

**Airline Industry Data Model**

*Business Conceptual Model Guidelines*

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Document Status

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**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date** | **Name** | **Description of change** |
| 0.1 | 09 Jan 2015 | Peter Neumann | First draft |
| 0.2 | 21 Jan 2015 | Peter Neumann | After first review |
| 0.3 | 11 Oct 2019 | Michael Thomas,  Jean-Christophe Cornu | Updates on Business Guidelines to refer to BPMN 2.0 for Business Process Guidelines notations |
| 0.4 | 11 Dec 2019 | Michael Thomas,  Jean-Christophe Cornu | Further updates on Business Pillars |
| 0.5 | 07 Jan 2020 | Jean-Christophe Cornu | Minor corrections after internal review |
|  |  |  |  |
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|  |  |  |  |

# Introduction

## Document Purpose and Intended Audience

The purpose of this document is to describe how to develop the Business Conceptual Model, i.e. the conceptual layer of the business pillar (partition “B2”), of the airline industry data model.

The intended audience of this document are all individuals involved in developing the model, mostly:

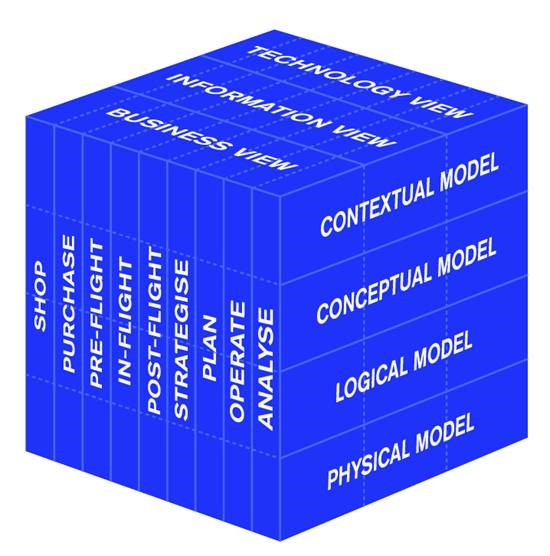
* members of PSC (Passenger Standards Conference) standards work-groups developing or expanding the LDM as part of BRD development,

These individuals have a variety of profiles including Airline and IT supplier Business Analysts and Enterprise Architects.

## Document Context

The Airline industry data model is to be published by IATA as a foundational layer for the development of airline messaging standards in XML or any other data format that may emerge in the future.

The data model is structured in 3 pillars (Business, Information, Technology), 4 layers (Contextual, Conceptual, Logical, Physical), and operational stakeholder views. A separate guideline document will exist for each of the 12 partitions defined by the pillar and layer.



The data model uses UML and as a tool Sparx Enterprise Architect (EA). The first 3 layers are platform-independent.

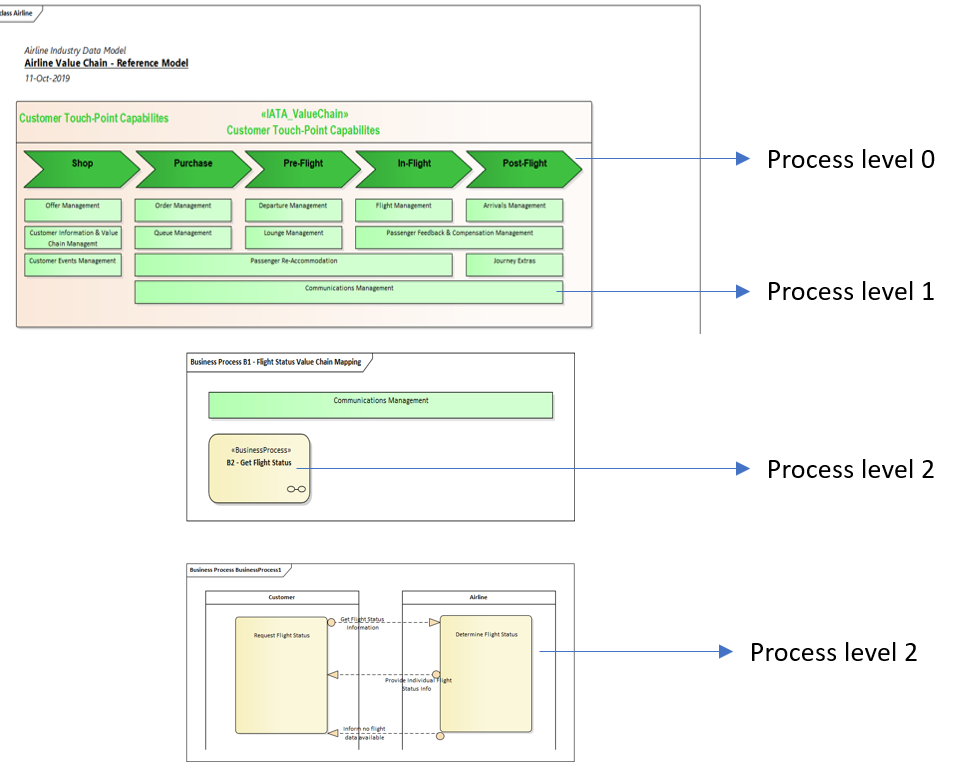
The present guidelines will therefore be (partly) EA specific, but agnostic to the target messaging standard (e.g. XML).

# Overall Approach to Business Process Modeling

The content of this chapter is the same for all Business pillar guidelines (B1, B2, B3) to introduce the business process modeling approach.

## Definition of Levels

As a fundamental concept used in this Business Architecture the following picture shows the different process levels with their definitions. This concept is derived from the process architecture used in SAP reference model.



Process Level 0 (Primary Activity)

Shows the Domain Primary Activities which have the goal to create value that exceeds the cost of providing the product or service.

Process Level 1 (Process Area):

Shows a Business Process area for a specific business purpose.

The Business Domain Model is the modeling starting point and the highest-level model type. It shows the business domains and clusters the subdomains into these business domains.

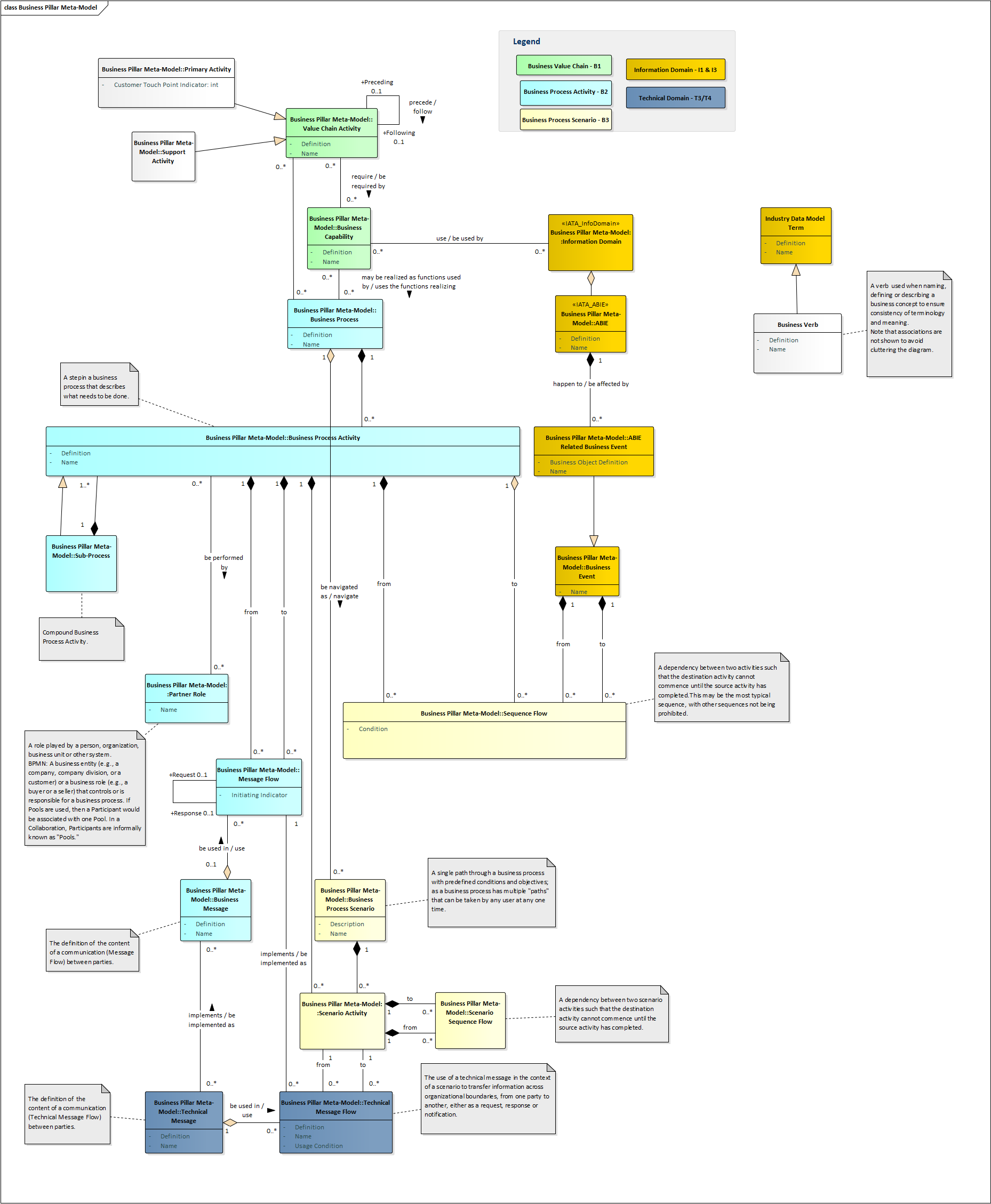
Process Level 2 (Business Process Activity Diagram):

Shows the root level for a specific business process activity purpose.

This is where the Business modeling starts describing the Business capabilities using Business Process Notations workflow

## Business pillar to Information & Technology pillar Connections

The following diagram available in AIDM Enterprise Architect represents the Business metamodel and how business information is linked to the Information pillar and the Technology pillar.

The following picture shows the main artefacts and how they are connected between the Business (green and light blue & yellow), Information (yellow) and Technology (dark blue)l

## Upfront vs progressive Modeling of Content

The actual content of the Business Architecture will be created using 2 complementary approaches:

Upfront Modeling

* The content of the Value Chain is be provided as initial model.
* The content of the Process Level 1 diagram made up of the Value Chain process areas is provided as initial model.

Progressive Modeling

* All other content will be created by the work-group BRDs during their projects, as well as additions or updates to the upfront created content.

# General description of Business process activity

## Use industry framework for Business Process Modeling activities.

The focus of the guideline is for the recommended practices to use of **BPMN 2.0 framework** with the recommended elements, naming conventions, diagram layout and process descriptions.

## What objectives for using BPMN modeling

**BPMN** is a graphical notation for drawing business processes. It is an industry well known standard developed since 2002 as the **Business Process Modelling Notation** and now managed as the **Business Process Model and Notation 2.0** by the international, open membership, not-for-profit, technology standards consortium, the Object Management Group (OMG). BPMN is a flowcharting technique very similar to activity diagrams from the Unified Modelling Language (UML).

1. The main objectives of BPMN is to

* assist communication about business processes
* support business process management
* provide a mapping between the notation and computing execution languages such as the Business Process Activity

## What benefits to use of BPMN models

Business processes are underlying mechanisms that support the delivery of every organisation's day-to-day services.

A business process encompasses participants, tasks and supporting systems that work together to produce a result that is of value to the organisation. Organisations are becoming increasingly aware of the importance of adopting a process-centric view of their business activities to better coordinate implementation activities.

Business process modelling is a technique that promotes the **visual representation** of an organisation's **business processes**.

The use of BPMN process models allows an organisation to obtain a view of its business activities so that it can then:

* identify interactions and inter-dependencies between various components of a process
* analyse a process for improvements
* allocate ownership of a process
* identify risk in a process
* apply metrics to a process to measure the impact of any process change
* report the metrics and key performance indicators for use in business performance management
* determine the alignment of a process with business strategy and objectives
* identify the information, applications and technologies associated with a process
* simulate changes to a process and determine the outcome

## Overview of the main Business process elements in BPMN 2.0 models

|  |  |
| --- | --- |
| **Activity** | Work that an organisation performs using processes. An activity can be atomic (such as a task) or non-atomic (Process or Sub-Process). |
| **Pool** | A Pool represents a Participant in a Collaboration. Graphically, a Pool is a container for partitioning a Process from other Pools/Participants |
| **Process** | A defined sequence of activities in an organisation that represent the steps required to carry out work and achieve a business objective. It includes the flow and use of information and resources. In BPMN, a Process is depicted as a graph of Flow Elements, which are a set of Activities, Events, Gateways, and Sequence Flows. |
| **Sub-Process** | A Process that is included within another Process. The Sub-Process can be in a collapsed view that hides its details. |
| **Message Flow** | Extend a Control Flow relationship to define the flow of communications in the process. |
| **Event** | Define a state of a process (e.g. Start, Intermediate, End) |
| **Task** | An atomic activity that is included within a Process. A Task is used when the work in the Process is not broken down to a finer level of Process Model detail. Generally, an end-user, an application, or both will perform the Task. |
| **Conversation Link** | Connect a Conversation Node with a Pool, in either direction. |

# Modeling Business Process Activity Diagram

## Modeling Artifacts

### Artifact Usage

Modeling Business Process Activity diagram are created **in B2 partition** in the Operational View node.

### Artifacts and Properties

This chapter explains which BPMN 2.0 standards Artifacts needs to be used and which attributes of the Artifacts need to be filled.

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** |  | **Type / StereoType** |
| **Business Process** | A defined set of business activities that represent the steps required to achieve a business objective. It includes the flow and use of information and resources. |  |  |
|  |  |  |  |
| **BPEL** | Define the behavior of an executable or abstract business process. |  |  |
|  |  |  |  |
| **Activity** | Represent work that is performed within a Business Process.  An Activity can be modeled as a: |  |  |
|  |  |  |  |
|  |  |  |  |
|  | As a sub-process, the Activity can be made a composite element that links to a child diagram containing the flow of other BPMN elements |  |  |
|  |  |  |  |
|  |  |  |  |
| **Global Task** | Define a task or activity performed in the top-level process, at a higher level of |  |  |
|  | execution. |  |  |
|  |  |  |  |
| **Data Store** | Represent a mechanism for an Activity to retrieve or update stored information. |  |  |
|  |  |  |  |
| **Start Event** | Define the initiating event that does not result from some other event(s) – in other word this is the start activity in a process within the same pool of activity’s |  |  |
| **Intermediate Event** | Define an intermediate event in a process |  |  |
| **End Event** | Define the terminating event in a process. |  |  |
| **Gateway** | Define a decision point in a business process |  |  |
| **Pool** | Define the process owner, - in other words the participant. It assigns the tasks of a business entity (e.g., a company, company division, or a customer) or a business role (e.g., a buyer or a seller) that controls or is responsible for a business process. |  |  |
| **Lane** | Lanes always exist in a pool, and the lane boundaries represent process boundaries from start to end |  |  |
| **Message** | Represent the contents of a communication between two Participants.  A message is transmitted through a Message Flow.  A Message may contain the list of Data elements (ABIE) already defined in the Governance Catalog and indicate the need for new Data elements to be created. |  |  |
| **Group** | Extend a Boundary element to group other elements. |  |  |
| **Text Annotation** | Create a comment. |  |  |
| **Data Association** | Link data between Data Objects, Data Store, Properties and Activities, Processes. |  |  |
| **Association** | Link the information and Artifacts with BPMN graphic elements |  |  |
| **Conversation Link** | Connect a Conversation Node with a Pool, in either direction |  |  |

## Modeling Associations

A **Message Flow** is used to show the **flow** of **Messages** between two Participants that are prepared to send and receive them /…/. In **BPMN**, two separate Pools in a Collaboration Diagram will represent the two Participants

A **sequence flow** is the connector between two elements of a process. After an element is visited during process execution, all outgoing **sequence flows** are followed.

Complete rules concerning the use of Sequence Flows and Message Flows, as defined in the BPMN 2.0 Specification and summarized here:

These rules apply to Sequence Flows in relation to Events (Start, Intermediate and End), Activities (Task and Sub-Process, for Processes), Choreography Activities (Choreography Task and Sub-Choreography, for Choreographies) and Gateways:

* A Sequence Flow cannot cross a Pool boundary
* An End Event cannot be the source element for a Sequence Flow
* A Start Event cannot be the target element for a Sequence Flow
* An Intermediate Event, if edge mounted on an Activity element, cannot be the source element for a Sequence Flow; it cannot have incoming Sequence Flows
* An Intermediate Event - if edge mounted on an Activity element and having the Tagged Value
* Objects within a Sub-Process cannot have a Sequence Flow relationship with objects outside the Sub-Process
* A Sequence Flow cannot connect directly to a Pool

## Views / Diagrams

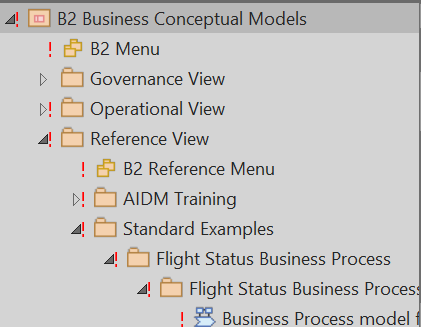
The project will need to create a Business process activity Diagram with all included artifacts in the specific Process area with project name in the Operational View node.

The diagram and all its Artifacts need to be created in the Operational View.

|  |  |  |  |
| --- | --- | --- | --- |
| **Diagram** | **type** | **Toolbox** | **Properties** |
| Business Process Activity Diagram | Business Process |  | * Name: Name of the Business Process activity diagram for the project   (e.g. Business Process Model for Flight Status) |

## Package Structure

There will be one Package per project in B2 Operational partition.



# View BPMN 2.0 Toolbox on EA Tool

To create BPMN elements and relationships on Collaboration diagrams in either BPMN 2.0 or BPEL formats, you can use the 'BPMN 2.0 Collaboration' pages of the Diagram Toolbox.

## Access to Toolbox for BPMN 2.0 elements & Artifacts

Use any of the methods outlined here to display the Diagram Toolbox.

On the Diagram Toolbox, click on the More tools button then select 'BPMN 2.0 | BPMN 2.0 Collaboration'.

|  |  |
| --- | --- |
| Ribbon | Design > Diagram > Toolbox : More tools > BPMN 2.0 > BPMN 2.0 Collaboration |
|  |  |
| Keyboard Shortcuts | Alt+5 : More tools | BPMN 2.0 | BPMN 2.0 Collaboration |
|  |  |
| Other | Click the icon on the Diagram caption bar to display the Diagram Toolbox, then |
|  |
|  | More tools | BPMN 2.0 | BPMN 2.0 Collaboration |
|  |  |



## View standard BPMN 2.0 Collaboration Elements

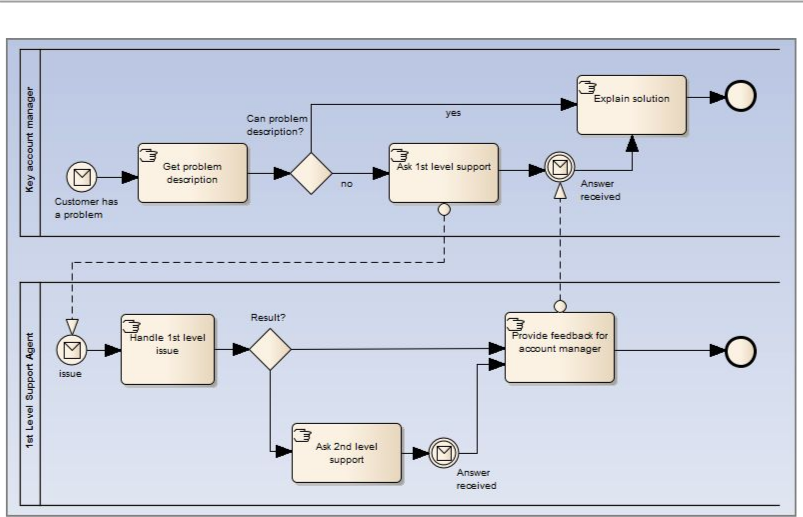
|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | | **Use to** | |
| Collaboration Model | | Extend a composite Activity that defines a Collaboration process. | |
|  | |  | |
| Pool | | Extend a Partition element to logically organize an Activity. | |
|  | |  | |
| Lane | | Extend a Partition element to subdivide a Pool. | |
|  | |  | |
| Conversation | | Extend a Class element to group a set of Message Flows based on a certain concept. | |
|  | |  | |
| Start Event | | Define the initiating event in a process. | |
|  | | Elements of this type cannot be edge-mounted on other elements. | |
|  | |  | |
| Intermediate Event | | Define an intermediate event in a process. | |
|  | | Elements of this type can only be edge-mounted on Activity elements. | |
|  | |  | |
| End Event | | Define the terminating event in a process. | |
|  | | Elements of this type cannot be edge-mounted on other elements. | |
|  | |  | |
| Gateway | | Define a decision point in a business process. | |
|  | | If a condition is true then processing continues one way; if false, then another. | |
|  | |  | |
| Activity | | Represents work that is performed within a Business Process. An Activity can be | |
|  | | modeled as a: | |
|  | | · Sub-Process - a compound Activity that is defined as a flow of other BPMN | |
|  | | 2.0 elements or  · Task - an atomic Activity that cannot be broken down into a smaller unit | |
|  | |  | |
|  | |  | |  | |  |
|  | |  | |  | |  |
|  | | Data Object | | Provide or store the information for an Activity. | |  |
|  | |  | |  | |  |
|  | | Data Store | | Represent a mechanism for an Activity to retrieve or update stored information. | |  |
|  | |  | |  | |  |
|  | | Choreography | | Extend an Activity element to represent a process unit of information exchange | |  |
|  | |  | | between elements. | |  |
|  | |  | |  | |  |
|  | | Group | | Extend a Boundary element to group other elements. | |  |
|  | |  | |  | |  |
|  | | Text Annotation | | Create a comment. | |  |
|  | |  | |  | |  |

## View Standard BPMN 2.0 Collaboration Connectors

|  |  |
| --- | --- |
| **Item** | **Use to** |
| Message Flow | Extend a Control Flow relationship to define the flow of communications in the |
|  | process. |
|  |  |
| Conversation Link | Connect a Conversation Node to or from an element. |
|  |  |
| Sequence Flow | Extend a Control Flow relationship to define the flow of activity. |
|  |  |
| Association | Link the information and artifacts with BPMN graphic elements. |
|  |  |

# View examples of Business Process Activity diagrams

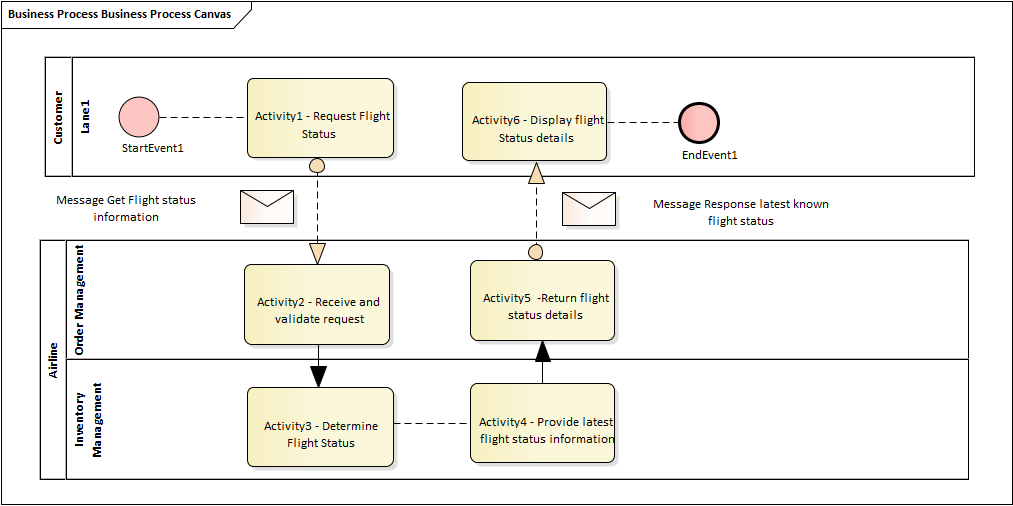
## Example from Standard of BPMN 2.0 Collaboration Diagram



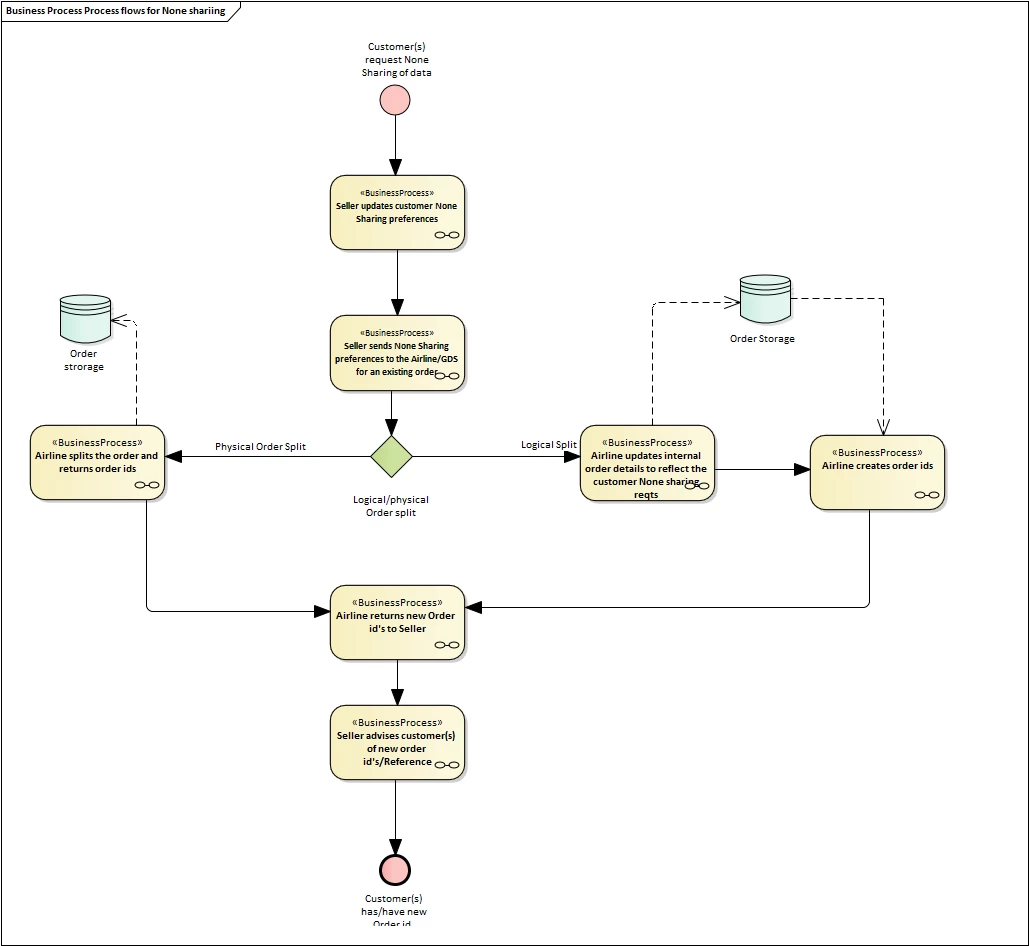
## Example of Project for Flight Status Collaboration Diagram

Below is s an example of Business Process Level 2 diagram for a project activity of Flight Status request and response between Customer and responsible Airline.

### Example of Business Process Activity diagram for Flight Status including message flow Request and response.



### Example of Business process activity diagram for a Passenger request to stop sharing information



# Annexes

## Third Party Standards

**BPMN 2.0 :**

BPMN 2.0 provides instruments to enable enterprise architects to describe, analyze and visualize the relationships among business domains in an unambiguous way.

Business Process Model and Notation has become the de-facto standard for business processes diagrams. It is intended to be used directly by the stakeholders who design, manage and realize business processes, but at the same time be precise enough to allow BPMN diagrams to be translated into software process components. BPMN has an easy-to-use flowchart-like notation that is independent of any implementation environment.

[http://www.opengroup.org/subjectareas/enterprise/BPMN 2](http://www.opengroup.org/subjectareas/enterprise/BPMN%202).0

<https://sparxsystems.com/enterprise_architect_user_guide/14.0/guidebooks/tools_ba_bpmn_business_process_diagram.html>

**UML :**

The Unified Modeling Language™ - UML - is [OMG](http://www.omg.org/)'s most-used specification, and the way the world models not only application structure, behavior, and architecture, but also business process and data structure.

<http://www.uml.org/>

## Glossary of this document

|  |  |
| --- | --- |
| **Term** | **Description** |
| ABIE | Aggregated Business Information Entity |
| AIDM | Airline Industry Data Model |
| BPMN | Business Process Model Notation |
| BRD | Business Requirements Document |
| DMTFG | Data Model and Tooling Focus Group |
| EA | Enterprise Architect |
| IATA | International Air Transport Association |
| OMG | Object Management Group |
| PSC | Passenger Services Conference |
| UML | Unified Modeling Language |
| XML | Extensible Markup Language |