White Paper

An Introduction to the Business Process Modeling Notation v2.0

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David Jones and **Roderick Brown**

David Jones is a Senior Consultant with Enterprise Architects in Australia, specializing in Enterprise Architecture, particularly Business Architecture. He is also an experienced practitioner in business process improvement and simplification. David has worked with many sector clients, undertaking assignments in Financial Services, Telecommunications and Power Utilities.

Roderick Brown is a freelance Consultant working in Melbourne, Australia, specializing in Business Architecture, particularly in Process Architecture. He is also an experienced practitioner in business process improvement and simplification. Roderick has worked with many sector clients, undertaking assignments in Banking, Investment Management and Wealth Management.

David and Roderick are passionate about helping organizations understand and document their own business processes, using frameworks such as APQC's Process Classification Framework and standards such as BPMN as well as applying simple approaches to improve and simplify these business processes.

1.1 Background

Much has been written about the importance of documenting processes. You have decided to, or have been asked to document some processes within your organization. You have also heard that BPMN (Business Process Model and Notation) is the best way of documenting processes.

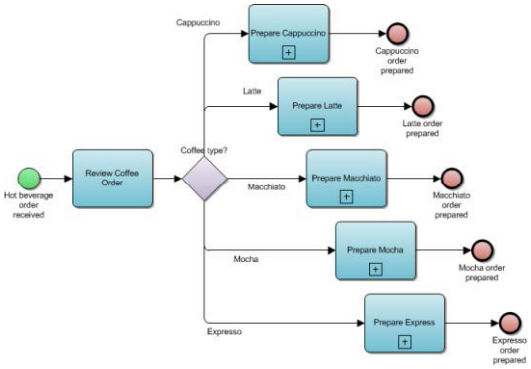

Figure 1: Example BPMN Model

However, you are unsure as to the facts of:

- Whether you should use BPMN;
- Why you should use BPMN;
- What you should use BPMN for; and
- How you should use BPMN?

The search for answers to these questions starts by searching for "BPMN" on Google, with approximately 2,000,000 results returned. So, where do you start?

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The large number of the results shows the level of interest in the subject and the website of the Object Management Group (www.OMG.org) is a good place to start. The OMG created BPMN and are responsible for managing the development of the standard.

Opening the BPMN v2.0 specification, you discover it is 550 pages long! If you were really adventurous and managed to get to Chapter 7 or beyond, you would discover there are more than 100 objects in the complete palette for BPMN. However, approximately 50% of these or around 50 to 60 are required to simply document processes, as the remainder relate to being able to define Business Processes that can be made executable.

Quickly moving to open the next document (BPMN 2.0 by Example: non-normative OMG document with BPMN 2.0 examples), you find that this is a more manageable 47 page document. After scanning this document, however, you are even more confused, with all this technical jargon and mentions of a funny language called XML.

1.2 History of BPMN

The need for a common process diagramming standard in the late 1990's was a key driver in a number of different initiatives beginning in the early 2000's. One of these initiatives was the Business Process Management Initiative (BPMI). It was under the management of the BPMI, that the Business Motivation Model (BMM) and Business Process Model and Notation (BPMN) came into existence.

BPMN V1.0 was first published in 2004. Shortly after, in 2005, the BPMI merged with a larger initiative group, the Object Management Group (OMG). Since 2005, OMG has continued to develop BPMN and a range of other potentially helpful standards, such as the Semantics of Business Vocabulary and Business Rules (SBVR) and Business Process Maturity Model (BPMM).

The latest finalized version of BPMN is Version 2.0, released in January 2011, which followed on from BPMN 1.2.

Although there are reasonably significant changes between BPMN 1.2 and 2.0, the majority of the changes relate to the various technical aspects of BPMN, which are not covered in this document.

1.3 Why would I use BPMN?

The importance of documenting Business Processes has been covered in Management articles and texts. To illustrate the importance of documenting your business processes, virtually all Process Improvement approaches, such as Six Sigma and Lean, start with documenting the business processes being studied. However, that obviously begs the question, "How do I document business processes?"

BPMN has become widely adopted, as the means of graphically documenting business processes across the globe. For example, many

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government and corporate organizations now mandate the use of BPMN in the documenting of their Business Processes.

Because of the wide adoption of BPMN as a business process modeling standard, there are an increasing range of tools to:

- Assist in setting standard times or targets for your business processes;
- Help manage the execution of your business processes;
- Collect data from your business processes to help identify issues that need to be improved; and
- Assist in analyzing your processes to identify and test (by simulation) possible improvements.

The growing take up of BPMN has also been driven by adoption of Business Process Management (BPM) supported by the rising use of Business Process Management Suites (BPMS), many of which use BPMN as their means of describing business processes to enable execution of these processes.

1.4 What you should use BPMN for?

BPMN should only be used to document the details of how a process operates. BPMN is a visual representation of a process that shows:

- Who is involved in the process and their interactions; and
- The flow of a business process from activity to activity.

Although BPMN can be used to breakdown a process into increasing levels of detail, it is generally not seen or used as a means of showing process decomposition at high levels.

1.5 How you should use BPMN?

This document focuses on how to use BPMN in documenting your processes by showing what each of the various symbols mean and the context in which they should be used using examples.

As briefly mentioned earlier, you do not need to learn the complete range of BPMN 2.0 objects to be able to successfully apply BPMN. In fact, it is best to learn and apply BPMN to document your Business Processes in a layered approach.

Using this approach, it is only necessary to learn and apply around 25 BPMN Objects and Symbols to build quite reasonably detailed representations of your Business Process using BPMN.

Only around another 25 to 30 BPMN Objects and Symbols are needed to increase the level of detail required to cope with about 90% to 95% of all Business Processes.

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Well, let's get started.

2 Overview of BPMN

2.1 Overview of BPMN Components

The BPMN 2.0 Specification has been created to support many different points of view, for example:

- Business Users wanting to document their processes;
- IT Professionals wanting to turn the above processes into executable process applications; and
- Software Vendors wanting to develop Business Process Modeling tools or BPMS products.

With so many competing interests to satisfy during the development of BPMN 2.0, it is no surprise that the final specification ended up resembling one designed by a committee, i.e. lacking a clarity of purpose, frequently verbose (as witnessed by its 500 plus pages) and unsure of who is the primary audience.

This is best illustrated by looking at the Core and Layer Structure of BPMN shown in the Specification:

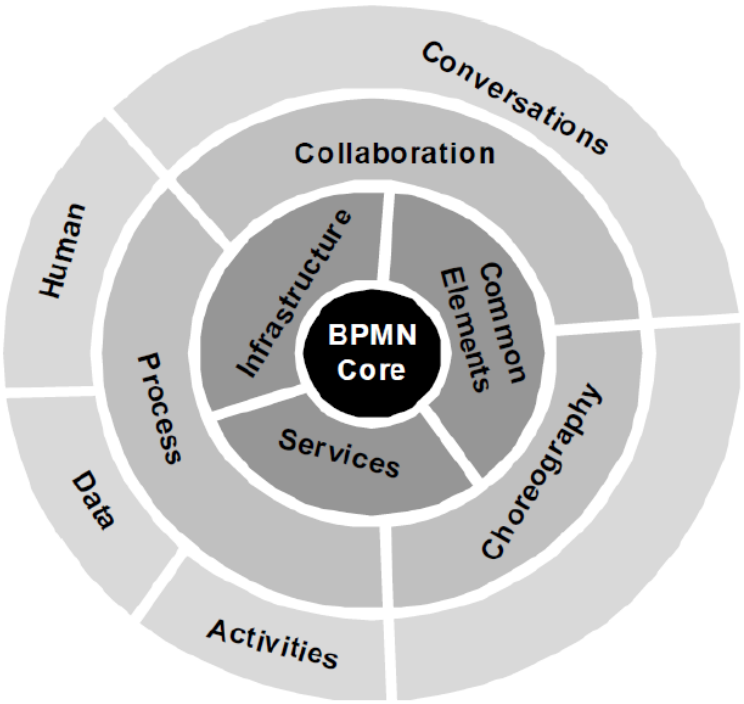

Figure 2: A representation of the BPMN Core and Layer Structure[i]

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2.2 Overview of BPMN Process Types and Categories

The BPMN 2.0 Specification defines three “sub-classes” (or types) of Process Models:

- Descriptive;
- Analytic; and
- Common Executable.

The Descriptive type of Process Models document Business Processes at an overview or high-level (i.e. minimal details) and use a limited sub-set of BPMN’s visible elements and attributes.

The Analytic type of Process Models provide more detail than the Descriptive type with an expanded sub-set of BPMN’s visible elements and attributes, about half the complete set.

The Common Executable type of Process Models focus on the detail needed to explain how Business Processes can be executed and use the complete set of BPMN’s visible Elements and attributes.

The Specification also explains that to conform to BPMN 2.0, Process Models must, at a minimum, allow Business Processes to be documented using Core BPMN Elements (see the following later section) in the form of 3 different types of diagrams;

- Collaboration diagrams (see 4.2);
- Process diagrams (see 4.3.2); and
- Conversation diagrams (not covered any further within this document).

2.3 Overview of Core BPMN Elements

BPMN comprises of a small set of graphical elements that are used to produce a Business Process Diagram (BPD). These elements are divided into five basic categories:

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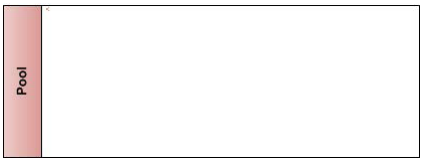
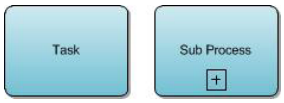
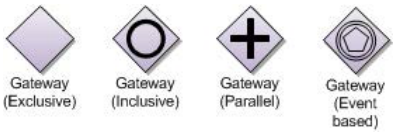
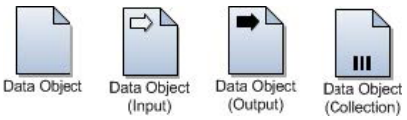
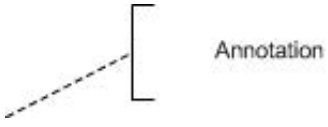
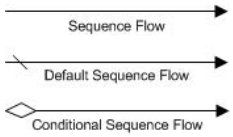
Table 1: Core BPMN Elements

Category	Elements	Description	Symbol
Swim Lanes The set of elements that define the participants within a Process.	**Pool**	Defines either group of participants or an external entity who collaborate within a process and may also contain lanes.	
	Lane	Defines a specific participant or role within a process and may be contained in a pool or contain other lanes.	
Flow Objects The set of elements that describe what happens within a Process.	**Event**	Shows something that has happened or may about to happen during a process.	
	Activity	Work performed within a process by a participant.	
	Gateway	Controls the sequence and flow within a process, providing routing within a process.	
Flow Objects The set of elements that describe what happens within a Process.	**Data Object**	Information required or produced by an Activity, the life of which is limited to that of the Activity.	
	Data Store	A set of information required or produced by an Activity, which persists beyond the Process.	
	Message	Contains the contents of a communicaion that flows between two participants.	
Artefacts The set of elements that amplify other elements within the Process.	**Group**	Allows flow objects to be grouped for purposes of documentation or analysis.	
	Annotation	Provides additional information of potential benefit to elaborate an element within the process.	
Connecting Objects The set of elements that connect two elements.	**Sequence Flow**	Connection between flow objects in a process, showing the path of execution of the activities within the process.	
	Message Flow	Shows message flowing between partipants or processes.	
	Association	Links Data Items to Flow Object and shows direction(s).	

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3 Case Study

3.1 Overview

The case study is based on the simple concept of ordering, making and providing Coffee or Tea in a typical Café. For the purposes of attempting not to over complicate the Case Study, the only drinks that can be ordered are:

- Coffee
  - o Cappuccino
  - o Café Latte
  - o Espresso
- Tea
  - o English Breakfast
  - o Earl Grey

For the purposes of the Case Study, it is assumed that the processes to order, prepare and deliver the hot beverage are similar to those in any large coffee chain. The processes include:

- Orders and cash are taken by the Serving Attendant / Cashier from the Customer;
- Orders taken by the Serving Attendant / Cashier are passed to a Barista automatically and shown on a screen for fulfilment by a Barista;
- There are separate processes for preparing tea and coffee;
- Completed orders are provided to the Customer by the Barista; and
- The Barista can also request additional milk and coffee beans to be obtained from the store room by the kitchen hands or additional stock to be ordered by the Café Manager.

The Customer is able to select the Sugar or Sweetener of their choice from a serving bar, located at the point where Customers receive their beverage.

3.2 Applying the Learning using the Case Study

Each of the following sections of the document details the key aspects of BPMN, covering:

- What it means;
- How to use it; and
- Suggested best practices to use.

At the end of these sections, each key aspect will be put into context by describing how a component of the Case Study can be documented.

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4 Understanding Types of BPMN Diagrams

4.1 Overview of BPMN Process Models and Diagram Types

As previously covered, the BPMN 2.0 Specification defines three "sub-classes" (or categories) of Process Models, namely:

- Descriptive Process Models;
- Analytic Process Models; and
- Common Executable Process Models.

The BPMN Specification explains that BPMN 2.0 aims to cover three basic models of Business Processes:

- Public Processes, which are more commonly known as Collaboration Diagrams;
- Private Processes, which are more simply called Process Diagrams; and
- Choreographies, which are more commonly called Choreography Diagrams.

A fourth BPMN diagram type, Conversation Diagrams, is also defined by the BPMN 2.0 Specification.

4.2 BPMN Process Model Types

4.2.1 Descriptive Process Models

Because Descriptive Process Models are used to document Business Processes at a high-level, Descriptive Process Models are essentially the starting point for documenting Business Processes. The primary purpose of Descriptive Process Models is to show the overall flow of a Business Process, covering the details of the process steps undertaken and how the different Parties interact within it.

Not surprisingly, the limited nature of the sub-set of BPMN visual elements and attributes of Descriptive Process Models make it the ideal starting point for learning how to document your Business Processes using BPMN. In fact, it is possible to adequately document an Organization's entire set of Business Processes using only Descriptive Process Models.

You could even decide not to progress any further. However, the restrictive sub-set of BPMN visual elements and attributes means that the level of detail that can be captured is limited. This can cause problems when you are trying to adequately cover details of complex or intricate processes.

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4.2.2 Analytic Process Models

As described above, Analytical Process Models allow more detail to be added in documenting your Business Process by extending the sub-set of BPMN visual elements and attributes that are contained within Descriptive Process Models.

Analytical Process Models are typically the key to capturing the more complex or intricate details of Business Processes. The additions to the Descriptive Process Model sub-set of the BPMN visual elements and attributes effectively double the available set of visual elements and attributes.

4.3 BPMN Diagram Types

4.3.1 Collaboration Diagram

A Collaboration Diagram documents the interactions between a process and either other processes or a Party.

A Party is either external to the organization or a different area within the organization and can be either responsible for the process or provide necessary information for the process. A Party is represented by a Pool.

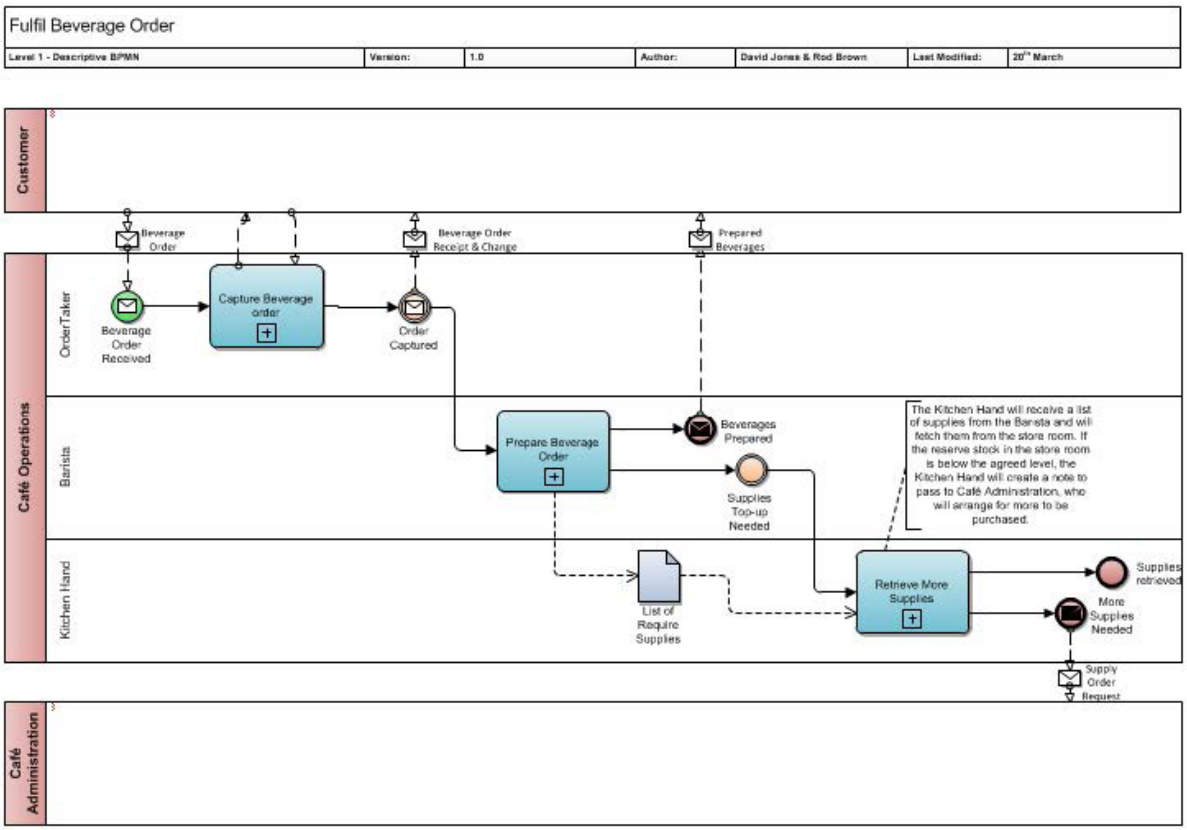

Figure 3: Example of Collaboration Diagram

A Collaboration Diagram provides the “canvas” to document your business processes at the level which shows the interaction between all the participants and the processes. However, it is not the only form of Diagram you use to document your Processes. Rather, its primary

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purpose is to show how the key external and internal Parties are involved in the processes being documented.

Consequently, the primary use of a Collaboration Diagram is to show the collaboration of Parties with the higher level Processes.

4.3.2 Process Diagram

A Process Diagram documents processes that are internal to an organization or a specific area within the organization. Consequently, a Process Diagram represents the processes contained with a Single Pool. However it may contain none, one, or more than one Lane in a Pool or a Pool implied by one inherited from a Collaboration Diagram.

As illustrated below, the use of no Lanes can provide a simple means of documenting a Process where the role executing the Process is shown on the Collaboration Diagram above it.

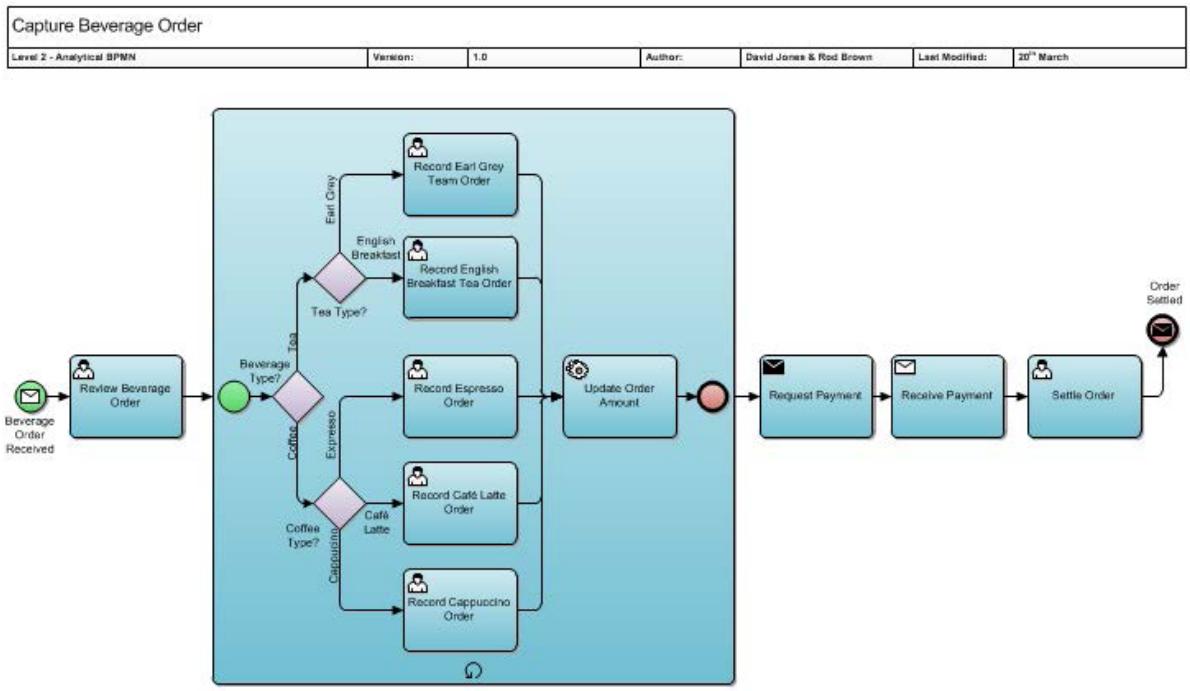

Figure 4: Example Process Diagram

4.4 Process Model Types versus Process Diagram Types

As we outlined earlier, the primary purpose of Descriptive Process Models is to show the overall flow of a Business Process, covering the details of the process steps undertaken and how the different Parties interact within it.

Consequently, a Descriptive Process Model is typically the type of Process Model used to document Collaboration Diagrams. So, it is probably no surprise that Analytic Process Models are also typically the type of Process Models used to document Process Diagrams.

However, it is not necessarily that simple. For example, you may wish to just use Descriptive Models, or to also use the Analytic Process Model type for documenting Collaboration Diagrams.

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The basis for deciding which of the Process Model types to use will depend on the level of detail you want to capture and also the number of levels of detail you choose to adopt in documenting your Organization's Business Processes.

4.5 Best Practice Recommendations

For simple or straight forward processes, the typical choices would be to use:

- A single level of Collaboration Diagrams using a Descriptive type of Process Model; plus
- Each Process defined on the Collaboration Diagrams documented with a Process Diagram using an Analytic type of Process Model.

For less straight forward or complicated processes, the typical choices would be to use:

- Two levels of Collaboration Diagrams, with the top most level using a Descriptive type of Process Model type and the lower level documenting each of the processes identified and documented on the top level using an Analytic type of Process Model; plus
- Each of the Processes defined on the lower level Collaboration Diagrams documented with a Process Diagram using an Analytic type of Process Model.

4.6 Case Study Process Models and Process Diagrams

To document the Case Study:

- A single Collaboration Diagram, using the Descriptive type of Process Model, will be used to document the overall Process; and
- Multiple Process Diagrams, using the Analytic type of Process Model, will be used to document each of the Processes required to prepare the Coffee and Tea Beverages.

5 Understanding the types of Swim Lanes

5.1 Overview

Swim Lanes are used to represent the various Parties and Roles involved in a Process. They are represented on the Collaboration and Process Diagrams by Pools and Lanes.

The analogy of a Swimming Pool demonstrates each Pool is independent of another, and can also contain one or more Lanes. This is

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extended to show a Process may flow from one Lane to another within a single Pool, but it is not allowed to flow across Pools, although information (in the form of messages) is allowed to flow from one Pool to another.

Consequently, a key issue in understanding what to represent with a Pool or a Lane is to understand the relationships between the Parties and Roles being documented and the degree of influence the management of one Party or Role has over another Party or Role.

5.2 Pools

As summarised in 2.3, a Pool represents a Party involved in a process. The Pool often represents a Party external to the organization being modeled. However, a Pool can also be used to represent different areas within the organization. Under some circumstances, a Pool can also be used to show a Process. This should be seen as the exception rather than the norm.

The BPMN symbol for a Pool provides the “canvas” that is used to contain all the BPMN Flow Elements that are used to define the details of the Process contained within it.

Figure 5: BPMN Symbol for a Pool

Pools can be documented and shown as either a “White Box” or “Black Box”:

- A “White Box” Pool contains all the details of a Process contained within it; whereas
- A “Black Box Pool” does not, i.e. the details are shown to the reader in a “White Box” Pool but hidden from the reader in a “Black Box” Pool.

5.3 Lanes

As also summarised in 2.3, a Lane represents a position or role position within the Party defined by the Pool in which it contains. Lanes can also be further divided into sub-Lanes.

Similar to that for a Pool, the BPMN symbol for a Lane provides the “canvas” that can be used to contain the BPMN Flow Elements used to define the details of the Process contained within it.

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Figure 6: Example of the BPMN Symbols used for Lanes and Sub-Lanes

5.4 Best Practice Recommendations

It is recommended that all Parties involved in the Business Process but who are external to the Organization, such as a Customer or Supplier, should be represented using Black Box Pools.

The only reason to vary this would be where it is necessary or highly desirable to document the actual steps being undertaken within the Pool. This may, for example, be appropriate if you are attempting to agree a new process with a Supplier.

Parties internal to an Organization should be documented using one of more White Box Pools. The deciding factor on how many White Box Pools to include will be based on how many areas within the Organization participate but are operated and managed independently of other areas. For example, in the Organization that sells Coffee Beans to the Café in our Case Study, the Sales area of the Organization will be documented using a different Pool to that which sources the Coffee Beans or ships the Coffee Beans to Cafés.

Lanes within the White Pools should represent the different Participants who undertake the various steps within it. A Lane can be further divided into Sub-Lanes to represent different roles that a Participant undertakes. However, this should be used sparingly to illustrate specific key role variations of importance.

5.5 Case Study Implications

The recommended Pools and Lanes for the Collaboration Diagram are:

- A Black Box Pool to represent the Customer; and
- White Box Pools to represent:
    - Café Operations with Lanes to represent the Order Taker, Barista role, and kitchen hand; and
    - Café Administration This is not the only acceptable possible solution. For example another valid alternate solution could be to use Black Box Pools for the Kitchen Hands and

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Café Manager. The answer will depend on factors such as whether we are interested in what happens in the Kitchen or Administration to process the requests received from the Barista. For the purposes of the Case Study, we are assuming that we will want to understand how the requests from the Barista for coffee beans and milk will be fulfilled. Although, documenting what happens is not actually covered in the Case Study.

6 Overview of Flow Objects

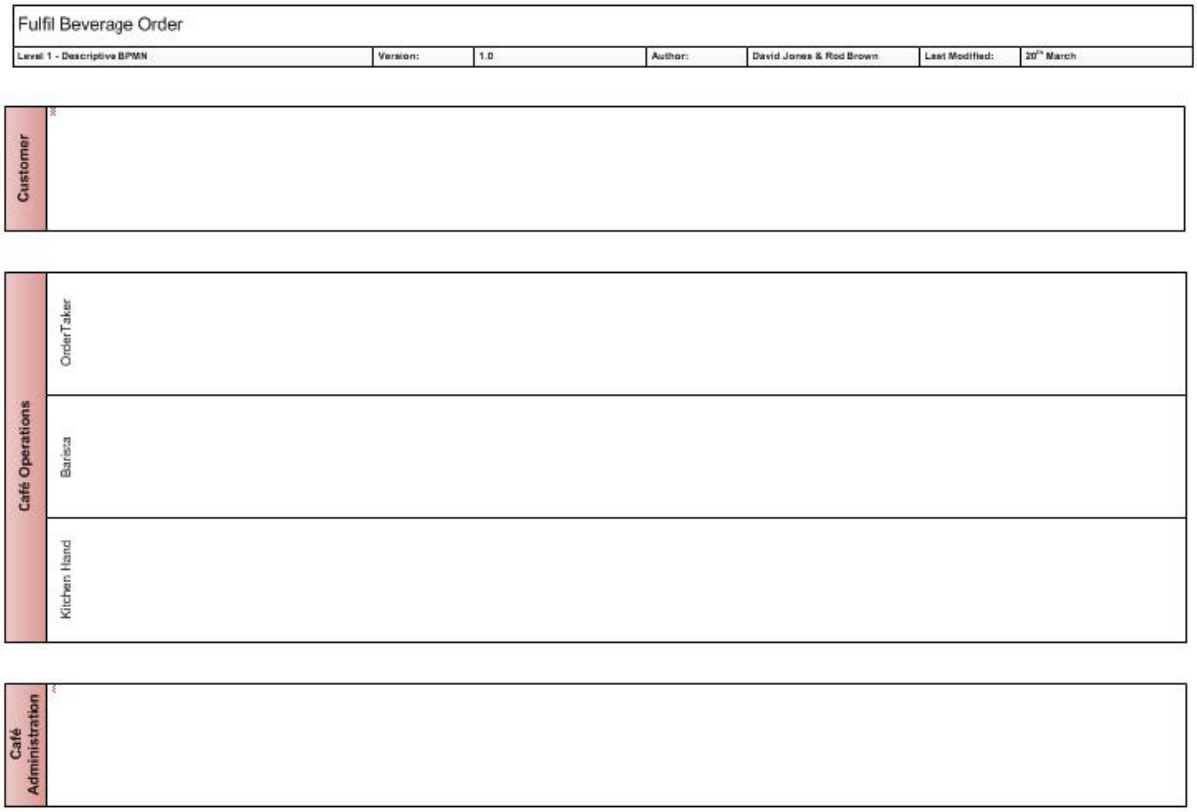

Figure 7: Recommended Swim Lanes for Case Study

6.1 Overview of Flow Objects

There is a set of 3 Flow Objects, namely:

- **Events** – represent something that "happens" during the course of a Process;
- **Activities** – represent work undertaken within a Business Process; and
- **Gateways** – control the flow within a Business Process.

6.2 Overview of Event Types

As summarised in 2.3, an Event is something that "happens" during the course of a Process and these Events affect the flow of the model and usually have a cause (trigger) or an impact (result).

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Events are circles with open centres to allow internal markers that help to differentiate different triggers or results. There are three basic types of events:

- Start Events occur at the start of a process and cause the initiation of a process;
- **Intermediate Events** – which can occur anywhere between the start and end events within the process; and
- **End Events** – these can only occur at the end of a process and describe the results that are leading to the exit of the process.

There is also a special form of Intermediate Events that are attached to the boundary of an Activity. These are called Intermediate Boundary Events.

6.3 Overview of Activity Types

As also summarised in 2.3, an Activity is used to represent work undertaken within a Business Process. Activities are used to represent the points in a Process flow where work is actually performed.

An Activity is represented, within a Process, as either:

- **An Atomic Activity** – which is the lowest level (or simplest) form of an Activity, i.e. not able to be broken down further; or
- **A non-Atomic Activity** – which is the highest level (or compound) form of an Activity, i.e. able to be broken down further.

The Atomic form of an Activity is called a Task and the non-atomic form of an Activity is called a Sub-Process.

An Activity doesn't have a single graphical object; rather it is a set of graphical objects. Both Tasks and Sub-Processes can also be used as a Call Activity, which allows a specific instance of a Tasks or Sub-Process to be re-used across multiple Processes.

6.4 Overview of Gateway Types

As outlined in 2.3, Gateways are used to control how Sequence Flows interact as they converge and diverge within a Process. If the sequence flow does not need to be controlled and the process is flowing from one activity to the next, then a Gateway is not needed.

There are five types of Gateways;

- **Exclusive Gateway** – which represents a branching point in the process that requires one and only one of the possible paths being chosen from the available options based on the evaluation of an Expression;
- **Inclusive Gateway** – which represents a branching point in the process that allows one or more (i.e. multiple) of the possible

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paths being chosen from the available options based on the evaluation of an Expression;

- **Parallel Gateway** – which represents a branching point in the process where all of the paths in the process must be followed;
- **Event Based Gateway** – which represents a branching point in the Process where the alternative paths that follow the Gateway are based on Events (defined after the Event Based Gateway) that can occur, rather than the evaluation of an Expression; and
- **Complex Gateway** – which provides the ability to support complex merging, and branching behaviour that is not captured by other Gateways.

Note: *A Gateway does not undertake any processing to evaluate expressions or events. Rather, it should be simply seen as the routing mechanism. Evaluation of any expression, for which the Gateway is to undertake the routing, should be undertaken in the previous Activity.*

7 Understanding Event Types

7.1 Start Event Triggers

As previously outlined in 6.2, a Start Event can only occur at the start of a process. It is the means by which a Process is started (hence the name) or initiated. A Start Event is graphically represented in BPMN as a circle with a single thin outside border, as shown below:

A start event is typically triggered by:

Figure 8: BPMN Symbol for a Start Event

- **None** – which has no specific defined trigger;
- **Message** – is triggered by the arrival of a message from another process or participant;
- **Timer** – is triggered by the arrival of a specific date (and time) or after a cycle, e.g. 9am on Monday or 1st of the Month; and
- **Conditional** – is triggered when a specified condition is reached, e.g. credit limit is exceeded;
- **Escalation** – occurs when escalation is identified and has been triggered;
- **Error** – is triggered when some form of error state has been previously identified and triggered; and
- **Signal** – is triggered by the arrival of a signal broadcast by another activity or process.

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7.2 Intermediate Events Triggers

As previously indicated in 6.2, an Intermediate Event occurs anywhere within a Process between the start and end events. An Intermediate Event is graphically represented in BPMN as a circle with twin thin outside borders, as shown below:

Figure 9: BPMN Symbol for an Intermediate Event

An intermediate event is typically triggered or impacted by:

- **None** – which has no specific defined trigger;
- **Message** – by the arrival of a message from another process or participant (a Catch event) or sending of a message to another process or participant (a Throw event);
- **Timer** – is triggered by the need to wait for a specific date (and time), cycle or delay, e.g. Monday at 9am, End of the Month or 12 hours;
- **Escalation** – occurs when escalation is identified and needs to be triggered;
- **Compensation** - occurs when a process has finished, but that compensation is needed;
- **Conditional** – is triggered when a specified condition is reached, e.g. credit limit is exceeded;
- **Link** – is used to connect two parts of the process, usually across page boundaries or to remove the need for crossed lines; and
- **Signal** – is triggered by the arrival of a signal broadcast by another activity or process.

A number of the trigger types of Intermediate Events occur in two forms:

- **Throwing** – which occurs when the Intermediate Event is causing something to happen, for example a 'throwing' Intermediate Message Event represents the sending (or throwing) of a message; and
- **Catching** – which occurs when the Intermediate Event is listening and waiting for something to happen, for a catching Intermediate Message Event represents the receiving (or catching) of a message.

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7.3 Intermediate Boundary Events Triggers

As also previously indicated in 6.2, Intermediate Boundary Events are a special form of Intermediate Events. A Boundary Event is attached to an Activity and is consequently triggered during the execution of an Activity if the specific event trigger occurs.

Boundary Events can be defined in two forms:

- **Interrupting Boundary Events** – which interrupts the execution of the Activity, i.e. the Activity is cancelled, when the event trigger occurs; and
- **Non-interrupting Boundary Events** – which does not interrupt the execution of the Activity, i.e. the Activity continues execution, when the event trigger occurs.

An Interrupting Intermediate Boundary Event is graphically represented in BPMN using the same symbol as a normal Intermediate event, i.e. a circle with twin thin outside borders, but shown on the side of an Activity (either Task or Sub-Process, but more commonly on a Sub-Process) as shown below:

Figure 10: BPMN Symbol for a Message Interrupting Intermediate Boundary Event

A Non-Interrupting Intermediate Boundary Event is graphically represented in BPMN using the same symbol as a normal Intermediate event, i.e. a circle with twin thin outside borders, but shown on the side of an Activity (either Task or Sub-Process, but more commonly on a Sub-Process) as shown below:

Figure 11: BPMN Symbol for a Message Non-Interrupting Intermediate Boundary Event

The set of Boundary Event used in preparing Analytic type of Process Models are:

- Message Intermediate Boundary Event (both Interrupting and Non-Interrupting);
- Timer Intermediate Boundary Event (both Interrupting and Non-Interrupting);
- Error Intermediate Boundary Event (Interrupting only);

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- Escalation Intermediate Boundary Event (Non-Interrupting only);
- Signal Intermediate Boundary Event (both Interrupting and Non-Interrupting); and
- Conditional Intermediate Boundary Event (both Interrupting and Non-Interrupting).

7.4 End Events Triggers

As also previously explained in 6.2, an End Event can only occur at the end of a process and is used to define the exit point of a process and be the trigger for why the process ended. An End Event is graphically represented in BPMN as a circle with either a single (or twin) thick outside borders, as shown below:

Figure 12: BPMN Symbol for an End Event

An end event is typically triggered or impacted by:

- **None** – which has no specific defined trigger;
- **Message** – is triggered by the sending of a message to another process or participant;
- **Escalation** – occurs when escalation is identified and needs to be triggered;
- **Compensation** - occurs when a process has finished, and compensation is necessary;
- **Conditional** – is triggered when a specified condition is reached, e.g. credit limit is exceeded;
- **Error** – is impacted when some form of error state is identified and a named Error should be generated and triggered; and
- **Terminate** – indicates that all Activities in the Process should be immediately ended;

7.5 Best Practice Recommendations

7.5.1 Recommendations for Event Naming

Events should be named using a <Qualifier> <Data Object> <Verb> approach. The Verb is usually derived from the preceding or following action to be undertaken, taking the past tense or future tense of the Verb used.

For example:

- Beverage Order captured;
- Beverage Order prepared;
- Supplies retrieved; and

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- More Supplies needed.

Data Object names should contain words that provide specific and useful to describe the Data Object.

It is important to avoid ambiguity so your readers can understand the Event and its trigger.

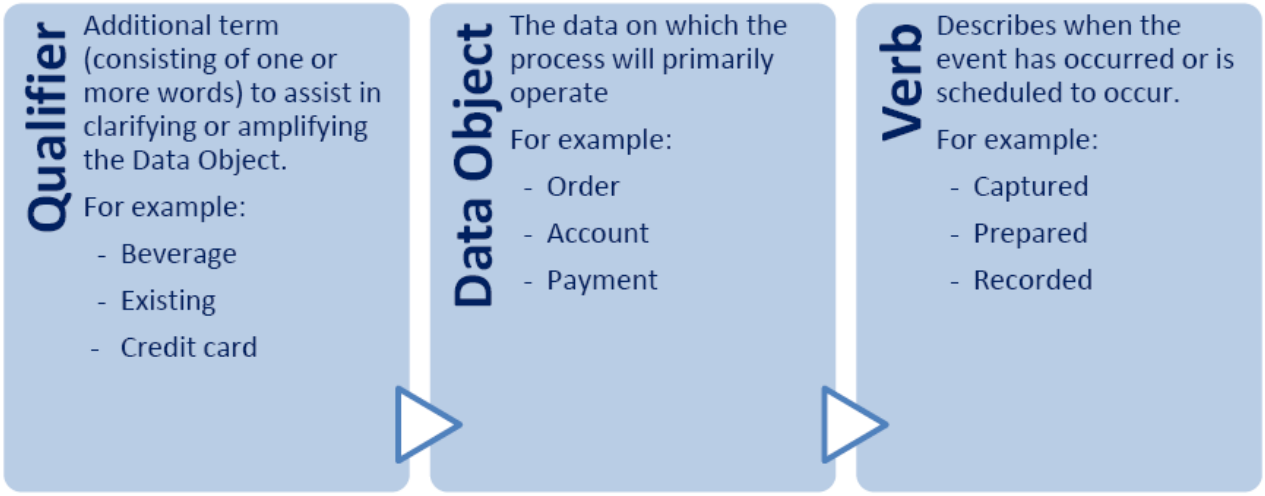

Figure 13: Recommended approach for naming Events

7.5.2 Recommendations for Start Events

The most commonly used trigger types for Start Events are the None, Message and Timer. However, there are also occasions when the Error, Escalation and Conditional trigger are not only useful but appropriate.

7.5.3 Recommendations for Intermediate Events

The None and Message and Timer triggers are again the most commonly used triggers when documenting processes, although there are occasions when the Escalation, Compensation, Conditional and Error can be useful. The Link type of an Intermediate Event is a special form of Intermediate Event that allows linking between pages.

7.5.4 Recommendations for Boundary Intermediate Events

Knowing when to make use of Boundary Intermediate Events is difficult. The common uses for Boundary intermediate Events are to handle Error and Escalation triggers within Activities, i.e. Sub-Processes or Tasks.

Note: It is more likely that Boundary Intermediate Events will be used on Sub-Processes than Tasks, as they are used as a means of catching specific event triggers during the execution of a Sub-Process.

7.5.5 Recommendations for End Events

The None and Message triggers are the commonly used triggers when documenting processes, although there are occasions when the Escalation, Conditional, Error and Terminate can be useful.

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7.6 Case Study Implications

7.6.1 Start Events usage in Case Study

Each Collaboration and Process diagram needs to begin with Start Events. For example, in the Case Study:

- *"Fulfil Beverage Order" begins with Start Message Event "Beverage Order Received"; and*
- *Prepare Beverages begins with None Start Event, Beverage Order Placed.*

7.6.2 Intermediate Events usage in Case Study

There are three Intermediate Events used in the Case Study.

The first two of these are contained in *"Fulfil Beverage Order"*:

- *"order captured",* a Message Intermediate Event, is between *"Capture Beverage order"* and *"Prepare Beverage Order"* sub-processes and is used to handle the Order Receipt and any change to the customer and pass the order to the Barista; and
- *"supplies top-up needed",* a None Intermediate Event, is between *"Prepare Beverages Order"* and *"Retrieve More Supplies"* Sub-Processes and is used to indicate a possible break in execution between the Barista (requesting the replenishing of their supplies) and the Kitchen Hand (retrieving and storing the additional supplies).

A None Intermediate Event called *"Beverages Made"*, the remaining Intermediate Event used in the Case Study, is used in *"Prepare Beverage Order"* to handle *"beverage prepared"* End Event, one of the End Events in the Expanded Sub-Process.

7.6.3 Boundary Intermediate Events usage in Case Study

The Case Study uses several Boundary Intermediate Events.

As explained previously, Boundary Intermediate Events do have their uses and are an effective way of handling events such as an Error or the need for Escalation. However, their use needs careful consideration and application.

The Case Study uses Boundary Intermediate events in:

- *"Prepare Beverage Order"* process to handle the escalation of when the Barista identifies that the Coffee and Tea supplies need to be topped up; and
- *"Retrieve More Supplies"* process to handle the escalation of when the Kitchen Hand identifies that the Coffee and Tea Supplies need to be re-ordered by the Café Administration.

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7.6.4 End Events usage in Case Study

Every process needs to have at least one End Event, just like Start Events. For example, in the Case Study:

- *"Fulfil Beverage Order"* ends with the End Events:
  - o None End Event *"Order Completed"*,
  - o None End Event *"Supplies Retrieved"*, and
  - o Message End Event *"More Supplies Needed"*;
- *"Capture Beverage Order"* ends with the None End Event "Order Settled";
- *"Prepare Beverage Order"* ends with the End Events:
  - o None End Event *"Supplies Needed"*, and
  - o Message End Event *"Beverage Order Prepared"*.

8 Understanding the types of Activity

8.1 Tasks

As explained previously, a Task is the atomic form of Activity and occurs within the overall flow of a Process. Tasks are used when the work in the Process cannot be broken down to any finer level of detail and generally, an end-user and/or application is used to represent the work performed by the Task when it is executed.

Tasks can be used in one of two forms:

Type of Sub-Process	Description	BPMN Symbol
Task (Standard form)	A Task shares the same basic outline shape in as the Sub-Process, which is a rectangle with rounded corners with a single thin line	
Call Activity Task	When a Task is being used in its Call Activity form, i.e. as a re-usable Task used across many Processes, the thin line is changed to a thick line	

Table 2: BPMN Symbols for Tasks

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In addition to the standard form of a Task, Tasks can also be divided into a number of sub-types. These sub-types are used to identify specific details of who the Task is performed by or how the Task is performed. For example, in Descriptive and Analytic types of Process Model, the following sub-types of Tasks are defined:

Table 3: Task types of Activities

Sub-type	Description	BPMN Symbol
Service	A Service Task is where the Task is being by a service, i.e. some form of automation, e.g. a Web service or an automated application	
User	A User Task is a "workflow" Task performed by a person with the assistance of an application and is scheduled through a task list manager of some sort	
Send	A Send Task is designed to send a Message to an external Participant of the process	
Receive	A Receive Task is designed to receive a Message from an external Participant	

8.2 Sub-Processes

As explained earlier in 6.3, a Sub-Process is the non-atomic form of Activity and occurs within the overall flow of a Process. A Sub-Process is an Activity whose internal details have been modeled using Activities, Gateways, Events, and Sequence Flows in another Process Model.

Essentially, a Sub-Process is the graphical object within a Process that can be "opened up" to show the lower-level details of a Process.

Although a Sub-Process shares the same basic outline shape as a Task (i.e. a rectangle with rounded corners with a single thin line, except when used in its Call Activity form, the actual symbol used depends on whether a Sub-process is:

Table 4: Types of Sub-Process Activities

Type of Sub-Process	Description	BPMN Symbol (standard form)	BPMN Symbol
Expanded	The details of the Sub-Process are embedded inside the Sub_Process symbol contained on the Process Model		
Collapsed	The details of the Sub-Process are shown on a separate defined		

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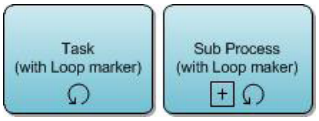
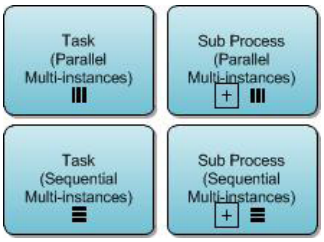
8.3 Additional forms of Activity

In addition to the sub-types of Activity, i.e. Task and Sub-Process, there are additional forms of different makers that can be added to an Activity. The two Activity markers most commonly used are:

Table 5: Activity Markers

Activity	Description	BPMN Symbol
Loop	The Loop marker is used to indicate an Activity is repeated sequentially until a defined condition is achieved.	
Multi-Instance	The Multi-Instance market is used to show that (defined) instances of an Activity are created and executed either in Parallel or Sequentially.	

8.4 Best Practice Recommendations

8.4.1 Background

Under normal circumstances, Processes are documented at two levels. However, three levels are not uncommon.

If there are two levels, the top level will be a collaboration diagram and the second level will be a Process Diagram.

If there are three levels, the top and second levels will be Collaboration Diagrams and the third level will be a Process Diagram.

Collaboration Diagrams typically contain Sub-Processes and Process Diagrams contain Tasks. Although there is no technical reason why Tasks are not typically contained on Collaboration Diagrams, it is unusual to use them in that context.

8.4.2 Recommendations for Activity Naming

Processes should be named using a *<Verb> <Qualifier> <Data Object>* pattern.

For example:

- Capture Beverage Order;
- Prepare Beverage Order; and
- Retrieve More Supplies.

You should consider developing a list of commonly used and understood actions used within your processes. The Verbs in the Activity names can then be taken from this defined list.

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Data Object names should contain words that provide specific and useful descriptions, and use terms that characterise them.

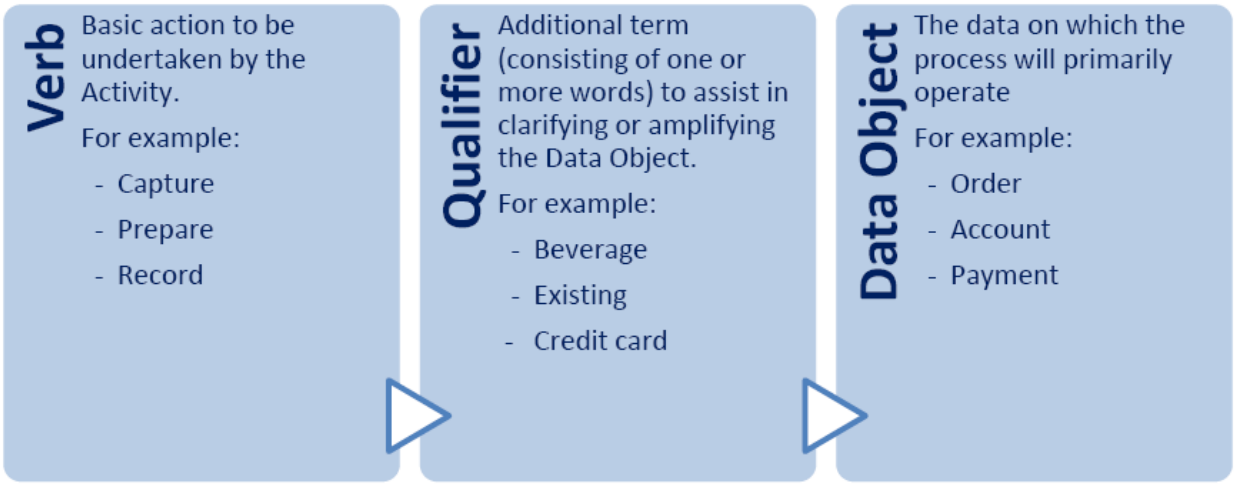

Figure 14: Recommended approach for naming Activities

It is important to avoid ambiguity so readers can understand the Activity and its purpose.

8.4.3 Recommendations for Tasks

Tasks are typically contained on Process Diagrams.

Although there is no technical reason why Tasks are not typically contained within Collaboration Diagrams, it is unusual to use them in that context.

8.4.4 Recommendations for Sub-Processes

Collapsed Sub-Processes are typically contained within Collaboration Diagrams and Expanded Sub-Processes are typically contained within Process Diagrams.

Again, there is no technical reason why Collapsed Sub-Processes do not appear on Process Diagrams or Expanded Sub-processes on Collaboration Diagrams, however, it is unusual to use them in these contexts.

8.5 Case Study Implications

8.5.1 Using Tasks in the Case Study

As explained above, Tasks are typically contained on Process Diagrams; consequently Tasks appear on each of the three Process Diagrams in the Case Study:

- "*Capture Beverage Order*";
- *"Prepare Beverage Order";* and
- *"Retrieve More Supplies".*

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8.5.2 Using Sub-Processes in the Case Study

As also explained above, Collapsed Sub-Process are typically contained on Collaboration Diagrams and Expanded Sub-Processes on Process Diagrams. Consequently, the Collaboration Diagram contains the Collapsed Sub-Processes from the Case Study and two of the three Process Diagrams contain Expanded Processes.

9 Understanding the Types of Gateway

9.1 Exclusive Gateway

The Exclusive Gateway is used to create alternative paths within a Process flow. It is the “diversion point in the road” for a Process. The exclusive gateway represents the need to make a decision where only one of the paths can be taken.

An Exclusive Gateway is graphically represented in BPMN as a diamond with a single line and usually no X, as shown below:

Figure 15: BPMN Symbol for an Exclusive Gateway

9.2 Inclusive Gateway

The Inclusive Gateway is used to create both alternative and parallel paths within a Process flow. The inclusive gateway represents the need to make a decision where all conditions must be evaluated. Whilst the Inclusive Gateway can be used to show that all paths must be taken, it should be used in such a way that at least one of the paths is taken.

An Inclusive Gateway is graphically represented in BPMN as a diamond with a single line and a circle inside as shown below:

Figure 16: BPMN Symbol for an Inclusive Gateway

9.3 Parallel Gateway

The Parallel Gateway is used to represent parallel paths in a process. The Parallel Gateway does not check any conditions and will wait for all incoming flows before triggering the parallel path.

A Parallel Gateway is graphically represented in BPMN as a diamond with a single line and the plus symbol inside as shown below:

Figure 17: BPMN Symbol for a Parallel Gateway

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9.4 Event Based Gateway

The Event-Based Gateway represents a branching point in the Process where the alternative paths that follow the Gateway are based on Events that occur rather than the evaluation of the process flow that lead to this point. A specific Event such as the receipt of a message from a customer, determines the path that will be taken.

An Event Based Gateway is graphically represented in BPMN using a pentagon marker inside a double line circle, inside a diamond with a single line as shown below:

Figure 18: BPMN Symbol for an Event Based Gateway

9.5 Best Practice Recommendations

9.5.1 Recommendations for Exclusive Gateways

Exclusive Gateways are one of the key Gateways used in process modeling as they provide the mechanism for routing decisions (i.e. require the choice of one path from the set of available paths), consequently it is typically the most commonly used Gateway.

They should be used whenever a single path through a Gateway is required after a condition has been evaluated in the previous Activity.

9.5.2 Recommendations for Inclusive Gateways

Although Inclusive Gateways are not as commonly used as Exclusive Gateways, they can be useful when you require one or more of the paths to be used after a condition has been evaluated in the previous Activity.

9.5.3 Recommendations for Parallel Gateways

Parallel Gateways do not provide routing based on decisions. Instead, a Parallel Gateway provides the mechanism in Process Modeling to allow multiple paths to be undertaken in Parallel.

Consequently, their use is limited to circumstances where multiple paths are needed to be executed in parallel and to re-joining these multiple paths back together.

9.5.4 Recommendations for Event Based Gateways

Event Based Gateways provide the means of routing a Process based on waiting for the occurrence of one of two or more events.

Although they are not commonly used, there are circumstances when Event Based Gateways are useful.

An Event Based Gateway is to provide a means of handling waiting

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for the first occurrence of one of two events. A typical use of an Event Based Gateway is to provide a time-out mechanism for the handling of another event, for example, using a Timer Intermediate Event to provide a time-out mechanism while waiting for the arrival of a Catching Message Event.

9.6 Case Study Implications

9.6.1 Using Exclusive Gateways in the Case Study

Exclusive Gateways are used in the Case Study in two of the three Process Diagrams, for example:

- Three Exclusive Gateways (*"Beverage Type"*, *"Coffee Type"* and *"Tea Type"*) appear in the *"Capture Beverage Order"* Process Diagram; and
- Two Exclusive Gateways (*"Beverage Type"* and *"Coffee Type"*) appear in the *"Prepare Beverage Order"* Process Diagram.

9.6.2 Using Inclusive Gateways in the Case Study

The *"More Supplies"* Inclusive Gateway is used in the *"Retrieve More Supplies"* Process Diagram to handle the possibility that the Kitchen Hand may have been asked to retrieve additional Coffee Supplies, Tea Supplies or both.

9.6.3 Using Parallel Gateways in the Case Study

There are no Parallel Gateways used in the Case Study.

9.6.4 Using Event Based Gateways in the Case Study

There are no Event Based Gateways used in the Case Study.

10 Understanding the Types of Data

10.1 Overview of Data

As indicated in 2.3, Data objects in BPMN provide the mechanism to show how data or information is created or consumed by a process.

The three different forms of Data Items are:

- **Data Object** – represents an item of data that is either used or created by an Activity that only exists for the current life of the Process;
- **Data Store** – represents a collection of data that is either used or created by an Activity that exists beyond the current life of the Process; and
- **Messages** – represents the content of a communication that flows between two participants.

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10.2 Data Objects

A Data Object is graphically represented in BPMN by a rectangle with a folded top right-hand corner, as shown below:

Figure 19: BPMN Symbol for a Data Object

The standard (or normal) Data Object graphical symbol represents a single occurrence. A set or collection of data is indicated by adding a visual attribute consisting of three vertical bars at the bottom of the BPMN Symbol, as shown below:

Figure 20: BPMN Symbol for Data Object Collection

Data Objects can also have an additional visual attribute that shows if the Data Object is an Input or Output to the Activity to which it is attached, which can also be combined with the Collection attribute. Input and Output attribute is indicated by the use of an arrow in the top left of the Data Object symbol, as shown below:

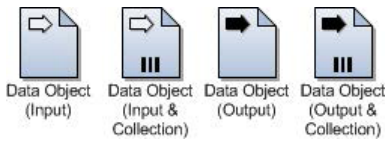

Figure 21: BPMN Symbol for Data Object with Input and Output attributes

As shown above, the filled arrow is used to represent information flowing from an Activity to a Data Object and the arrow without any filling represents information that flows from a Data Object to an Activity.

10.3 Data Stores

A Data Store is graphically represented in BPMN by a cylinder with two additional arcs underneath the type of the cylinder from one side to the other, as shown below:

Figure 22: BPMN Symbol for Data Store

Although it is not expressly defined, a Data Store usually represents a collection of information that can be either held in a physical or electronic form, such as a file (e.g. paper-based file or an electronic document) or a database (held electronically).

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10.4 Messages

A Message is graphically represented in BPMN by an envelope, which is not filled in, as shown below:

Figure 23: BPMN Symbol for Message

10.5 Best Practice Recommendations

Data Objects, Data Stores or Message objects should be used to indicate key information used within a Process.

The Data Objects will typically be used to indicate the inputs and outputs of Process or Activities.

For example:

- Use a Data Object when:
    - Key input documents are being used by an Activity, or
    - Key output documents are being created by an Activity;
- Use a Data Store when information is being used or created within a Process or across Processes; and
- Use a Message to document the information being passed in Message Flows.

10.6 Case Study Implications

A Data Object is used on the Collaboration Diagram to indicate that the Barista passes a list of additional supplies required to top-up their stock from the store room.

The Case Study also uses Message objects to show the information flowing to and from the Message Events on the Collaboration Diagram.

11 Understanding the types of Artefacts

11.1 Overview of Artefacts

As indicated in 2.3, Artefacts provide a set of elements that amplify other elements being documented within the Process.

The two different types of Artefacts are:

- **Group Objects** – allows flow objects to be grouped for purposes of documentation or analysis; and
- **Annotation** - provides additional information to elaborate an element within the process.

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11.2 Group Objects

The Group object provides a visual mechanism to group elements on a Process diagram informally and does not affect the flow of the process. The Group symbol can stretch across the boundaries of Pools and is often used to highlight certain sections of a diagram without adding additional constraints.

For example, a Group may be used to highlight further analysis.

A Group is graphically represented in BPMN using a rounded corner rectangle with a solid dashed line as shown below:

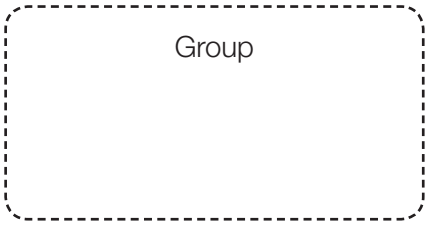

Figure 24: BPMN Symbol for Group Object

11.3 Annotations

The Annotation provides the ability to provide additional information for the reader of a BPMN Diagram. The Annotation can be connected to a specific object in the process, but does not affect the flow of the process.

An Annotation is graphically represented in BPMN using an open rectangle with a solid single line as shown below:

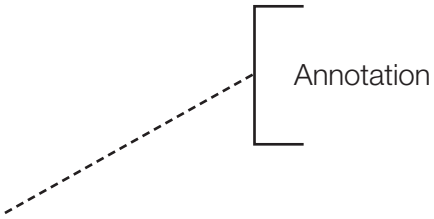

Figure 25: BPMN Symbol for of Annotation Object

11.4 Best Practice Recommendations

Artefact objects provide a means for items to be highlighted or amplified in your Processes. Consequently, care should be taken not to overuse them, as overuse runs the risk of either hiding the overall process or hiding the items you actually want to highlight!

For example, consider only using:

- Group Objects when there is something important and significant to show by grouping objects; and
- Annotations when you feel there is a need to explain something which is not immediately apparent read the Process documentation, such as shown in the Case Study Collaboration Diagram.

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11.5 Case Study Implications

An Annotation object is used in the Collaboration Diagram for the Case Study to explain the role of the Kitchen Hand in the Fulfil Beverage Order Process, as the Kitchen Hand would otherwise seem to have no role within the Process.

12 Understanding the types of Connecting Objects

12.1 Overview of Types of Connecting Objects

As outlined in 2.3, Connecting objects provide a set of connectors that are used to connect two objects within a Process Model.

The three different types of Connecting Objects are:

- **Sequence Flows** – shows the execution path (or order) of Process by connecting Flow Objects;
- **Message Flows** – shows the flow of information in the form of Messages between Participants; and
- **Associations** – are used to attach Data objects or Artefact objects to Flow Objects, typically Activities.

12.2 Sequence Flow Connecting Objects

There are three different Sequence Flow connections:

- **Normal Sequence Flow** – is the normal and hence typical means of connecting two Flow Objects;
- **Default Sequence Flow** – defines a default path following an Exclusive, Inclusive or Complex Gateway; and
- **Conditional Sequence Flow** – provides a pathway from an Activity that is only followed where a defined condition is true.

Note: *A Conditional Sequence Flow is only allowed when it comes from where there is more than one Sequence Flow from an Activity.*

Sequence Flow is graphically represented in BPMN by a single solid line with a solid arrow at one end, as shown below:

Figure 26: BPMN Symbol for Sequence Flow

The two variations of Sequence Flow, Default and Conditional Sequence Flow, are graphically represented in BPMN by a adding an element to the normal Sequence Flow BPMN Symbol. The Default Sequence Flow is indicated by the use of a simple oblique line, like a back slash, on the end of the line opposite to the arrow. The Conditional Sequence Flow is indicated by the use of a small diamond, like a small Gateway Symbol,

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on the end of the line opposite to the arrow. These are shown below:

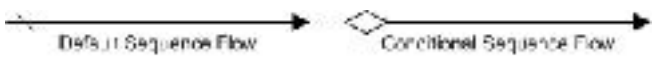

Figure 27: BPMN Symbols for Default and Conditional Sequence Flows

12.3 Message Flow Connecting Objects

As explained above (12.1), Message Flows are used to show the flow of Messages between two Participants, who are prepared to send and receive them.

The key factor here is that as a Message Flow connects two Participants, the Message Flow must connect two separate Pools and connect either to the Pool boundary or to a Flow Object within the Pool boundary.

Note: *A Message Flow must not connect two objects within the same Pool.*

Message Flow is graphically represented in BPMN as a line with an open circle line start and an open arrowhead line end with a dashed single line in between, as shown below:

Figure 28: BPMN Symbol for Message Flow

12.4 Association

As explained above (12.1), Associations are used to connect Artefact objects or Data objects to Flow Objects, typically Activities.

Association is graphically represented in BPMN as a dashed single line between the connected objects, as shown below:

Figure 29: BPMN Symbol for Association

The typical use of an Association is the connection of Data Objects to Activities. The Data Association can also be used to indicate direction, by adding an arrow to the BPMN Symbol, as shown below:

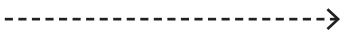

Figure 30: BPMN Symbol for Directional Association

The direction of the association is used to indicate the direction with which the information flows from the Data object to the Activity (or vice versa).

12.5 Best Practice Recommendations

12.5.1 Recommendations for Sequence Flow Connecting Objects

Most people are used to reading diagrams from left to right. Consequently, it is highly recommended to draw your process models so that they can be easily read from left to right.

An important factor in achieving this is to use the Sequence Flow object leaving from the right and arriving on the left and not the top or bottom.

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This not a technical requirement or a rule, rather it is a recommended style that will make your process models more readable.

The next recommendation is to attempt to minimise the number of Sequence Flows that cross. The best way of doing this is to use the Throw and Catch Link Intermediate Event.

12.5.2 Recommendations for Message Flow Connecting Objects

Message flow Objects typically flow vertically, connecting at one end to a Pool boundary (for Black Box Pools) or an Activity and at the other end to either a Message Event or an Activity. Consequently, it is recommended that Message Flow be drawn to flow from the top and bottom of the appropriate object.

12.5.3 Recommendations for Associations

The only recommendation for Associations is to be careful in using the directional form of the Association.

12.6 Case Study Implications

12.6.1 Implications for Sequence Flow Connecting Objects

The most commonly used BPMN symbol is the Sequence Flow, so it is no surprise that it is used in all the process models in the Case Study!

12.6.2 Implications for Message Flow Connecting Objects

The Message Flow objects can only appear on Collaboration Diagrams and the Case Study Collaboration Diagram includes six Message flow objects, which connect:

- The Customer Pool to *"Beverage Order Received"* Message Event;
- The *"Capture Beverage Order"* Sub-Process to and from the Customer Pool;
- The *"Beverage Order Captured"* Message Event to the Customer Pool;
- The *"Beverage Order Prepared"* Message Event to the Customer Pool; and
- The *"More Supplies Needed"* Message Event to the Café Administration Pool

12.6.3 Implications for Associations

An Association object is used on the Collaboration Diagram to connect the *"List of Required Supplies"* Data Object to the Collapsed Sub-Processes *"Prepare Beverage Order"* and *"Retrieve More Supplies"*.

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13 Bringing it all together

13.1 Overview

Understanding all the various Diagram types and Symbols in BPMN is only the start to understanding how to document your processes. However, it is beyond the scope of this document to explore and understand how to document your business processes. However in summary, to document your business processes, you need to:

1. **Define Scope of the Business Area**

   Define the area of business in which you are planning to document your business processes. Understand what is within the scope and what is outside the scope.

2. **Identify the Processes in Scope**

   With the scope of the business area, identify all the processes that are to be documented.

3. **Prepare a High Level Process View**

   Prepare a Collaboration Diagram that documents the overall process in a summary view.

4. **Analyze Contents of each Process**

   Investigate how each of the processes identified as being in scope are performed.

5. **Document each Process**

   For each of the identified processes, prepare a Process Diagram to document the tasks within each process.

13.2 Define Case Study Scope

The first step in documenting your processes is to define the scope of a business area.

The scope of the Case Study is limited to documenting the processes required for:

- Taking beverage orders;
- Preparing the beverage orders;
- Restocking the beverage ingredients from the store room; and
- Requesting that new beverage supplies be ordered when current stocks are low.

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13.3 Identify Case Study Processes

The next step is to identify all the processes to be documented.

It is best practices to name the processes using a Verb Noun structure that explains the action (i.e. the Verb) of the Process and the Object (i.e. the Noun) on which the Process is acting.

For the Case Study, the processes we have identified to document are:

- Fulfil Beverage Order (the high level summary view);
- Capture Beverage Order;
- Prepare Beverages; and
- Retrieve More Supplies.

13.4 Prepare high level Case Study Process View

The next step is to prepare a Collaboration Diagram providing a high level summary view of the overall Process being documented.

The Collaboration diagram is the highest level diagram to be prepared and is used to provide a high level summary view of the business area and shows how all the identified Processes interact with each other.

For the Case Study, this looks like:

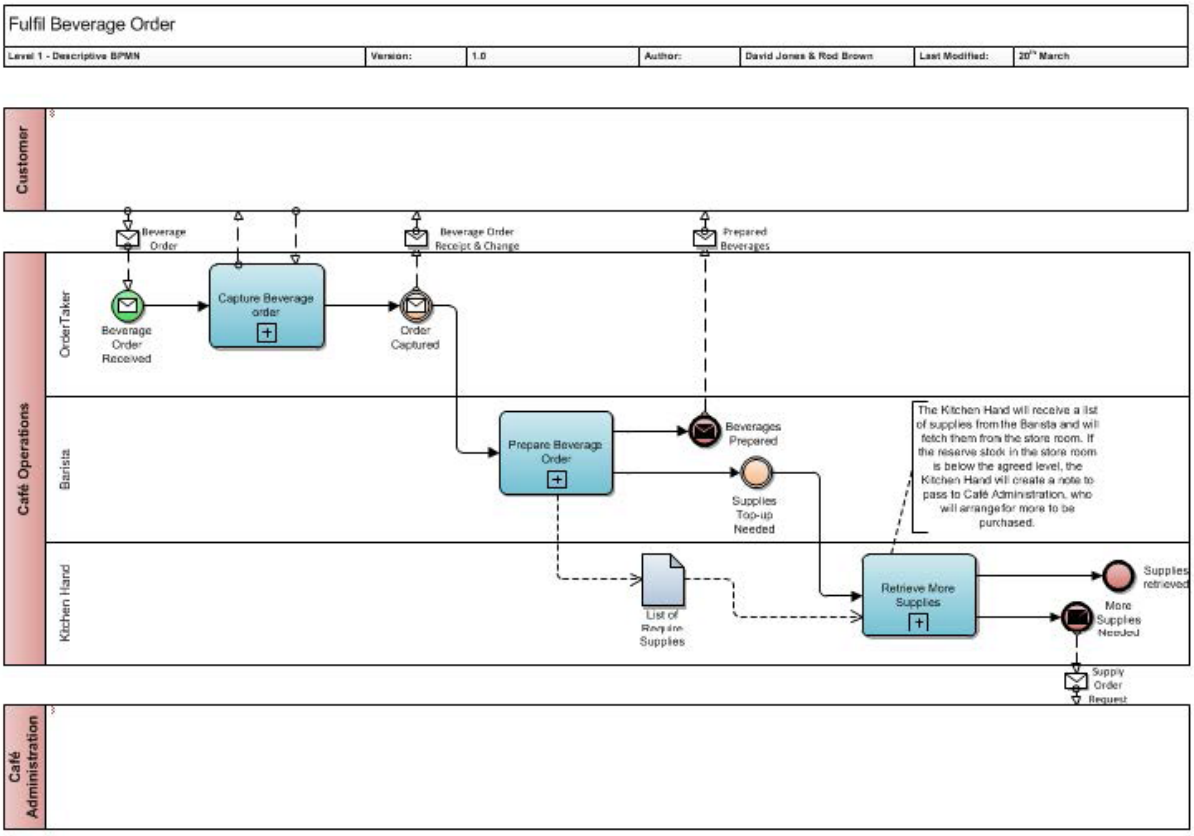

Figure 31: Collaboration Diagram - Fulfil Beverage Order

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13.5 Analyze the Contents of each of the Case Study Processes

13.5.1 Overview

The next step is to analyze each of the identified processes to identify the component Activities or Tasks within each of the processes.

13.5.2 Analyze Contents of Capture Beverage Order

The tasks that comprise the Process *"Capture Beverage Order"* include:

- Review details of the Beverage Order;
- Record specific details of each Beverage being ordered;
- Update total amount of the Beverage order;
- Request Payment of the Order;
- Receive Payment for the Order; and
- Settle Beverage order providing a receipt and the change.

13.5.3 Analyze Contents of Prepare Beverages

The tasks that comprise the Process "Prepare Beverage Order" include:

- Review details of the Beverage Order;
- Prepare each of Beverages ordered, with a different set of tasks to prepare Tea and Coffee orders; and
- Deliver prepared Beverages to the Customer; and
- Request additional Supplies.

13.5.4 Analyze Contents of Retrieve More Supplies

The tasks that comprise the Process "Retrieve More Supplies" include:

- Check levels of current Supplies;
- For each of the Fetch each type of Supplies to top up the Barista's supplies; and
- Request new Supplies to be ordered if they are running low.

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13.6 Document each of the Case Study Processes

13.6.1 Overview

The last step is to prepare a Process Diagram for each of the identified Processes.

For the Case Study, we need to prepare Process Diagrams for:

- Capture Beverage Order;
- Prepare Beverages; and
- Retrieve More Supplies.

13.7 Details of BPMN Core Elements

Table 6: BPMN Diagram Types

Core Element	Description	Element Types
Collaboration Diagram	A Collaboration Diagram documents the interactions between a process and either other processes or a Party. A Party can be external to the orgranisation or a different area within the organization and is either to be responsibile for the process or to provide necessary information for the process. Each Party is represented by a Pool.	Not Applicable
Process Diagram	A Process Diagram documents processes that are internal to an organization or a specific area within the organization. Consequently, a Process Diagram represents the processes contained with a Single Pool. However, it may contain one or more Lanes that are contained in a Pool or the Pool inherited from a Collaboration Diagram.	Not Applicable

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Table 7: Swim Lane Objects

Core Element	Description	Additional Element Types
Pool	A Pool represents a Party involved in a process. The Pool often represents either a Party external to the organization being modeled. However, a Pool can also be used to represent different areas within the organization. For example, the Customer of a process is typically shown as a Pool within a process and a set of Pools can be used to represent the various departments within an organization.	Not Applicable
Lane	A Lane represents a role or position within the entity defined by the Pool in which it contains. For example, if a Branch of a Bank is shown as a Pool, then possible Lanes would be a Teller or a person answering Customer Service Enquiries. A Lane can be further subdivided into sub-Lanes. This notation is used to represent different roles undertaken by the same person or position.	Sub-Lane

Table 8: Flow Objects

Core Element	Description	Additional Element Types
Events	An event is something that has happened, may happen or about to happen during a process. There are 4 different types of Events, as shown to the right, with each type then divided into sub-types. For example, Start Events include None, Message, Time and Conditional sub-types.	Start Event, Intermediate Event, End Event, Boundary Event
Activity	An Activity is the work performed within a business process by a participant and is either simple (i.e. the smallest item of work, which is also known as atomic) or compound (i.e that can be further decomposed into a set of simple and / or compound item of work, which is also known as non-atomic). A simple (or atomic) Activity is called a Task and a compound (or non-atomic). Activities can also have additional attributes or markers that document additional properties, such as whether the Activity is repeated or re-usable.	Sub-Lane

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Gateway	A Gateway is used to control the sequence and flow within a process, by providing routing, divergence or convergence within a process. There are 6 different types of Gateways, each of which has its own behaviour in how the path through a process is undertaken.	Exclusive, Inclusive, Parallel, Complex, Event-based, Parallel Event-based

Table 9: Artefact Objects

Core Element	Description	Additional Types
Data Object	A Data Object is used to provide details of the information required by an Activity or produced by an Activity. A Data Object can be used to represent a single item (called a Data Object) or a set of items (called a Data Store).	Data Object, Data Store
Group	A Group is used to provide a visual means of allowing activities to be grouped together for purposes of documentation or analysis.	Not Applicable
Annotation	An Annotation is used to provide additional information of potential benefit to a reader by elaborating on the details of an element within the process.	Not Applicable

Table 10: Connecting Objects

Core Element	Description	Additional Types
Sequence Flow	A Sequence Flow is to show the connection between flow objects in a process and consequently shows the path of execution of the activities within the process. A Sequence Flow can also be used to indicate a conditional flow or a default flow where multiple paths are possible.	Conditional Sequence flow, Default Sequence flow
	A Message Flow is used to show the flow of a message between partipants and / or processes.	
Association	An Association is used to associate Artefacts to specific Flow Object. An Association may be shown as uni-directional, bi-directional or non-directional to indicate the direction(s) of the assocation.	Uni-directional, bi-directional, non-directional

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13.7.1 Capture Beverage Order

The Process Diagram for Capture Beverage Order is shown below:

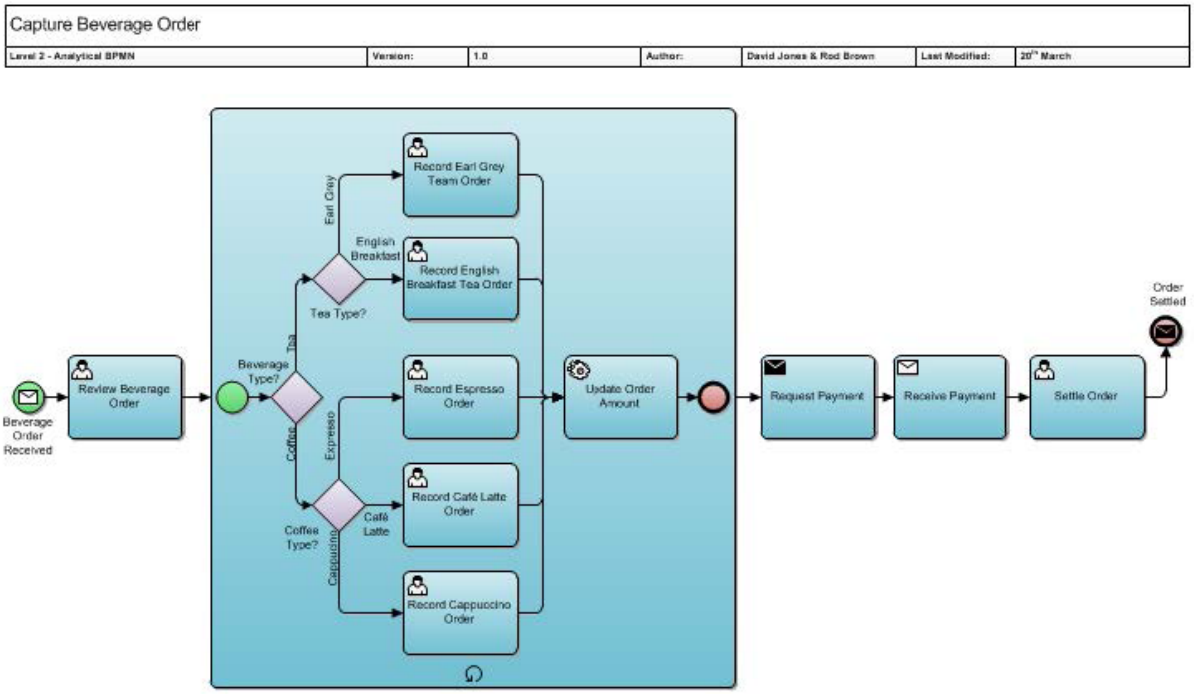

Figure 32: Process Diagram - Capture Beverage Order

The Expanded Sub-Process enables looping for recording of each beverage ordered.

13.7.2 Prepare Beverage Order

The Process Diagram for Prepare Beverage Order is shown below:

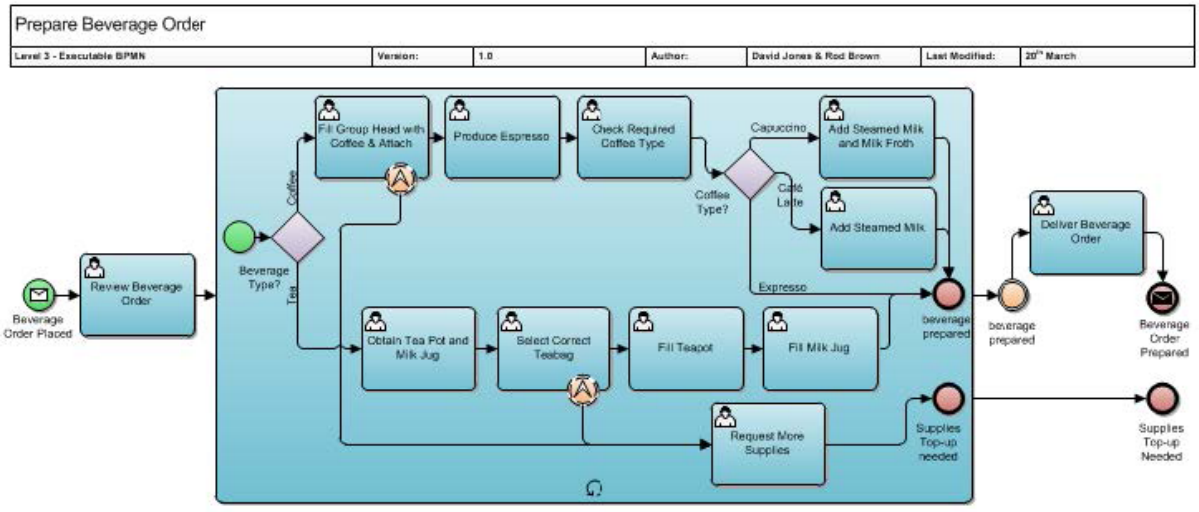

Figure 33: Process Diagram - Prepare Beverage order

The Expanded Sub-Process enables the loop in preparing each beverage ordered.

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13.7.3 Retrieve More Supplies

The Process Diagram for Retrieve More Supplies is shown below:

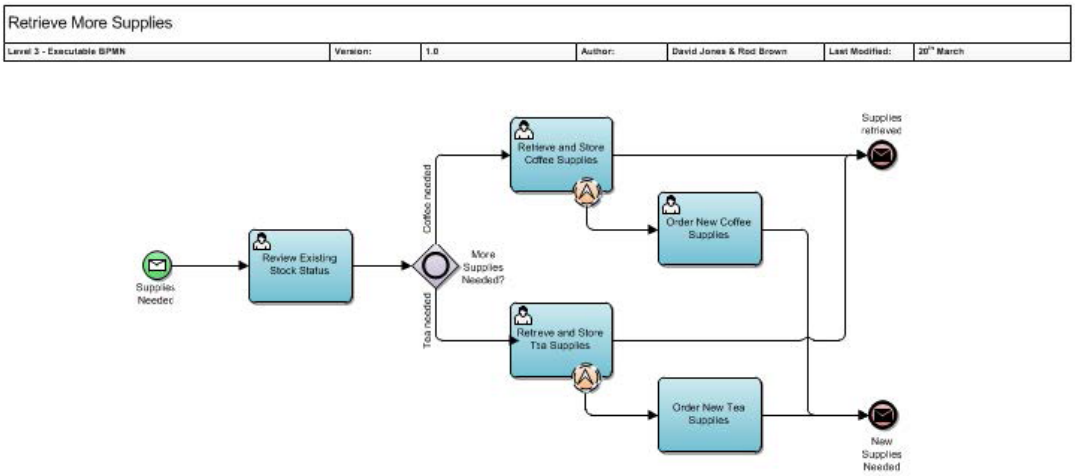


Figure 34: Process Diagram for Retrieve More Supplies

13.7.4 Appendices

Summary of Appendices:

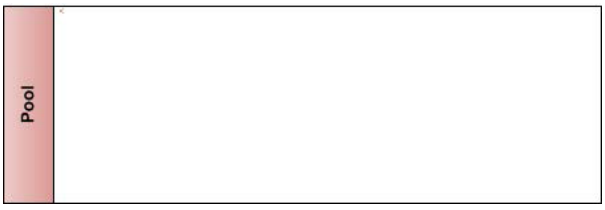
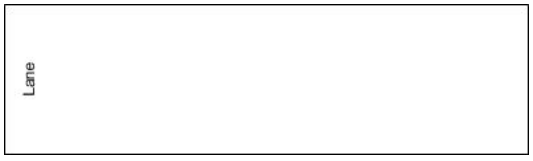
14.1 Details of BPMN Core Elements

14.2 BPMN Elements for Descriptive Type Process Models

14.3 BPMN Elements for Analytic Type Process Models

13.8 BPMN Elements for Descriptive Type Process Models

Table 11: BPMN Elements for Descriptive type Process Model

Category	Element Types	Element Sub-types	Symbols for Descriptive Process Models
Swim Lanes	*Pool*		
	Lane		
Flow Objects	*Event*	Start Event	
		End Event	

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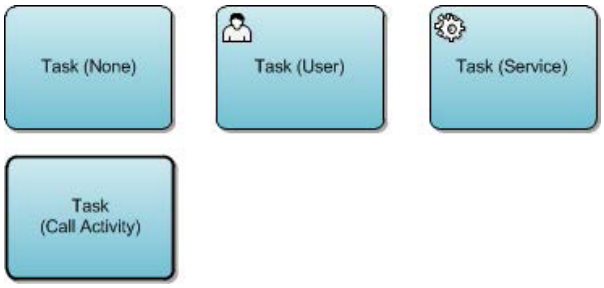
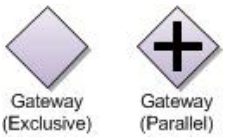
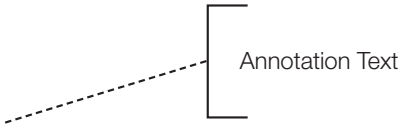
Swim Lanes	*Activity*	Task	
		Sub-Process	
	Gateway	Start Event	
Data	*Data Object*		
Artefact	*Group*		
	Annotation		
Connecting Objects	*Sequence Flow*		
	Message Flow		
	Association		

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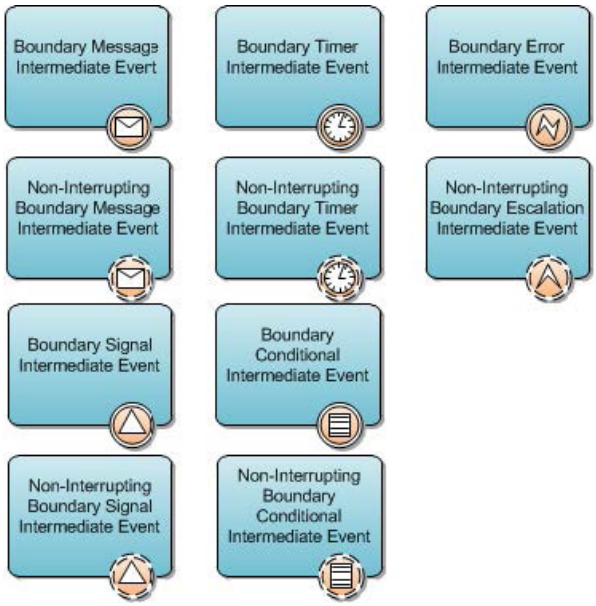
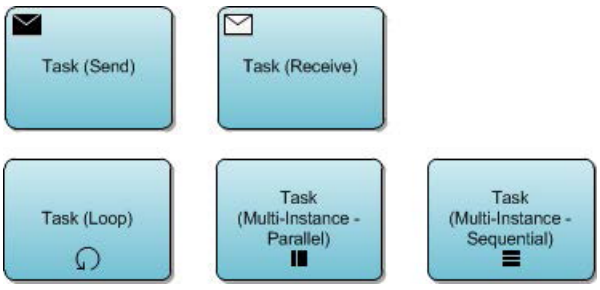
13.9 BPMN Elements for Analytic Type Process Models

Table 12: BPMN Elements for Analytic type Process Model

Category	Element Types	Element Sub-types	Symbols for Descriptive Process Models
Flow Objects	*Event*	Start Event	
		End Event	
		Intermediate	
		Boundary Intermediate	
	Activity	Task	

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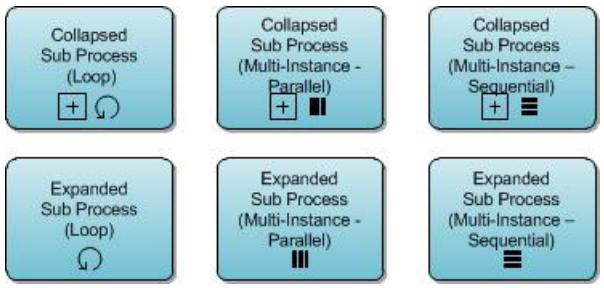
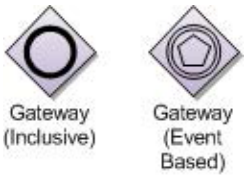
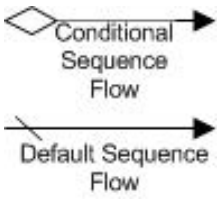
			
			
Data	*Message*		
Connecting Objects	*Sequence Flow*		

13.10 Bibliography

[i] BPMN 2.0 Specification, Object Management Group, January 2011

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Orbus Software
3rd Floor
111 Buckingham Palace Road
London
SW1W 0SR
United Kingdom

+44 (0) 870 991 1851
enquiries@orbussoftware.com
www.orbussoftware.com