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and resource management in Future  
internet enabled Innovation CloudS**

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## Deliverable D7.3

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customization and case management  
modelling capabilities**

**Work Package 7**

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## Executive Summary

This document reports on the second year's increment in the development of tool support for NEFFICS, as part of WP7. It demonstrates progress of development of tool support for integrated modelling in three distinct areas:

- Value Delivery Modelling
- Social Collaboration
- Entity Modelling

A series of video fragments is provided to demonstrate results in detail.

Development will progress further and will also focus on other related subjects, such as tool support for Case Management, during the third and last year of NEFFICS.

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# 1 Introduction

Within NEFFICS, WP7 focuses on advancing the Cordys Business Operations Platform (BOP) towards a single-integrated platform, available as a Platform as a Service (PaaS), in which all relevant models, including business (value) analysis and automation models, can be used in an integrated fashion. The goal is to ensure that modelling and development are made as easy and productive as possible, by abstracting from the technical details of SOA and resolving the fragmentation and lack of semantics that is caused by web-services. The platform is meant to be the platform of choice that serves collaborative analysis, design and development between business analysts, citizen developers and professional developers, due to the adoption of open standards and main stream and open source development frameworks, as well as by application of Social Collaboration technologies.

Several parallel and converging streams of research and implementation effort are required, in order to achieve this major advancement. NEFFICS D7.2 (2011) distinguished the following streams, and demonstrated the first year's increment on several of them:

- Value Delivery Modelling
- Social Collaboration
- Entity Modelling, including support for tenant-specific application customization
- Case Management

For information about backgrounds of these subjects, solution directions and main design choices, the reader should refer to NEFFICS D7.1 (2011) and NEFFICS D7.2 (2011).

This document demonstrates the results of the second year's increment of the following streams:

- Value Delivery Modelling
- Social Collaboration
- Entity Modelling

Application of Case Management as well as potential advancement of tool support for Case Management are subject of research during the third year of NEFFICS, and thus Case Management will not be covered in this document.

Chapter 2, 3 and 4 will report on the development of tool support for respectively Value Delivery Modelling, Social Collaboration and Entity Modelling.

Chapter 5 will provide a summary and highlights areas for next developments during the Third and last year of NEFFICS.

The Appendix lists video fragments to demonstrate the second year results in these three streams.

## 2 Tool support for Value Delivery Modelling

NEFFICS D7.2 (2011) did report on the first year’s implementation of VDML. Meanwhile, the VDML concept and modelling language evolved further. A high-level abstraction of the VDML metamodel, as specified in NEFFICS D3.3 – Part B (2012), is provided in Figure 1. NEFFICS D3.3 – Part A (2012) provides a detailed explanation of the concepts and their relationships in this diagram.

The shaded part of the diagram indicates the scope of VDML for which an implementation of modelling support is now available in the NEFFICS project. Support for identification, measurement and analysis of value, as well as identification and analysis of value propositions, including measurements as part of value propositions, is subject of implementation during the third year of NEFFICS.

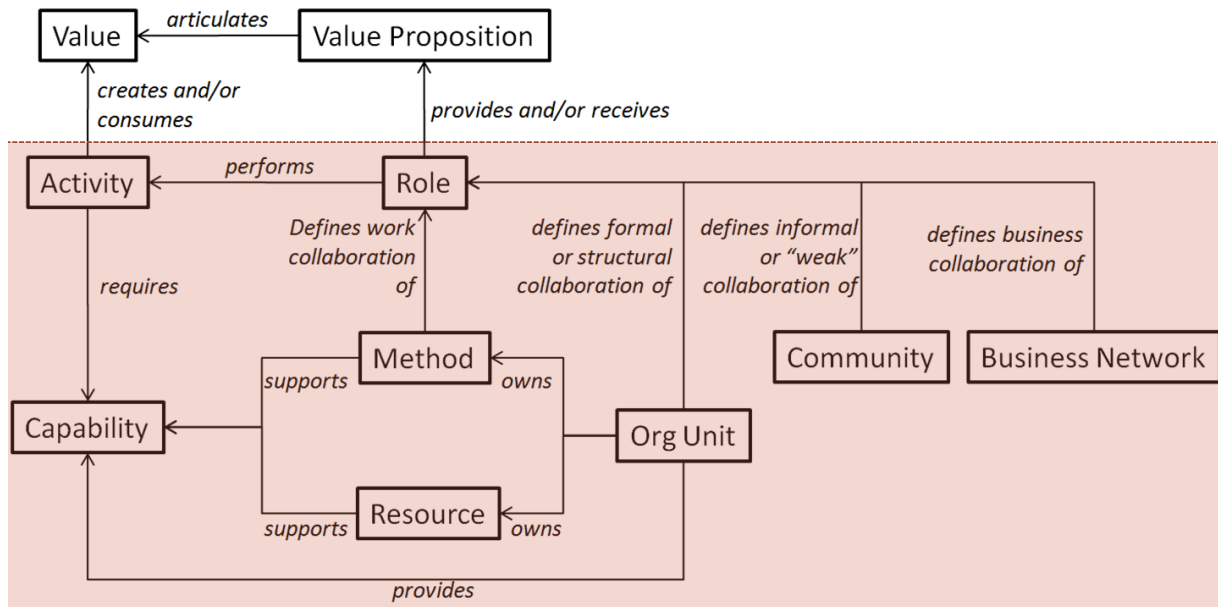


Figure 1: High-level VDML ontology

Figure 2 represent VDML diagrams and navigable relationships between them. The reader can refer to NEFFICS D3.3 – Part A (2012) for use case-based explanation and demonstration of these diagrams.

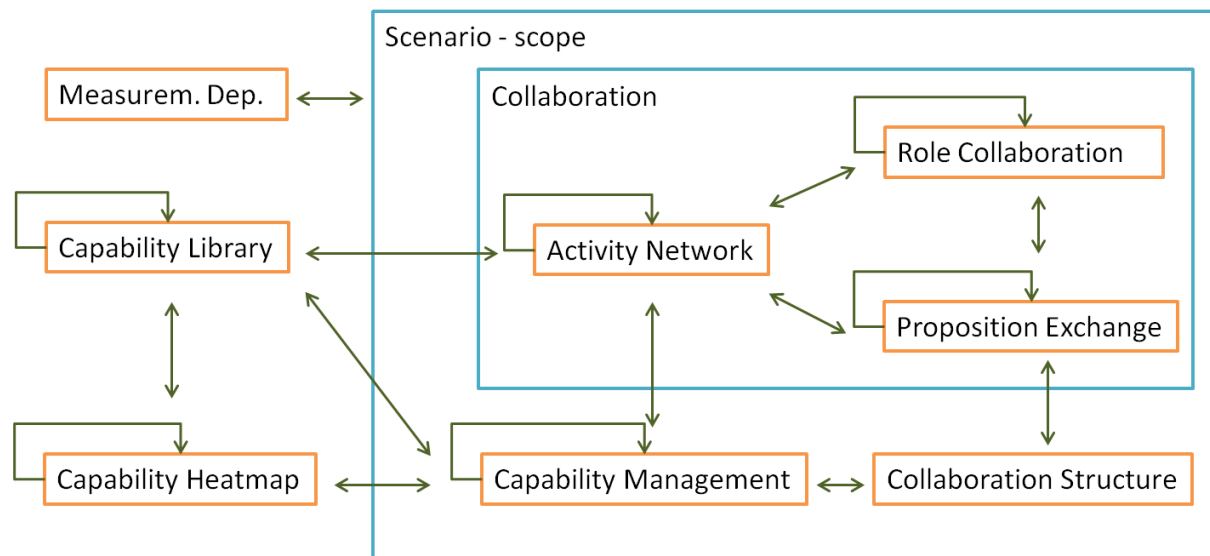


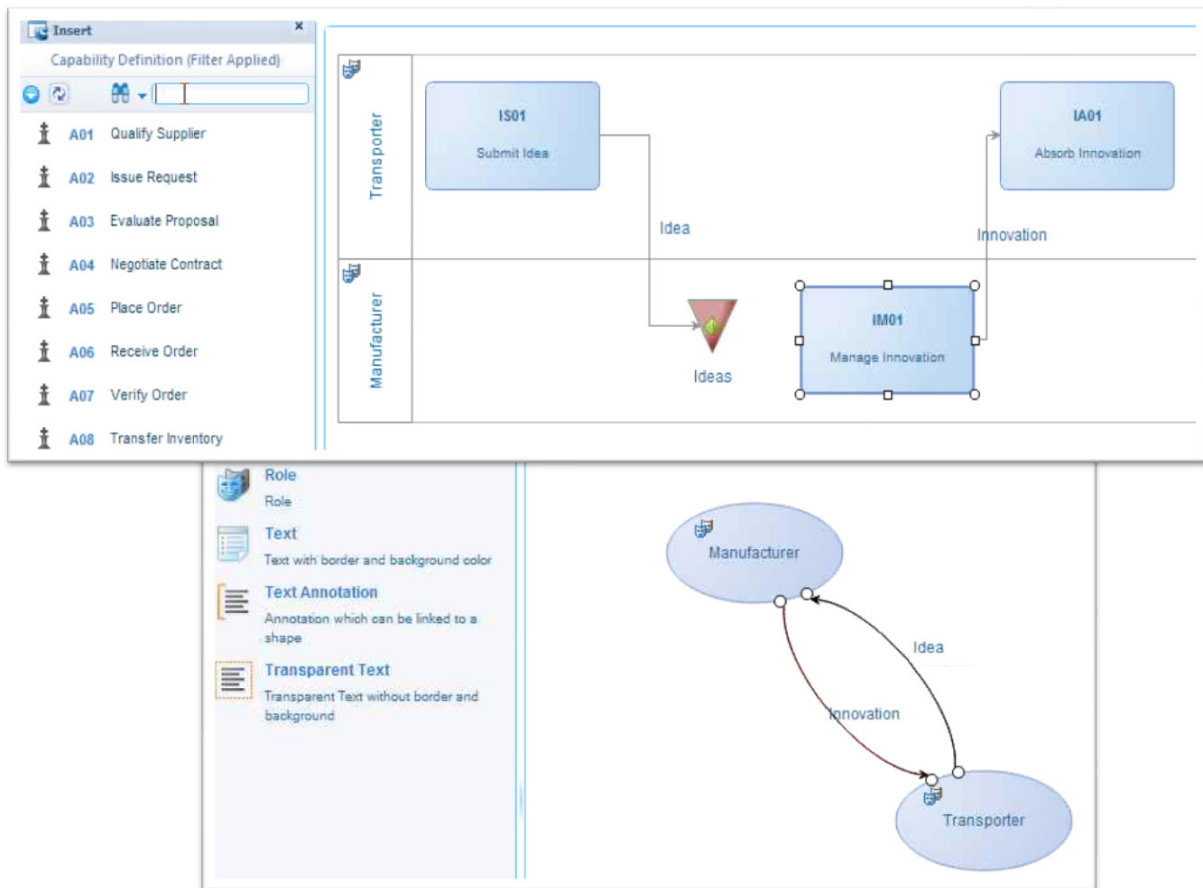
Figure 2: VDML diagrams and relationships between them

The following diagrams have been implemented so-far:

- Activity network diagram

- Role collaboration diagram
- Collaboration structure diagram
- Capability Management diagram

Activity network diagram and role collaboration diagram provide two synchronized views on the same collaboration model. Figure 3 provides an impression of the implementation of these two diagrams. It shows how these two diagrams provide synchronized views on the same underlying collaboration: they represent the same roles, as well as the deliverables that are exchanged between these roles. The underlying collaboration is the XTrailer business network collaboration, as analyzed in NEFFICS D3.3 – Part A (2012).



**Figure 3: Multiple views on a collaboration**

Capability library support has been implemented, but a graphical capability library diagram as well as graphical representation of a capability “heat map” have not yet been implemented. Implementation of measurement dependency diagrams will be undertaken during the third year of NEFFICS as well.

Within the scope of what has been implemented so-far, implementation effort has focused in particular on the following:

- Migration to a radically improved and VDMML submission-compliant meta-model.
- Role collaboration modeling (supported by role collaboration diagram)
- Model capability offers and of how organizations manage their capabilities (supported by capability management diagram)
- Extension of modeling of activities with support for discovery of providers of capabilities (as required by activities)
- “Delegation” of activity-work to capability methods that support providers’ capability offers, whereby it is also possible to specify role assignment to resources, within these capability methods, in the context of a particular delegation.
- Definition of use of resources (by activities) that support the providers’ capability offers.

- Various wizards, that guide the user through modeling procedures in consistent ways, and that also leverage knowledge as contained in libraries to further assist the user.
- Aspects of organization alignment (supported by collaboration structure diagram).
- Scenario-based analysis support. Support for this is yet preliminary and need to be extended further.

Section 7.1 refers to video fragments that demonstrate the current state of implementation of VDML modeling support.

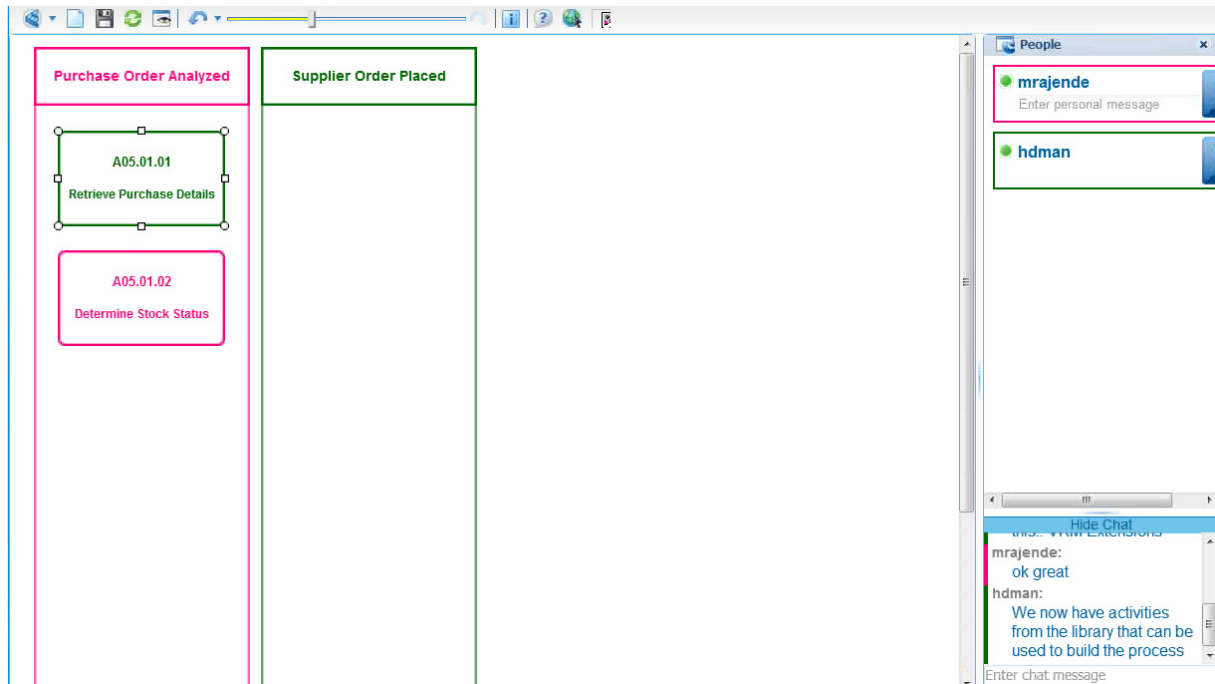


### 3 Tool support for Social Collaboration

Social-collaborative modeling has been applied to several types of models, amongst others, BPMN models and VDML models. Section 7.2 refers to video fragments that demonstrate its application to creating VDML models.

Note that, according to NEFFICS DoW (2010), it was originally intended to apply “Google Wave” as foundation for Social Collaboration. As “Google Wave” was taken off the market soon after NEFFICS started, it was decided to undertake a “native” implementation of similar functionality in the context of WP7.

Figure 4 provides an impression of what has been implemented and shows Social Collaboration in the context of VDML-based modeling.



**Figure 4: Social-collaborative modelling, applied to VDML-based modelling**

Implementation effort has focused in particular on the following:

- Support for inviting collaborators in the context of the model.
- Possibility to switch between Social Collaboration mode and “normal” mode of modeling, so that it is possible to only share the model collaboratively, during phases where it is required.
- Involving a collaborator with or without model editing rights.
- Possibility to apply social collaborative modeling for a model that is exposed via multiple views (synchronized diagrams), like the activity network diagram and role collaboration diagram in VDML.

## 4 Tool support for Entity Modelling

NEFFICS D7.2 (2011) provides the motivation, as well as main design directions, for implementing integrated Entity Modeling support as part of BOP. It also provides an initial implementation of it.

Section 7.3 refers to video fragments that demonstrate the current state of implementation of Entity Modeling support.

Figure 5 provides an impression of how Entities can be implemented and extended in code, whereby model and code are kept synchronized in both directions.

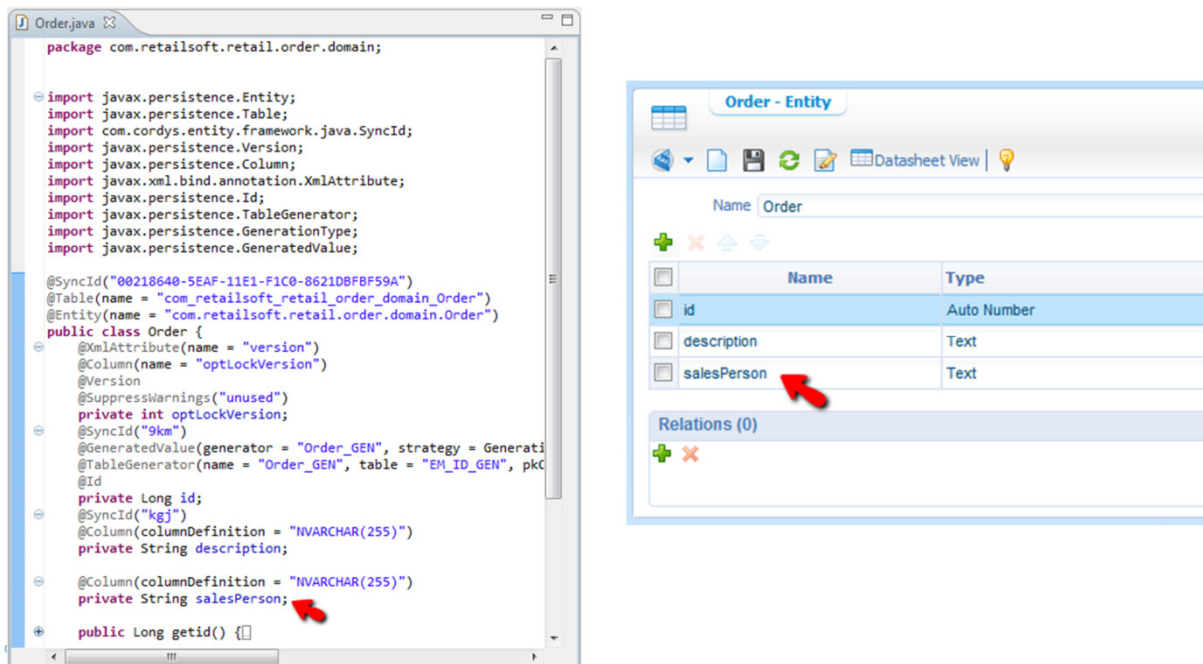


Figure 5: Entity Model versus code

The following has been achieved, in further advancing Entity Modeling support, during the second year of NEFFICS:

- The prototype, as was demonstrated as part of NEFFICS D7.2 (2011), has been transformed into an integrated Entity Modeler, and its related runtime framework to use Entity instances.
- The Entity Modeler enables a business analyst/solution designer to define an Entity, including its attributes and relations to other Entities. The runtime takes care of reading and writing Entity instances into a persistent store.
- Persistent storage is based on the Java Persistence API (JPA) standard and is tenant-aware, i.e. a single runtime can handle Entities for multiple tenants. The reader may refer to NEFFICS D7.2 (2011) for explanation and broader discussion of this.
- Java code can be generated for Entities. A Java developer can add business logic in Java code; this code is used within the runtime environment.
- The Entity Modeler provides web-services to access Entities. These web-services can be used in other Cordys BOP components (form modeler, business process modeler, etc).

## 5 Conclusions

### 5.1 Summary of results

Tool support has been advanced and extended on three streams of research and implementation effort, in the context of WP7: Value Delivery Modelling, Social Collaboration and Entity Modelling.

Implementation results from these streams have not yet been integrated.

Implementation of Value Delivery Modelling support is compliant with the VDML specification as will be submitted to the OMG in November 2012.

Within NEFFICS, use case partner Vlastuin has made significant progress in validation and applying Value Delivery Modelling support (see NEFFICS D1.4 (2012)). Instantaneous feedback from this use case partner has resulted into improvement of the implementation in various areas.

### 5.2 Next steps and future work

The following subsections will indicate next steps and future work per each of the streams of research and implementation effort in WP7:

- Value Delivery Modelling
- Social Collaboration
- Entity Modelling
- Case Management

#### 5.2.1 Further advancement of Value Delivery modelling support

As discussed in NEFFICS D3.3 – Part A (2012), VDML depends on and is integrated with another OMG modeling standard, called “Structured Metrics Meta-model” (SMM). The SMM-based measurement framework is integrated into VDML, in order to support measurement of performance and value. SMM is currently undergoing a revision to best facilitate this integration, and to optionally tune its concepts to support measurement concepts as required in VDML. NEFFICS initiated this revision and actively contributes to it.

Implementation of an SMM-based measurement framework, as integrated with the VDML implementation, will be undertaken during the third year of NEFFICS, along with implementation of the concepts of Value and Value Proposition. Diagrams that have not yet been implemented, such as the Value Proposition Exchange diagram and the Measurement Dependencies diagram will be implemented as well.

Modeling user support needs to be extended in many ways, including support for impact analysis, comparisons, and model versioning.

As NEFFICS D3.3 – Part A (2012) suggests, VDML models are an adequate basis for discovery of processes and services, and so, derivation of and alignment with process models, service models, and other artefacts that are relevant in the context of that, such as Entities, Business Rules, User Interfaces, etc. For this reason, several elements in VDML will be associated with meta-model classes that represent these artefacts. These associations are not normatively specified by the VDML specification, but are essential in an implementation. Implementation will be undertaken during the third year of NEFFICS. In close relation to this, it is also relevant to research possibilities for transformation of parts of VDML models, in particular capability methods, to other models, in particular BPMN process models and CMMN case models. Section 7.2 refers to a video fragment that demonstrates an early prototype of transformation to BPMN process model. Additional implementation effort is required to make this compliant with the current VDML meta-model, and to provide a more robust transformation. In order to provide a transformation to a CMMN case model, more research is required. As both VDML and CMMN-based modelling support will be applied in WP1, being the work package of use case partner Vlastuin, it is expected that validation and application efforts in that context will deliver further insights into patterns of transformation from VDML models to CMMN models.

One of the intended integrations is to integrate elements of VDML with Entities (in Entity models). For instance, a deliverable definition that defines information, e.g. “Sales Order”, might be associated with an Entity, which defines its information structure.

The graphical notation that has so-far been implemented is not completely compliant with the notation that is meant to be normative in VDML (see NEFFICS D3.3 – Part A (2012)). Additional implementation effort is required to make the notation compliant.

### **5.2.2 Further advancement of Social Collaboration support**

The framework that supports Social Collaboration will need to be completed and integrated with modellers for the various types of models. Regarding VDML, social collaborative modelling should be enabled for VDML-based modelling based on the current version of the metamodel.

In the context of NEFFICS, and in particular in the context of supporting leadership and management of business (model) innovation, it has to be investigated how communities as supported by Induct, in the context of WP6, can be aligned and integrated with community support as provided by the Social Collaboration framework in Cordys BOP.

### **5.2.3 Further advancement of Entity Modelling support**

Integration of Entity Modelling with other areas of modelling, such as user interface modelling, business process modelling, case modelling and Value Delivery Modelling, has to be completed and advanced further. It is intended to not only integrate based on web-services that represent Entities and expose Entity logic, but to integrate directly at the model level, so that business analysts and solution designers need no longer work with web-services directly. The reader might refer NEFFICS D7.2 (2011), for the motivation of this, and the explanation of how this will lead to significantly higher levels of modelling and design productivity and ease of use for so-called “citizen developers”.

Additional research is required to investigate how Entities can be implemented by “foreign” webservices, such as web-services that are provided by “given” enterprise applications.

### **5.2.4 Further advancement of Case Management modelling support**

This document did not deal with the subject of Case Management. According to NEFFICS DoW (2010), application and advancement of Case Management is part of NEFFICS. NEFFICS D5.4 – Part A (2012) suggests how use case(s) in NEFFICS, such as subject of WP1, will apply Case Management.

Application will start based on the existing implementation of Case Management in Cordys BOP. In the context of WP7 it will be demonstrated to which extent this implementation is compliant with the CMMN specification as contained in NEFFICS D5.4 – Part B (2012). Use case partner feedback will provide the opportunity to advance the state of implementation, into a direction that leads to a higher level of compliance with the specification.

As part of this effort, it is intended to based the information-part of CMMN (“case file”) on Entity models. It will be considered to integrate Case Management with Social Collaboration also.

## 6 References

BPMN, *Business Process Model and Notation*, Version 2.0, Object Management Group, Release Date: January 2011, <http://www.omg.org/spec/BPMN/2.0/> .

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NEFFICS D1.3, *Initial Release of the Virtual Extended Factory*, April 2011.

NEFFICS D1.4, *Second Release of the Virtual Extended Factory*, September, 2012 .

NEFFICS D3.3 – Part A, *Value Delivery Model and Methods*, June 2012.

NEFFICS D3.3 – Part B, *Value Delivery Modeling Language (VDML)*, Version 0.2, Object Management Group, Submission for May 21, 2012.

NEFFICS D4.1, *Baseline for Networked Innovation Models*, April 2011.

NEFFICS D4.3, *Models for Network-based Open Business Model Innovation*, June 2012.

NEFFICS D5.4 – Part B, *Case Management Model and Notation (CMMN)*, Version 1.0, Object Management Group, Submission for November 12, 2012.

NEFFICS D7.1, *Base-line implementations of use case applications and requirements for platform extension*, June, 2011.

NEFFICS D7.2, *Platforms extended with advanced business modelling support*, September, 2011.

NEFFICS D7.4, *Extension of platforms to support continuous evolution and innovation of networked enterprises*, Forthcoming, Due September 2013.

SMM, *Software Metrics Meta-Model*, Version 1.0, Object Management Group, Release Date: January 2012, <http://www.omg.org/spec/SMM/1.0/> .

SoaML, *SOA Modeling Language*, Version 1.0, Release Date: March 2012, <http://www.omg.org/spec/SoaML/1.0/> .

UML, *Unified Modeling Language, Superstructure*, Version 2.4.1, Object Management Group, Release Date: August 2011, <http://www.omg.org/spec/UML/2.4.1/Superstructure/PDF/> .

## 7 Appendix – Video fragments

### 7.1 Value Delivery modeling video fragments

These fragments are based on the VDML use case as presented in detail in NEFFICS D3.3 – Part A (2012). These fragments all highlight fragments of VDML models in the context of this use case. Several fragments also demonstrate how the tool support the user in modeling, for instance by making use of wizards and guidance based on libraries of standardized model elements. Several of these fragments are partly overlapping with each other. The set of fragments together expose the complete state of development of VDML modeling support.

These fragments are provided in “.wrf” format. WebEx Player, which is free downloadable, should be used to run them.

### 7.2 Social Collaboration video fragments

These fragments show how VDML models can be created collaboratively, whereby the VDML modeling environment is enabled for social-collaborative modeling.

The version of the VDML modeling environment dates back to May 2012, and is older than the version of the VDML modeling environment that is exposed by the fragments in 7.1 therefore. This is due to the fact, that currently, two separate branches in the development environment are maintained in parallel. It is intended to ingrate them during the third year of NEFFICS.

One fragment also shows an early prototype of transformation from a part of a VDML model into a BPMN process model. This transformation will be improved during the third year of NEFFICS also.

These fragments are also provided in “.wrf” format. WebEx Player, which is free downloadable, should be used to run them.

### 7.3 Entity Modeling video fragments

These fragments focus on the following aspects of integrated Entity Modeling:

- Modeling Entities itself.
- Synchronization between Entities, as modeled, and code that implements compilable business logic for these entities.
- Integration of Entity models with other types of models, such as, for instance, User Interface models.

These fragments are provided as the following types of documents:

- Some fragments are provided in “.mov” format. Windows Media Player, which is free downloadable, should be used to run them.
- Other fragments are provided in “.swf” format. They run in a Web browser directly.