process applications

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Figure 13-8. Review answers

## Exercise 11

Playback 3: Creating a snapshot for deployment

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Figure 13-9. Exercise 11

Complete Exercise 11, Playback 3: Creating a snapshot for deployment, in the exercise guide.

## Exercise objectives

After completing this exercise, you should be able to:

- Create a snapshot for deployment

Playback 3: Deploying process applications

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*Figure 13-10. Exercise objectives*

---

# Unit 14. Course summary

## Estimated time

00:30

## Overview

This unit summarizes the course and provides information for future study.

## Unit objectives

- Explain how the course met its learning objectives
- Access the IBM Training website
- Identify other IBM Training courses that are related to this topic
- Locate appropriate resources for further study

Course summary

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*Figure 14-1. Unit objectives*

## Course objectives

- Describe why process modeling is an important phase in the BPM lifecycle
- Create structured and unstructured processes (formerly Case) using Web Process Designer
- Create ad-hoc activities by using the Process Designer
- Identify how to use Process Designer to create a process application
- List and identify the core elements that are used to create a process in the Process Designer
- Translate workflow steps into business process activities and nested processes
- Use gateways to control the process flow

Course summary

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*Figure 14-2. Course objectives*

## Course objectives

- Validate that the process model meets Playback 0 goals and requirements
- Identify how intermediate events are used during the execution of a business process
- Describe the architecture of IBM Business Process Manager
- Organize process assets into toolkits
- Manage variables and data flow
- Implement timer events
- Implement gateways and routing to control process flow

Course summary

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*Figure 14-3. Course objectives*

## Course objectives

- Build a business data model
- Build services and user input forms (coaches)
- Create a snapshot for deployment
- Create a decision service
- Model and implement message events
- Apply asset tags to organize artifacts
- Enhance coaches for a rich user experience and apply themes
- Implement effective error handling in processes and services

Course summary

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*Figure 14-4. Course objectives*

**IBM Training**

## To learn more on the subject

- IBM Training website:  
[www.ibm.com/training](http://www.ibm.com/training)
- IBM Redbooks:  
[www.redbooks.ibm.com](http://www.redbooks.ibm.com)
- To stay informed about IBM training, go to the following sites:
  - IBM Training News: <http://bit.ly/IBMTTrainEN>
  - YouTube: [youtube.com/IBMTraining](http://youtube.com/IBMTraining)
  - Facebook: [facebook.com/ibmtraining](http://facebook.com/ibmtraining)
  - Twitter: [twitter.com/websphere\\_edu](http://twitter.com/websphere_edu)

Course summary

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*Figure 14-5. To learn more on the subject*

## Identify other IBM Training courses

- Training paths:  
<http://www.ibm.com/services/learning/ites.wss/us/en?pageType=page&c=a0003096>
- The next course in the sequence is: *Process Implementing with IBM Business Process Manager Standard v8.5.7 – II*
- The course objectives include:
  - Describe IBM Business Process Manager topology considerations and typical system configurations
  - Use the REST API tester to integrate with external systems
  - Integrate with a Content Management Interoperability Services (CMIS) system and use content events in a process
  - Translate a coach into numerous languages through localization
  - Design an IBM Business Process Manager data architecture for a process application with complex business data
  - Model all decision authority for a process and employ complex logic for task routing and assignments
  - Construct complex task and process task-to-task interaction controls
  - Identify and solve common integration issues

Course summary

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Figure 14-6. Identify other IBM Training courses

## Enhance your learning with IBM resources

*Keep your IBM Cloud skills up-to-date*

- IBM offers resources for:
  - Product information
  - Training and certification
  - Documentation
  - Support
  - Technical information



- To learn more, see the IBM Cloud Education Resource Guide:
  - [www.ibm.biz/CloudEduResources](http://www.ibm.biz/CloudEduResources)

Course summary

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Figure 14-7. Enhance your learning with IBM resources

## Unit summary

- Explain how the course met its learning objectives
- Access the IBM Training website
- Identify other IBM Training courses that are related to this topic
- Locate appropriate resources for further study

Course summary

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*Figure 14-8. Unit summary*



## Course completion

**You have completed this course:**

*Process Implementing with IBM Business Process Manager Standard V8.5.7 - I*



**Do you have any questions?**

Course summary

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Figure 14-9. Course completion

---

# Appendix A. IBM BPM on Cloud

## Estimated time

00:00

## Overview

In this unit, you learn about BPM on Cloud.

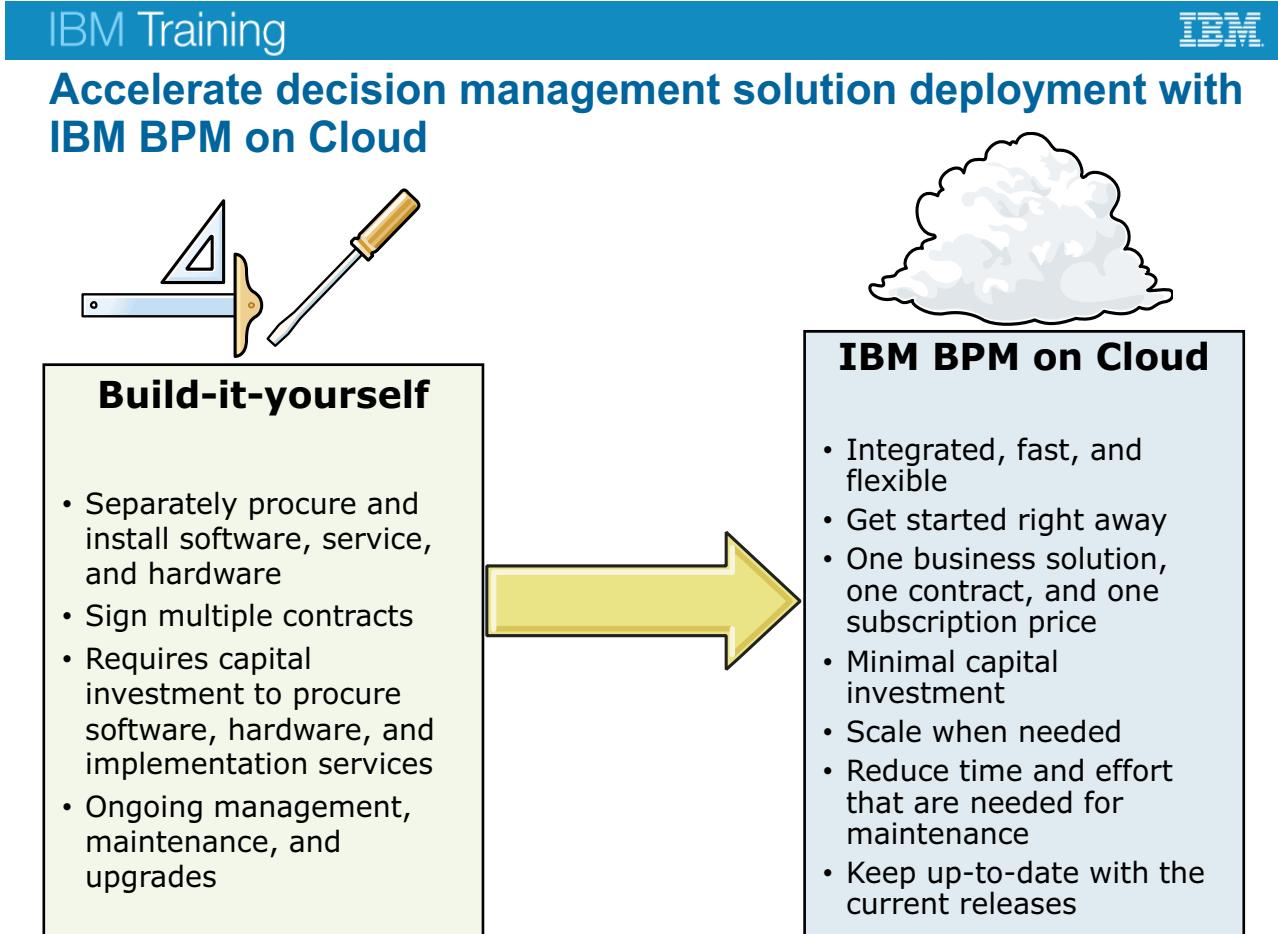
## Introduction to IBM BPM on Cloud

- Enterprise-grade BPM cloud service for development, testing, and production
- Cloud-based, collaborative, and role-based environment
  - Capture, automate, and manage frequently occurring, repeatable rules-based business decisions
- Ready-to-use development, test, and production environments are available
- Monthly subscription plans
- Available exclusively on IBM Cloud infrastructure
  - As of 2015, over 25 data centers are available worldwide
- Managed by IBM
- Artifacts that are created with IBM BPM on Cloud are compatible with IBM BPM on-premises product

IBM BPM on Cloud

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*Figure A-1. Introduction to IBM BPM on Cloud*



IBM BPM on Cloud

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Figure A-2. Accelerate decision management solution deployment with IBM BPM on Cloud

## BPM on Cloud customer focus: Manage and automate decisions

### IBM manages:

- Uptime
- Monitoring
- Backup
- High availability
- Disaster recovery
- Updates
- Maintenance



### Customers manage:

- Application development
- Application integration
- Application support



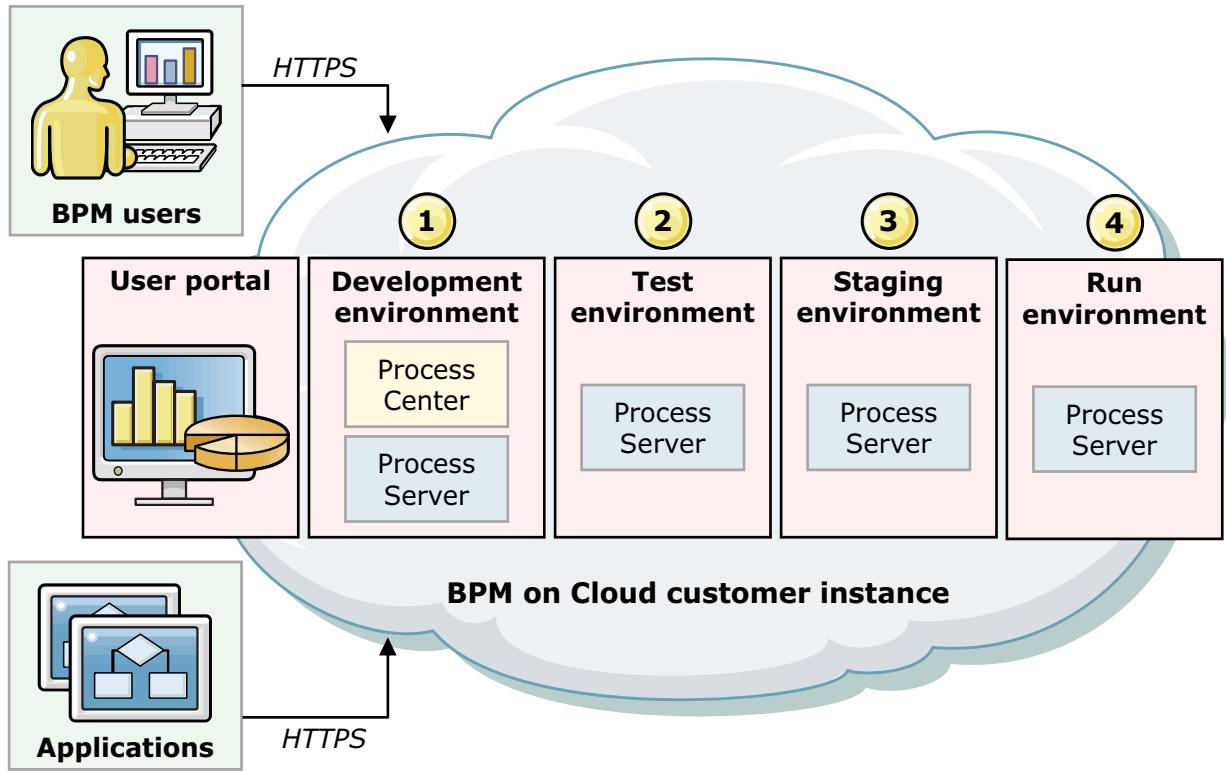
IBM BPM on Cloud

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Figure A-3. BPM on Cloud customer focus: Manage and automate decisions



## IBM BPM on Cloud: Four runtime environments



IBM BPM on Cloud

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Figure A-4. IBM BPM on Cloud: Four runtime environments

IBM BPM on Cloud provides four runtime environments for process development:

1. Development
2. Test
3. Staging
4. Run

In this diagram:

- **BPM users** include developers, business analysts, business users, and rule authors who access the Process Designer, Rule Designer, and the other various user consoles.
- **Applications** are applications that call services.



## IBM BPM on Cloud free trial

- Free 30-day trial for IBM BPM on Cloud is available
- Go to the following website and click **Try for free** to sign up:  
<https://www.bpm.ibmcloud.com/#home>



IBM BPM on Cloud

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Figure A-5. IBM BPM on Cloud free trial



## Activating access and logging in to IBM BPM on Cloud

- Welcome email includes the following information:
  - Link to activate BPM on Cloud access
  - Link to BPM on Cloud instance
- Activation link is tied to a specific email
- After activating access, you can log in to your BPM on Cloud instance



IBM BPM on Cloud

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*Figure A-6. Activating access and logging in to IBM BPM on Cloud*

**IBM Training**

**IBM BPM on Cloud user portal (1 of 2)**

Development Environment		
<b>Process Center</b>  <p>Install and run process applications, store performance data, and manage running instances of process applications on the Process Center servers.</p> <p><a href="#">Launch</a> <a href="#">More info</a></p> <p><a href="#">Available Downloads (2)</a></p> <ul style="list-style-type: none"> <li><a href="#">IBM® Process Designer</a></li> <li><a href="#">IBM® Integration Designer</a></li> </ul>	<b>REST UI</b>  <p>Prototype IBM BPM REST resources and their associated parameters</p> <p><a href="#">Launch</a> <a href="#">More info</a></p>	<b>Process Portal</b>  <p>Collaborate on tasks and view the progress of individuals, teams, and processes on the Process Portal</p>
<b>Access from home page to an array of tools in three environments</b>		
<b>Tech Preview: Responsive Federated Portal</b>  <p>Technical demonstrations of Responsive Federated Portal and Responsive Coach Toolkit as a sample</p>	<b>Business Process Choreographer Explorer</b>  <p>Monitor and manage BPEL processes. The BPC Explorer provides a number of views that show process and task metadata</p>	<b>Business Rules Manager</b>  <p>Manage business rules</p>

IBM BPM on Cloud

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Figure A-7. IBM BPM on Cloud user portal (1 of 2)

**IBM Training**

**IBM BPM on Cloud user portal (2 of 2)**

**Process Runtime Operating Environment**

<b>Process Portal</b>  Collaborate on tasks and view the performance of individuals, teams, and processes on dashboards.  <a href="#">Launch</a> <a href="#">More info</a>	<b>Process Admin Console</b>  Manage the Process Center server and the process servers in your runtime environments.  <a href="#">Launch</a> <a href="#">More info</a>	<b>Tech Preview: Responsive Federated Portal</b>  Technical demonstrations of Responsive Portal and Responsive Coach Toolkit  <a href="#">Launch</a> <a href="#">More info</a>
<b>Business Rules Manager</b>  Manage business rules  <a href="#">Launch</a> <a href="#">More info</a>	<b>Business Process Choreographer Explorer</b>  Monitor and manage BPEL processes. The BPC Explorer provides a number of views that show process and task metadata  <a href="#">Launch</a> <a href="#">More info</a>	<b>Access from home page to an array of tools in four environments:</b> <ul style="list-style-type: none"><li>• Test</li><li>• Production</li><li>• Runtime</li><li>• Operating</li></ul>

IBM BPM on Cloud

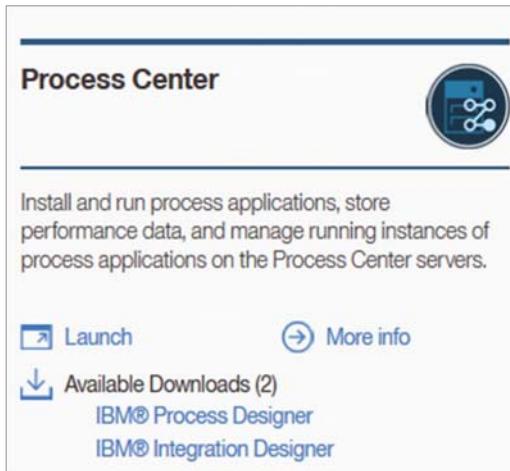
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Figure A-8. IBM BPM on Cloud user portal (2 of 2)



## Using the IBM Process Designer (1 of 3)

- Download a version of Process Designer that is configured for use with IBM BPM on Cloud
- Start Process Designer by double-clicking `eclipse.exe`



IBM BPM on Cloud

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Figure A-9. Using the IBM Process Designer (1 of 3)

IBM Training

**Using the IBM Process Designer (2 of 3)**

**Process App Settings**

**Common**

- Name: Hiring Sample Advanced
- Acronym: HSAV1
- Description: (Edit) This sample shows the SCA integration of a BPEL process to identify a number of job candidates from simulated backend HR systems

**Exposed Items**

- Business Process Definitions: [Open New Position](#)
- Heritage Human Services: <none>
- Client-Side Human Services: <none>

**Authorization Settings**

**Properties**

• Features and user interface similar to on-premises  
• Automatically connected to Cloud Process Center and Process Server

Figure A-10. Using the IBM Process Designer (2 of 3)

# IBM Training

## Using the IBM Process Designer (3 of 3)

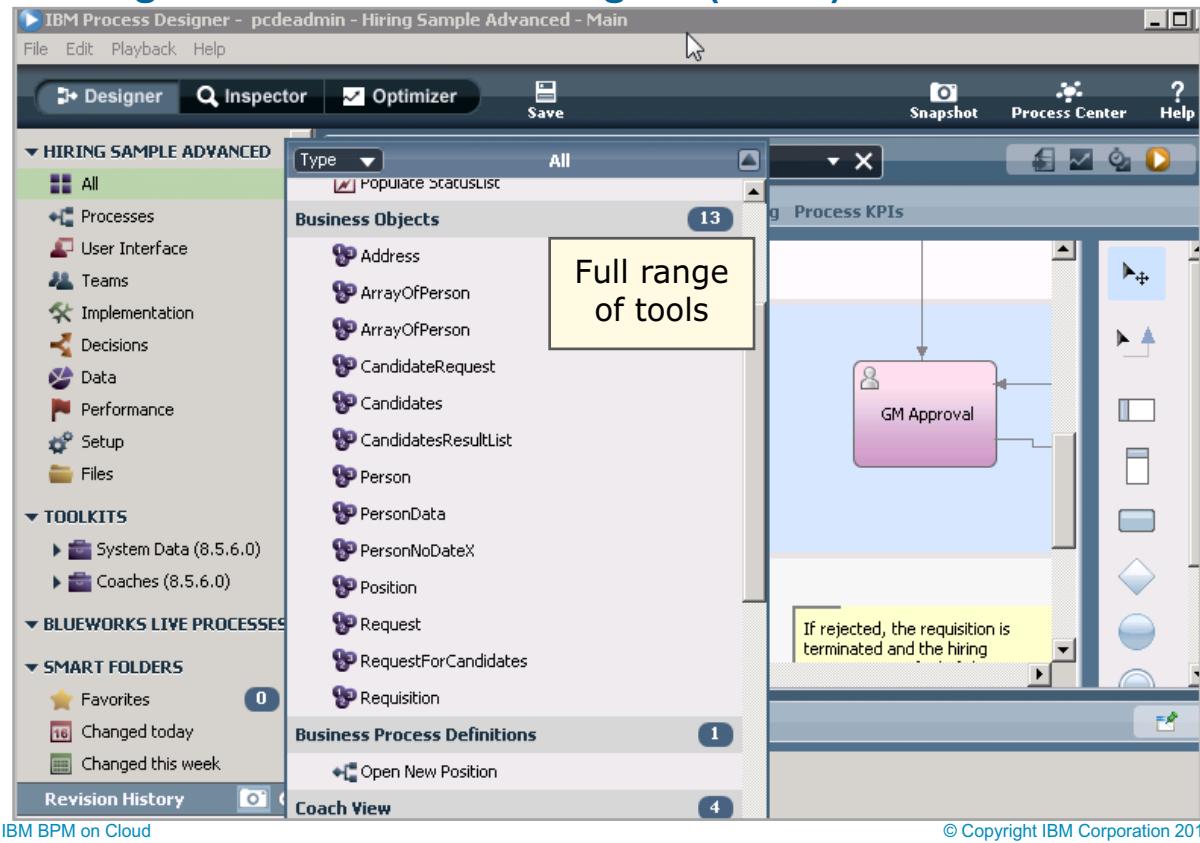


Figure A-11. Using the IBM Process Designer (3 of 3)

The screenshot shows the IBM Process Center interface. At the top, there's a blue header bar with the text "IBM Training" on the left and the "IBM" logo on the right. Below the header is a main content area with a dark blue header bar containing navigation links: "Process Apps", "Toolkits", "Servers", and "Admin". To the right of these are "Preferences | Logout" and a search bar. The main content area displays a list of process applications. A dropdown menu "Sort By:" is set to "Recently Updated". The list includes:

- Hiring Sample Advanced (HSAV) ★ ?  
Last updated on 2/24/16 by te@us.ibm.com
- Account Verification Skeleton (AVS) ★ ?  
Last updated on 2/4/16 by te@us.ibm.com

On the right side of the content area, there's a sidebar with the following options:

- + Create New Process App
- Import Process App
- Download Process Designer
- Download MobileFirst Adapter

At the bottom right of the sidebar is a link "Launch Getting Started". The footer of the page also features the "IBM" logo and the text "Process Center".

IBM BPM on Cloud

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Figure A-12. Using the IBM Process Center (1 of 3)

# IBM Training

## Using the IBM Process Center (2 of 3)

The screenshot shows the IBM Process Center Designer Inspector interface. The left sidebar has a tree view with 'DESIGNER INSPECTOR' at the top, followed by 'Account Verification Skeleton', 'Cases' (which is selected), and 'Toolkits'. The main area is titled 'MyHiringCase' and contains tabs for 'Overview', 'Activities', 'Variables', 'Folders', and 'Views'. The 'Overview' tab is active. It displays common details like 'Name: MyHiringCase', 'Modified: Feb 4, 2016 1:57:33 PM', and a documentation editor. There are sections for 'Advanced' (instance name), 'Exposing' (expose to start, business data, performance metrics), and 'Team' (instance owners). At the bottom, there's a 'Starting Document' section with a 'Select...' button.

IBM BPM on Cloud

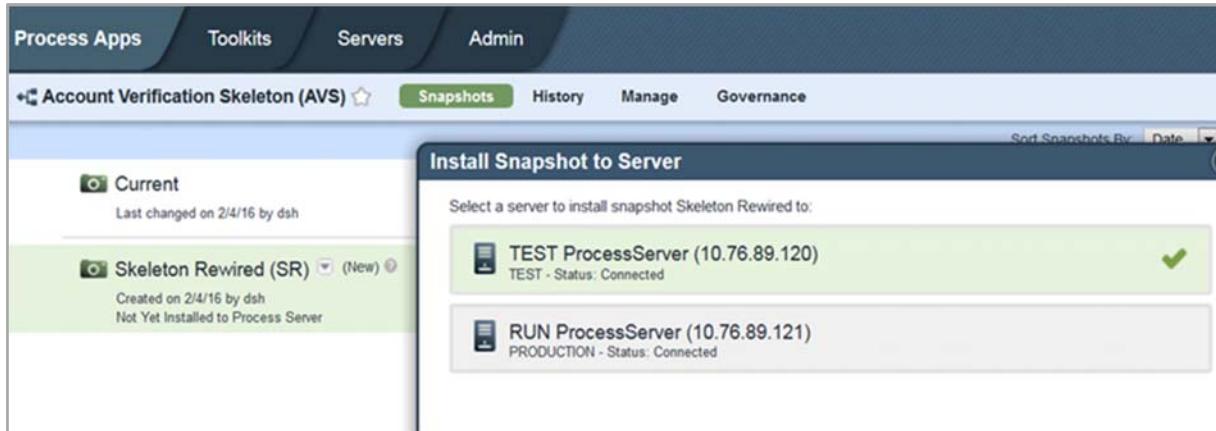
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Figure A-13. Using the IBM Process Center (2 of 3)

# IBM Training

## Using the IBM Process Center (3 of 3)

- Snapshots, export, install familiar



IBM BPM on Cloud

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Figure A-14. Using the IBM Process Center (3 of 3)

The screenshot shows the IBM Process Portal interface. At the top, there's a blue header bar with the text "IBM Training" on the left and the "IBM" logo on the right. Below the header, the main title "Using the IBM Process Portal" is displayed in a large, bold, blue font. The interface has a navigation bar at the top with several tabs: "WO...", "PROCESS...", "TEAM PERFORMANCE", "PROCESS PERFORMANCE", and a plus sign icon. On the left, there's a sidebar titled "My Work" with sections for "My Tasks" and "Overdue (9)". Under "My Tasks", there's a red notification bubble for "Step: Enter Applicant". The main content area is titled "Step: Submit job requisition". It contains a form for "Job requisition data" with three columns: "Requester" (Request number: 1140, Hiring Manager: Roland Peisl), "Requested job position" (Employment status, Department, Number of employees required: 1), and "Requested job start date and location" (Planned date of job start: 2/4/2016, Location). Below this is a "Position data" section with fields for Position type and Job title (Head of Product Development). At the bottom, there's a "Make your decision" section with a "Next" button. A yellow callout box on the right side of the "Position data" section says "Users shown familiar Work, Tasks, Coaches interface". At the bottom of the page, there are copyright notices: "IBM BPM on Cloud" on the left and "© Copyright IBM Corporation 2016" on the right.

Figure A-15. Using the IBM Process Portal

## Finding help for IBM BPM on Cloud

- IBM Knowledge Center for IBM BPM on Cloud:  
[http://www.ibm.com/support/knowledgecenter/SS964W/ditamaps/product\\_welcome\\_oncloud.html](http://www.ibm.com/support/knowledgecenter/SS964W/ditamaps/product_welcome_oncloud.html)
  - Complete product documentation for IBM BPM on Cloud, including a “Getting Started” tutorial
  - IBM BPM on Cloud user portal also has direct links to the documentation
- IBM BPM Support Portal:  
<https://www.ibm.com/support/entry/portal/product/websphere>
  - Support Portal provides tools and resources for help with IBM Business Process Manager
  - Open service requests, view fix lists, access community resources, and more

IBM BPM on Cloud

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*Figure A-16. Finding help for IBM BPM on Cloud*

# Appendix B. List of abbreviations

## A

<b>AIS</b>	Advanced Integration service
<b>Ajax</b>	Asynchronous JavaScript and XML
<b>AMD</b>	Asynchronous Module Definition
<b>APAR</b>	authorized program analysis report
<b>API</b>	application programming interface

## B

<b>B2B</b>	business-to-business
<b>BAL</b>	Business Action Language
<b>BPD</b>	business process definition
<b>BPD</b>	business process diagram (used primarily in Blaworks Live)
<b>BPEL</b>	Business Process Execution Language
<b>BPM</b>	business process management
<b>BPMN</b>	Business Process Model and Notation
<b>BPMS</b>	business process management system
<b>BWL</b>	Blaworks Live

## C

<b>CICS</b>	Customer information Control System
<b>CMIS</b>	Content Management Interoperability Services
<b>CRM</b>	customer relationship management
<b>CS</b>	coach service
<b>CSS</b>	Cascading Style Sheet

## D

<b>DB</b>	database
<b>DB2</b>	Database 2

## E

<b>ECM</b>	Enterprise Content Management
<b>EJB</b>	Enterprise JavaBeans

<b>ENV</b>	environment variable
<b>EPV</b>	exposed process variable
<b>ERP</b>	enterprise resource planning
<b>ES</b>	enabling service
<b>ESB</b>	enterprise service bus

**G**

<b>GB</b>	gigabyte
<b>GEX</b>	General Exception Handling Toolkit
<b>GUI</b>	graphical user interface

**H**

<b>HR</b>	human resources
<b>HS</b>	human service
<b>HTML</b>	Hypertext Markup Language
<b>HTTP</b>	Hypertext Transfer Protocol
<b>HTTPS</b>	Hypertext Transfer Protocol Secure

**I**

<b>IBM BPM</b>	IBM Business Process Manager
<b>I/O</b>	input/output
<b>IP</b>	Internet Protocol
<b>IT</b>	information technology

**J**

<b>J2C</b>	J2EE Connector architecture
<b>J2EE</b>	Java 2 Platform, Enterprise Edition
<b>JAR</b>	Java archive
<b>JCR</b>	Java Content Repository
<b>JDBC</b>	Java Database Connectivity
<b>JMS</b>	Java Message Service
<b>JNDI</b>	Java Naming and Directory Interface
<b>JS</b>	JavaScript
<b>JSON</b>	JavaScript Object Notation
<b>JVM</b>	Java virtual machine

**K**

**KPI** key performance indicator

**L**

**LAN** local area network

**LDAP** Lightweight Directory Access Protocol

**N**

**NVP** name-value pair

**O**

**OASIS** Organization for the Advancement of Structured Information Standards

**ODM** Operational Decision Manager

**OMG** Object Management Group

**OS** operating system

**P**

**PaaS** platform as a service

**PC** Process Center

**PDF** Portable Document Format

**PDW** Performance Data Warehouse

**PI** Project Interchange

**POJO** plain old Java object

**PS** Process Server

**R**

**RACI** responsible, accountable, consulted, informed

**RAD** rapid application development

**REST** Representational State Transfer

**RUP** Rational Unified Process

**S**

**SaaS** software as a service

**SCA** Service Component Architecture

**SDK** software development kit

**SIPOC** suppliers, inputs, process, outputs, customers

<b>SLA</b>	service level agreement
<b>SME</b>	subject matter expert
<b>SMTP</b>	Simple Mail Transfer Protocol
<b>SOA</b>	service-oriented architecture
<b>SOAP</b>	A lightweight, XML-based protocol for exchanging information in a decentralized, distributed environment. Usage note: SOAP is not an acronym; it is a word (formerly an acronym for Simple Object Access Protocol)
<b>SQL</b>	Structured Query Language
<b>SSL</b>	Secure Sockets Layer
<b>SSO</b>	single sign-on
<b>T</b>	
<b>TS</b>	task service
<b>U</b>	
<b>UCA</b>	undercover agent
<b>UI</b>	user interface
<b>UML</b>	Unified Modeling Language
<b>URI</b>	Uniform Resource Identifier
<b>URL</b>	Uniform Resource Locator
<b>V</b>	
<b>VM</b>	virtual machine
<b>W</b>	
<b>W3C</b>	World Wide Web Consortium
<b>WECBT</b>	WebSphere Education Coach Bonus Toolkit
<b>WS</b>	web services
<b>WSDL</b>	Web Services Description Language
<b>WYSIWYG</b>	what you see is what you get
<b>X</b>	
<b>XML</b>	Extensible Markup Language
<b>XPath</b>	XML Path Language
<b>XSD</b>	XML Schema Definition
<b>XSLT</b>	Extensible Stylesheet Language Transformation

# Appendix C. Resource guide

Completing this WebSphere Education course is a great first step in building your WebSphere, CICS, and SOA skills. Beyond this course, IBM offers several resources to keep your WebSphere skills on the cutting edge. Resources available to you range from product documentation to support websites and social media websites.

## Training

- **IBM Training website**
  - Bookmark the IBM Training website for easy access to the full listing of IBM training curricula. The website also features training paths to help you select your next course and available certifications.
  - For more information, see: <http://www.ibm.com/training>
- **IBM Training News**
  - Review or subscribe to updates from IBM and its training partners.
  - For more information, see: <http://bit.ly/IBMTTrainEN>
- **IBM Certification**
  - You can demonstrate to your employer or clients your new WebSphere, CICS, or SOA mastery through achieving IBM Professional Certification. WebSphere certifications are available for developers, administrators, and business analysts.
  - For more information, see: <http://www.ibm.com/certify>
- **Training paths**
  - Find your next course easily with IBM training paths. Training paths provide a visual flow-chart style representation of training for many WebSphere products and roles, including developers and administrators.
  - For more information, see:  
<http://www.ibm.com/services/learning/ites.wss/us/en?pageType=page&c=a0003096>

## Social media links

You can keep in sync with WebSphere Education, including new courses and certifications, course previews, and special offers, by going to any of the following social media websites:

- **Twitter**
  - Receive short and concise updates from WebSphere Education a few times each week.
  - Follow WebSphere Education at: [twitter.com/websphere\\_edu](http://twitter.com/websphere_edu)
- **Facebook**

- Become a fan of IBM Training on Facebook to keep in sync with the most recent news and career trends, and to post questions or comments.
- Find IBM Training at: [facebook.com/ibmtraining](https://facebook.com/ibmtraining)
- **YouTube**
  - Go to the IBM Training YouTube channel to learn about IBM training programs and courses.
  - Find IBM Training at: [youtube.com/IBMTTraining](https://youtube.com/IBMTTraining)

## Support

- **WebSphere Support portal**
  - The WebSphere Support website provides access to a portfolio of support tools. From the WebSphere Support website, you can access several downloads, including troubleshooting utilities, product updates, drivers, and Authorized Program Analysis Reports (APARs). To collaboratively solve issues, the support website is a clearing house of links to online WebSphere communities and forums. The IBM support website is now customizable so you can add and delete portlets to the information most important to the WebSphere products you work with.
  - For more information, see: <http://www.ibm.com/software/websphere/support>
- **IBM Support Assistant**
  - The IBM Support Assistant is a local serviceability workbench that makes it easier and faster for you to resolve software product issues. It includes a desktop search component that searches multiple IBM and non-IBM locations concurrently and returns the results in a single window, all within IBM Support Assistant.
  - IBM Support Assistant includes a built-in capability to submit service requests; it automatically collects key problem information and transmits it directly to your IBM support representative.
  - For more information, see: <http://www.ibm.com/software/support/isa>
- **WebSphere Education Assistant**
  - IBM Education Assistant is a collection of multimedia modules that are designed to help you gain a basic understanding of IBM software products and use them more effectively. The presentations, demonstrations, and tutorials that are part of the IBM Education Assistant are an ideal refresher for what you learned in your WebSphere Education course.
  - For more information, see: <http://www.ibm.com/software/info/education/assistant/>

## WebSphere documentation and tips

- **IBM Redbooks**
  - The IBM International Technical Support Organization develops and publishes IBM Redbooks publications. IBM Redbooks are downloadable PDF files that describe

installation and implementation experiences, typical solution scenarios, and step-by-step “how-to” guidelines for many WebSphere products. Often, Redbooks include sample code and other support materials available as downloads from the site.

- For more information, see: <http://www.ibm.com/redbooks>

- **IBM documentation and libraries**

- Information centers and product libraries provide an online interface for finding technical information on a particular product, offering, or product solution. The information centers and libraries include various types of documentation, including white papers, podcasts, webcasts, release notes, evaluation guides, and other resources to help you plan, install, configure, use, tune, monitor, troubleshoot, and maintain WebSphere products. The WebSphere information center and library are located conveniently in the left navigation on WebSphere product web pages.

- **developerWorks**

- IBM developerWorks is the web-based professional network and technical resource for millions of developers, IT professionals, and students worldwide. IBM developerWorks provides an extensive, easy-to-search technical library to help you get up to speed on the most critical technologies that affect your profession. Among its many resources, developerWorks includes how-to articles, tutorials, skill kits, trial code, demonstrations, and podcasts. In addition to the WebSphere zone, developerWorks also includes content areas for Java, SOA, web services, and XML.
- For more information, see: <http://www.ibm.com/developerworks>

## WebSphere Services

- IBM Software Services for WebSphere are a team of highly skilled consultants with broad architectural knowledge, deep technical skills, expertise on suggested practices, and close ties with IBM research and development labs. The WebSphere Services team offers skills transfer, implementation, migration, architecture, and design services, plus customized workshops. Through a worldwide network of services specialists, IBM Software Service for WebSphere makes it easy for you to design, build, test, and deploy solutions, helping you to become an on-demand business.
- For more information, see: <http://www.ibm.com/developerworks/websphere/services/>



IBM Training



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