

# **Tutorial SemTalk 2.3 BPMN Edition for Business Process Analysis**



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## 1. About Business Process Modeling Notation (BPMN)

The Business Process Modeling Notation (BPMN) specification provides a graphical notation for expressing business processes. This notation has been proposed by the Business Process Management Initiative ([www.bpmi.org](http://www.bpmi.org)).

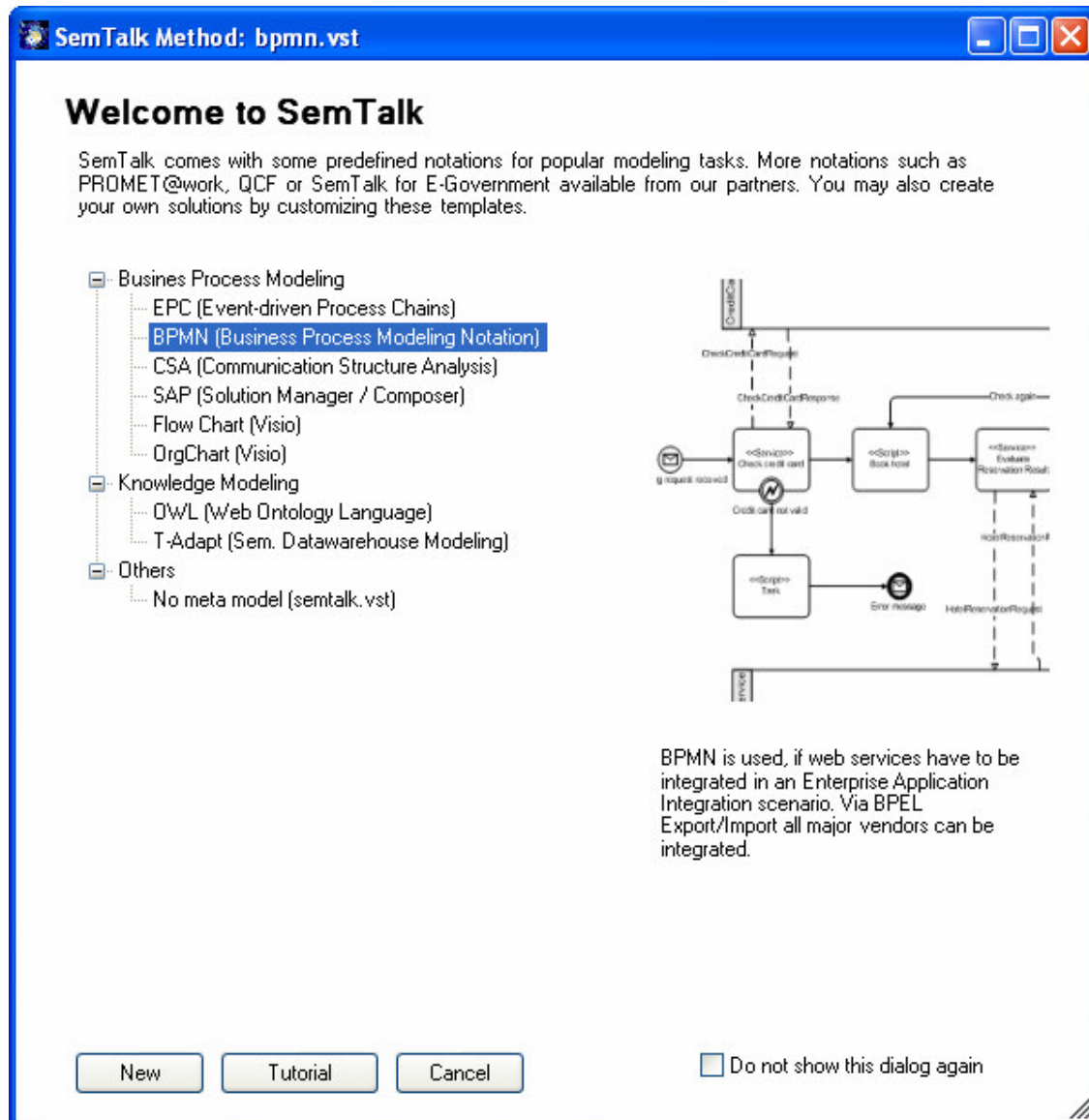
Standard specification can be found here: [www.omg.org/docs/dtc/06-02-01.pdf](http://www.omg.org/docs/dtc/06-02-01.pdf)

The objective of BPMN is to support business process management by both technical users and business users by providing a notation that is intuitive to business users yet able to represent complex process semantics. The main focus of BPMN is on systems that interact and interrupt one another, where there are many deeply nested independent, but coordinated, interacting threads of execution.

**This tutorial is intended to be used for Business Process Analysis, rather than the design and orchestration of web services. Please refer to our other documentation if you are interested in generating BPEL Code.**

## 2. Starting SemTalk BPMN Edition

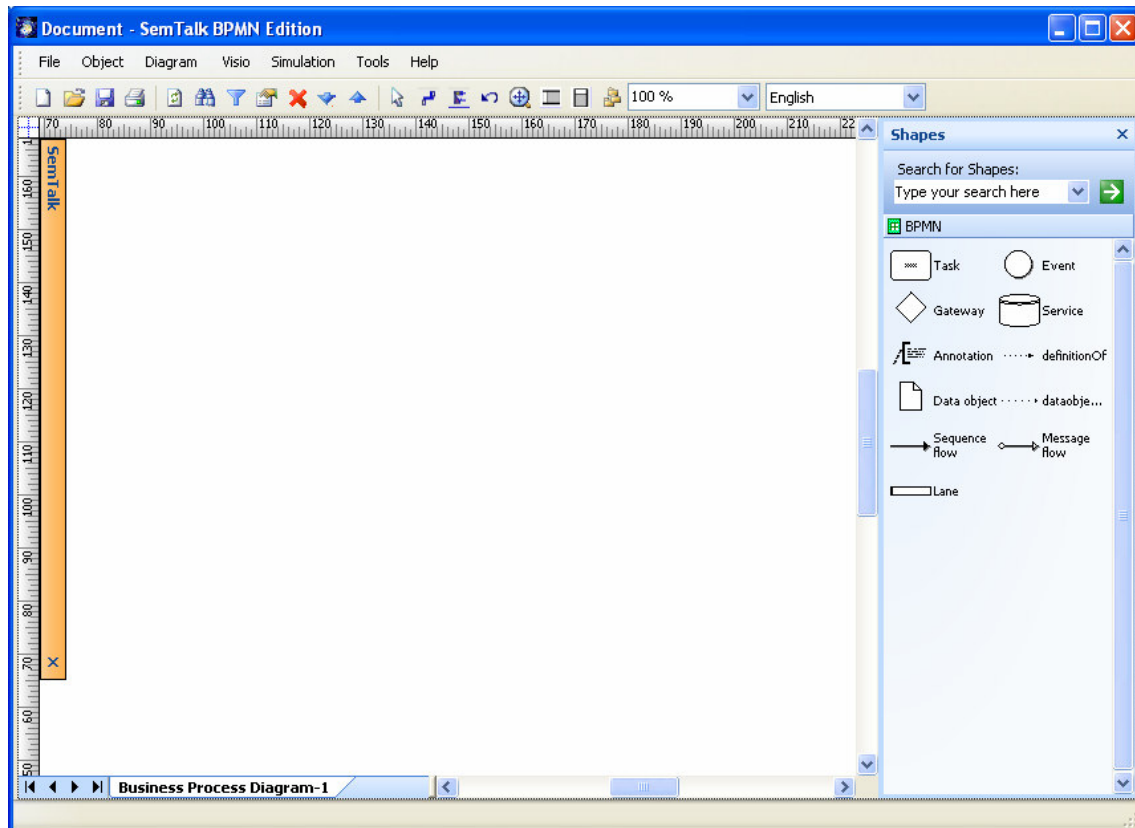
In order to start SemTalk you can use “Start->Programs->SemTalk->SemTalk 2” or the icon on your desktop. The first time you start SemTalk it will come up with the following dialog, which gives new users quick access to available modeling methods.




**Figure 1: SemTalk Welcome Screen**

Please select “New” to start SemTalk BPMN Edition. If have already used SemTalk, please open a BPMN template with “File->New” and select “**bpmn.vst**”. File menu options such as “Save”, “Save As” etc. are very similar to other MS Office applications especially to Visio. Most of the Visio commands used by SemTalk can be found in the “Visio” Menu.

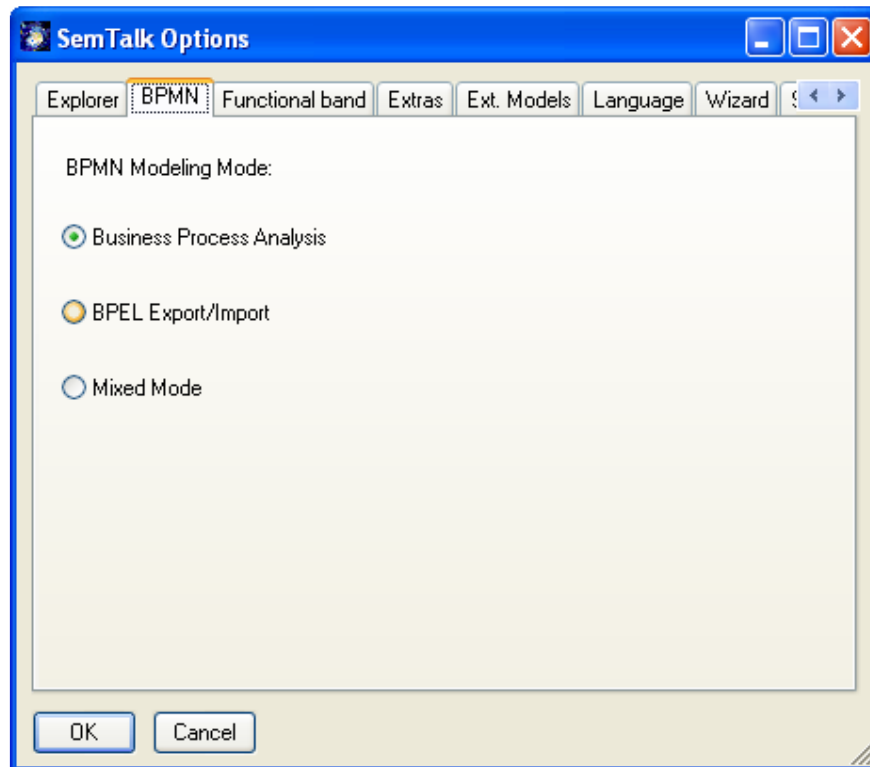
SemTalk shows up as follows.



**Figure 2: Starting SemTalk BPMN Edition**

You can show the SemTalk explorer using the  Button or “Tools->Explorer->Show”. In the Explorer you will get a structured access to those objects contained in your model.

For this tutorial please make sure that you are using the Business Process Analysis Mode of SemTalk BPMN Edition at **Tools->SemTalk Options-> BPMN**.

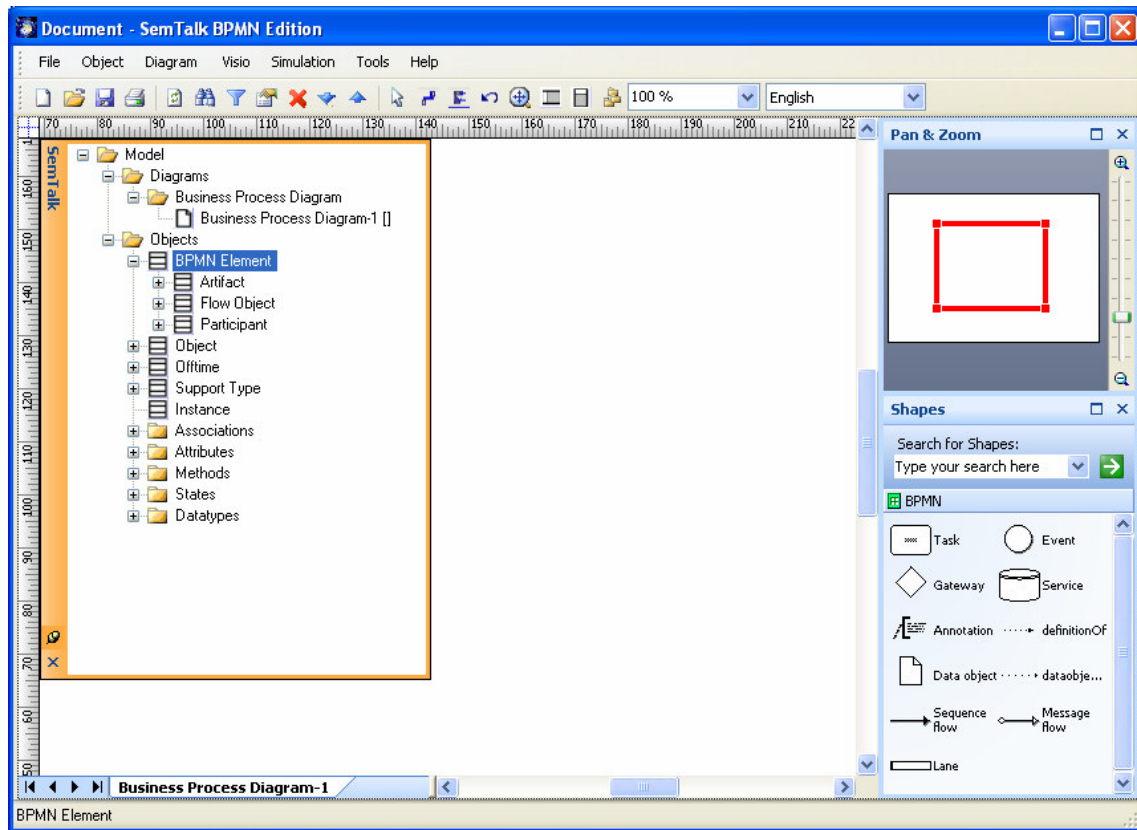


**Figure 3: BPMN Modes**

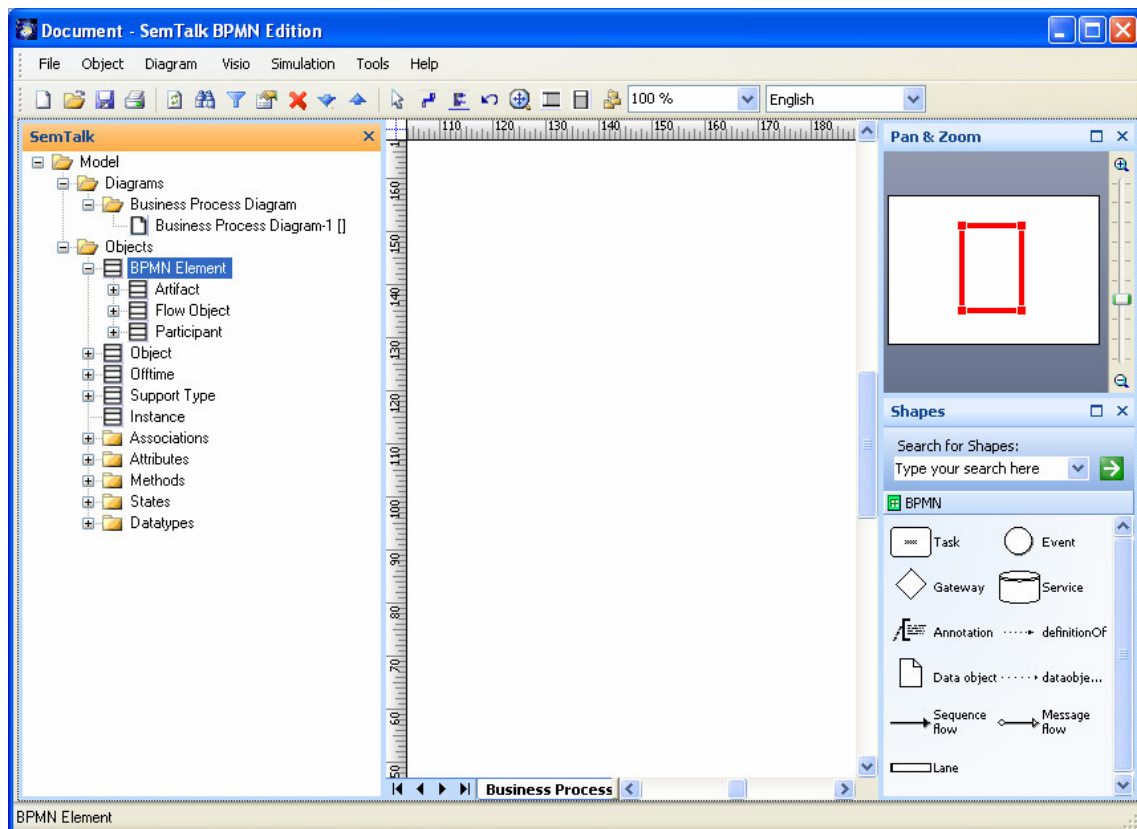
Visio's Pan & Zoom Window can be shown also:



The Stencil Windows and the Pan & Zoom Window can be “docked” to the Borders of the Visio pane with or without the Autohide mode.



It also can be attached to a border of the Visio document. See Visio's Help for details.

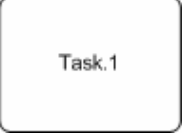
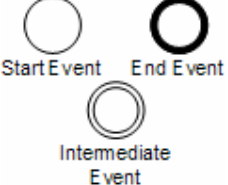
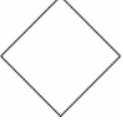
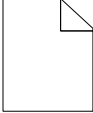



### 3. Editing a Process

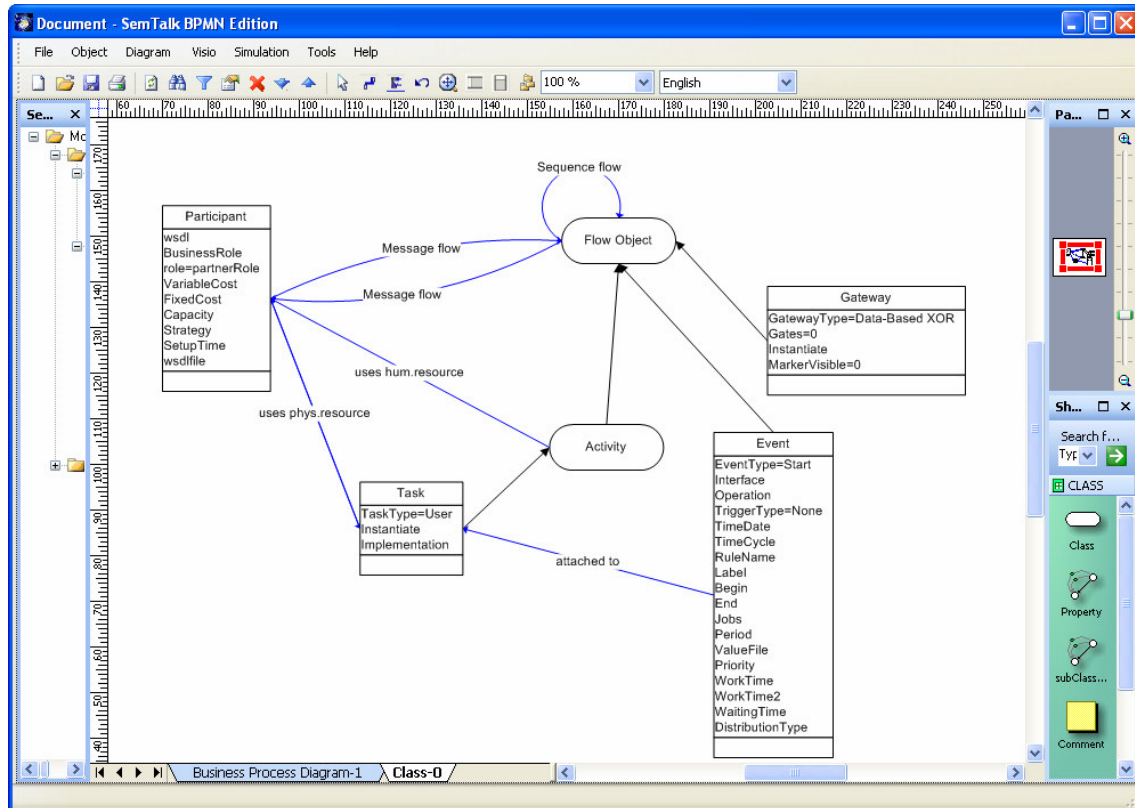
#### 3.1. Adding Process Elements

Please add now elements to the existing process: Simply drag them from the stencil to your diagram (or “Process”). Objects can be renamed by selecting the object and entering the new name.

A process is a sequence of process steps (*Task*). It has well defined interfaces. These are *Start Event* and *End Event*. Between every two of those elements the can be a Sequence flow.

	<p>A Task is 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 and/or an application are used to perform the Task when it is executed</p>
	<p>An Event is something that “happens” during the course of a business process. These Events affect the flow of the Process and usually have a cause or an impact. BPMN has restricted the use of events to include only those types of events that will affect the sequence or timing of activities of a process. Start and most Intermediate Events have “Triggers” that define the cause for the event. End Events may define a “Result” that is a consequence of a Sequence Flow ending.</p>
	<p>Gateways are modeling elements that are used to control how Sequence Flow interact as they converge and diverge within a Process. It implies that there is a gating mechanism that either allows or disallows passage through the Gateway--that is, as Tokens arrive at a Gateway, they can be merged together on input and/or split apart on output as the Gateway mechanisms are invoked.</p>
	<p>Data objects do not have any direct affect on the Sequence Flow or Message Flow of the process, but they do provide information about what the Process does. That is, how documents, data, and other objects are used and updated during the Process. While the name “Data Object” may imply an electronic document, they can be used to represent many different types of objects, both electronic and physical.</p>
	<p>A Pool is a graphical container for activities within an orchestration. We use a Service symbol for IT-Systems (incl. Web Services). Human Participants (or roles) will be expressed by Visio Swimlanes</p>

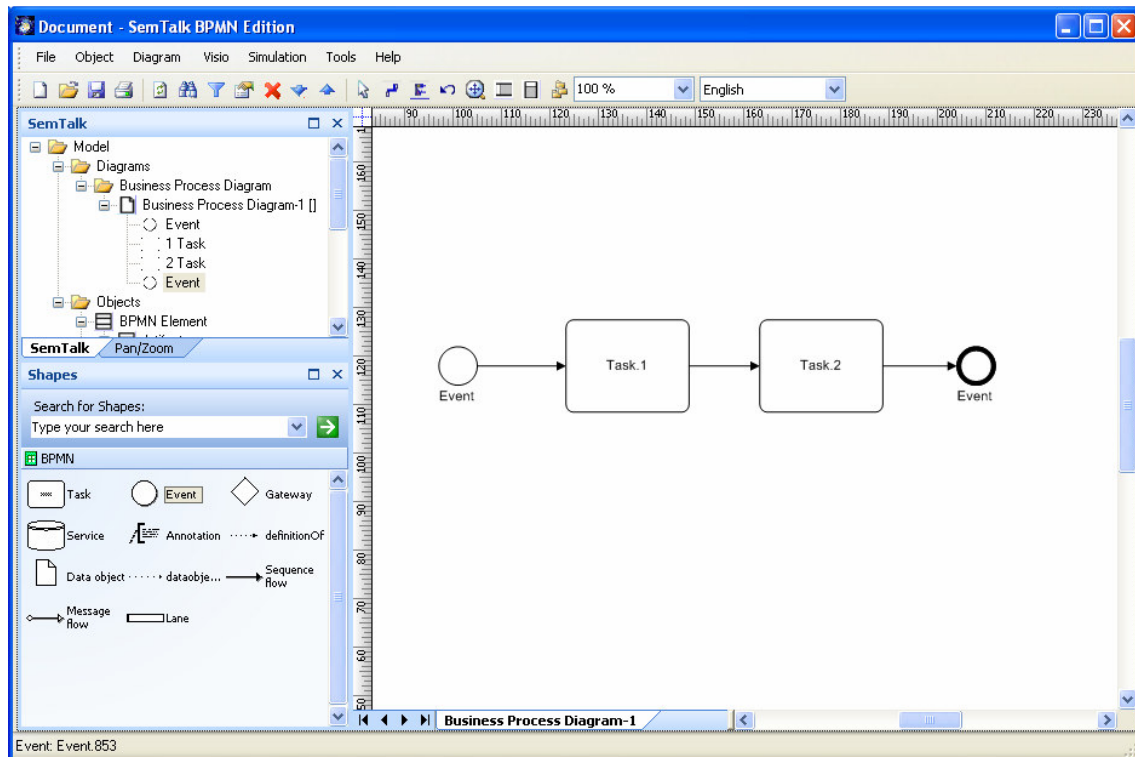





**Figure 4: The simplified BPMN Meta Model in SemTalk**

Adding links is quite simple. Drop the “Sequence flow” shape somewhere on the background. If you hover its ends over an object’s “connections point” you are notified by a red square that you can glue the relation to that object. Select an ending point and glue your relation to the objects of your choice.

After adding some elements and connecting them with the “Sequence flow” connector your diagram looks like this one:



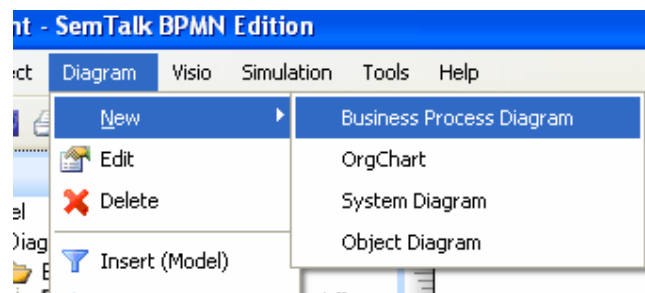
**Figure 5: Adding Process Elements**

To speed up the creation of diagrams the stamp tool and the connector tool are very useful (both from the Visio-Menu). The connector tool is also available from the toolbar .

BPMN does not display human resources graphically as nodes in a process (even it could be easily customized to do so). In order to do that you must use the Edit Dialog and assign a resource on the “Performers” tab, which will be explained later on. Let first begin with Swimlanes.


### 3.2. Using Swimlanes

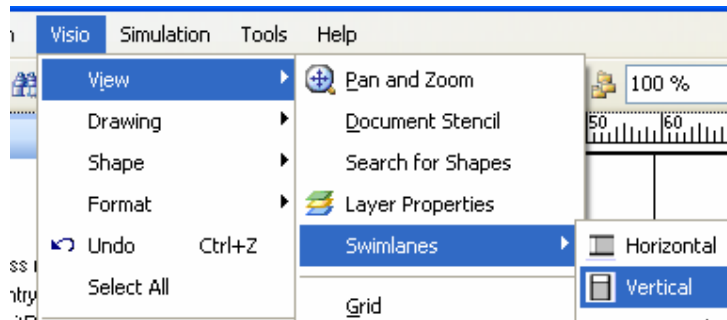
Let us first create a new process page:



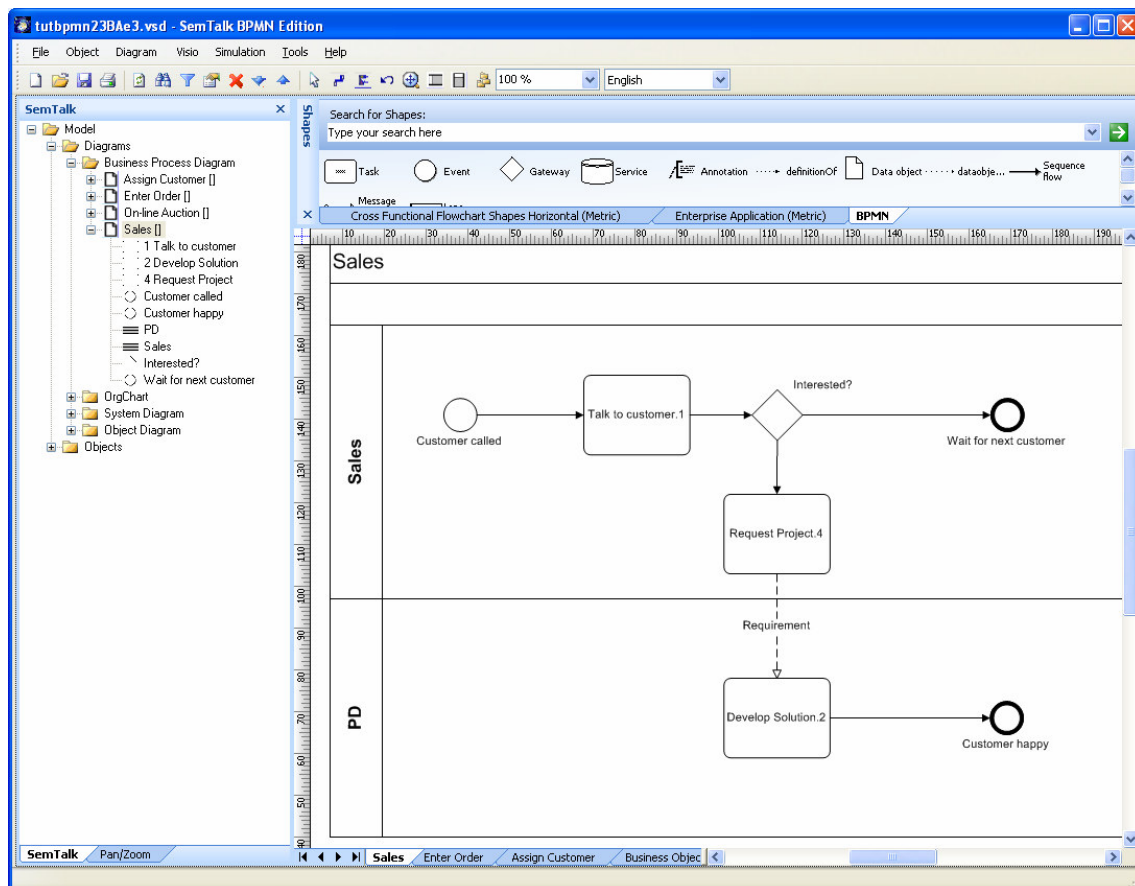
This will create a new Visio Page of diagram class “Business Process Diagram”. You may rename that page directly by renaming the tab or a via a SemTalk dialog (Right Click-> Edit on the background or the menu item “Diagram->Edit”).

Swimlanes are well known from Visio’s Flowcharting stencil. They can be used via the

command buttons  or the Visio Menu of SemTalk.



After dropping functional bands on the drawing you select the title area of the Swimlane and go ahead type. Alternatively you can select existing roles or org. units via the right click menu. (“Select Resource”).



**Figure 6: Process with Swimlanes**

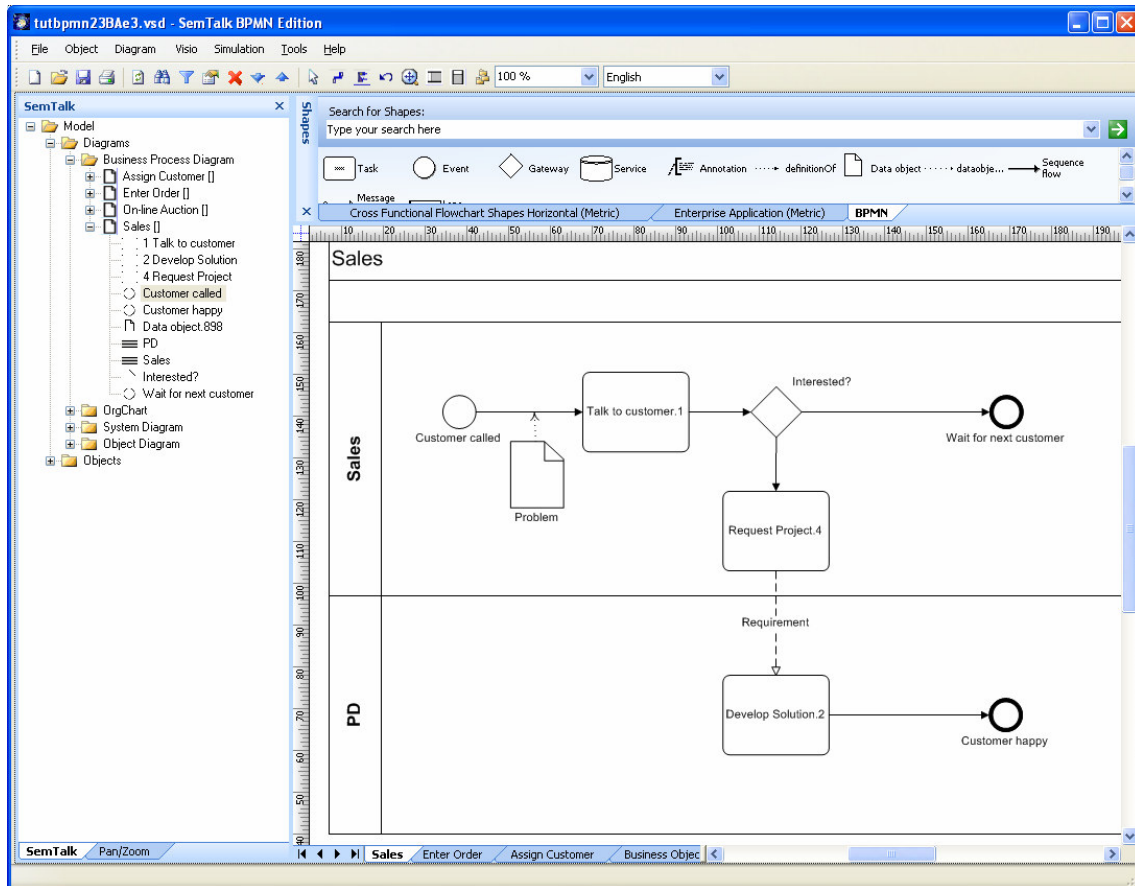
If you move an activity to a Swimlane this is detected by SemTalk and the function will be assigned automatically to the role of the Swimlane.

If you select the head of a swim lane, you can create new roles just by renaming the Swimlane. Via the right-click menu on the Swimlane you can select existing roles and edit the objects.

Between tasks on different Swimlanes a special link (“Message flow”) has to be used. You may not relate a gateway on one Swimlane with a task on another Swimlane.

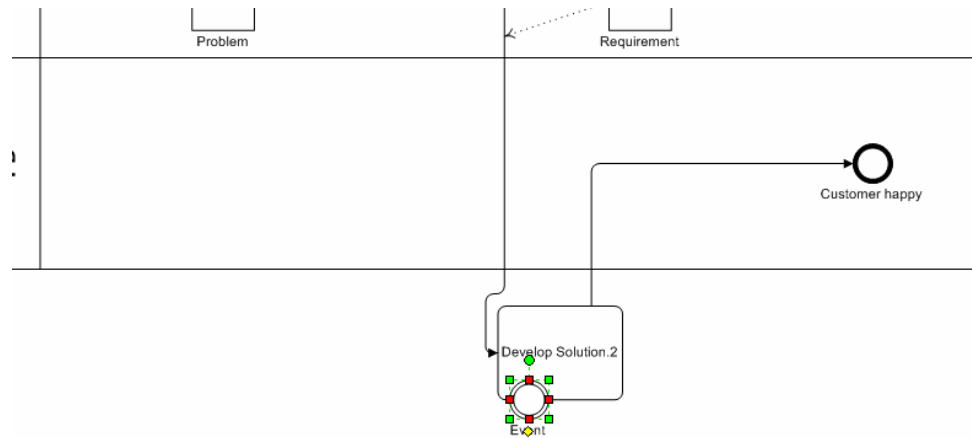
Inputs and outputs of task are specified as data objects on the sequence flow.

A process with data object might look like:



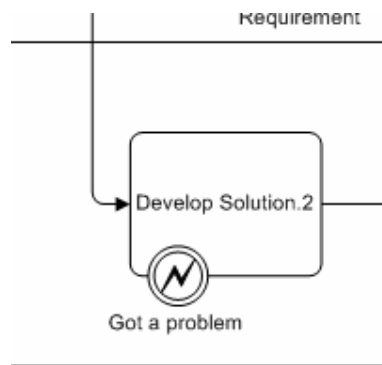
**Figure 7: Process with Swimlanes and data objects**

In BPMN you can attach Events to a task in order to express, that something happened while the task was executed.

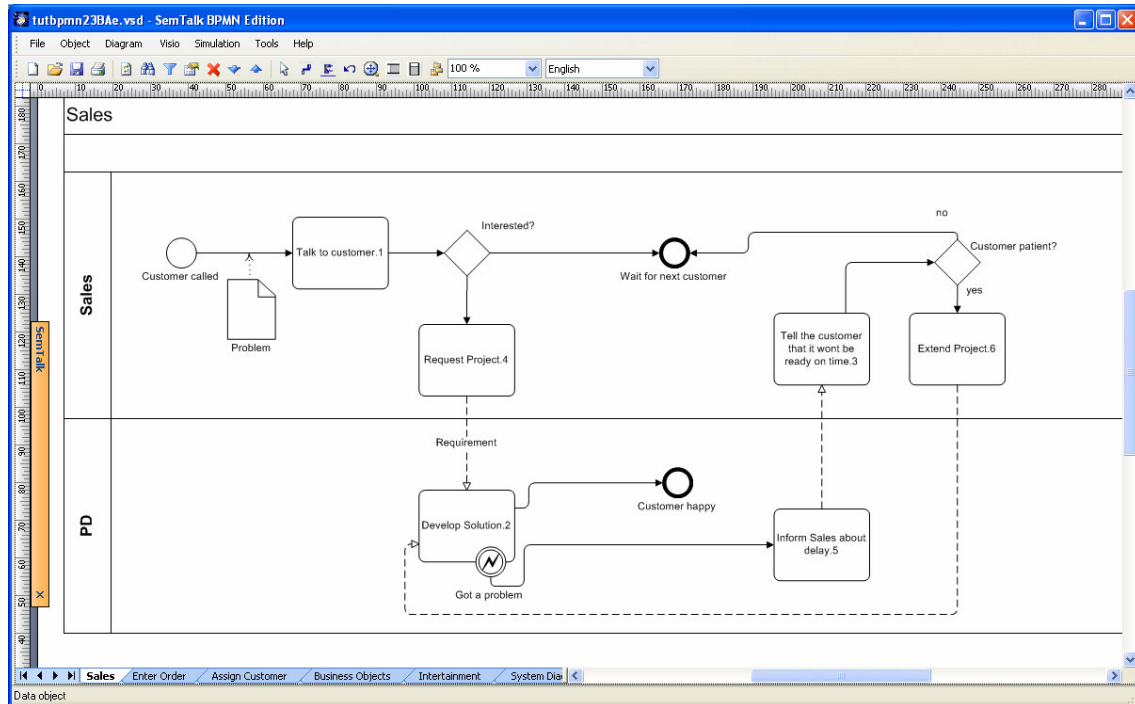


**Figure 8: Attaching an Event**

Due to a tiny problem with Visio Swimlanes, events must be attached outside of the Swimlane. Move “Develop Solution” down, so that it is off the “PD” Swimlane and drop a new event shape on the task. Once it is connected, you can move it back on the Swimlane. Edit the event and select on the “Measures” tab the option “Process Error” as an Event type:



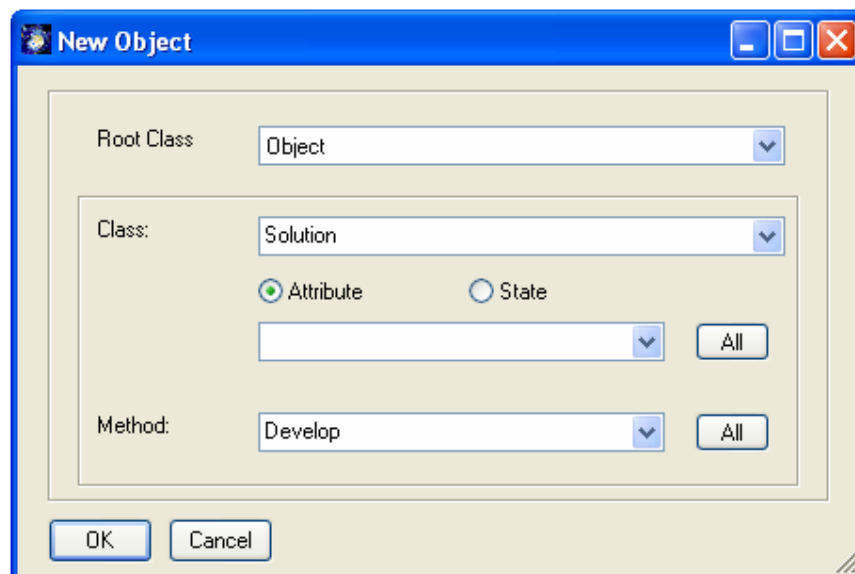
**Figure 9: Back on the Swimlane**



**Figure 10: Intermediate Event and Error handling**

### 3.3. Object oriented process modeling

If you select the menu „Object->Compose“ or right click compose, you will have the option to specify object oriented tasks and events.



**Figure 11: Composing object oriented tasks**

**Root Class** is the base object type: Object, physical resource, media etc. The most used type is “Object” for the business objects, but there are also other cases as “open letter” (media) or “boot Laptop” (physical resource). Please make sure you have selected “Object” for this tutorial.

**Class** is the object the task is related to. You can reuse existing classes or create new classes in a bottom up style. E.g. “Bid” is the class at “make Bid”

The options **State** and **Attribute** allow to specify which of these feature will be used to create the activity name. For the BPMN methodology only methods are relevant for activities.

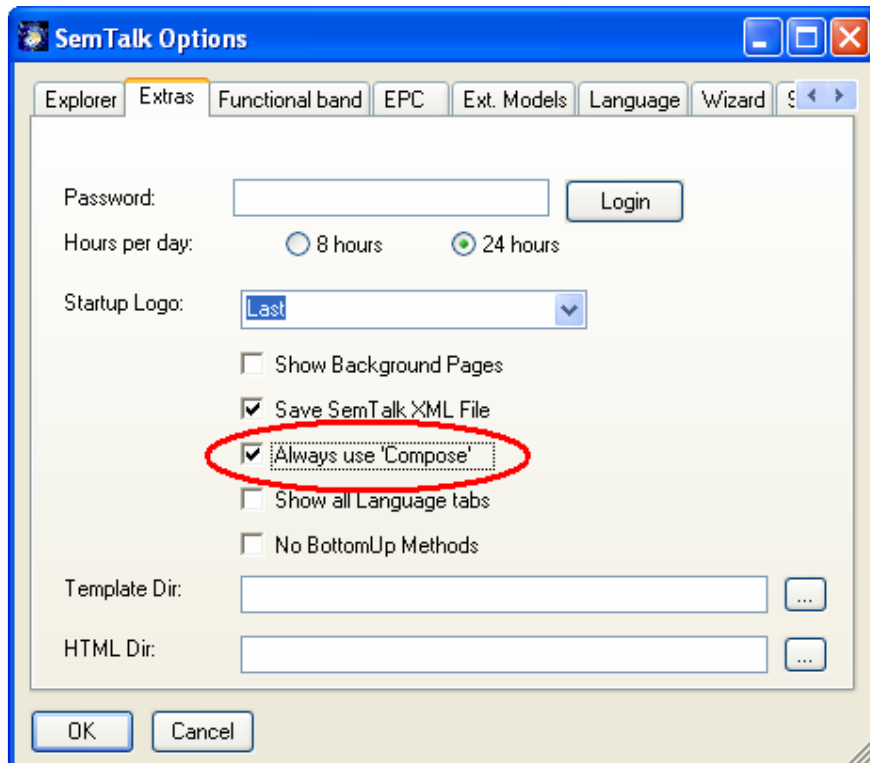
In the combo box **Method** the name of the method (or verb) can be entered newly or be selected from the already defined methods of the class

SemTalk creates the class and method in case they do not exist in the database yet. In our example a class named “order” with the method “enter” will be created.

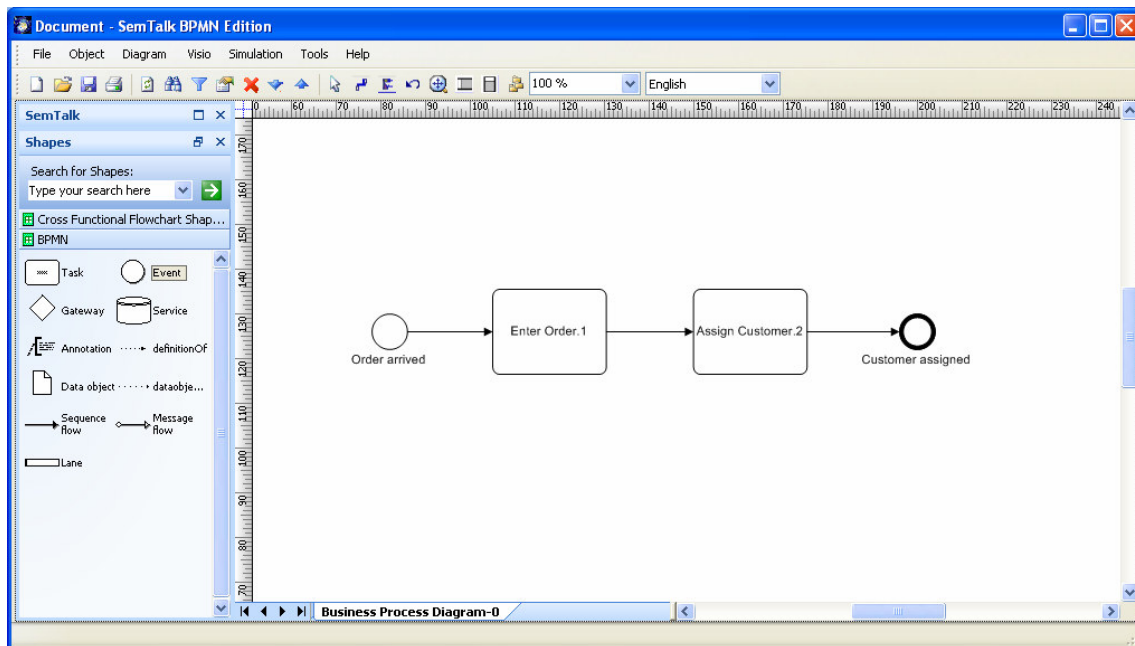
**The whole idea about compose is, that the name of the task is generated from the name of the class and the name of the method. If classes or methods are being renamed, the name of the activity is being updated. Note that method (as well as attributes and state) can be inherited from super classes.**

The order of how the name of the activity will be generated is language specific („Order Enter” or “Enter Order”). You can change it as a general setting in the SemTalk options dialog. For English you will use “Method Object”.

You can also specify to use “Compose” on any new activity:

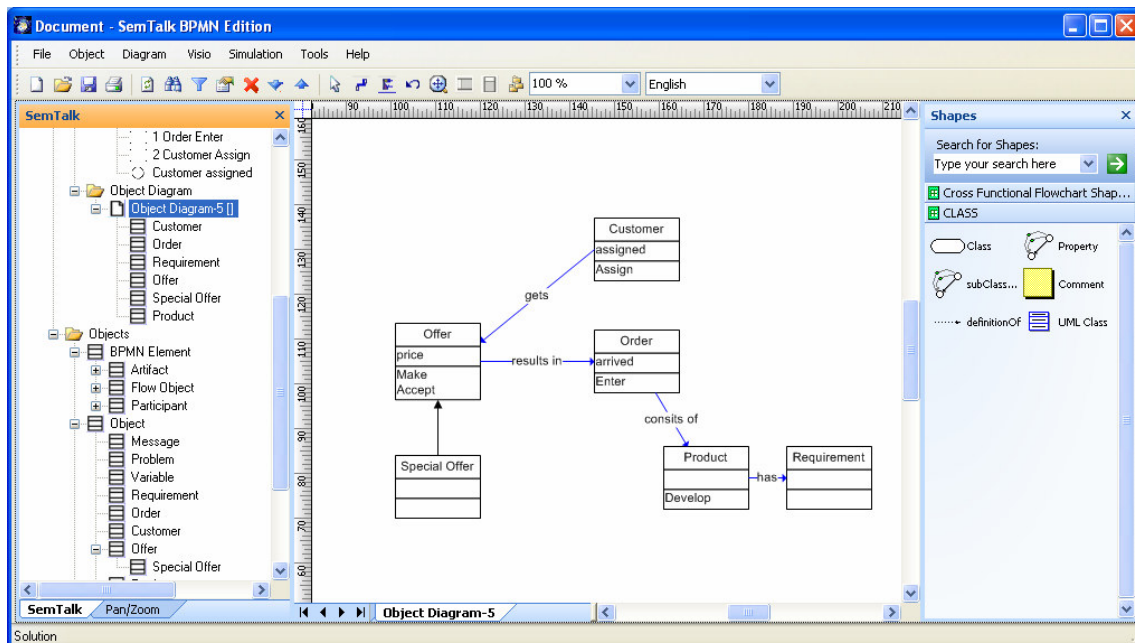


A newly created Process with some object oriented functions:



**Figure 12: An object-oriented Process**

The objects “Order” and “Customer” are created in the background. A diagram of these (and some others) will look like this:



**Figure 13: Object Model**

If you make „Special Offer“ a subclass of „Offer“. “Special Offer” will inherit all methods from “Offer”. In the compose dialog those inherited methods will be shown in the method combobox.



SemTalk ensures the consistency between object models and process models. If you rename a class or method all depending functions will be updated.

We recommend object oriented process modeling especially for large projects. It is a good idea to define in a first step the most important business objects and build a catalogue of methods (verbs). This is the foundation of consistent process models.

If you are going to use the same business objects in multiple projects we recommend to store such object libraries in separated files and publish them on intranet or extranet. The SemTalk Wizard will ensure that those libraries are used consistently.

### 3.4. Editing process elements

You can now edit the objects on your diagram:

1. By double clicking or
2. Right Click "Edit" or
3. Select & Menu "Object->Edit" or
4. Find it in the explorer as a child of "Diagrams->Process->Process-6" or
5. Find it in the explorer as a child of "Objects->".

In case you just want to rename the object, you can select it and type-in the new name. You may also use the Properties Window, which allows reviewing and changing the values directly. (Tools->Explorer->Properties)

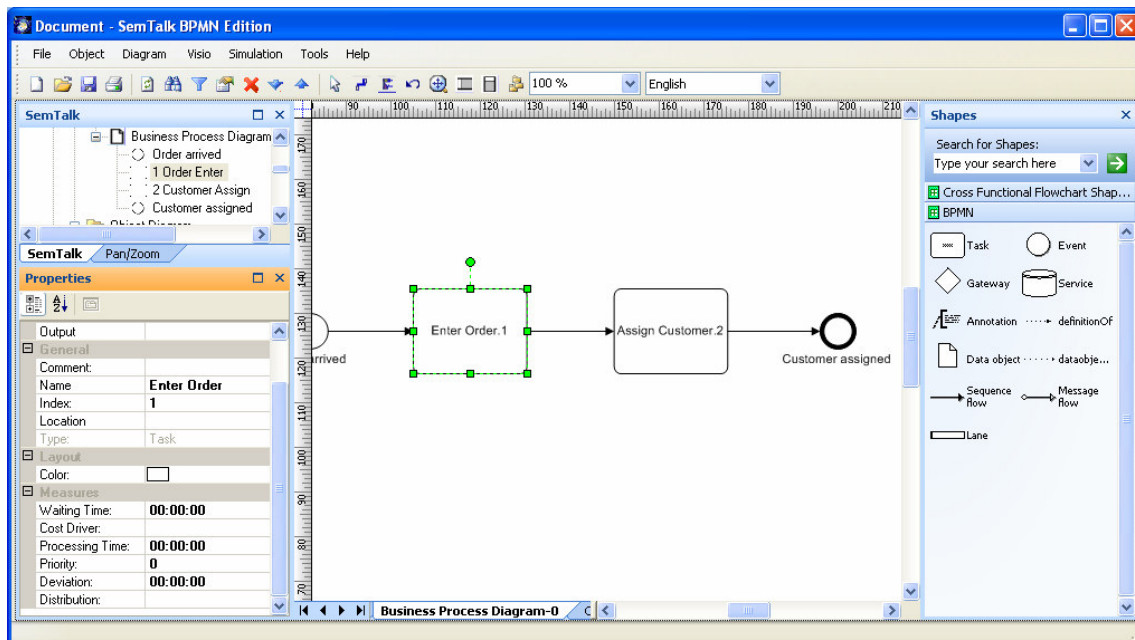
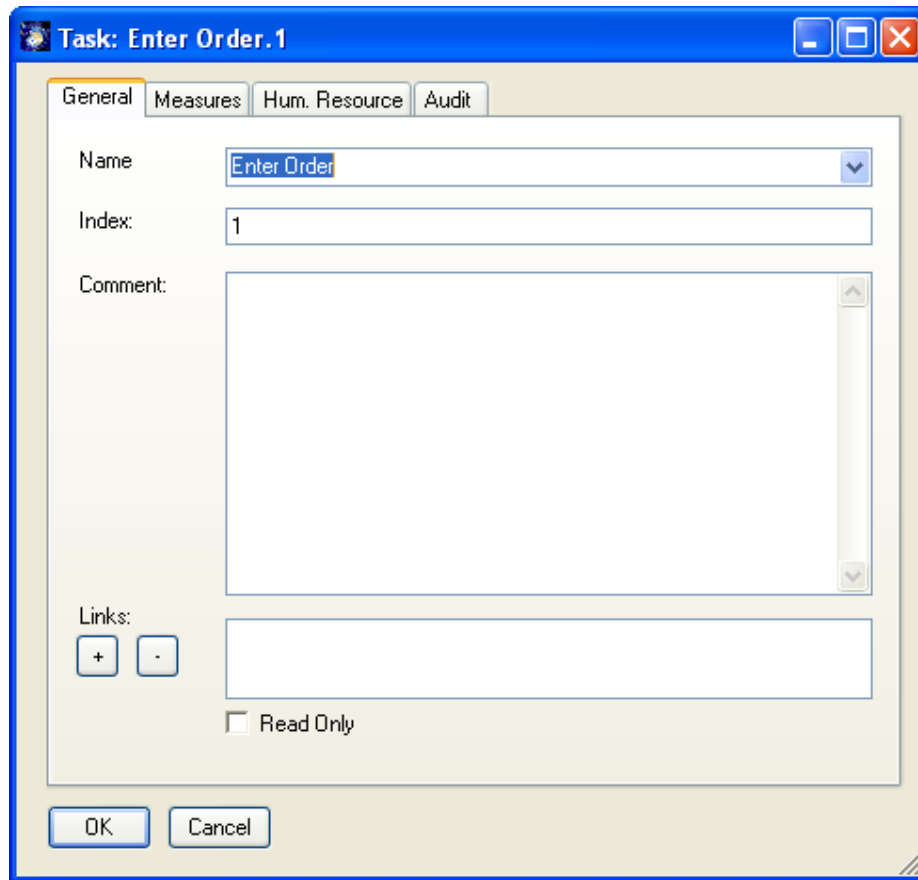


Figure 14: Properties Window

#### 3.4.1. Task Dialog

The task dialog looks like this:



**Figure 15: Task Dialog**

**Links** (hyperlinks, attachments, documents), can be added with the right click menu “New” (“+” button), changed and removed by the right click menu “Remove” (“-“ button) on the background of the links list. Double clicking the link in the listbox opens that document with the (for windows) associated application. Activities having at least one link will show up with a little marker in the upper left corner.

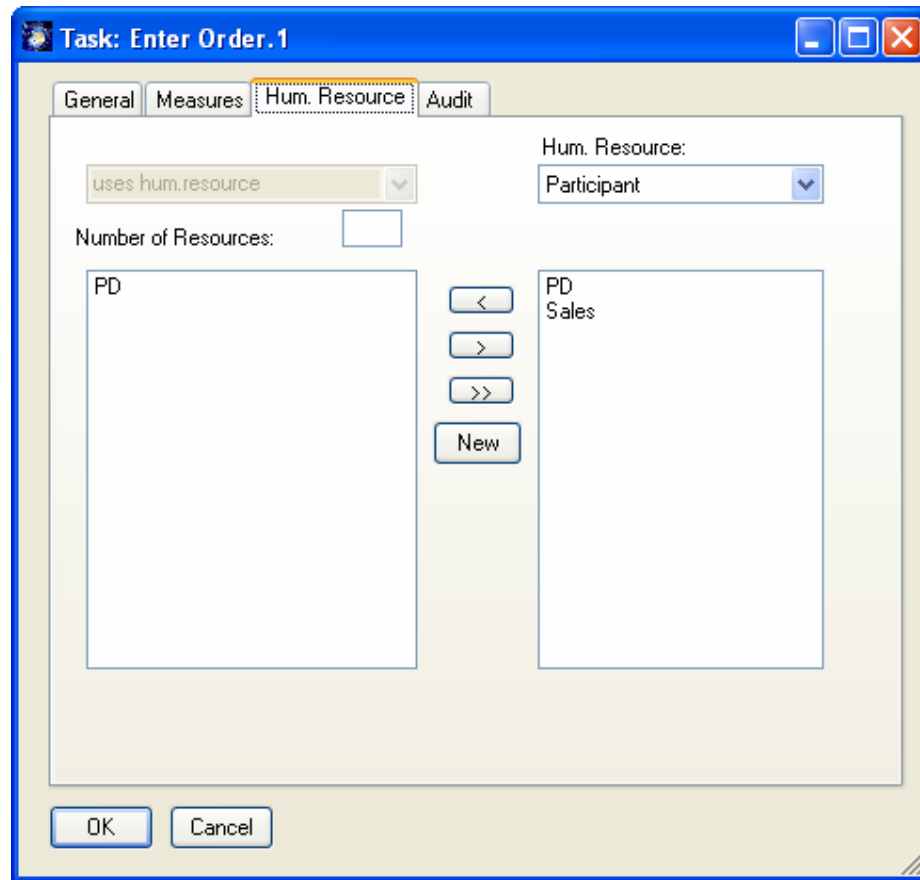
NOTE: In order to change all occurrences of the task you must edit the class itself using “Edit Class”.



**Figure 16: Edit & Compose a Task Class**

NOTE: The “General” tab is a generic SemTalk tab and not a BPMN specific one.

### **3.4.2. Task: “Hum. Resource” Tab**



**Figure 17: Task: Hum. Resource**

On the “Hum. Resource”-tab you can assign “Participants” to the task. These are people, roles or organizational units which actually execute the task. The left hand listbox shows the currently assigned resources and the right hand listbox shows the list of all available human resources.

You may use the arrow buttons to add / remove resources. Double clicking in the listboxes will edit the resource.

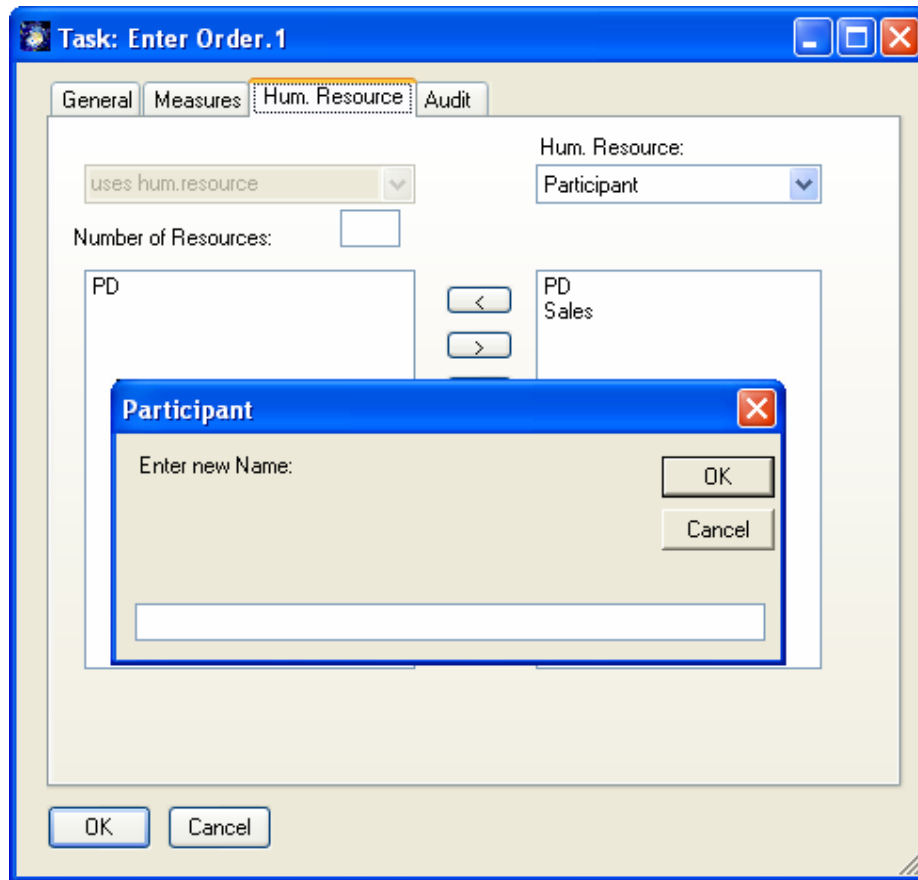
The right combobox having the selection “Human Resource” allows to filter resources by class.

The left combobox having the selection “uses hum.resource” allows to specify certain types of execution such as “controlled by” or “supervised by”.<sup>2</sup>

Using the new button you can add new human resources and new human resource classes. The new instance will automatically get the class which is selected in the combobox.

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<sup>2</sup> These could be defined as subclasses of the relation “executes”

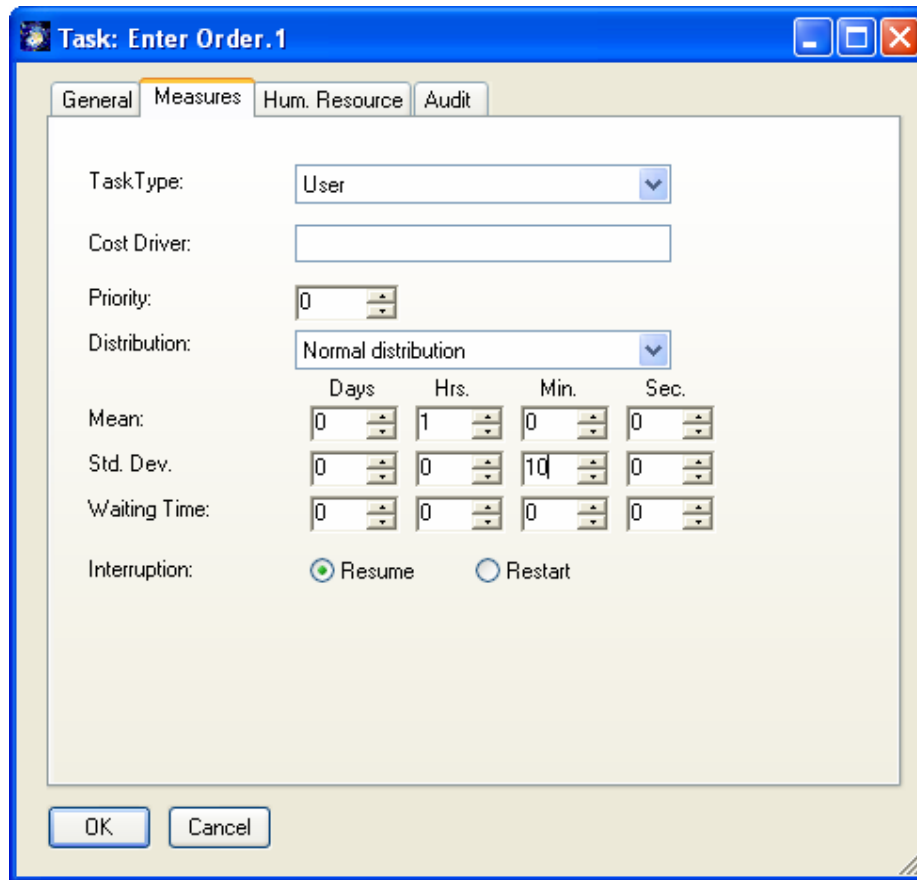


**Figure 18: Adding new Human Resources**

You can see / edit all existing resources in the explorer as child nodes of “Human Resource”

### 3.4.3. Task “Measures” Tab

The “Measures” tab allows the processing time, fixed cost, variable cost and probability. Some of these attributes are used in reports and at MS Project export.



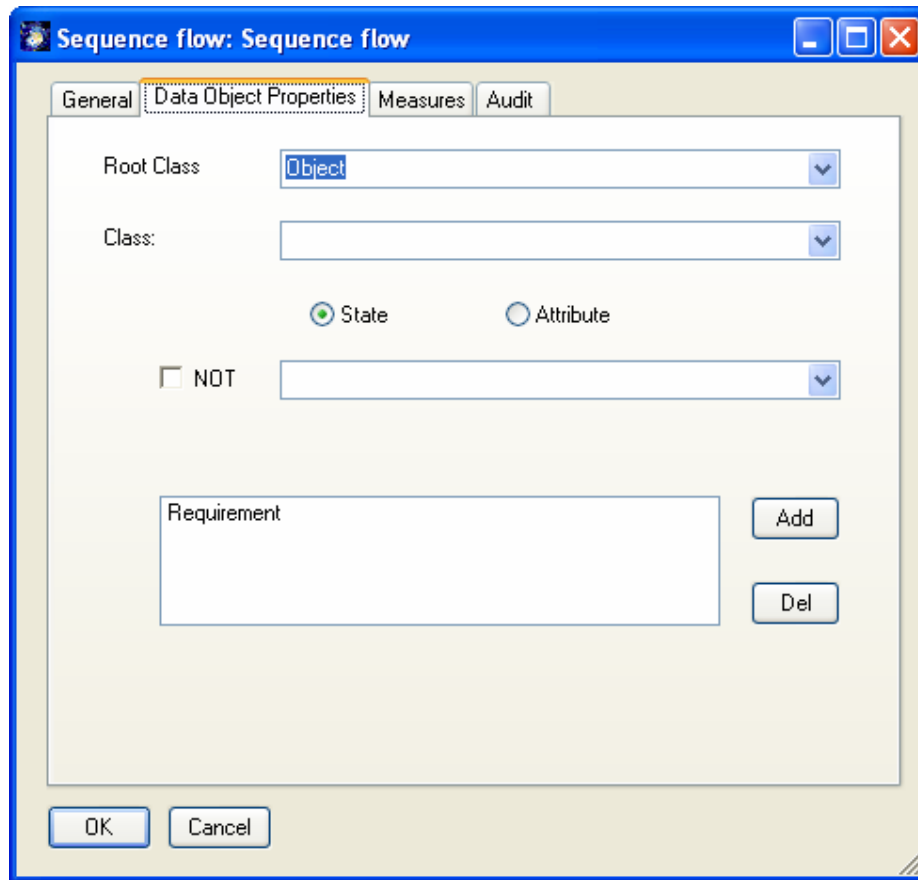
**Figure 19: Task: Measures**

Relevant for simulation, the work plan report, MS-Project etc is especially the "Processing Time". For all others please see the Simulation Tutorial.

### **3.4.4. Sequence Flow Dialog**

#### **Note on BPMN Methodology:**

A Sequence Flow is used to show the order that activities will be performed in a Process.



The “Data Object Properties” tab allows you to specify which data object, is “flowing” between the two connected tasks. Editing the data object itself, will open the Sequence flow dialog also.

You can select existing objects from the comboboxes. If you select an existing object or enter a new one, you must push the “Add” button in order to add it to the list of objects that flow.

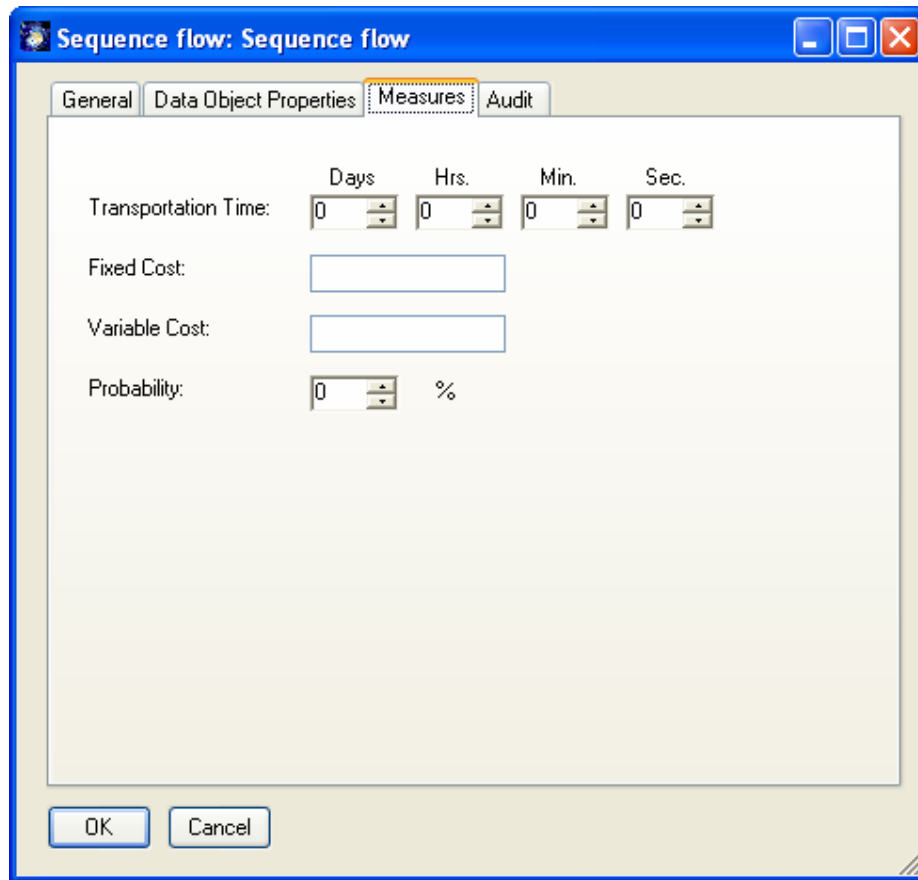
Object composition is done similar to the “Compose” for tasks.

**Root Class** is the base object type: Object, Physical resource, Media etc. The most used type is Object for the business objects.

**Class** is the object. You can reuse existing classes or create new classes in a bottom up style.

**State** (and Attribute) is the state of the object which is being send e.g. “Order entered”.

You can remove an object from the list by double clicking it or by using the “Del” Button.

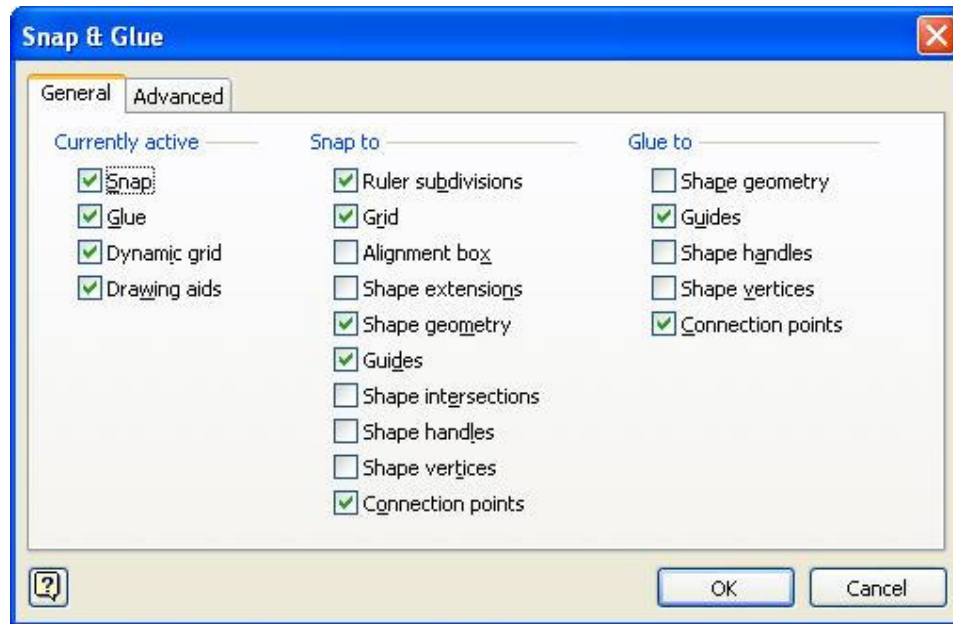


**Figure 20: Sequence Flow: Measures**

The “Measures” tab allows the specification of transportation time, fixed cost, variable cost and probability.

NOTE: You can glue relations to any point on the object if you select the Visio option “Glue to geometry”





**Figure 21: Visio: Snap& Glue Options**

## 4. Org Charts

Org Charts are used to describe the organizational structure of your company graphically. You may add new element using shapes for Org Unit and Position and connect them with then “superior of” connector.

Using Diagram->Insert (Model) you can add the existing Org Units “Sales” and “PD” to the org chart.

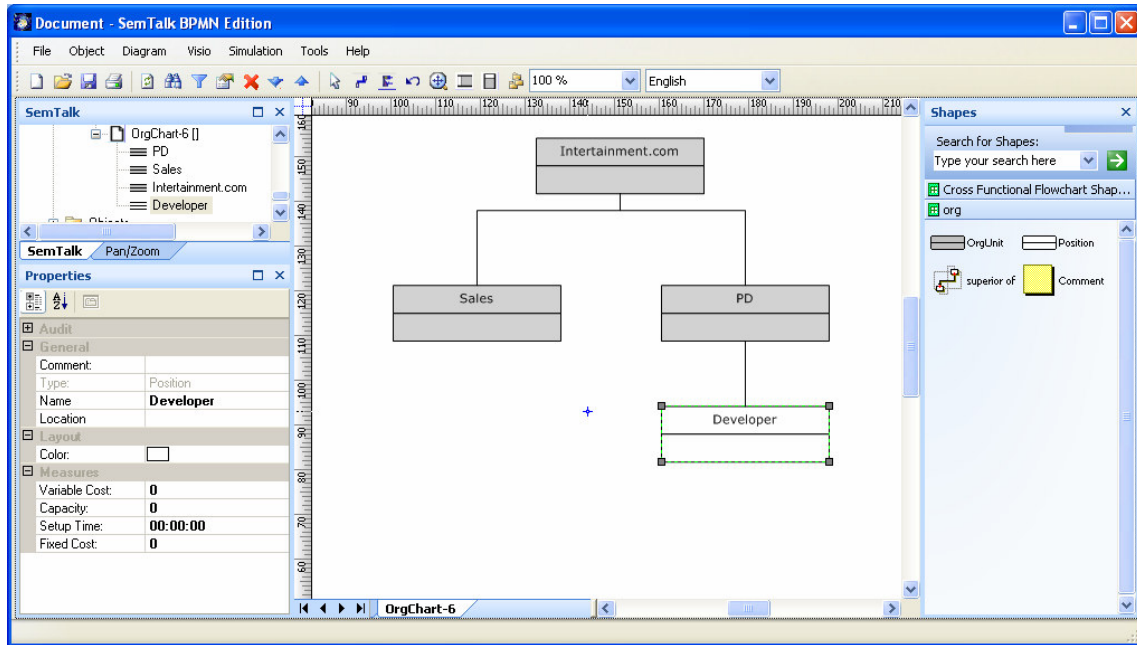


Figure 22: Org Chart

If you edit an Org Unit or Position, you may add Persons to the element.

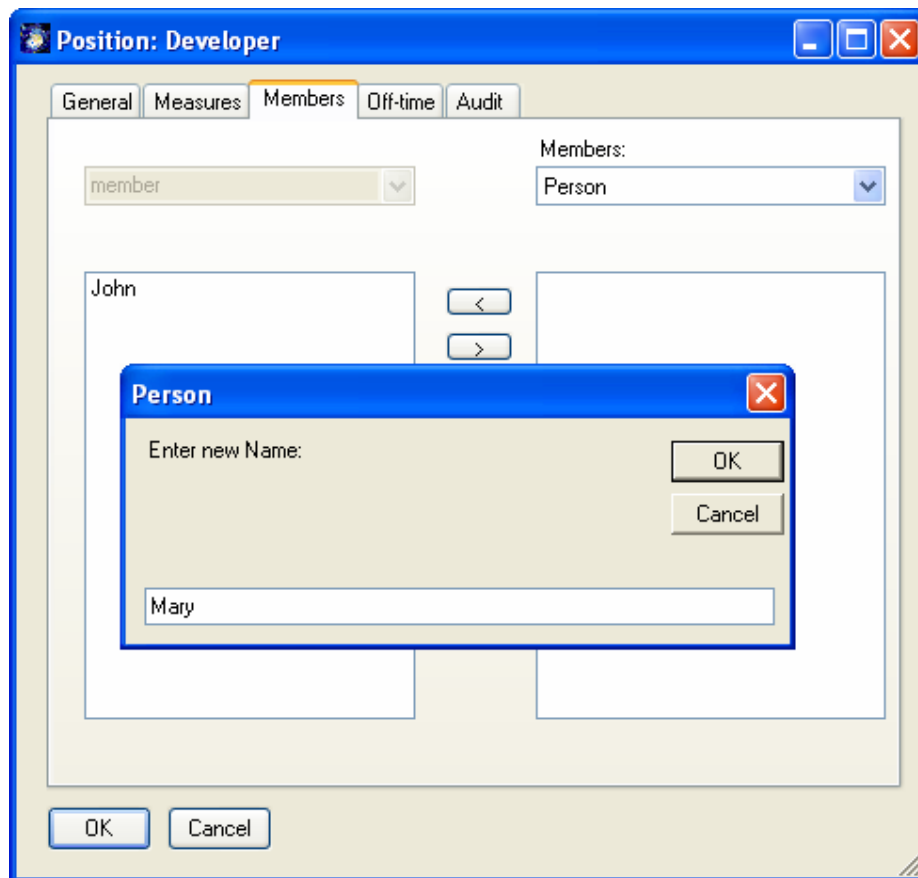


Figure 23: Adding Persons

The person can be edited directly by double clicking in the list. Any organizational unit is a resource with measures like fixed cost, variable cost and a capacity.

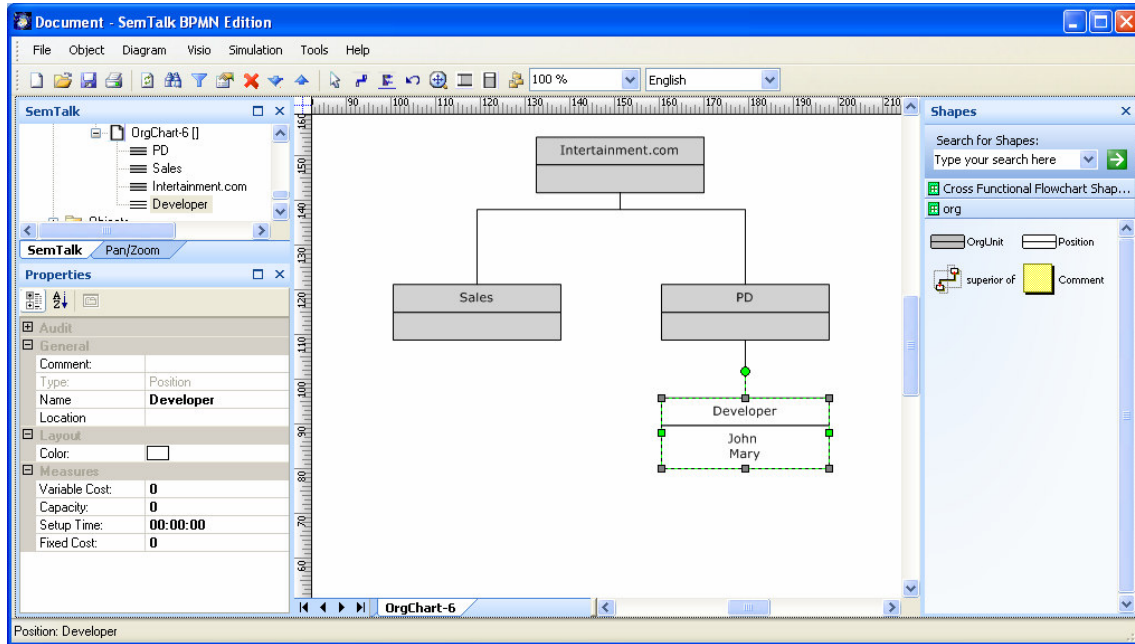


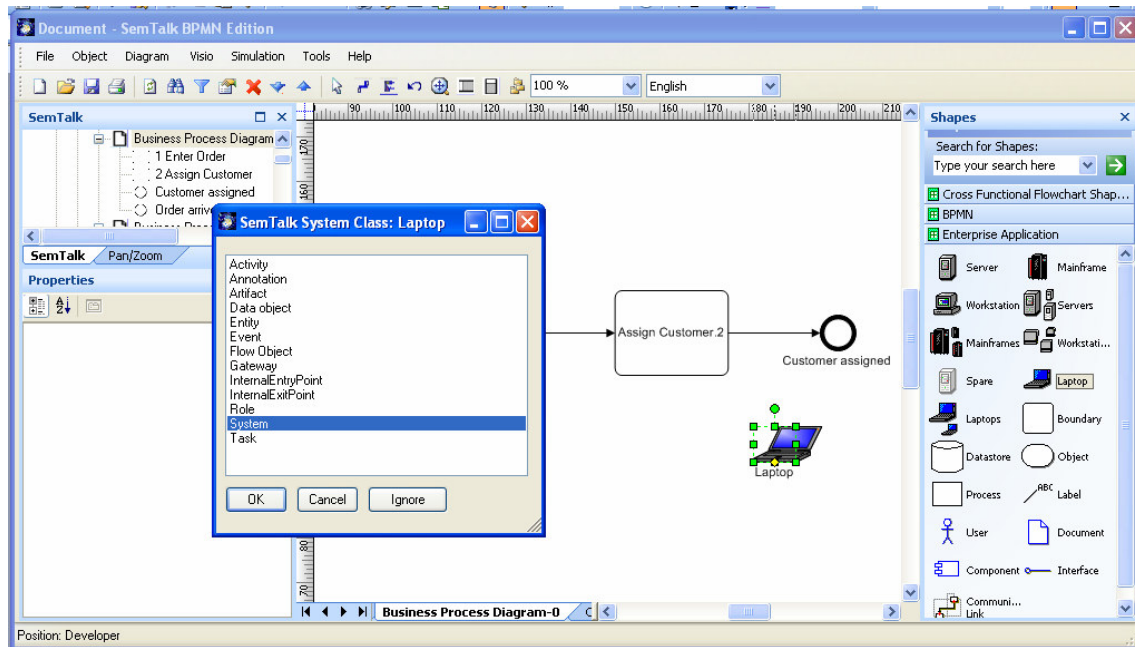
Figure 24: Org Chart with Persons

## 5. Class Diagrams

Open a Visio Stencil using File->Open Stencil or search for a Visio shape. Please open the Visio Stencil „Enterprise Application“ (ENTAPP\_M.VSS, ENTAPP\_U.VSS) for additional Visio Masters. You will find the stencil for Visio 2007 at „C:\Program Files\Microsoft Office\1031“ or for Visio 2003 at „C:\Program Files\Microsoft Office\VISIO11\1031“.<sup>3</sup>

If you drag an arbitrary Visio master onto your process sheet, SemTalk does not recognize the shape in the context of the current modeling method. A Dialog is shown, which allows to select the appropriate modeling construct. For example a Server should be uses as an alternative symbol for system. “Ignore” just accepts it as a Visio shape and does not add it to the SemTalk database.

<sup>3</sup> If you are using Visio Shapes frequently, it makes sense to change file path for stencils (2003) or “My Shapes” (2007) using Visio’s options dialog.



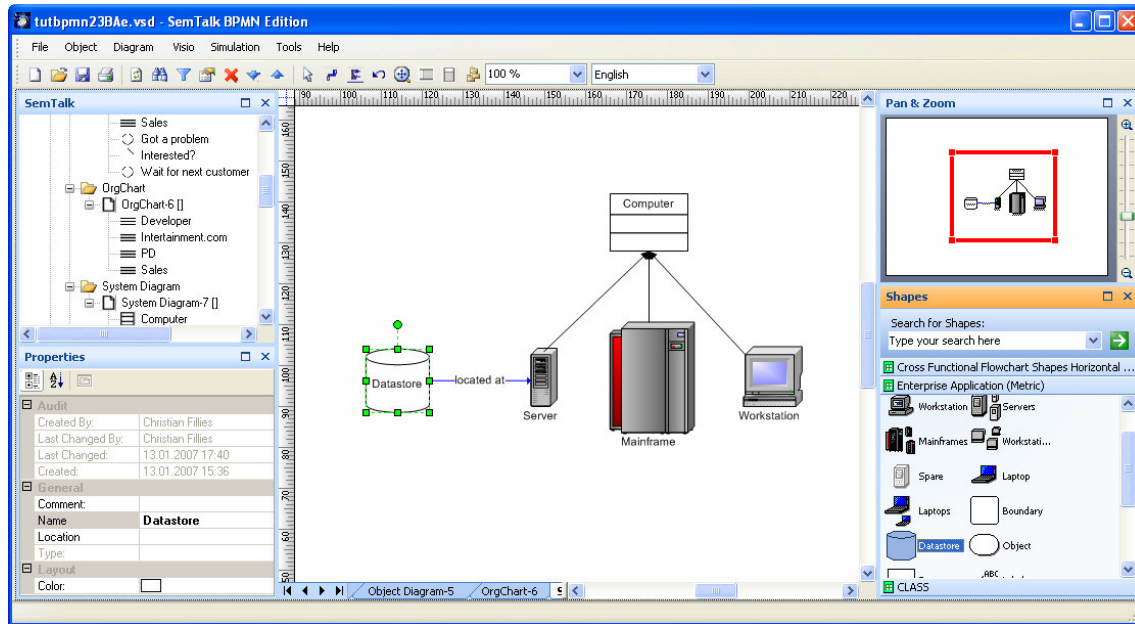
**Figure 25: Adding an arbitrary Visio Shape to a process**

Visio masters, which as used as alternative Visio masters can not be used for new classes anymore.

Instead of this bottom up approach we can also define new classes of systems on class pages. Create a new diagram of type “System Model” and drop some shapes there again.

In the new diagram you can create classes and subclasses with attributes and associations. To add a new class, please use the “UML Class” shape. A “subClassOf” (or is a) relation between two classes is created with the “subClassOf” connector. Associations are made with the “Property” connector. It is a special behavior of class diagrams, that every class is automatically a subclass of their root class, which is in this case the class System.

**You can also add new classes by opening a Visio stencil or search for a shape. Drop the shapes onto a System Model.** Now you can create further subclasses and super classes.



**Figure 26: Classes of Systems**

We have used the Visio shapes for Data store, Server etc<sup>4</sup>. Computer has been created using the UML Class master.

The properties of the Visio master are becoming attributes of the class. In the following picture you can see the attributes coming from Visio such as “Serial Number” and “Asset Number” and the inherited attributes coming from the root class “Participant” marked with a “\*”.

<sup>4</sup> These shapes are much easier to use if you turn of “Snap to Member” (Format->Behavior)

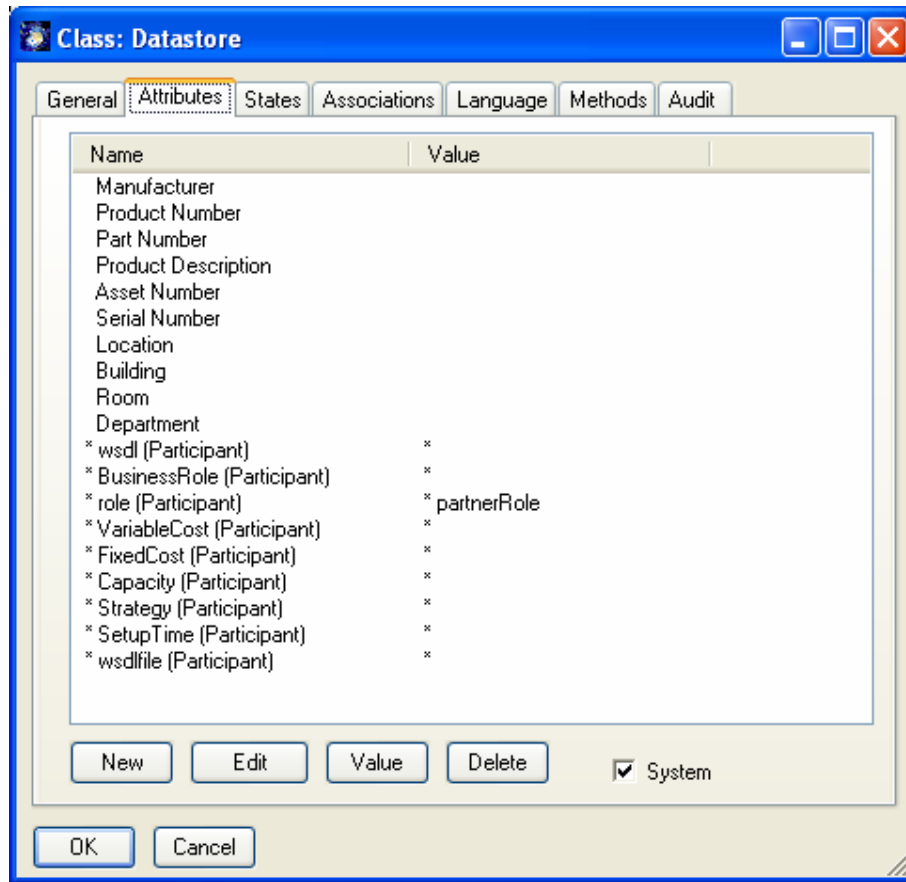


Figure 27: Attributes imported from Visio Masters

Now let us assume we need a class named CRM-System. We can simple define a subclass of data store.

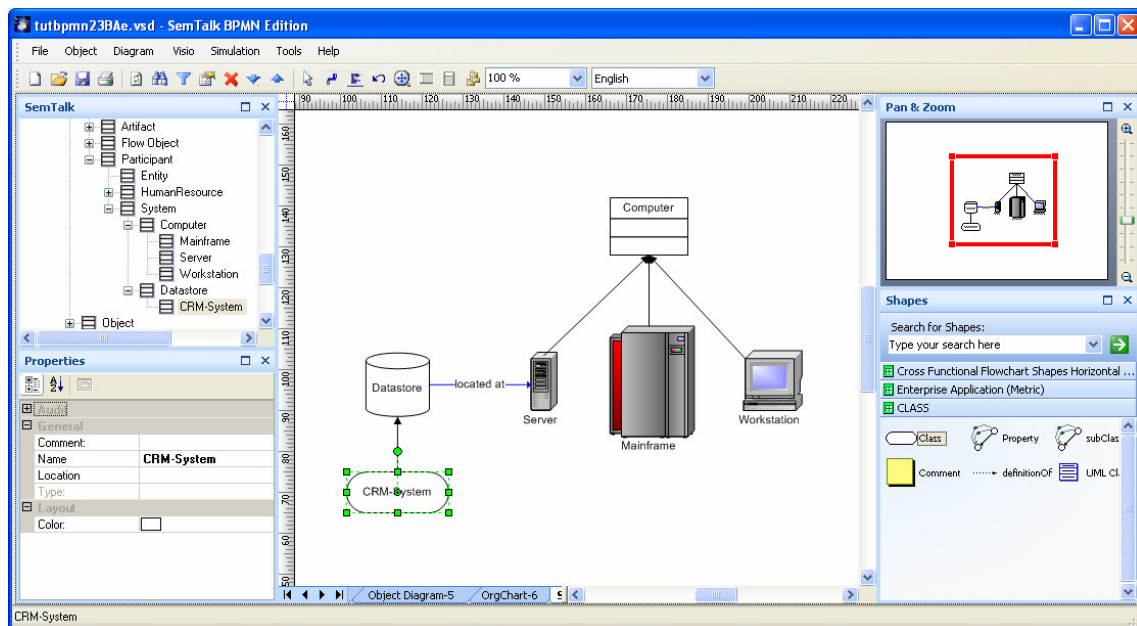


Figure 28: CRM System Class

Since CRM-System is a subclass of data store, SemTalk will use the data store shape for CRM-Systems.

Visio does not contain a specific master for CRM Systems, but we can easily create a new master shape in Visio or reuse another Visio master for our purpose. The document stencil (Visio-> View->Document Stencil) contains copies of the used Visio masters. Copy the component master to the document stencil. Using right click master properties on the master you can rename the master to a class name of your choice. Please make a copy of "Data store" and rename it to "CRM-System".

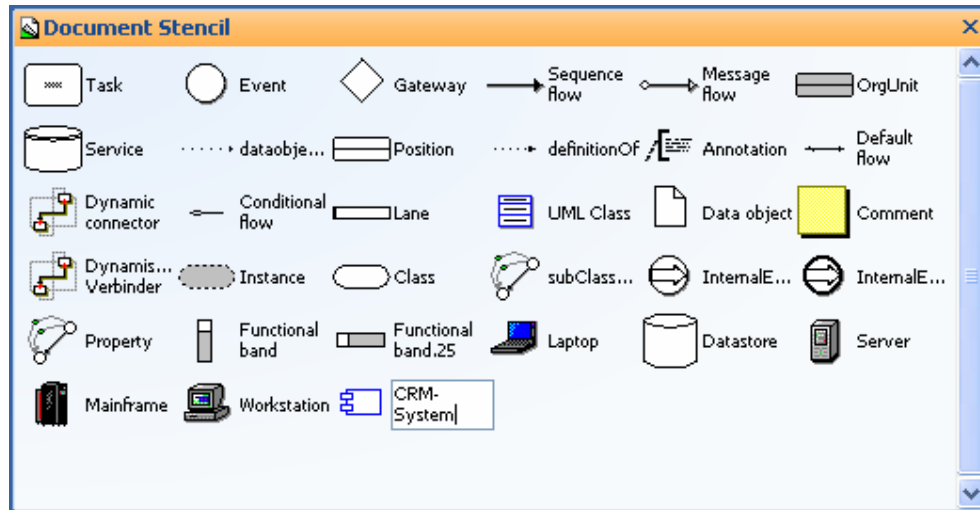


Figure 29: Shapes for resources in the Document Stencil

The CRM System master can now be used in the process model.

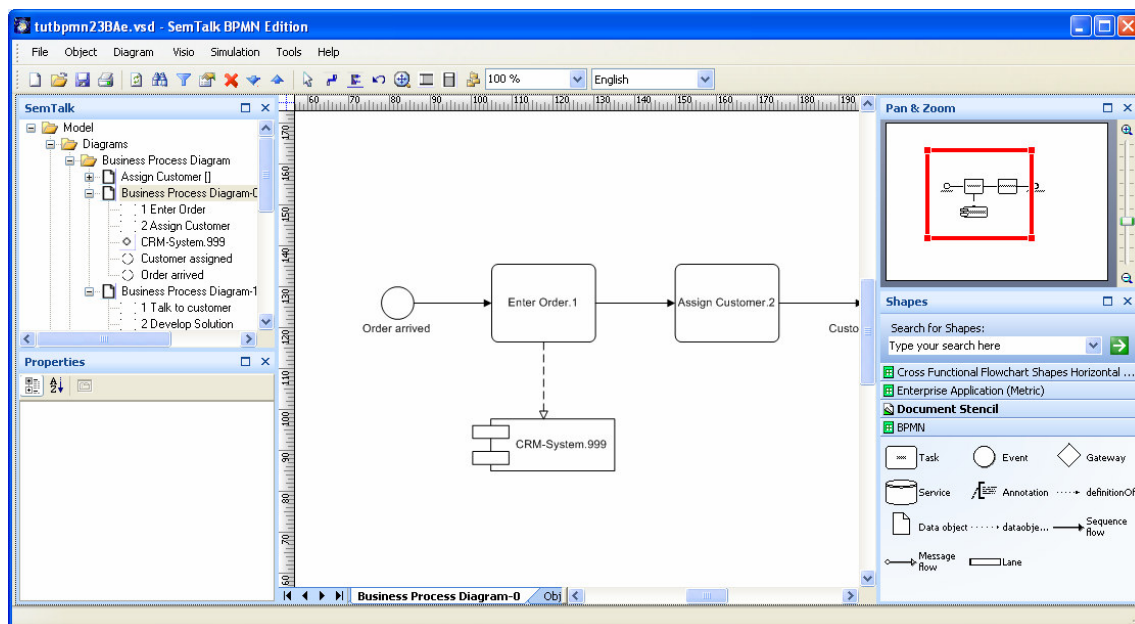
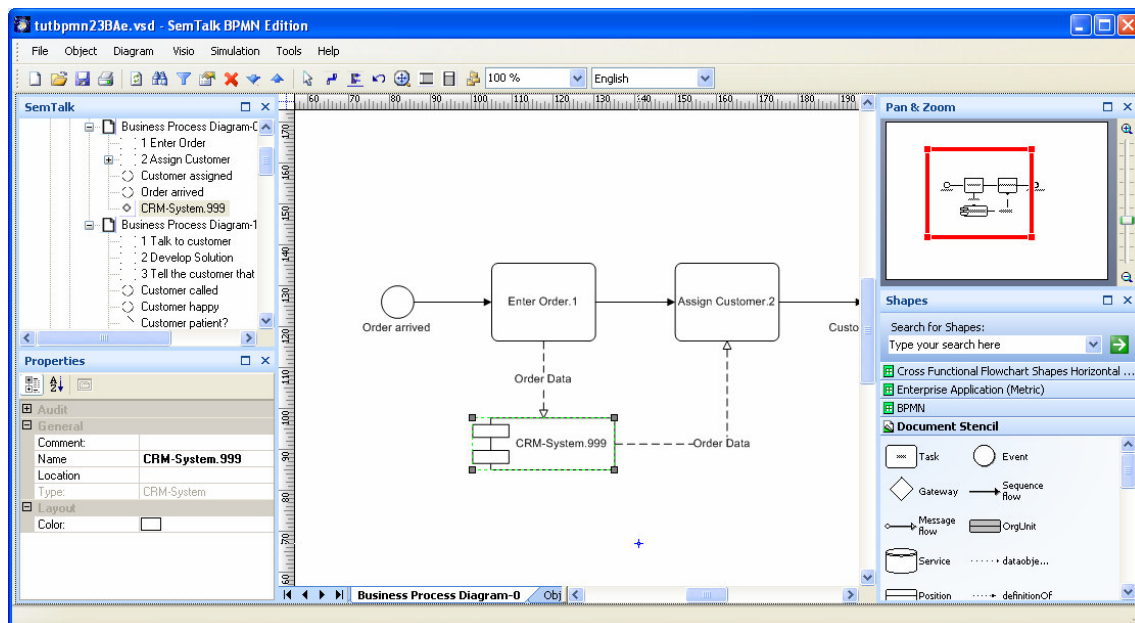


Figure 30: Renamed Visio Master

NOTE: A good object oriented model has the definition of attributes on a common super class rather than classes created from Visio masters.

## 6. Systems

Please add a system (e.g. a CRM-System or simply a “Service” in case you skipped to preceding chapter) to the process:



**Figure 31: A System with a Visio Shape in a Process**

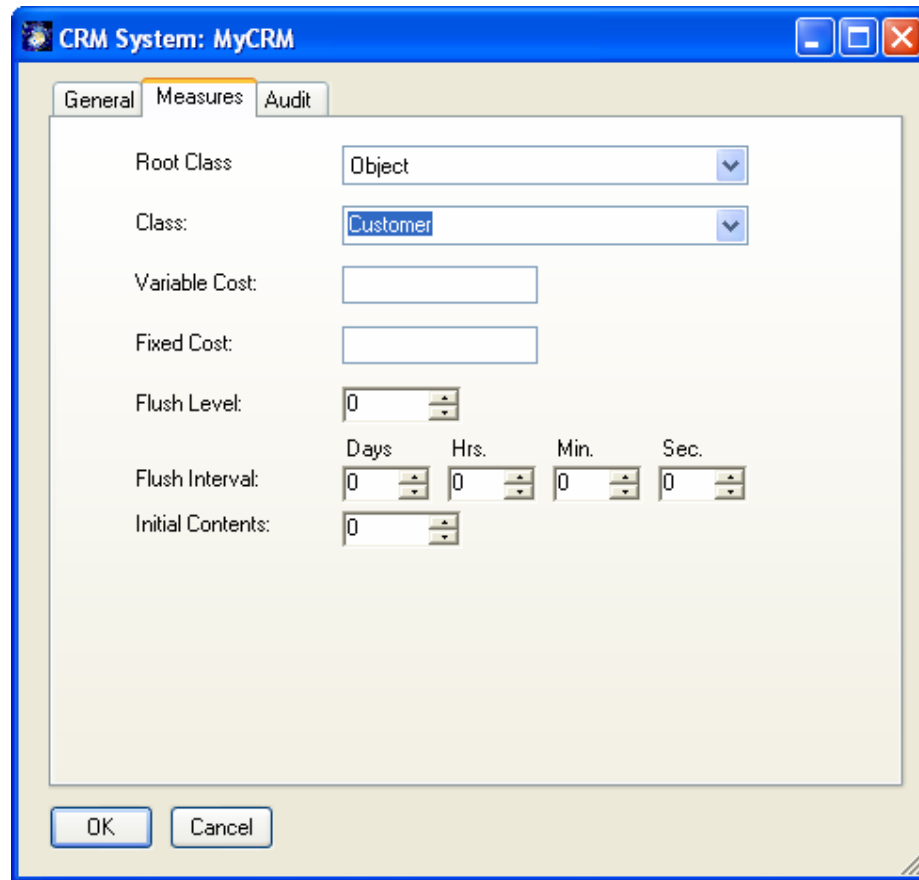
Connect it to “Assign Customer” with a “Message flow” connector. These relations describe whether you store information to the system or whether you read information from the system.

NOTE: You may insert the same system more than once into a process using right-click insert and check “Show Existing”. You may not insert the same task call than once, but you can execute the same task multiple times.

A system is a storage device for information or in general for objects. Objects can be stored in a system and afterwards be read from that system. Typical systems are the inbox of a mail client or a database. A system has a dedicated type.

If you edit the buffer you can specify which type of information is stored in the system. The general tab is identical to other dialogs.





**Figure 32: System: Measures**

Fixed Cost is used to assign cost for each information object, which is stored in the system. Capacity limits the amount of information objects that can be stored in the system. Flush level and flush number are used to specify that the information is send through and outbound “Message flow” link if a certain amount or time is exceeded.

For the “Message flow” relation you can select the type of information which is accessed or stored.

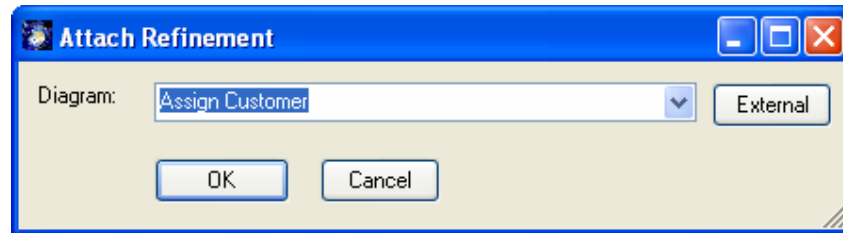
Note: You can also edit the label of “Message flow” connectors directly to specify the information.

## 7. Refinements (Sub-Process)

Note BPMN Methodology:

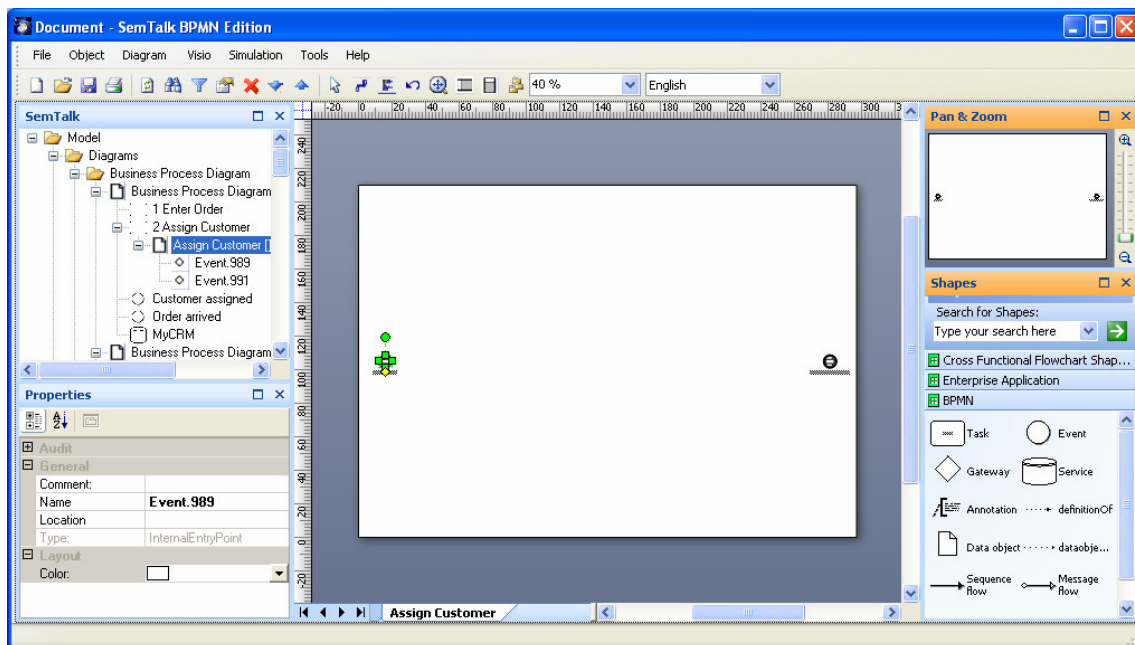
Breaking down a task into more detailed tasks is expressed in the BPMN with multiple shapes such as “Sub-Process”. In SemTalk a refinement is more dynamic: A (sub-) process for the detailed tasks can be attached to any task. For every inbound sequence flow link an (internal) entry point is added to the refined process. For outbound Sequence flows an (internal) exit point is added.

Right Click on “Assign Customer” and select “Refine”. A dialog pops up asking for the name of the sub process:



**Figure 33: Creating a Refinement**

A new empty process with entry and exit point is generated:



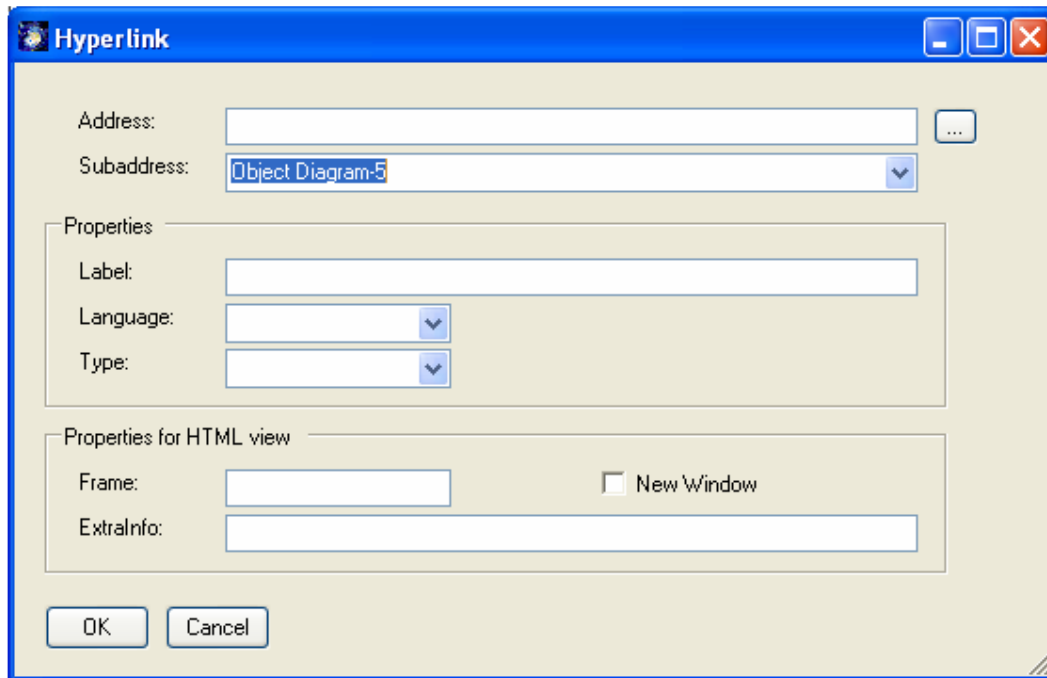
**Figure 34: A new Refinement**

You can see in the explorer the new process as a child node of “Business Process Diagram-5”. In Business Process Diagram-5” “Assign Customer” is now marked with as “+” to inform you that it has a refinement. Any time you select “Refine” you open the refinement. The menu “SemTalk->Diagram->Go Up” navigates from the refinement to the refined process.

NOTE: If you use the option “External” you can assign of process in a different model as the refinement. In this case the refinement works like a hyperlink to the other model. But you can not connect entry- and exit points.

## **7.1. Attachments and Visio-Hyperlinks**

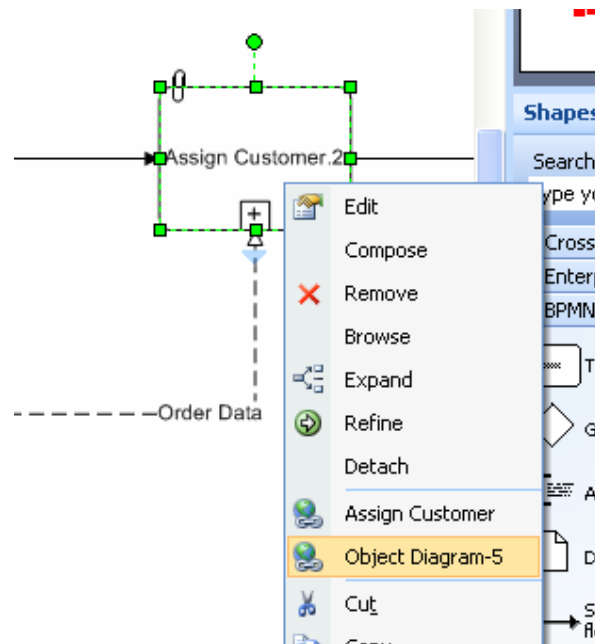
Refinements are used for a unique structured decomposition of processes. Attachments are used to assign unstructured information such as documents, hyperlinks or arbitrary Visio pages to an object. In order to add an attachment please use the edit dialog.



**Figure 35: Editing Hyperlinks**

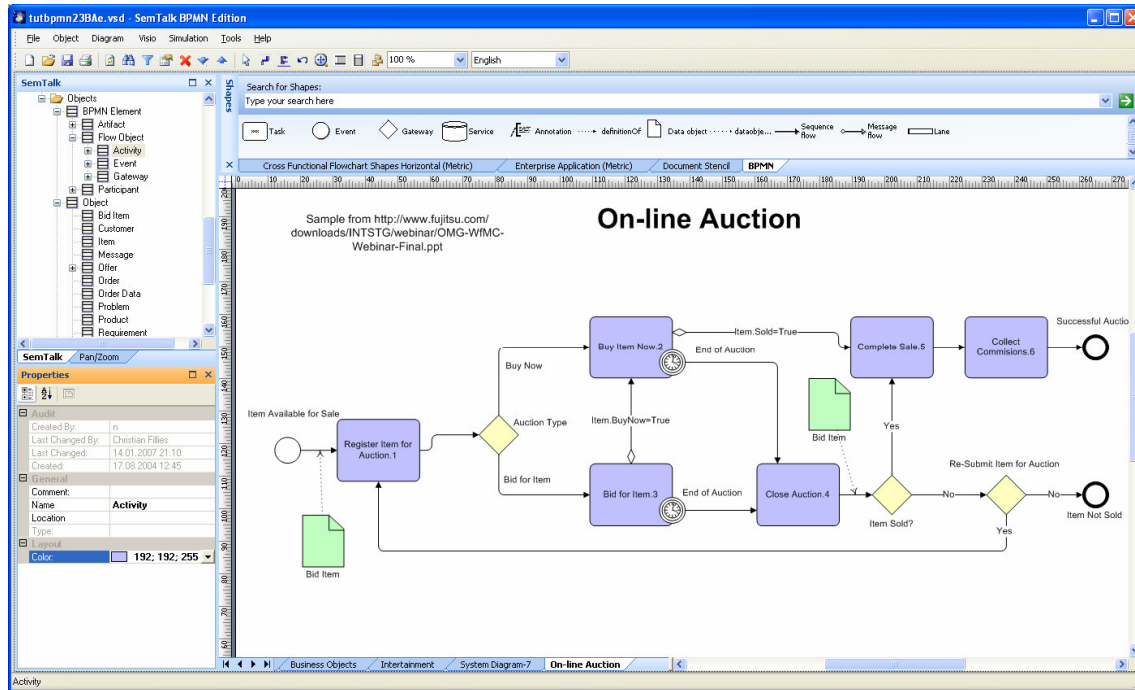
Use **Subaddress** to attach other Visio pages. **Address** will be used to attach documents or Hyperlinks. **Language** marks the document for a certain model language. You may attach as many documents as you need. Please visit the general tutorial for further information.

Navigation in the document and its HTML representation is realized via Visio-Hyperlinks:



**Figure 36: Navigation with Hyperlinks**

## 8. Customizing Colors



**Figure 37: Colored Process**

You have the option to change the color of shape for each type separately without touching the Visio Master shapes. Select Activity, Gateway or Data Object in the “Objects” part of the SemTalk Explorer and select a color of your choice.

## 9. Simulation

Simulation is available for SemTalk BPMN Edition. This allows testing the logical behavior of your process in order to find possible deadlocks.

Using colored Petri-Nets you can investigate your process in a dynamic environment with multiple inputs processed in parallel, in order to find out bottlenecks.

Please refer to our Simulation Tutorial for Details.

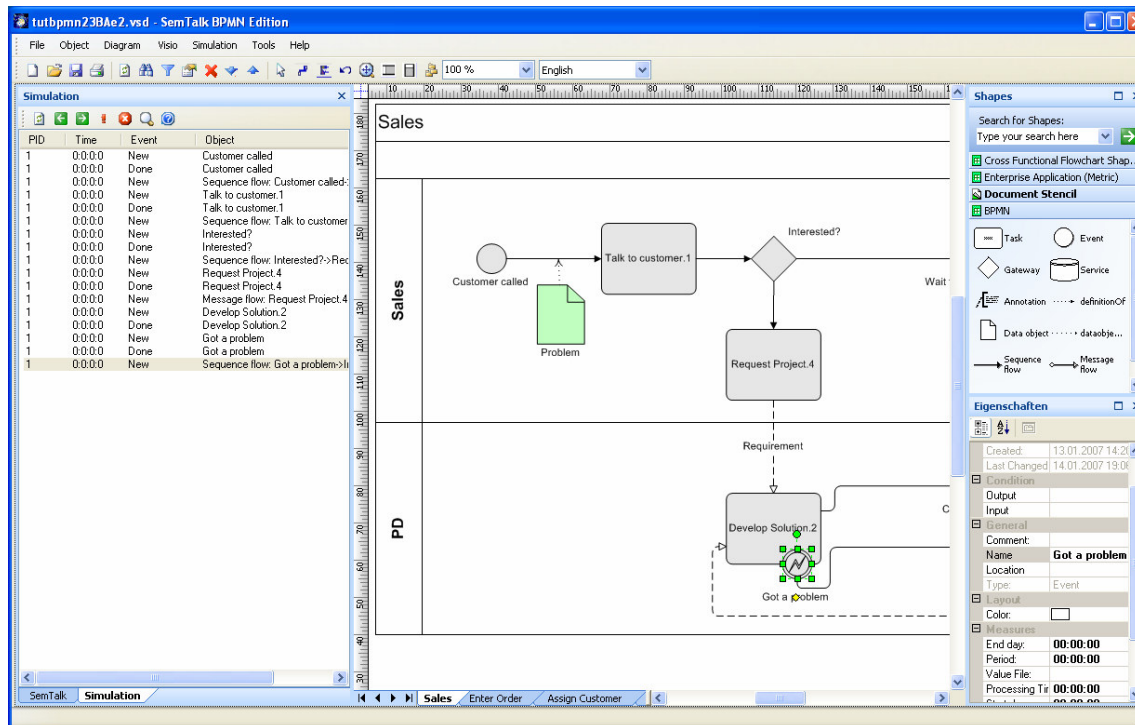
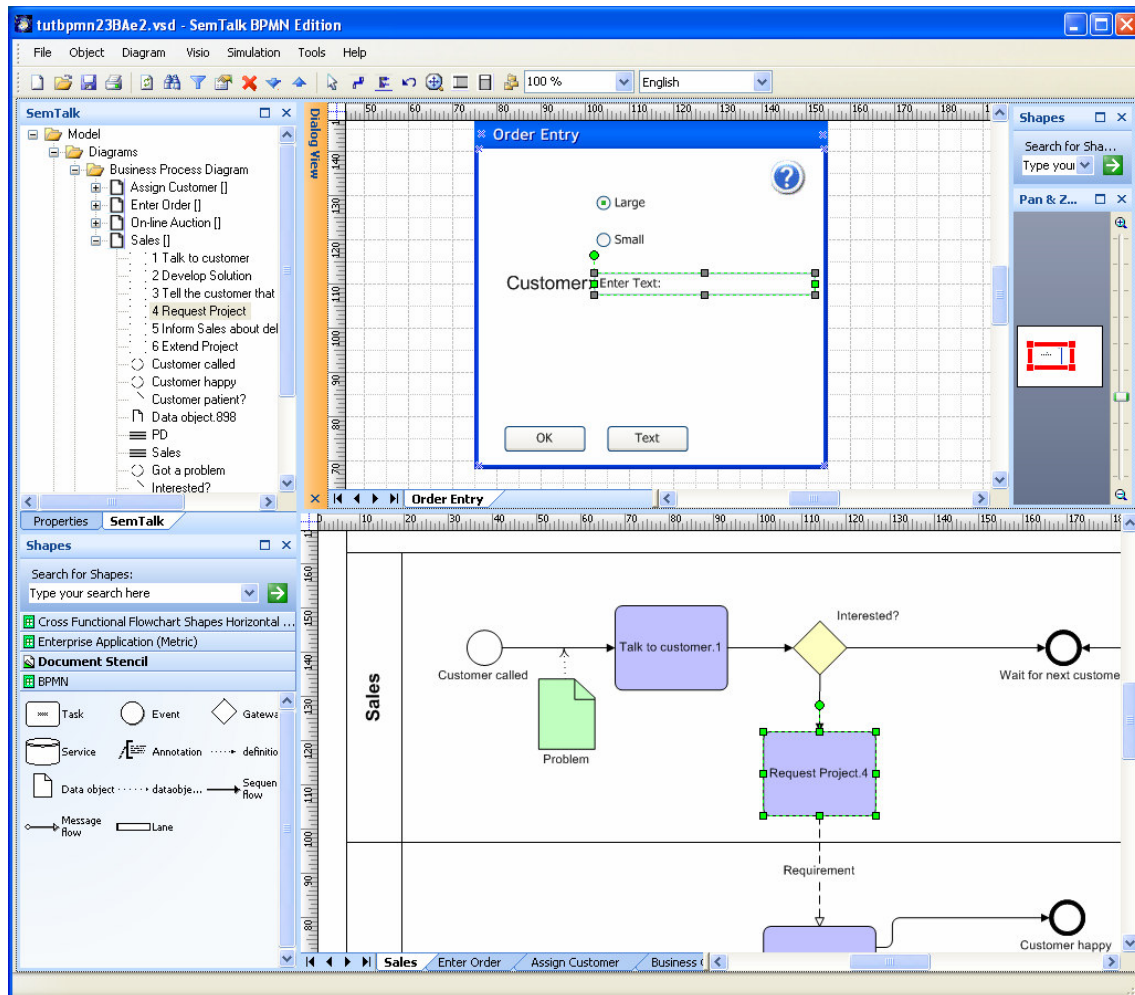


Figure 38: Simulation

## 10. Dialog View

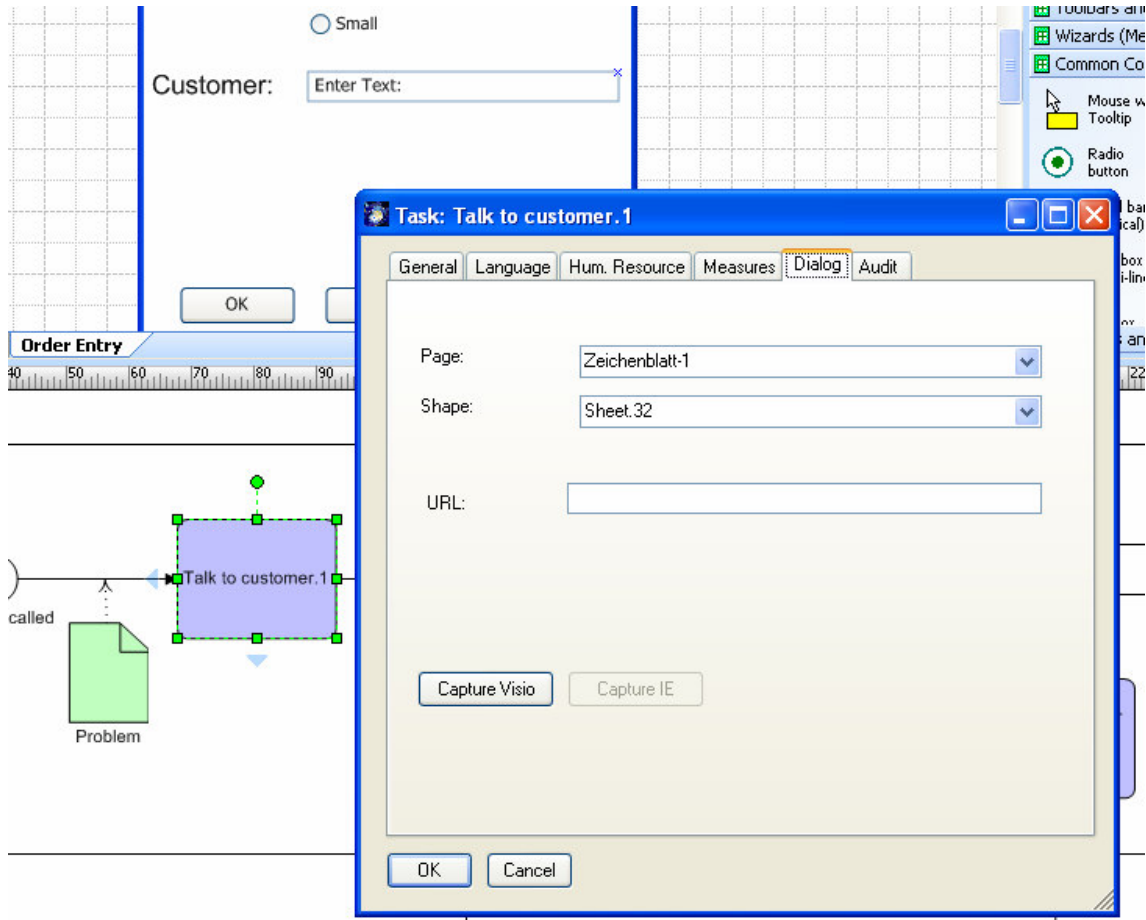
Dialog View allows controlling one Visio document from another. Every time you select a process shape in the main Visio document a shape (or “Control”) in the other Visio Document will be selected. This is intended to be used for the specification of IT-Systems, Workflows or Portals. It might be used in conjunction with the stepping mode of simulation.

Dialog View can be opened from Tools->Dialog View->New/Open. The workspace will be split in two areas. You may create or modify user interfaces here. Any Visio document can be used. It does not have to be created with SemTalk.



**Figure 39: Dialog View**

In order to connect a process element with a shape in the drawing please select both shapes and choose the option Tools->Dialog View->Capture. Each process element can only be assigned to one shape. Each time you select the process the shape will also be selected. This is actually what the Simulator does in Single-Step Mode.



**Abb. 1: Dialog Tab**

Using the dialog tab you can review and change your settings. Instead of connecting the Visio shapes, you may also connect the process element to hyperlinks. In order to do that you MUST open the browser via Tools->Dialog View->Browser.

SaveAs Webpage will retain the links to an HTML representation of the 2<sup>nd</sup> Visio document.

## 11. XPDL Export

The XML Process Definition Language (XPDL) has its origin in the text-based workflow exchange format of the Workflow Management Coalition (WfMC Interface 1)

- Allow tools to exchange process models
- Format to exchange Process Definitions between
  - Components within Workflow/BPM Products
  - Different BPM/Workflow Products
  - Process Modelling/ Simulation tools and BPM/Workflow Products

In SemTalk you'll find XPDL Export at File->Export/Import->WfMC XPDL Export.

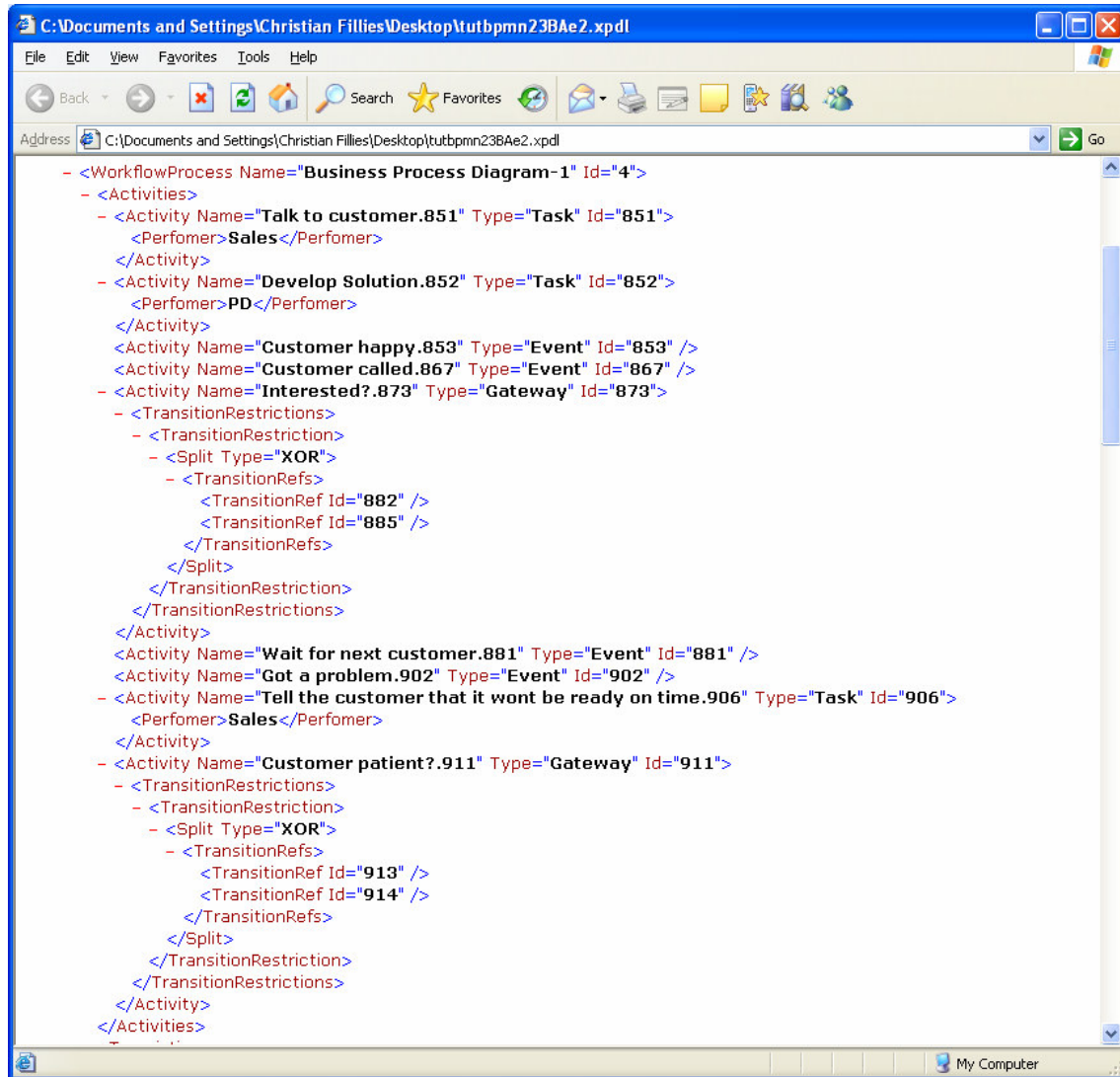


Figure 40: XPDL Export

## 12. Importing from SAP<sup>7</sup>

### 12.1. Import data from SAP Solution Composer

You may use content from SAP Solution Composer in SemTalk EPC Edition and Visio (<http://www.sap.com/solutions/businessmaps/composer/index.epx>) in a pretty simple way.

In order to get the SAP Look & Feel it is recommended to use the template „cview.vst“, which has the right colors and shapes. Supported diagram types are Component View and Collaborative Business Map.

<sup>7</sup> R/3 and AcceleratedSAP are registered trademarks of SAP AG



Copy (Ctrl+C) a process at Solution Composer and paste it at SemTalk (Ctrl-V). Do **not** use **Insert (Model)** but Visio's **Paste** command. Please select vertical swim lanes.

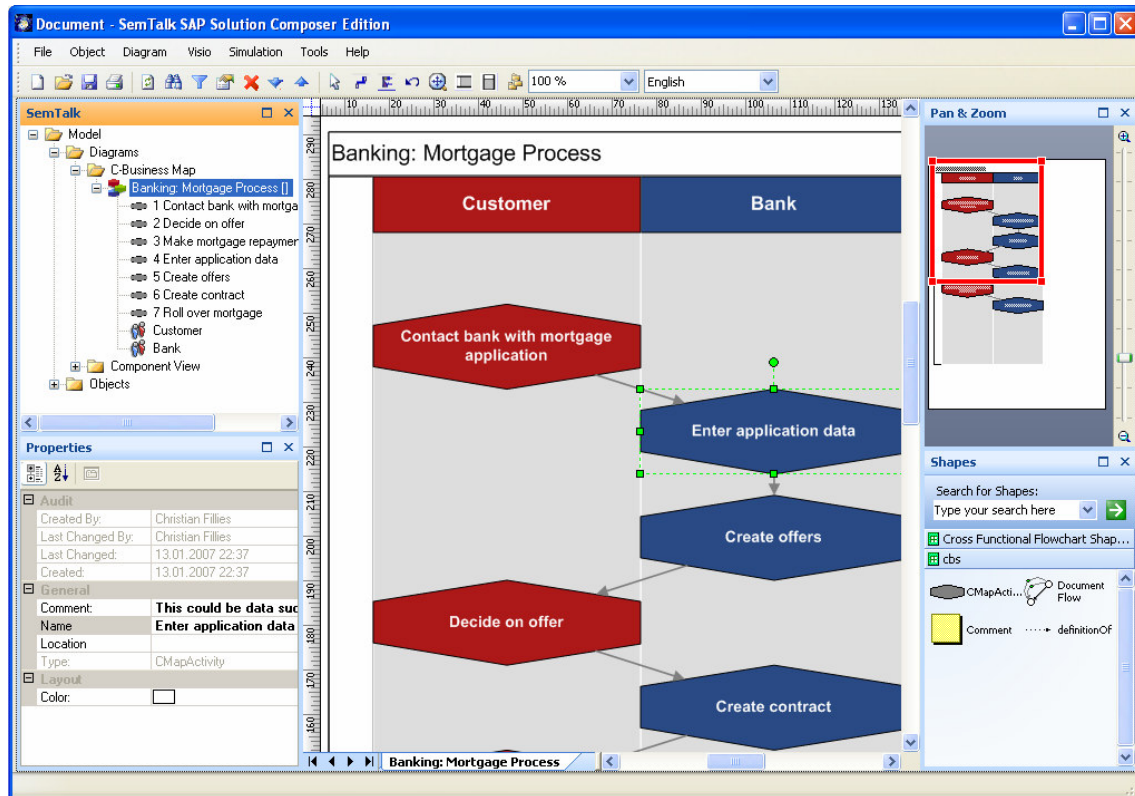
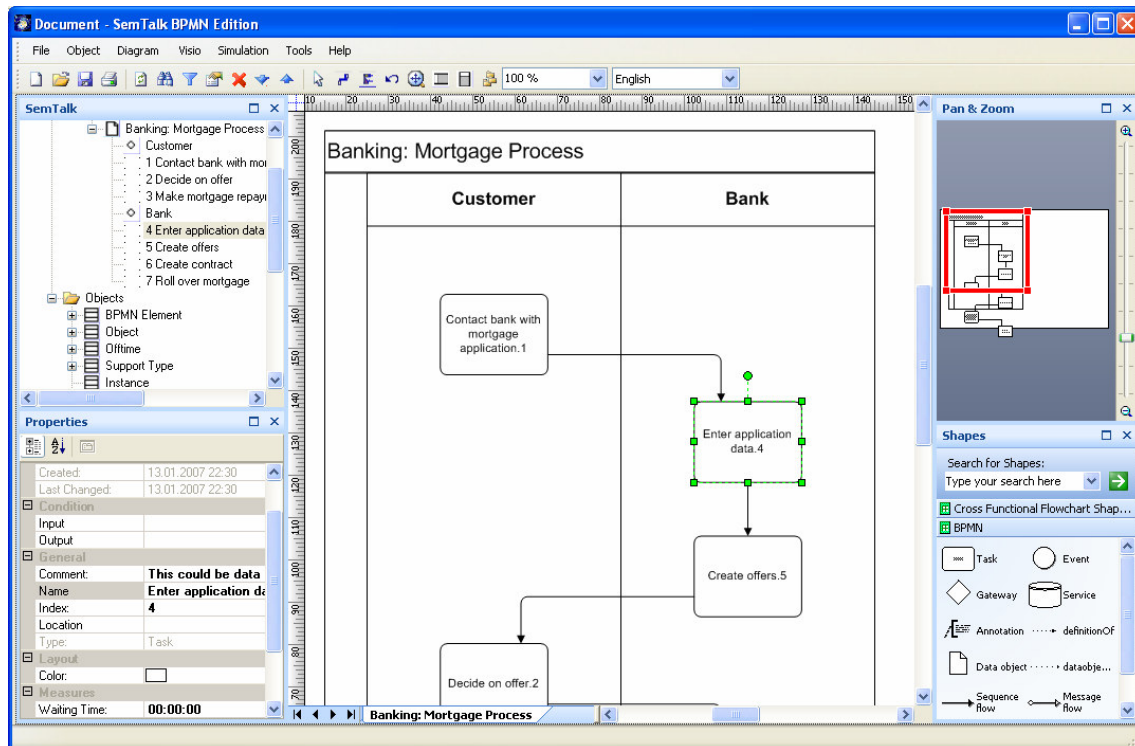


Figure 41: SAP Solution Composer (1)

SAP Content can (in SemTalk) only be used with vertical Swimlanes. Visio does not allow horizontal and vertical Swimlanes in one document. To try out the following must open a new document based on bpmn.vst.

If you paste it into a process, the same process looks like this:



**Figure 42: SAP Solution Composer (2)**

Via simple Copy & Paste you may also add variants and web service definitions of the ESA Preview System.

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