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Εισαγωγή στα Δίκτυα Υπηρεσιών

SNAPT User Manual (English)

Μαριάννα Καρμαζή, Παντελής Πετρίδης, Γιώργος Στρατάκης, Χρήστος Νικολάου

Τμήμα Επιστήμης Υπολογιστών

User's Manual

SNAPT

Service Network Analysis and Prediction Tool

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Authors:

Mariana Karmazi, Pantelis Petridis, George Stratakis, Christos Nikolaou

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1 Introduction

1.1 About the SNAPT tool

SNAPT is a software tool for modeling and analyzing Service Networks. The tool targets business analysts who need to study existing Service Networks or explore the vitality of emerging ones.

For this purpose, SNAPT is designed to serve as an intermediate service system design and analysis platform, allowing for drawing service network models and then transforming them into a draft form of collaborative business process models and simulation models.

1.2 About this Document

This document is a User Manual for the SNAPT tool. It describes the basic concepts underpinning this work and how to use the tool step by step. The manual is divided into chapters, each of which deals with a different aspect of the tool. The chapters discuss the basic concepts and research assumptions that have driven the development of the tool and it provides snapshots of the tool to familiarize readers with it.

1.3 Where to find more information

SNAPT was the result of three Master's Theses carried out in University of Crete under the supervision of Professor Christos Nikolaou;

- "Towards a universal Service Network-centric framework to design, implement and monitor Services in complex Service Ecosystems: The Service Network Analysis & Prediction Tool (SNAPT)",
- "Analyzing Service Networks from different perspectives using the Service Network Analysis & Prediction Tool (SNAPT)",
- and "Simulating Value Networks in a competitive world using Vensim tool and suggesting competition strategies".

The tool can be downloaded from: http://downloads.tsl.gr/CS592/CS452/snapt.zip

Contact us: nikolau@tsl.gr or karmazi@tsl.gr

2 The SNAPT Infrastructure – System Overview

2.1 Background

Over the past years, the service sector has claimed a huge share of the income in the world's most advanced countries, and services have become essential for the economic viability of modern enterprises. This emerging and dynamic service-oriented economy requires exploring ways to design and deliver services to meet the new customer needs. To address these needs, service science communities established new modern business models, which are approached from many different aspects and under many labels such as service systems, service ecosystems, value networks, service value networks or service networks. The dynamics of these service systems is studied from various perspectives; business analysts study complex service systems in terms of strategic decision making and business performance management. From a more technical viewpoint, Service-Oriented Architecture (SOA) can provide the implementation infrastructure for developing, monitoring and optimizing entire service systems. Service Networks offer an abstract way of viewing complex service systems as a set of independent entities that interact with each other to deliver services and serve their customers.

In order to bridge the gap between business analysts and SOA (IT) infrastructure, Service Network Analysis & Prediction Tool (SNAPT) was designed with the objective of becoming a universal platform for developing, analyzing, monitoring, and optimizing Service Networks.

2.2 Purpose and Scope

SNAPT is a service network modeling and analysis tool targeting business analysts who need to study existing service networks or explore the vitality of emerging ones. In addition to modeling and studying Service Networks, SNAPT users are also allowed to develop their own KPI Library and map business goals to the Service Network model.

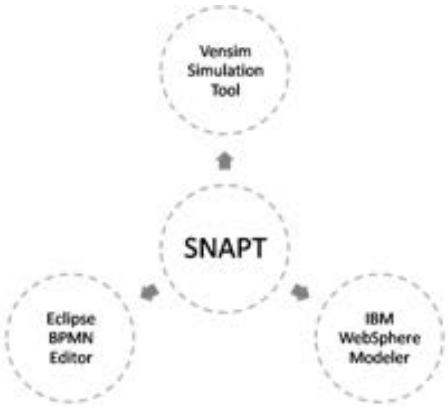


Figure 1: SNAPT vision as an intermediate platform

Current version of SNAPT handles visualization techniques of service networks based on a proposed service network meta-model presented later in this guide, and the transformation process of the service network models into a draft set of business processes based on the free-format format supported by IBM WebSphere Business Modeler, version 7. Also, SNAPT supports a set of guidelines transforming service network models into a draft-form of collaborating business processes in a BPMN 1.2 format that can be imported to the Eclipse BPMN editor. The transformation process into BPMN business diagrams is still in infantry mode.

Additionally, SNAPT provides the functionality of mapping service network models into models of system dynamics which can be visualized and simulated by Vensim tool.

The above in conjunction with supplementary implemented functionality such as the report generation mechanism adopting methodologies of Verna Allee's Value Network Analysis, elevates SNAPT to a standalone Service System designing platform.

3 SNAPT Architecture

Since Service Network theory is constantly evolving, it is possible that the service network model will be a subject to future revisions. Therefore, SNAPT has been developed with such technologies which allow for future modifications of the underlying model without affecting – or affecting the less- SNAPT's already implemented functionality.

To achieve this, SNAPT has developed following the Model-Driven Architecture (MDA) rather than a traditional monolithic application approach. To this extent, the Eclipse platform has been utilized for the development process taking advantage of the plug-ins extension mechanisms in order to allow future extensions or modifications to the tool.

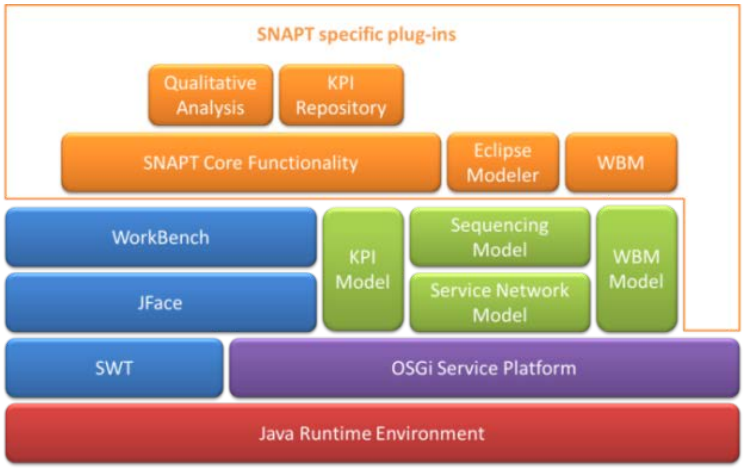


Figure 2: SNAPT Plug-ins

In brief, various models and plugins have been developed providing and supporting the desired functionality of SNAPT, as depicted in Figure 2. Firstly, the Service Network Ecore Model (SNE), which is the core of the system, has been implemented supporting the visualization of service network models. Then, a KPI Model is developed for allowing business users to define their KPIs. KPIs are stored in a KPI Library and each standalone SNAPT application own its own KPI Library. A KPI repository plugin has been implemented as a REST-based SOA repository

providing a highly available storage service for any location independent SNAPT application. The repository is based on the APQC's Process Classification Framework (PCF), which provided business measurements from all industries.

The SNAPT's KPI Model follows the APQC's categorization schema of KPI. SNAPT provides a KPI Editor to support the definition of new KPIs and also to allow correlating KPIs with the service network model's services. The data in the KPI Library corresponds to the KPIs inserted by the business users and it also contains the KPIs of the repository.

Furthermore, a qualitative analysis plugin is provided to support the analysis of service network models in terms of a simple cost-revenue analysis model to estimate the profitability of each business entity and of the network as a whole. To this extent, SNAPT allows the exportation of excel-based profitability sheets as an overview of cost-revenue calculations. Separate excel sheets are generated corresponding to each business entity and an additional for summarizing costs-revenues for the entire network. The Apache POI project has been used for implementing the above functionality. The Eclipse Modeler Plugin and the WBM plugin supports the transformation of the service network models to business process models for two different software tools, the Eclipse BPMN modeler, which is compatible with the BPMN 1.2 standard, and the IBM's Websphere Business Modeler. Finally, the Sequencing plugin has been implemented in order to describe how services delivered in a service network model are composed of other services.

3.1 SNAPT Meta-model

In our view, a service network is a set of business entities and services depicted as a graph composed of nodes corresponding to the participating business entities and edges corresponding to services. An arc implies an economic exchange; the origin point is the business entity which offers the service, while the end point refers to the business entity that consumes the offered service. Figure 3 illustrates the proposed Service Network Model and its concepts as a UML class diagram.

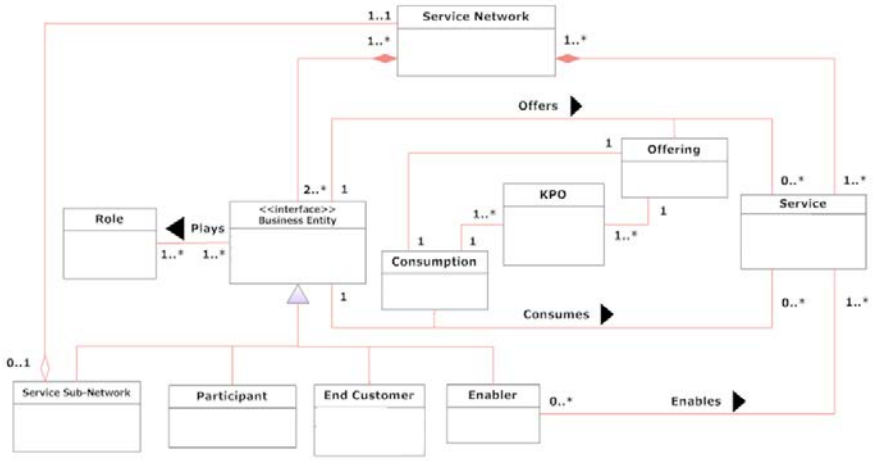


Figure 3: SNAPT's Meta-model as a UMl Class Diagrams

The term "**business entity**" refers to any independent economic entity that provides and/or consumes services in a service network. Business entities may offer various distinct and even unlike services at the same time, cooperating with a lots of independent business entities. When modeling a service network, only those services that contribute to the final service offering is modeled for each business entity. Business entities generate value from their participation in the network, so we assume that they have costs and revenues that derive from the services they offer or consume in the network. Each business entity is assigned with one role in a particular service network and this assignment depends purely to what services it offers, e.g "Ford" is a Business Entity with the role of being "car manufacturer".

Four types of business entities are distinguished and serve as graphical annotations in the models; participants, end-customers, service sub-networks and enablers.

- The "**end customer**" represents business entities that do not offer any service but just consume them, so they are not a business partner and they do not contribute to the service composition. But they are an important aspect in business models because actually they offer a service by providing feedback on their experiences and it is used to recognize the final service or service bundle offered by the service network.
- "**Enablers**" represent a special type of business entities that offer services that enable the delivery of other services. Enablers always interact with both service provider and service consumer and they are non strategic partners in a service network that offer services that do not affect the composition process as a whole but they are crucial because they enable service delivery. For example, FedEx, intermediate payment services like Paypal or Google Checkout can be considered as "**enablers**" in a service network model.
- "**Service sub-networks**" are business entities that have an internal structure of their own and nestle an entire service network that provides and/or consumes services. The only restriction applying to service sub-networks is that each service offered or consumed by a service sub-Network must also be offered or consumed by a single Business Entity inside

the Sub-Network. Service sub-networks can be used to analyze the internal structure of an organization.

- Finally, a "**Participant**" is an ad-hoc business entity in the network, which is not service sub-network, end-customer or enabler.

"**Services**" in our meta-model refer to both goods and services, tangible and intangible in nature, and denote what is exchanged in the context of service network model. A service always connects two business entities indicating that a business entity offers a service to another business entity which consumes it. Thus, services connect business entities with 1-to-1 relationships, 'offer' and 'consume'; a 'service offer' is represented with a solid-line arc originated from the business entity node, which acts as a service provider, that offers the service, while the 'service consumption' is depicted as a dashed-line arc in the opposite direction originate from the business entity that consumes the service, who acts as a service consumer. This implication ensures that for every service offered in the service network model; another business entity exists that consumes this service, pointing the difference of our view of service networks in respect of service ecosystems. Another type of service originating from the "enablers" type is the "**EnablementService**". This service connects an enabler with another business entity or directly with the service it enables during the visualization process.

In order to support the economic analysis of service networks, services are associated with costs and revenues. Revenues are presumed to be costs of the consumer and revenues for the provider. A "service offer" indicates that target service's revenues should be added to the source business entity's total revenues. However, services can be intangible in nature; in this case, the revenues are assumed to be equal to zero.

The meta-model also includes the concept of **Key Performance Objectives** (KPOs) in order to model business and performance objectives. KPOs are like Key Performance Indicators (KPIs) but they reflect the expected value as declared by a business analyst. KPIs are business metrics used on the Business Process Management layer as a part of the monitoring process for measuring business process performance, and they are directly related to an enterprise's strategy and decision making. Hence, KPIs contains the measured value of a business metric in contrast to the expected value declared by a KPO. The concept of KPOs is included in the service network modeling phase to describe the expected performance of the underlying business processes from both the source and target business entities. For any given service, service provider has his own business goals reflected to the KPOs that he will try to satisfy. At the same time, the consumer has some requirements that the service must meet and these should also be reflected to the KPO Model. As a result, in our meta-model service offerings are related to KPOs, and so do service consumptions.

4 Getting Started with SNAPT

4.1 Start of the program

SNAPT runs as a standalone application on Windows by double clicking the "**snapt.exe**". No installation is needed. The SNAPT interface looks like the one in Figure 4. The main interface consists of a graphical editor ("canvas" or a "gmf editor") including a palette, a main menu, an outline view and the properties view.

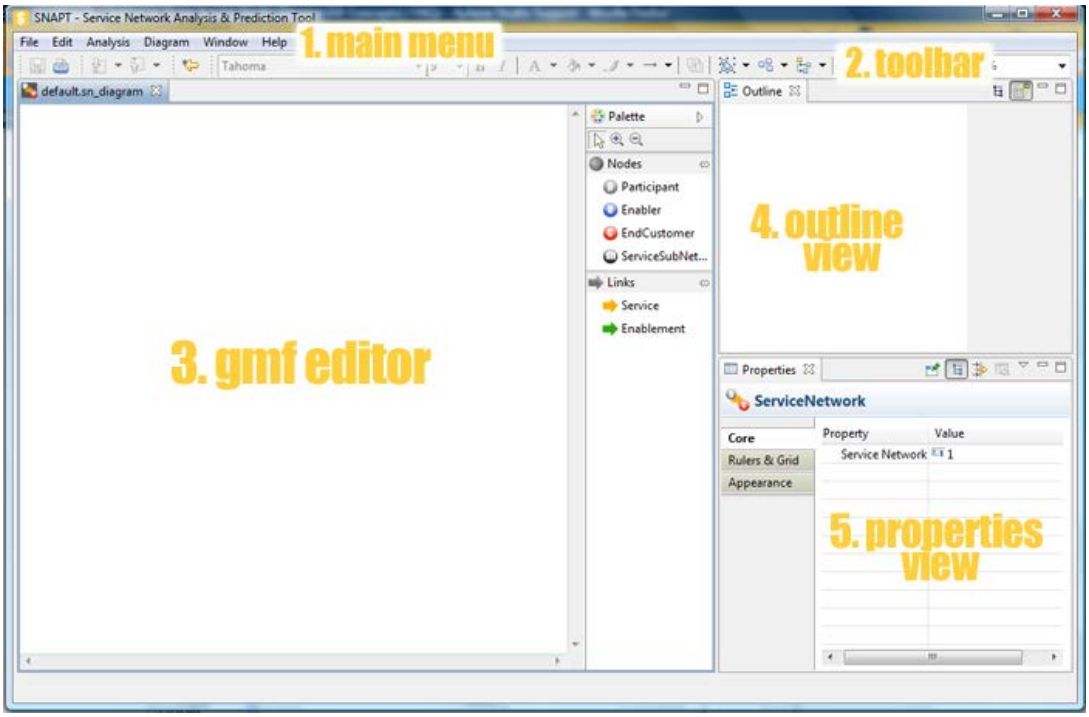


Figure 4: Overview of SNAPT

4.2 SNAPT Views

The canvas (or the "gmf editor") is the drawing area of the tool. Elements can be added to a service network model by selecting the visual elements from the palette and then clicking on the canvas.

The toolbar contains the functionality for determining the look and feel of the service network models such as fonts, line colors, fill colors, and also provides general functionality like automatically selecting all business entities nodes or all connectors, aligning the elements on the canvas, appearing and disappearing labels on the services, zooming functions and so on (Figure 5).

Figure 5: SNAPT toolbar

The properties view contains general information of a selected node or edge of a service network model. The SNAPT user can use this view to change the properties of the elements. Figure 6 illustrates the properties of a participant node, which are the unique id, the name of the node, the role it's playing in the service network and total costs and revenues, while Figure 7 depicts the properties of a Service.

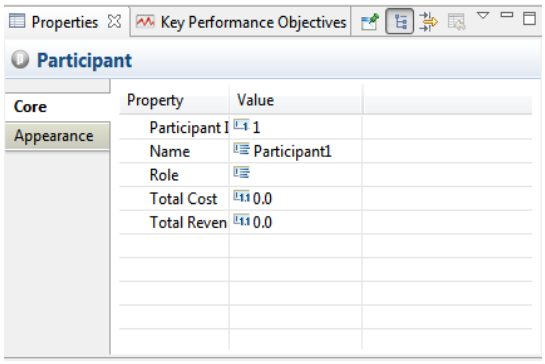


Figure 6: Properties of a Participant node

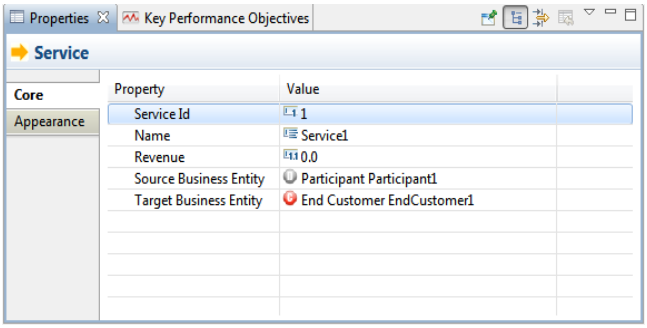


Figure 7: Properties of a Service

4.3 Visualizing Service Networks with SNAPT

To create a new diagram, you must select "**File**"→ "**SNAPT Diagram**" from the Main Menu. A new visual diagram is opened and you are ready to start drawing the new model. You can select the desired visual element from the palette and then click on the canvas to add the element to the model. With this way, you can add the nodes in the network model you draw.

Services can be added with two possible options; either by selecting the service element from the palette and then click the source business entity (the business entity that offers the service) and then drag towards the target business entity (the one that consumes the service); or by selecting the source business entity and drag the edge towards the target business entity as depicted in Figure 8.

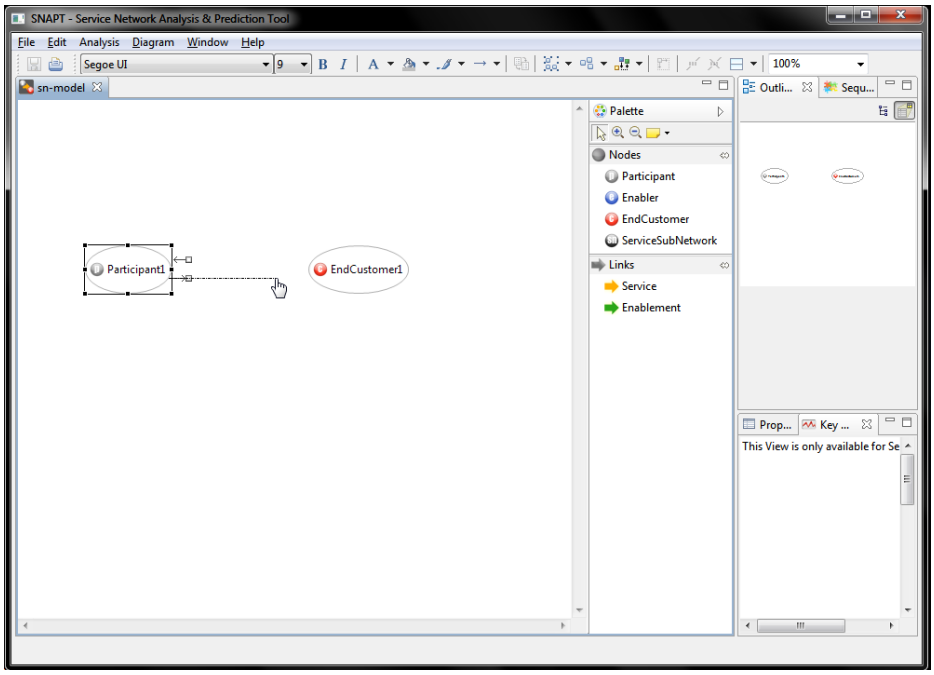


Figure 8: Drawing a Service from a Business Entity to another business entity (option b)

The simplest form of a SN is depicted in Figure 9. The SN model corresponds to the simple example; "Amazon" sells books to its "Customers". Amazon is an instance of "**participant**" and Customer is an instance of "**end customer**" with Books being the "s**ervice**". Please note that "Customer" refers to the Role that this Business Entity plays in the Service Network rather than the entity itself. If we move a step forward and decide to include the book delivery service, provided by FedEx, in our model we should end up with the Service Network of Figure 10.

Figure 9: The simplest form of a SN

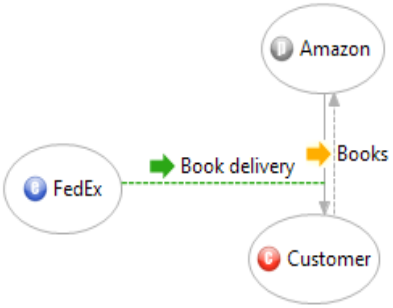


Figure 10: A service network with an Enabler

If a business entity is of type "Service Sub-network", a new visual diagram is created in order to depict the internal structure of this network. In this new diagram, two visual elements are automatically added corresponding to inputs and outputs of the network. This is because every

service offered or consumed by a Service Sub-Network must also be consumed or offered by a single entity inside the sub-network.

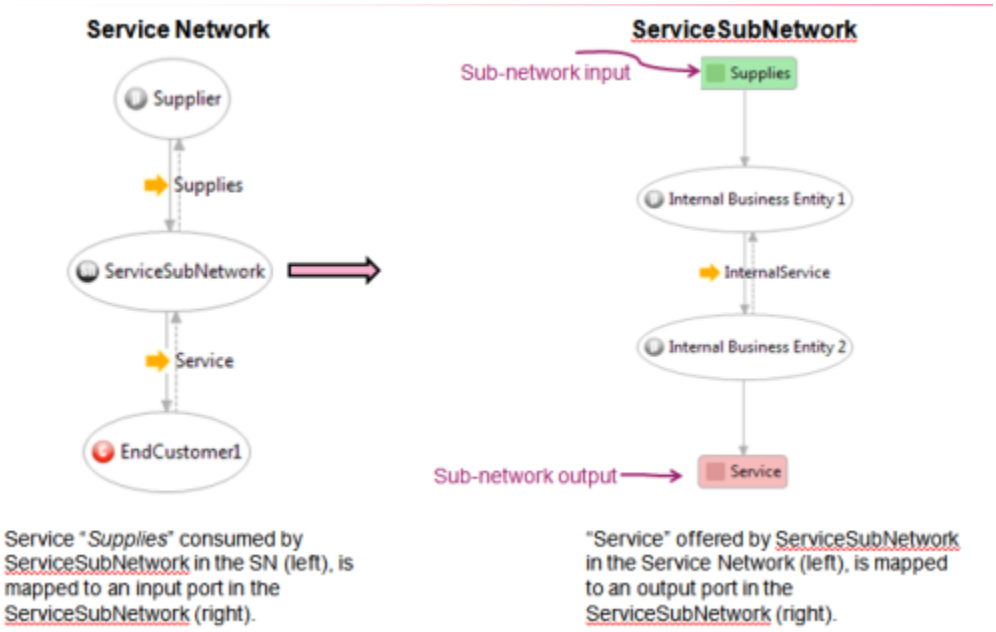


Figure 11: Service Network Model and the corresponding Service Sub-Network Model

Appendix A at the end of this user manual contains the Amazon service network models as created with SNAPT. It also contains a graphical representation of the service sub-networks.

4.4 Assigning Key Performance Objectives (KPOs)

The KPOs can be assigned only to services of the model using the **KPI Library**. The KPO view is shown in Figure 12, and positioned right next the Properties View. The KPO view is enabled after selecting a service from the model and KPOs are assigned to both the source and target business entities of the service as shown in Figure 12.

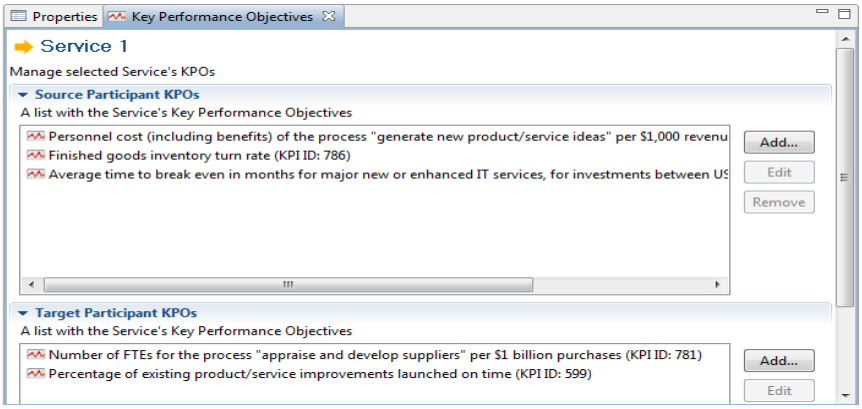


Figure 12: The KPOs view

In order to add a KPO, SNAPT user should click the “Add” button (right-hand size in Figure 12) and then, the KPO selection window is opened (Figure 13). SNAPT user can select the KPI from the list above and then the user should specify the value of the KPO (a number, duration or unspecified).

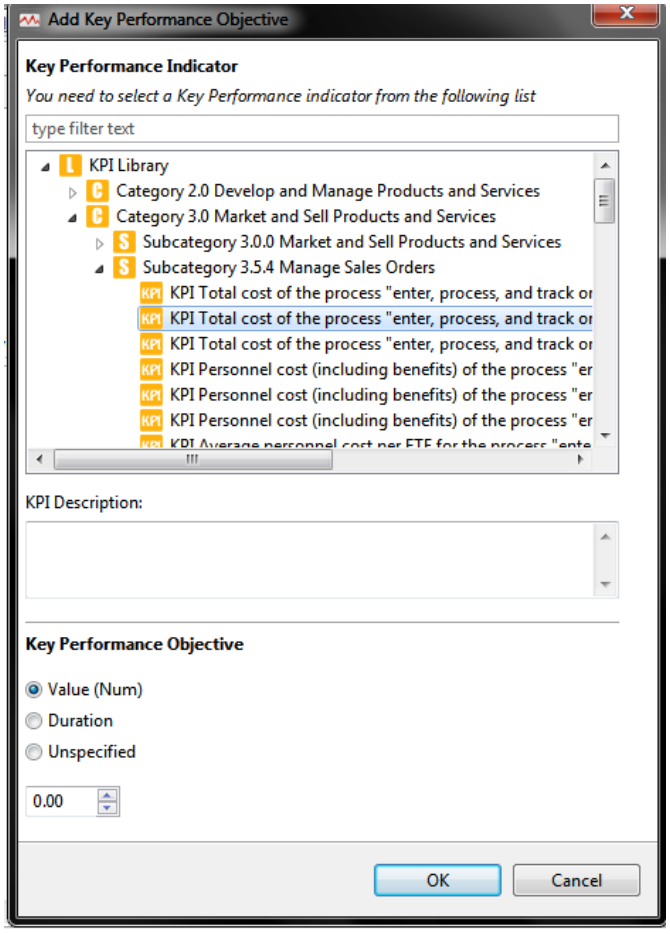


Figure 13: Adding a KPO to a service

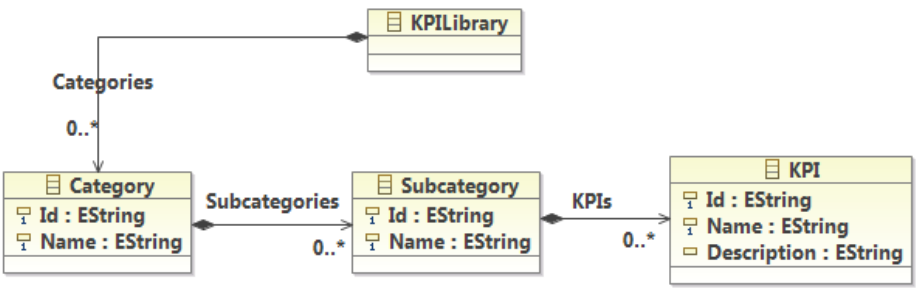


Figure 14: KPIs Editor as UML Class Diagram

KPIs are grouped into categories and sub-categories. Both categories and sub-categories have a unique identifier as attributes. The KPI Model is depicted in Figure 14 as a UML Class diagram. Both Category and Subcategory classes have a name and a unique identifier as attributes. KPIs have an ID, a name and an optional description. Figure 15 illustrates a snapshot of the KPIs Model as shown in the tool.

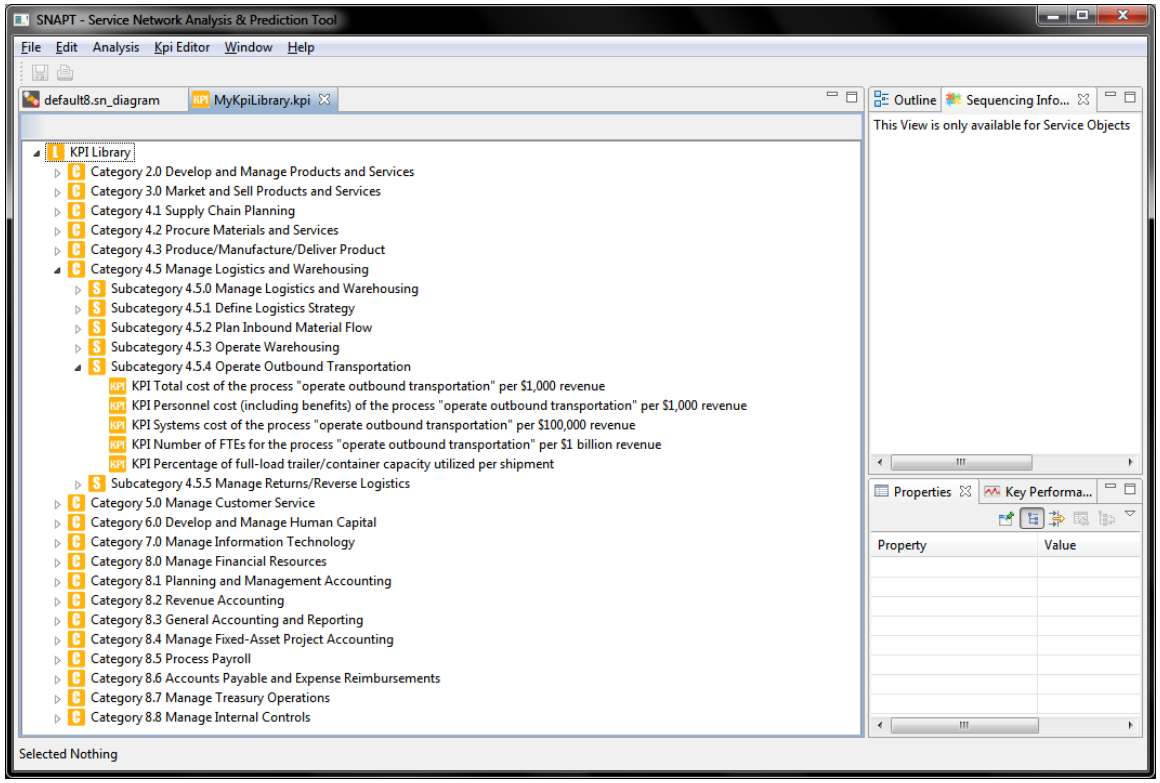


Figure 15: KPIs organized in Categories and Sub-categories

4.5 Import and Export SNAPT Wizard

SNAPT provides a wizard for importing service network semantic model files (XML file) and automatically initializes a diagram to represent them on the canvas. The wizard allows users to select the file to import (Figure 16). To import a service network xml file, select "**File**"→"**Import**" from the Main Menu.

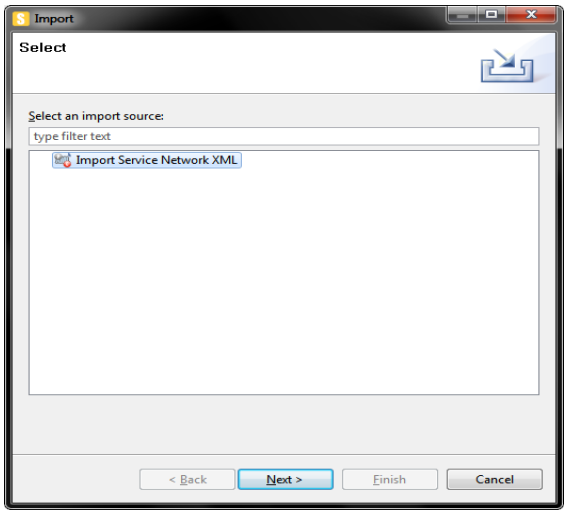


Figure 16: SNAPT Import Wizard

SNAPT also provides an export wizard with two options regarding whether we deal with business processes or service networks. For service network models, two options are supported: **a)** to export a service network model into an XML format and **b)** to convert a service sub-network into a service network. For business processes, the wizard allows the export of business process models compatible with the Eclipse BPMN Modeler or the export of business process models compatible with IBM WebSphere Modeler. The export format of the latter is in XML format.

The wizard is depicted in Figure 17. To export a service network model, select "**File**"→"**Export**" from the Main Menu.

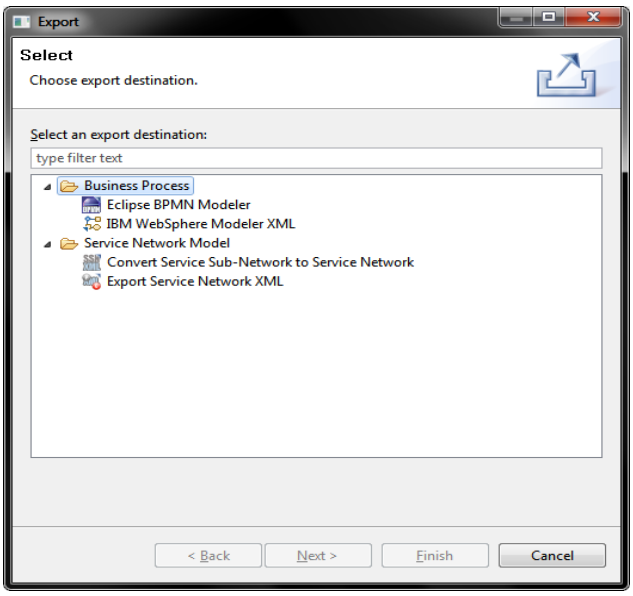


Figure 17: SNAPT's Export Wizard

Special treatment is needed for exporting a service sub-network to a service network. An example of the transformation process is depicted in Figure 18. The business entity “Outside 3” is a service sub-network (the internal structure is shown in part 2), who consumes a service from the business entity “Outside 2”. The exported service network model is included in Part 3 of Figure 18.

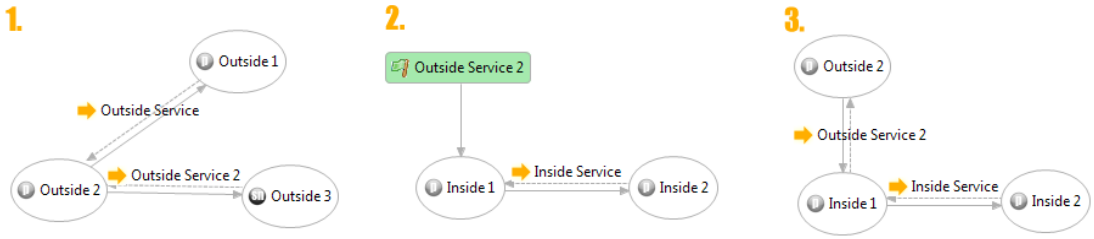


Figure 18: 1) A Service Network 2) The “Outside 3” Service Sub-Network’s internal structure 3) The Service Sub-Network converted to a standalone Service Network

5 From Service Networks to draft Business Process Models

Service networks models are highly abstract in nature and they do not include any operational details, like sequencing of processes, message exchanges and so on. To this extent, proper sequencing information exposing information regarding ordering and composition of services must be set to service network models in order to transform them into business process models.

SNAPT supports a set of transformation rules mapping the service network models to draft forms of collaborative business processes. Two sets of transformation rules are proposed and supported by SNAPT; the first set maps SN models to collaborative business process models according to the BPMN standard supported by the Eclipse BPMN editor; and the second set transforms SN models to the business process model format supported by the IBM WBI Modeler.

This document does not include the transformation rules. In general, the transformation process is based on whether sequencing information exists for the service or not. Thus, we will start describing the concept of sequencing information.

5.1 Managing Sequencing Information in SNAPT

Annotating service network models with sequencing information help us to identify services which are composed of other services. Three gateways are currently supported by SNAPT, which can be nested in any order; the “**Sequential Block**”, the “**AND-Block**” and the “**XOR-Block**”. The “**Sequential Block**” implies that any of its children elements is delivered in series, one after the other. The “**AND-Block**” specifies that its elements should be delivered in parallel. Finally, the “**XOR-Block**” denotes that exclusively one of the elements in the block must be delivered.

"Sequence" is the final element of the sequencing information structure, which corresponds to a specific service and an integer indicating the order in which this service must be delivered.

5.1.1 Adding new Sequencing building blocks

After the user has designed the desired service network in SNAPT the first step is to distinguish the final services that are delivered within the service network. Afterwards, the user must add the sequencing information for all final services and if necessary, for the services that are included in the sequencing information of the final services. The procedure of adding new sequencing information in a service is achieved through the "Sequencing Information" view of SNAPT as depicted in the figure below. The specific view is "activated" whenever a user selects a service from the service network diagram of SNAPT.

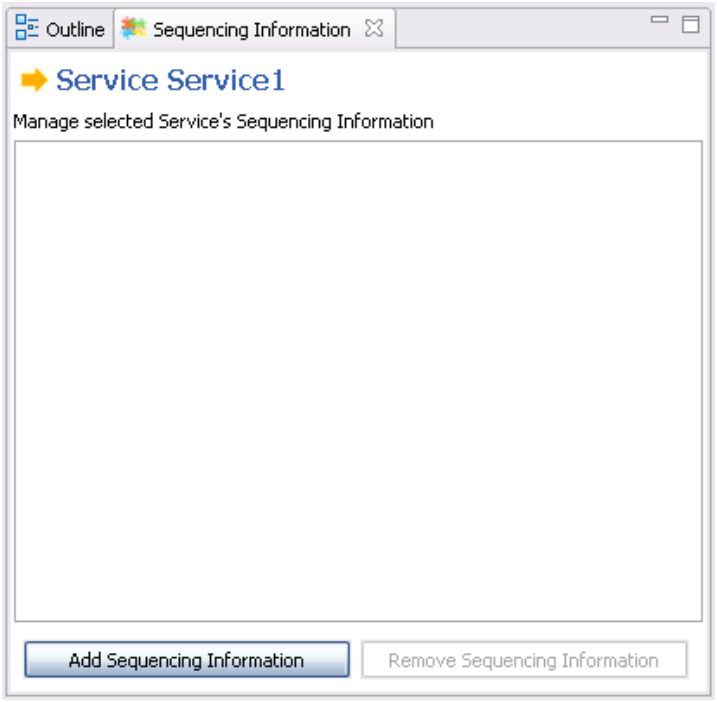
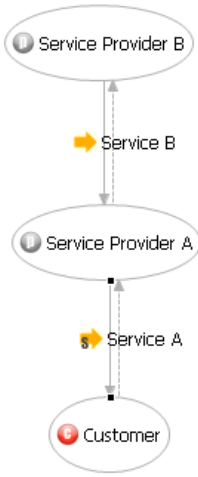
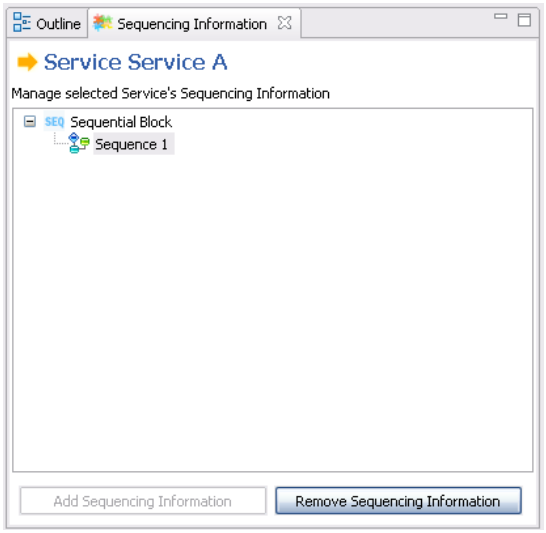
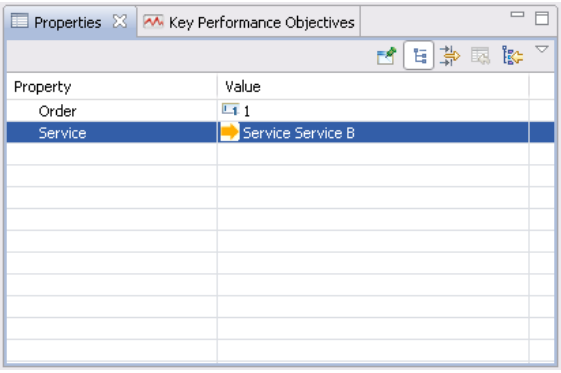


Figure 19: Sequencing Information View

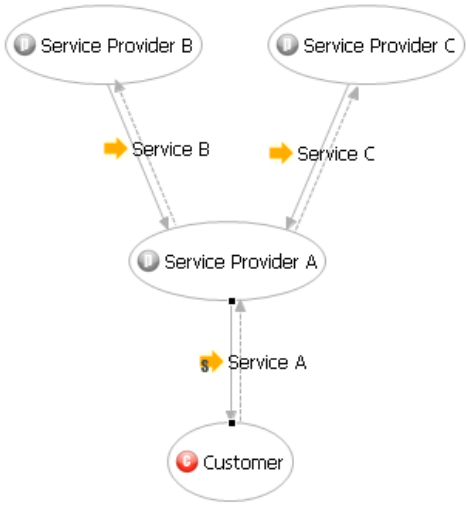
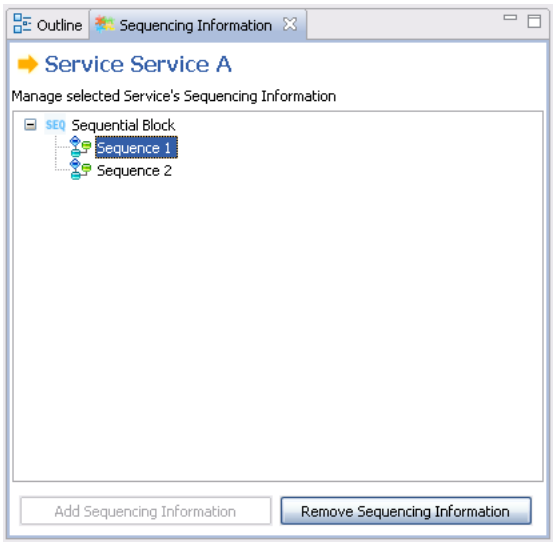
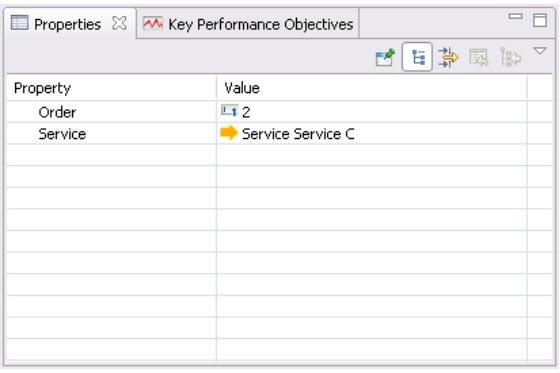
5.1.1.1 Adding new Sequence block

As already stated the Sequence block is the simplest building block within a service's sequencing information. Below we demonstrate how a final service is delivered through the simplest form of sequencing information that can be found in a service network, in three steps.

The first step consists of designing the service network diagram. The screenshot in the right depicts a simple service network as designed in SNAPT: the delivery of service A from service provider A to an end customer, requires the delivery of service B from service provider B to service provider A, which in this case consumes service B before delivering service A to the customer.	
In order to depict the previously described service network, the SNAPT user must enter the following building blocks in the sequencing information of Service A via the Sequencing Information view: the top building block is a *Sequential* block that consists of a *Sequence* block as illustrated in the adjacent figure. This is the simplest case of sequencing information that can be assigned in a single service.	
In the final step, the user must choose the service that is under the Sequence block via the Properties view. The available set of services to choose from include all the incoming services that are consumed by service provider A, in this case only service B. Thus, service B must be delivered to service provider A, in order for the final service A to be delivered to the customer.	

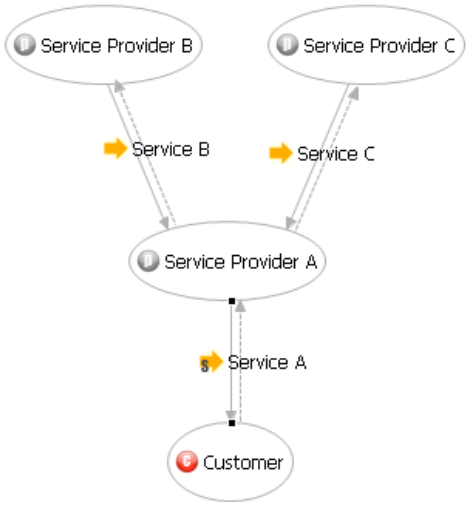
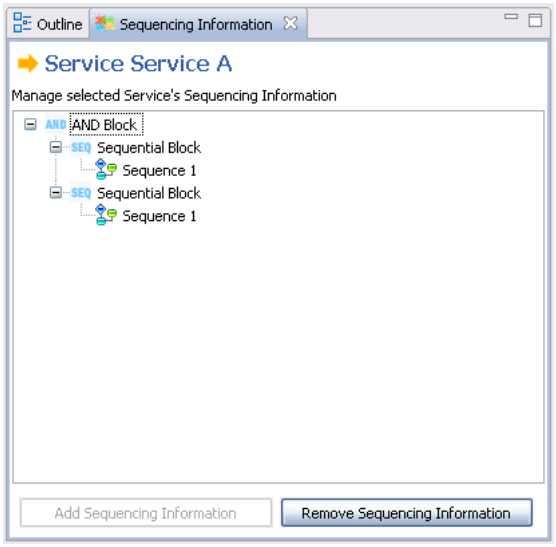
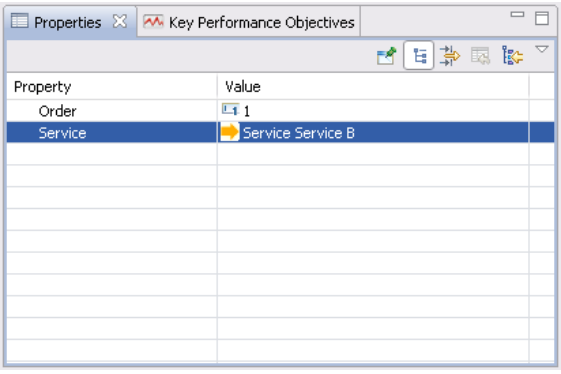
5.1.1.2 Adding new Sequential block

In this case we will study the delivery of a final service that requires the service provider to consume two other services in series, in the order specified by the SNAPT user. The same procedure can be followed for more than two services that are delivered in series.

The service network illustrated in the figure delivers the final service A to the customer. In order for the service provider A to deliver service A, he must first consume service B offered by service provider B and then service C offered by service provider C.	
The sequencing information that must be assigned by the user to service A consists of one *Sequential* block that contains two *Sequence* blocks as shown in the screen-shot. It indicates that the two Sequence blocks are executed in series in the order that is depicted by the number next to the Sequence blocks.	
Finally, the user must associate each Sequence block with service B and service C and determine the order in which they must be delivered to service provider A from the Properties view. In this case service C is delivered after service B and must be assigned with order 2, while service B has order 1.	

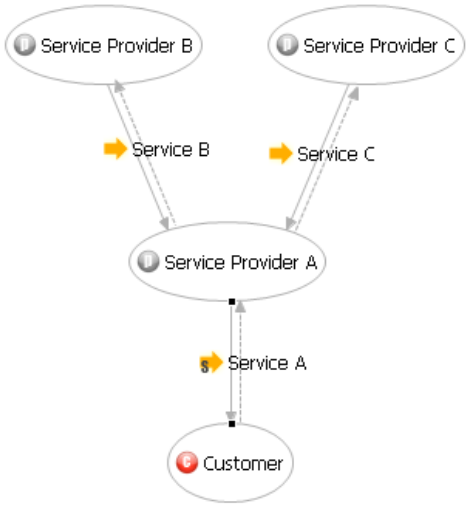
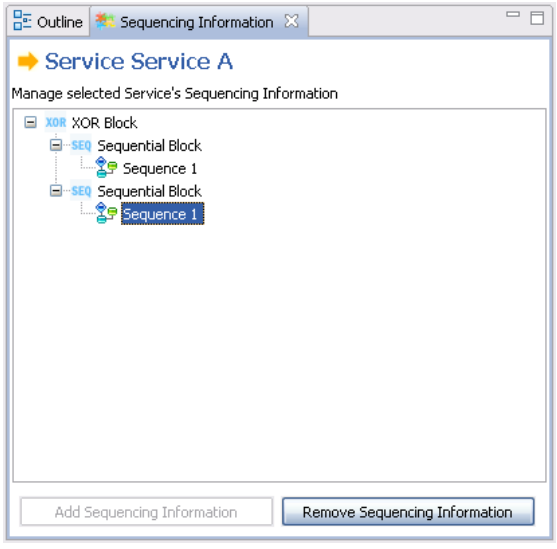
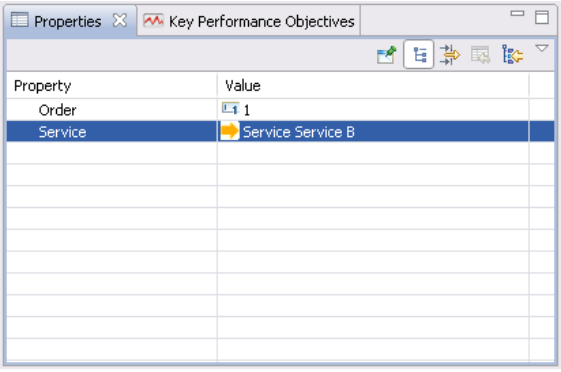
5.1.1.3 Adding new AND block

In this case we will study the delivery of a final service that requires the service provider to consume two other services in parallel. The same procedure can be followed for more than two services that are delivered-consumed in parallel.

The figure on the right illustrates the same service network of the previous case. The difference here is depicted on the way the final service A is delivered to the customer. In order for the service provider A to deliver service A, he must consume in parallel, both service B and service C offered by service provider B and service provider C, respectively.	
The sequencing information of service A has an *AND* block as the top building block that is further decomposed to two *Sequential* blocks, each containing a *Sequence* block. The number indicating the order in which the Sequence blocks are executed is not important in this case, as all blocks contained in AND blocks are executed in parallel.	
Finally, the user must assign from the Properties view the Sequence blocks to service B and service C, without determining the order in which they will be delivered to service provider A.	

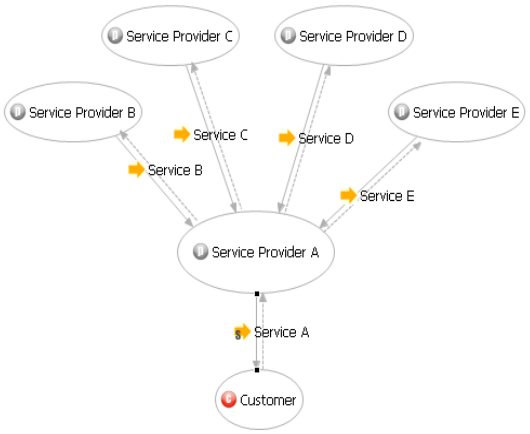
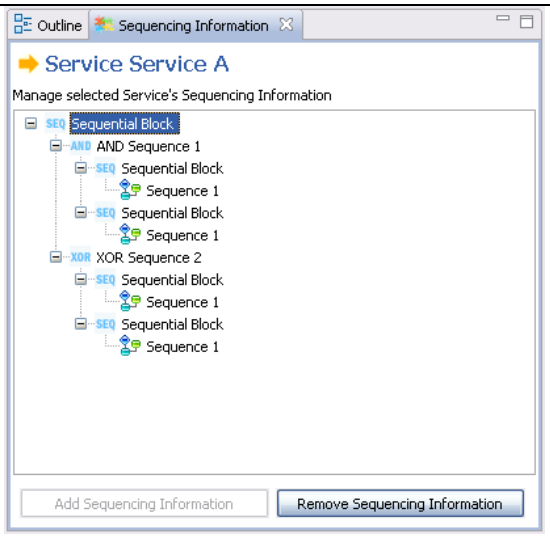
5.1.1.4 Adding new XOR block

Here we examine the delivery of a final service that requires the service provider to consume only one of two possible services that are delivered to the service provider. The same procedure can be followed when the service provider has more than two services to choose from, in order to exclusively consume only one of them.

The figure displays the same service network as in the two previous cases. Here, in order for the service provider A to deliver service A, he must consume either service B or service C offered by service provider B and service provider C, respectively.	
The sequencing information of service A has an *XOR* block as the top building block that is further decomposed to two *Sequential* blocks, each containing a *Sequence* block. The number indicating the order in which the Sequence blocks are executed is not important in this case, as exclusively only one of the blocks contained in XOR blocks is executed.	
Finally, the user must assign from the Properties view the Sequence blocks to service B and service C, without determining the order in which they will be delivered to service provider A.	

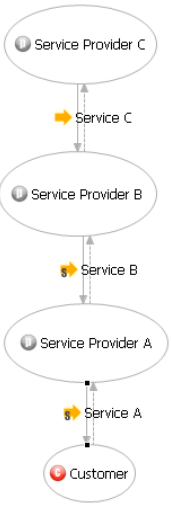
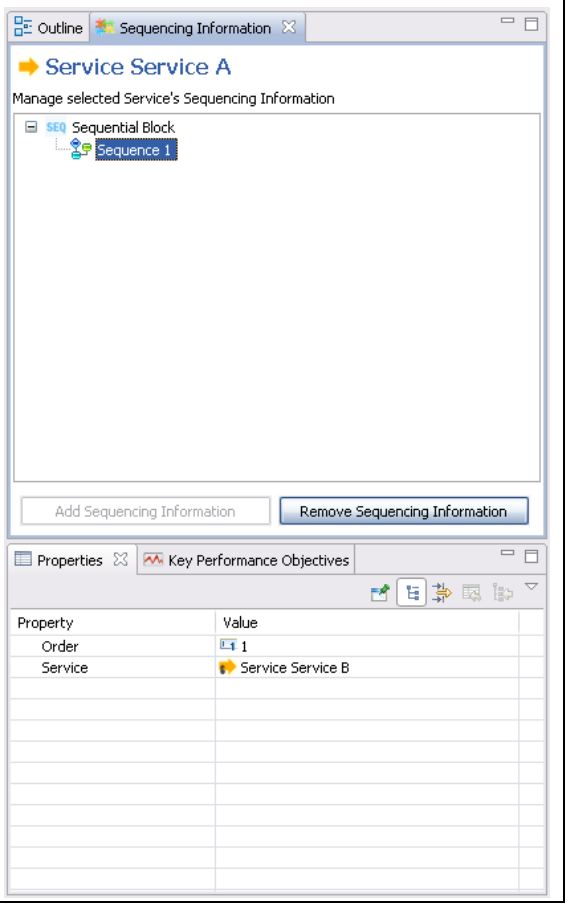
5.1.1.5 Adding new ANDSequence, XORSequence blocks

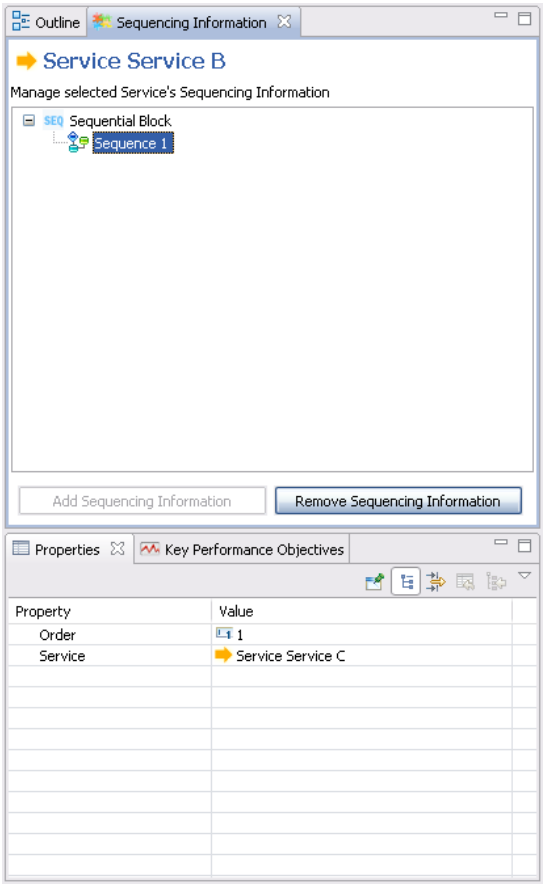
In this case, we examine the delivery of a final service that requires the service provider to consume in a specific way four services offered by four different service providers: he must first consume two services in parallel and then choose one service to consume from two possible services offered. The above sequencing behavior is achieved through the use of ANDSequence and XORSequence blocks.

The service network shown in the figure displays the final service A to the customer with a specific way: in order for the service provider A to deliver service A, he must first consume both service B and service C offered by service provider B and service provider C respectively and afterwards choose to consume either service C from service provider C or service D offered by service provider D.	
The sequencing information that the user must assign to Service A is more complicated: the top building block is a *Sequential* block that is consisted of two blocks an *ANDSequence* and a *XORSequence*. The number next to these blocks indicates that the ANDSequence block is executed before the XORSequence block. Each of the ANDSequence, XORSequence block is decomposed to two *Sequence* blocks, same as the AND, XOR blocks are described in section 1.3 and 1.4 of the appendix, respectively. The Sequence blocks of the ANDSequence are associated with services B and C that must be consumed in parallel, while the Sequence blocks of the XORSequence are associated with services D and E, that exclusively one of them will be consumed by service provider A.	

5.1.1.6 Adding sequencing information in multiple services

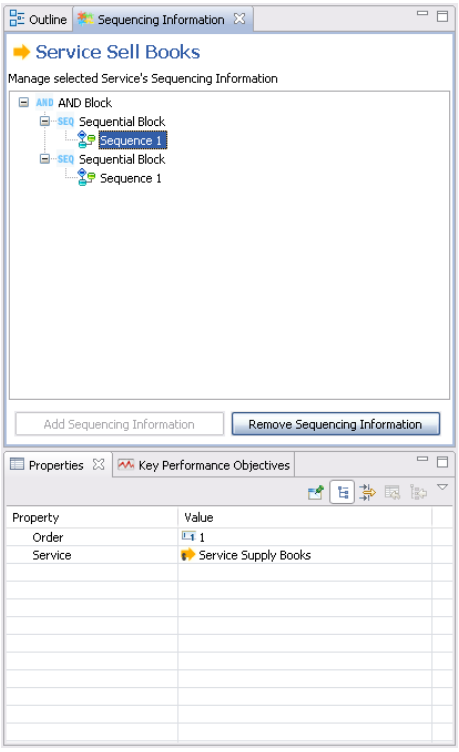
In this case, we examine the delivery of a final service that requires several service providers to consume services until the final service becomes available to the customer. We will demonstrate the consumption of two services by different service providers, but the same procedure can be followed for multiple services consumed by several service providers in many possible ways.

The service network of the figure delivers the final service A to the customer. The delivery of service A requires the service provider A to consume service B offered by the service provider B, which in turn requires the consumption of service C from the service provider B. Thus, the SNAPT user needs to assign sequencing information to two different services: service A and service B as described below.	
The sequencing information that the user must assign to Service A consists of a *Sequential* block that contains a *Sequence* block, which is associated with the delivery of service B offered by service provider B. It indicates that service B must be consumed by service provider A in order for him to deliver service A to the customer.	

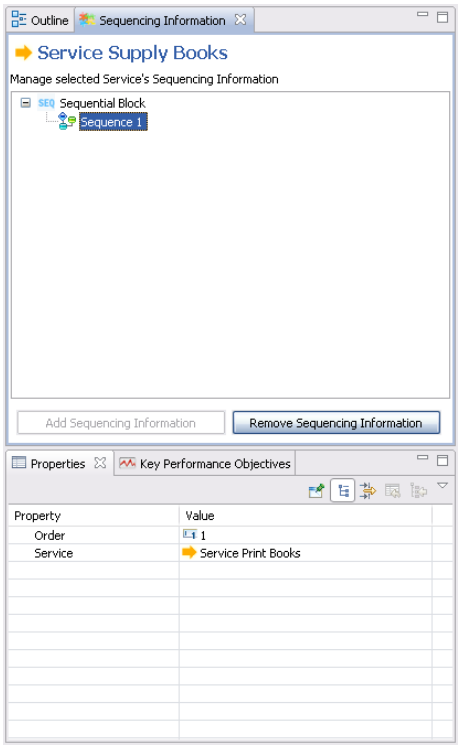
The sequencing information that the user must assign to service B is similar to the one assigned for service A. It consists of a *Sequential* block that contains a *Sequence* block, which is associated with the delivery of service C offered by service provider C. It indicates that service C must be consumed by service provider B in order for him to deliver service B to the service provider A.	

5.1.2 Adding Sequencing Information in a real-world Service Network

In this section, we present how to add the appropriate sequencing information in a simplified real-world case study. The case study discussed is based on the Amazon's service network that delivers the final service of selling books to the end customers.

As depicted in the figure the simplified Amazon's service network consists of four different service providers and the end customers that consume the final service of selling books provided by the Amazon. The Amazon needs to consume both the *Supply Books* service offered by the Book Warehouse and the *Website Host & Support* service offered by the Web Hosting Provider in order to deliver the *Sell Books* service. The Book Warehouse must consume the *Print Books* service offered by the Amazon Printing Press in order to provide the *Supply Books* service.	
The user must assign the following sequencing information to the *Sell Books* service as described in section 1.3 of the appendix B. The *Sell Books* service requires the parallel consumption of two services offered by two different service providers. Thus, its sequencing information consists of an *AND* block that is decomposed to two *Sequence* blocks. Each Sequence block is associated to the *Supply Books* service offered by the Book Warehouse and the *Website Host & Support* service offered by the Web Hosting Provider respectively, as they form the composition of the *Sell Books* service offered by the Amazon.	

Another service that needs to be assigned with the appropriate sequencing information by the SNAPT user is the *Supply Books* service offered by the Book Warehouse. In order for this service to be provided to the Amazon, the books must be printed from the Amazon Printing Press, which is a service consumed by the Book Warehouse. Thus, the sequencing information of the *Supply Books* service is assigned according to the 1.1 section of this appendix. It is the simplest form of sequencing information that is associated with the single consumption of the *Print Books* service offered by the Amazon Printing Press in order for the Book Warehouse to be enabled to offer the *Supply Books* service to Amazon.



5.2 From Service Network Models to IBM WebSphere Business Modeler

For each service with no sequencing information defined for it, a generic process flow is created containing the following: two business items named “Service request” and Service Item”, which correspond to the data flows; a sub-process corresponding to the Service assigned to the source business entity organization unit; two tasks assigned to the organization unit of the target business entity that starts and ends the process; and finally two additional tasks for the source business entity for receiving the request, process the Service and send the response back. depicts the process flow as described above.

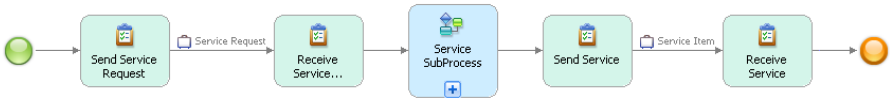


Figure 20: Mapping a single service delivery to a generic workflow in WBM

For more information, refer to the hyperlinks introduced in Section 1.3.

5.3 From Service Network Model to Eclipse BPMN Editor Process Models

For each service with no sequencing information defined for it, a new BPMN diagram is created depicting a generic workflow consisting of the two pools, corresponding to the source and target

business entity, connected with message exchanges. The generic workflow is depicted in Figure 21.

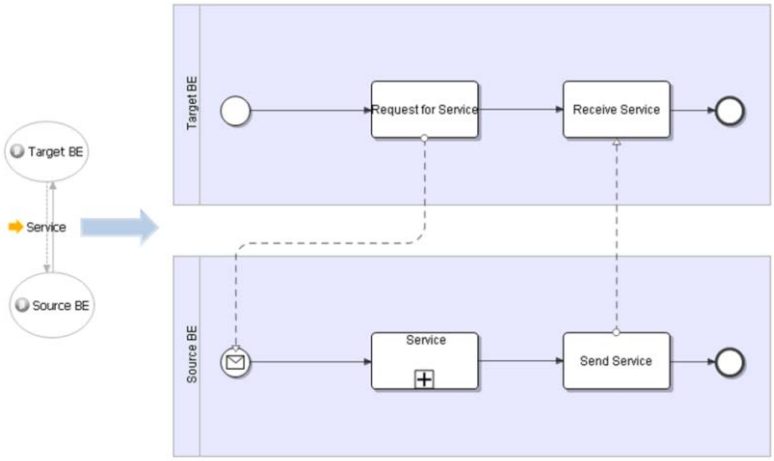


Figure 21: Mapping a single service delivery to a generic BPMN workflow

If the service contains sequencing information, then the service's sequencing information is mapped to both generic and complex workflows, depending on the service or the sequencing gateways that is composed of. For more information, refer to the hyperlinks introduced in Section 1.3.

6 Cost-Revenue Analysis

Service Network's analysis is closely related to the *value* of the network. SNAPT encompasses a simple model for exploring the vitality of a service within a service network.

In brief, each service delivery generates revenues. Service revenues are costs for the service consumer and revenues for the service provider. As a result, the profit of any Business Entity is calculated as follows:

$$\mathbf{Profit = \Sigma(IncomingServiceRevenue) - \Sigma(OutgoingServiceCost),}$$

where *IncomingServiceRevenue* and *OutgoingServiceRevenue* refer to the revenues deriving from the business entity's consumed and offered services respectively.

6.1 Generating Profitability Sheets

SNAPT allows the generation of profitability sheets from a service network model in terms of Excel worksheets. These worksheets provide an overview of the cost-revenue calculations within the service network. Separate excel sheets are generated to display each business entity's costs and revenues; an additional sheet is also used to summarize the costs / revenues for the entire network. Within the excel file, formulas are assigned to appropriate cells, connecting service

revenues with business entities' total costs and total revenues. That's way, when a service revenue cell is modified, the changes automatically affect the costs and revenues of the business entities consuming and providing the service respectively.

For generating the profitability sheets, you have to select "**Analysis→Generate Quantitative Report**" from the Main Menu.

7 Qualitative Analysis in SNAPT

SNAPT supports an approach for transforming the service networks models to Verna Allee's value networks model and carry out a qualitative analysis on Service Networks. Thus, the Value Network Analysis (VNA) is applied to service networks. The results of this analysis are displayed through comprehensive indicator reports generated by SNAPT. We used the Eclipse Business Information Reporting Tools (BIRT) project to generate the report template for showing the results of the analysis and lastly we implemented a wizard to enable the SNAPT user to assign the appropriate inputs to the value network model that will be the basis of the VNA and the parameters to the report template.

In order to perform the qualitative analysis in SNAPT, you have to select "**Analysis→ Generate Qualitative Report (Verna Allee)**" from the Main Menu. Next step is to select the sub-networks, if they exist.

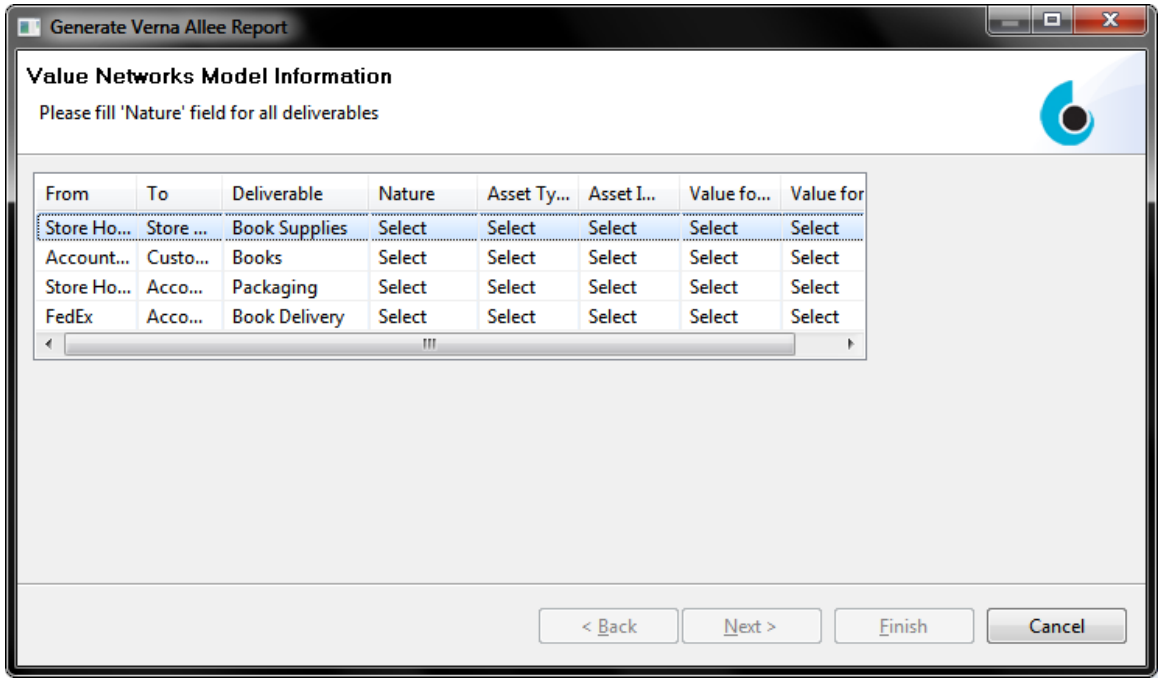


Figure 22: Second page of the Qualitative Analysis Wizard

Then, you have to fill the fields as depicted in Figure 22. SNAPT supports the following nine indicators for the qualitative analysis: resilience, value network, brand management-perceived value, asset management-asset impact, asset management-cost/benefit, reciprocity, risk, structure and value, and stability. Firstly the nature of the transaction must be defined, meaning whether the transaction offers a tangible or an intangible deliverable to the receiver. Moreover, every transaction contributes directly to a specific asset type of the value network, which must be chosen from the set of pre-defined asset types that includes financial assets, business relationships, competence and internal structure. Next the user must answer for every transaction whether it has a positive or negative impact on the previously defined asset. Lastly, the user must define the perceived value of the deliverable for the sender and the receiver, answering the question of whether each deliverable really provides value to the corresponding participant.

Based on the information provided by the user in the second wizard page, the qualitative analysis can now be applied to the value network. In the last wizard page the user sets the file path of the report generated by the BIRT engine in PDF. The report will contain the results of the qualitative analysis based on the template as defined by SNAPT. For more information regarding templates and the generated report refer to the links provided at Section 1.3.

8 From Service Network Models to Value Networks

Current work on transforming service network models to value network models is not included in Version 1.0 of the tool.

9 Appendix A – Case Study: Amazon

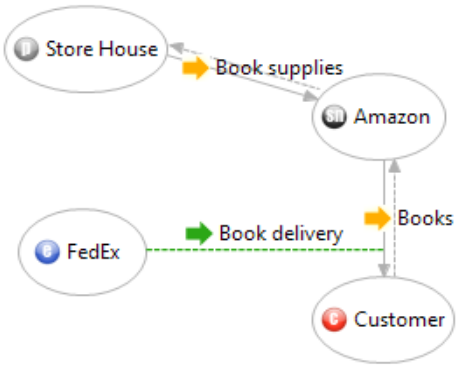


Figure 23: Amazon Service Network Model

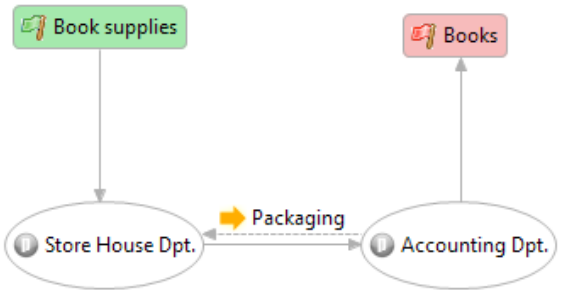


Figure 24: Amazon Sub-Network

Σημειώματα

Σημείωμα αναφοράς

Σημείωμα Αδειοδότησης

Διατήρηση Σημειωμάτων

Οποιαδήποτε αναπαραγωγή ή διασκευή του υλικού θα πρέπει να συμπεριλαμβάνει:

- το Σημείωμα Αναφοράς
- το Σημείωμα Αδειοδότησης
- τη δήλωση Διατήρησης Σημειωμάτων
- το Σημείωμα Χρήσης Έργων Τρίτων (εφόσον υπάρχει)

μαζί με τους συνοδευόμενους υπερσυνδέσμους.

Χρηματοδότηση

- Το παρόν εκπαιδευτικό υλικό έχει αναπτυχθεί στα πλαίσια του εκπαιδευτικού έργου του διδάσκοντα.
- Το έργο «Ανοικτά Ακαδημαϊκά Μαθήματα στο Πανεπιστήμιο Κρήτης» έχει χρηματοδοτήσει μόνο τη αναδιαμόρφωση του εκπαιδευτικού υλικού.
- Το έργο υλοποιείται στο πλαίσιο του Επιχειρησιακού Προγράμματος «Εκπαίδευση και Δια Βίου Μάθηση» και συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση (Ευρωπαϊκό Κοινωνικό Ταμείο) και από εθνικούς πόρους.