



The Open Networks Models User Guide

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Contents

1.	Background & Introduction	1
2.	Key Terms	2
3.	The Software	3
3.1	Enterprise Architect	3
3.2	Smart Grid Architecture Model (SGAM) Toolbox	3
4.	User Level: Viewer	4
4.1	Landing Page.....	4
4.2	Business Layer Diagram	6
4.3	Actor View Diagrams	7
4.4	High Level Use Case Diagrams	8
4.5	Primary Use Case Diagrams	9
4.6	Sequence Diagrams	10
4.7	Activity Diagrams.....	12
5.	User Level: Editor	13
5.1	The Model Packages	14
5.1.1	Overview	15
5.1.2	Business Layer.....	15
5.1.3	Function Layer.....	16
5.2	Element Library	16
5.2.1	Updating Actors and Information Objects	16
5.3	High Level Use Case Diagrams	17
5.3.1	Mapping PUCs to swimlanes	17
5.4	Primary Use Case Diagrams	17
5.4.1	Edit Actors	17
5.5	Sequence Diagrams	17
5.5.1	Edit a step.....	18
5.5.2	Edit an information object.....	19
5.5.3	Edit the actors	19
5.6	Activity Diagrams.....	20
5.6.1	Edit steps	20
5.6.2	Edit information objects	20
6.	User Level: Developer	21
6.1	Adding a new Actor	21
6.1.1	Updating the landing page.....	22
6.1.2	Update the Business Layer Diagram	23
6.1.3	Add a new Actor View Diagram	23
6.1.4	Update PUC Diagrams.....	24
6.2	Adding a new High Level Use Case	25
6.2.1	Add HLUC (swimlane) diagram	25
6.3	Adding a new Primary Use Case	28
6.3.1	Add a new PUC diagram	28
6.4	Adding a new Process	30
6.4.1	Add a new Sequence Diagram	30
6.4.2	Add a new Activity Diagram	31
7.	Publishing HTML Reports	32
8.	Change Management	34
8.1	Enterprise Architect Model Version Control	34

8.1.1	Version Control by Element	34
8.2	Dashboards	35
8.3	Tracking Changes in Enterprise Architect	37
8.3.1	Auditing	37
8.3.2	Baselining	37
9.	Useful Resources	39
10.	References	39

1. Background & Introduction

This user guide accompanies the Smart Grid Architecture Models (SGAMs) developed by EA Technology representing different possible market frameworks (or ‘worlds’) that could arise as part of the DSO transition. The development of these models was commissioned by Energy Networks Association as part of its flagship, cross-industry Open Networks project. This work falls into Work Stream 3 (WS3) of Open Networks and ran from September 2017 until June 2018.

Extensive stakeholder workshops considering detail of specific DSO functions and activities informed the development of five worlds:

- World A: DSO Coordinates
- World B: Coordinated Procurement and Dispatch
- World C: Price Driven Flexibility
- World D: NETSO Coordinates
- World E: Flexibility Coordinators

These models were created in Sparx Enterprise Architect software making use of the SGAM framework adapted to the requirements and constraints of the project. Further information about Enterprise Architect and SGAM and their installation (if required) is included in section 3 after an explanation of key terms in Section 2. At this point it is important to state that this report primarily uses standard Enterprise Architect terms rather than WS3 nomenclature as this is what will be visible to the user as they navigate the models.

The models are available in two formats, HTML and .eap files (the latter is an output from Enterprise Architect software) and there are deemed to be three levels of user for the models – Viewer, Editor and Developer. This guide provides the knowledge required to:

- View, navigate and interpret the HTML models (User Level: Viewer - Section 4);
- View the models in Enterprise Architect and edit them (User Level: Editor - Section 5);
- Make major changes to the models (User Level: Developer - Section 6).

Tracking changes is imperative to maintaining consistency in the communications between the large number of cross-industry stakeholders involved. Which changes are made, when, and by whom should be determined by a well-defined governance process which is outside the scope of this User Guide. The technical aspects and options for monitoring changes in Enterprise Architect are described in Section 7.

Section 7 explains how to disseminate updated models by converting them to HTML files – a simple process. For further details and explanations useful resources are presented in Section 0.

2. Key Terms

Enterprise Architect makes use of terminology from the Object Management Group (OMG) standard Unified Modelling Language (UML) and SGAM. These may not be familiar to those close to the Open Networks Project and acquainted with the WS3 terminology. Table 1 shows how these two sets of terms relate to each other.

Table 1: Translation between terms used in Open Networks project WS3 and Enterprise Architect.

Open Networks WS3 Terminology	Enterprise Architect Terminology
Function	High Level Use Case (HLUC)
Activity	Primary Use Case (PUC)
Process (view showing information flows between business actors)	Sequence Diagram
Process (view showing communication protocols)	Activity Diagram

Other useful technical terms:

Package	the name of a folder in Enterprise Architect
Root node	top-level package for the model
Swimlanes	vertical or horizontal bands in a diagram that divide the diagram into logical areas or partitions (Sparx Systems, 2018). SGAM swimlanes are made up of vertical Domains and horizontal Zones. Domains: show the energy conversation chain Zones: show hierarchical levels of power system management, distinguishing between electrical process and information management viewpoint
Lifeline	represents an individual actor in an interaction on a sequence diagram.
Stereotype	used to classify and extend UML elements such as, classes and components. Graphically, it is a name enclosed by guillemets (« ») and additionally or alternatively it may be indicated by a specific icon. SGAM stereotypes include HLUC, PUC, Business Actor and Information Exchange.

The numbering of HLUCs and PUCs does not indicate an order of play, they are used to create an ID for a 'stream' for easy reference across teams/personnel. e.g. World A, HLUC 1, PUC 2, Process 5 (or A.1.2.5) describes a full stream.

3. The Software

3.1 Enterprise Architect

Sparx Systems is the software company behind Enterprise Architect, a visual modelling and design tool based on the OMG standard UML.

OMG UML specifications are updated periodically and new versions of Enterprise Architect are also released periodically. The Open Networks WS3 models were created in programme version 13.5, build 1352 which was based on UML Specification 2.5 (originally released in May 2015 (Object Management Group, 2018)). The different versions are cross-compatible though there may be changes in, for example, the location of menu items.

Enterprise Architect can be downloaded as a trial or purchased and downloaded as a full version from sparxsystems.com. For Editors and Developers a Corporate edition is required in order to make use of the change management functionality, such as baselining and auditing - further discussed in section 7 (Sparx Systems, 2018). The output file from Sparx Enterprise Architect, which can be shared between users, is of file extension .eap

3.2 Smart Grid Architecture Model (SGAM) Toolbox

The Enterprise Architect modelling tool can be enhanced by with the SGAM toolbox. This enables the user to create SGAM models in Enterprise Architect.

SGAM was developed to provide a framework for analysing and visualising Smart Grid use cases in a technology neutral manner.

The SGAM Toolbox is an add-in that has additional toolboxes, UML profiles, patterns, templates and other modelling resources including model templates – accessed via the ‘new model wizard’ to ease the use of the Toolbox.

The SGAM toolbox is of most benefit to the Developer. It is of some use to the Editor though not essential if changes are minor and not required for HTML model Viewers.

At the time of writing the SGAM Toolbox is a free plug-in which can be downloaded from <https://sgam-toolbox.org/download/>.

For more information on SGAM see Section 3 of the accompanying project report (‘Modelling the DSO transition using the Smart Grid Architecture Model’).

4. User Level: Viewer

This section of the guide will lead the user through the navigation and interpretation of the Open Networks WS3 models. The five models have been made available as both Enterprise Architect files and HTML publications. From the Landing Page the navigation is largely the same for either file type. It is the system requirements and set-up that differ.

To view the Enterprise Architect model files (.eap) the Enterprise Architect software is required. More information on the set-up of the Enterprise Architect software window is given in Section 5.

To facilitate ease of viewing for those who do not have the Enterprise Architect software, the files are available in HTML format. There are two ways in which a viewer may access the HTML files depending on the source. The first is the recommended method.

1) Viewing via a webpage.

When accessing the models via the webpages listed below, they can be viewed in any web browser and the models will be navigable like any other website.

<https://modela.eatechnology.com/>

<https://modelb.eatechnology.com/>

<https://modelc.eatechnology.com/>

<https://modeld.eatechnology.com/>

<https://modele.eatechnology.com/>

2) Downloading the files from a server.

1. Download the relevant zipped folder to a local destination on your computer.
2. Extract the folder contents (may take several minutes).
3. Open the 'index' file using Microsoft Edge or Internet Explorer. This will open the Landing Page in your default browser.

4.1 Landing Page

The Landing Page (see Figure 1) is annotated with numbers corresponding to items in the below list:

- 1) The name of the Open Networks WS3 'world' being viewed and a short description of it
- 2) A link to the SGAM Business Layer diagram (see Figure 2 and Section 0)
- 3) Link to webpage where you can navigate to the other Open Networks world models
- 4) A Useful Tips document
- 5) Link to a Quick Start Guide video tutorial showing you how to navigate and interpret the models
- 6) A diagram showing the business actors in SGAM Domain swimlanes and the contractual and information links between them – starting point for 'navigation by actor'
- 7) The eight High Level Use Cases – starting point for 'navigation by function'
- 8) Links to Useful Resources: the Open Networks project; SGAM background and the SGAM Toolbox.

The Landing Page allows for two main ways to navigate through the model: by Actor and by Function. To navigate by actor, click on the actor icon of interest to open the linked Actor View diagram (see Figure 3). To navigate by function, double-click on a HLUC element to open the linked HLUC diagram (see Figure 4). Both Actor View and HLUC diagrams contain links to PUC diagrams (see Figure 5).

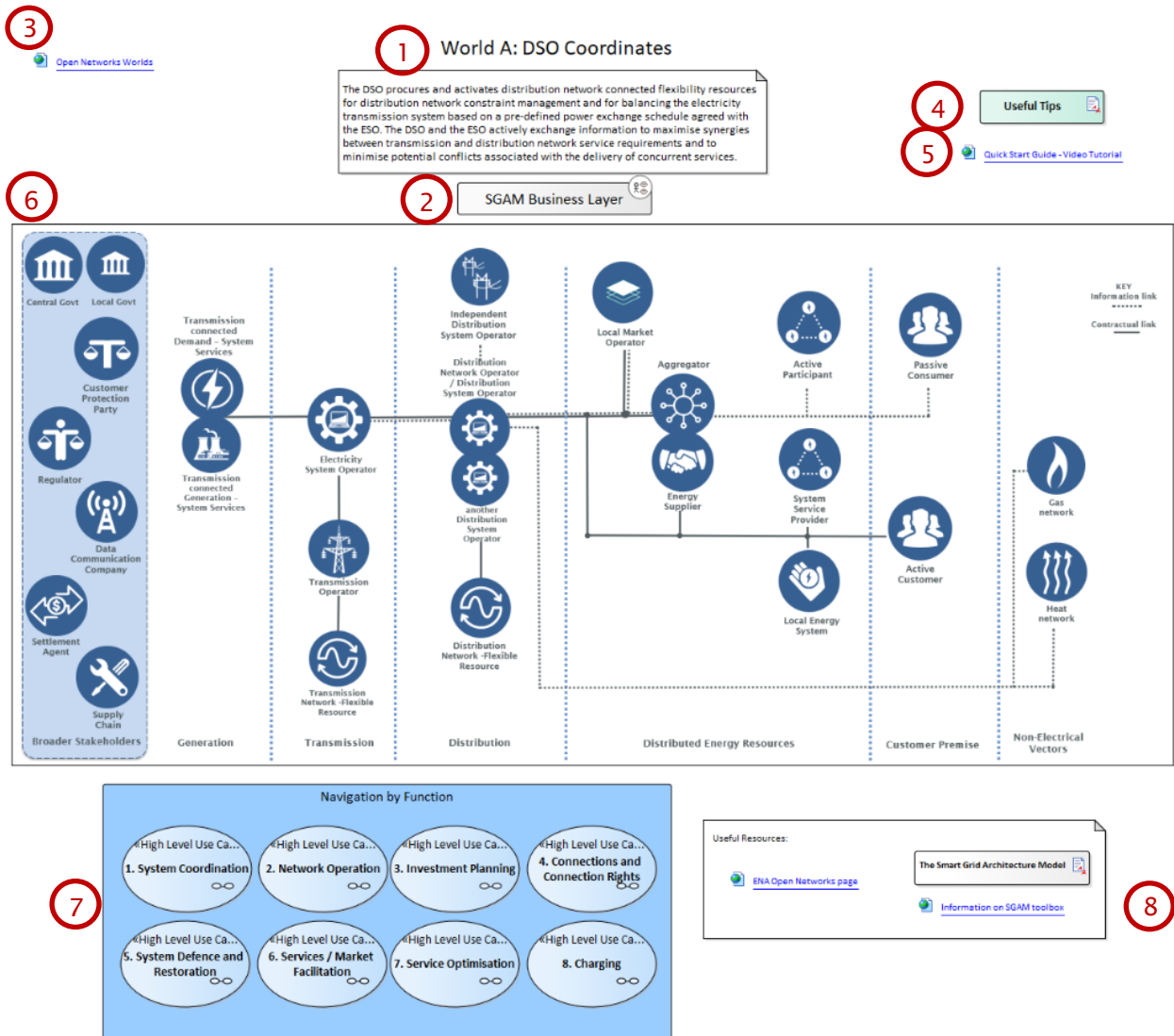


Figure 1: Model Landing Page marking key elements described in more detail in the text.

Throughout your time navigating the models you may use the forward and back browser buttons to assist.

4.2 Business Layer Diagram

The SGAM Business Layer Diagram (see Figure 2) links the Business Actors (stick figures at the top of the diagram) to their Goals (green boxes - click for the description), which are realised by the central Business Use Case (yellow oval). The Business Use Case invokes the eight HLUC functions (blue ovals at the bottom of the diagram).

Clicking on an actor will open the linked Actor View diagram (see Figure 3). Clicking on a HLUC will open the linked HLUC diagram (see Figure 4).

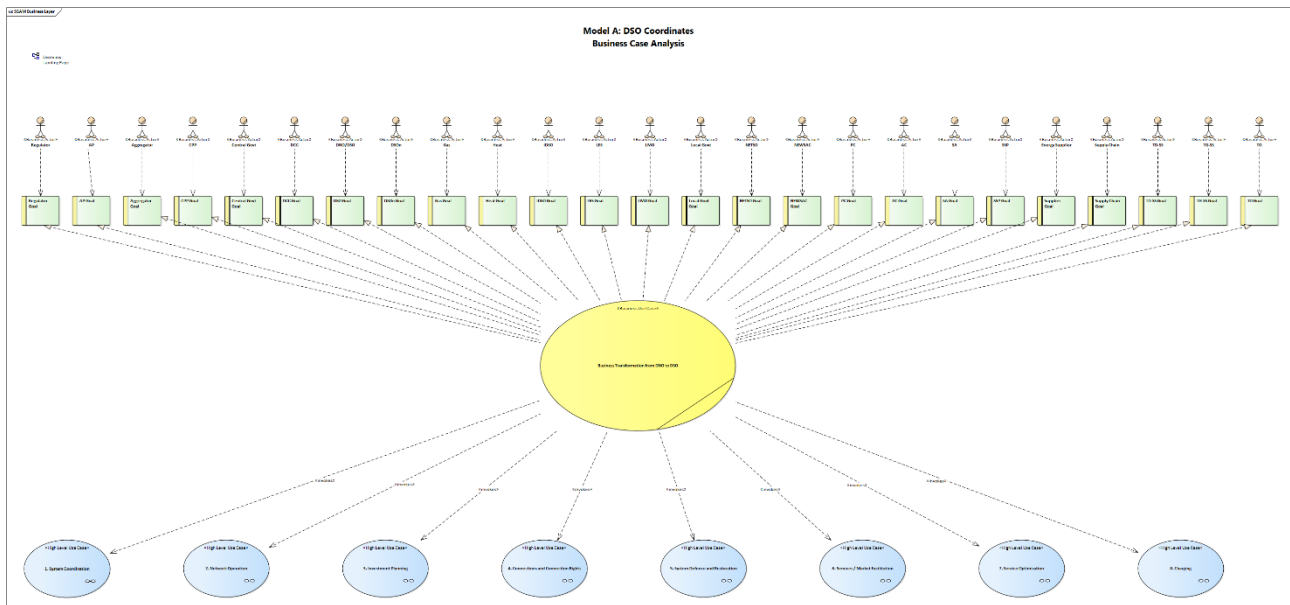


Figure 2: Business Layer diagram showing the business actors, their goals, and all the functions.

4.3 Actor View Diagrams

Clicking on an actor on the Landing page leads to Actor View diagrams (see Figure 3 for an example) which show the actor in the centre of the page linked to each PUC diagram where it is present. The PUCs are placed in HLUC groups in titled boxes. The full name and a description of the actor can be found in the Note on the bottom right corner of the page with a link back to the landing page in the top left corner.

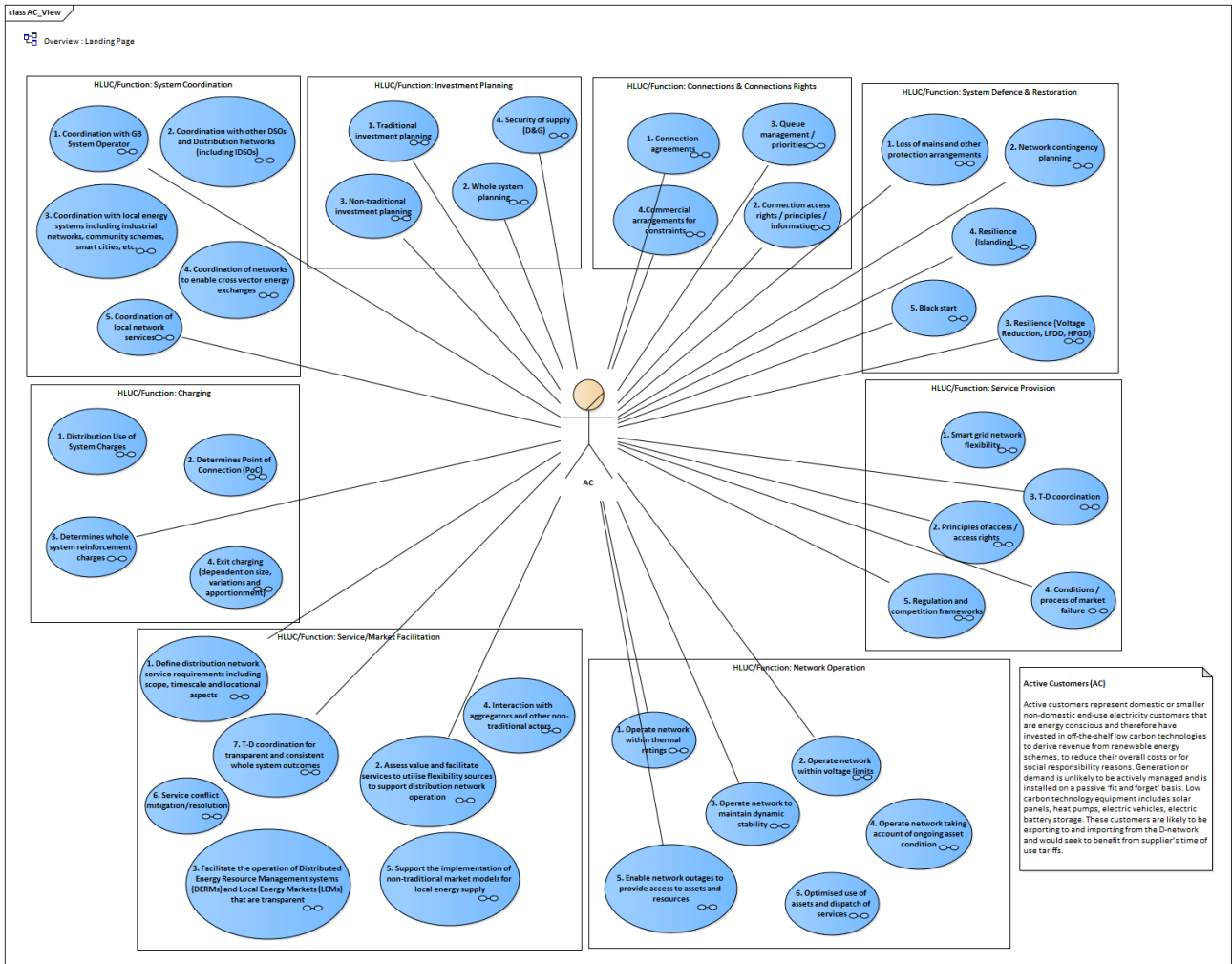


Figure 3: Actor view diagram showing links to the Primary Use Cases where the actor has a role.

4.4 High Level Use Case Diagrams

Each HLUC is made up of a number of PUCs. The HLUC diagram (see Figure 4) maps these PUCs onto the SGAM swim lane framework. The width and height of the PUC rectangle on the swim lanes shows the coverage across the breadth of the energy conversion chain and the depth of the hierarchical levels of power system management covered respectively. In short, the width of the PUC tells you who is involved and the height tells you the level of detail involved. Each rectangular PUC object on this diagram can be used to navigate to its linked PUC diagram (see Figure 5).

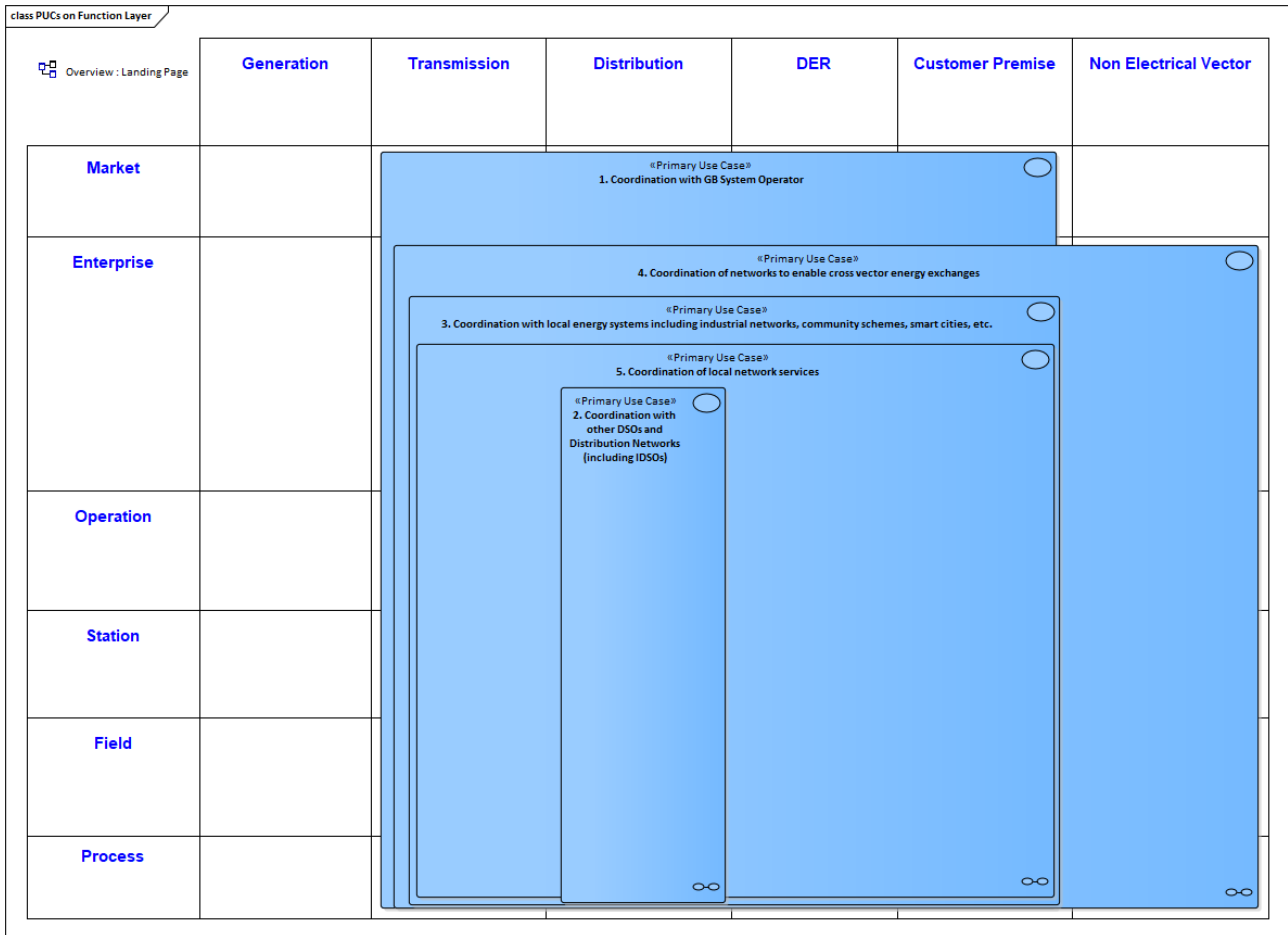


Figure 4: HLUC Diagram showing the areas covered by each PUC in terms of the energy conversion chain or Domains (x-axis) and the hierarchical levels of power systems management or Zones (y-axis).

4.5 Primary Use Case Diagrams

The next level down, PUC diagram (see Figure 5) contains:

- The PUC element which is placed centrally on the diagram
- The HLUC element which invoked the PUC element at the top left of the diagram. Clicking on the HLUC element will navigate back to the HLUC diagram (see Figure 4)
- The Business Actors which are present in the activities in the PUC are placed around the PUC element. Clicking on a Business Actor will navigate back to the linked Actor View diagram (see Figure 3). Note that the actors on this PUC diagram may not be present in all of the processes listed. The presence of an actor in a process can be gleaned by viewing the sequence diagrams (example shown in Figure 6) which show all participating actors across the top of the page.
- And links to the Sequence and Activity diagrams, in boxes on the right-hand side, which fully describe the processes needed to fulfil the functionality of the PUC.

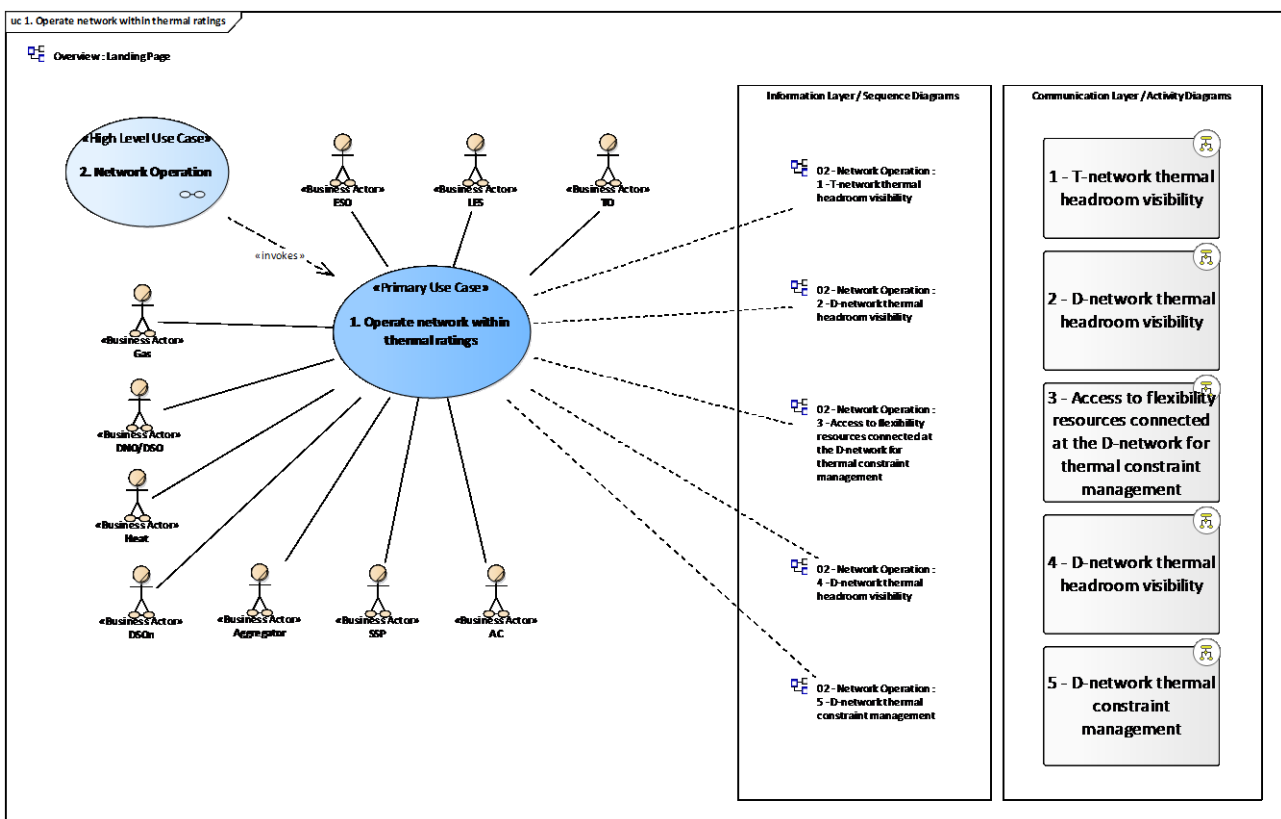


Figure 5: PUC diagram showing the associated business actors, HLUC and processes, the latter split into activity and sequence diagrams.

4.6 Sequence Diagrams

The sequence diagram is used primarily to show the interactions between actors in the sequential order that those interactions occur. Each Sequence Diagram (see Figure 6 as an example) contains:

- Lifelines of the Business Actors required to fulfil the process that the Sequence Diagram is describing
- Links between the actor lifelines which describe process steps and the information objects exchanged between actors to fulfil a given step.

Process steps follow a logical sequence of implementation from the top of the diagram to the bottom. The direction of the links in a sequence diagram may only indicate which actor leads a particular process step. For example, if the linked information object is an 'industry consultation' or 'service contract' a reverse flow of information is implied to complete the step.

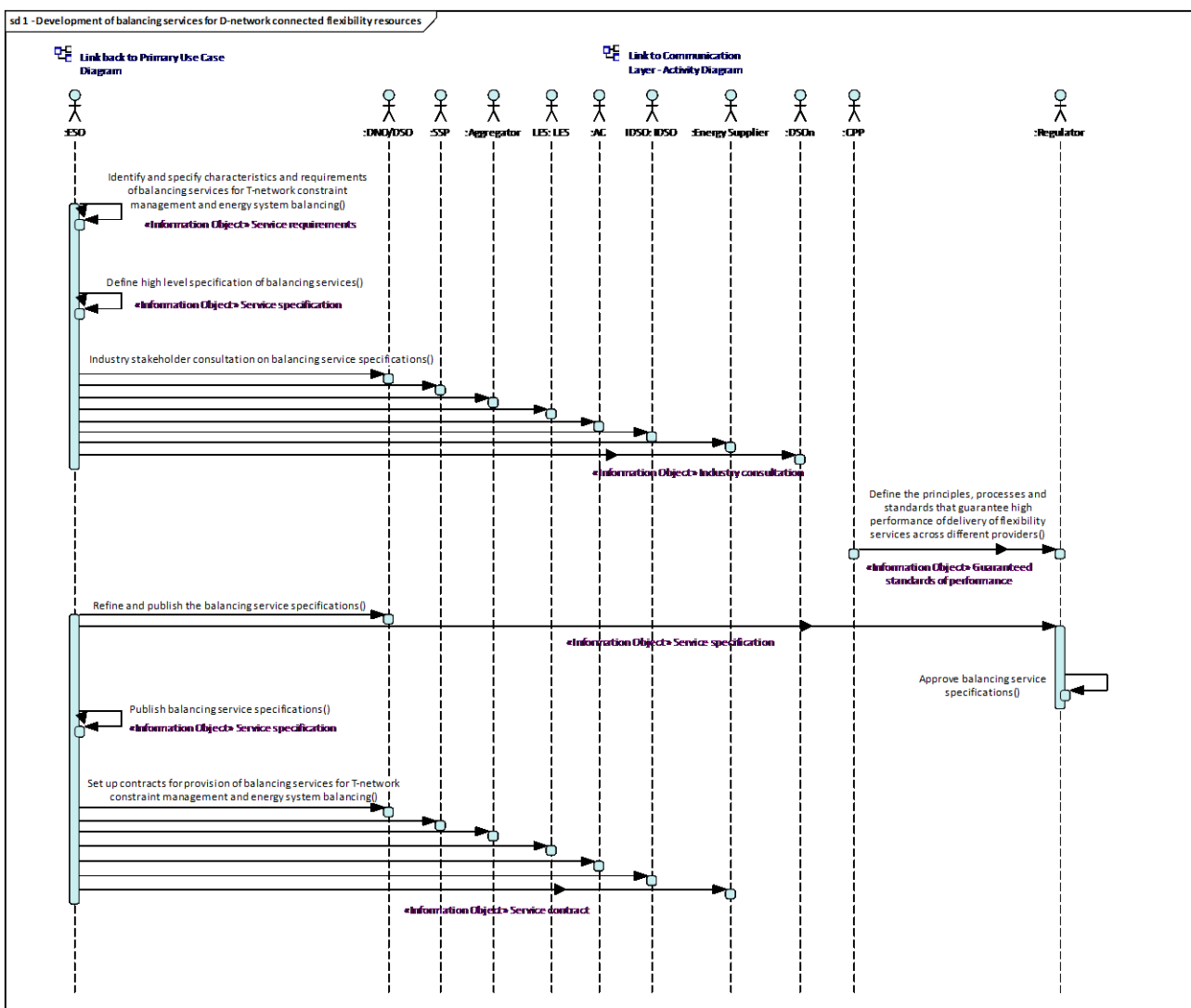


Figure 6: An example sequence diagram showing the actions and associated information flows between business actors.

The blue bars shown on the lifelines in the sequence diagrams (example in Figure 6) are called activation bars. They are created automatically by the software and indicate that an object is active in an interaction (creately.com, 2018). The bars length indicates the number of concurrent actions a given actor is involved in.

In terms of the labels on the links describing the step, when it's the same step carried out between multiple parties (as on the third step in Figure 6) there will be one label for the group to make the diagram more easily readable. The same principle applies for the information flow associated with that step and group (if there is one).

4.7 Activity Diagrams

The purpose of the activity diagram is to model the procedural flow of actions that are part of a larger activity. Each Activity Diagram (see Figure 7 for an example) contains, in logical sequence of process implementation, from top to bottom:

- A description of the process step in the left region
- The information object and a description of the information that object represents in the right region
- And a link between the two with a high-level description of the communication protocol used in the information object exchange (e.g. SCADA, contract, etc.)

Note that not all process steps have an associated information objects, particularly process steps describing an internal task (i.e. where no external actor is involved in realising that given process step).

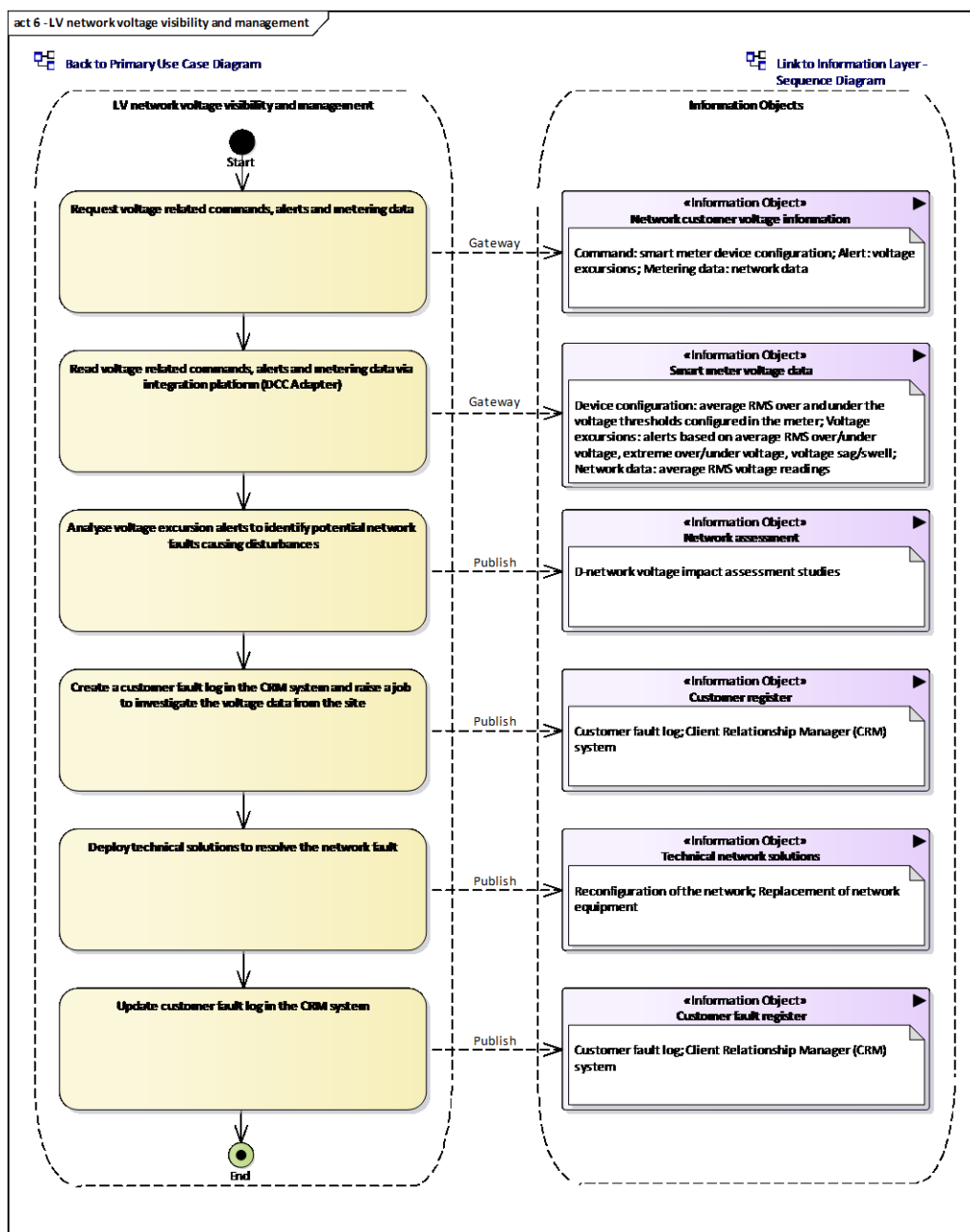


Figure 7: Activity diagram showing steps and associated information objects with additional details.

5. User Level: Editor

The Enterprise Architect software is needed to be able to make any changes to the models. Once it has been downloaded and installed as described in Section 3, double-click on the .eap file to open the corresponding world.

The basic Enterprise Architect workspace should be configured similarly to that shown in Figure 8. To enable the Project Browser as shown in the left-hand side of Figure 8:

1. Go to the Start toolbar
2. Click on Window
3. Click on Project Browser

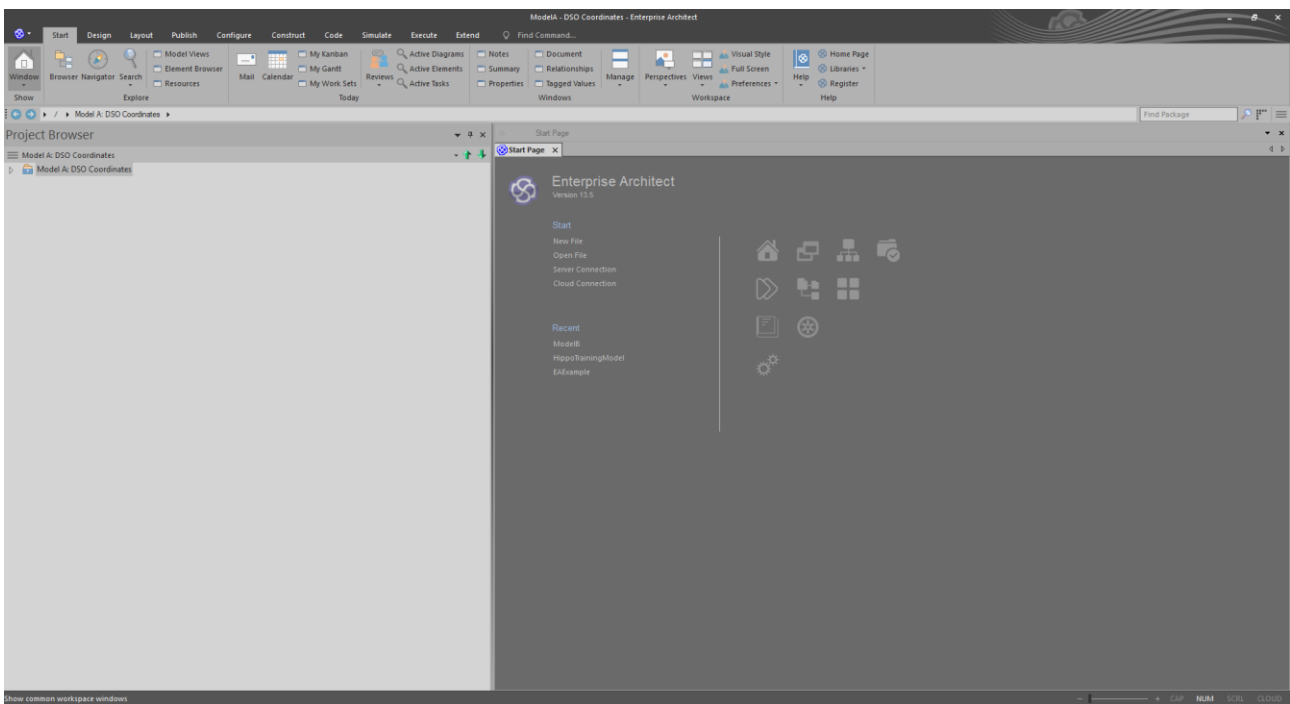


Figure 8: A screenshot of the Enterprise Architect software (version 13.5).

Within the Enterprise Architect software and model, the navigation principles described in Section 4 remain valid. However, there is another means of navigation. This section describes the layout of the structural hierarchy visible in the Project Browser window (which does also appear in the HTML publication) which offers a quicker more targeted means of reaching the desired area.

5.1 The Model Packages

Enterprise Architect models are comprised of elements and diagrams contained in packages. The high-level package hierarchy is shown in Figure 9.

Double-clicking on an element in the Project Browser will display its properties including its description (e.g. double clicking on a Business Actor will provide its definition). Double-clicking on a diagram will open that diagram. Note also that some elements may themselves act as containers for further elements.



Figure 9: Project Browser showing the hierarchy of Packages beneath the model Root Node (a).

5.1.1 Overview

The Overview package (highlighted with a red square in Figure 9) contains:

- The Landing Page, which is the default starting point in the HTML publications
- The Business Actor to PUC Mapping package which contains the Actor View diagrams
- The Business Actors package forming a part of the element library (see Section 5.2)
- The Information Objects package forming a part of the element library (see Section 5.2)
- A Useful Tips document linked to the Landing Page
- And a navigation element to link the Landing Page to the SGAM Business Layer

5.1.2 Business Layer

This package contains the Business Layer Diagram (Figure 2) and the Business Use Case (Figure 10).

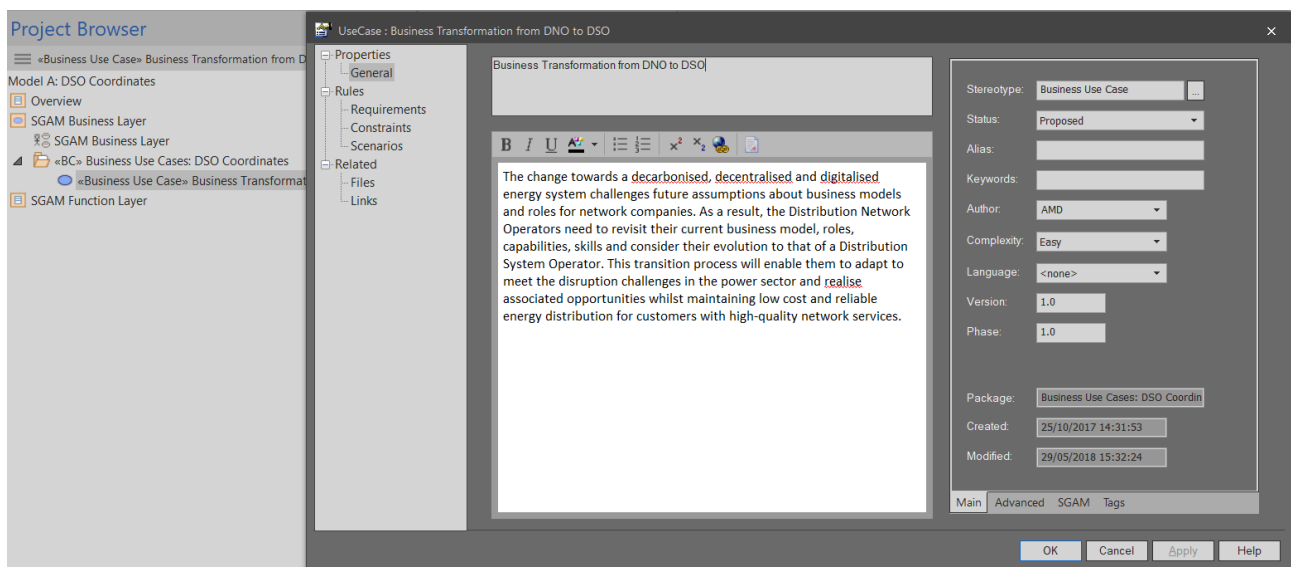


Figure 10: Business Use Case

5.1.3 Function Layer

The SGAM Function Layer package holds the eight HLUC packages. Each HLUC package contains the following hierarchy of folders (as labelled in Figure 11):

- 1) A HLUC diagram PUCs on Function Layer
- 2) A HLUC element containing the further PUC elements
 - a. A number of PUC elements each containing:
 - i. a PUC diagram;
 - ii. an Activity Diagram container element; and
 - iii. a Sequence Diagram container element.

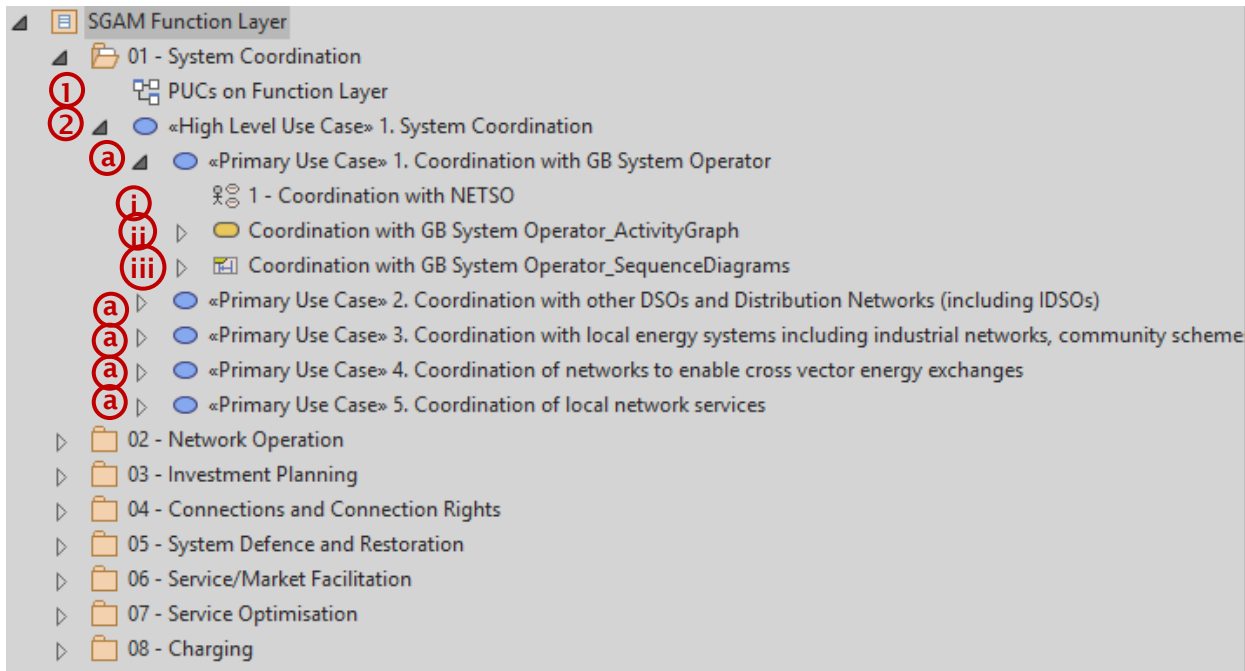


Figure 11: Project Browser showing the hierarchy of folders beneath an example HLUC (System Coordination) in the Functional Layer package with elements numbered to line up with descriptions given at the start of Section 5.1.2.

5.2 Element Library

The folders within the Overview package entitled Business Actors and Information Objects are the libraries of elements contained across the model. Any change to these elements will propagate through all the diagrams in which a given element appears.

5.2.1 Updating Actors and Information Objects

From the Element Library updates to the following can be made:

- 1) Actor name (Business Actor element)
- 2) Actor definition (Business Actor element)
- 3) Actor goal (Business Goal element)
- 4) Information Object name (Information Object element)

Changes to the above can be made by double clicking the relevant element in the Project Browser or right clicking and selecting 'properties'.

The Information Object elements in the library are linked and present in the Activity and Sequence diagrams within the model. Any change to these elements will propagate through all the diagrams in which a given element appears. However, to ensure all parts of the model are updated with any changes to the Actor name and definition, further steps are required. These are:

- Update the 'note' containing the actor name and definition on the relevant Actor View diagram (see bottom right hand corner of Figure 3 as an example).
- Update the name of relevant Actor View diagram (element to be found in the Business Actors to PUC Mapping package) [Useful tip: to find the location of an open diagram in the Project Browser click on the diagram and press Shift+Alt+G].
- Update actor name on the Actor Goal element (these is contained in the Business Actors package).

5.3 High Level Use Case Diagrams

The first diagram in the Function Layer package is the PUCs on Function Layer diagram or the HLUC diagram as described in Section 0 and shown in Figure 4. The following subsections relate to this diagram.

5.3.1 Mapping PUCs to swimlanes

If it is decided that a certain Primary Use Case covers more or less of the SGAM Domains or Zones then the PUC element icon can be modified. This is as simple as resizing the box to match the width and height of the desired swimlanes. Note that this action may cause the PUC element to move and become hidden in the Project Browser. To resolve this issue simply open each of the PUC packages (labelled 'a' in Figure 11) to find it and then drag and drop the element back to the HLUC

To find out how to edit Swimlanes – add, remove, reorder or format them - see Section 6.1.

5.4 Primary Use Case Diagrams

5.4.1 Edit Actors

On these diagrams (example show in Figure 5) Actors are added and the links to the PUC are created manually. So, if a sequence diagram has an actor added to it the actor will need to also be dropped onto the PUC diagram and a 'Use' link drawn to the PUC in the centre.

If there are multiple relationships that you do not want to be visible you can hide these in one go. Press Ctrl+Shift+I to show the 'Set Visible Relations' dialogue box. From here you can uncheck all the links you do not want to appear on the diagram you are currently viewing.

5.5 Sequence Diagrams

The Sequence Diagram container element contains a number of Sequence Diagrams (Figure 6) and the assorted actor lifeline elements required for their construction.

5.5.1 Edit a step

The description of a step can be edited simply by double clicking on the associated line and updating the Message at the top of the dialogue box that appears (Figure 12).

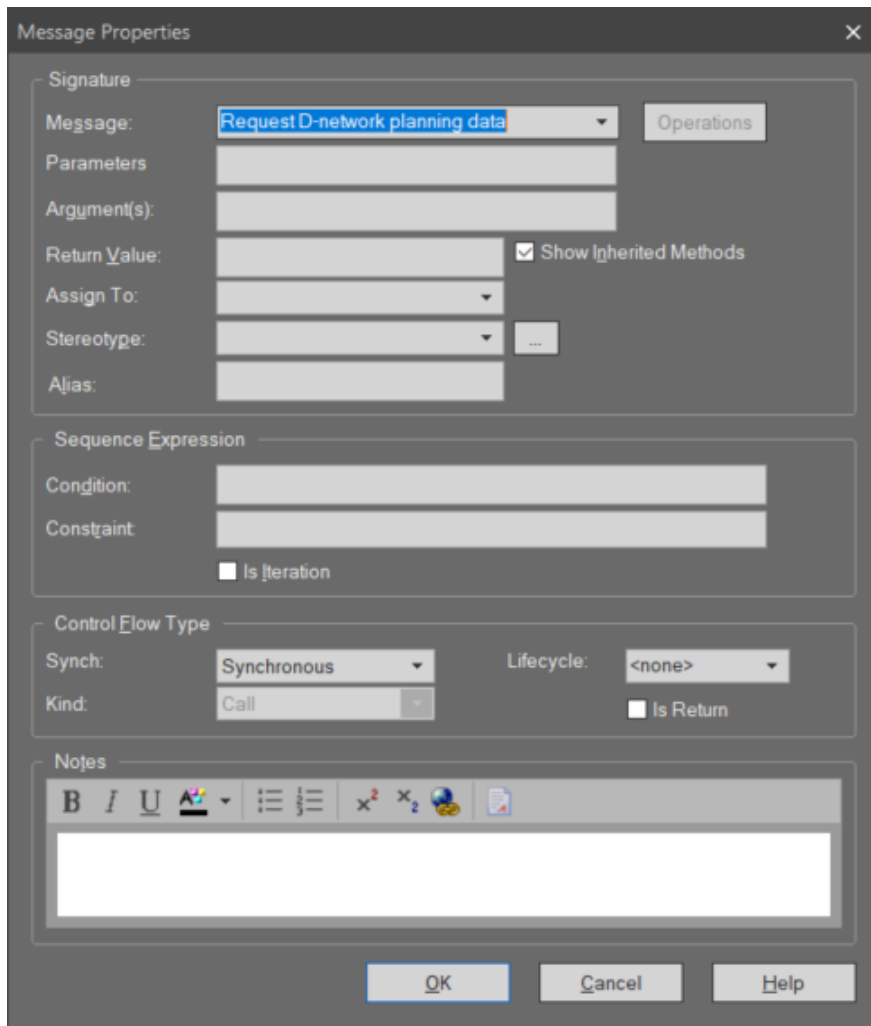


Figure 12: Dialogue box for editing the description of a step in a sequence diagram.

5.5.2 Edit an information object

To change the information flow, right click on the line and select 'Information Flows Realized' (under the Advanced options). Scroll through the list until you find the Information Object that is currently selected, untick this and scroll to the bottom of the window. Clicking on the very last row 'Click to create new information flow....' will take you to a new dialogue box from where you can navigate to the library of Information Objects (Figure 13). When you select the required Information Object it will appear on the diagram, click OK on both dialogue boxes to finish.

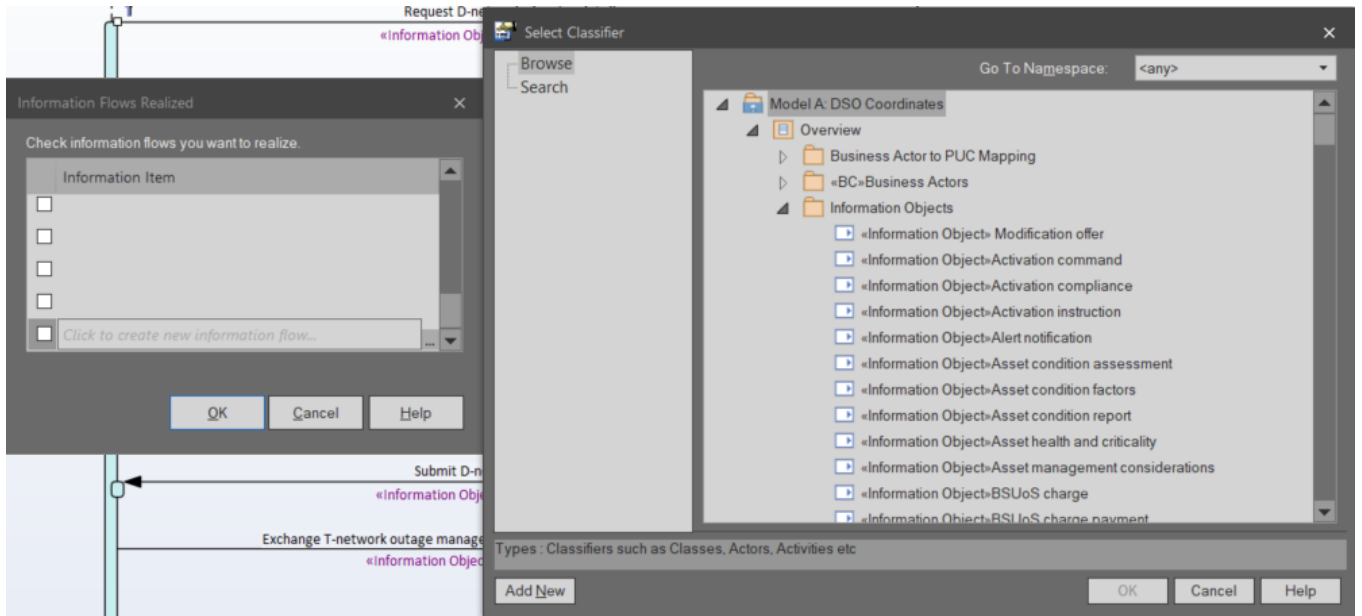


Figure 13: Dialogue boxes for selecting new Information Objects on sequence diagrams.

5.5.3 Edit the actors

To add an actor to a sequence diagram, find it in the library in the project browser, drag and drop it as a Lifeline. To connect the actor in the process you can either drag and drop either end of an existing step to it or create a new step. To do the former, click on the horizontal line representing the step you wish to change and hover over the end until you see a diagonal arrow. Click and drag to your new actor.

To create a new step, click on the actor lifeline where the step would start from. Click on the upwards arrow on the edge of the selected actor lifeline (this looks like the one shown in Figure 14), drag across to the desired actor lifeline and also up or down to position in the right place in the sequence. Follow the steps in Section 0 and 0 to populate the new step.

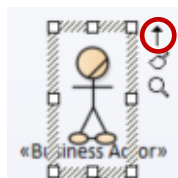


Figure 14: The starting point for linking two elements on a diagram.

5.6 Activity Diagrams

5.6.1 Edit steps

Each step represented by a yellow rectangular element is called an Activity. This type of element can be easily edited by double clicking on it and altering the text in the dialogue box.

The order of the steps or Activities can be changed by deleting the links between them, placing the steps in the new desired order and adding the links back in. The link type is a Control Flow.

5.6.2 Edit information objects

To change the Information Object linked to a step, delete it and add one from the library by drag and dropping the desired Information Object, as a Link, onto the diagram.

For formatting purposes press the Ctrl key and select a pre-existing Information Object so that both the new Information Object and an old one are selected, with a shaded grey border around the pre-existing information object. Right click on the older Information Object and select 'Same Height and Width' from the menu (Figure 15). The Information Objects will now look the same.

You can also select a group of elements and 'Align Centers' and/or 'Space Evenly' to tidy the diagram.

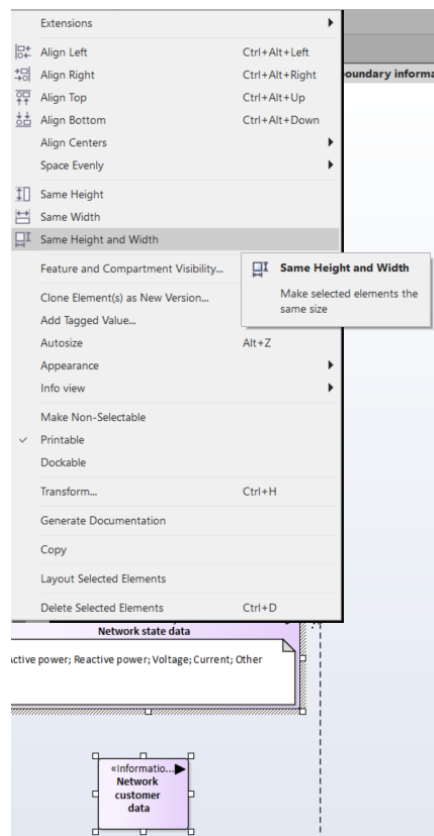


Figure 15: The menu for formatting objects on a diagram.

Right click on your newly added Information Object and go to 'New Child Element' and select 'Attach Note'. Edit the text as required and you can also format this in the same way as you formatted the Information Object element.

Link the relevant Activity (or step in the process) to your Information object in a Dependency relationship. Double clicking on this link allows you to add the communication type to it.

6. User Level: Developer

This section covers the steps required for larger changes and additions to the model. The content for major additions to the models may be derived and documented in a number of ways. For information we briefly describe the method used in Open Networks. Please remember that you will need the SGAM add-in installed in Enterprise Architect (see Section 3.2 for details) for the tasks described in this section.

To gather the material required to construct the original five world models, workshops were held with industry stakeholders. The outputs of the workshops were translated into a series of Excel workbooks. Further details concerning the methodology employed to produce the models can be found in Sections 4 of the accompanying EA Technology report, 'Modelling the DSO transition using the Smart Grid Architecture Model'. Forty excel workbooks were created in total, corresponding to one per Function (or HLUC) per world (there are eight functions and five worlds). Each workbook then has multiple worksheets, one per Activity (or PUC). The structure of these sheets, known as the metamodel, is shown in the table in Figure 16 which also shows how each field relates to model elements.

1 Process no.	2 Process name	3 From actor	4 To actor	5 Step no.	6 Information exchange	7 Information name	8 Information description	9 Communication type
Forms the name of the element in the project browser	Name of the Region surrounding the Activities in the Activity Diagram	The start of the arrow on the sequence diagram	The arrow head on the sequence diagram	n/a	Step description	Information Object on an Activity or Sequence Diagram	The Note on the Information Object in an Activity Diagram	The label on the link between the Activity and Information Object on an Activity Diagram

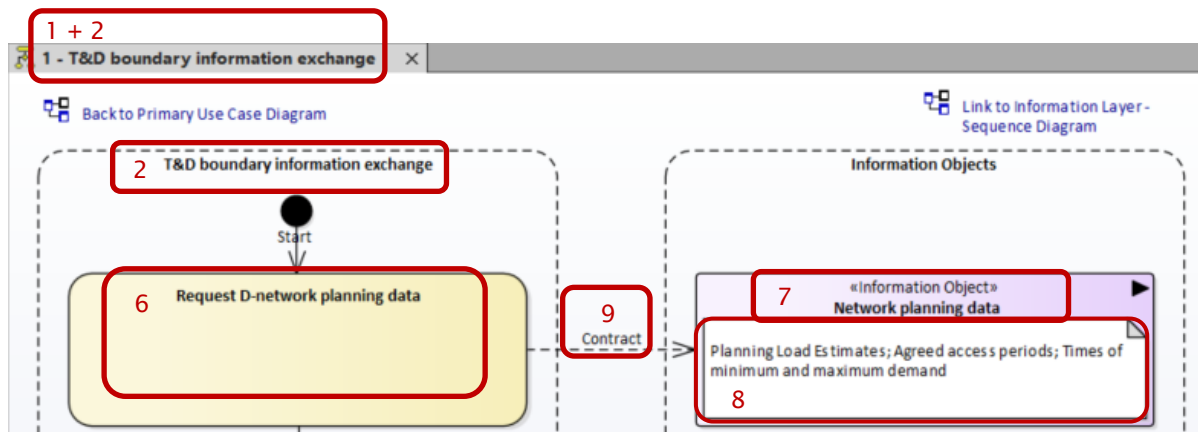


Figure 16: Table showing headings from metamodel and their relation to Enterprise Architect elements as mapped to annotated screenshot from example Activity diagram.

Please note that because of the way model elements are interlinked the process of making additions in the model is iterative rather than linear. There are signposts to related sections to guide you in ensuring the necessary updates are made across the model.

6.1 Adding a new Actor

Should it be decided that a new actor is required this section describes the steps needed for its addition into the model.

In the Overview package right click on the Business Actors folder and select 'add new element'. This will bring up the dialogue box shown in Figure 17. Open the drop-down menu from the Toolset button, find the SGAM toolbox and select SGAM Business Layer. Ensure that the Type reads Business Actor. Type in the name of your Actor. When you click Save and Exit the new actor will appear in your browser.

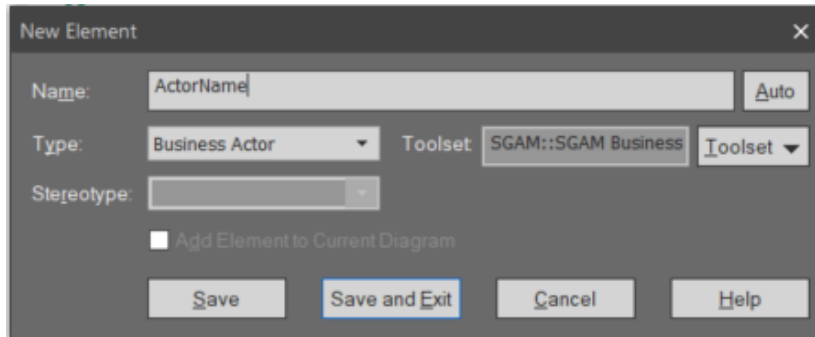


Figure 17: Add new element, Toolset: SGAM Toolbox, SGAM Business Layer.

To add the definition double click or right click and select Properties on your new actor and type the definition in the comment box as shown in Figure 18.

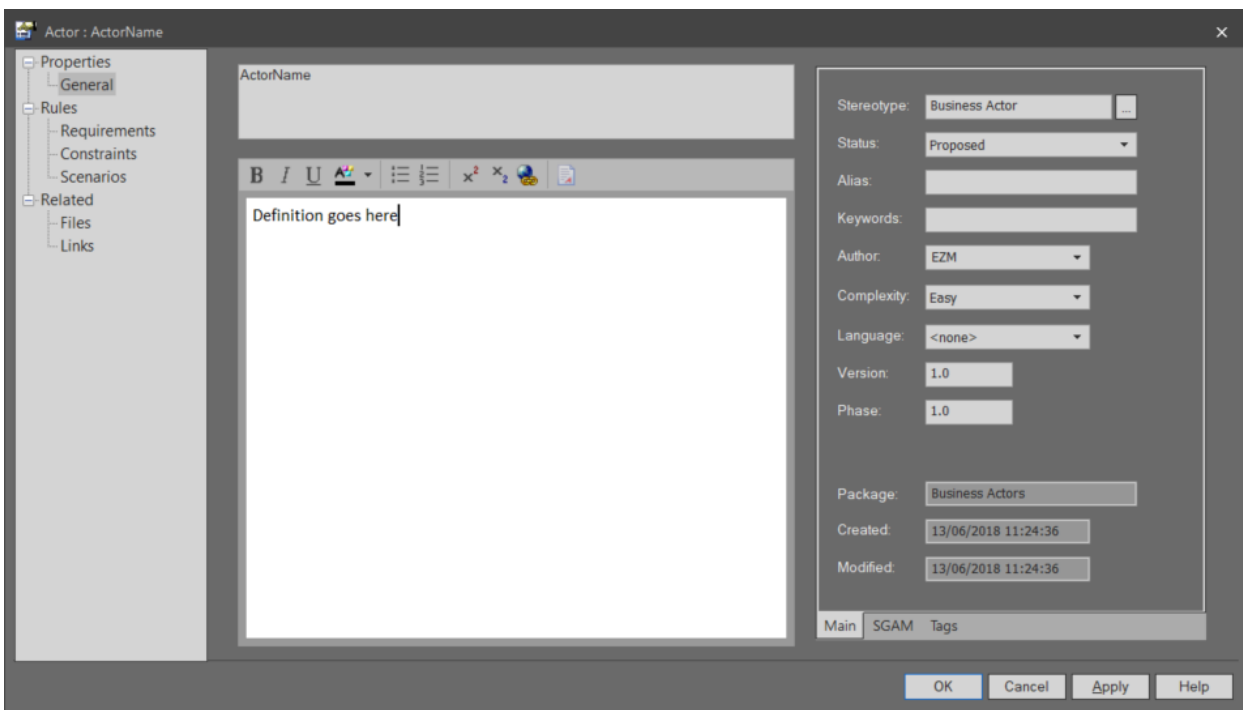


Figure 18: Actor Properties, definition comment box.

Every actor needs a goal. Add a new element as described in the steps at the start of this subsection but in the dialogue box (as in Figure 17) select Type, Business Goal from the drop-down menu. The name should follow the format "<ActorName> Goal".

The remainder of this section describes the other changes required across the World to update it for the new Actor.

6.1.1 Updating the landing page

Drag the Actor View diagram from the Project Browser to the Landing page as a hyperlink (you will need to create the Actor View diagram first, see section 6.1.3 for details). Right click on it and Select Alternate Image. This will give you the dialogue box shown in Figure 19 from where you can upload

a custom icon from your computer by selecting 'add new'. These steps enable navigation by the actor from the landing page when the HTML report is generated. If the background image needs updating this can be done in the same way, by selecting a new Alternate Image.

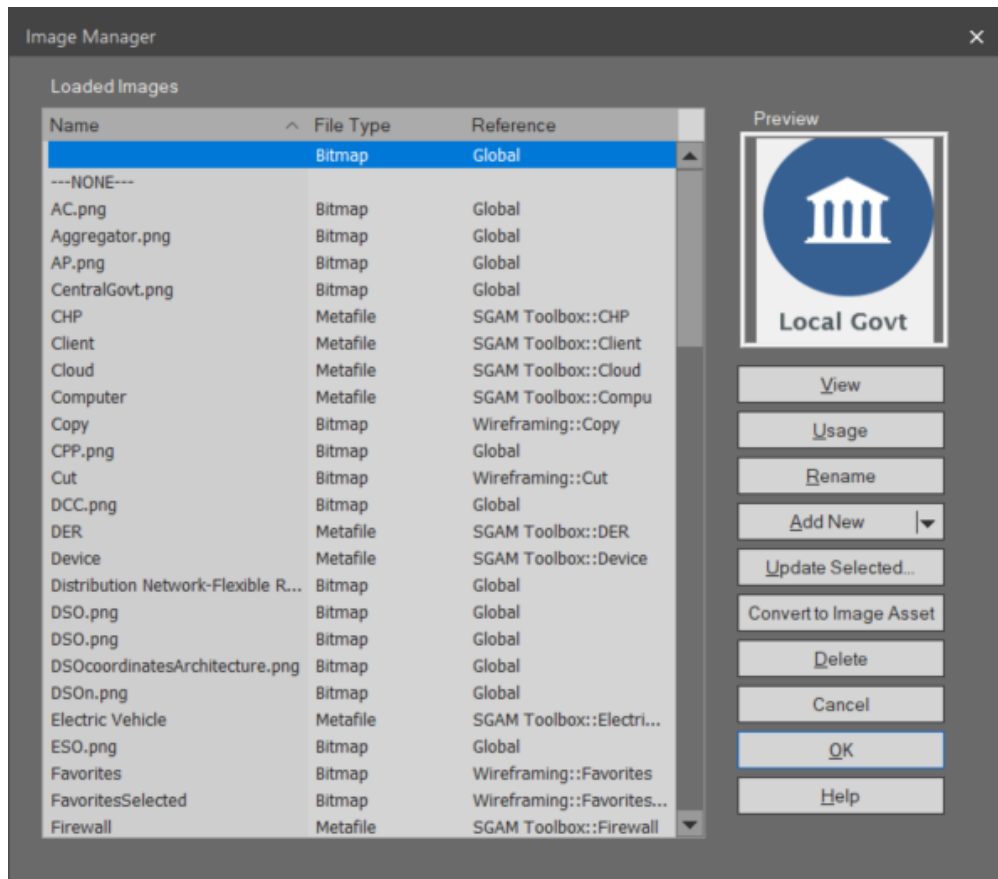


Figure 19: Changing the Appearance of a hyperlink by Selecting Alternate/Default Image.

6.1.2 Update the Business Layer Diagram

The Business Use Case diagram (example shown in Figure 2) needs to show all the actors within the world. Hence you should drag and drop your new Actor and Goal on the Business Layer Diagram and create the necessary links. When you click on an element you will see an upward pointing arrow on the top right-hand corner of its outline (see Figure 14). Click on this and drag it to the element you want to connect it to.

The connection type between the Actor and the Goal is a Dependency and the Business Use Case and Goal is a Realisation. The direction of the arrows should match that of the existing relationships.

6.1.3 Add a new Actor View Diagram

The simplest way to create a new Actor View diagram is to copy and paste (or duplicate) an existing Actor View diagram.

There are three ways of copying diagrams - shallow, deep and smart - as described in Table 2.

Table 2: Copying modes for diagrams, what they do and the impact of further changes from there on.

Copy Mode	What it creates	Changes to the properties of the original elements...
Shallow	links back to the original diagram elements	are reflected in the elements in the pasted diagram
Deep	complete copies of all elements in the diagram, as simple links only; you cannot paste as new	are not reflected in the elements in the pasted diagram
Smart	complete copies of all elements in the diagram that have the same parent as that of the diagram and links back to the original diagram elements for all other elements on the diagram	are reflected only in those elements that are copied as simple links in the pasted diagram

In the case of the Actor View diagram when pasting an existing diagram in the Business Actor to PUC Mapping package you will see the dialogue box shown in Figure 20 where you should ensure that Shallow is selected. This will mean that links to PUC diagrams are kept in tact and any changes to the names of the PUCs elements will be reflected in your diagram.

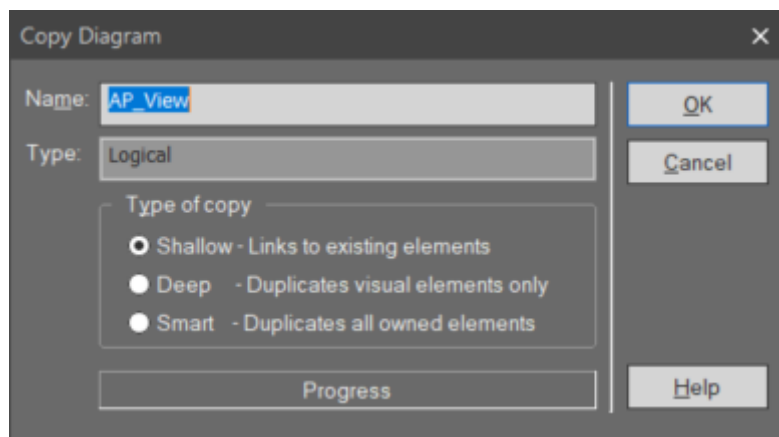


Figure 20: Duplicated an Actor View diagram for a new Actor - shallow copy.

To update the actor simply delete the existing actor on the diagram and drag and drop your new actor for the project browser. The links to the relevant PUCs will appear as you update the PUC diagrams (details in Section 6.1.4).

To finish, remember to rename the diagram with your new actor name and also to update the note in the bottom right hand corner with your new actor name and definition.

6.1.4 Update PUC Diagrams

Drag and drop your new actor from the Project Browser to the related PUC diagrams. Link your actor the PUC with a 'use' relationships.

Choose the relevant processes and update the sequence diagrams, details on this are given in Sections 5.5. If you need to add a Process that does not yet exist see Section 6.4 for more details.

6.2 Adding a new High Level Use Case

If it is decided that it would be useful to have a new Function then a HLUC can be added by right clicking on the Function Layer package and selecting 'add a package', the dialogue will look like that seen in Figure 21 and should be populated in the same way.

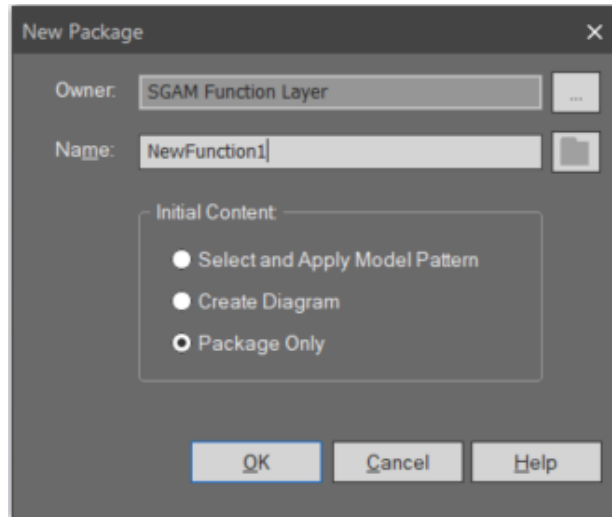


Figure 21: Dialogue box for adding a new package

You will see that a package with the name of your new function will appear in the Project Browser. Right click on your new package and select 'Add new element'. In the dialogue box (as in Figure 22) ensure that the Toolset selected is SGAM Function Layer, select High Level Use Case as the Type. This will give you the HLUC element container.

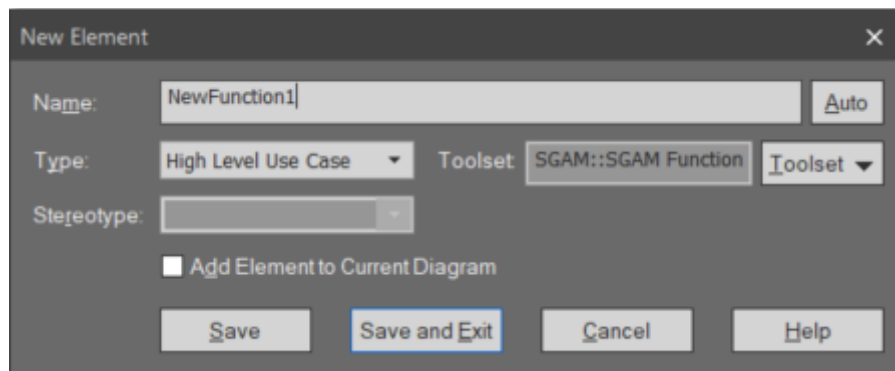


Figure 22: Dialogue box for adding a new element.

6.2.1 Add HLUC (swimlane) diagram

Right click on the HLUC package to 'add a diagram'. It should be a UML Structural, Class type diagram as in Figure 23.

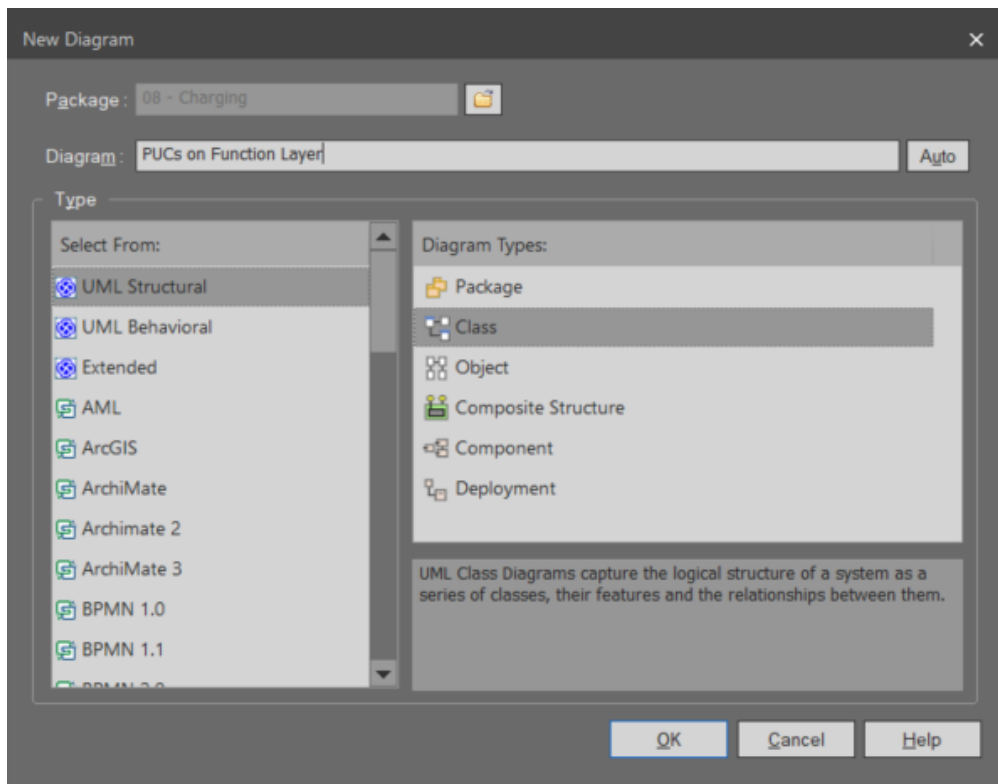


Figure 23: Dialogue box for adding HLUC diagram (swimlanes with PUCs).

When you open the new HLUC diagram from the project browser you will see a blank page. To add the SGAM swimlanes, right click anywhere on the empty diagram and select 'Swimlanes and Matrix', you will get the dialogue box shown in Figure 24. Select 'Matrix' from the left-hand side. In the 'Model Profiles' select the relevant layer for the grid type you want to create (i.e. SGAM Function Layer in this case). Check the 'Active' box at the top of the window – you will see the grid appear in the diagram behind the dialogue box.

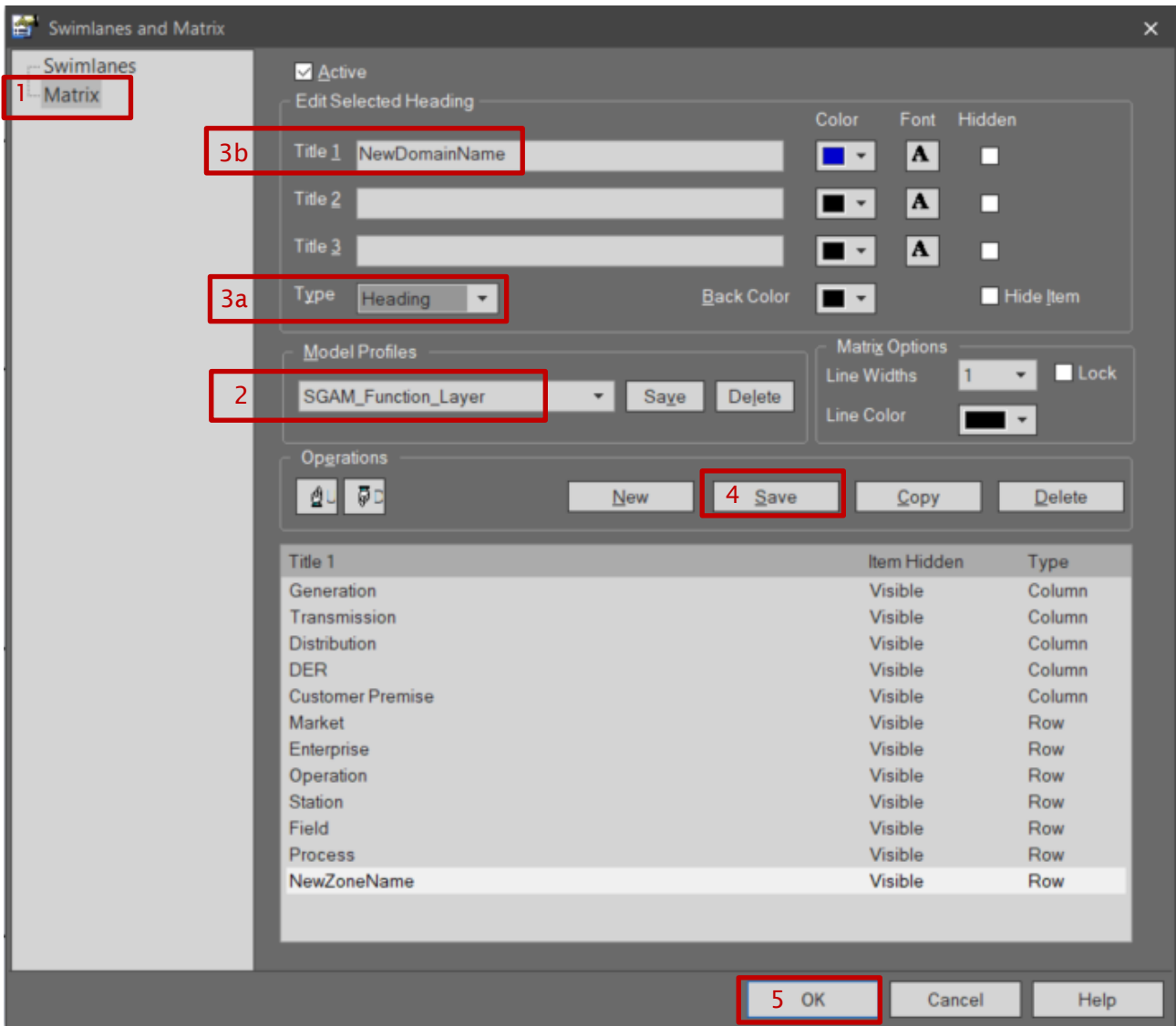


Figure 24: Dialogue box for configuring swimlanes highlighting key sections.

To add a swimlane, click 'New' and select whether you want to add a Domain (Column) or Zone (Row) (at number 3a in Figure 24). Then fill out the details, choose the name and the formatting and don't forget to click 'Save'. You should be able to see your new swimlane in the list in the bottom half of the dialogue box. If required you can use the upwards and downwards pointing finger icons under 'Operations' to reorder your Domains and Zones. Otherwise click OK and you should see that the diagram is now set up with the swimlanes you have configured.

Next you need to add PUC elements to the diagram. When adding PUCs to the swimlane diagram (by dragging and dropping them from the project browser) they may appear as ovals, to correct this right click on the element and find 'Use Rectangle Notation' in the menu (under the Advanced options).

For the HTML to function correctly you need to right click on the PUC and go to 'New Child Diagram' then 'Select Composite Diagram', navigate to the correct PUC diagram in dialogue box and select it. (You will first need to create the PUC diagram, see Section 6.3.1 for details). An infinity symbol should appear in the bottom right hand corner showing it's linked to a different diagram. You can click on the PUC to double check the link.

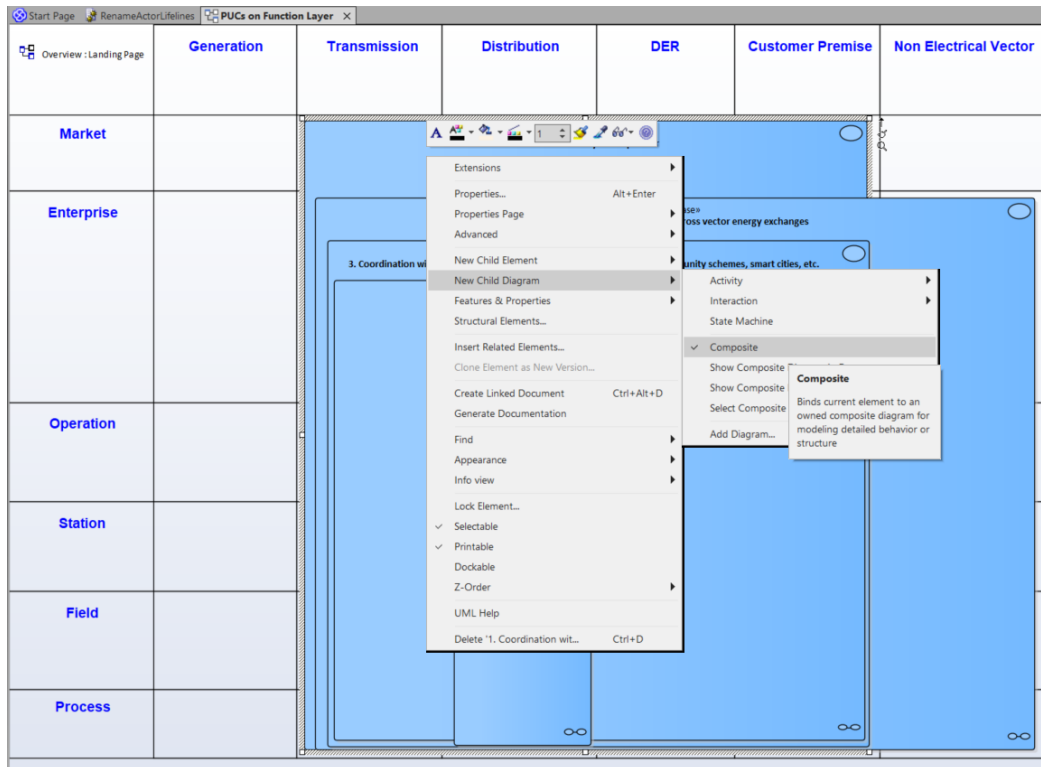


Figure 25: Screenshot showing how to add a composite diagram.

6.3 Adding a new Primary Use Case

Adding a new PUC (Activity) is much the same process as adding a HLUC. Right click on the related HLUC package and select add an element. The Type selected in the dialogue box (Figure 22) should be Primary Use Case. The final step is to drag this to the HLUC element in the project browser to ensure the correct hierarchy is maintained.

6.3.1 Add a new PUC diagram

First right click on the PUC element in the project browser and 'add diagram'. The type is indicated in Figure 26, UML Behavioral, Use Case diagram.

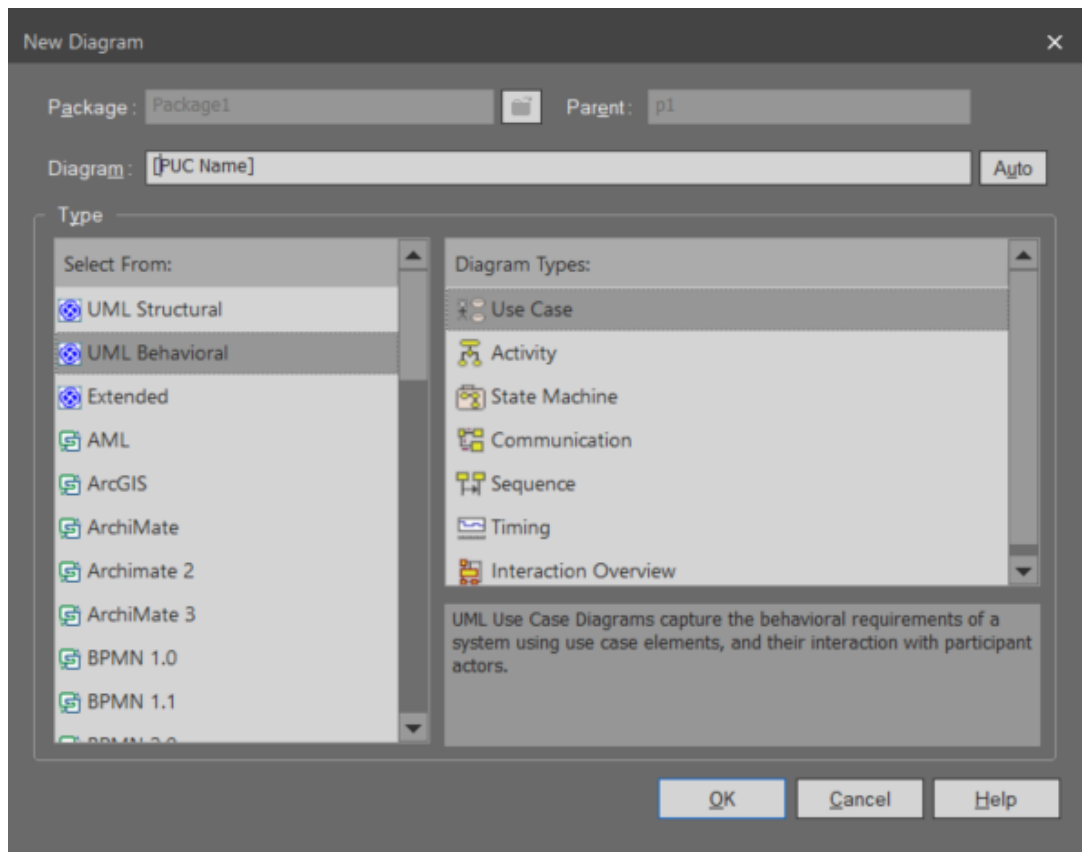


Figure 26: Dialogue box showing how to add a new PUC Diagram.

Simply drag and drop the PUC from the Project Browser onto the centre of the diagram as a link (Figure 27). Drag and drop the associated HLUC from the project browser to the top left-hand corner of the diagram also as a link. The relationship from the HLUC to the PUC is an invoke, draw this by dragging and dropping a line from the upward pointing arrow that appears on the HLUC when it's selected.

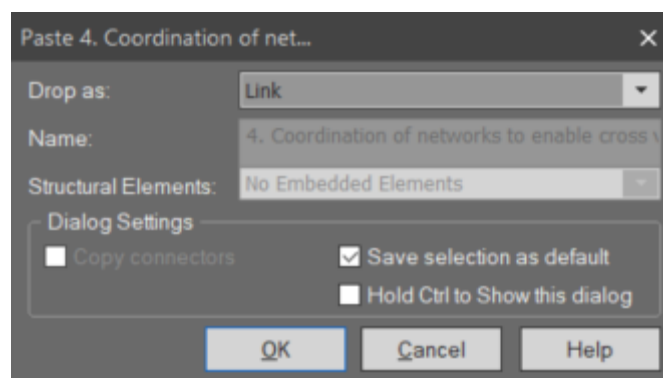


Figure 27: Drag and drop a PUC onto a swimlane diagram as a 'link'.

Add the actors related to the PUC by dragging and dropping links from the project browser, linking them to the PUC with the 'use' relationship.

Drag and drop the sequence diagrams (for how to create these see Section 6.4.1) as Hyperlinks and the activity diagrams (for how to create these see Section 6.4.2) as Navigation Cells (Figure 28). For the latter you will get a second dialogue box that looks like the one on the right in Figure 28, you do not need to select anything here, just click OK. Join the PUC in the centre of the diagram with each of the sequence diagrams, there is just one type of link possible.

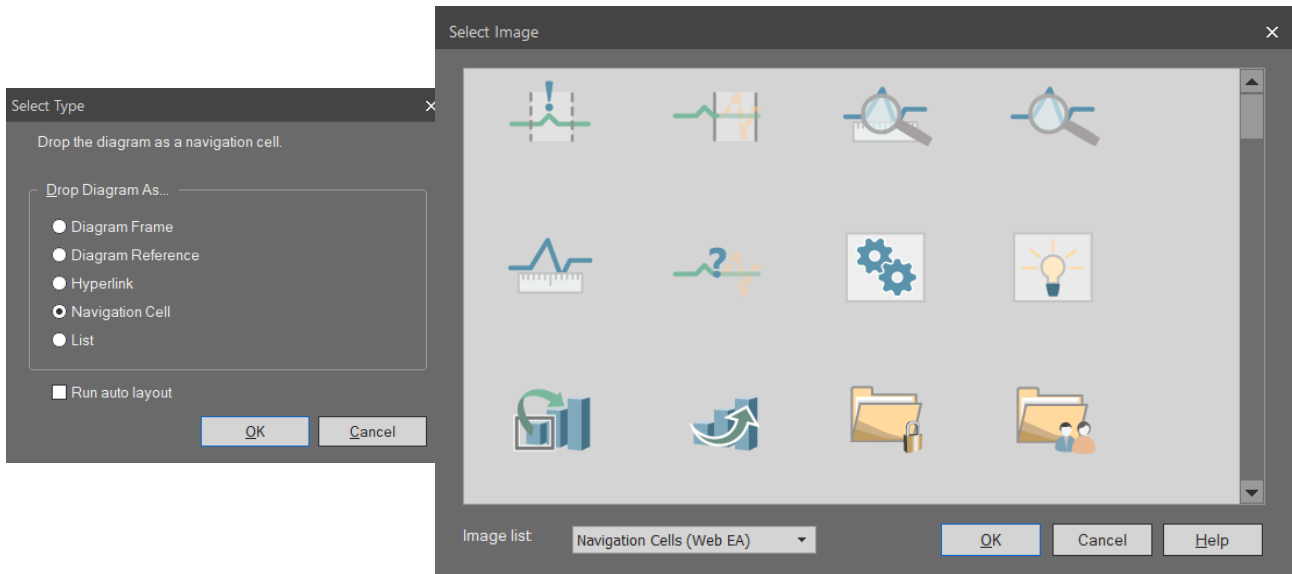


Figure 28: Drag and drop activity diagrams as Navigation Cells – clicking OK on the second dialogue box.

To complete the diagram and you need to add two boundary boxes (see Figure 29), one behind the list of sequence diagrams and the second behind the list of activity diagrams (as in Figure 5).

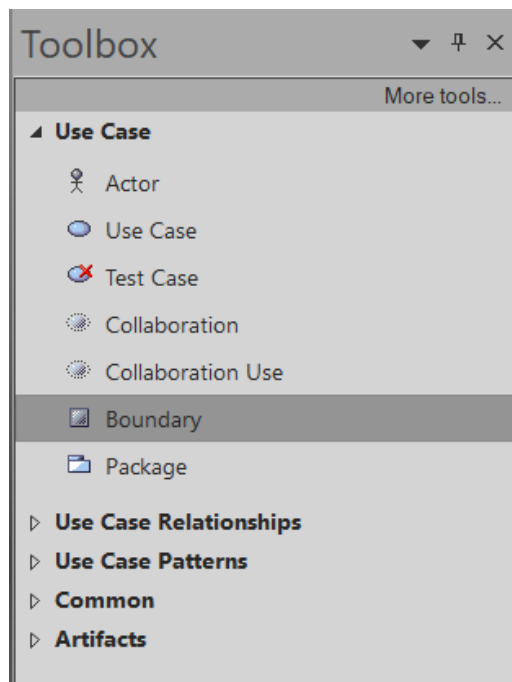


Figure 29: Adding a boundary box (found in the Toolbox) to the PUC diagram.

6.4 Adding a new Process

6.4.1 Add a new Sequence Diagram

Right click on the sequence elements container in the project browser (2aiii in Figure 11) and select 'add diagram'. In the dialogue box shown in Figure 26 the configuration selected should be UML Behaviour diagram of type Sequence. If this is a new PUC you can add the sequence elements container by selecting 'add Interaction', 'with Sequence Diagram' from the menu that appears when you right click the PUC element in the Project Browser.

Once you have got your new sequence diagram open all the information you need to know for creating a sequence diagram can be found in Section 5.5.

6.4.2 Add a new Activity Diagram

Right click on the Activity elements container in the project browser (2a11 in Figure 11) and select 'add diagram'. In the dialogue box shown in Figure 26 the configuration selected should be UML Behaviour diagram of type Activity.

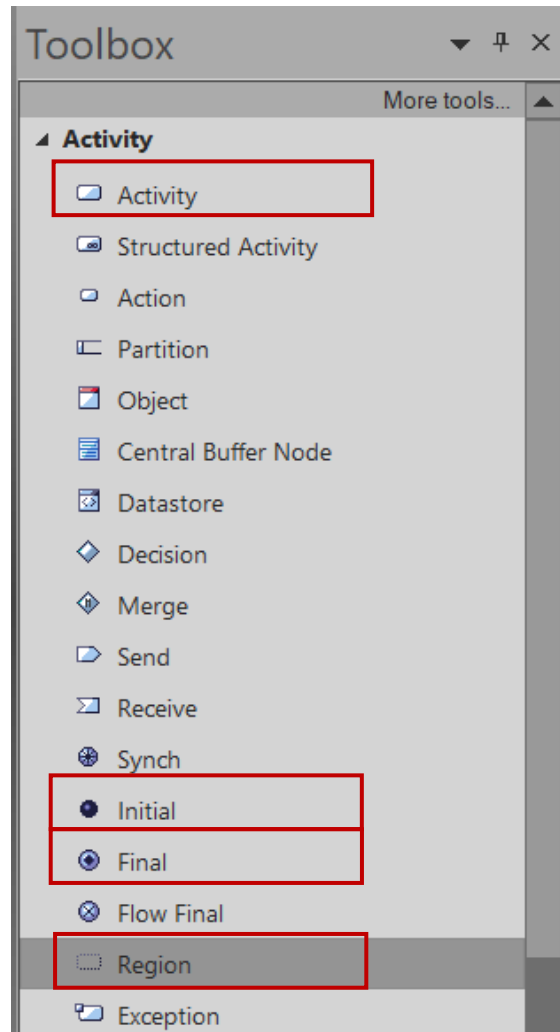


Figure 30: Toolbox elements required for the creation of an activity diagram.

Add two Regions by clicking on Region in the Toolbox (Figure 30) and clicking somewhere on the diagram. You will see a dialogue box like the one in Figure 31, click OK. Give one of the Regions the name of the Process name. The Other Region should be entitled Information Objects.

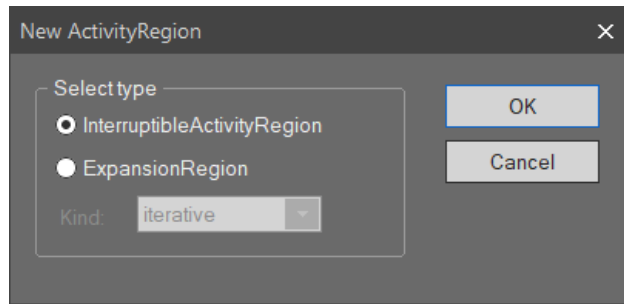


Figure 31: Dialogue box that appears when adding a Region to an activity diagram.

Add an Initial element from the toolbox (in the same way as you added a Region) to the diagram renaming it Start. Add Activity elements, one for each step in your process and linking them in the correct order with Control Flows. There should be a Control Flow link from the Start point to the first step too. At the end of the process add a Final element from the toolbox (Figure 30) and rename it 'Finish' linking the final step in your activity to it.

Details on the steps required to add Information Objects can be found in Section 5.6.2.

7. Publishing HTML Reports

There are a number of ways to share the updated Worlds to those without access to Enterprise Architect. HTML reports are the most intuitive

Right click on the root node – the top level package for the entire world - and select 'generate html report...'. This will give you the dialogue box shown in Figure 32.

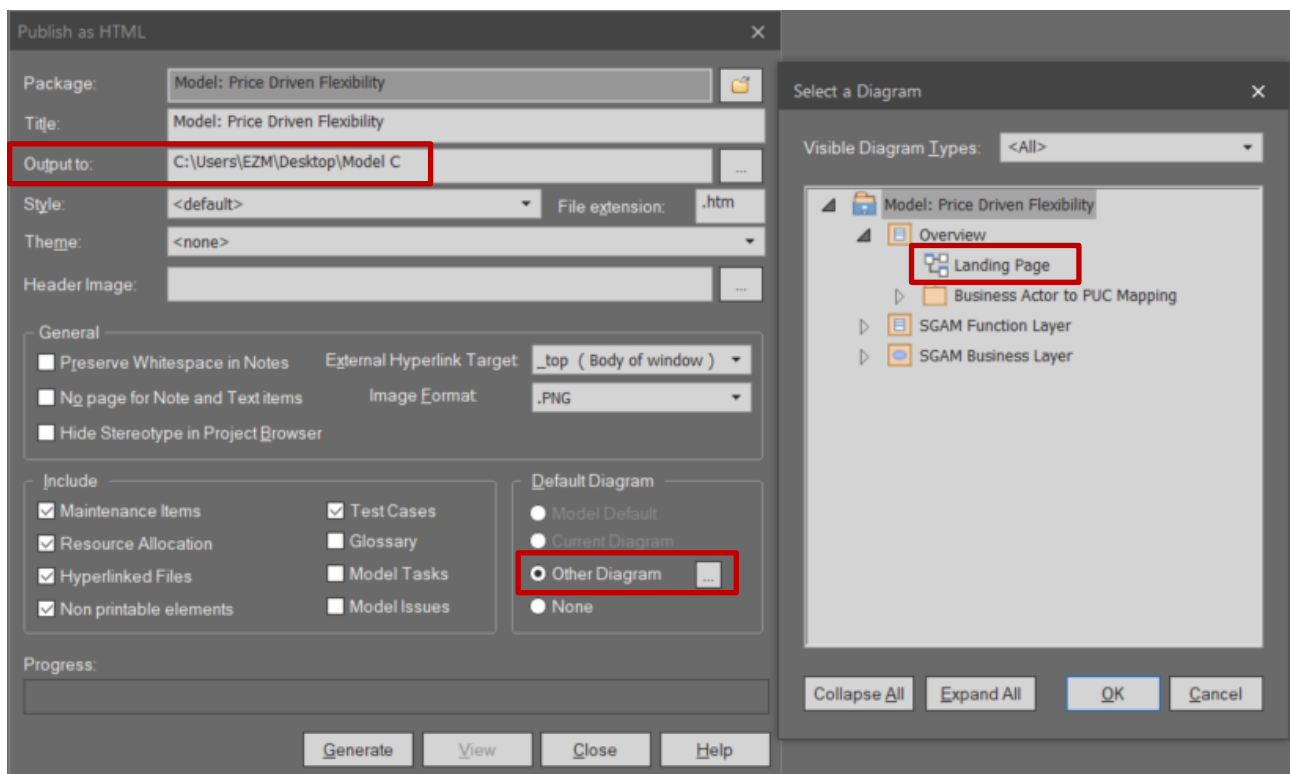


Figure 32: Generate HTML Report dialogue box.

Ensure the 'Output to:' line points to a new and empty folder. Select Other in 'Default Diagram' and navigate to and select Landing Page in the hierarchy as shown in Figure 32. Finally click Generate - this process will take several minutes.

To check the generated file, navigate to the folder from your computer, right click on the 'index' file and open in Internet Explorer. If you wish to transfer files, zipping the folder will improve the speed.

8. Change Management

8.1 Enterprise Architect Model Version Control

Version control happens at the Package level rather than the Model level. A third-party application (such as Subversion, for more information on system requirements - http://sparxsystems.com/enterprise_architect_user_guide/12.1/the_model_repository/version_control_system_require.html) is required to manage access to and store revisions of the controlled Packages.

Enterprise Architect Model Version Control helps you to:

- Coordinate sharing of Packages between users, with either read-only access or update access, ensuring that work on different areas of the model is coordinated and synchronous rather than conflicting; and
- Save and retrieve a history of changes to Packages.

8.1.1 Version Control by Element

The properties dialogue box for each element has fields that facilitate version control – Status and Phase (Figure 33). The Status can be set as Approved, Implemented, Mandatory, Proposed or Validated. The Phase and Version are textboxes that can and should follow the numbering conventions defined in the governance project processes and procedures.

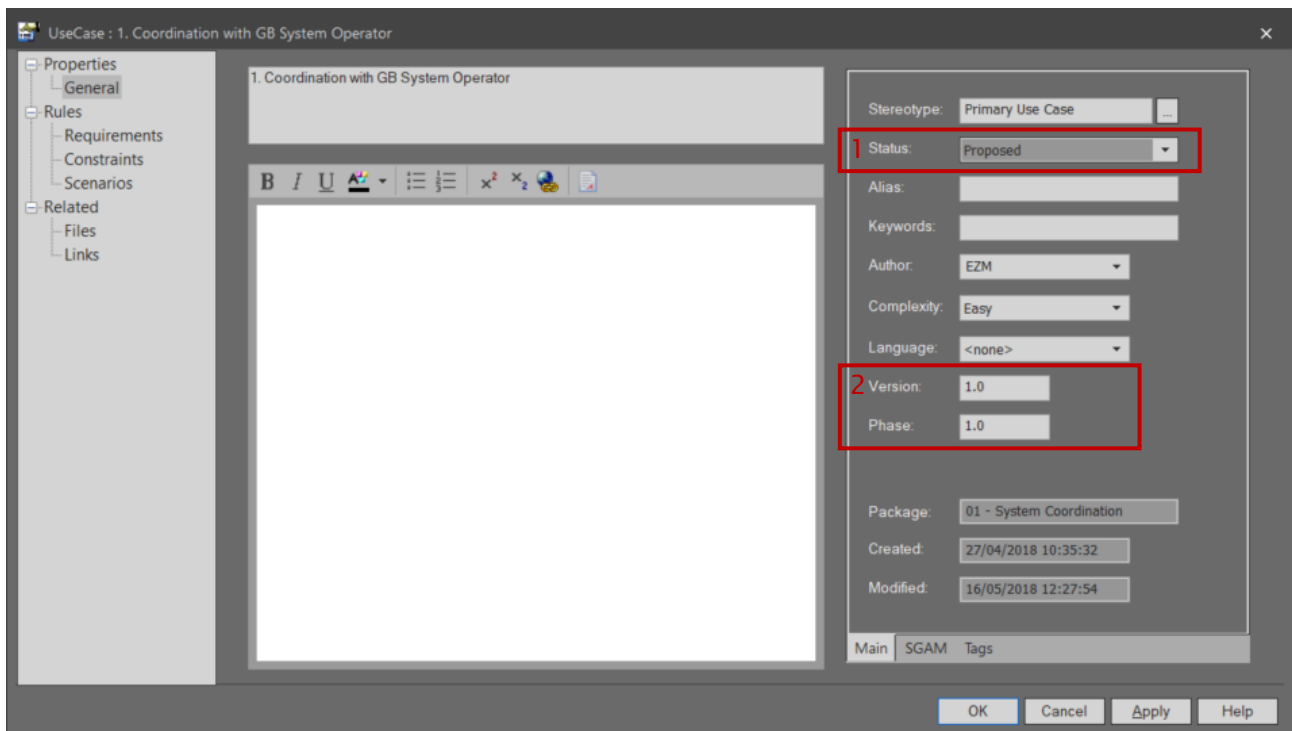


Figure 33: Dialogue box for element showing the version control properties (element by element).

8.2 Dashboards

The Dashboard diagrams allow charts and graphs to be created to display repository information in a visually compelling way. There is a toolbox page of pre-configured charts and graphs, but you can create and save charts sourcing data from anywhere in the model. The charts and graphs provide summary information. High-level reporting and project status can be easily tracked and documented using these elements that link in with the model content and status.

Figure 34 shows the configuration required to set up a new Dashboard Diagram of type Extended.

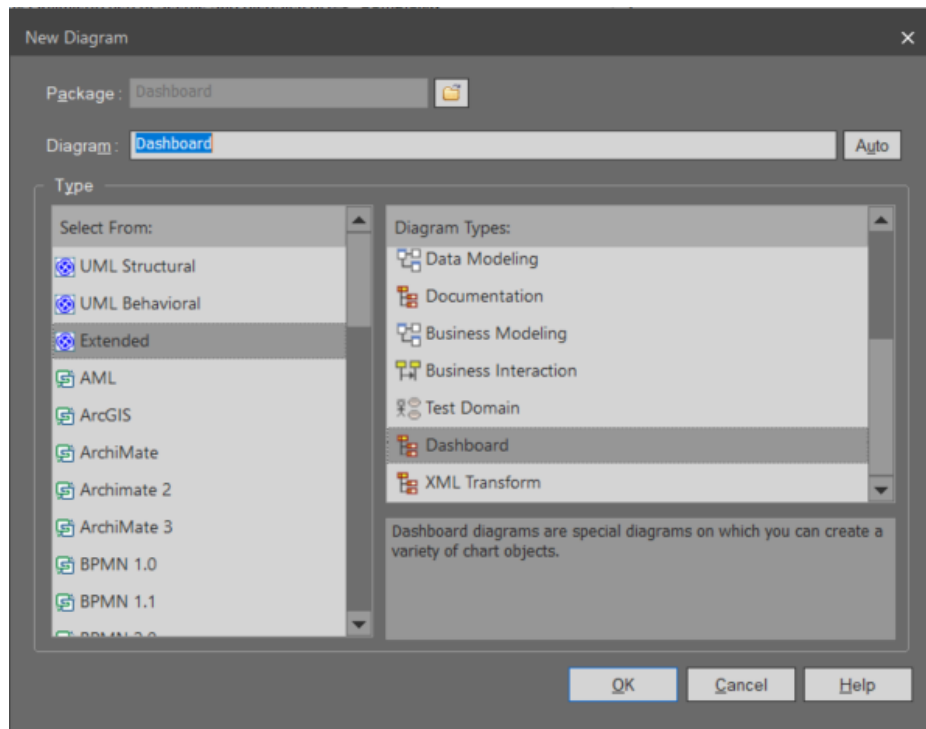


Figure 34: Dialogue box showing the setting required to add a dashboard diagram.

The toolbox shows charts by Status and by Phase. These fields are populated for each element as described in Section 8.1.1 providing a useful overview of the developments across a Model.

Appearance settings can be managed by double clicking on the graph in question or right clicking and selecting 'properties' (Figure 35).

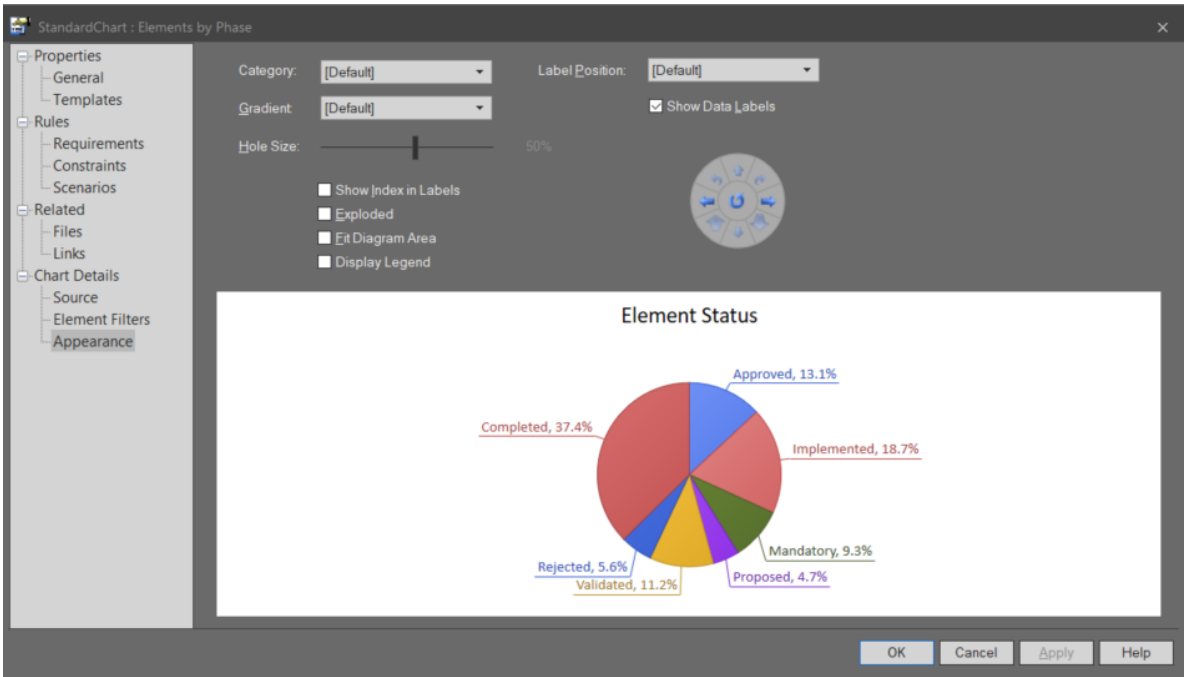


Figure 35: Dialogue box to edit dashboard diagram chart appearance settings.

Filters can be applied to get a more granular view of progress or changes. For example, if you wish to check the developments across a particular stereotype (such as Business Actor or PUC) you can use a setup like that shown in Figure 36.

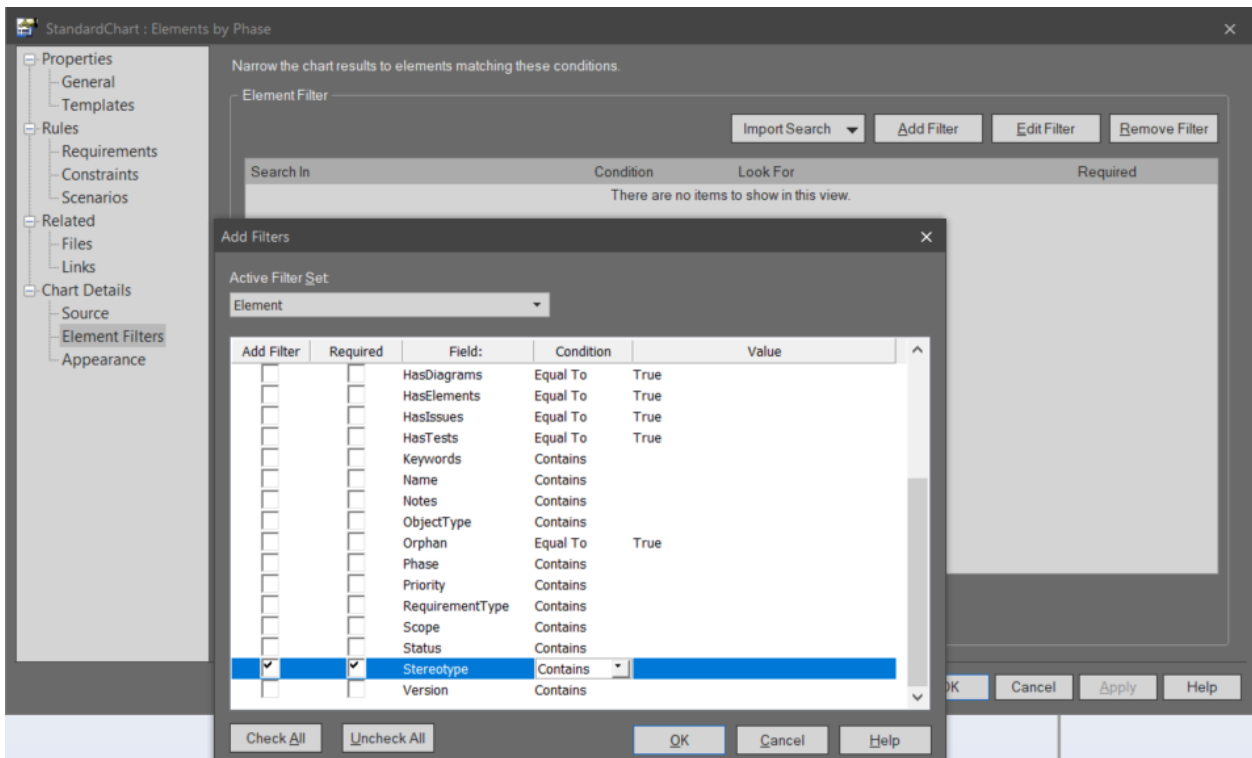


Figure 36: Adding filters to dashboard diagram charts.

8.3 Tracking Changes in Enterprise Architect

8.3.1 Auditing

Auditing is a project-level feature that model administrators can use to record model changes in Enterprise Architect. After switching Auditing on, you can view information such as:

- Who changed an element;
- How many elements they changed;
- When they changed the data;
- What the previous values were; and
- What type of elements they changed.

Auditing does not record changes to:

- Document Templates;
- Model Documents;
- Baselines; or
- Profiles.

This feature is available from the toolbar under the Configure tab and the Model heading

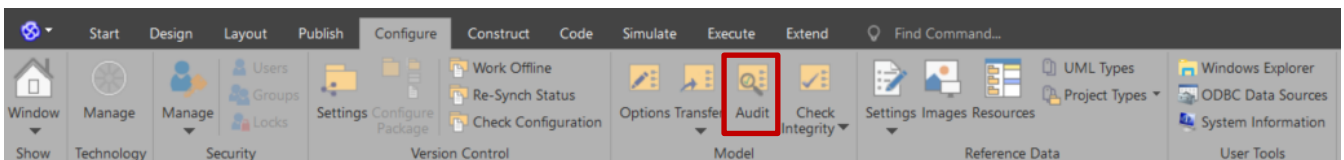


Figure 37: Audit facilities in Enterprise Architect.

For more information on Auditing see:

http://www.sparxsystems.com/downloads/resources/booklets/auditing_uml_models.pdf

8.3.2 Baselining

Baselines are snapshots of the model at a particular point in time, created at the package level and stored in XMI format. Two baselines can be used to highlight changes made in a phase of work or over a time period. Large packages (such as models) can take a long time to compare so it is recommended to create minor baselines for areas of the model which change more frequently. Once the next major baseline/milestone is passed minor baseline can be deleted.

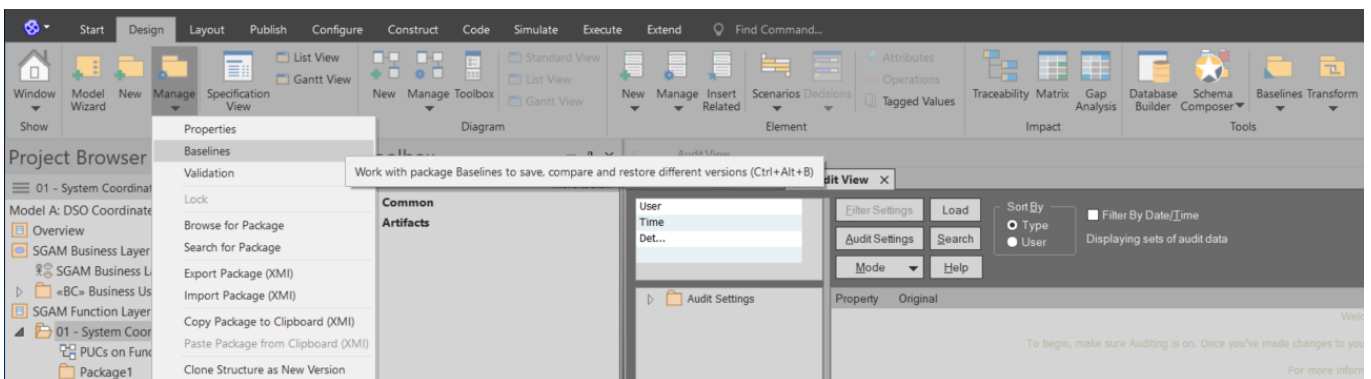


Figure 38: Baseline facilities in Enterprise Architect.

Baselining should not be relied upon for back-ups these must be kept separately and securely.

For more information about the use of Baselines see:
<http://www.sparxsystems.com/resources/baseline/>

9. Useful Resources

The accompanying report for the Open Networks WS3 modelling work, 'Modelling the DSO transition using the Smart Grid Architecture Model'.

The Energy Networks Association webpages on the Open Networks project <http://www.energynetworks.org/electricity/futures/open-networks-project/>

The website from the developers of the Enterprise Architect SGAM toolbox which contain examples, tutorials and other documents <https://sgam-toolbox.org/documentation/>

Sparx Systems Enterprise Architect User Guide <http://www.sparxsystems.com/resources/user-guides/14.0/model-domains/requirement-models.pdf> (Please note as new version of the Enterprise Architect software are released this document and the link will be updated).

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