
Open Business Model, Process and Service Innovation with VDML and ServiceML

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ABSTRACT: This paper presents the NEFFICS platform which provides a foundation for cloud-based open business model innovation, process innovation and service innovation for networked enterprises. Business model innovation is supported with a basis in a business model framework with six views, where each view is supported by a corresponding diagram from the Value Delivery Modeling Language (VDML). Process innovation is supported by VDML activity diagrams with options for mappings to Business Process Model and Notation (BPMN) and Case Management Model and Notation (CMMN). Service innovation is supported by the Service Modelling Language (ServiceML) which shares the core collaboration models of VDML for role modelling and value networks.

KEY WORDS: Open Innovation, Business Model Innovation, Process Innovation, Service Innovation, VDML, SoaML, ServiceML, AT-ONE

1. Introduction

This paper presents a platform for community support for open business model innovation including support for process and service innovation. This is provided through the NEFFICS platform which combines an open innovation social media platform with a business modelling and operations platform. Together this provides a foundation for cloud-based open business model innovation, process innovation and service innovation for networked enterprises. Business model innovation is supported with a basis in a business model framework with six views, where each view is supported by a corresponding diagram from the Value Delivery Modeling Language (VDML) [OMG 2012b]. VDML has now been proposed for further standardisation within the Object Management Group (OMG). Process innovation is supported by VDML activity diagrams with options for mappings to Business Process Model and Notation (BPMN) [OMG 2011] and Case Management Model and Notation (CMMN) [OMG 2013]. Service innovation is supported by the Service Modelling Language (ServiceML) which shares the core collaboration models of VDML for role modelling and value networks. ServiceML extends the Service oriented architecture Modeling Language (SoaML) [OMG 2012a] for business architectures, i.e. Business-SoaML as described in [Chang 2012], and combines this with the five views of the AT-ONE method [Clatworthy 2008] to support service innovation. A further relationship of these languages in the context of an Enterprise Architecture framework can be found in [Berre 2012, Berre 2013b].

The remainder of this paper is structured as follows: In Section 2 we provide a description of the functionality offered by the NEFFICS platform. Section 3 introduces VDML and describes the business model innovation framework. Section 4 describes process innovation with VDML. Section 5 introduces ServiceML and describes the service innovation support. Finally, Section 6 concludes this paper and outlines further work.

2. The NEFFICS (Innovation, Modelling and Execution) platform

This section provides a description of the functionality, i.e. services and tools, offered by the NEFFICS platform and its methodologies and frameworks. The NEFFICS platform, as shown in Figure 1, is grouped into five main areas:

- The Innovation Community provides the services for idea, challenge and innovation management with possible links to analysis models.
- The Business analysis modelling provides the collaborative cloud based, VDML implementation that enables model based Enterprise design and transformation, over and above the model driven platform that enables application development.

- The Business automation modelling provides support for models that can be automated and directly supported through business operations runtime.
- The Business operations runtime provides services for execution of models, management of work to be performed as part of model execution, and monitoring of model execution and business data generated as a result of model execution, all in a distributed service-oriented architecture context.
- The Internet of Services and Things area includes third party services that provide access to underlying services for collaboration, interoperability, sensor and RFID information. Services of enterprise applications, available on premise of use case partners, can be positioned in this area as well.

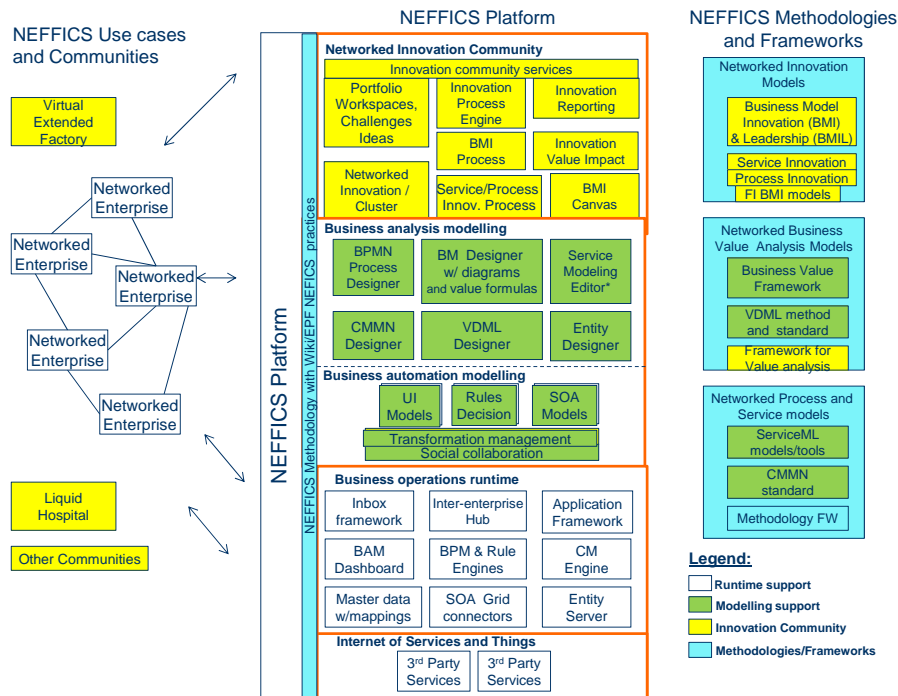


Figure 1. The NEFFICS platform

The NEFFICS platform provides tools and services that build upon the baseline functionality for innovation community and business operations extended with support for the NEFFICS Methodologies and Frameworks:

- The Networked Innovation Models define frameworks for different innovation types, starting from business model innovation and further supporting service, process and product innovation.

- The Networked Business Value Analysis Models define frameworks and methods for business value analysis, including the VDML specification.
- The Networked Process and Service Models define frameworks and methods for process and service modelling, supporting process and service innovation. It also includes the CMMN specification.

Accompanying the NEFFICS platform we have the public NEFFICS Methodology Wiki (neffics.modelbased.net) which provides descriptive guidelines in the form of practices for how to apply and adopt the models, methodologies and tools provided by the NEFFICS platform and frameworks.

Business Model Innovation is the core innovation activity of the business. It could be said to encompass the other innovation types such as Process and Service Innovation. One can address innovation from many perspectives and define types for these, but in the context of NEFFICS we have chosen to expand upon three particular innovation types.

- **Business Model Innovation** could be seen as the root innovation type, where all changes to a business could be seen as a new business model, or improvements to existing ones. Innovating the business model is related to changing one or more of the blocks of the business model. The NEFFICS platform enables you to innovate, implement and execute the services in the same environment, drawing upon resources from your enterprise network.
- **Process Innovation** is about innovating a process itself. In NEFFICS this type of innovation plays a very important role because the NEFFICS Business Operations Platform (BOP) is often used to facilitate live business processes and cases that support the actual business activities. Having them under the same roof as the innovation process are precursors for an efficient innovation lifecycle.
- **Service Innovation** is about establishing new or improving existing services. This is particularly relevant in the context of NEFFICS because the platform is enabling services that span the boundaries of the enterprises. The NEFFICS platform offers tools that help you approach service innovation from the users' point of view. This is complementary to the abovementioned process innovation perspective.

2.1. Networked Innovation Community

The innovation community provides a social media based community for the suggestion and management of ideas and challenges in a community. The innovation community was built with open innovation in mind and supports various aspects of opening up the innovation practice to be more receptive for input from other stakeholders such as customers and partners. The transition towards a more open innovation practice could manifest in many ways, such as including selected

partners of customers in the front-end or back-end of your innovation practice. It could also be the place where new business opportunities are enabled through sharing and opening up business models so that others can compete for a place in the value network, or extended to change any of the components of a business model.

The core objective of the innovation community is to increase innovation capacity by bridging the many users that have an innovation challenge with the users that have possible solutions, whilst at the same time supporting the strategic context of the organization that drives the community.

The innovation community is built on top of a set of baseline features one can expect from any enterprise social media platforms such as user management, integration with user directory services, content management, search and access control, community functions (i.e. profile page, interest groups), communication tools (i.e. chat, comments and messaging) and collaboration tools (i.e. workgroups, task management and file sharing). The more specialized features support different levels of openness (i.e. company/organization, enterprise internal innovation, innovation in networks and public innovation zones). In order to support a good user dialogue it is typically instantiated for the relevant native language.

The platform supports different innovation practices through customizable processes by providing generic workspaces for innovation and portfolio work. It supports different ways of tracking interest such as voting, evaluations, rating and commenting. It supports different ways of delegation of responsibilities, for example dedicated roles for doing certain activities such as evaluating, responding to and following up innovation projects. Finally, it supports reporting such as innovation funnel, focus area matrix, impact estimation and cost/benefit quadrants.

The innovation community supports the steps of an innovation process. This way of working with innovation processes acts as scaffolding for innovation projects; ensuring a repeatable, comparable and evolvable approach to running innovation projects. One can choose to have an arbitrary number of stages but map them to a generic innovation process. The purpose of such mapping is to maintain comparability and make consolidated overviews of innovation progress across the different innovation types that are supported (i.e. process, product and service innovation).

In the process of generating or evaluating of ideas, it is possible to create or link to related business models that can be developed from a business model innovation perspective. Community members can contribute challenges and ideas into a social innovation process where the status and progress can be presented and further analysed and progressed. Figure 2 shows the innovation funnel, and shows the progress of ideas through different stages. Ideas can be analysed and refined further through a link to business model innovation with value models in the Business Operations platform (BOP), with potential further process and service innovation support. Maintaining the associations between ideas and business models, and the

diagrams of these, capture important contextual information and support for analysis which is helpful in deciding which ideas to develop further.

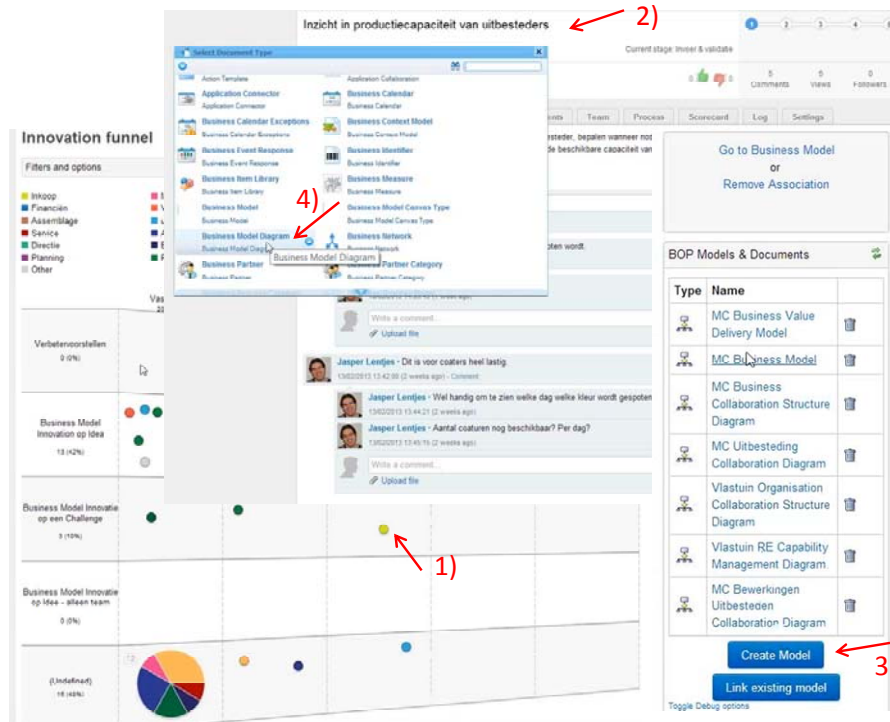


Figure 2. *The Innovation Community with Innovation funnel and linked models*

Figure 2 shows how an idea can be selected from the innovation funnel (1) to open a window with an idea page with relevant discussions (2), from which it is possible to create new models and diagrams, or link to an existing one (3), such as a business model diagram (4). It is also possible for an underlying system to generate new ideas or challenges into the innovation community for further innovation management.

3. Business Model Innovation with VDML

The Business Operations Platform (BOP) serves as the integrated component in the NEFFICS platform that supports modelling and model-based management of business and business operations. It is logical to extend modelling support in BOP with support for model-based design and analysis of Business Models (BMs).

In NEFFICS, BMs are considered to have six different views in to one integrated model, conceptually represented as a cube, while other related approaches like [Osterwalder 2012] consist of separate building blocks or dimensions. The six dimensions of the “business model innovation cube (BMI Cube)” [Lindgren, et al. 2011a], [Lindgren, et al. 2011b] are: Customers, Value Propositions, Activities (the “value chain”), Capabilities (or Competences), Network Partners and Value Formulas. This cube, together with an unfolded representation, in this paper referred to as “BM Diagram”, is represented in Figure 3.

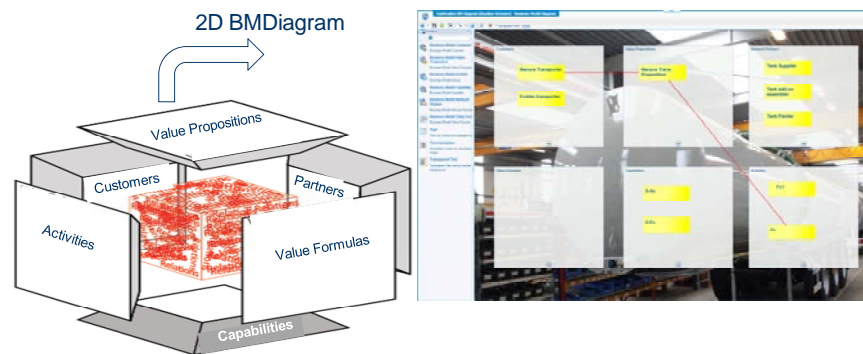


Figure 3. BMI Cube with BM Diagram as 2D representation for the 6 related dimensions

Each dimension of a BM is typically associated with one or more “BM items”. The main areas and related diagrams of VDML happen to align well with the dimensions of the BMI Cube, as indicated in Figure 4. VDML provides a diagram for each dimension of a BM. Every BM item, as associated with a BM dimension, can also be represented on the corresponding VDML diagram. This allows navigation from the BM diagram to the “underlying” VDML diagrams which represents how the BM item is related to other items. Thus VDML-based models provide a structured and detailed representation of BM items (according to the six dimensions) and their “relationships” (seventh dimension).

Note that this integration between the BMI Cube framework and VDML will benefit managers, innovators, and business designers (e.g. analysts and architects):

- It enables managers and innovators to abstract from business design and business architecture details. It will also, and eventually, provides them with a useful context to present measurements, ideas and challenges, that are related to underlying details.
- It will provide a useful way to guide business analysts and architects, whereby the various dimensions of a BM serve as “chapters” of business design “methodology”. It will provide them with a broad understanding and

context of the business and with a useful means to navigate business designs.

It is intended to extend the VDML metamodel and notation with the integrated BM metamodel and BM diagram. This will involve integration of both model objects and notation (diagrams), with support for diagram-based navigation from BM Diagram to VDML diagrams (and vice versa), where appropriate. Further details about BM use of each of the VDML diagrams can be found in [Berre 2013a].

Figure 4. *BMI Cube with VDML diagrams*

4. Process Innovation with VDML

A high-level representation of VDML concepts is represented in Figure 5. The figure clarifies how VDML model elements can identify BM items in the various dimensions of a BM: A “business”, typically an enterprise, modelled as organization unit, might fill a role in (a) business network(s), via which it collaborates with customers and network partners, which fill roles in the business network(s) as well. They exchange value propositions, through collaboration. Value propositions that “the business” provides to its customers are the value propositions that are represented in a BM. A “business” collaborates with both customers and network partners, and it may provide and receive value propositions to and from both, which

is the basis for “value formulas” in a BM. In order to deliver value, “the business” and its network partners have to perform certain activities, which require certain capabilities that are provided by their organization units. Note that, as far as activities explicitly contribute value, as articulated by value propositions to the customers, these activities, together with the capabilities that they require, are also BM constituents.

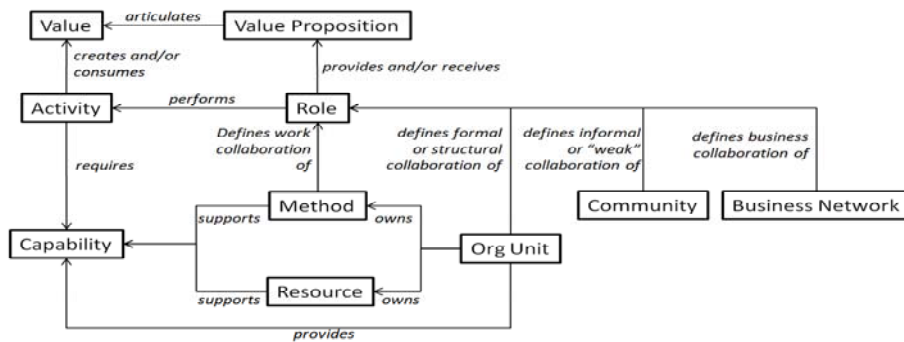


Figure 5. VDML concepts

Organization units typically use “capability methods”, to provide their capabilities. A capability method is a work collaboration of roles, designed to support and provide a particular capability. As such it also expresses which activities are performed by these roles, to deliver the intended value. Capability methods that are sufficiently structured can be considered “processes”. Figure 6 provides a VDML activity network view on a Capability Method. It looks like a “process”, but is distinct from “control” oriented representations of process, such as BPMN and CMMN provide.

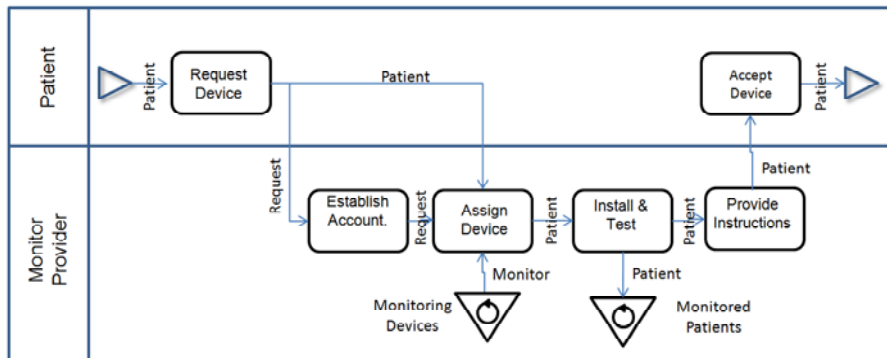


Figure 6. VDML Activity diagram of Capability Method

An activity network view in VDML focuses on the flow of deliverables and contributions of value, and is not concerned with control flow. It is possible to transform a Capability Method in VDML, as used in a particular context in VDML, to a BPMN process or Case Management model, so that the work that is represented by a Capability Method, can be enforced by “process automation” in the operations of the business. Figure 7 suggests how value-driven business analysis and design, based on VDML models, is a business-oriented way to “discover” processes, supporting process innovation, in a way, whereby business, using VDML models, and IT, using BPMN and CMMN models, are aligned.

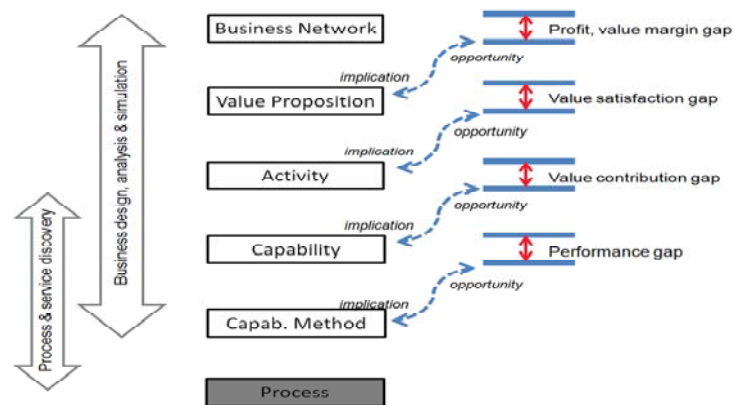


Figure 7. Value-driven process innovation, with VDML

5. From Business Model innovation to Service Innovation with ServiceML

In many cases the value proposition from a Business Model Innovation will be about providing a service. In this case the VDML models will also be able to serve as a foundation for further service innovation.

Service innovation provides a holistic approach to the development of innovative services by relying on the way customers experience such services. By integrating design-thinking into the service platform creation, service innovation enables service providers to enhance their service portfolio through improved or innovative services.

The concept or role collaboration is the central concept both in VDML and in service design, so VDML also provides a good foundation for service innovation.

5.1. ServiceML based on the AT-ONE Method

The AT-ONE method [Clatworthy 2008] provides a valuable insight into service innovation by proposing to innovate a service in terms of five distinct lenses, namely

(A)ctors, (T)ouch-points, (O)fferings, (N)eeds and (E)xperiences. The ServiceML language has been aligned with AT-ONE and comprises three different packages [Carrez et al. 2012], namely: (1) Business-SoaML, a SoaML variant suited for business people, (2) Light-USDL, a USDL variant for interface descriptions for business-minded people, and (3) Service Journey Maps, an AT-ONE customer journey variant for describing service experiences.

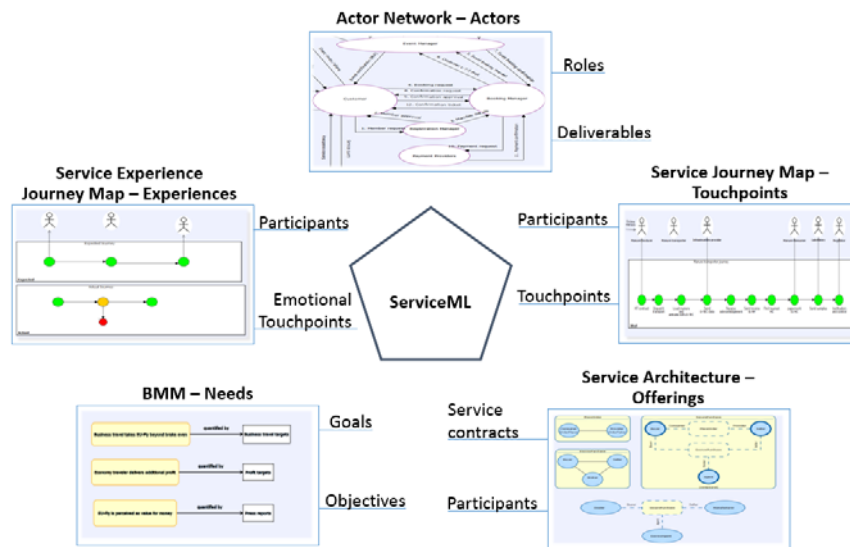


Figure 8. Summary of ServiceML models for the five AT-ONE lenses

ServiceML is currently being tested with the cooperation of industry partners. Figure 8 depicts the five ServiceML AT-ONE lenses which are described as follows:

- **Actors:** An actor network represents a collaboration of roles and deliverable flows in a value network [Allee 2002]. We make use of a hybrid notation, namely: ‘participants’ (roles in a service collaboration) and ‘conversations’ (BPMN 2.0 [OMG 2011]) to group together a set of flows between roles.
- **Touch-points:** We model touch-points (physical or logical points of contact such as mobile phones and web) using a service journey map which is similar to an AT-ONE customer journey showing the flow of events from both service providers and service users [Schneider and Stickdorn 2011].
- **Offerings:** Service offerings are described as Service Contracts forming part of a Service Architecture (from Business-SoaML). A service contract establishes a service agreement between two participants while a service architecture provides an overview of all participants and proposed services.

- **Needs:** Matching the customer needs to offerings is very important. Needs, in ServiceML, are expressed as goals which are quantified by objectives as explained in the BMM (Business Motivation Model) standard [OMG 2010].
- **Experiences:** In ServiceML, service experiences are modelled as different coloured icons representing various levels of emotional states which a consumer of a service goes through as touch-point events are being carried out. “Bad (Poor)” (represented by red circles), “Average” (represented by yellow circles), “Good (Normal)” (represented by green circles), and “Outstanding” (represented by blue circles).

5.2. VDML and ServiceML alignment

The elements of VDML and ServiceML have been aligned to provide integration support for the various AT-ONE models. Each ServiceML model, which will be discussed in the next section, can be related to its corresponding VDML model(s) across a particular AT-ONE perspective as shown in Figure 9. For instance, roles present in a ServiceML Actor network can also be found in VDML role collaboration models.

A ServiceML Service Journey Map typically describes touchpoints or a set of user activities that are also detailed in a VDML Activity network. Services present in a ServiceML Service Architecture diagram can be regarded as providing value propositions to various actors or participants in a VDML Value Proposition Exchange diagram. A ServiceML BMM diagram articulates customer needs that can be regarded as forming part of the VDML Value Proposition Exchange diagram as well as the Measurement Dependency Graph used to express value formulas based on customer interests.

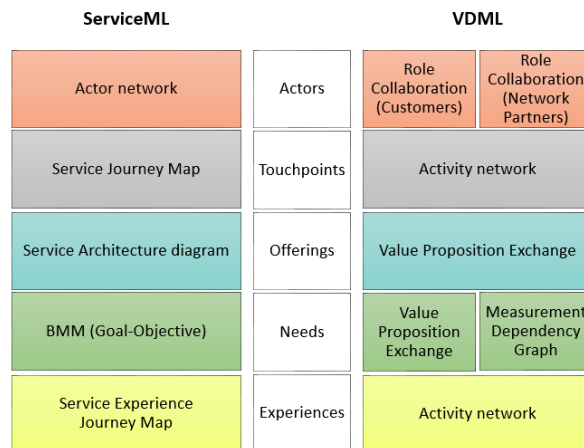


Figure 9. VDML and ServiceML alignment

Finally, a ServiceML Service Experience Journey Map can be used to define the set of VDML activities with user emotions based on the level of satisfaction experienced by service consumers. Further details about each of the ServiceML diagrams can be found in [Berre 2013b].

6. Conclusion and future work

This paper has presented a platform for Open Business Model, Process and Service Innovation with VDML and ServiceML. The platform is currently being tested and validated in different pilot case scenarios.

Future work is focusing on reflecting the experiences from the platform usage to potential updates to the current VDML standardisation proposal. The approach provides a basis for further development of corresponding executable models and simulation models.

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