

# Business Process Modelling Implementation Guide

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Enterprise Architecture, OCCIO

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Service Alberta, Government of Alberta  
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Business Process Modelling Implementation Guide

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# 1. Use of This Guide

This guide accompanies and elaborates on GoA's Business Process Modelling (BPM) standard. It describes only the aspects of process modeling relevant to GoA's standards and best practices.

This guide assumes that the reader has the basic knowledge of business process modelling and Business Process Model and Notation (BPMN) version 2.0 specification. The reader may refer to Appendix C for a list of resources for further learning.

Intended users of this standard include, but not limited to, executives, business owners, business relationship managers, governance and strategy developers, policy developers, enterprise architects, business analysts, solution architects, and system analysts.

## 2. Standard and Best Practices

### 2.1. Notation

Business process models must use the graphical elements, shapes, and markers illustrated in the BPMN 2.0 specification. An example of the graphical elements can be found on the accompanying *GoA BPMN 2.0 Poster*, and within the examples in Appendix A.

BPMN 2.0 uses three shapes for process modelling – circles, round rectangles, and diamonds to represent events, activities, and gateways, respectively. Detail is added through subtypes, border styles, and the placement of symbols inside the shapes and within the diagram itself.

The notation standard allows:

- The use of all BPMN 2.0 shapes while recommending the use of a minimal, flowchart-like subset where sufficient precision in the model can be achieved through the use of the subset, with annotations where needed.
- The use of annotations/callouts on models to explain the model or symbols on the model, where these will add clarity for casual readers.
- Adding new markers, indicators, and/or shapes to a model as BPMN 2.0 extensions, as long as they do not conflict with any other BPMN element or marker and the model remains BPMN 2.0 compliant.

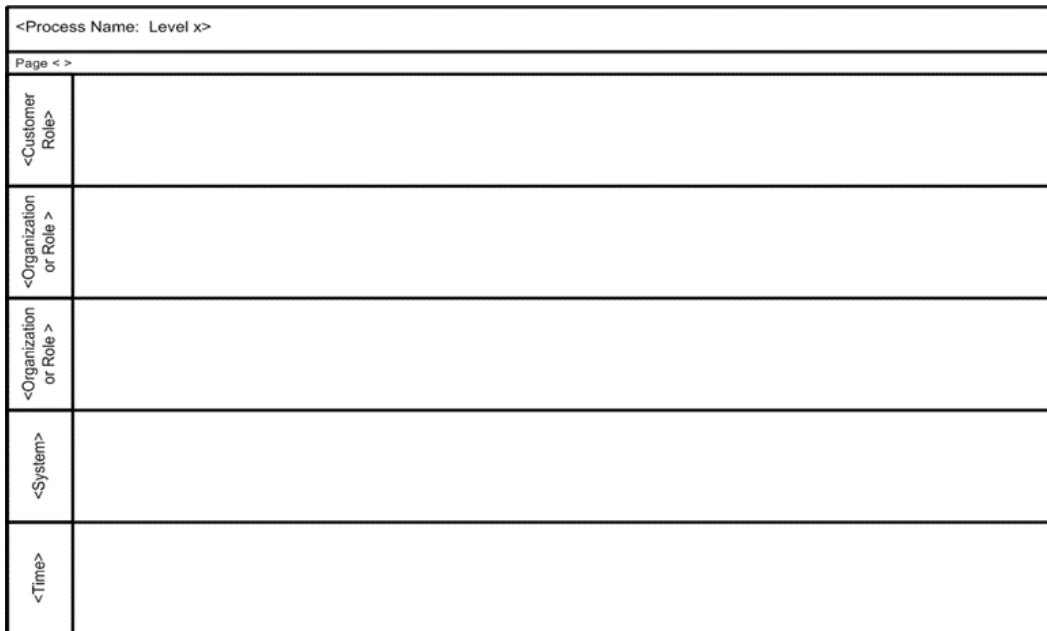
The size, color, line style, and text positions of the defined graphical elements are left to the discretion of the modeller, except where otherwise specified.

### **Pools and Swimlanes**

Business processes of the GoA must use a swimlane diagram for modelling:

- Lanes are sub-partitions of a pool and are used to organize and categorize activities, with each lane representing a participant in the process.
- Customers of the process must be represented by a separate, black-box pool above the process pool and labelled with a participant role or business entity.
- External processes or service providers that communicate with the process must be represented by black-box pools below the process pool and labelled with the name of the process or entity.

- Swimlane diagrams must be drawn with sequence flows entering from the left (or top) and leaving from the right (or bottom).
- Swimlanes and pools can be presented horizontally or vertically. An example of a horizontal swimlane diagram with a single pool is shown below:



## Activities

- Activities must be labeled.
- The label of a child-level page must match the name of the sub-process activity.

## Sequence flow

- A sequence flow may cross the boundary between lanes but may not cross a pool boundary.
- Sequence flow out of a parallel gateway may not be conditional.
- A conditional sequence flow may not be used if there is only one sequence flow out of the element.

## Message flow

- A message flow must be used to represent a message sent between two pools. Message flows must not connect elements in the same pool.

- A message flow can only come from a:
  - Message end or intermediate event
  - Send, User, or Service task
  - Sub-process
  - Black box pool
- A message flow can only go to a:
  - Message start or intermediate event
  - Receive, User, or Service task
  - Sub-process
  - Black box pool

## Events

- Start events:
  - A process must have a start event. A start event must not have an Error trigger.
  - A start event in a sub-process must have a None trigger.
- Intermediate events:
  - An intermediate event with incoming message flow must be a catching type with a Message trigger.
  - An intermediate event with outgoing message flow must be throwing type with Message trigger.
- End events:
  - An end event with an outgoing message flow must have Message result.
  - A process can have multiple end events, especially when the process can end in different states. If a process contains parallel process flows, each flow must reach an end event.

## Gateway

- A gateway cannot have incoming nor outgoing message flow.

- The flow logic of a gateway must be indicated by a label on the gateway and labels on the sequence flows out of the gateway.

## Data

- A data object is represented by a dog-eared page and a dotted-line connector is used to represent the data association. Data associations show how a data object flows between data inputs or outputs of an activity or event. When showing a data association to a message flow, a message symbol (envelope) must be used on top of a message flow, instead of a data object.
- A data store is used to show data that is stored externally but is accessible to the process. This is distinct from a data object, as a process can query and receive information from a data store. Additionally, data stores may exist beyond the lifecycle of the process, where a data object only exists as long as the instance of the process.

## Annotation

- Text may be inserted in a process diagram and connected to an object using text annotation.
- The symbol for text annotation consists of a large left square bracket with an association connector.

### Notation best practices:

- Use collapsed pools (i.e. pools with no swimlanes or activities) for participants external to the process (e.g. customers/clients that are external to the organization whose process is being modelled).
- Customer-facing processes should begin with a Message start event receiving a message flow from the Customer pool.
- Message flows should be consistent between child and parent-level diagrams.
- A conditional start event should be labeled to indicate the condition.
- Only one start event should be used in a sub-process.
- Lanes for automated systems should appear at the bottom of a pool, with either one lane per system (in which case the system name is a role name) or one lane for all systems (in which case the lane should be named “systems” and the activity names should be prefixed with the system name or acronym).



## 2.2. Business Process Hierarchy/Decomposition<sup>1</sup>

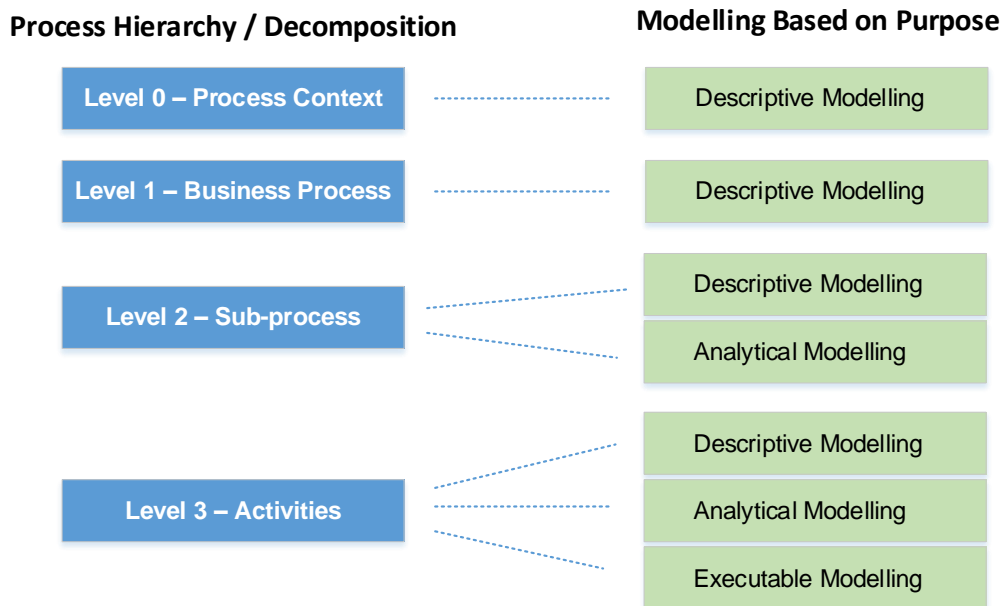
Hierarchically breaking down/decomposing process model helps reduce detail and improve the readability and usability of process models.

Business processes must be documented hierarchically to a level of appropriate usage. The process hierarchy must be both complete and succinct for its intended use.

The level of detail required in a process model will be determined by its intended use and can vary in two ways: Process Levels and Model Types.

These two methods are related, but are not the same. It will be common for a business process of any complexity to require more than one model to document its design in a manner consumable by a reviewer.

The following diagram provides an illustration of these two methods:



### Business Process Hierarchy/Decomposition best practices:

Rules of  $7 \pm 2$ : As a best practice, models at any level should not have more than  $7 \pm 2$  symbols. Human working memory has a capacity of about 7 “chunks”. To be consumable, models should conform to the needs of their audience.

<sup>1</sup> Silver, B. (2009). *BPMN Method & Style*.

## Process Levels

Description	Level Characteristics
<b>Level 0 – Process Context</b>	
<p>This is a high-level aggregation of business functions or steps. It is used to illustrate/confirm scope of a single process.</p>	<p>This level shows only the basic process context, including the initiating event, the process and the process output. The internal elements of the process are not shown.</p>
<b>Level 1 – Business Process</b>	
<ul style="list-style-type: none"> <li>Aggregates business oriented functions or steps that are essential to fulfill a business capability (the lowest level of function). It consists of all related sub-processes, but does not satisfy a user requirement for a specific service.</li> <li>Used to illustrate both the roles involved and the handoffs between the roles. Many activities at this level are sub-processes and require Level 2 for elaboration.</li> <li>The Level 1 diagram must capture the end-to-end process on one page and show interactions with the process requester, service providers, and other external participants. Each sub-process in the top-level diagram must be expanded in a separate Level 2 diagram to reduce complexity and ensure the high-level process is easily consumable.</li> </ul>	<ul style="list-style-type: none"> <li>The first level of decomposition- shows the top-level internals of the process</li> <li>Starting point for representing a high-level sequential workflow.</li> <li>Represents a broad grouping of activities and/or sub-processes that logically belong together.</li> <li>Typically include sub-processes that cross-organizational boundaries (e.g. not all done in the same business unit).</li> <li>Categorize WHAT is done, not the specifics of HOW.</li> <li>Do not necessarily involve automation.</li> <li>Should direct readers to a Level 2 diagram for each sub-process.</li> <li>Often support a stage in the lifecycle of a resource.</li> <li>Shows the roles involved in the process using pools and swimlanes.</li> </ul>
<b>Level 2 – Sub-process</b>	
<ul style="list-style-type: none"> <li>This is the sequence of user level (lowest level) process. It satisfies the requirement of a user for a specific service. It consists of Events, Activities, Gateways, Sequence Flows and Lanes.</li> <li>Each Level 2 diagram breaks down exactly one sub-process from the Level 1 diagram to show the major</li> </ul>	<ul style="list-style-type: none"> <li>Medium or work level process that is tangible and achieves definable business objectives. Grouping work processes together provides understanding how they meet customer needs.</li> <li>Starting point for any process re-engineering.</li> <li>Sequence of User-level (medium-level) processes that satisfy the requirement of a user for a specific service.</li> </ul>

<p>decisions, state changes and looping in each lane.</p> <ul style="list-style-type: none"> <li>• Sub-processes may have additional sub-processes embedded within them. This implies that there may be a hierarchy of Level 2 diagrams, each expanding on an individual sub-process, before Level 3 is reached. Nested sub-processes should be avoided if possible to keep models succinct and easy to consume.</li> <li>• A sub-process may be expanded inline if this does not over-complicate the model and if the model can still be represented on a single page. An expanded inline sub-process is shown as a process diagram within an enlarged activity shape.</li> </ul>	<ul style="list-style-type: none"> <li>• Represents a process that makes up its associated Level 1 process.</li> <li>• Are discontinuous in nature – have a definable start and stop.</li> <li>• Are repetitively performed – continuously initiated and completed.</li> <li>• Independent of organizational structure.</li> <li>• Require specific data (e.g., Complete Order requires product data).</li> <li>• Differs from business function or capability in that they: <ul style="list-style-type: none"> <li>– produce identifiable results.</li> <li>– have more clear-cut boundaries (but may still cross boundaries at a departmental level).</li> <li>– are performed as a unit (e.g. Complete Order is a Level 2 process that is performed as a unit with other processes including Authorize Credit, Receive PO &amp; Issues Orders, etc.)</li> </ul> </li> </ul>
<p><b>Level 3 – Activities</b></p>	
<ul style="list-style-type: none"> <li>• This is the lowest level of process that is meaningful to the business. It is under a single authority responsible for its execution and control, has a single purpose and is performed as a single unit. Nested activities are possible.</li> <li>• It consists of Notifications, Positions, Information Products (Input/Output), Notifications, Policies, Business Rules, Systems, Directional Arrows, Mechanism Arrows.</li> <li>• It breaks down a Level 2 model to show the discrete activities in a specific sub-process from Level 2. A Level 3 model cannot be elaborated further.</li> </ul>	<ul style="list-style-type: none"> <li>• Lowest level of decomposition documented on Functional Decomposition Diagram before we describe HOW a process is done.</li> <li>• Lowest level of process that is meaningful to the business.</li> <li>• It is under a single authority responsible for its execution and control, has a single purpose and is performed as a single unit.</li> <li>• Are discontinuous in nature – have a definable start and stop.</li> <li>• Independent of organization structure.</li> <li>• Related to 1 or 2 entities.</li> <li>• Interact with specific kinds of business data (e.g. Validate Billing Information requires the actor validate specific data pertaining to Billing).</li> <li>• Common to both Business and Application Architecture views.</li> <li>• Similar to Level 2 processes in that they: <ul style="list-style-type: none"> <li>– Produce identifiable results.</li> <li>– Have clear-cut boundaries (usually do not cross-departmental boundaries).</li> <li>– Are performed as a unit.</li> </ul> </li> </ul>

## Model Types

Model type is a method used to reduce the complexity of a process model by clarifying whether it is for descriptive, analytical or execution purposes. It is used to describe, analyze or automate (such as by direct transcription to Business Process Execution Language) a process. Descriptive models are primarily used for communication and are intended to convey the process without full accuracy. An analogy to programming might be pseudocode. Models intended for execution must be very precise and complete. An analogy to programming may be complete, working code – the model must be “runnable”.

Typical use cases, such as determining the requirements for or configuring an IMT solution to a business need, will require modelling such that all discrete activities in a process are shown at some point within the hierarchy of models that describe the process.

Model Types	Description
<b>Descriptive</b>	<ul style="list-style-type: none"> <li>• Descriptive models provide high-level diagrams that can be easily communicated across the organization. Descriptive models limit the BPMN palette to a basic working set of shapes and symbols readily understood by any business person and supported by almost all BPMN vendor tools.</li> <li>• This level requires understanding of fundamental concepts such as pools and lanes, tasks and sub-processes, and sequence flow, but not the complexities of BPMN’s various flow control and event patterns.</li> <li>• Descriptive models may exist at all of Process Levels (0 to 3), i.e. the modeller may create an activity model that is correct and consumable by its target audience but is not suitable for in-depth analysis or automation.</li> <li>• A Process Level 0 model will always be descriptive.</li> </ul>
<b>Analytical</b>	<ul style="list-style-type: none"> <li>• Models built for process analysis typically show all the steps, including exception paths. The emphasis of analytical modelling is on events and exception handling, matching each type of event or exception to a specific pattern in the diagram.</li> <li>• Analytical modelling requires understanding of BPMN’s various decision and merge patterns, events, and exception handling patterns. The palette of BPMN notation used in analytical models will expand beyond the basic working set.</li> <li>• Typical BPMN 2.0 variants on the recommended working set in descriptive models that will appear in analytical models include:               <ul style="list-style-type: none"> <li>– Start event (None, Message, Timer)</li> <li>– End event (None, Message, Terminate)</li> <li>– Link event pair</li> <li>– Parallel gateway</li> <li>– Task (Service, User)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>- Sub-process, collapsed and expanded</li> <li>- Data object, Data store and Message</li> <li>- Text annotation</li> <li>• Analytical models will typically require going to at least Process Level 2.</li> </ul>
<b>Executable</b>	<ul style="list-style-type: none"> <li>• Models built to be executable, such as within a simulation or workflow tool (e.g. via conversion into the Business Process Execution Language) adds executable detail to analytical models as part of the process implementation.</li> <li>• This level of model may be is vendor tool-dependent and may impose additional validation constraints beyond those of the BPMN specification.</li> <li>• Executable models will always require going to Process Level 3.</li> </ul>

## 2.3. Attributes

Business process modelling uses attributes of the model itself to provide basic information about the model. These attributes provide descriptive information when modelling using Visio as a modelling too; they are also used as direct metadata attributes when modelling in SAP PowerDesigner<sup>2</sup>.

The following attributes must be included with a business process model:

Attributes	Description
<b>Process Name</b>	<p>The name of the business process or sub-process being modelled.</p> <p>Refer to section 2.4 “Naming of Processes and Process Model Elements” of this guide for naming convention details.</p>
<b>Process Level</b>	<p>Indicates the level of decomposition of the business process that the model represents.</p> <p>Refer to section 2.2 “Business Process Hierarchy/Decomposition” of this guide for process level details.</p>

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<sup>2</sup> Refer to section 2.2.4 Business Process Modelling Tools

<b>Model Type</b>	<p>Describes the intended use of the model, which in turn indicates the level of detail available within the model. There are three model types: descriptive, analytical or executable.</p> <p>Refer to section 2.2 “Business Process Hierarchy/Decomposition” of this guide for process level details.</p>
<b>Description</b>	A textual overview of the process. Describes “what” the process or sub-process is.
<b>Author</b>	Name of the creator of the model.
<b>Date Created</b>	<p>Provides the date the model was created.</p> <p>Date format: YYYY-MM-DD</p>
<b>Date Modified</b>	<p>Provides the date the model was last modified.</p> <p>Date format: YYYY-MM-DD</p>
<b>Sector</b>	Indicates the Sector where the process being modelled is used within the GoA. This will typically be the Sector that includes the position that is the controller of the process.
<b>Ministry</b>	Indicates the ministry where the process being modelled is used within the GoA. This will typically be the ministry that includes the position that is the controller of the process.
<b>Department</b>	Indicates the department where the process being modelled is used within the GoA. This will typically be the ministry that includes the position that is the controller of the process.
<b>Business Process Owner</b>	Indicates the position within GoA accountable for the process. This is most commonly an individual role, but may be a committee.

## 2.4. Naming of Processes and Process Model Elements

A process or process model element must be given a valid and unique name. The length of the name must not exceed 64 characters.

### Processes and Activities

Process names must clearly identify the action and result of the process, so that anyone who reads the model can understand and follow it. The following naming rules apply:

- Processes must be named from the point of view of the customer of the process.
- Names must use a [verb]-[noun] format (possibly with an optional qualifier) to clearly identify the action and the result of the process, and to distinguish the process from functions or states.
  - Nouns must be singular in process names.
  - Names must indicate the result of the process.

Examples: Request permit, Request mineral rights permit, Select process modelling notation.

- Keywords used in names must be meaningful to the business. Do not use uncommon abbreviations. Abbreviations must appear in GoA's business glossary.
- Activity names must be unique within the same process.
- The process or activity name must not be an area, function (i.e. Accounting, inventory), an event, or results such as "claim arrives or claim is registered".
- The verb phrase must highlight the goal of the process, rather than the method used. Suggested verbs for process and activity names are<sup>3</sup>:

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<sup>3</sup> Podewsa, H. (2009) *The Business Analyst's Handbook*

<b>Acquire</b>	<b>Determine</b>	<b>Remove</b>
<b>Add</b>	<b>Identify</b>	<b>Report</b>
<b>Adjudicate</b>	<b>Maintain</b>	<b>Reject</b>
<b>Assess</b>	<b>Manage</b>	<b>Review</b>
<b>Calculate</b>	<b>Merge</b>	<b>Roll back</b>
<b>Cancel</b>	<b>Modify</b>	<b>Select</b>
<b>Change</b>	<b>Obtain</b>	<b>Specify</b>
<b>Check</b>	<b>Plan</b>	<b>Submit</b>
<b>Conduct</b>	<b>Query</b>	<b>Update</b>
<b>Control</b>	<b>Record</b>	<b>Validate</b>
<b>Create</b>	<b>Receive</b>	<b>Verify</b>
<b>Delete</b>	<b>Request</b>	

### Processes and Activities best practices:

- Process names should be able to be “flipped around” into “noun is verbed” form such that the phrase indicates the result of the process.  
E.g. Assess eligibility → eligibility assessed, select modelling notation → modelling notation selected
- Acronyms should have an accompanying definition, to improve clarity. These should be from an authoritative glossary.

### Data Objects

- Data objects must be named for the specific data object being used by the process (e.g. a specific form being processed).
- In analytical or executable models where the process is intended to be automated, the data object name must reference the particular data entities represented by the message. The referenced data entities must exist in an associated data model or catalogue.

### Messages

- Messages must be named for the specific message being used by the process.



- In analytical or executable models where the process is intended to be automated, the message name must reference the particular message schema and/or data entities represented by the message.

## **Data Stores**

- Data stores must be named for the specific data store being used by the process (e.g. a data store associated with an application, a specific network share).
- In analytical or executable models where the process is intended to be automated, the data store name must reference the particular application or storage location represented by the data store.

## **Actor/Role Names in Swimlane**

- Each swimlane must be specific to a participant in a process, such as an organization, a role, or a system.
- Lane names must correspond to existing or, for to-be process models, proposed GoA participant names.

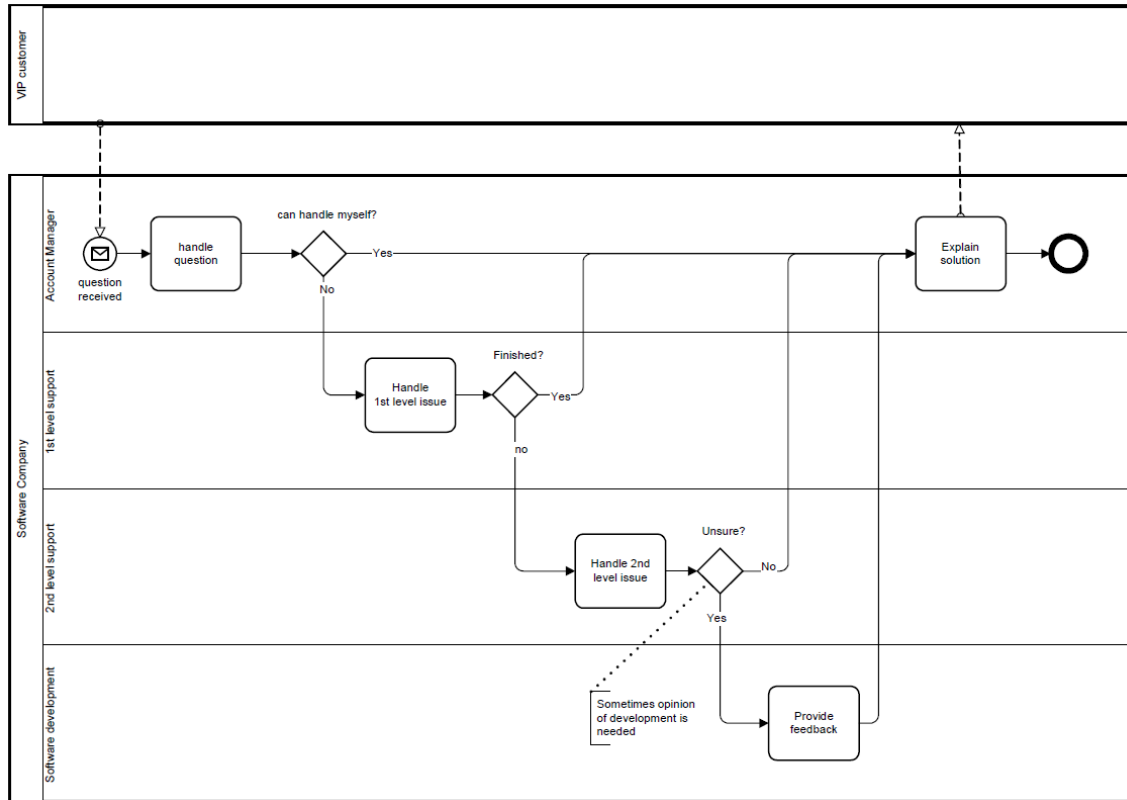
## **2.5. Business Process Modelling Tools**

Business processes must be modelled using PowerDesigner 16.x or Visio 2016.

GoA provides a preferred Visio stencil in the accompanying “BPMN 2.0 Template for Visio” to Visio users to both facilitate compliance with the standard and to facilitate model interchange between Visio and PowerDesigner.

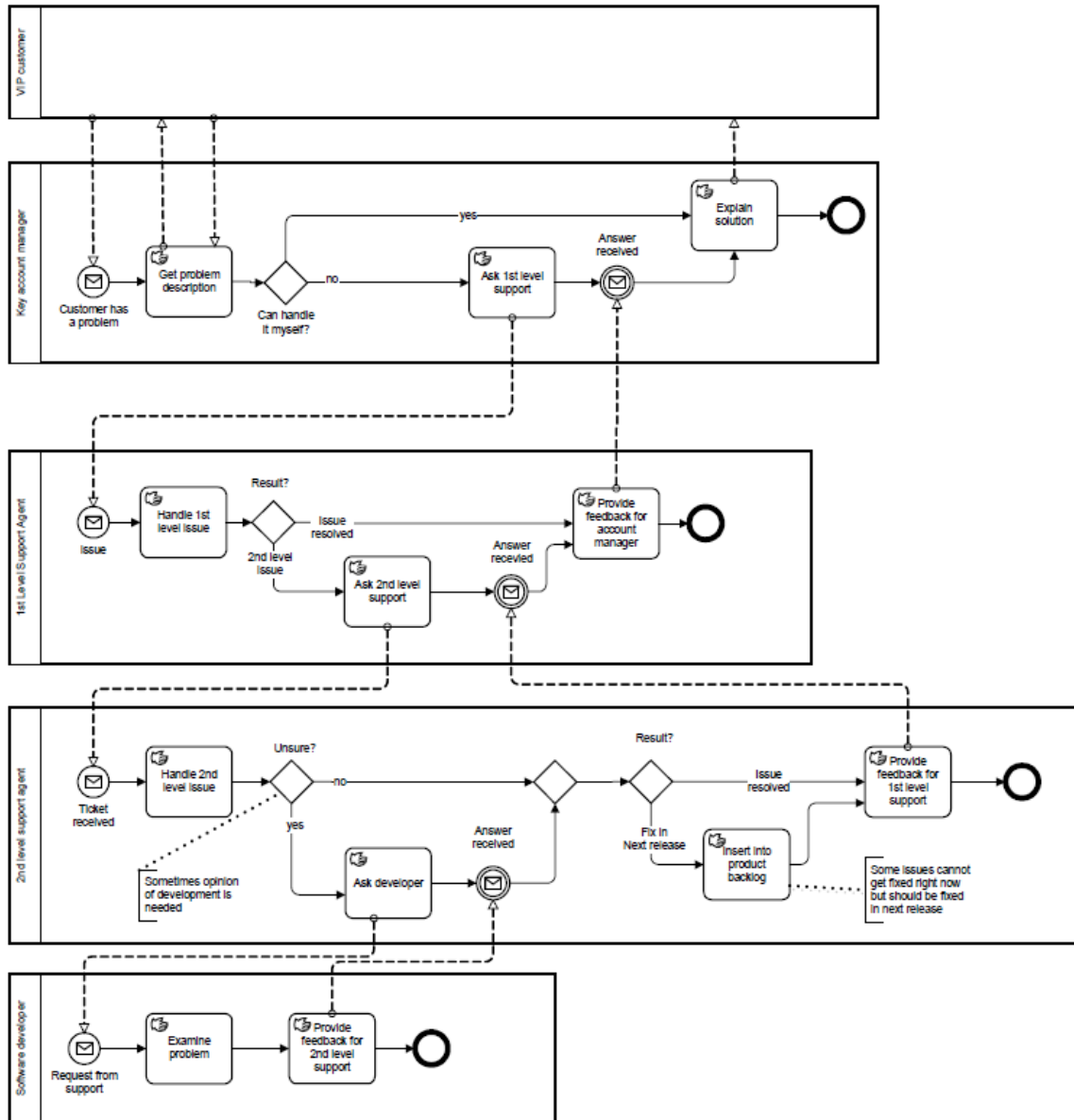
# Appendix A: BPMN 2.0 Examples<sup>4</sup>

High-level overview of an Incident Management process:



<sup>4</sup> Object Management Group (OMG), *BPMN 2.0 by Example*.  
<http://www.omg.org/spec/BPMN/2.0/examples/PDF>

Detailed view of an Incident Management process:



# Appendix B: Counter-Examples of Process Scoping/Naming

Examples of candidate processes that are not actually processes<sup>5</sup>:

<i>Suggested Process</i>	<i>What we Call It</i>	<i>If Not a Process, Why Not?</i>
Customer Relationship Management	Process area	Doesn't deliver a single, specific result; a set of related business processes meeting an overall objective.
Acquire New Customer	Business process	Delivers a single, specific result, and meets all other criteria in this section. An "end-to-end business process"
Assess Prospect Financial Status or Set Up Customer	Subprocess	Too small – both deliver specific results, but are intermediate results in an end-to-end business process.
Calculate Customer Credit Limit or Create Customer Account	Activity, Step, Task,... (no specific term)	Much, too small – a part of a subprocess. Possibly described in a procedure, or use case or service.
Determine Customer Credit Limit or Set Customer Account Type	Activity, Step, Task,... (no specific term)	Much, much too small – a single step or instruction. Possibly one line in a procedure, or step in a use case.
"The Inside Sales process"	Function	Doesn't deliver a single, specific result; an organizational unit that participates in multiple business processes.
"Our Oracle CRM process"	System	Doesn't deliver a single, specific result; a system that supports multiple business processes.
"Our e-business process"	Technology	Doesn't deliver a single, specific result; a technology employed by multiple business processes.

<sup>5</sup> From Sharp & McDermott

# Appendix C: Resources

The reader may refer to the following resources for further learning on the Business Process Model and Notation (BPMN) version 2.0 specification:

- BPMN Method & Style by Bruce Silver (2007)
- Object Management Group (OMG). BPMN Quick Guide, Second Edition:  
<https://www.bpmnquickguide.com/view-bpmn-quick-guide/>
- Object Management Group (OMG). BPMN 2.0 by Example:  
<http://www.omg.org/spec/BPMN/2.0/examples/PDF>
- Workflow Modelling: Tools for Process Improvement and Application Development, Second Edition by Alec Sharp and Patrick McDermott (2009)