Towards A Method for Developing Reference Enterprise Architectures

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Abstract. In most economic sectors organizations face rapid environmental changes like regulations. Such changes can force them to adjust both their organizational and operational structure. For instance, in the energy utility sector numerous developments moved German Public Utilities (PUs) towards a liberalized market. Nowadays PUs have to stay competitive while managing a heterogeneous information technology (IT) landscape. We address this demand for aligning business and IT by combining the holistic perspective of Enterprise Architecture Management (EAM) with the characteristic of reference modeling to reuse knowledge in a problem domain. Therefore, we utilize configurative reference modeling within Design Science Research (DSR). The artefact at hand is a method for developing a Reference Enterprise Architecture (R-EA), which is applied in the problem domain of PUs. Our contributions are the (i) adaptation of Configurative Reference Modelling (CRM) to develop a R-EA and (ii) a procedure how to elicit knowledge for R-EA development method.

Keywords: Reference Modelling; Public Utility Industry; Enterprise Architecture Management; Reference Enterprise Architecture

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1 Introduction

After the directives by the Council of the European Union from 1996 [1] and 2003 [2], Europe's energy utility industry has faced significant structural market changes in terms of market liberalization and renewable energy sources [3]. A PU is defined a natural or legal entity that supplies energy, operates an energy grid or holds power if disposition on these grids [4]. In Germany, PUs suddenly faced many challenges after the government passed the German Energy Act [4]. They do not only imply organizational or operational changes for PUs but also business opportunities for third parties to intensify competition in a prior monopolistic market. Nowadays PUs face the need to integrate new technologies resulting in heterogeneous IT landscapes. For instance, flexible demand-side management by the integration of Smart Grid technologies becomes necessary due to the volatility and uncertainty of renewable energy resources like wind or solar energy [5]. Moreover, the installation of new smart and real-time metering systems requires the reorganization of PUs' metering data management [6, 7]. This requires adaption of the PU's business models and the reengineering of existing and the establishment of new business processes [3]. Furthermore, integrating new technologies like smart metering systems has an impact on the PUs' IT architecture [7]. A survey with 53 respondents from German PUs' management level revealed that organizations currently lack in fulfilling this requirement of effective Business-IT alignment, although they assess it vital to cope with the challenged stated above [8].

In order to tackle these different challenges sketched above, it is not sufficient to focus on single aspects or initiatives. Rather, a holistic approach is needed such as EAM that creates a holistic perspective on the organization and is capable of revealing relationships between the strategy of an organization, business processes, responsible roles, applications and information infrastructures [9]. Implementing an EAM initiative would allow PUs to locate environmental changes within their organization in order to reveal necessary Business-IT alignment actions. Despite this potential, recent information systems research (ISR) activities hardly addresses EAM aspects, since it primarily focuses on Smart Grid technologies or the market itself [10], [11, 12]. They do not create holistic models or methods tailored to the PUs' situation in particular. Still, some show the multi-dimensional consequences and opportunities that challenges like smart metering cause for PUs [13]. Although practitioners agree on the potential of EAM discussed above, they consider implementing such initiatives from scratch as too resource-consuming [8]. To address this issue, we suggest the construction of a reference model as a useful approach to support PUs in benefiting from the EAM discipline. Such a model would enable organizations to reuse knowledge and reduce the effort of creating an individual model, e.g. a concrete model of an enterprise architecture [14].

In order to support the construction of such a model, we devise a method to develop a Reference Enterprise Architecture (R-EA) that is based on established literature found in the ISR sub-disciplines of reference modeling and EAM. In more detail, we adapt a configurational reference modeling method [15] in the frame of a Design Science Research approach [16]. The resulting artefact, the R-EA method, is focused on data elicitation as well as on representational aspects. The work is structured as follows:

After discussing reference modeling approaches and related work in section 2, our application of configurative reference modeling within DSR is presented in section 3. In section 4 we present the R-EA method. The method's evaluation and application in a Use Case is presented in sections 5 and 6 before concluding our work on section 7.

2 Background

As depicted earlier, practitioners agree with us that EAM would support PUs to overcome the stated market challenges [8]. This is in line with current research, since it is agreed that establishing EAM within organizations through architectural thinking increases manageability and flexibility as well as consistency [17]. EAM is a management discipline to understand, plan, develop, control and adjust organizational structures. Therefore different perspectives are developed resulting in a holistic view, which captures the current state as well as a target state of the organization [9]. These perspectives are manifold and a plethora of frameworks exist how to structure and develop such an EAM initiative [18]. In our work we use the TOGAF framework [19] as it is widely accepted among practitioners and comes with an detailed modeling language specification ArchiMate [20] as well as an open source modeling tool Archi[1].

In our work, we leverage the principles of the TOGAF framework in our method for reference model construction, the R-EA method. This means that concrete reference models constructed using our method should conform to the principles and structure of the TOGAF framework. In order to provide more background connected to the development of the R-EA method which is at the core of the paper at hand, we discuss general reference modeling approaches in the next Section 2.1. After this, we discus related work and define our work's problem statement in Section 2.2.

2.1 Utilizing Reference Modeling Approaches

A reference model can be defined as "every model […] which can be used in supporting the construction of another model can be seen in this sense as a reference model" [14], p.491). This notion emphasizes a use-oriented perspective. However, in order to be reusable, other authors such as [21] argue that also other characteristics such as the universality and recommendation have to be considered while developing a reference model. This is in line with our aim of developing a reference model that is intended for reuse. With regard to reuse, [15] identify a dilemma in reference modelling among the general validity of the model during construction and the effort of adjusting the model during its application. Their approach suggests to solve this conflict by developing *configurative reference models*, which define rules to determine model adjustments during application. This approach integrates the application aspects into the construction phase of reference modelling. We adopt this technique since the configuration of the presented R-EA would allow a certain PU to tailor the R-EA to its individual structure and thus avoiding to develop a model from scratch or adapting an

[1] See http://www.archimatetool.com.

extensive model that may be a resource consuming and tedious task. In the main part, this configurational aspect is discussed in more detail.

Regarding the overall approach of reference modelling, older works see reference model construction and application as an integrated process (e.g. [22, 23]). This is in contrast with more recent works differentiating between a phase of model *construction* and model *application* (e.g. [14]). We stick to the former distinction and present a method for the construction of a R-EA. This implies that the application of the models that can be created with this method is part of our future work.

In order to develop a reference modelling method, it is important to distinguish between two generic strategies of reference model development. While the deductive developed models emerge by deriving from generally accepted knowledge, the inductive approach abstracts from individual models to agree on a common understanding within the reference model [24]. As a part of our work on the R-EA, we propose an initial approach how to combine these two strategies into a hybrid reference modeling development method [25]. This is made transparent in Section 4.1.

Regarding these considerations, we understand the R-EA method developed in the research underlying the paper at hand as a method which supports the development of reference models that ease the implementation of EAM initiatives at German PUs. The models created using the R-EA method should be reusable, universal and should give recommendations towards the PUs on how to structure their organizations depending on certain market roles.

2.2 Related Work and Problem Statement

Only few research activities can be identified that relates to our purpose of a R-EA development method. As a starting point to develop a R-EA in the financial industry, [26] propose a working definition on enterprise reference architectures corresponding to the authors' term R-EA. They describe an R-EA as "… a generic EA for a class of enterprises, that is a coherent whole of EA design principles, methods and models which are used as foundation in the design and realization of the concrete EA that consists of three coherent partial architectures: the business architecture, the application architecture and the technology architecture" [26]. Further, [27] developed a reference requirements set in the e-government domain, which serves as a starting point for certain EAM initiatives in this domain. The approach utilizes the motivation extension of TOGAF and ArchiMate and aims to develop a complete R-EA for the e-government domain. Despite these works do identify the need for a method, neither of them addresses methodical aspects.

Most literature in the utility domain address the context of environmental sustainability, but lacks in investigating the implications for PUs' IS and its role in the current developments [28]. There has been little research activity directly addressing EAM as a means to face the challenges in the utility industry. Most research focuses on parts of EAM's scope only. [29] identified 11 reference models for information systems development in utility industry and proposed a catalogue for reference models in order to agree on a common terminology. Other topics addressed are Smart Grids [10, 11], Smart Metering Systems [6], load management and demand response [30] or dynamic tariff models [31]. All these research activities address issues PUs nowadays have to consider not only in their business but also in their information systems. The stated literature investigates this at a relatively detailed level.

We point out that current literature lacks a methodical approach for developing R-EAs. Other R-EA related research in domains such as public administration or the financial industry do not clarify how to elicit necessary knowledge for a R-EA in general nor how a R-EA should be structured. Based on these considerations this work addresses the following problem statement.

Problem Statement. We identify the need for a R-EA development method that guides data elicitation and representation of the model. The problem is addressed by two separate research questions (RQs):

RQ1: How should a R-EA method support the elicitation of the necessary domain knowledge for developing the R-EA?

RQ2: How could a R-EA method support the model structure development and the R-EA model evaluation?

3 Methodological Considerations

We selected the Design Science Research (DSR) paradigm as our research design since it supports the development of artefacts as a contribution to tackle real-world problems. At the same time, it facilitates deriving conclusions relevant for research [16]. This decision is also taken by other authors who developed reference models in diverse areas such as Master Data Management [32] or Supply Chain Management [33]. This is no surprise since DSR is essentially a problem-solving paradigm that seeks to improve the reality, in which enterprises act, by creating and analyzing innovative IT artefacts such as models, methods and prototypes [16]. Consequently, the DSR paradigm is highly relevant for method development. Our work refers to the DSR approach proposed by [34]. In this model, a regulative cycle is defined comprising the phases of *(I) problem investigation*, *(II) solution design*, *(III) design validation* and *(IV) solution implementation*, which are traversed iteratively. We applied the DSR regulative cycle as presented in Figure 1. In phase (I) we conducted an online survey, that revealed the need for a R-EA method in the certain problem domain of PUs [8]. We further analyzed literature towards methodical approaches of R-EA development and derived our problem statement as discussed in sections 1 and 2. Within (II) we adapted the method for configurative reference modeling [15] to the concepts of EAM. Therefore, we extended the CRM method with specifics of TOGAF. This resulted in an additional procedure for data collection and guidelines for structuring a developed R-EA, which are explained in section 4. In phase (III) the method was validated using Technical Action Research [35] by applying the R-EA method in the PU problem domain described above. This is illustrated in section 6. The phase (IV) is out of the scope of this paper and will be subject of our future work.

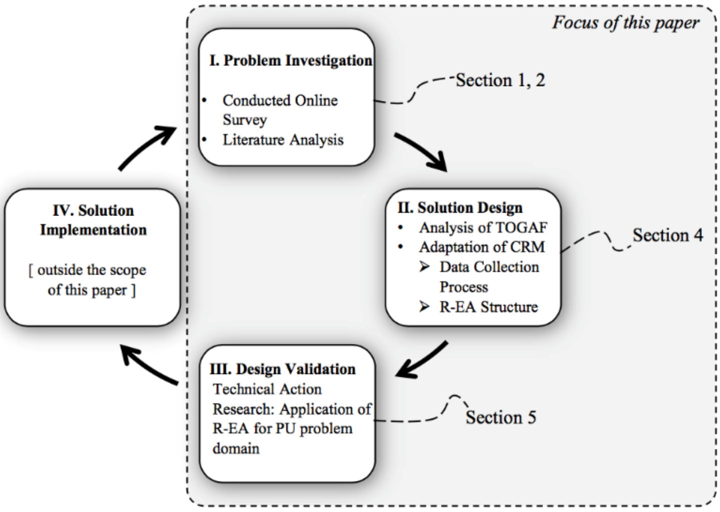

Figure 1. Applied DSR Regulative Cycle according to [34]

4 Method for R-EA development

We developed the R-EA development method based on the CRM method proposed by [36] and adapted towards the specifics of EAM. CRM comprises the five phases for reference modeling. In (1) the project's objective is defined. Therefore, the scope of the R-EA has to be clarified by identifying the problem domain and the class of organizations that are addressed by the R-EA. Also requirements towards the R-EA are set. An example of the R-EA problem domain could be the integration of smart metering systems at PUs. During phase (2) the modeling approach needs to be defined. For R-EA development one need to define what EAM framework (e.g. TOGAF) and modeling language (e.g. ArchiMate) to use. Further, the configurational aspects of the R-EA are defined. These two phases set up phase (III) were the actual reference modeling is conducted. The data is collected and the R-EA is modeled. The R-EA is refined by evaluating it in phase (IV). In the end, the R-EA is released to the market. Figure 2 illustrates that our R-EA method extends CRM in phases (3) and (4). We assess the CRM to be not comprehensive enough regarding data collection and model structure for R-EA model development. Phase (5) is out of the scope of this paper.

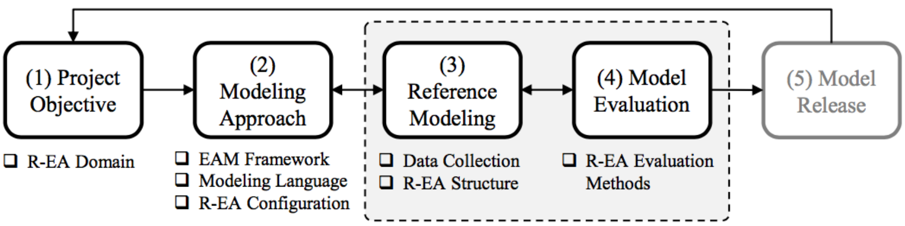

Figure 2.Basic R-EA development method applying CRM [36]

4.1 R-EA Method: A Procedure for Data Collection during R-EA Development

As described above we extend the reference modeling task CRM's phase (3) in order to comply with specifics of EAM. Therefore, we add a procedure model to phase (3), which proposes how to elicit the relevant data in order to perform R-EA development later in this phase. The procedure comprises three steps shown in Figure 3. Each step uses several data collection methods and produces an output in the form of a R-EA model version. Section 4.2 explains how to define the R-EA's elements and structure is defined.

Our R-EA method uses a hybrid approach of deductive (Step A) and inductive (Step B) reference modeling before abstract the data to final R-EA (Step C). In *Step (A)* an initial R-EA is developed using deductive collection methods. In order to ensure objective findings we propose to use methodological triangulation according to [37]. For instance, the data sources could include an analysis of domain-specific literature, expert interviews with practitioners of the domain as well as a survey addressing representatives of the prior defined organization class. The analysis of this data produces an **initial R-EA**, following a structural guideline described in section 4.2.

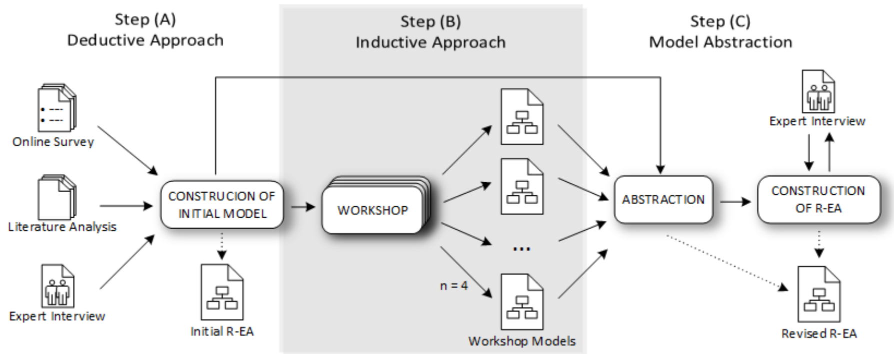

Figure 3. Development Process of the R-EA

Step (B) defines to conduct inductive reference modeling by collecting concrete enterprise architectures of representative organizations from the problem domain. The organizations' current state and challenges are captured with focus on the defined R-EA problem domain. To do so the R-EA method suggests to conduct workshops at the representative organizations'. A concrete workshop design is proposed in [38]. The workshop, its preparation and post-processing is in line with the first three stages of preparation, collection and preprocessing for inductive reference modeling from [39]. The workshop has to collect data from different perspectives on the R-EA's problem domain. These perspectives depend on the EAM framework that was chosen in (II) of CRM. When using TOGAF, elements from business, data, application and technology layer have to be considered [19]. Therefore, we recommend to conduct several small workshops at each organization. They differ in their focus and participants from the particular organization. In order to enable effective data collection, each workshops should be conducted following the guidelines of participative enterprise modeling [40].

There are several roles participating in a workshop. The research team consists of the modeling facilitator and minute takers. While the modeling facilitator moderates, asks questions and illustrates the talking points, minute takers keep record of the discussion. The participants from the organization, i.e. the domain experts, depend strongly on the focus of the respective workshop. For instance, identifying the business areas of a PU that are influenced by the integration of smart metering systems requires domain experts to be from the management level. In contrast, collecting information regarding concrete business processes or data models for smart meter installation rather requires process owners or specialists as participants. Thus, the workshops have to be planned wisely and a concrete agenda needs to be communicated to the organization. After condensing the collected data and cross-checking it with the participants, an individual **workshop model** is developed for each organization using ArchiMate. These have to be comparable and, thus, must comply with the modeling conventions defined by the researchers. This is discussed in section 4.2.

In *Step (C)*, the actual R-EA is developed based on the initial R-EA and the workshop models. It is then validated by dint of expert interviews resulting in a **revised R-EA**. For abstracting to the R-EA, reference modeling research identifies clustering as a means to derive a reference model, which requires the comparability of the individual models [39]. This is also applicable towards the R-EA. Still, research only addresses the comparability of process models in this regard and lacks methodical aspects for comparing individual EA models. In this last step of model abstraction, it is vital that the initial and all workshop models are comparable with each other, since they are more complex than process models. Therefore, the next section explicates how to agree on a structure for the R-EA development.

4.2 R-EA Method: Definition of R-EA Structure

As depicted above it is essential to model comparable individual EA models. Therefore, we suggest how to define a concrete R-EA structure that guides the development of each model (i.e. initial R-EA, workshop model and revised R-EA). Therefore, it is important to understand how an EA model is structured. First, a meta model defines what elements are used to model the EA model, e.g. the TOGAF meta-model [19]. Second, different types of relationships are defined how these elements are related among each other, e.g. a certain role *is assigned to* a business process. Third, viewpoints are used as projections on parts of the EA model to visualize a certain purpose of the model, e.g. to see what business processes are using a certain software component [20]. We understand a sound R-EA structure to consider all of these three aspects in order to guarantee comparability of the individual models.

The definition of a R-EA structure is influenced by *(a) the problem domain* and intention of the R-EA identified during (I) of CRM, *(b) the meta model* of the chosen EAM framework as well as its modeling language and *(c) the data available* for conducting the R-EA method. We suggest the following actions to follow in order to develop a R-EA structure. Keeping the problem domain of the R-EA method application in mind, the meta model of the choses EAM framework has to be analyzed. It has to be clarified what EA layers to cover, what concrete EA elements as well as what relationship types to use. This results in a modified meta model. Afterwards, a list of viewpoints has to be defined that explicates what elements and relationships are projected in what viewpoint for what purpose. When using the TOGAF framework, the ArchiMate specification provides a profound documentation of the meta-model and defines standard viewpoints [20]. Although the R-EA structure should be agreed on before modeling the initial R-EA model, data quality and data availability during data collection in steps (A) and (B) from Figure 3 will influence the R-EA structure. Thus, it may be modified during the R-EA development.

4.3 R-EA Method: Evaluation of the R-EA

Next to the construction perspective on R-EA development, our R-EA method provides a procedure how to evaluate the developed R-EA. The procedure is illustrated by Figure 4. Next to the data collection the workshops can be used to validate and refine the initial R-EA model. After conducting the model abstraction step, the resulting R-EA needs to be further validated. The R-EA method addresses this by conducting another expert interview. We recommend to interview specialists for evaluating detailed parts of the R-EA. In order to assess the R-EA's overall validity managers or business consultants should be interviewed. On the one hand, the interviewees should be familiar with EA models. On the other hand, they should not have been played a part in the R-EA construction.

The R-EA can be interpreted as a set of statements formulated in a modelling language. It can be evaluated first according to whether they are built properly (e.g. adhering to the syntactical and grammatical rules) and second to their content (e.g. semantical meaningfulness, truthful, understandable). Thus, we suggest the evaluation activities to distinguish between construction- and content-centric aspects. The construction-centric perspective concentrates on whether modeling conventions of the chosen EAM framework were followed and design decisions for the R-EA structure are appropriate towards the R-EA problem domain. Addressing the content-centric perspective it has to be assesses whether the R-EA is valid regarding semantic aspects (e.g. conciseness, consistency, completeness) and pragmatic aspects (e.g. appropriateness). During the workshops and interviews, the participants should be confronted with the model and judge it according to these aspects.

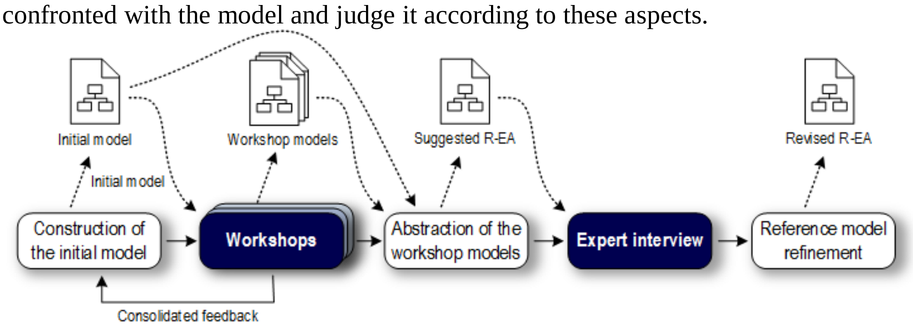

Figure 4. Procedure for Evaluating the R-EA

5 Validation of the R-EA Method

As visualized in Figure 1 we applied technical action research (TAR) for design validation of our R-EA development method [35]. After developing a first version of the method, we applied it to a problem domain. Before summarizing the method application in section 6, we discuss the setting of TAR application and want to make the R-EA method's evolution more transparent.

The R-EA method was applied in order to develop a R-EA that identifies the consequences of the market liberalization and the emerge of renewable energy sources for PU organizations. We worked together with a vendor of an enterprise resource planning (ERP) system in the energy sector, with whom we together conducted the workshops at four German PUs. During the R-EA method application (i.e. during the definition of the R-EA structure, after each workshop and during the modeling of the R-EA model) as well as after the method application we conducted interviews with the experts of the ERP system vendor addressing benefits and drawbacks of the R-EA method. According to [34] we were able to assess the method's internal validity and try to make first conclusions regarding its external validity. This relates to the observational evaluation method for DSR [16].

The method presented in section 4 represents the latest version of the R-EA method. During its application in the PU problem domain, necessary modifications of the method were identified and incorporated later on. Referring to Figure 3, the conduction of expert interviews was added in Step (A) in the first place. With the help of the vendor's expert knowledge of the industry, the initial R-EA model gain in quality and was then enriched with information from the other sources. Secondly, Step (B) was enhanced in terms of the workshop design. After we defined a strict workshop agenda, the experts noticed that the workshops need to be more flexible regarding the independence of the participants' availability. Third, in Step (C) we added the evaluation loop by conducting another expert interview in order to evaluate the final R-EA model towards construction- and content-centric aspects. Fourth, the importance of a sound definition of the R-EA structure became clear during the modeling activities in Step (B). This led to a more precise process how to structure the R-EA (see section 4.2).

According to [41] the evaluation of our artefact is primarily of formative nature. The application of the R-EA had a significant impact on the method's structure. A final expert interview with the project partner assessed the R-EA method as internal valid as defined in [34]. The developed R-EA met the partner's expectations and was used in subsequent meetings with their clients, i.e. PUs. In order to make a credible statement regarding external validity, the R-EA method needs to be applied in another problem domain. We currently apply it in a project located in the finance sector and first results indicate that the method is applicable to a different context.

6 Applying the R-EA Method to the Problem Domain of PUs

As described above the R-EA method was applied to the use case of the PUs current situation. The application was conducted together with a project partner, an ERP system vendor specialized on PUs. In Phase (I) (see Figure 1) of CRM the problem objective was to develop a R-EA that identifies the consequences of the market liberalization and the emerge of renewable energy sources for PU organizations. The class of addressed organization were PUs in Germany. The national restriction was due to the fact, that we only had positive feedback from PUs located in Germany. In (II) we agreed on using the TOGAF framework in line with the modeling language ArchiMate. The models were created with the open source tool Archi, which has full ArchiMate support. During studying the initial literature, it became clear that the business models of German PUs strongly depend on the market role they take. Thus, we derived that the R-EA will be configurable by the market role a certain PU takes. In (III) Step (A) we conducted an online survey [8], expert interviews with specialists from the partner, and analyzed domain-specific literature. This resulted in an initial R-EA, which was validated again with the partner's experts. In (III) Step (B) we designed the workshop agenda for collecting the data at four PUs. Each workshop was conducted on two days and comprised of five different workshops slots, using a top-down approach. In the first slot PU's participants were managers and department chiefs (i.e. IT department, corporate development). The focus was to identify the PU's organizational structure, its market roles as well as their business-to-customer and business-to-business relationships. For the remaining four slots, it was decided to pick four domain-specific business processes (namely customer acquisition, meter data collection, consumption-based billing and house connection) and discuss each of them with the respective process owners of the particular PU. While the first slot focused on TOGAF's business layer, the latter four collected more detailed information also for the data and application layer.

In parallel to (III) Step (A) and (B) we developed a R-EA structure and defined modeling conventions according to section 4.2. After the analysis of the data from Step (A) we modified the TOGAF meta-model by concentrating on the most vital EA elements like business actor, function, application component or data object. Due to the problem domain, we excluded all elements from the technology layer. On the basis of this modified meta-model we identified four viewpoints to model each EA model for the R-EA development: *business function, actor cooperation, service realization (for each of the four business processes) and application structure viewpoint* [20]. Three project members modeled the workshop models. Following the defined R-EA structure, it was possible to minimize the different individual modeling intentions, that occurred in the beginning. During project internal modeling workshops, we further agreed on name conventions for the same phenomena.

In (III) Step (C) the R-EA was derived by analyzing the initial R-EA and the four workshop models. During internal modeling workshops we identified similarities regarding element types, their names and relationships with other elements for each viewpoint. This was conducted manually and thus assessed as very time-intense. Figure 5 visualizes an extract of the final R-EA, the service realization viewpoint of *"contract closing"*. A PU provides this service to the consumer during the customer acquisition business process. The model shows which processes (e.g. customer registration), IT systems (e.g. CRM software), business objects (e.g. Core Data of the consumer), additional services (e.g. Checkout former Supplier) and business events (e.g. form arrives) are related to the realization of closing a new contract with a consumer. It thus also reveals the interplay between TOGAF's business, data and application layer.

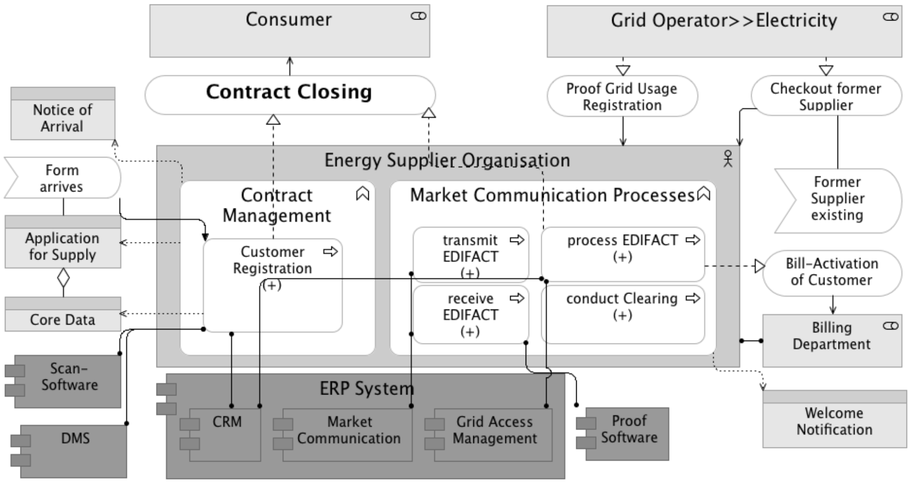

Figure 5. Extract of Service Realization Viewpoint for the Business Process Contract Closing

7 Discussion and Conclusion

Our work proposes a method for reference enterprise architecture (R-EA) development within a design science research (DSR) framework [16]. Therefore, the artefact builds on the configurative reference modeling (CRM) method [36] and extends it. Using technical actions research (TAR) [35], we apply the R-EA method in the problem domain of the energy industry and discuss the method's evolution. Our first contribution is the *(i) adaption of Configurative Reference Modelling to develop a R-EA*. We extend the CRM method and apply it for the R-EA development. Further, we suggest *(ii) a procedure how to elicit knowledge for R-EA development method*. These contributions answer RQ1. Thus, an approach for data collection is developed. We present a workshop design using participative modelling [40]. Next to knowledge elicitation the R-EA method extends CRM by providing an approach for defining a R-EA structure as well as an evaluation design of the resulting R-EA model (both addressing RQ2).

After one iteration of the regulative cycle [34], the R-EA method was assessed internally valid as the developed R-EA met the partner's expectations and was used in subsequent meetings with their clients, i.e. PUs. In terms of external validity resp. sensitivity analysis, we cannot make a credible statement so far, since the R-EA method needs to be applied to other problem domains. Currently, we apply it in a project located in the finance sector and first results indicate that the method is applicable to a different context.

Next to the validation results, there are several limitations of the R-EA method we want to point out. Although we stick to TAR by [35], the validation design holds a bias risk, since we as the method designers also applied it for validation. For future work, we should rather act as observers when applying the method in another use case. This leads to the limitation that we assess, that the method holds too much implicit knowledge for its application. This will be addressed by using a method conceptualization (e.g. [42]) and developing a method handbook. Further, the current version of the R-EA method mainly focuses eliciting the current state of practice in the problem domain, e.g. how PUs work at the moment in the changing market. Expanding this focus to future requirements of the problem domain would incorporate a *to-be* R-EA model. According to the experts this would raise the value of a resulting R-EA model. Moreover, the configuration aspect of the R-EA method needs to be investigated in more detail. This would enable to broaden the R-EA method's focus towards the application of a developed R-EA model a certain organization. Finally, also economic aspects of R-EA application have to be investigated.

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