

BPaaS Modelling: Business and IT-Cloud Alignment based on ADOxx

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Abstract: Business Process as a Service (BPaaS) is a new paradigm in Cloud Computing using domain-specific business processes as a mediator for business and IT-Cloud alignment. Therefore, business process models are extended with cloud-specific concepts. This paper introduces the modelling concepts and mechanisms to bridge the semantic distance between domain-specific business processes and IT-Cloud deployable workflows. A prototype has been developed in the H2020 project CloudSocket, where the current status of the modelling tool is available for the research community on ADOxx.org.

Keywords: Business IT Alignment, Semantic Lifting, Business Processes as a Service, Cloud

1 Introduction in BPaaS Modelling

This paper demonstrates a modelling tool that supports the business and IT-cloud alignment. The business process designer can model business-related decisions such as buying strategies for the cloud, domain specific requirements on data or organizational compliance rules. A technician can derive sufficient information out of the extended business process model, in order to select appropriate service end points, configure appropriate virtual machines (VM), create deployment rules or specify the service objectives (SO) for a particular infrastructure. The proposed semantic lifting envisions a semi-automatic support of this model-based communication.

Business Process as a Service (BPaaS) is based on the BPMS paradigm [Ka95], distinguishing between the (a) design, (b) allocation, (c) execution, and (d) evaluation phase. The technical discussion on the separation of concerns and the introduction of the marketplace can be found in the technical architecture of CloudSocket [Cl15a].

BPaaS Design Environment implemented a semantic lifting that enables the annotation of business process models [OMG11] with ontology concepts. Based on Zachmann [Za14] and ArchiMate [TOG12], the enterprise modelling ontology ArchiMEO [HMS] has been provided to semantically lift the business process. This enables to align business processes with workflows deployed in the cloud in a semi-automatic way.

This paper introduces (a) the service descriptions model reducing the semantic gap between business processes and workflows, as well as (b) the semantic lifting that had been implemented on ADOxx [AD16].

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2 Required Concepts to realise BPaaS Modelling

The modelling method specification language [WEK15] is used to define the meta-model. In the following the modelling stack is introduced that shows business process relevant models like (a) business process models, (b) organizational model, (c) document model and (d) process maps. The workflow is seen as a separate concern although workflows and business processes use BPMN notation. Key performance indicator (KPI) model and decision model are out of scope of this paper. For further information, please refer to the BPaaS Modelling Framework [C115b].

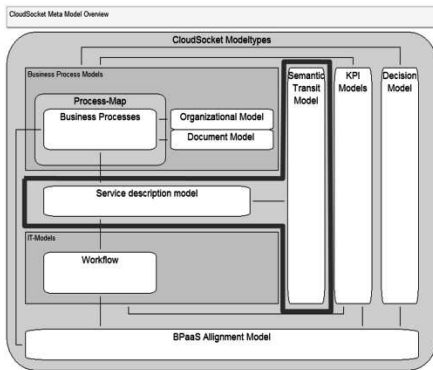


Fig 1 BPaaS Meta Model Stack

The focus is on the so-called “Service description model” consisting of the service-requirement construct that describes the cloud-specific properties: (a) service description (b) functional description, (c) input and output parameter, (d) non-functional requirements, (e) business description, (f) regulatory description.

The semantic transit model consists of one concept representing an ontology class, and hence, enables the different forms of semantic lifting.

The so-called “BPaaS Alignment Model” is an interface that enables the access of all relevant models in a structure way. Focus of this paper is the semantic lifting of the Service description model, which is highlighted in Fig.1.

2.1 Service Description Model

The service descriptions model is introduces that aims to improve the communication between the business process designer and the workflow engineer. It is based on the FODA approach [FOD05], according to which each business process activity is analyzed depending on the specific IT requirements. Currently, the vertical weaving from business process to workflow is performed due to intellectual manual modelling, it is expected that semantic support can be introduced, when the aforementioned attributes are semantically enriched. Following properties have been indicated and implemented to describe the requirements of a service:

- Service Requirement enables a name, a responsible author and a textual description.
- Functional Description indicates the general functionality, possible functional requirements, keywords or even exact ontological description of a certain function.

- Input / Output Description describes the expected data format by enabling generally descriptions – like distinction between parameters or documents – as well as enabling detailed specification on data format and protocol standard level.
- Non-Functional Requirements indicate (a) the reliability based on error rates, the (b) availability like targeted availability time, (c) sample service that explains the developer the intended service interaction with mock-ups, prototypes or similar services, as well as (d) indication on the scheduling and planning.
- Business Description indicate (a) vendor criteria elaborating on potential vendor locks, helpdesk or onsite visits, (b) security and trust criteria describe relationships or standards, (c) preferred payment method, (d) costs and required contractual obligations as well as (e) comments on business intension in general.
- Regulatory Description indicate (a) data location to ensure data privacy enforcement, (b) certification of the vendor according standards, (d) domain specific data protection and cloud maturity concerns as well as (c) a relevant list of regulation that needs to be considered.

For the full representation of the meta-model in FDMM notation, please refer to [C115b].

2.2 Semantic Lifting

Semantic lifting can be implemented on ADOxx in different forms. A full representation can be found on ADOxx.org, in the CloudSocket development space. Here the different implementations for human-based annotations are introduced:

Non-Supported direct linkage uses a text attribute for manual entries of ontology concepts. This is suitable for inflexible modelling languages that cannot be changed.

Supported pre-defined linkage uses a flat list to select pre-defined ontology concepts. In ADOxx it can be implemented using enumerations that correspond to the ontology. It is suitable for top-level concepts that do not evolve.

Supported direct linkage using a semantic tunnel for flexible enumeration accesses a third party ontology and provides the result in the modelling tool. Hence the user has the impression to work in one tool, whereas a part of the information is provided by the third party ontology system. This is suitable for flexible ontologies, but due to the built-in presentation is only appropriate for a small set of concepts.

Indirect linkage using a semantic transit model imports the ontology, hence holds the ontology concepts redundant and provides a fully structured ontology representation. This is appropriate in case of using highly complex ontologies. With respect to flexibility, this approach is only for moderately flexible ontologies, as the redundancy handling only pays off in case of not too many changes.

Direct and indirect linkage can be combined via (a) the semantic tunnel and (b) the

transit model. The flexible part of the ontology is accessed via aforementioned tunnel whereas the static part of the ontology is accessed via semantic transit. The combination of the two techniques enables hence the handling of complex and flexible ontologies.

3 BPaaS Modelling - Prototype

The BPaaS Modelling prototype has been developed in the H2020 project CloudSocket [C15] and can be downloaded from the development space in ADOxx.org [ADS15].

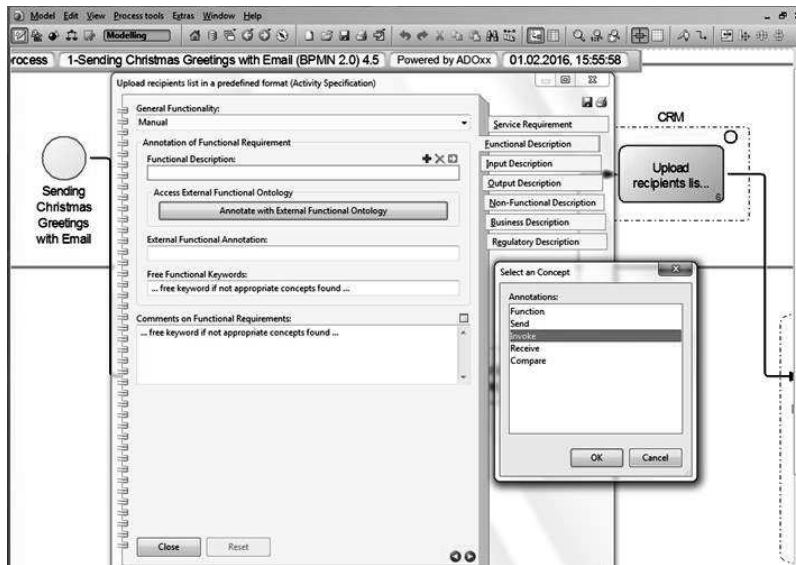


Fig 2 Screen shot of semantic lifting of services requirement description

The notebook shows a four-step semantic annotation, starting with (a) a pre-defined enumeration describing the general functionality, (b) details of the description with an indirect linkage to parts of the ontologies and, (c) detail those parts again by using the semantic tunnel accessing the ontology directly – indicated in the separate window.

In order to allow flexibility, free keywords are also allowed realizing the non-supported direct link. Finally, a feedback possibility is foreseen, to improve the alignment.

The Current prototype is going to be validated by two BPaaS Brokers who models their business process offerings for cloud deployment. First introductory sample on sending Christmas Card via emails already raised several issues like (a) how to ensure that the text of a card is not illegal, (b) how to ensure that no forbidden symbols are used when uploading an image, (c) how to ensure data privacy when uploading the recipient list or (d) how to communicate the different virtual machine settings, when sending all emails

on the day before Christmas. After the first feedback on this simple sample, the BPaaS Broker are now modelling more sophisticated business processes on e.g. newspaper distribution logistics, internet recherche for offers or customer relationship management.

The user feedback is continuously provided at the developer space on ADOxx.org.

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