MASTER

Characteristics of CKM processes in a value network
a multiple case study

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Characteristics of CKM processes in a Value Network:
A multiple case study

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1 Acknowledgements

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Luc van Merrienboer

Eindhoven, October 2015
2 Abstract

The development in value creation for the customer is entering a new chapter. Value is no longer generated through a firm’s product or service, but by a focus where the customer can create its own experience and co-create a solution based on his environment, context, and needs. Therefore, customers need to be supported by a network of firms in a way he receives the best experience.

In relation to this development this study takes a value network perspective. The value network is a collaboration network existing of relational processes between firms that influence the customer’s experience and the customer itself for co-creation, with the aim to provide a bundle of products and services that fulfil customer needs. Offering a solution in collaboration with partners and co-creation with customers starts with understanding of customers. For this customer knowledge (CK) is a prerequisite, since acquiring and analysing CK helps in understanding customer characteristics, needs, and preferences. To manage CK on value network level Bagheri et al. (2015a) introduced value network customer knowledge management (VN-CKM), which supports the alignment and development of services and products on value network level. They defined VN-CKM as “a strategic capability of a value network to collaboratively employ an on-going process of creation, storage, transfer, and usage of the value network knowledge ‘with’ customers that is applicable across the value network with emphasis on bi-directional interaction of multiple actors with customers, to all actors and customers benefits” (Bagheri et al., 2015a).

Based upon literature Bagheri et al. (2015b) developed a conceptual framework, which represents VN-CKM process characteristics. The VN-CKM framework can serves as a descriptive mechanism enabling practitioners to recognize their current situation with respect to CKM processes at a network level. Based on their situation next steps can be defined in improving CKM processes across their value network. This report reflects on the VN-CKM process characteristics of the conceptual framework in practice. With the aim to validate and enrich the conceptual framework, based upon practical insights.

In addition, to achieve an effective knowledge network an efficient collaboration should be achieved when dealing with a larger group of participants. To establish a more efficient collaboration an orientating study has been performed on IT requirements. Due to further developments in IT, support could be given to joint activities, integration, and communication among partners. The second goal is to link IT capabilities to the VN-CKM process, as orientation for future research.

To obtain results multiple case studies have been performed at an energy grid provider in the Netherlands. Three students of the technical university of Eindhoven were committed to data collection and analysis. Two Industrial Engineering Bachelor students studied each one case and an Innovation Management Master student performed two. The results obtained by the Bachelor students served as input for the master thesis project, along the reports of themselves. A close collaboration between the three involved students has been established to ensure valuable and comparable results.

The data was gathered through semi-structured interviews with employees of the studied cases and one partner. In close collaboration between the students and university supervisors an interview protocol has been developed to enable comparison of results. First, questions related to the VN-CKM process were formulated and next enriched with IT questions. This ensures a primarily focus on VN-CKM process characteristics and additional IT. Further, the interviews were held in duo and results discussed afterwards to enhance the alignment and comparison of results.

Results indicate that the conceptual framework is a valuable framework for managers to mirror and recognize their current situation. In addition, the conceptual framework can be used as descriptive mechanism and enables practitioners to improve their VN-CKM processes. However, the results should be considered with care. Since the studied cases were start-ups and could not
confirm all processes due to their orientating nature. Further research might look into more mature value networks.

The IT orientation part gives a first sight on how IT could have a role in supporting VN-CKM processes. Suggestions are made regarding, cloud computing, social media, communication, analytical abilities, system integration, and knowledge search support.
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# Abbreviations

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<th>Abbreviation</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>VN-CKM</td>
<td>Value Network – Customer Knowledge Management</td>
</tr>
<tr>
<td>CKM</td>
<td>Customer Knowledge Management</td>
</tr>
<tr>
<td>CK</td>
<td>Customer Knowledge</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer Relationship Management</td>
</tr>
<tr>
<td>KM</td>
<td>Knowledge Management</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>IOS</td>
<td>Interorganizational system</td>
</tr>
<tr>
<td>BIA</td>
<td>Business-IT alignment</td>
</tr>
<tr>
<td>PSS</td>
<td>Product Service System</td>
</tr>
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## 5 Definitions

<table>
<thead>
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<th>Concept</th>
<th>Definition</th>
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<tr>
<td><strong>Product-Service system/Value Network</strong></td>
<td>An on-going relational process, in which a provider aims to jointly solve the customer problem by reciprocal interaction and long-term collaboration with customers and other value network partners to deliver a bundle of goods and services to fulfil customer demands.</td>
</tr>
<tr>
<td><strong>Customer Knowledge Management</strong></td>
<td>A continuous process of generating, disseminating and using CK within organizations, with the purpose to learn about, from and with customers.</td>
</tr>
<tr>
<td><strong>Value Network - Customer Knowledge Management</strong></td>
<td>A strategic capability of a value network to collaboratively employ an on-going process of creation, storage, transfer, and usage of the value network knowledge ‘with’ customers that is applicable across the value network with emphasis on bi-directional interaction of multiple actors with customers, to all actors and customers benefits</td>
</tr>
<tr>
<td><strong>Good-dominant logic</strong></td>
<td>Tangible output and discrete transactions are central in creation of customer value.</td>
</tr>
<tr>
<td><strong>Service-dominant logic</strong></td>
<td>Intangibility, exchange processes, and relationships are central in creation of customer value.</td>
</tr>
<tr>
<td><strong>Case study</strong></td>
<td>A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>Context refers to a specific value co-creating situation when a constellation of resources and actors co-creates value through activities and interactions.</td>
</tr>
<tr>
<td><strong>Tacit knowledge</strong></td>
<td>Internalized knowledge through experience and practice, it is highly context dependent, complex and hard to code.</td>
</tr>
<tr>
<td><strong>Explicit knowledge</strong></td>
<td>General knowledge that can be coded, noted and stored. Users are able to apply it in different contexts without additional information.</td>
</tr>
<tr>
<td><strong>Socialization</strong></td>
<td>Conversion of tacit knowledge into tacit knowledge between individuals, with the key being experience. Due to the context dependency, the experience of emotions, contacts and handlings is important.</td>
</tr>
<tr>
<td><strong>Externalization</strong></td>
<td>Conversion of tacit into explicit knowledge relates to attempts of defining common concepts and making knowledge easier to share, through explicitly stating knowledge. A prerequisite for this is having a common understanding of the context.</td>
</tr>
<tr>
<td>Combination</td>
<td>Conversion of explicit to explicit, the combination mode. Sorting, adding, and categorizing of existing explicit knowledge can lead to new knowledge. Nowadays computers take this role more and more.</td>
</tr>
<tr>
<td>Internalization</td>
<td>Conversion of explicit to tacit knowledge is related to traditional 'learning' as we know from school, which is the internalization of knowledge.</td>
</tr>
<tr>
<td>Interorganizational systems</td>
<td>In the broadest sense, IOS consist of computer and communication infrastructure for managing interdependencies between firms. From a KM perspective, this infrastructure enables and facilitates knowledge flows amongst organizations (and their participating representatives) such that the needed knowledge gets to the relevant participants on a timely basis in a suitable presentation(s) in an affordable way for accomplishing their collaborative work</td>
</tr>
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1 Introduction

The introduction chapter explains the background of the Master Thesis. Based on the introduction the research goal and research questions are clearly stated. To conclude an outline of the report is given.

1.1 Problem Statement

The development in value creation for the customer is entering a new chapter. As Prahalad and Ramaswamy (2003) stated, ‘innovation must shift the focus away from products and services and onto experience environments [...] to co-create unique value for individual customers’. This shift in value creation is due to advances in different research fields, the globalization of the market, and most of all the more active role of customers in an increasingly networked society. Value is no longer generated through a firm’s product or service, but by a focus where the customer can create its own experience and co-create a solution based on his environment, context, and needs. This has a big influence on the current market organization, since customers start to combine and personalize offerings from different firms to their need, which blurs market borders, redefines functionalities of products and services, and makes collaboration and alignment key factors. Therefore, customers need to be supported by a network of firms in a way he receives the best experience.

In relation to this development this study takes a value network perspective. The value network is a collaboration network existing of relational processes between firms that influence the customer’s experience and the customer itself for co-creation, with the aim to provide a bundle of products and services that fulfil customer needs. The partners and customers in the value network are the relevant actors. Establishing partnerships with related firms therefore is required.

The involved firms still might be good-dominant or service-dominant oriented (Prahalad and Ramaswamy, 2003), however to create an experience for the customer the interaction between involved firms and the customer must be fine-tuned and adapted to the customer’s preferences. Through collaboration and alignment the value will be larger than the sum of the individual value propositions. Preferences and experiences of the customer depend upon his context, individual perception of the context, involvement and personal meaning (Gannage, 2014; Edvardsson et al., 2013). Therefore the experience environment should be a robust, though flexible network of firms and customer interaction channels to assess the context and time specific needs.

Offering a solution in collaboration with partners and co-creation with customers starts with understanding of customer needs (Bagheri et al., 2014). For this customer knowledge (CK) is assumed to be a prerequisite, since acquiring and analysing CK helps in understanding customer characteristics, needs, and preferences (Weng and Huang, 2012). Based upon these insights the value network is able to improve their solution performance. Customer relationship literature describes four categories of CK, namely knowledge for, about from and with the customer (e.g. Gebert et al., 2002; Buchnowska, 2011). Knowledge ‘for’ the customer is required to satisfy the knowledge needs of customers, for example knowledge about the product, service or market. Knowledge ‘about’ the customer is accumulated to understand the motivations of customers and to refine the solution. Knowledge ‘from’ the customer is feedback on products, services and the market, which can be used to improve firms their offering. The fourth CK category is focused on the bi-directional interaction between customers and firms, through dialogues and cooperation (Bagheri et al., 2015a). Knowledge co-creation ‘with’ customers is an interactive process to create joint value and mutual benefits.

Besides the four categories of CK, knowledge management (KM) research highlights characteristics of knowledge. A distinction is made between two knowledge dimensions explicit and tacit knowledge. Explicit knowledge can be coded, written down and be stored, it is slightly context dependent (Oliva, 2014). Tacit knowledge on the other hand is harder to code, complex
and highly context dependent, it is internalized knowledge through experience and practice (Oliva, 2014). To create knowledge both dimensions are relevant, Nonaka et al. (1994) showed interplay between the dimensions is necessary. Based on the previous mentioned two knowledge dimensions, the authors identified and confirmed four dimensions of knowledge conversion. First of all, tacit to tacit where social interaction is crucial due to the hard to express and context dependent nature of the knowledge. Key in this process is to understand the context to eventually understand other's thinking processes. Second, tacit to explicit where tacit knowledge is tried to note down based on shared definitions and context. Third, explicit to explicit that refers to combining each other's explicit knowledge to create new insights. Fourth, explicit to tacit that refers to internalization of coded knowledge into daily routines.

To benefit from the gathered customer knowledge and its related characteristic, it should be managed within the value network. This study therefore focuses on customer knowledge management in the value network (VN-CKM). Customer knowledge management (CKM) exist of the processes creation, storage, transfer and application (Bagheri et al., 2015a), with the aim to improve the customer understanding and enhance the customer experience of using the solutions. To increase the customer's experience in a value network, these processes need to be extended towards a value network perspective. VN-CKM is defined as 'a strategic capability of a value network to collaboratively employ an on-going process of creation, storage, transfer, and usage of the value network knowledge 'with' customers that is applicable across the value network with emphasis on bi-directional interaction of multiple actors with customers, to all actors and customers benefits” (Bagheri et al., 2015a).

To achieve an effective knowledge network, Li et al. (2012) found three practices to be of importance. Partners should be motivated to participate and contribute valuable knowledge to the network. In relation, collective actions of all partners should be maintained and free riders expelled. Next an efficient collaboration should be achieved when dealing with a larger group of participants. To establish a more efficient collaboration research proposes to align business and IT strategies (Bagheri et al., 2014), which is a specific focus of this thesis. “Information technology (IT) makes joint activities, integration, and communication among partners possible”, where alignment with the business strategy is crucial for the level of success (Bagheri et al., 2014).

Literature on KM networks already highlighted some IT capabilities recommended to enhance the collaboration. For example, Chi and Holsapple (2005) showed for different network configurations different IT capabilities are used. They found, for example, that in a networked configuration (multiple firms collaborate with the same goal) ‘interfirm cooperative work’ is an important capability to develop. In contrary, Ramesh and Tiwana (1999) showed an approach towards establishing IT capabilities. Where IT capabilities are distilled from VN-CKM issues, which is problem solving based.

Given the previous introduction on market developments, new focus points are customer experience, co-creation and collaboration on value network level. To create a customer experience with a value network, acquiring and managing customer knowledge is an important factor (Weng and Huang, 2012). Therefore, this master thesis looks into characteristics of VN-CKM processes, which is an under researched concept in current literature. A first initiative is taken by Bagheri et al. (2015b), which developed a conceptual framework based upon relevant literature. A practical evaluation of this framework would enhance insights into VN-CKM process characteristics and point out missing or irrelevant characteristics. In addition, due to the development of IT in the recent years, the role of IT in supporting VN-CKM processes is researched on an orientating level. IT can streamline joint activities, integration, and communication among partners (Bagheri et al., 2014), creating an efficient process. Hence, it is interesting to look into the possibilities IT offers in supporting VN-CKM processes and suggest future research directions.
1.2 Research Goal
In combination the concepts customer experience, VN-CKM processes and Business-IT alignment (BIA) might be a source of innovation and valuable propositions, which are key for a competitive advantage. Combinations of the topics are, however, to a limited extend explored by researches.

In a first attempt Bagheri et al. (2014, 2015a, 2015b) tried to link the three concepts. In their papers a theoretical foundation is established around customer understanding, VN-CKM and BIA. For the VN-CKM process the organizational knowledge creation model of Nonaka et al. (1994) has been used, to take the tacit and explicit characteristic of knowledge into account and their interplay. In this thesis it is tried to see if the theoretical findings are reflected in practice and if some adjustments or alternations are needed. The first goal is to validate and enrich the conceptual framework on VN-CKM process characteristics in practice to establish a customer experience. The second goal is to link IT capabilities to the VN-CKM process characteristics, as orientation for future research.

This thesis makes both practical and theoretical contributions, based upon performed case studies. The key theoretical contribution is the validation and enrichment of the on literature based VN-CKM framework of Bagheri et al. (2015b) (Appendix 10.1.1). A graphical representation of the VN-CKM processes is given in figure 1.1. Second, an orientating insight on IT support in relation to the VN-CKM process is provided.

From a practical point of view, the VN-CKM conceptual framework can serves as a descriptive mechanism enabling practitioners to recognize their current situation with respect to CKM processes at a network level. In addition, they can define next steps in improving CKM process across their value network. Individually, the business managers might obtain more insight into establishing a customer experience with partners in the value network concerning CK sharing. Both contributions are to a limited extent addressed in literature and therefore this study might enrich managers’ insights.

![Figure 1.1 VN-CKM processes (Bagheri et al., 2015b)](image)

1.3 Research Question
To guide the research in obtaining its objective, research questions have been developed. The main research questions are supported by sub-questions to structure the research and help to detect the fine grains underneath them.

RQ1. How reflect the VN-CKM process characteristics of the conceptual framework of Bagheri et al. (2015b) in practice?

- What VN-CKM characteristics are identified in the creation process in practice?
- What VN-CKM characteristics are identified in the storage process in practice?
- What VN-CKM characteristics are identified in the transfer process in practice?
- What VN-CKM characteristics are identified in the application process in practice?
RQ2. What are relevant IT requirements, regarding VN-CKM processes support?

- What IT requirements are proposed in literature?
- What IT requirements are identified in practice?
- What future research directions can be identified?

For creating a customer experience, understanding the customer and alignment with partners is essential. In order to understand the customer and address his needs properly managing customer knowledge in the value network is key. Due to the IT developments of recent years, the supporting capability has increased and could support understanding the customer in the value network.

1.4 Outline

This section describes the structure of the report. First, in the current chapter, an introduction is provided on the relation between the thesis project, the research goal and related research questions. In the following chapter is elaborated on Value Network and VN-CKM from a literature perspective. Next, the research approach and methodology are explained. The studied cases are introduced in chapter four. In the subsequent chapter the results on VN-CKM characteristics are presented. To address the second focus of the thesis a literature review on IT requirements for VN-CKM is performed and presented in chapter six. Chapter seven addresses the limitations of the performed study. The final chapter concludes this report and highlights future research directions.

2 Literature

To elaborate more on the first and primarily research question an in-depth literature analysis on VN-CKM process characteristics is carried out. In the following first an elaboration on value network is discussed. Next VN-CKM is addressed, with in addition the separately VN-CKM processes.

2.1 Value Network

As Prahalad and Ramaswamy (2003) stated, ‘innovation must shift the focus away from products and services and onto experience environments [...] to co-create unique value for individual customers’. This shift in value creation is due to advances in different research fields, the globalization of the market, and most of all the more active role of customers in an increasingly networked society. Value is no longer generated through a firm’s product or service, but by a focus where the customer can create its own experience and co-create a solution based on his environment, context, and needs. Customers are not merely seen as passive recipients of products and services, but as additional knowledge partners (Rowley et al., 2007). This has a big influence on the current market organization, since customers start to combine and personalize offerings from different firms to their need, which blurs the current market borders, redefines functionalities of products and services, and makes collaboration and alignment key factors (Tax et al., 2013). Therefore, a network of firms needs to support customers, in a way they receives the best experience.

In the relevant research discipline ‘product-services systems’ (PSS) the focus is on creation of a value network (Beuren et al., 2013). This research discipline has emerged in the recent years and its definition and objectives are not yet commonly defined. In this study PSS is defined as “an on going relational process, in which a provider aims to jointly solve the customer problem by reciprocal interaction and long-term collaboration with customers and other value network partners to deliver a bundle of goods and services to fulfil customer demands” (Bagheri et al., 2014). This definition stresses collaboration with value network partners and customers to jointly solve the customer problem, with an integration of physical products and services. In contrary, the objective of some PSS articles is to reduce consumption by altering how products and services are used in a close collaboration with value network partners and customers.
(Beuren et al., 2013). During the master thesis this objective is seen as additional benefit of the close collaboration and tailoring of services and products, not as primarily aim.

Individual firms still might be good-dominant or service-dominant oriented (Prahalad and Ramaswamy, 2003), however to create an experience for the customer the interaction between involved firms and the customer must be fine-tuned and adapted to the customer’s preferences. Literature refers to four collaborative activities regarding value co-creation within a network, namely 1) diagnosing needs, 2) designing and producing the solution, 3) organizing the process and resources, and 4) implementing the solution (Aarikka-Stenroos and Jaakkola, 2012; Tuli et al., 2007). These activities do not represent a sequential process though compose an iterative process with customers and value network firms. Of both actors an active attitude is required during the activities.

The experience environment should be a robust, though flexible network of firms and customer interaction channels, to assess and act upon the context and customers needs. Tax et al. (2013) identified four main dimensions of aggregated service delivery networks, from the customer perspective. The first dimension they mention is ‘formality of the service provider network’, which highlight that networks can vary from formal interactions (i.e. managed with contracts) to situation with no formal interactions where interaction is, for example, determined by customer choice or geographic location. Networks based upon formal interactions can provide a more integrated solution, due to their commitment and close collaboration in comparison to less formal networks. Second Tax et al. (2013) discuss the relationship goal of customers, to which they refer as ‘transactional or relational goals’. Customers may prefer long-term relationships with firms or only deal on a transactional basis. A mix of both within the value network might exist as well, for example the same hotel is often booked but the reservation is done via multiple travel booking sites. From a firm perspective, it might be that multiple actors in the value network would like to have long-term relationships with customers and potentially cause conflict between them. With long-term relationships the experience of customers can be enhanced, since firms begin to see the customer’s perspective and needs. Third, the freedom of selecting additional value providers influence the value network, which is called ‘freedom in selecting providers’. In some value networks the customers are constrained in using preselected co-providers. This enables to create a higher predictability in service encounters, and due to the common interest it is likely to lead to a more integrated solution. In the contrary, the selection of additional providers can be unconstrained. This provides more freedom for customers, which is likely more attractive for them, however it introduces a higher complexity for involved firms, and less appealing to create integrated solutions. At last, Tax et al. (2013) discuss the ‘complexity of service offering’. Complexity is made up of the number of elements involved and the unpredictability of interactions amongst customers and firms. When the complexity increases involved firms need to manifest more flexibility, compatibility, consequential decisions, and information exchange and coordination.

2.2 Customer Knowledge Management

To create an experience environment, understanding the customer needs on value network level is necessary (e.g. Bagheri et al., 2015a; Aarikka-Stenroos and Jaakkola, 2012). To better understand customers, in this report customer knowledge (CK) is taken as point of view. Since accumulated CK can provide valuable insights in customer characteristics, needs, and preferences (Weng and Huang, 2012). Based upon this CK the value network can offer an aligned solution that complies with customers’ needs, preferences, and expectations. Since CK has increasingly been recognized as a significant resource that can be managed, this report focuses on customer knowledge management (CKM). More specifically the perspective of value network customer knowledge management (VN-CKM) is taken, as introduced by Bagheri et al. (2015a).

CKM is defined as a continuous process of generating, disseminating and using CK within organizations, with the purpose to learn about, from and with customers (Rollins and Halinen, 2005). Many papers link CKM to customer relationship management (CRM) and knowledge
management (KM) (e.g. Gebert et al., 2003; García-Murillo and Annabi, 2002). Both concepts separately promise positive impacts on the status of an organization, however a combination of both concepts even further enhances the impact by managing and applying the inside knowledge to better serve the outside customer (e.g. Gebert et al., 2002; Rollins and Halinen, 2005). A comparison between all three concepts is given in Appendix 10. Due to the close relationship among the three concepts, in this report their contribution towards an experience environment is combined and reflects in activities suggested by theory while discussing VN-CKM processes.

In this report the VN-CKM process definition of Bagheri et al. (2015a) has been used. VN-CKM is “a strategic capability of a value network to collaboratively employ an on-going process of creation, storage, transfer, and usage of the value network knowledge ‘with’ customers that is applicable across the value network with emphasis on bi-directional interaction of multiple actors with customers, to all actors and customers benefits” (Bagheri et al., 2015a). Managing CK on value network level facilitates the creation of a shared understanding on needs and preferences of customers among network partners, which supports the creation of an aligned solution ‘with’ customers (Bagheri et al., 2015a). The concept CKM is in this respected extended with collaborative activities among partners, multi-actor interactions, and a continuous learning experience of all actors with customers.

With CKM having roots in knowledge management (KM) and customer relationship management (CRM), knowledge processes and knowledge characteristics make up CKM focus points (Gebert et al., 2002). KM is focused on systematic handling of knowledge through the KM-lifecycle processes creation, storage, transfer and application (Alavi and Leidner, 2001; Gebert et al., 2002). The creation phase involves the development of new and replacing outdated knowledge (Alavi and Leidner, 2001). Through personal interactions, collaborations, combinations and individual cognitive processes, new knowledge is obtained. In addition to creation, organizations sometimes forget to store knowledge and lose track of it. Therefore, storage, organization and retrieval of knowledge are important aspects of KM and covered in the storage step. Next, obtained knowledge needs to be transferred to location where it is required and can be used (Alavi and Leidner, 2001). However, as Alavi and Leidner (2001) state, “it is not a simple process and most organizations do not know what they know”. Most often knowledge is shared via the traditional communication routines. At last, to leverage on knowledge it needs to be applied or act upon, this enhances the customer experience and improves the competitive position of the value network. The KM-lifecycle processes should not be seen as discrete and sequential, though as dynamic. Instead the value network’s organizations, employees, and customers are engaged in the multiple steps of the KM-lifecycle processes at any given time.

Besides the KM-lifecycle process, the knowledge characteristics are important. First of all, within the information science discipline a distinction is made between data, information, and knowledge (Zins, 2007). Which are used extensively and often in an interrelated and sequential relation, meaning that data is input for information and information is input for knowledge. The distinction between data, information and knowledge is often made on the level of abstraction, understanding or truthfulness (Chen et al., 2009). This results in vague relations between data, information and knowledge in both use and interpretation. In this report the distinction as made by Alavi and Leidner (2001) is applied; “a commonly held view with sundry minor variants is that data is raw numbers and facts, information is processed data, and knowledge is authenticated information”.

That being the case, this master thesis project focuses specifically on customer knowledge, which in literature is divided into four categories encompassing knowledge for, about, from, and
with the customer (Gebert et al., 2002). Knowledge ‘for’ the customer is required to satisfy the knowledge needs of customers, for example knowledge about the product, service or market. Knowledge ‘about’ the customer is accumulated to understand the motivations of customers and to refine the solution. Knowledge ‘from’ the customer is feedback on products, services and the market, which can be used to improve alignment between partners. The fourth CK category is focused on the bi-directional interaction between customers and firms, through dialogues and cooperation (Bagheri et al., 2015a). Knowledge co-creation ‘with’ customers is an interactive process to create joint value and mutual benefits.

Often is spoken of two dimensions of knowledge, explicit and tacit. Explicit knowledge can be “articulated, codified and communicated in symbolic form or natural language” (Alavi and Leidner, 2001), where context is less important to understand its meaning. Tacit knowledge, in the contrary, is much harder to express and resides insight people. It contains both cognitive and technical elements, it depends upon ones mental model and beliefs, and concrete-knowledge and skills in a particular context (Alavi and Leidner, 2001). Due to context dependency differences, explicit knowledge is easier to share.

Nonaka et al. (1994) stated that a focus on only tacit or explicit knowledge for creation of knowledge would diminish its value. A single focus on tacit knowledge would make it only applicable in a specific situation, whereas a single focus on explicit knowledge would make it lose its association with reality. Therefore, both dimensions are not single knowledge entities, in the contrary they are closely related. In the SECI-model Nonaka et al. (1994) describe the interplay between tacit and explicit knowledge and identified four transition modes. A graphical representation of the modes is given in figure 2.1; the four identified modes are socialization (t-t), externalization (t-e), combination (e-e), and internalization (e-t). The first mode refers to the conversion of tacit knowledge into tacit knowledge between individuals, with the key being experience. Due to the context dependency of the first mode, the experience of emotions, contacts and handlings is important. The second single dimension of knowledge conversion is explicit to explicit, the combination mode. Sorting, adding, and categorizing of existing explicit knowledge can lead to new knowledge. Nowadays computers take this role more and more. The other two modes insinuate that tacit and explicit knowledge are complementary and can be transformed over time. The conversion of explicit to tacit knowledge is related to traditional ‘learning’ as we know from school, which is the internalization of knowledge. The conversion of tacit into explicit knowledge relates to attempts of defining common concepts and making knowledge easier to share, through explicitly stating knowledge. A prerequisite for this is having a common understanding of the context.

Bagheri et al. (2015b) combined the previously discussed customer knowledge processes and knowledge dimensions in their literature review. As stated, the authors extended CKM to VN-CKM. In the core they combined the four CKM processes and the SECI-model, which gives a focus on the CKM processes in the value network and on the four modes of knowledge translation. Form literature and via logical reasoning, it was noticed that not each mode can be reflected to be VN-CKM processes. For example, the storage of T-T knowledge is not included in the framework. Since tacit knowledge resides inside people and is context dependent, this restricts recording knowledge.

Concerning the conceptual framework of Bagheri et al. (2015b), in the following the individual CKM processes are addressed at a value network level. A summary of characteristics of each VN-CKM process is given in their conceptual framework and can be found in Appendix 10.1.1.

2.2.1 VN-CKM creation process

The creation phase involves the development of new and replacing of out-dated knowledge in collaboration with all actors in the value network. Through personal interactions, collaborations, combinations, co-creation and individual cognitive processes, new CK is obtained and shared within the value network. Both explicit and tacit CK should be taken into account. More to say a dynamic interaction between both knowledge dimensions is required (Nonaka et al., 1994). A single focus on one mode limits the interpretation and application of results. In the conceptual
framework, all four conversions modes of knowledge are included, and are discussed in the following (Bagheri et al., 2015b).

As previously explained, key to ‘socialization’ (t-t) is obtaining a deep understanding of customers’ emotional experience by involved value network actors, due to context dependency. Therefore, in co-creation between customers and partners capturing emotions, context, problems, needs, symbols and non-utilitarian aspects of consumption are main focus points (Payne et al., 2008). These points enable the involved actors to create a shared form of experience, helps in creating a shared understanding of customers’ problems, and directs the solution with a customer centred focus (Nonaka et al., 1994, Payne et al., 2008). To gather tacit CK, KM research suggests having frequent interaction with customers. One could think of interactions during the traditional customer buying phases orientation, buying and implementation, but as well in organize sessions to brainstorm with customer or to brief them about solutions (e.g. Hakanen, 2014; Frow and Payne, 2007). This enables a comprehensive conversation with the transfer of non-verbal cues and immediate feedback, supporting the creation of a common context, solution requirements and understanding among the value network actors (Mahr et al., 2014). Trust between the involved actors is key to flourish this conversation, since trust makes customers more willing to explain difficulties and needs with the partners of the value network (Hakanen, 2014; Aarikka-Stenroos and Jaakkola, 2012). The final objective is to create a mutual understanding on the customer value creating processes between partners and customers (Payne et al., 2008). The customer-oriented perspective enables the value networks to align their processes with those of the customer and helps understanding their problems and solution requirements. The first row of the conceptual framework provides a comprehensive summary of tacit-tacit CK creation on value network level (Bagheri et al., 2015b).

Tacit knowledge is restricted by temporal and geographic constrains, requiring customers and partners to be at the same time at the same place (Mahr et al., 2014). Since this cannot always be arranged the translation of tacit into explicit knowledge is interesting, which reduces the effect of both constrains. Clear agreements, an overall understanding on the context and used concepts should be created, so customers and partners can communicate on distance and independent of time. The creation of explicit CK among value network actors can be done in multiple ways, for example by analysing CK from co-creation activities from which general problems and opportunities can be identified, or via close collaboration during development of the value network processes and definition of roles and responsibilities (e.g. Fang and Zou, 2010; Wetter-Edman et al., 2014). The drawback of making tacit knowledge explicit is the loss of context. Therefore, design research proposed storytelling, visualization and mapping out customer processes as alternatives to reduce the loss of context (Wetter-Edman et al., 2014; Frow and Payne, 2007). These alternatives give a graphical representation and enable others to picture the situation, which might also be valuable in value network collaborations. Tools like service-blueprints or service system maps help providing insight in the current processes and their analysis. In an iterative process, with meetings between network actors the graphical presentation can be constantly fine-tuned (Frow and Payne, 2007). This ensures an overall agreement on the experience environment, customer needs, and collaboration to achieve goals (e.g. Hakanen, 2014; Wetter-Edman et al., 2014). From literature identified characteristics in relation to the IDEF-model are given in the table of Bagheri et al. (2015b), in the T/E creation row.

In the contrary to tacit-tacit CK creation, there is explicit-explicit CK creation referring to sorting, adding and categorizing explicit knowledge into new CK (Shang et al., 2009). Explicit knowledge enables value network actors to discuss concepts and recombine scattered sources in the value network to create new, or update existing CK. For the combination of knowledge in a supply chain Samuel et al. (2011) suggest four influential dimensions ‘integration of experiments’, ‘using several tools’, ‘creation of knowledge’, and ‘development of common tools’. These might also be valuable in a value network environment, since both situations are comparable. One could think for example of integrating customer experience along the value
network, the individual performed researches might complement each other and the customer approach process might be optimized. In a health care situation it might be that diabetic patients start to look for both exercises and nutrition information. Since both disciplines have specific knowledge on helping diabetic patients, combining the insights into a package and present it to people would enhance the search experience. To enhance the efficiency of the combination phase routines and mechanisms can be introduced in the value network to make the sharing of explicit CK run smoothly between partners (Shang et al., 2009; Samuel et al., 2011). Providing knowledge in similar formats, could improve reading, understanding, and combining CK. Where there might be a role for IT in presenting the knowledge, but as well identifying gaps in the experience offering (Samuel et al., 2011). One could think of data mining of gathered measures in the value network. The final objective of combining explicit knowledge is to identify new patterns of fit between the solution offering and customer needs in terms of experience (Li et al., 2012). A comprehensive theoretical summary of explicit knowledge conversion is given in the E/E creation row of the conceptual framework (Bagheri et al., 2015b).

In the contrary to translating tacit into explicit knowledge, explicit knowledge can be translated into tacit knowledge. The conversion of explicit to tacit knowledge is related to traditional ‘learning’, which is internalization of knowledge through a process of ‘learning by doing’ (Nonaka et al., 1994). Translated towards customer experience, value network firms should support customers in using the solution (Tuli et al., 2007). According to the study of Tuli et al. (2007) customer value delivery and installation of the solution in their context, which sometimes leads to new requirements but with a main focus on explaining the utilization of the solution. This enhances the value derived from the solution and makes it concrete in the customer context. Customers can be informed about the abilities of the solution in multiple ways, they can for example be given training or offered reading material. The challenge is to align value network actions based upon gathered or created explicit knowledge and providing it to customers (Samuel et al., 2011). Therefore, establishing network routines in offering the right information is important. Characteristics of the internalization mode are presented in the E/T creation row of the theoretical framework (Bagheri et al., 2015b).

2.2.1 VN-CKM storage process
The second step of the CKM-lifecycle process is storage, which is the process of identifying, evaluating and capturing relevant and valuable CK of value network activities, and store these on locations (Li et al., 2012; Parent et al., 2014). This takes the experience of value network actors and created CK a step further and preserves them, which creates a value network memory of accumulated CK, and facilitates the use of the CK potential among involved actors. But also, protects against departures of actors and loss of their knowledge. To store CK, it first needs to be made explicit. Therefore, only externalization (t-e) and combination (e-e) as transition modes of the SECI-model are discussed in the following.

The combination mode deals with two explicit formats that might be used to recombine and enhance the solution offering with customer needs. To store and retrieve explicit knowledge efficiently in a value network, Li et al. (2012) suggest linking different knowledge repositories of partners based upon supply chain insights. In value network perspective this might be a good suggestion as well. Linking CK repositories enables the value network partners to access the scattered CK and use it to improve the solution offering by linking it to their own CK. To enhance the CK retrieval agreements on CK coordination formats and locations need to be made (Parent et al. 2014). The objective should be to develop common interfaces, and a unified and organized access to the multiple repositories. Bagheri et al. (2015b) provided a comprehensive analysis of characteristics, their findings are presented in the E/E storage row.

The externalization mode is concerned about converting tacit knowledge into explicit knowledge. Based upon supply chain knowledge integration research Li et al. (2012) suggest capturing tacit knowledge via interviews or observations in the value network. Based upon the input a set of scenarios and related responses can be assembled, experiences can be documented, and knowledge organized. Performing interviews or observations might be
valuable in value network perspective as well. It helps value network actors in identifying common concepts, which can be used to document experiences and scenarios, and organize the CK. Further Li et al. (2012) suggest the implementation of a knowledge inventory map, which shows where knowledge, skills and expertise reside in the supply chain. This enables partners easy access to required knowledge or ask for appropriate support. Again developing a CK inventory map on network level can be a useful activity. It might help value network partners as well to oversee which partners entail what CK or specific customer expertise. In the end the suggested activities help in creating an efficient storage and access to tacit-explicit knowledge conversion. A comprehensive overview of the identified characteristics from literature on T/E storage is presented in the framework of Bagheri et al. (2015b).

2.2.1 VN-CKM transfer process

In contrast to knowledge creation with a focus on the demand side, knowledge transfer is concerned about the supply side of knowledge (Shih et al., 2012). The creation of CK might be an individual activity, however in order to create a customer experience the obtained CK needs to be shared so the value network can learn from one another and innovate the solution offering (Easterby-Smith et al., 2008). This helps the value network to continuously occupy a competitive position on the market. Transfer of skills, experiences, and insights can be both tacit and explicit, urging the value network to use multiple interactive mechanisms. One can think of meetings, interactions with customers, but also written documents and forums that reduces the imposed constrains of time and place. Both dimensions of knowledge can be shared, however not all transition modes will be discussed. For knowledge transfer the input knowledge dimension is important, it is assumed that the same transfer characteristics between partners and customers apply in a x-t and t-e, or e-e and e-t situation. In both situation knowledge is either offered in a tacit or explicit form, respectively. Only the translation into a new form of knowledge by partners and customers differs, this however is assumed to be a creation activity (Gupta and Polonsky, 2014). For this reason in the following the modes combination and socialization are discussed.

Transferring explicit CK is less context dependent and more formalized. Overall KM literature mentions that transfer of explicit knowledge is supported by mechanisms like documents, contracts, blueprints and even hardware (e.g. Easterby-Smith et al., 2008). Since those mechanisms are quite formal of nature, they might as well reflect in value network collaborations with partners and customers. One could think of customer research that is documented in reports, but as well of mapping out customer interaction points in blueprint formats. Since explicit knowledge has a concrete nature, IT tools can play a significant role in the transfer. It has been noticed that firms developed platforms, use e-mail or create websites to interact with customers and partners (e.g. Hakanen 2014, Shih et al., 2012). Creating a knowledge transfer system is difficult due to the integration of numerous business processes, data and IS (Shih et al., 2012). However, if properly implemented it provides knowledge in time, accurate and reliable (Bagheri et al., 2015b). In the modern times of today the use of IT might be as well a resource of transferring explicit format in the value network. A comprehensive overview of the identified characteristics from literature on E/E storage is presented in the framework of Bagheri et al. (2015b) in the row E/E transfer.

Learning from one another in a tacit way involves interactions between customers and partners. KM literature mentions multiple ways of sharing tacit knowledge with partners and customers, for example meetings, workshops, conferences, and even transfer of skilled employees (e.g. Feller et al., 2009; Hakanen 2014; Fang and Zou, 2010). Underlying these activities are discussions, dialogues and face-to-face communication, which support the transfer of tacit knowledge. Along theory mentions social factors like trust, risk, and mutual norms, which triggers the customers and partners willingness to collaborate and sharing their experiences (Easterby-Smith et al., 2008; Fang and Zou, 2010). Converted to transferring CK in a value network, these activities are expected to be valuable as well for sharing tacit CK with partners. Since knowledge transfer is an iterative process, these new processes, knowledge, and
competences shall need alterations along the way. Bagheri et al. (2015b) group their theoretical findings in the T/T transfer row.

2.2.1 VN-CKM application process

The final CKM-lifecycle process is application, which is aimed at leveraging on the acquired, stored and transferred CK to enhance the customer experience and improve the competitive position of the firm and value network (e.g. Hakanen, 2014; Li et al., 2012; Tuli et al., 2007). Since application of knowledge is an explicit knowledge process, only the combination phase will be addressed. Between value network actors CK can be used to coordinate processes, and align the involved solution products and service, to improve the solution (Li et al., 2012; Hakanen et al., 2014). For example, based on CK it might be concluded that customers want to be better supported in the use of the provided solution or explanation of its operation. Overall the customers can be better supported throughout the customer lifecycle; roughly existing of diagnosis of needs, development of solution, preparation for implementation, support during use, and post-deployment support (Aarikka-Stenroos and Jaakkola, 2012; Tuli et al., 2007). Since multiple of these activities are performed by different actors in the value network a good coordination and alignment is needed. Literature suggests developing network routines and contracts would positively influence this (Tuli et al., 2007; Li et al., 2012; Hakanen, 2014). An overall analysis of the literature is given in the last row of the conceptual framework of Bagheri et al. (2015b).

The four CKM-lifecycle processes discussed above complement each other in an iterative way. In a stable environment their operations are primarily a process of creation and fine-tuning. In the contrary, in a dynamic or evolving value network the four processes are all intensively used so the customer experiences becomes or remains top of the shelve (Li et al., 2012).

3 Research Methodology

This chapter addresses the research strategy, design choices and techniques used to answer the questions of the Introduction chapter.

Three students of the technical university of Eindhoven were committed to data collection and analysis. Two Industrial Engineering Bachelor students studied each one case and an Innovation Management Master student performed two. The results obtained by the Bachelor students served as input for the master thesis project, along the reports of themselves. A close collaboration between the three involved students has been established to ensure valuable and comparable results.

In the following first the research process is presented, followed by the research strategy. Next the study design is explained in detail, addressing data identification, study design, case selection, data collection, data analysis and conclusion. A discussion about the quality of the research methodology concludes the chapter.

3.1 Research Process

As an introduction to the general approach of the master thesis project, this paragraph represent the main steps performed to conduct the research.

As a first step a literature study has been performed, with the main focus on value network collaboration in order to establish a customer experience. The literature study helped in getting a firm grasp on related concepts, way of thinking, interrelations and used definitions. Through which a better understanding of the conceptual framework of Bagheri et al. (2015b) was obtained and a better selection of cases could be made. In addition insights supports the preparation of the semi-structured interviews, which enhances the relevance of collected data.

In addition to the core of the literature study, an orientation on IT in value network perspective has been performed. Supporting the second research question, which is aimed at taking a first
step in identifying IT requirements in creating and supporting a customer experience on value network level. The obtained insights have been used as well to enhance the relevance of collected data, by adding IT questions in the interview protocol.

Next an orientation amongst possible cases to study has been performed. Resulting in four start-up value networks operating in the energy market. Two of those cases are discussed in detail in this master thesis report, the others separately in two Bachelor project reports. Graphical representations of the value networks and an explanation of the relations provide clear insight in the value network actors and customer experience creation. This constitutes the basis for the research, interviews, and conclusions.

The second part, and main focus of the master thesis, is concerned with the validation and enrichment of the conceptual VN-CKM framework of Bagheri et al. (2015b). Semi-structured interviews have been performed and analysed to obtain insights on practical characteristics. The results confirm (or parts of) the framework and propose enrichments when practical findings indicated derivations from the theoretical model. The analysis part helps in answering RQ1 and establishes the basis for answering RQ2.

In the third part of this report the focus is on IT in relation to VN-CKM processes and issues. This part is in addition to the main purpose of validating the conceptual framework, and serves as an orientation. First, an orientating literature review on VN-CKM IT and related fields is performed. This shows what is previously explored by researches and provides insight on approved and efficient solutions for supporting VN-CKM processes. The literature review forms the basis for and helps in answering RQ2.

Based on the analysis part of IT and the orientating literature review on IT, future research directions are proposed to support VN-CKM processes. This answers RQ2, by identifying issues and linking approved solutions to it.

To conclude the master thesis, limitations, general conclusions and future research are pointed out.

### 3.2 Research Strategy

A case study is performed to answer the research questions. A case study is defined as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2003). Which favours the case study strategy in situations where contemporary events are investigated, and behavioural events cannot be influenced or influence on the context is not desired. For this research it is desired to capture the contemporary events like interactions, contexts, and complexities in a value network. Therefore, an influence on events is unnecessary; the aim is to capture the current situations and activities. Besides, case studies are preferable in situation when little is known or poorly understood about the research phenomenon (Yin, 2003). This is clearly the case in the subject of this thesis, since a small amount or research reports on the extension of CKM towards CKM in a value network. To sum up, performing a case study is a suitable strategy in answering the research questions.

Besides the advantages of a case study, as being able to capture multiple and complex relations, and taking context into account, case studies do have their limitations (Yin, 2003). Performing a case limits the influence on the behaviour of events and statements about the past cannot be made. Also case studies are less applicable when one wants to get results on where, how many or how much alike questions. These points are, however, not of interest for this study. However must be considered since it raises limitations to the conclusions.

### 3.3 Study design

The research design is a logical plan that links the collected data to the research questions, with the aim to obtain well founded conclusions (Yin, 2003). Which makes it different from the research process that is focused on the steps to be taken.
3.3.1 Data Identification

To make the studied concept more concrete and guide the data collection, propositions and a unit of analysis are defined (Yin, 2003).

In this report the characteristics, as presented in the conceptual VN-CKM framework of Bagheri et al. (2015b), have been used to direct the attention of the research and served as propositions. The identification of IT support is based on the comparison between the literature study and the performed interviews. This is an exploratory activity and no propositions are formulated.

The 'case' under consideration is defined in the unit of analysis (Yin, 2003). In this report the unit of analysis is customer knowledge management processes in the value network, delineated by the processes creation, storage, transfer and use among partners that influence the customer experience. In addition, specific interest is given to IT support.

3.3.2 Case study design

There are four basic types of case study designs, based on the criteria single versus multiple cases, and holistic versus embedded studies. A single case study design is appropriate when critical, unique, typical or revelatory cases are researched (Yin, 2003). Conditions surrounding the case might be special, which makes the results interesting though not generalizable. A multiple case study design enables comparison of situations and shows replicating or contrasting results (Yin, 2003), which strengthens the building of a theory. Since the objective of this report is to validate the theoretical framework in practice, a multiple case study design has been adopted. This ensures a greater confidence in the obtained results, validation of the framework and generalizability to cases with similar context.

In the contrary, there are also some disadvantages when conducting a multiple case study. First of all, a multiple case design diminishes the possibility to report extensively about special conditions surrounding cases (Yin, 2003). However, in this report not detailed but general observations are the focus points. Additionally, a multiple case design requires extensive resources and time (Yin, 2003). Since three students are involved the influence of limited resources and time is reduced. The involvement of multiple students causes the need for a careful alignment process, in order to obtain comparable results (Yin, 2003). A close collaboration, discussing the design of the study, regular meetings and providing feedback diminished this effect.

The distinction between holistic and embedded case study approaches is made on single case level, also in multiple case study designs (Yin, 2003). The holistic approach considers the global nature of a case. Embedded case studies take into account the main unit of analysis and along attention is given to a subunit. The focus of the thesis is on VN-CKM characteristics and the additional unit of analysis is IT support. Therefore the design can be characterized as an embedded case study. Each case belongs to its own context, however with the same main and additional unit of analysis. This allows comparison between the cases (Yin, 2003).

Since the embedded design allows for adding sub-units of analysis to enhance the insight, a major pitfall of the design occurs when the case study focuses on the sub-unit of analysis and fails to return to the covering unit of analysis. This pitfall has been prevented; by first developing the interview protocol based on the theoretical framework and supplement the protocol with IT related questions.

Before selecting cases, one needs to consider the objective of research and the number of cases to study. The objective of research might be to predict similar results or contrasting ones for anticipated reasons (Yin, 2003). A mix of both objectives is chosen in order to support each other but as well to look for contrasting results in different contexts and enrich the conceptual framework. The distinction of cases is based upon the previously discussed four service delivery network dimensions of Tax et al. (2013). A drawback of this design choice is that the cases might not saturate all VN-CKM process characteristics applied in the specific value network construction, which limits the strength of conclusions.
To conclude, the case study design can be characterized as multiple embedded, with the mix objective of predicting similar and contrasting results.

### 3.3.3 Case selection

Two selection criteria have been considered for selecting cases. The first criterion relates to VN-CKM; *the case should have (some) customers and at least one partner with whom they are cooperating to improve the offered solution*. This criterion is important since a value network should exist to manage CK. The second criterion relates to VN-CKM IT support, *the case is receptive or currently using IT in supporting VN-CKM processes*. It was preferred that the cases recognize IT as an important supporting resource for VN-CKM, to have a cultural support or a vision on IT.

The selection of cases was divided into three stages, where both of the criteria have been considered. In the first stage, the company supervisors were consulted to discuss potential cases. Second, semi-structured orientation interviews were held with IT contact persons of the suggested cases. The focus of these interviews was aimed at several facets; to visualize the value network in a relationship diagram, to define what kind of integrated solution was provided by the cases, to get an insight on the processes in the value network, and to get a notion of the co-creation maturity. The respondent had an informative role during the interviews and has been approach with open and interested questions, this initiated insights into matters, access to new sources of evidence, and contact persons (Qu and Dumay, 2011). The final selection of cases was based on discussions afterwards between students and university supervisors, as third stage.

The selection of cases was primarily based on interpretations of multiple involved persons, which creates the risk of excluding more suitable cases. Therefore, supplementary sources have been used (i.e. websites, intranet, documents, presentations).

### 3.3.4 Data collection

Data collection is vital to answer research questions and obtain valuable insights. An advantage of conducting case studies is the possibility to collect data from many different sources (Yin, 2003). The main source used in this study is the semi-structured interview, which is known to capture rich detail and provide flexibility to adapt the interview based on the background of the respondent and the responses given (Qu and Dumay, 2011). This makes it a suitable source for capturing contemporary events like interactions, contexts, and complexities in value networks. Additionally, since a small amount of research reports on VN-CKM processes and IT, semi-structured interviews provide the opportunity to elaborate on choices, limitations and issues to enrich the conceptual understanding. To strengthen the conclusion, supplementary documents, websites and external advice have been used.

The main disadvantage of semi-structured interviews is ‘content bias’, from the respondent and interviewer perspective (Qu and Dumay, 2011). Which reflects in respondents who are not a source of objective truth due to political influences, misinterpretation of the question-objectives by the respondents or the interviewer influencing the respondents. From the interviewer perspective, interpretation of answers might not be an exact mirror of reality. Data triangulation will reduce the content bias (Yin, 2003). Therefore, multiple interviews are held and supplementary data sources used to confirm conclusions.

On an overarching level the students should be aligned to obtain comparable results. Where the approach of respondents, the interview questioning and data to be gathered are relevant. Therefore, an interview protocol (Appendix 10.3.1) has been developed in close collaboration between the students and university supervisors. Furthermore, the interview protocol keeps the target on the topic during interviews, and it incites anticipation on several possible problems. In addition and part of the protocol, a visualization of the value network has been made in terms of involved partners and interrelationships. The visualization supported the interviews and was relevant in establishing a common context with respondents. The entity-relationship (E-R) diagrams developed are based on the UML class diagram language. An initial version was made based on documents, and orientation interviews. In an iterative process,
based upon the in-depth interviews and new insights, the value network is updated to get a proper representation of the value network. Since each respondent has another viewpoint on the network, alterations needed to be supported by argumentation. The final E-R diagrams are presented in the Chapter 4, the intermediate used diagrams and developments are shown in Appendix 10.6.

Three pilot interviews with IT employees were performed to validate the protocol as well as to align the students’ approaches and interview skills. One passive student accompanied the pilot interview to provide individual feedback and discuss weaknesses and shortcomings of the protocol. In consultation with the organizational supervisor IT employees have been selected, who had similar field experience as the potential case respondents.

After finalizing the interview protocol and aligning the approaches, respondents were selected. Based upon the article of Ngai (2005) concerning customer interaction and functional influences, employees of ‘marketing and sales’, ‘service and support’, and ‘IT’ were approached. The first two are directly related to customer interaction and collaboration with partners, and IT supports these functional areas. The IT contact person or a lead-out suggested respondents, since both could make a clear assessment of valuable respondents. Complementary, a partner was interviewed to include an external perspective. Suggestions of partners came mainly from respondents who were involved in collaboration.

Again it might be that the interpretation of the informer is not correct and more suitable respondents, in respect to the study, are not interviewed. In addition, more internal employees are interviewed than external, which might lead to the identification of internal CKM characteristics and not VN-CKM characteristics. By carefully designing the interview protocol this should have a limited effect.

Respondents were approach via e-mail (Appendix 10.4), where a short introduction of the interviewer was followed by the objective of the research (Qu and Dumay, 2011). This made the respondent able to judge if he is knowledgeable enough. To conclude a word of appreciation was noted and the respondent was asked if he could suggest a time and date.

Most of the interviews had a length of 1-1.5 hours to keep the interviews focused on the subject, though leave room for some explanation as well. An assisting student accompanied the interviews, to enhance the collection of data. However, the assigned case student was responsible of leading the semi-structured interview and contacts the respondents. To improve the validation of the framework the interviews were recorded and noted down afterwards.

The interview questions are based upon the activity and objective columns. The probes were related to the control column, resource column, and IT related. This ensures a focus on the VN-CKM characteristics and additionally on IT, to establish a clear distinction between the two focus points of the study. Besides the scheduled probes, unscheduled probes have been used to draw out more complete narratives from the interviewees, or drilling down a particular topic. The phrasing of the question was open ended and formulated in a how format instead of why. How questions are less offensive and evoke more storytelling then why questions do, which are experienced as more explanatory and offensive (Qu and Dumay, 2011).

3.3.5 Data analysis

Data analysis is focused on drawing conclusions from the obtained data for establishing support on VN-CKM characteristics and IT support issues. In order to formulate valuable conclusions a general strategy is defined, and techniques are explained. In the following the analysis of VN-CKM process characteristics and IT requirements are addressed separately.

VN-CKM analysis

Using an analysis strategy helps “to treat the evidence fairly, produce compelling analytic conclusions, and rule out alternative interpretations” (Yin, 2003). Additionally, a strategy helps in using tools and manipulations of data. The analytical strategy applied for VN-CKM process
analysis is “examining rival explanations”, which assumes a relation based upon an intervention, however tries to rule out or show alternative interventions (Yin, 2003). This is suitable for this case study, since based upon practical experiences the interventions mentioned in the conceptual framework of Bagheri et al. (2015b) are validated and enriched if possible.

Considering the strategy different sub-strategies have been defined in literature. Due to the purpose of this case study the strategy can be specified as ‘commingled rival’, which is characterized by “it was not only me”. Besides the interventions of the theoretical framework other interventions might have influence on VN-CKM processes and IT.

As part of and along these analytical strategies, practicing analytical techniques to analyse case data is needed. Yin (2003) identified five analytical techniques, which are ‘pattern matching’, ‘explanation building’, ‘time-series analysis’, ‘logic models’, and ‘cross-case syntheses’. A mix of these techniques has been applied with the main analytical technique being ‘explanation building’. Which is a special type of pattern matching, with the objective of building an explanation based on a presumed set of links, subsequently rival explanations are addressed and tested. Reflected to the case study, VN-CKM process characteristics have been identified from practice based upon the theoretical framework of Bagheri et al. (2015b). The purpose is to validate the framework and make necessary alterations.

In accordance with the explanation-building process, the explanation building is a result of a series of iterations (Yin, 2003). First the assigned student interpreted, coded and structured the responses according to the interview protocol and theoretical framework. Since all interviews are held in pairs, the second student evaluated the analysis to reduce the interpretation bias. The obtained results were translated into a tabular format, which contains the summary of the semi-structured interviews supplemented with additional data per question (Appendix 10.7.2 and 10.8.2).

In the next step the responses are grouped and related to concepts of VN-CKM processes, in the same way as Bagheri et al. (2015b) did, by applying the IDEF-model (figure 3.1) along the VN-CKM lifecycle and knowledge conversion modes. The use of IDEF-model helps in identifying characteristics of processes, consisting of input, resource, control, activities, output, and objective (Bagheri et al., 2015b). The input an output of VN-CKM relates to the dimension of knowledge widely recognized as tacit and explicit. Resources refer to tools and actors required for processing input into output. Regarding the control aspect, Bagheri et al. (2015b) made a distinction between formal and informal perspectives, overall control aspects influence the way of processing input into output. Formal control refers to “contractual agreements, rules, procedures, regulations, reports, incentive system, and also performance monitoring”. Informal control refers to “shared norms and values, trust, meetings, open communication, and interaction “. The activities relate to deployed actions for processing input into output. The objective aspect shows why input is processed into a particular output. In identifying the process characteristics of the studied cases these IDEF aspect are taken into account. Again a close collaboration has been established between students for creating, comparing and composing the case specific frameworks. Results are shown in Appendix 10.7.1 and 10.8.1.

In the third step the results of the studied cases are structurally analysed. As starting point the conceptual framework is used, which is compared to practical findings. Since the students and studied cases have limited experience of working in a value network, the obtained findings, considerations and indications should be regarded as the basis for further discussion and future research. To evaluate the framework four points are taken into account:

1. **Confirmation**, referring to support of the conceptual framework by practical findings. Strengthening the findings of the conceptual framework.
2. **Enrichment**, additionally indicated characteristics to the conceptual framework based on practical findings. The relevance towards the framework needs to be discussed and studied, if proven to be valuable they might be included in the VN-CKM framework.
3. **Discrepancy**, when studied cases do not confirm characteristics of the conceptual framework. It might be that this is a point of improvement for the studied cases, or a suggestion for alteration to the framework. Both ways a careful consideration of literature and practice needs to be made, and additional discussions and studies held in order to establishing a well-supported conclusion.

4. **Generalization**, when the mentioned characteristics in the conceptual framework are to specific and in practice a wider range of similar practices is performed, those can be grouped under a more general term. This triggers a further topic discussion.

The process can be classified as a mix of top-down (literature directed) and bottom-up (practical input) analysis.

As final step, the individual studied cases are assessed on how well they perform the multiple activities in relation to the conceptual framework. Therefore a rating of plus and minus has been used. In addition, it has been used to compare the individual studied cases to point out strong and weak points. The VN-CKM processes rated ++ refer to an encompassing and effective application of identified VN-CKM process characteristics. The processes assessed with + do apply activities on value network level, however room for improvement is identified for example in terms of regularity. In the middle of performing good and bad is +/-, referring to performance of some activities, however not all of them are or on an insufficient level carried out in the value network. Those VN-CKM processes rated – do perform activities, however on such a low level that there effect is minimal and could be strongly improved. As final rating -- has been used, which refers to no identification or on such as small basis that effects cannot be attributed to those activities. The rating of the studied cases is performed individually and afterwards discussed in a group meeting amongst the students.

Since much analytic insight is demanded of the explanation building the approach has some pitfalls. The iterative process causes the largest pitfall, where attention might drift away from the topic. Referring multiple times to the framework, literature, and linking to the protocol will limit this. Secondly, subjective judgement is a critic to this approach. Through a close collaboration and multiple evaluating moments subjective judgement is reduced to the minimum.

**Figure 3.1 IDEF-model used by Bagheri et al. (2015b)**

**IT analysis**

As orientating part for future research, the four studied cases have been analysed on IT requirements. The analytical strategy applied is the same as for VN-CKM being "examining rival explanations". This is suitable for the IT analysis since based upon literature IT requirements are identified that are tested in the field, however due to the orientating nature an eye is kept on additional requirements as well (rival explanations). Considering this strategy, different sub-strategies have been defined in literature. Due to the purpose of RQ2 the strategy can be specified as 'commingled rival', which is characterized by "it was not only me". Besides the IT requirements identified from literature, other IT requirements might be observed in practice.

The main analytical technique applied is again 'explanation building'. Reflected to IT analysis, requirements have been identified in literature and additional ones might be identified in practice. To obtain a comprehensive view on IT requirements both literature and practice need to be considered.
In accordance with the explanation-building process, the explanation building is a result of a series of iterations (Yin, 2003). First the Master student interpreted, coded and structured the responses of Case A and B according to the literature observations, next a summary is made. For Case C and D ½ hour discussions were held with both Bachelor students to identify IT requirements. The obtained results were translated into a tabular format (Appendix 10.9).

Since the students and studied cases have limited experience of working in a value network, the obtained findings, considerations and indications should be regarded as the basis for further discussion and future research.

3.3.6 Conclusion
To sum up the case study design, a preliminary theory is constructed. This theory should not be considered as a formal one, the aim is to have a sufficient blueprint and a strong guidance in the collection of data (Yin, 2003). The previous five components of research designs enable the construction of the following theory statement:

The case study will show what characteristics are relevant for VN-CKM processes based upon the conceptual framework of Bagheri et al. (2015b), as part of establishing a customer experience. In line with the progress of IT, the case study will show how managing CK in a value network can be supported by IT.

The developed theory statement helps in ensuing relevant data is collected but also determines the level at which the generalizations of the case study occur (Yin, 2003). The mode of generalization applied is “analytical generalization”, where a developed theory is used to compare the case study findings. Since case studies might not be seen as samples but are experiments. When two or more cases are shown to support the same theory or rival explanation, replication might be claimed.

3.4 Quality of Research Methodology
In this part the quality of the research methodology is assessed according to the four most common used tests: construct validity, internal validity, external validity, and reliability. Taking these tests into account evaluates if the previous outlined research methodology results in logic and trustworthy conclusions.

First the three validity aspects are addressed, which generally refer to the relationship between the case study results and the way they have been generated (Van Aken et al., 2009). Next reliability has been addressed, which focuses on doing the same case study again and obtaining the same findings and conclusions, independent of results from the case study particular characteristics.

3.4.1 Construct validity
Construct validity defines how well the research methodology reflects the research objective and related theoretical definitions (Yin, 2003). To evaluate the construct validity two conditions should be taken into account; 1) "the concept should be covered completely", and 2) "the measurements should have no components that do not fit the meaning of the concept" (Van Aken et al., 2009).

Three activities have been performed to assure construct validity. First the students evaluated the semi-structured interview protocol by themselves and developed it in close collaboration based upon the conceptual framework of Bagheri et al. (2015b), and additionally added IT related questions. This assures a first covering of all concepts. Second, the protocol has been critically evaluated with expert to debug and fine-tune it. The experts approached were in this case the authors of the article Bagheri et al. (2015b), which are at the same time the supervisors of the case studies. Third, pilot interviews were held to evaluate if following the protocol captured all concepts as highlighted in the theoretical framework. Based upon these three activities the protocol has been altered when needed.
To enhance the construct validity multiple sources of evidence have been used. This encourages a convergent line of results and covering all concepts (Yin, 2003).

3.4.2 Internal validity

Internal validity addresses the conclusion about relationships between phenomena, which are valid when justified and complete. The question to be answered is; do the results reflect reality? Therefore one has to make sure no rival explanations are possible. Which is hard in cases where inferences result from activities that cannot be directly observed.

To obtain a high internal validity, four activities have been performed. First, multiple sources have been used, in terms of both different information sources (i.e. semi-structured interviews, websites, intranet, documents, etcetera). Next different employee functions are interviewed (i.e. Marketing and Sales, Service and Support, and IT). In addition, third, an external perspective has been included. This might give different insights and point out important issues. At last, a systematic analysis has been applied to obtain all valuable and influential results.

In addition, through a clear representation of data collection and analysis, insight is given in the process towards results.

3.4.3 External validity

External validity concerns about the findings generalizability beyond the direct context of the case study (Yin, 2003). In conditions of case study research, which employs analytic generalization, particular set of results are tried to generalize to some broader theory. In order to generalize findings to similar situations as the investigated case studies found themselves. Replication of findings will strengthen this way of generalizing (Yin, 2003).

To enhance the external validity of the case study, multiple cases have been analysed. Following the selection criteria and performing orientation interviews a similar set of cases have been studied. Therefore the results can be generalized to situations where companies are developing a new market and have strong and weak ties among partners. However, generalizing findings to more mature organizations or different value network configurations might be limited.

3.4.4 Reliability

Reliability, as final research quality test, focuses on doing the same case study again and obtaining the same findings and conclusions, independent of results from the case study particular characteristics (Van Aken et al., 2009). Therefore the research methodology should be comprehensive to minimize errors and biases (Yin, 2003). In the following the procedures and personal, instrumental and respondents bias are discussed.

As first prerequisite, the procedures have to be documented to limit personal, instrumental or respondent bias (Van Aken et al., 2009; Yin, 2003). The developed protocol and elaboration on analysis should enable one to replicate the study in procedural respect. In addition, as many steps as possible are explain and shown throughout the report.

Due to the personal bias in case study research, close attention has been paid to the personal interactions. The performed case studies established a close collaboration amongst the three students to reduce the bias of personal interactions and subjective interpretation, replicating studies should as well try to establish such collaboration.

Another point to take into account is the use of instruments (Van Aken et al., 2009). As stated multiple times before, triangulation of data has been used to reduce the subjective interpretation and to fix irregularities. As main data source, for each semi-structured interview question its objectives are clarified. This enhances the gathering of the same data in replicating studies. In addition the same evaluation criteria have been used amongst the four studied cases.

Since multiple respondents (functions) have multiple perspectives one has to carefully select them (Van Aken et al., 2009). The objective of the case study research is to obtain an inter-subjective view on reality and therefore multiple functions within the cases have been interviewed as well as an external perspective has been included. Through carefully considering
which roles and functions to interview and setting criteria, the comprehensive and inter-subjective representation of reality has been captured.

4 Case Introduction

This chapter introduces the two Master student assigned cases to give the reader a grasp on the context and propositions of them. Introduction of both Bachelor cases can be found in Appendix 10.5.

All cases are divisions of a large grid provider in the Netherlands, which has the responsibility to facilitate new energy markets that need a first push. The cases can be classified as start-ups in new energy markets.

The following parts address the context and vision of both studied cases in this report. In addition, the relation between the case and VN-CKM processes is pointed out. Along, the visualisation of the value network is discussed.

4.1 Case A

![Figure 4.1 Entity-Relationship diagram of the value network of Case A](image)

In the recent years the development and implementation of smart meters took a great leap. At first smart meters were implemented in newly-build houses and at households that requested one (for example, due to solar panel installations). After the ‘test period’ the Dutch government decided that each house holding should be offered the smart meter. The government decided so with the aim to reduce the emission of greenhouse gasses. Giving customers insight into their energy consumption (gas and electricity) should trigger a change in behaviour and reduction of energy consumption. The area specific smart grid provider is responsible for the implementation, since the smart meter needs to be attached to their electricity and gas pipes into houses. In total around 7,5 million house holdings should be offered a smart meter, which is a complex operation involving multiple partners. Though the smart meter on its own does not add any specific value to the customers, the potential services surrounding it do. These services provide insight into the energy consumption and trigger a behavioural change. In order to
realize a high acceptance rate on the smart meter offering, a good collaboration between the different involved partners should be established. This way the customer receives the smart meter with comfort and is able to use it quickly.

To start the smart meter is offered to the customer, construction companies do so in name of the specific grid provider. Through multiple customer studies and pilots a ‘best approach’ is formulated. For example, the content of letters and clothing style of installers is investigated and defined during the collaboration.

During the installation of the smart meter the installer has face-to-face contact with the customer. Afterwards he leaves an informative folder, which is established in collaboration between the grid providers, energy suppliers, energy managers, and Milieu Centraal. In addition, via multiple websites the customer is informed about the smart meter (e.g. data sharing process and privacy issues), and the additional services offered (e.g. http://www.energieverbruiksmanagers.nl), which is managed by collaboration between grid providers and Milieu Centraal. Also magazines are composed with non-technical explanations of figures, with the aim to make more people aware of energy saving solutions. These different informative channels have been composed in collaboration between Sanoma, Milieu Centraal, Netbeheer Nederland and the different grid providers.

As stated before additional services create value for customers. Energy Managers (ODAs and alike) on the market are concerned with the developments of these services. Customers decide what is the best energy module, and what will become the standard in providing insights. However, since energy managers are dependent upon the energy data from the smart meter a close collaboration between the multiple involved actors is established. During six weekly meetings developments and issues concerning the smart meter and its data are discussed amongst grid providers, energy suppliers, and energy managers, where technical and customer input are used.

Additionally, customers find it interesting to control their energy suppliers, since a low trust relationship exist between them. The smart meter gives them this insight, but to deliver a smooth energy billing processes, again, a close collaboration with grid providers is required. Therefore also energy suppliers attend the six weekly meetings.

In order to give more insight into the value network and interactions a graphical representation is developed. Figure 4.1 represents the final version and encompasses all actors involved. The network is a mix of all discussed dimensions by Tax et al. (2013). Each actor focuses on its core business and no central player takes the role of coordinator. Some providers have formal established relationships, for example the grid provider and the contractors concerning the installation of the smart meter. Others have relationships based upon customer choice, for example the grid providers and energy managers that only have a relationship to share energy data based on customer choice for a particular energy manager. Second, the goal of customers is twofold. On the one hand they like a transactional relationship with for example the contractors, which install the smart meter. On the other hand, they establish long-term relationships with for example energy managers to obtain relevant insight on their energy consumption. Third in selecting providers the customers is both constrained and free. The customer is for instance constrained to a particular grid provider and its contractors, but free to choice which energy supplier he would like to have. Due to these different options and involved partners, at last the value network can be classified as being complex.

Overall the customer is supported in its value creation through energy insight services, controlling the energy suppliers, and providing non-technical explanations of results as well. Multiple partners gather CK concerning these topics and share their insight in meetings or publish reports.
For 2020 the Dutch government has to reduce emissions of global warming gasses with several percentages. To obtain this goal multiple measures can be taken, of which many should be initiated to reach the goal. The second case focuses on one of these measures, more specifically it focuses on sustainable housing. With more sustainable houses in The Netherlands, less electricity and gas is needed. Which results in a reduction of emissions. For the customers it results in lower energy costs and an improvement of their living comfort. Making houses sustainable can be done in multiple ways, which one to apply depends on the house characteristics and customers wishes.

Hoom offers six measures, which are presented during neighbourhood meetings. Therefore Hoom uses input of general house information, municipalities and cooperation. To see what fits best at a specific house an assessment is made by an energy advisor linked to Hoom during a house visit. During the assessment observations are shared with the customer and afterwards with Hoom. Based upon the advice customers can choose one or a multiple measures to be implemented, for which Hoom will gather 3 tenders, of 2 local and 1 national construction company (as rule of thumb). Next the customer selects the construction company that will implement the measure. Eventually Hoom notifies the construction company about the assigned order, which implements the measure(s). Afterwards, Hoom arranges the billing and the customer’s house is improved in terms of sustainability.

During the value creation, well informing customers is important. Since the customers are most often not aware of the possibilities and effects of measures. To establish this Hoom initiated multiple direct contact points, a coach and developed a customer portal. Via the portal tenders are presented and information about the progress is displayed. To improve customers’ understanding about energy consumption, in addition Hoom offers an energy insight module.

A good communication with partners is needed, since both houses and wishes of customers differ. In the initial phase, Hoom gathers opportunities itself or is notified by cooperation. In the latter case, the cooperation operates in name of neighbourhood customers. Which have valuable CK about opportunities in terms of global work or specific measures desired by customers, or even how to approach the group.
In the next step Hoom needs to coordinate the CK sharing between energy advisors, customers and construction companies. Common work is desire, however the case has to deal with custom fit solutions. For this interaction a partner portal has been developed, which is partly linked to the customer portal for sharing tenders and feedback.

Communication with Sales Force and EnergyWorx is face-to-face or via e-mail since the interaction is less frequent. Sales Force helps in managing the customer information and is linked to the portal. EnergyWorx develops together with Hoom the energy insight module on the customer portal. Since EnergyWorx has experience with customer wishes, this can be used to create a valuable energy module. However, direct contact or a market survey with customers of Hoom is not (yet) the case.

A graphical representation of the value network is presented in figure 4.2. Hoom is the central player in the network and coordinates the activities. According to the dimensions named by Tax et al. (2013), the value network can be classified as being a formal network, with contracts among partners. This limits customers to select any additional firms for advice or implementation of solutions. But reduces the complexity of the offering for the value network. The nature of interaction can be classified as being relational, based on development of the MyHoom portal and the energy insight module.

Overall Hoom tries to make homeowners aware of sustainable measures they can apply for improving their house. Hoom offers to take over as much steps of the customer and easy their way in creating a sustainable house. Finally, to provide customers with insights in their energy consumption Hoom offer an energy module.

5    VN-CKM Conceptual Framework Validation

This chapter presents the validation and enrichment step of the conceptual framework, through analysis of studied cases. The purpose of analysing the studied cases is to answer research question 1, validation and enrichment of the conceptual framework of Bagheri et al. (2015b) in practice. The obtained responses from the semi-structured interviews served as input for the construction of ‘case specific frameworks’.

In the first part an individually comparison of Cases A and B is made with the conceptual framework. Where the focus is on the application of the framework in practice and what both views can learn from each other (i.e. practice form literature and vice versa). Since the developed theoretical framework is of a higher abstraction level than the case specific ones, terms might need to be grouped together. To make the comparison more concrete quotes of respondents are presented. The second objective is to introduce the case specific developed framework, which is also used in the second and third part of this chapter. For the elaboration of the Cases C and D see the Bachelor reports of Van der Linden (2015) and Schillemans (2015).

In the second part the four individual cases are compared with each other, to identify differences amongst them, and what can be learned from each other. Where Case A and B are considered, for the comparison of Case C and D see the Bachelor reports of Van der Linden (2015) and Schillemans (2015). Complementary the conceptual framework is used to support findings.

In the last part the conceptual framework is discussed based upon the evaluation of the four cases. For which the previous presented criteria have been used.

5.1    Case A VN-CKM Framework Validation

The VN-CKM framework is split up according to the KM-lifecycle processes and presented in the tables 5.1, 5.2, 5.3 and 5.4.

5.1.1    Creation

Case A recognized all four modes of knowledge conversion in respect to creation, however not all were executed within the value network.
Table 5.1 Case A - Creation Phase

<table>
<thead>
<tr>
<th>P</th>
<th>I/O</th>
<th>Main activities</th>
<th>Control</th>
<th>Resources</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>T/T</td>
<td>Running customer-approach pilots to enhance acceptance rate; panel to obtain customer experience and uncertainties; experience of customer evaluation through customer interaction; communication when customer has issues; contact on customer expectations</td>
<td>-</td>
<td>Pilots; panels; customer interaction; issue communication; feedback discussion (+)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; municipalities (++)</td>
<td>Enhance customer acceptance rate; obtain customer experience, uncertainties and concerns; obtain reviews and feedback to improve services; create common understanding about customer context; enhance efficiency (++)</td>
</tr>
<tr>
<td>T/E</td>
<td>Survey analysis after implementation; monitoring the experience of the smart meter and analysis; feedback is analyzed and used to improve services; scanning social media to obtain concerns of customers and debug wild stories; a website to obtain reviews of customers; customer journey mapped and evaluated; use of user-voice to evaluate services; Roles and expectations should be clearly described; failure codes are agreed to enhance the efficiency (+/-)</td>
<td>Monitoring experience; scanning; survey; roles and expectations; failure codes (++)</td>
<td>Meetings; social media (++)</td>
<td>ODAs; Milieu Centraal; Netbeheer Nederland; EDSN (++)</td>
<td>Enhance process efficiency through mutual understanding of context; improve services; define customer concerns, experiences; uniform way of communications towards the customer; debug wild stories (*)</td>
</tr>
<tr>
<td>E/E</td>
<td>Informative folder about the smart meter; additional information, services and reviews can be found on websites; a magazine to inform about sustainable living; video’s online about the smart meter and applications; user box and e-mail to communicate about service issues; translating technical language (++)</td>
<td>- (--)</td>
<td>- (--)</td>
<td>- (--)</td>
<td>Inform the customer about process; inform the customer about additional services; resolve/explain issues; inform customer about product(s) (++)</td>
</tr>
<tr>
<td>E/T</td>
<td>Informative folder about the smart meter; additional information, services and reviews can be found on websites; a magazine to inform about sustainable living; video’s online about the smart meter and applications; user box and e-mail to communicate about service issues; translating technical language (++)</td>
<td>Multiple websites; agreements on procedures, letters, folder, magazine (++)</td>
<td>Collaborations; customer interaction (+/-)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies; media concern (++)</td>
<td>Inform the customer about process; inform the customer about additional services; resolve/explain issues; inform customer about product(s) (++)</td>
</tr>
</tbody>
</table>

Case A applied multiple initiatives to investigate customer experience(s) and concerns (table 5.1). For example, the Marketing and Strategic Partnership respondent described a performed panel in Texel. “We went placing the smart meter and were interested in the customer experience of this process. The most imaginary stories seem to exist, and some customers have fear towards the smart meter. They have questions concerning the privacy, but also concerning the capabilities of the smart meter, questions like ‘it is placed in my house can you see what I am watching on television now?’ are raised. Therefore it is good to have conversations with customers and explain the functioning”. This example stresses the importance of customer contact, and shows Case A is actively approaching the customer. Overall the identified main activities for Case A take care of the delineation of customer context, and identification of customer needs and uncertainties. Which are obtained via customer interactions and market research techniques, where the customer shows or explains their challenges, experiences and emotions. These activities are in line with conceptual framework, and evaluated confirming and rated ++.

Confirming the conceptual framework, no formal control aspects have been identified. In contrary, informal control aspects are, like pilots and frequent interactions. Only trust and risk issues are not mentioned. Indirectly, the manager of 'Customer and Market Facilitation' mentioned, “it might be better to keep advertising low, this way the voice of suspicious customers becomes less public”. Which might indicates they have some trouble with gaining customers' trust. A point of improvement therefore is to focus on gaining customer's trust, to enhance openness and willingness at the customers' side, to collaborate and improve the value network solution (e.g. Hakanen, 2014). Due to the lack of trust informal control is rated +, and evaluated with discrepancy.

The objective of tacit-tacit knowledge creation is shown in the last row. The Marketing and Strategic Partnership manager stated for example, “we visit customers to see how they currently are using the smart meter, what are their experiences, and what can be improved. We noticed a need at women for more tips and tricks. To involve women and less technical persons, we started collaborating with a media...”
concern, to translate the graphs into tips and tricks”. This and other examples given, confirms the objectives identified from literature. Overall the objective of Case A confirms the conceptual framework and is rated ++.

To enable tacit-tacit knowledge creation a network of customers and partners is involved. In mutual interactions CK is created with customer and firms in the value network. This confirms the conceptual framework and is assessed ++.

Next phase is T/E conversion, for which Case A employs multiple activities like analysing the previous quoted ‘panel research’ and publishing research reports, which for example resulted in the detection of a need for tips and tricks (BENERGY BV, 2012). Besides, a respondent pointed out a need for defining roles and responsibilities. The Energy manager partner, mentioned the following; “Currently I am displeased with grid providers that are developing ODA services, and offer these for free. As Energy Managers we are trying to make a living from these services, and charge customers some costs for using them. Due to the free offerings customers are getting confused, ‘why should I pay when it is offered for free elsewhere?’ Defining roles and responsibilities and stick to it, would help the value network”. As Hakanen and Jaakkola (2012) found “disagreements of the role division between service suppliers confuses the customer and hinders the coherent service experience and delivery of a seamless solution in the eyes of the customer”. Related to the literature framework, it confirms the characteristic ‘clarify roles and responsibilities’. In addition to this remark, theory suggests to explicitly describe the service offering(s), which explicitly highlights expectations from partners. Currently Case A has agreements with the construction companies about the installation and the process, however not with ODAs and energy supplier a like companies. Besides some regulations, those are responsible for their own development and are not restricted to a particular service offering. By defining service offerings, less ambiguity would occur as previously described by the ODA partner and literature. To conclude, previous examples and analysis of interviews support that the main activities performed by Case A reflect the ones identified in literature. Despite the recognition of the different activities, it is noticed that not all activities have been (extensively) performed (e.g. roles). Therefore the Case A could improve on points and is assessed +/-, however recognizes the characteristics and confirms the conceptual framework.

Concerning the formal control, ‘rules and guidelines’ from theory are reflected in ‘roles and expectations’ and ‘failure codes’ in practice. The literature framework might be enriched with the point ‘performance monitoring’ as formal control activity. Since, Case A sends out surveys and scans social media, which aids the customer and value network in translating tacit into explicit concepts. Concerning the informal control characteristics, the respondents refer to P4-meetings and social media. The P4-meetings are six weekly meetings with grid providers, ODAs and energy suppliers, where developments concerning the smart meter are discussed and general ‘concepts’ being defined. For example, the specification of failure codes is addressed in those meetings. Scanning social media is done to prevent wild stories, this relates to forums like Twitter and Facebook. These channels support customers in translation of tacit knowledge into explicit format. The mentioned informal controls are linked to workshops and forums as informal control characteristics identified in literature.

The final objective of Case A to is to create a better customer experience and improvement in the service offering of the value network by analysis of studies. For example the previous mentioned pilot study, afterwards the grid provider entered the collaboration with a media concern to set up tip and tricks. A mutual understanding of the solution is created with definition of roles and responsibilities, and failure codes. Both activities forces involved actors to think about the solution, which creates a common understanding. As point of improvement, Case A is recommended to explicitly define roles and responsibilities and the customer service offering as value network. To conclude, the identified objectives from practices reflect the ones from literature. However, creating a common understanding of the solution is weakly supported in the value network currently and therefore is rated +.
At last, it is confirmed that collaboration between the network actors is important to translate the CK into explicit format. So customer needs are taken into account and a common view established, via customer feedback and partner interactions.

The third creation phase E/E is not performed within the value network of Case A, nevertheless it is recognized to be a creation phase. Individually the partners do perform some data analysis, reactions are; “We as grid provider do perform some analysis on the collected data”, “We gather some information from users about our service from which we obtain some trends, but we do not share this with others since it is focused on our own product”. The obtained results are not shared within the value network and therefore classified as internal activities. Theory also mentions that tacit to tacit knowledge creations is one of the first activities firms and value networks apply, so they develop a common understanding of the context, and develop a feeling with the market (Fang and Zou, 2010). However, since respondents could not answer this phase it cannot be validated.

In the contrary, Case A should start to focus on such processes. In the previous part is outlined that common concepts have been defined, linking and combining these concepts should be the next step. Through integration, synthesis and dissemination, the current CK quality can be improved, structurally organized, and new CK created (Nonaka et al., 1994). Nonaka et al. (1994) suggest two ways of supporting this process. First they mention social processes, as meetings and telephone conversations. Translated to Case A, the P4-meeting’s aim can be updated or extended with discussing current insights and evaluation of processes. This will improve the service offering due to some automations and efficiency improvements. Second, computer systems can help in E/E creation. One could thing of data mining for generation of new CK/insights, but as well think of graphical representations of CK. Since Case A provides no basis for the comparison with the conceptual framework it is rated --.

Partners have individually however dependent on each other a role in providing the right knowledge in the deployment phase towards customers (E/T). The Marketing and Strategic Partnership manager outlined the first part of offering the smart meter as follows; "First the construction companies send out a offerings letters and next a notification letter with implementation date. Subsequently, the installer visits the customer and tells something about the smart meter and leaves a folder behind. Via websites customers are supported with additional information over and services for the smart meter. The energy managers shall inform customers about the functioning of their products". Through the mentioned channels customers are supported with required information, which they internalize during use and use to develop routines. Besides these channels, customers can always contact the relevant partner via e-mail or similar media for support. It can be concluded that identified main activities confirm theory. Based upon the evaluation the phase is rated ++.

The multiple activities serve the objective to enhance the customer experience with the smart meter. For example, the customer is informed about the process via letters, the installer explains the smart meter working, and via the magazine tips and tricks are presented. These objectives enhance the knowledge level of the customer and its abilities to handle the smart meter services, confirming the conceptual framework. Since multiple initiatives have been taken concerning this objective, Case A is scored ++.

The control of explicit-tacit creation is both formal and informal. The formal control in practice reflects the theory, in this case agreements have been made on who develops and maintains the websites, who sends out the letters and distributes folders, which can be grouped together as Network routines. The informal control shows discrepancy with theory; a distant interaction with customers is noted. Short talks are held with the customer instead of extensive trainings, which might be due to the larger network or being a characteristic of a developing market, (e.g. resources for trainings are restricted). Case A tries to compensate customer training initiatives with posting video’s online, to explain the solution and its possibilities. Therefore, the phase is rated +.

The resources from both frameworks for transforming the input into output match, in both cases network solution partners and customers are involved. However, a better integration between the different partners could still be achieved. For example, the rollout manager
highlighted “the implementation planning is online for everyone and energy managers could use it to advertise after we have installed the smart meter. However this is currently not the case”. Due to the small improvements the network is rated a + on this phase.

5.1.2 Storage

Literature identified only the E/E and T/E modes of knowledge conversion. This has been supported in Case A, where no T/T or E/T modes of knowledge conversion are identified.

<table>
<thead>
<tr>
<th>P</th>
<th>I/O</th>
<th>Main activities</th>
<th>Control</th>
<th>Resources</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>E/E</td>
<td>Storage</td>
<td>Informative websites; portal at EDSN</td>
<td>(-)</td>
<td>(-)</td>
<td>Milieu Centraal; EDSN; Nebeheer Nederland; media concern; ODAs</td>
</tr>
<tr>
<td>T/E</td>
<td>T/E</td>
<td>Publishing reports of research; publishing minutes of meetings; compose informative folders; compose informative letters; compose sustainable energy magazine</td>
<td>Reports; minutes; procedures</td>
<td>Pilots; interviews; meetings; discussions</td>
<td>Customers; ODAs; Milieu Centraal; Nebeheer Nederland; EDSN; construction companies; municipalities</td>
</tr>
</tbody>
</table>

As in creation the E/E conversion mode is limited supported in storage. The energy manager respondent answered “We have no arrangements on the storage of CK, only the energy data is fully standardized. Reports or findings are not standardized, but I have to admit that I am not very interested in and seek actively for them”. The grid provider respondents said, “I receive minutes and reports via e-mail, which I cannot find back in five years from now of course. To my knowledge, at EDSN there is a share point, where we can look up reports. Further we post insights on the website, where our implementation planning can be found as well”. The respondents noted websites as information sources for customers and partners, however, most often the communication went via e-mail and CK is internally stored not in an integrated way. Therefore, Case A can learn a lot from literature and organize integrated CK repositories, coordinate formats, and define a uniform way of access. This will enhance the access to CK and improve the creation of new insights and efficiency of processes. Due to the discrepancy, the conceptual framework is not validated. Further research and discussions are needed, despite the strong suggestions in literature. Since little effort is put into storage of CK on value network level it is rated – on both activities and objective.

Due to the limited use of E/E storage, no responses have been gathered on control. For those activities performed respondents notified a network of solution partners to be involved. The objective of the websites and portal was to store the relevant customer knowledge for the value network so actors can use it when they prefer. Which reflects the literature framework, however to a limited extend. As mentioned in the creation part, the next step for Case A should be to focus on E/E conversion as well as storage.

In the contrary, T/E storage is performed a lot. The manager Marketing and Strategic Partnership said, “After the P4 meetings, where we discuss market developments, minutes are made by EDSN. Of the multiple market researches performed by us, reports are composed. To better inform the customer we translated our knowledge into letters, folders, and a magazine”. To conclude tacit CK is documented in reports and minutes, which confirms the literature framework and Case A is doing well.

With regard to formal control, the suggested documentation in the conceptual framework is reflected in composition of reports, minutes and procedures, confirming the literature. Informally Case A performs pilots, interviews, meetings and discussions to monster the context but also tries to identify common concepts. Confirming the conceptual model, it even suggests a generalization of the characteristic ‘interview’. Based on the informal controls identified the characteristic could be generalized to ‘qualitative research method’. Both control aspects provide input for reports and similar documents, and are assessed ++.

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The conversion of tacit into explicit knowledge in the storage phase was due to the network of solution partners and customers. Customers provide input and multiple actors translate the obtain CK into, for example, reports. This confirms partially the literature framework, since a CK inventory map, as suggested from literature, has not been used. However it might be a good option for Case A, since they operate in a large and complex value network. Creating an overview of knowledge could help in finding the right information at the right time. This discrepancy could be investigated in future research.

Overall the objective in practice was to store the relevant CK. By documenting and storing CK, the value network can obtain the knowledge when they need it. This objective reflects the findings from literature. However due to the unstructured way, the value network might improve in structurally store the explicit CK and is rated +.

### 5.1.3 Transfers

Transfer of CK focuses on E/E and T/T. Both knowledge dimension are considered in the value network of Case A, and are discussed in the following.

<table>
<thead>
<tr>
<th>Transfer</th>
<th>Main activities</th>
<th>Control</th>
<th>Resources</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/E</td>
<td>Informing customers through letters, folder, magazine and different websites; minutes of meetings shared via e-mail or websites; agreed failure codes; special requests are received via website (++)</td>
<td>Agreements on informing customers; developing and maintaining websites; sharing of minutes; contracts; sharing of reports; failure codes (++)</td>
<td>E-mail; websites; letters; folder; magazine; minutes; reports; contracts (+)</td>
<td>To inform customers in time; inform partners in time; enhance efficiency (++)</td>
</tr>
<tr>
<td>T/T</td>
<td>Customer-installer contact about smart meter (installation); telephone contact between customer and ODA; meetings to discuss developments and suggest changes; telephone contact about customer or data issues (++)</td>
<td>Face-to-face communication; meetings; telephone conversation; customer interaction (++/)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies (++)</td>
<td>Inform value network about developments; resolve issues quickly; inform customers; update processes (++)</td>
</tr>
</tbody>
</table>

The explicit knowledge residing in the value network is communicated via multiple documents. As previous outlined, first the customer is informed about the smart meter and its implementation processes by letter. Afterwards a folder is left behind, where the customer can find additional information, read back about the smart meter, and is referred to other websites. The letters and folder are composed in collaboration with grid providers, ODA, and energy suppliers. Communication with partners of the value network on agreements or developments is done via minutes and research reports, which are most often communicated via e-mail, websites or a portal. In case there is a common failure, a failure code is communicated with related partners to notify them about the occurred failure. These activities confirm the identified ones from literature and can be characterized as 'documenting and transferring CK throughout the value network'; Case A has well arranged these activities and is rated ++.

Due to the explicit nature, which makes it controllable, only formal control characteristics have been identified. The ones used in Case A reflect the identified ones from literature, for example, organizational routines are observed in Case A in the form of failure codes and agreements on informing customers. Besides contractual agreements have been established with construction partners.

The objective of sharing CK is to inform the value network, customers and partners, in time about new CK or developments. Confirming the literature framework, rating it ++.

An enhancement of the conceptual framework is found at involved resources. Besides IT tools as resources for transfer (e.g. email), the value network makes use of paper alternatives (e.g. folders). Therefore, the literature framework might be updated with paper tools. In addition,
Case A could learn from the conceptual framework by using more integrated IT tools. One could think of a platform or integration of databases (Li et al., 2012).

Tacit knowledge sharing is concerned around verbal communication of CK. The customer itself is initially informed about the smart meter during the face-to-face contact with the installer. During the use of additional services the customer can contact ODAs via telephone to discuss issues or solve questions. Currently the ODAs do not actively inform customers in meetings or workshops. In the future this might be necessary if non-technical customers enter the market. As noticed during the performed panel, customers need tips and tricks to benefit from smart meter insights. With partners multiple meetings are arranged to discuss overall market trends, like customer problems and needs, and value network opportunities. Customer specific issues are solved over the telephone. These activities related to the first part of the literature framework, being the sharing of customer problem, needs, and value expectations. The second part, identifying customer preferences of knowledge sharing, is not mentioned in the interviews. This might be due to the value network configuration, which is characterized by low integration and focus on core-business. Indicating further research might be given to the second part, to identify if this is a value network characteristic or a business model item. Despite this discrepancy, Case A is rated ++.

The tacit CK sharing is controlled via face-to-face communication, meetings, telephone conversation, and customer interactions. Those characteristics confirm the first part of the informal control from the literature framework. Compared to the conceptual framework again no social control mechanisms have been mentioned, like trust, mutual norms, and shared value. These are recognized to be important, however, due to the complexity of the value network, the forced grouping, and size of the operation hard to establish. In addition, a joint training program has not been established, for similar reasons. Therefore, these characteristics are neither confirmed nor validated. However as previously explained, this discrepancy can be theoretically supported and should be taken into account. Since some basic interactions have been established and improvements identified Case A is rated +/-.

Case A performs these activities to inform the value network in time about new developments, to quickly solve problems, and update processes if necessary. Besides the from literature identified reciprocal learning processes, Case A adds the characteristics of timely informing the value network. If this enhancement is relevant should be discussed in further research. It can be concluded that the phase is well supported and therefore rated ++.

### 5.1.4 Application

Since application of knowledge is an explicit knowledge process, only the combination phase is identified from theory. Practice confirms this finding, mentioning only explicit application of knowledge.

<table>
<thead>
<tr>
<th>Application</th>
<th>Main activities</th>
<th>Control</th>
<th>Resources</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/E</td>
<td>Alteration of strategy and vision; improvement of customer approach; alternation of energy data related processes; improved communication to customer and partners (++)</td>
<td>Processes; strategy and vision; contracts (++)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies; municipalities (++)</td>
<td>Enhance customer acceptance rate; improve services; enhance efficiency of solution provision (++)</td>
</tr>
</tbody>
</table>

The main activities identified from the interviews can be summarized to be value network experience improvements. Respondents mentioned: "We might change the strategy or vision regarding the smart meter, or alter processes if necessary". "We adjust our approach towards customers if needed, in order to place more smart meters". "Improvement projects are started concerning the smart meter, the process, the customer contact, flyers, communication etcetera". These activities correspond with the ones identified from literature, and are actively applied and therefore rated (++).
The value network recorded them in formal controls like processes, contracts and strategies, which confirms the identified characteristics in literature. In contrast, informal controls were not found during interviews or in additional sources, as well confirming the literature framework. The complete value network is engaged in the translation of CK in new applications. The final objective of creating, storing, transferring and applying the knowledge is to improve the solution, enhance its efficiency, and enlarge the acceptance of the smart meter. Compared to the literature framework these characteristics group together into providing an outstanding customer experience, and enhance the customer’s business. Based upon theoretical insights no improvement suggestions can be made and therefore Case A is rated ++.

5.2 Case B VN-CKM Framework Validation

The VN-CKM framework is split up according to the KM-lifecycle processes and presented in the tables 5.5, 5.6, 5.7 and 5.8. In the following each KM-lifecycle is discussed and compared to the theoretical framework.

5.2.1 Creation

Case B recognized all four modes of knowledge conversion, however not all were executed within the value network.

<table>
<thead>
<tr>
<th>P</th>
<th>I/O</th>
<th>Main activities</th>
<th>Control</th>
<th>Resources</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>T/T</td>
<td>Elicit customer needs in neighbourhood meetings and house visits; evaluate products or new value propositions with customer focus groups; obtaining customer complaints via telephone conversations; obtaining local knowledge, opportunities and approaches provided by cooperatives and municipalities; customer-installer interaction</td>
<td>Neighbourhood visits by energy advisor; focus groups; contact with municipalities and cooperatives; telephone contact</td>
<td>Customer; independent advisors; construction companies; cooperatives</td>
<td>A clear picture about the different types of customer and what they value; reach mutual understanding with the customer about the solution; Enhance customer context understanding</td>
<td></td>
</tr>
<tr>
<td>T/E</td>
<td>Analyse focus group meeting and update processes, propositions, etc.; energy advisor takes notes of the situation (an app is being developed for this); pictures taken of the situation by energy advisor; solution proposition established and reviewed with the customer; e-mail with pictures and order explanation send to construction partners; clear agreements about roles and expectation with partners; work method contracts with partners; established policy with partners; partner portal development with partners; document customer contact</td>
<td>Contracts with customer and partners; agreement on roles and expectations; work method/framework; policies; measuring/evaluating performances, and customer satisfaction; notes</td>
<td>Meetings; focus groups; discussion</td>
<td>Construction companies; customers; energy advisor; Energy Wors; camera (photo and video)</td>
<td>Efficiency improvement in service provision; improved processes and collaborations with partners; improved quality delivery; prepared tender and solution implementation plan; improved process satisfaction; evaluate products and new value propositions; inform partners about new strategy or platform</td>
</tr>
<tr>
<td>E/E</td>
<td>Inform customers via neighbourhood meetings about options; explain solutions and effects to customers, during visits of energy advisor; offer comparable tenders; inform customer about order of event during execution; additionally inform customers by coaches over telephone</td>
<td>Work method</td>
<td>Construction companies; energy advisors; Hoorn; customers</td>
<td>Customer is informed about options and effects; customer is acquainted with the process</td>
<td></td>
</tr>
</tbody>
</table>

“The should always keep an eye on customer needs” and “each customer is custom work and their needs have to be taken into account”, these citations highlight the customer perspective of Case B. In the value network of Case B the tacit-tacit creation phase is well developed, as table 5.5 shows multiple characteristics have been identified. Overall there are three customer touch points where customer context, problems and expectations are obtained. As the realization manager explains; “A first analysis is done in collaboration with municipalities or cooperatives, which inform us about the neighbourhood and potential opportunities as customer representatives. In the second step we arrange a neighbourhood meeting to inform the individual homeowners and have a first interaction with them about concerns, needs, and wishes. Those customers who are interested in one or multiple sustainable solutions, is
visited by an Energy advisor in the third step, to assess the context, discuss the possibilities, and agree on measures”. These interactions make sure a thorough understanding is created of customer needs, problems, their context and expectation. It can be concluded that the main activities identified from literature are applied in Case B and on such a level it is rated ++.

Through multiple interactions with the customer and research techniques as focus groups, these activities are informally controlled. Which confirms the conceptual framework and absence of any formal control characteristics. Since multiple actors are active in the three general touchpoints with customers, resources can be summarized to be a network of solution partners and customers.

As the introduction citation highlight, the final objective is to keep an eye on the customer needs, and develop a custom solution through mutual understanding. Which confirms the conceptual framework as well and is rated ++.

Case B deploys multiple activities to translate CK in to explicit concept and format. The realization manager, for example, describes the process of establishing an offer. "After the house screening and conversation with the customer agreements are summarized in a tender, which is reviewed with the customer the next day. Sometimes it occurs the process takes three weeks and both the customer and we have no clue anymore what has been agreed, and discrepancy occurs between offered and expected. Explicitly describing the tender and discussing it reduces this discrepancy." Other examples are; analysis of focus groups on new propositions, and processes formalization with partners. Put along the literature framework, it can be concluded that Case B confirms the identified characteristics. A discrepancy and suggestion for Case B, is to explicitly map out the customer journey, since it will provide a better sight on the customer experience and provide insight in the links between partners. Since the partner could tell the process of Hoom, this point is of less importance for the evaluation and is rated ++.

In respect to the control characteristics, the formal rules and guidelines are confirmed by practice. Enhancements for the conceptual framework are found in terms of performance monitoring and notes. Which aids the customer and value network in conversing tacit into explicit CK. With respect to informal control characteristics, the identified ones in practice confirm 'workshops' from literature. The use of a forum is not mentioned, and sceptically received due to the low number of customers, but could be an improvement for Case B. It helps to gather customer feedback and monitor experience and familiarity with the solution of customers (...). In addition to the conceptual framework 'meetings' might enrich the externalization mode. Case B uses them to present new developments, and evaluate performance with partners through which a common understanding is created. In relation to resources, practice and literature are consistent and mention value network partners and customers.

All objectives of these activities from practice reflect the ones of literature. For example, the objective characteristics 'elicit the right requirements', is translated in Case B in 'improved quality delivery', 'prepared tender and solution implementation plan', and 'evaluate products and new value propositions'. Overall it is rated ++.

The third creation phase E/E is not performed within the value network of Case B, nevertheless it is recognized to be a creation phase. The interviewed Marketing and Communication coordinator said "on the long run we would like to combine explicit data, it is already on the agenda. However, currently I do this sporadically on my own with survey or website data". Due to the limited application of this phase, it is excluded from the framework. The previous citation does underline the suggestion made at Case A, E/E creation might be considered as a next step in the maturity of VN-CKM. Further research and discussions are needed to confirm this conversion mode.

Based on theory, the E/E creation phase is regarded to be important and Case B should start to focus on such processes. The T/E part outlined that common concepts have been defined, a next step should be to link and combine them. Through integration, synthesis and dissemination, the current CK quality can be improved, structurally organized, and generate new CK (Nonaka et al.,
1994). Nonaka et al. (1994) suggest two ways of supporting this process. First they mention social processes, as meetings and telephone conversations. Translated to Case B, regular meetings with partners should be held. Where besides a common understanding of the solution also evaluations of current concepts and combinations of them are discussed. This will improve the service offering due to some (efficiency) improvements. Second, computer systems can help in E/E creation. One could thing of data mining for generation of new CK/insights, but as well think of graphical representations of CK. For example, collected customer reviews or survey outcomes can be analysed on a larger scale.

As final mode of knowledge conversion E/T creation has been addressed, this phase is extensively supported in Case B. For example, the sustainable solutions are presented in explicit form on the website of the facilitator, customers can read this information and internalize this knowledge. However, not each customer has the capability to internalize such information. Therefore, in addition during neighbourhood meetings the sustainable solutions are explained. As the realization manager sketches “In the neighbourhood meetings we present multiple sustainable solutions. Each sustainable solution is explained on technical but also beneficial level, like the increase in comfort. Through floor insulation the heat does not go through the floor and simply keeps your feet warm. Individual homeowners are most often not aware of these effects”. This example typically illustrates provision of knowledge for customers at the deployment phase. In addition Case B also performs activities like screening the house, suggesting sustainable improvements, and explain their effects in the specific situation. With this knowledge input and customer experiences, customers internalize the knowledge and translate it into routines. All activities reflect the general main activity formulated in the literature framework, and no further suggestions can be made for Case B. Due to the multiple activities employed the phase is rated ++.

The final objective is to inform customers better, let them enjoy the new solution, and take away their concerns. Corresponding to, as stated in the literature framework, ‘enhance the value customers derive from solution’. The activities are formally controlled via agreed work methods; confirming the characteristic identified from literature ‘network routines’. Informally, practice applies the control variables meetings, visits and phone calls, via which customer questions are answered but they are as well informed about opportunities, and effects. On a broad scale this can be translated into (individual) training, from literature. As can be deduced from the activities and control variables, in the network, solution partners and customers have their roles in informing customers. Resulting in the confirmation of the E/T creation row, where additional characteristics for informal control are found to be meetings, visits and phone calls.

5.2.2 Storage

<table>
<thead>
<tr>
<th>Storage</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td>I/O</td>
<td>Main activities</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
</tr>
<tr>
<td>E/E</td>
<td>Development of partner portal; development of customer portal;</td>
<td>Contract about using the partner portal; fixed communication pattern via the partner portal; receive and communicate tenders to partners via the partner portal</td>
<td>Partner portal (web portal); photos; tenders</td>
</tr>
<tr>
<td></td>
<td>document house characteristics</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>T/E</td>
<td>Document customer interaction in Sales Force; document collaboration evaluation with partners; record and store focus group sessions; store sustainable solution context information/photos</td>
<td>Customer interaction documentation; evaluation reports about partner collaboration; reports and videos on focus groups; survey</td>
<td>Customer phone call; focus groups; dialogue</td>
</tr>
<tr>
<td></td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
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</table>

Table 5.6 Case B - Storage Phase
In the recent months Case B put a lot of effort in the E/E conversion mode. All respondents mentioned the development of a partner portal. The realization coordinator describes how the partner portal functions; "Currently we use multiple channels to communicate CK with partners (i.e. description of the sustainable solution, photo's and house characteristics), we would like to structure this. In the partner portal each construction partner gets its own account, where we post customer tenders and receive their responses. Additionally partners post their invoices and we take care of them in the next step. So the partner portal ensures each partner receives the same CK, has the same deadline, and creates one communication channel". Concluding from this description, the partner portal creates a unified access to CK, coordination of CK formats, and a central storage location. Put next to the literature activity characteristics it can be concluded practice confirms theory and vice versa. However Case B did not mentioned any integration of CK repositories. Since Case B collaborates with many partners on an irregular basis, the partner portal is deliberately introduced to establish uniformity in sharing and obtaining flexibility. Therefore Case B is still rated ++.

Translated into objectives, Case B aimed to create uniformity, flexibility and efficiency concerning CK storage and access. Again Case B confirms theory, and is performing well. A link can be made to resources; the partner portal has a pivotal role and can be seen as a 'network collective CK memory', affirming literature. The formal control characteristics from practice consist of, a contract about the use of the partner portal and agreed formal processes. Linked to the theoretical framework, it supports the formal control variables. No informal control activities have been identified in practice, confirming theory. Overall Case B supports findings in literature and confirms the framework contains all characteristics.

The second conversion mode is as well supported in multiple ways within Case B. The Market and Communication coordinator described the use of focus groups; "On a regular basis we perform customer cases in focus groups. These sessions are record and stored in our database, so we have many hours of customer feedback on tape. It's a process that requires careful guidance and some inspiration, where cherry picking is needed to indicate important elements. Eventually, the session results are shared and implemented". The tapes are not available for the value network, though the results are translated into new solutions, contracts and processes, making the tacit CK explicit. Storing the tapes makes it able to analyse them in future, and can be classified as documenting and organizing tacit knowledge. Compared to the literature framework, it can be concluded that the externalization mode of Case B reflects the theoretical findings. However improvements regarding efficiency of storing informal customer interactions are lacking. When customers call the coach their remarks are inefficiently stored, therefore still improvements can be made by Case B and is rated a ++.

The aim of recording the focus groups and documenting other customer interactions is to assess them in future and ensure others can as well. For which the characteristics efficient preservation and access to CK from literature are prerequisite. Translated to Case B, recording is an efficient preservation technique and enables access to CK fairly easy, which matches theory. Overall in collaboration with partners and customers CK is documented, which reflects findings from academic research. A CK inventory map has not been established by Case B, however it might be a good option to inform partners about solutions. To control the activities and objectives, Case B uses recording and documentation as formal control. Compared to the literature framework practice affirms the theoretical findings, where recording might be classified as a special type of documentation. Informally the literature framework needs to be updated, Case B highlights focus groups and phone calls as characteristics. In relation to the literature framework, which is only suggesting 'interview', it can be enriched with 'customer research techniques' and 'dialogue'.

5.2.3 Transfer

As discussed in chapter 2 at the transfer subsection, the input knowledge dimension is important. During the interviews of Case B and analysis no different phases have been discovered, supporting the assumption.
The explicit CK residing in the value network is communicated in multiple formats. As previously outlined, tenders have been send, photos are used to clarify customer context, e-mail is used to communicate with customers and partners, etcetera. The realization coordinator explained the communication about tenders: "We first make uniform tenders of the ones receive, so the customers is able to compare them. Afterwards we send them via e-mail to the customer, and receive their answer via e-mail. To improve this and being able to link processes we are developing a tender module. The customer can log in and view the different tenders offered to him. When a decision has been made this can be communicated via the module, and this will be linked to the partner portal". This example and other identified activities confirm the identified characteristics of literature. They show CK is documented (e.g. tenders, notifications, website) and transferred within the value network. The objective of transferring explicit CK with these activities is to establish an efficient sharing of CK to timely inform customers and partners. As stated in the conceptual framework, ‘provide timely, accurate, reliable access to the required CK across a PSS value network’ (Bagheri et al., 2015b). Through which practice confirms theory. The control characteristics identified in literature are supported as well. Just as in the literature framework no informal control characteristics have been identified in practice. In the contrary formal control characteristics have been found, to support the processes Case B makes great use of platforms, and made agreements on and developed organizational routines around the platforms. Additionally multiple documents are used to transfer CK. These processes support the identified characteristics in literature as formal control. Besides they highlight the use of IT tools as resources, to transfer the explicit knowledge; examples are the use of platforms and e-mail communication.

Tacit knowledge sharing is concerned around verbal communication of CK. As previously stated dialogues with customers are held in neighbourhood meetings, during visits, and in phone call conversations. In addition multiple conversations are held with partners, in for example meetings. The Marketing and Communication coordinator described the following example of a feedback session with construction partners; "During the collaborations we noted down our experience with the partners and monitor the customer’s experience with the partner. When enough feedback is gather every three months we evaluate it and discuss findings with the partner in a face-to-face meeting. Points of improvement are discussed and new focus points are formulated. This enhances the collaboration and improves the solution". Based upon this example and previous mentioned interactions, it can be concluded that Case B employs multiple activities to share customer problems, needs and experiences in a face-to-face setting. This confirms the first part of the literature network ‘main activities’ (sharing of CK in terms of needs, problems and experiences).

The second part, the customers’ preference for central or de-central communication, is not evaluated in Case B. However, the value network has made agreements on it see part 4.1.2. As noticed in the validation part of Case A, further research might look into and discuss if this literature characteristic is a VN-CKM one or business model item. Despite this discrepancy, Case B is rated ++.
The objective of the performed activities is inform and learn from customers and partners. In relation to the theoretical framework it can be suggested to focus on reciprocal learning during the solution process. Through feedback and constructive conversations, the quality of solution and value network reputation on the market improves.

As to be expected from the creation phase, no formal control characteristics have been identified for tactic transfer, confirming theory. In the contrary multiple informal characteristics have been identified. As mentioned in the given example, contact with partners and customers, is made via face-to-face conversations and discussions. This partially confirms the theoretical identified characteristics; no social control mechanisms have been mentioned (e.g. trust, mutual norms, and shared value). This indicates either that Case B should focus more on social mechanisms, or the characteristics should be excluded from the framework. Further research might be spending on this point. The resources used to transfer tacit knowledge consist of an interchange between customers and partners of the value network, to inform both customers and partners. This confirms the resources identified from literature, in the framework mentioned as ‘network of solution partners and customers’.

5.2.4 Application
Since application of knowledge is an explicit knowledge process, only the combination phase is identified from theory. Practice confirms this finding, mentioning only the explicit application of knowledge.

<table>
<thead>
<tr>
<th>Application</th>
<th>Main activities</th>
<th>Control</th>
<th>Resources</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/E</td>
<td>Improvement of process based on customer feedback; improvement of customer solution expectation; improvement of alignment/collaboration based on evaluations; add services/new focus points</td>
<td>Contractual agreements about work method; performance monitoring of partners</td>
<td>Construction companies; energy advisors; Hoom; Sales Force; Energy Wors; Customer</td>
<td>Serve the customer better; manage the expectation of customers; increase satisfaction with the solution</td>
</tr>
</tbody>
</table>

The main activities identified from the interviews can be summarized to be value network experience improvements. Respondents mentioned: “We use CK to improve our process and give direction to our development, if we receive feedback on the throughput time we go and look for causes”. “It is mostly focused on structural development, instead of operational process. Which means we look at process-step improvements not the customer process itself, like the level of information providing”. These activities correspond with the ones identified from literature. For the translation of CK in new applications an interaction between all involved value network actors has been identified both in literature and practice. Customers provide input and review the solution, together with partners this feedback is translated into solution improvements. Resulting in a ++ rating.

The process is clear, and the specific steps are updated with CK input, from identification of needs to post-deployment. The value network translates these activities in formal controls like contracts, work methods and performance monitoring, which confirms the identified characteristics in literature. In contrast, informal controls were not found during interviews or in additional sources, confirming the literature framework as well. The final objective of applying the knowledge is to improve the satisfaction of customers, and manage the expectations. Compared to the literature framework these characteristics group together into providing an outstanding customer experience, and enhance the customer’s business, and confirms literature.

5.3 Case Comparisons
This part compares individually Case A and Case B with the other three practical cases, to identify differences among them, and what can be learned from each other. Which is supplementary to the theoretical comparison of above. First Case A is discussed and put next to the findings of the other three cases; next Case B is addressed in comparison to the other three
cases. To start the creation phase is discussed, followed by a discussion about storage, transfer and application.

Discussed findings are established in close collaboration with the Bachelor students. After elaboration of the individual cases, the cases are placed next to each other and remarks are made. In a review session the findings are discussed and improvements for the individual cases put forward. Based upon the +/- ratings (table 5.11) it can be stated that the value networks of Case A and B are further developed, in comparison to Case C and D.

5.3.1 Case A
As previously concluded Case A employs multiple activities and provides support to the socialization phase during creation (++) Therefore the comparison amongst Cases did not reveal any lacking characteristics or activities to be performed. As similar to the comment in the framework comparison externalization part, explicit description of the value network solution would enhance the customer experience. An example could be taken from Case B, which made a clear distinction on the added value amongst different partners. Case A, for example, could define roles and responsibilities for grid providers, energy suppliers and ODAs. More concrete, a clearer distinction and alignment between implementing the smart meter and offering insight modules would help. The absence of the combination phase is confirmed by all three cases, due to a low level of customers. However, all recognized the potential of such actions and mention it to be a next step of the value network development. From comparison of +/- table the final creation step is best developed at Case B, which actively supports customers with meetings, visits, websites, and telephone support. Next year the roll out by Case A expands and the need for support will increase. Currently Case A already uses videos to support the large group of customers, this might be improved by notifying customers about uploaded videos to create awareness.

The storage of explicit to explicit knowledge is not integrated amongst partners. Therefore, from Case B it can be learned that the use of portals enhances the communication and centralization of CK, especially in situation of infrequent and random interactions. Translated to Case A, minutes, reports, procedures and agreements can be stored on a portal to inform the many involved partners. Currently this is not the case, and "everything ends up in the mail monster, where no one can find it in about three years". In contrary, the tacit-explicit storage phase is extensively supported. In the value network of Case A a lot is noted down and saved, cases B, C and D do so as well. The difference between both phases might again be due to the focus of emerging networks on tacit knowledge.

As to be concluded from part 5.1.3 both explicit and tacit transfer of knowledge is on a mature level (++). However a critical note might be placed at tacit knowledge sharing with customers. Currently there is low initiative to actively inform customers inside the value network, this might need improvement when the implementation expands and less technical customers enter. Local initiatives like Case B arranges in terms of neighbourhood meetings can be an option. However is resource intensive, therefore an alternative would be to upload videos and promote them amongst customers.

Case A applies the gathered CK on a wide range in the value network to enhance the solution on multiple points (5.1.4). A point of improvement might be to manage the customer expectation of the value network solution. Creating a common expectation with customers and enhancing its experience with the solution, as Case B actively does. In addition, it forces the value network to define roles and responsibilities.

5.3.2 Case B
As stated in the previous subsection, Case A and B are one of the mature cases on tacit-tacit CK creation (++). Also Case B takes a lot of initiatives to create together with the customer a solution and get a grip on the context. In the next step this knowledge is converted into explicit knowledge. Again Case B is very mature in this step as explained in subsection 5.2.1. From Case D might be learned to set-up workshops with partners, to create together an experience process
and define it. Just as is the other three cases, Case B does not perform combination of CK creation. For the similar reasons; little customer data and other priorities (tacit CK). However, they recognize the importance and have put it on their agenda. In the final step of creation customers are informed in multiple ways and even partners are included in explicit-tacit conversion. Case B could improve this phase by explaining additional services like Case A suggested, tips on sustainable living could be given and there effect(s) explained.

As to be concluded from the previous storage part Case B put a lot of effort in explicit to explicit storage, by developments of partner and customer portals, and is the most advanced of the four cases (++) . No suggestions of other cases could be made. The tacit-explicit conversion could be enhanced through composing minutes and research papers, which is currently lacking. From Case A and D could be learned to note down observations and store them on a general place, via which others could access them.

Based on the +/- evaluation it can be concluded that Case B takes initiatives to support the transfer of CK in the value network of Case B. The explicit CK transfer to customers could be improved by distributing folders or magazines on sustainable living, like Case A does in collaboration with Milieu Centraal and a media concern. Regarding the energy insight module Case B is developing; collaboration with Case A might be a good option to support customers with their smart meter insights. In addition, Case B takes multiple initiatives regarding tacit to tacit CK transfer, to both customers and partners. No additions have been found for these processes.

The application of CK is confirmed by the other Cases A, C and D. Overall one point can be added to Case B, the use of CK to upgrade the strategy and vision of the value network. Which will enhance the customer experience, due to a better expectation-solution outcome fit as Case A tries to do.

5.4 Recommendations Case A

Based upon the previous analysis, +/- categorization and Case comparison it can be concluded that Case A performs multiple activities, with the objective to offer an integrated solution. However, on several points some recommendations and future steps can be suggested. A summary of the recommendations can be found in table 5.9.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation</td>
<td></td>
</tr>
<tr>
<td>T/T</td>
<td>Trust</td>
</tr>
<tr>
<td>T/E</td>
<td>• describe value network roles and responsibilities</td>
</tr>
<tr>
<td>E/E</td>
<td>• describe service offering</td>
</tr>
<tr>
<td>E/T</td>
<td>• integration, synthesis and dissemination of current CK</td>
</tr>
<tr>
<td>E/T</td>
<td>• Workshops or and promotion of informative videos</td>
</tr>
<tr>
<td>Storage</td>
<td></td>
</tr>
<tr>
<td>E/E</td>
<td>• organize integrated CK repositories, coordinate formats, and define a uniform way of access</td>
</tr>
<tr>
<td>T/E</td>
<td>• CK inventory map</td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
</tr>
<tr>
<td>T/T</td>
<td>• inform customers in tacit formats</td>
</tr>
<tr>
<td></td>
<td>• social control mechanism (trust, mutual norms, and shared values)</td>
</tr>
<tr>
<td>Application</td>
<td></td>
</tr>
</tbody>
</table>
As highlighted in the creation part, the value network does not mention trust as informal control mechanisms. Through gaining customer trust they are more open and willing to collaborate (Hakanen, 2014; Aarikka-Stenroos and Jaakkola, 2012). This will enhance the co-creation and finally the offered solution. Therefore, Case A is recommended to create a trust relationship with customers.

The second recommendation is to clearly describe the roles and responsibilities within the value network. Currently those are not clearly defined and some partners are working against one another. As Hakanen and Jaakkola (2012) mention, this will confuse the customer and hinder the provision of an integrated solution from the customer’s point of view. Linked to roles and responsibilities, the value network is recommended to describe the service offering. This will create both, mutual insights in each other’s offerings and a mutual understanding of the customer context (Hakanen, 2014). By explicitly stating the service offerings, less ambiguity would occur and a well-aligned solution process.

Thirdly, the combination creation phase can be improved. Currently no such activities are performed in the value network. After establishing common concepts and thinking patterns, in the next step those concepts can be combined to create new knowledge and improve the value network solution (Nonaka et al., 1994). Therefore integration, synthesis and dissemination of CK are important processes and should be focus points in further development of the value network. Nonaka et al. (1994) suggest two ways of supporting this process. First they mention social processes, as meetings and telephone conversations. Translated to Case A, the P4 meeting’s aim can be updated or expanded with discussing current insights and evaluation of processes. This will improve the service offering due to some automations and efficiency improvements. Second, computer systems can help in E/E creation. One could think of data mining for generation of new CK/insights, but as well think of graphical representations of CK.

The last creation phase recommendation is related to internalization of knowledge. Currently Case A provides explicit knowledge in written format, which is internalized by customer during application. From the case comparison can be learned that workshops and informative videos would also support this phase. This helps customers with less imagination, concerning the energy data, to picture it and internalize the knowledge in its direct context (Fang and Zou, 2010). Therefore, in addition to the written documents, Case A could also think of workshops, and informative videos to explain the smart meter and related services.

For both processes of CK storage recommendations of improvement have been drawn. First, the explicit to explicit storage of knowledge can be improved with three actions. Via (1) integrated CK repositories, (2) coordination of formats, and (3) defining a uniform way of access to CK. The objective should be to develop common interfaces, and a unified and organized access to multiple repositories. This will enhance the dissemination and preservation of explicit knowledge (Li et al., 2012). Establishing and controlling this would be a responsibility of large organizations in the value network, like smart grid providers, energy suppliers, and Energy manager umbrella organizations.

In respect to the T/E storage of CK Case A is recommended to create an inventory map. This documents and organizes existing knowledge in the value network, enhancing the reachability of relevant CK in the value network (Li et al., 2012). Through interviews with partners an insight about the scattered CK can be obtained and a map be drawn.

As a final recommendation Case A could improve on tacit CK transfer towards customers, besides the explicit ways already applied. One could think of informative meetings, or previously mentioned workshops and videos. This facilitates the creation of new knowledge, and new competences at the customer and within the value network (Fang and Zou, 2010). Additional context relevant factors can be shared. Besides, as previously mentioned, Case A could improve by gaining customers’ trust. This will enhance the interaction and co-creation.
5.5 **Recommendations Case B**

The previous chapters put Case B next to the conceptual framework and other case studies. It can be concluded Case B performs multiple activities, with the objective to offer an integrated solution. However, on several points some recommendations and future steps can be suggested. A summary of the recommendations can be found in table 5.10.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation</td>
<td>T/E</td>
</tr>
<tr>
<td></td>
<td>• Customer journey</td>
</tr>
<tr>
<td></td>
<td>• Forums</td>
</tr>
<tr>
<td></td>
<td>• Workshop with partners</td>
</tr>
<tr>
<td></td>
<td>E/E</td>
</tr>
<tr>
<td></td>
<td>• Integration, synthesis and dissemination, of current CK</td>
</tr>
<tr>
<td></td>
<td>E/T</td>
</tr>
<tr>
<td></td>
<td>• Explanation of additional services, [e.g. tips on sustainable living, refer multiple websites]</td>
</tr>
<tr>
<td>Storage</td>
<td>T/T</td>
</tr>
<tr>
<td>Transfer</td>
<td>• Reciprocal learning</td>
</tr>
<tr>
<td>Application</td>
<td></td>
</tr>
</tbody>
</table>

Considering the externalization creation phase, the conceptual framework and case studies make three suggestions for Case A. First to explicitly state the customer journey, this helps to represent customers’ value network interaction points, and picture the context that exist (or could exist) around the customer and value network. The representation encourages the value network to think of different elements and their connections (Wetter-Edman, 2014). To get a better insight, Case B could improve in explicitly note down the process. Second, Case B could start to orientate itself on forms, for example Twitter and Facebook. It gets you closer to customers more easily and makes you able to monitor evaluation criteria of customers (Hakanen, 2014; Rosa and Spanjol, 2005). When services get more mature and common, customers move from detailed descriptions with the use of multiple words towards comparison of cases with specific terms. With specific terms customers express their evaluation criteria that can be useful information for solution improvements. Third, workshops with partners are recommended. Currently Case B organizes meetings with partners to inform them, however having dialogues and discussions with partners can enhance a common understanding on the context and solution.

Like in the other case studies, Case B could improve in the combination of explicit CK. After establishing common concepts and thinking patterns, in the next step concepts can be combined to create new knowledge and improve the value network solution (Nonaka et al., 1994). Therefore integration, synthesis and dissemination of CK are important processes and should be focus points in further development of the value network. Nonaka et al. (1994) suggest two ways of supporting this process. First, they mention social processes, as meetings and telephone conversations. Translated to Case B, workshops and evaluation meetings with partners can be moments on which improvement discussions are held about the solution. This will improve the service offering due to some efficiency improvements. Second, computer systems can help in E/E creation. One could thing of data mining for generation of new CK/insights, but as well think of graphical representations of CK. Translated to Case B, the survey data that is gathered could be analysed on a larger scale (more then individually).

In relation to the internalization creation support at the customer side, Case B performs many activities. However, with the recent developments of an energy module for customers, Case A can be a source of inspiration. Since not all customers have a though rough understanding of
energy data and graphs, they need to be informed. With additional tips and tricks Case B could support them, with the use of a magazine or reference to multiple websites.

As final recommendation, Case B could focus more on reciprocal learning within the value network. Through feedback and constructive conversations, the quality of solution and value network reputation on the market improves. Translated to Case B, they can make notes about the interactions with partners.

5.6 Discussion on Conceptual Framework

To answer RQ1, in the following the conceptual framework (Bagheri et al., 2015b) is discussed based upon the results from the four studied cases. The Tables 5.11 and 5.12 give an overall result. Table 5.11 provides an overview of the different performances among the cases on the VN-CKM processes based upon the +/- ratings. It can be concluded that the discussed cases in this report (A and B) are the most advanced in VN-CKM process practices. Table 5.12 represents the findings in respect to the defined characteristics of the conceptual framework. Different terms have been coloured to highlight remarks, reflecting the criteria as mentioned in the methodology part. The confirming case(s) regarding the remarks is highlighted underneath each process and IDEF-criterion. The terms coloured black are the ones that are confirmed by the studied cases. Green coloured are those terms that are proposed as enrichments of the conceptual framework. The blue terms represent discrepancy between practice and theory. The orange coloured terms represent generalization of the used term in the conceptual framework.

Further research should be done and discussions held to evaluate the relevance of the VN-CKM framework conclusions.

To answer RQ1, in the following parts the sub-questions are individually elaborated starting with creation and ending with application.

<table>
<thead>
<tr>
<th>Table 5.11 Case Comparison</th>
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<tbody>
<tr>
<td>Creation</td>
</tr>
<tr>
<td>Case A</td>
</tr>
<tr>
<td>Case B</td>
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<tr>
<td>Case C</td>
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<tr>
<td>Case D</td>
</tr>
</tbody>
</table>

| Table 5.12 Conceptual framework analysis with cases results |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| P | I/O | Main activities | Control | Resource | Objective |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| T/T | Ideations, identifying the business customer’s problem, customers explain their challenges, obtaining deep customer insight and contextual understanding of customer experience (CE) and emotions through brainstorming, empathic methods, and ethnographic research techniques besides traditional market research. | Briefing session, Frequent, collective and reciprocal interaction, | Network of solution partners and customers. | Mutual understanding of the customer problem, directing and evaluating solution, providing user-centered perspectives on solution offerings. |
| T/E | Analyzing and interpreting the customer preference, explicitly describing customer knowledge and service offerings, Storytelling and visualizing, mapping out the service encounters (firm-customer touch points) from the customer’s perspective by utilizing mapping tools (e.g. process mapping, service-blueprinting, and customer-firm touch point analysis), formalization of all the solution processes, clarify roles and responsibilities, reporting structure. | Rules and guidelines. | Workshops, forums, meetings. | Network of solution partners and customers. |
| | | Performance monitoring. | (A, B) | (A, B, C, D) | (A, B, C, D) |

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<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>E/E</strong></td>
<td>Integrating CK repositories, defining a unified access to the CK repositories, coordinating data formats and storage locations, making access to the stored CK. (A, B, D)</td>
<td>Formal CK representations, standards, routines. (B, D)</td>
<td>- (A, B, C, D)</td>
</tr>
<tr>
<td><strong>T/E</strong></td>
<td>Documenting and organizing past experiences of both solution providers and customers. (A, B, C, D)</td>
<td>Documentation. (A, B, C, D)</td>
<td>Interview. Customer research techniques (A, B, C, D) (A, B, D)</td>
</tr>
<tr>
<td><strong>T/T</strong></td>
<td>Sharing knowledge of the customer’s problem, needs, and value expectations, identifying the customer’s preferences for centralized or decentralized knowledge flows between partners and customers. (A, B, C, D) (A, B, C, D)</td>
<td>- (A, B, C)</td>
<td>Face-to-face communication, discussion, and dialogue, shared value, mutual norm, trust, joint training program. (A, B, C, D) (A, B, C, D)</td>
</tr>
<tr>
<td><strong>E/E</strong></td>
<td>Integrated solution proposals from identification to post-deployment support are based on using CK. (A, B, C, D)</td>
<td>Network routines, directives, contractual agreement. (A, B, C)</td>
<td>- Meetings. (A, B) (C, D)</td>
</tr>
</tbody>
</table>

### 5.6.1 VN-CKM creation

The first creation phase is socialization, which is concerned with the sharing of tacit CK. Key to acquiring tacit knowledge is experience and context, without these factors it is hard to understanding each other thinking processes (Nonaka et al., 1994). Translated towards CK, theory proposed and practice applied activities and objectives to identify the business customer's problem, create a contextual understanding of customers, and establishes a customer-centred perspective. It can be concluded that the identified 'main activities' and 'objectives' in the conceptual framework reflect in practice. Multiple social interaction types influence the tacit knowledge creation activities as shown by the studied cases, to create frequent, collective, and reciprocal interactions. Trust, as informal control type is not explicitly mentioned in the studied cases. However, theoretically it can be backed-up to be an important characteristic, since trust causes openness and willingness at customers, to collaborate and improve the value network solution (e.g. Hakanen, 2014). Future studies might look into its value to confirm this for VN-CKM process. To sum up the socialization part, the VN-CKM conceptual framework contains all relevant characteristics for establishing an effective and efficient process.

As next step the value network should try to translate the tacit knowledge into explicit concepts. This makes the customer experience process more concrete, and CK easier to analyse and share (Mahr et al., 2014). Tacit knowledge is made explicit by analysis and interpretation of customer preferences, noting down these preferences, visualization of processes, and formalization of roles and responsibilities within the value network collaboration. These activities contribute to a better common understanding of the solution, elicitation of customer experiences and requirement management. To agree on common concepts and formalization of the value network, sessions with partners are planned to discuss issues and developments. Inputs for such sessions are customer researches results and own experiences considering the
collaboration and customer feedback. Scanning forums, as suggested by the conceptual framework, has not been confirmed. Only Case A noted to scan social media, with the aim to debug wild stories. Based upon these wild stories, customer problems and evaluation criteria could be obtained. Other cases did not so due to the low customer base and activities on forums currently. Further research should shed light on its relevance, however theory is strong in support (e.g. Rosa and Spanjol, 2005). The conceptual framework could be enhanced with ‘performance monitoring’, which is applied by Cases A and B. Monitoring customer satisfaction helps in establishing concepts that are valuable for customers and should be taken into account for the solution (Rosa and Spanjol, 2005). From the previous it can be said that the conceptual framework represents all relevant characteristics of the externalization creation phase. Additions to these characteristics found in practice are meetings and performance monitoring as respectively informal and formal controls; future research might look into their relevance and contribution to the VN-CKM process externalization.

In contrast to what has been found by Nonaka et al. (1994), the studied cases did not follow a sequential order of knowledge conversion. The combination phase has not been performed in the studied cases, however the internalization phase is. Despite the fact that the context is clear and general concepts are defined within the subjected value networks. The discrepancy might be explained by the solution process as delineated in the article of Tuli et al. (2007), which highlights that customers value support during implementation and (post-) deployment. Therefore the value network needs to establish customer support early, in order to create a good customer experience and expand the customer base. Which supports the internalization conversion phase. In the contrary, due to the low customer base of entrepreneurial firms, the received feedback is low and no valuable insights can be obtained. Conclusions based upon the received feedback might cause the value network to focus on wrong topics, and devalue the solution. Both arguments result into a focus on internalization and skipping of the combination phase. To support this reasoning further research should be done and discussions amongst researches be held. In addition, future research should be devoted to the combination phase in order to validate the conceptual framework VN-CKM characteristics.

Since customers value support during deployment, value networks developed activities to enhance the solution experience. Knowledge can be provided in multiple formats to support the customer in learning by doing, examples are e-mails, brochure, and trainings. Informing customers enables them to better use the potential of the solution in their context. This translates into case objectives like solving issues and explaining possibilities, which will be internalized by the customer during use. To influence the transition of explicit into tacit knowledge in the multiple studied cases agreements have been made on routines and way of working, confirming the conceptual framework on formal control. Informal, customers are supported with explanations of the solution through interactions. During these interactions customers are taught how to use the solution and its possibilities. For the execution of activities an interaction between multiple providers and customers is needed. This confirms the identified resources from theory and can be grouped into a network of solution partners and customers. It can be concluded that the conceptual framework reflects all characteristics of the internalization phase.

5.6.2 VN-CKM storage

Regarding the storage in the combination phase the main activities of the conceptual framework are partially supported by the studied cases. The cases showed that explicit CK is coordinated, stored on multiple locations, and accessible for value network actors. To coordinate the storage of CK, agreements have been made with partners on standards and routines, which are formalized in contracts. However, not all studied cases highlighted ‘integration of CK repositories’ with partners. This might be due to the start-up nature of the studied cases; meaning collaborations with partners are not yet on an integrated level. However the transition between commitment and integration is a subtle one (Ellram, 1991). Therefore ‘integration of CK repositories’ might be a next step in value network developments. Since theories suggest
integration to establish efficiency, further research should be done to confirm it on network level. The final objective of storing CK in the value network is to store it efficiently and accessible across the value network. Overall can be concluded that the conceptual framework represents all relevant characteristic in relation to storage in combination phase.

In addition, storage of externalization output has been identified with the objective to ensure an efficient CK preservation and retrieval at a later time. As highlighted in the creation phase multiple activities can be applied to document the tacit CK within the value network. One could think of contracts on roles and responsibilities, or reports on customer research. Which support the theoretical identified main activity for storage ‘documenting and organizing CK’. In addition, theory suggests to use a CK inventory map, through which specific tacit CK, skills and resources can be found more easily across the value network (Li et al., 2012). However, none of the studied cases applied a CK inventory map, which might be due to the low number of partners currently involved. When more partners get involved introduction of a chart might be valuable, since short lines will evaporate. Therefore, it is assumed that ‘CK inventory map’ is a relevant characteristic and helps value networks in their storage of tacit into explicit CK. Further research might shed light on this assumption. Finally, to identify the relevant CK or skills as informal control ‘interviews’ have been suggested. Based upon the studied cases it could be concluded that this is just one of the techniques applied, also surveys have been send out and pilots performed. A generalization is therefore suggested regarding ‘interviews’; this might be altered into ‘customer research techniques’. To sum up, the conceptual framework seems to be valuable as guideline for managers in mirroring and developing their value network processes.

5.6.3 VN-CKM transfer

Explicit CK is transferred in documents throughout the value network. Documents can be for example e-mails, letters, brochures, contracts, minutes, reports and procedures. It can be concluded that resources used for the transfer of explicit CK are either IT tools or paper-based documents. Put along the conceptual framework, paper-based documents might enrich the framework. Since only Case A supports this enrichment, however in multiple ways (i.e. brochures, magazine, letters), further research might strengthen the observation. The final objective of sharing explicit CK is to inform the value network in time, accurate, and reliable. To sum up, the characteristics of the conceptual framework include all the relevant ones. Additional to the framework, paper-based resources have been identified in practice and might be added.

Transfer of tacit CK is concerned with obtaining a good understanding of the context and customer problems, needs and expectations (Bagheri et al., 2015b). This is supported by the studied cases, which applied multiple techniques to obtain CK in interactions with customers and sharing with partners. In addition, literature suggests activities to identify the preference of customers and partners concerned with centralized or decentralized flow of CK. In the studied cases this has not clearly been found. It rather seems to be a characteristic of the value network configuration, as being defined during the business model development. However this might be biased since the business model development is already performed at the studied cases and identification of preference of CK flow already identified. Further research might focus on this characteristic since customers have different preferences in being supported, and it influences the experience with the value network (Tax et al., 2013). In addition, social factors like shared value, mutual norms, and trust might have their influence. These have not been found in the studied cases, however are recognized to be important in multiple researches about collaboration and teams (e.g. Hakanen, 2014). The social factors create willingness at customers to explain their difficulties and provide feedback on services. This reveals problems and opportunities, creates a mutual understanding of the goal by partners, and evolution of requirements. Therefore, it is assumed to be a relevant characteristic and managers should take into account when establishing a value network. Further research might look into this assumption, since theory is strong in supporting their inclusion. The final objective of tacit CK transfer is to learn during the solution processes as mentioned in the conceptual framework.
Besides practice highlight ‘on time informing the value network’ as objective. When suddenly issues or something special occurs in the value network, telephone conversations are made to explain the situation and look for a solution. This will speed up the process and limit the negative experience of customers. To conclude not all conceptual framework characteristic have been supported. However based upon literature it can be explained why those should be important, and remain in the conceptual model. In addition, the conceptual model can be extended with the objective to inform the value network in time.

5.6.4 VN-CKM application

The obtained CK has been applied in multiple activities, reported by the studied cases. Based upon CK the features and applications of the solution are improved, new ones proposed, customer approaches and expectations better managed, and value network processes improved. Linked to the conceptual framework it can be concluded that the whole process from identification to post-deployment support is confirmed by practice and recognized as VN-CKM process characteristic. The final objective of altering products, processes, support and strategies is to offer a better solution towards customers in terms of quality, expectations, and satisfaction. As been stated in the conceptual framework, to provide an outstanding customer experience, and enhance their business. To perform these activities and obtain the objectives a good interaction between partners and customers in the value network is necessary. The studied cases recognized this prerequisite and involved partners and customers as much as possible in delivering the solution. To control the application of CK, the studied cases set up contractual agreements with partners about the process and work methods, and defined strategies. This confirms the formal control characteristics of the conceptual framework, which mentions network routines, directives and contractual agreements to influence the application. In addition, the studied cases C and D mentioned meetings with partners as informal control. During meetings agreements are made on process and solution improvements, based upon new CK gathered by partners. Therefore, the conceptual framework can be updated with the informal control ‘meetings’. In conclusion, the characteristics identified in the conceptual framework represent the ones for developing a value network.

6 IT

This chapter shows an orienting study regarding IT requirements and practical issues on value network level. First an orientating literature study has been performed to identify relevant aspect regarding IT requirements to value network activities. Second, the four studied cases have been analysed to identify how IT is currently applied and reflected with the theoretical observations. Based upon the previous parts further research topics are proposed.

6.1 Literature orientation

Due to recent developments in IT, KM activities on value network level could be supported in multiple ways. Summarized by Bagheri et al. (2014) “IT makes joint activities, integration, and communication amongst partners possible”. In addition, it could support in bridging the weaknesses between organizations in creating, storing, transferring and applying knowledge (Alavi and Leidner, 2001). Applying IT for these purposes can reduce the cost of communication, increase the reach of the organization, give access to alternatives and quality, and reduce the cost of related transaction (Chi and Holsapple, 2005).

As relevant discipline interorganizational systems (IOS) is taken into account. “In the broadest sense, IOS consist of computer and communication infrastructure for managing interdependencies between firms. From a KM perspective, this infrastructure enables and facilitates knowledge flows amongst organizations (and their participating representatives) such that the needed knowledge gets to the relevant participants on a timely basis in a suitable presentation(s) in an affordable way for accomplishing their collaborative work” (Chi and Holsapple, 2005). Regarding this statement IOS research focuses on the flow of knowledge and the way of knowledge presentation. To establish this, key aspects in knowledge sharing are
transparency and receptivity (Chi and Holsapple, 2005). In the following a closer look will be on both aspects. In addition, inherent to value network collaboration, shared decision making is taken into account since it influences the created solution.

In order to establish transparency, receptivity and shared decision-making activities, support needs to be given to interactions, communications and data sharing of systems (Saeed et al., 2011). This will enable the value network to share its obtained knowledge and information in an explicit format between systems, and as well support process communication. Broadly, literature makes a distinction between three levels of system integration; compatibility, interoperability and integration (Panetto and Molina, 2008). These three levels are categorized in a hierarchical way in respect of the dependency and closeness of systems. Compatibility is the most basic and makes sure systems are able to operate next to each other without disturbing one another. Interoperability takes compatibility a step further, and enables sharing and use of services between systems. However, those services are not really necessary to let systems operate. This plays a crucial role in environments with short and agile collaborations (Panetto and Molina, 2008). Integrated systems are the next step; they work closely together and are not able to operate independently. If certain services or information is not shared systems will lose significant functionality. Integration is most often used in long-term relationships and in more dependent collaborations (Panetto and Molina, 2008).

Key aspects in system interoperability and integration are ‘systems integration’ and ‘data compatibility’ issues (Saeed et al., 2011). System integration refers to the operational and technical aspects of integration, regarding protocols, middleware, interfaces, practices and alike (Gottschalk, 2009). This enables systems to exchange information on a technical level. Data compatibility is concerned around standardization of data formats and metrics, to enable the interpretation of services and information exchanged between systems (Saeed et al., 2011). Both syntax and semantic standardization are important in this respect (Gottschalk, 2009). Syntax standards refer to agreements on the structure of language and messages exchanged. Making systems able to read the messages rather than just receive. Semantic standards refer to the definition and meaning of terms used in the applied systems. This gives content to the messages and direction for implementation.

If systems are able to exchange services the first key aspect is transparency of knowledge, which refers to the ‘openness’ of an organization towards partners (Chi and Holsapple, 2005). In value networks, relationships with partners range from structured, to semi-structured, to highly unstructured, with an important emphasis on human interaction and contextual understanding. As such, interactions between contact persons of organizations are vital for knowledge transparency amongst partners. IT mediated communication might support partners in, for example, constructing and sharing beliefs, or express new ideas (Alavi and Leidner, 2001). Coakes (2006) suggests multiple ways of social networking supported by IT, indirect via e-mail, online messaging, weblogs and e-forums. But as well direct with technologies like videoconferences, webcams and telephone. An important additional aspect is planning to arrange meetings among partners to share knowledge in a direct way, be it face-to-face or supported by IT. Meeting management as IT support helps in doing so. Further it triggers regularity and routine in sharing of knowledge, which improves openness and creation of a common understanding (Monge et al., 1998).

The second factor influencing knowledge sharing effectiveness is receptivity, which refers to the ability of organizations to absorb knowledge and skills from partners in an explicit way (Chi and Holsapple, 2005). Since human interactions and contextual understanding are key points, IT could support with technologies that enhance the personal absorptive skills. Ramesh and Tiwana (1999) described such a system based upon identified problems in team collaborations. To support receptivity they suggest system functionalities, which are able to explicitly map people and skills, to facilitate the sharing of context, to capture and locate tacit and unstructured knowledge, and to create a common information pool. These system
functionalities support people in search for specific knowledge, show context if necessary to understand the knowledge, and create a common knowledge level.

In addition to knowledge sharing, shared decision making within a value network is important, which influences the outcome of collaboration among partners. Saeed et al. (2011) discuss three tools in supporting decision-making. First they discuss analytical abilities of value networks. Which ranges from extracting information from databases to applying decision models, with the objective to present trends or forecast events. Second, the evaluation ability is discussed, which is the extent to which tools are provided to evaluate the performance of value network partners. Insights show how smooth the processes of solution offering runs, and highlight underperformance and improvement areas. Third, alertness is discussed, which is the extent to which systems are capable to detect and report exceptions. To discuss results from these analyses, interactions are important for which IT could support in providing interactive technologies. Those can be the same as previously outlined (i.e. e-mail, online messaging, videoconference). A drawback of using interactive technologies like e-mail, instead of face-to-face communication, is miscommunication. To reduce this drawback Chi and Holsapple (2005) propose the use of central repositories to create a common knowledge base and understanding of the context to facility sharing of visions and ideas. This central repository could contain for example reports, minutes, frequently asked questions, problem definitions, successful experiences, and best practices.

In addition to the large body of theory reporting on knowledge sharing between partners, IT research is evolving towards customer interaction and data gathering. One of the large contributions to this shift is the rise of social media among customers (Trainor, 2012). Firms are starting to use social media to interact with their customers, to obtain feedback and co-create with them. To support this interaction, literature reports on social CRM (SCRM) systems. In comparison to traditional CRM systems, SCRM systems create many-to-many relationships to co-create value with customers via interactive dialogues. Regarding technology, SCRM aims at automating monitoring, interaction, and management tasks of social media (Alt, 2012). This enhances the efficiency and effectiveness of gathering customer knowledge via social media. In respect to the value network perspective of this report, the article of Bagheri et al. (2015a) described the concept value network social customer relationship (VN-SCRM). They introduced three types of systems for VN-SCRM analytical, operational, and communicative. Analytical refers to shared databases for analysing customer data and transactions among the value network partners. Operational refers to social media incorporation among value network service, marketing and sales activities. Communicative refers to integration and management of customer touch points among actors. In order to improve the solution these capabilities might aid in gathering relevant CK and related insights.

In summary, literature suggests some focus point with regard to IT support of VN-CKM processes. To stimulate the sharing of knowledge, transparency and receptivity are important. It creates openness and supports the absorption of knowledge. Important considerations are system integration, data compatibility, communication, knowledge support and knowledge sharing. In addition, IT might play a role in decision making throughout the value network, it helps in analysing data to reveal trends, suggest improvement points, and to detect exceptions in solution offerings. To do so, the value network needs to create a common understanding of concepts and be supported to communicate about results. An interesting development regarding customer interaction, feedback and co-creation is SCRM, which might aid in gathering useful results.

6.2 Case observations

In the following an analysis of IT applications, considerations, gaps and opportunities are discussed based upon the four studied cases. A summary of observations is given in Appendix 10.9.
First thing noted from the case analyses is no attention is given to compatibility, interoperability or integration of systems on value network level. Rather a preference is given to portals and content servers like features on the internet. Those are used to share documents, give insights, work on the same versions, and coordinate the process. According to Arto and Pasi (2011) cloud computing solutions free the user of technical specifications, it is always available due to the rise of internet availability, the latest version is accessible without updating, and it reduces the costs. Since start-ups are cautious in entering permanent relationships and expensive systems, cloud computing seems to be a good alternative. As the marketing and communication respondent mentioned, “start-ups are still shaping their processes. Since systems always follow the processes it is desirable to keep them flexible, when you do it the other way around you might end up with an expensive system that does not fit the process”. This indicates a system should be low cost, flexible and quickly adaptable. Therefore the use of cloud computing might be suitable. Further it enhances the efficiency of the value network, which reflects in statements like “with the content server, we do not have to take into account all the different partner systems and adapt ours” and “since we collaborate with so many partners, who have their own methods of working, we decided to develop the partner portal”. Based upon these observations future research might focus on cloud computing solutions, for example cloud based connections with a focus on sharing, communication and process alignment. Regarding cloud computing, Krucken and Meroni (2006) suggest to create “an explicit base to discuss operational details and to realize the expectations of partners and customers”, “a tool to analyse the operational/technical feasibility of the service and its acceptance by the user”, and “a frame to promote brainstorming about business strategies, such as the market position, the corporative brand personality”. Further research might look into the realization and applicability of these suggestions. Besides cloud computing integration of systems might still be a good solution, in more mature value networks it might be that such solutions are better in terms of efficiency, reliability and privacy (Gottschalk, 2009). Future research might look into requirements concerning technical, semantic and syntax level in relation to the previous discussed suggestions of Krucken and Meroni (2006). In addition, to assess if cloud computing or interoperability of system are preferred in value network collaboration, future research might look into evaluation criteria to be used.

Second, it is noted that direct communication is very important to support the sharing of knowledge, collaboration and solution offering. For direct communication the studied cases mostly use telephone and e-mail. For example Case A mentions to use e-mail to share minutes and documents. In addition, on a regular bases there is telephone contact with partners, as the realization manager explains “on a regular basis we have phone conversations with energy managers to quickly discuss and solve issues we have with them on data sharing”. The importance of direct communication is stressed in the article of Chi and Holsapple (2005). They state that communication in networked environments is very important due to the high degree of human interactions and irregularity of interaction, making capturing communication in rules, protocols and standards hard. Well-supported communication will nurture the transparency of the network, inducing commitment, trust and mutual understanding. In relation to the VN-CKM processes of the studied cases it can be observed that still more tacit in comparison to explicit activities are employed, supporting the statement of Chi and Holsapple (2005) that human interactions are important. Therefore future research might focus on supporting direct communication in the value network to create openness and share contextual relevant information. Besides e-mail and telephone other tools might be used, like forums, videoconferences, and online messaging applications (Coakes, 2006).

In addition, to communicate with customers all four cases used websites to inform customers. Due to the low threshold of entering the internet and it reach (Senn, 2000) it could perfectly assist the value network in presenting the solution, providing additional information and proposing additional services. The studied cases however only used the website to inform their customers, rather than the previous discussed social CRM literature suggests. Social media could be used to discuss market developments and gather feedback of multiple customers, it is characterised by many-to-many relationships enabling the creation of communities for co-
creation. Currently the studied cases deliberately choose not to use social media. Case A explains the following "if I send an e-mail I would like to receive an answer within 24-hours, if we cannot meet this expectation it might go viral and damage our reputation. Due to capacity limitations currently at our firm it is chosen not to respond on social media. Since we are not active on social media, we manage the expectations of customers and they start contacting us via e-mail or telephone. In addition to this, we have a limited number of customers and those are not very active on social media. So no much value is to be obtained.". Due to the inactivity of the studied cases no issues or limitations have been identified. Based upon literature and the number of users, social media could enhance customer understanding. Future research might therefore look into SCRM requirements. As highlighted by Bagheri et al. (2015a), a distinction between three capabilities can be made analytical, operational, and communicative. Analytical research could focus on what CK to share and via which mediums. Operational research might look into how social media information could be incorporated among the different value network activities from idea generation to after-sales support. Communicative research could focus on integration and management of customer touch points with partners, to keep everyone informed and responses aligned.

Third, the Cases A and B make both use of analysis tools to evaluate customer experiences and partner performances. They do so by gathering information via multiple channels. For example, the realization coordinator of Case B mentioned they use a balance scorecard to assess their partners’ performance. He described the following process of data gathering "via three channels we gather input to evaluate our partners, first by hiring an independent agency to control the quality based on random sampling, second we ask customer about their experience with the partner in the survey, and third we grade the partner ourselves based upon our collaboration experience". Since, both Case A and B have developed a good image of their solution offering and related measurements they are able to deploy analytical techniques. In contrast, Case C and D are less well developed and do not apply any analytical steps yet. As Saeed et al. (2011) outlined, broadly three analytical capabilities can be distinguished 'analytic, evaluation and alertness'. They report that during the supply chains establishment phase firms focus on analytical and evaluation capabilities. Those help to optimize their service and track down weak spots, to prevent them from occurring in the future. When a more established collaboration is created alertness capabilities are applied, which help in detecting exceptions. This enables firms to proactively respond to occurring errors and quickly solve them. Translated to the value network these analytical capabilities might as well occur in the same way, future research could examine the development of analytical capabilities in value networks and identify evaluation criteria for transitions. In addition, the focus could be on integration of analytical systems to analyse the gathered CK data of the value network. With shared databases every partner could perform analysis based upon all relevant information, agreements on syntax and semantics might be a focus of interest since they influence outcomes and interpretation of results.

At last, no support on knowledge search has been found. Only at Case B, via e-mail and later the partner portal, photo’s of the context are shared. However, support to find relevant skills and people, or to establish a shared database is not found in the studied cases. This might be due to the short lines that are present in the start-up phase. Therefore, currently there is no need for support in finding the relevant knowledge and understanding the context. However, when the network increases and short lines evaporate this might become an issue. As shown by Ramesh and Tiwana (1999), mapping knowledge, skills and persons might be a relevant feature to develop in a value network environment. It enables others to more easily find valuable knowledge, it helps teams to apply proven best practices, and tacit knowledge is more easily shared, which all add to a better service provision. In addition, linking databases with obtained measures can be used as input for further analysis with regard to the combination phase. Since no such activities have been recognized in the studied cases it might be valuable to study value networks that do so, it will give different insights and might enrich IT support capabilities.

To conclude, the studied cases did not confirm any activities with regard to system integration and support to knowledge search. However, from literature can be concluded those might be relevant and therefore future research on both is recommended. To share the obtained
knowledge, communication technologies are very important. Which translates in tools like e-mail, telephone, and shared platform. A better analysis of their applications, as well as the relevant context would shed light on the applicability. Besides customer communication is important. Due to the rise in social media activities, the value network might use SCRM capabilities to interact with communities, obtain CK and analyse CK. In order to optimize the solution and related processes, analytical abilities are applied by some cases. Indicating that analysis of feedback is valuable, future research therefore might focus on when, what and how to analyse the value network performance.

7 Limitations

Despites the best effort of the students, the research does have its limitations. First of all should be noted that the students have a limited experience in value network processes. Therefore the data gathering, analysis and conclusions might not be comprehensive. This has been tried to limit by establishing a close collaboration with knowledgeable persons. In addition, students might be lacking interview and analysis skills despite some followed courses, university projects and literature. Which might also influence results and conclusions. Research by better skilled persons might reveal lacking insights and provide a more comprehensive result.

Second, the studied cases might influence the generalizability of results. All studied cases could be classified as start-ups, introducing different characteristics in comparison to established networks. For example, entrepreneurial firms might change their target market and be less prone to establishing long-term relationships. In addition, their experience with value network processes and co-creation of solutions is limited. Besides, the four entrepreneurial cases were active on the energy market, which might limit the generalizability towards other markets. Researching different markets and more experienced value networks might enhance validation of the framework.

Third, the respondents interviewed were mainly internal persons of a single organization extended with one external respondent. Therefore, results might be internal CKM characteristics. However, by close guidance of more experienced researches with value network practices and the established protocol created confidence in having identified VN-CKM process characteristics. Nevertheless, additional research might include more external perspectives.

Fourth, since the study of IT support was orientating it might be that other relevant IT characteristics are left out. It should be noted that the suggested future research directions are a first guidance; additional capabilities might be identified in future research.

Finally, case studies are criticized to be subjective. To strengthen the conclusion future research might focus on quantitative analysis of characteristics. This study performed an orienting analysis of the conceptual framework confirming most of them, and might form the basis.

8 Conclusion and Future Research

In conclusion, the conceptual framework of Bagheri et al. (2015b) is a valuable framework for managers to mirror and recognize their current situation. In addition, the conceptual framework can be used as descriptive mechanisms and enables practitioners to improve their VN-CKM processes. The use of the IDEF-model provides insights from multiple viewpoints, through which a comprehensive view on VN-CKM processes is provided.

Based upon the practical studied cases, small suggestions have been made for updating the framework and future research. Due to the nature of studied cases the main suggestion for future research is to look into more established and long-term value networks. These might uncover different characteristics than the studied cases in this report. Second, the social factors mentioned in the conceptual framework are not validated. However, theory is strong in their support and future research might look into their value in respect to VN-CKM processes. Third, none of the studied cases reported any activity related to the combination mode in creative
perspective. To validate or enrich this mode, future research might be done at more established value networks with sufficient customers. Forth, regarding storage of value network CK the use of CK inventory maps might be examined in larger value networks. The studied cases of this report relied on short lines of cooperation and were aware of the capabilities present in the value network. In addition, studied cases had not deployed any integration of CK repositories. New insights, occurring problems or contextual changes were most often shared in meetings. This might again be a benefit of small value networks, however more difficult in larger ones. Future research at larger value networks might shed light on this aspect. Six, regarding transfer of CK in explicit format besides the IT support paper based support has been found. However by only one Case, further research might reveal the relevance of this resource. To conclude, some doubt is raised concerning the characteristic 'centralized or de-centralized communication'. No support for this characteristic has been identified and there might be argued this is a consideration during the business model development process. Despite the start-up nature of studied cases no evidence has been found for this characteristic to be a VN-CKM characteristic. Therefore, future research might look into its relevance.

The IT orientation part gives a first sight on how IT could have a role in supporting VN-CKM processes. Based upon case observations suggestions have been made for further research and attention. First thing noted was that internet plays a crucial role in the creation, storage, transfer and application of knowledge. It provides the value network with a cost effective and flexible alternative, next to system integration solutions. Future research therefore might focus on cloud computing solutions regarding sharing, communication and process alignment. Besides, the rise of social media provides firms to interact with communities of customers instead of one-on-one interactions. These communities might be a source of inspiration due to the feedback, insights and creative ideas generated by a large group of customers that brainstorm together. Social CRM might be a valuable IT capability to support the interaction and extraction of information from social media. Therefore, future research might look into the SCRM analytical, operational and communicative requirements. Further, communication between partners is very important in order to align value network solution activities. This reflects in heavy use of e-mail and telephone to share insights, align processes, and solve errors. Since human interactions and context are very important for communication, future research might look into requirements and alternatives for sharing contextual features. To evaluate the value network performance and customer experiences, analytical abilities are applied by some cases. Based upon gathered feedback from the market appropriate measures can be taken to improve the value network solution. Since several analytical abilities can be applied (analytic, evaluation and alertness) future research might look into evaluation criteria to choose the right ability for the situation. Finally, support for system integration and knowledge search have not been identified. This might be influenced by the start-up nature of the studied cases, which are not eager to fixate processes and relations, and make use of short lines with partners. However, as reasoned before, assistance in knowledge search might be valuable in larger networks. Future research might therefore focus on larger networks and take an example to the research conducted by Ramesh and Tiwana (1999), which also take into account tacit knowledge. As final suggestion for future research is system integration proposed, besides the advantages of cloud computing it also has some drawbacks. Therefore it is suggested to direct future research on system integration addressing the technical and communicative issues.
9 Bibliography


10 Appendix
This part provides additional documents to clarify the research conducted.

10.1 Conceptual Framework (Bagheri et al., 2015b)
The following represent the conceptual framework of Bagheri et al. (2015b)

10.1.1 Original conceptual framework
Table 10.1 represents the original conceptual model of Bagheri et al. (2015b), based upon their theoretical analysis.

<table>
<thead>
<tr>
<th>P</th>
<th>I/O</th>
<th>Main activities</th>
<th>Control</th>
<th>Resource</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>T/T</td>
<td>T/E</td>
<td>Ideations, identifying the business customer’s problem, customers explain their</td>
<td>Briefing session,</td>
<td>Network of solution partners and customers.</td>
<td>Mutual understanding of the customer problem, directing and evaluating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>challenges, obtaining deep customer insight and contextual understanding of customer experience (CE) and emotions through brainstorming, empathic methods, and ethnographic research techniques besides traditional market research.</td>
<td>Frequent, collective and</td>
<td></td>
<td>solution, providing user-centered perspectives on solution offerings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>reciprocal interaction,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trust, dialogue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T/E</td>
<td></td>
<td>Analyzing and interpreting the customer preference, explicitly describing customer knowledge and service offerings, Storytelling and visualizing, mapping out the service encounters (firm-customer touch points) from the customer’s perspective by utilizing mapping tools (e.g. process mapping, service-blueprinting, and customer-firm touch point analysis), formalization of all the solution processes, clarify roles and responsibilities, reporting structure.</td>
<td>Rules and guidelines.</td>
<td>Network of solution partners and customers.</td>
<td>Create common understanding of the content of the solution, elicit customer experiences, ensure that customer requirements define, meet, and support accurately.</td>
</tr>
<tr>
<td>E/E</td>
<td></td>
<td>Reconfiguring the existing CK - by sorting, combining, and categorizing, integrating CK data warehouses.</td>
<td>Developing common tools, establishing communication routines, guideline and standards.</td>
<td>-</td>
<td>IS.</td>
</tr>
<tr>
<td>E/E</td>
<td></td>
<td>Integrating CK repositories, defining a unified access to the CK repositories, coordinating data formats and storage locations, making access to the stored CK.</td>
<td>Formal CK representations, standards, routines.</td>
<td>-</td>
<td>Network collective CK memory.</td>
</tr>
<tr>
<td>T/E</td>
<td></td>
<td>Documenting and organizing past experiences of both solution providers and customers.</td>
<td>Documentation</td>
<td>Interview</td>
<td>CK inventory map, network of solution partners and customers.</td>
</tr>
<tr>
<td>E/E</td>
<td></td>
<td>Documenting, transferring present explicit CK in a transaction network.</td>
<td>Formal contract, common platform, standards, organizational routines, document, network’s institutional agreement.</td>
<td>-</td>
<td>IT tools.</td>
</tr>
<tr>
<td>T/T</td>
<td></td>
<td>Sharing knowledge of the customer’s problem, needs, and value expectations, identifying the customer’s preference for centralized or de-centralized knowledge flows between partners and customers.</td>
<td>-</td>
<td>Face-to-face communication, discussion, and dialogue, shared value, mutual norm, trust, joint training program.</td>
<td>Network of solution partners and customers.</td>
</tr>
<tr>
<td>E/E</td>
<td></td>
<td>Integrated solution proposes from identification to post-deployment support are based on using CK.</td>
<td>Network routines, directives, contractual agreement.</td>
<td>-</td>
<td>Network of solution partners and customers.</td>
</tr>
</tbody>
</table>

Table 10.1 Conceptual framework (Bagheri et al., 2015b)

68
10.2 Comparison between CRM, KM, and CKM

Table 10.2 gives a comparison between the three different concepts used in the research, which are KM, CRM, and CKM.

<table>
<thead>
<tr>
<th>Perspective</th>
<th>KM</th>
<th>CRM</th>
<th>CKM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Inside the organisation</td>
<td>Customer interface</td>
<td>In customer interface and inside the organization</td>
</tr>
<tr>
<td>Communication</td>
<td>Organisational communication</td>
<td>Marketing communication</td>
<td>Interaction between organization and customers</td>
</tr>
<tr>
<td>Communication</td>
<td>Knowledge creation, sharing and exploitation</td>
<td>Creating loyal and stable customer base, improving customer service and maintaining customer relationships</td>
<td>Generating, disseminating and using customer knowledge within organization and between organization and its customers</td>
</tr>
<tr>
<td>The Goal</td>
<td>To fuel organizational learning, cost savings, and &quot;avoid re-inventing the wheel&quot;</td>
<td>To build and develop long-term customer relationships with profitable customers, managing interaction between an organization and its customers</td>
<td>Learning about, from and with customers, in order to support CRM efforts</td>
</tr>
</tbody>
</table>
10.3 **Interview Protocol**

In the following the interview protocol used during the semi-structured interviews is presented. In the second subsection of this chapter, the interview protocol has been explained.

10.3.1 **Final version of interview protocol for the semi-structured interviews**

Hello,

Introduction of the researchers

We are Tim Schillemans (Bram van der Linden) and Luc van Merrienboer; both of us are student at the TU in Eindhoven and currently are doing or bachelor and master project at Alliander. Besides Bram van der Linden is part of our project group, who is also a bachelor student at the TU/e. The three of us all will do a similar research on three separate EBAs, which are case studies based a framework developed by a PhD-research at the TU/e. Luc van Merrienboer will generalize the output of the three separate case studies, so he can give an advice to the IT department of Alliander for future support. To support each other, and for the interconnectivity of the projects we attend each other’s interviews.

Introduction of the project

The PhD-research focuses on customer knowledge management in order to align different activities in the customer’s value network. Customer knowledge management is defined as: the creation, storage, transfer and application of customer knowledge (figure 10.1). Where customer knowledge is knowledge about, from and for customers, in relation to the service or product provided. We view this from a value network perspective, instead of a company or customer his perspective. This means that we will mostly consider the processes in which partners and customers are involved. With a special focus on how this could be supported by IT.

For our research we will look to the current situation and future situation dependent upon the future directions of [the EBA]. Based upon these two situations the bachelor students will give an advice on future steps to consider. The master student will generalize the findings and highlight issues to consider by the IT department.

Purpose of the interview

The purpose of this interview is to get insight in the customer knowledge management processes and what kind of support is desired. The responses are used to formulate the advices and general guidelines. Since you are familiar with the value network and future directions of [the EBA] we would appreciate it when you express your opinion on topics.

Structure of the interview

In this interview we will first ask you some general questions. After that we will continue with questions that are related to the framework that was developed by Bagheri et al. (2015b). For every of these processes we have developed questions so that the answers will give us an insight in the activities, objective, input, output and control (figure 10.2). In the end we have some room for feedback.

Remarks

In order to analyse the interview properly we would like to record the interview. Before we use your responses we will validate them with you. Besides, the responses given will be handled confidentially and used anonymously in the analysis. The findings and recommendations will be provided in a report.
Thanks in advance for your cooperation and input.

---

**Interview protocol**

Name EBA/company:
Name interviewee:
Department:
Function within the EBA/company:

**Interview Questions**

**General questions:**
1) Do you understand the roles and connections in this value network?
2) Could you highlight with whom you currently collaborate?
3) What are your experiences with the current collaboration(s) in the value network?
4) How important is managing customer knowledge in the value network considered within the EBA?
5) Are you aware of the importance of IT to support CK and idea generation?

**Creation:**
1) What customer knowledge/information do you currently collect?
   - Goal: To get an idea about the knowledge that is collected and has high value for the organization in picturing customer needs (tacit experience and/or explicit data).
   - Expected answer: Transactional data, past experiences (complaints, suggestions for improvement).
   - Input: Companies’ interest in the customer’s need(s)
   - Output: Better understanding of the customer’s needs(s)
   a) **PROBE:** Via which channels do you gather CK?
      - Goal: To find out how and what channels the EBA uses to obtain CK.
      - Expected answer: Face-to-face communication, intranet, e-mail, Facebook, satisfaction survey, personal interaction

2) What customer knowledge/information do your partners currently collect?
   - Goal: To get an idea about the knowledge that is collected and has high value for the organization in picturing customer needs (tacit experience and/or explicit data).
   - Expected answer: Transactional data, past experiences (complaints, suggestions for improvement).
   - Input: Companies’ interest in the customer’s need(s)
   - Output: Better understanding of the customer’s needs(s)
   a) **PROBE:** Via which channels do they gather the CK?
• Goal: To find out how and what channels the partners use to obtain CK.
• Expected answer: Face-to-face communication, intranet, e-mail, Facebook, satisfaction survey, personal interaction

b) **PROBE:** How is this shared with you?
• Goal: To find out how CK is shared
• Expected answer: Face-to-face communication, meetings, intranet, e-mail, linked CRM systems.

3) **Does the collaboration with partners makes you able to address the customer needs better?**
• Goal: To find out if the current collaboration is satisfactory or not and what could be improve.
• Expected answer: No/Yes, because [multiple reasons]
• Input: Satisfaction about the current collaboration
• Output: points of improvement, points to certainly retain.

a) **PROBE:** What is positive in the collaboration?
• Goal: To find out what is going well and should stay this way
• Expected answer: The monthly meetings and the way of feedback

b) **PROBE:** What is negative in the collaboration?
• Goal: To find out what goes wrong and should be adjusted
• Expected answer: Meetings are a waist of time.

4) **How do you make sure that a mutual understanding is reached about relevant customer need(s) with customers?**
• Goal: To get an insight in the contextual understanding of the customer and the interaction with them in order to better understand the customer.
• Expected answer: briefing session, frequent, collective and reciprocal interaction, and dialogue.
• Input: Knowledge from the customer
• Output: Knowledge from the customer is updated

a) **PROBE:** How is this translated into sharable CK?
• Goal: How is the obtained knowledge handled
• Expected answer: it is written down and shared with relevant persons, it is not handled, it is put on intranet

b) **PROBE:** How is this verified with customers?
• Goal: If the CK is written down is it checked again and how
• Expected answer: Not verified, due to already close collaboration. Interaction with a small group of customers

c) **PROBE:** Through which channels do you interact with the customer?
• Goal: To find out how they communicate towards the customer
• Expected answer: face-to-face, enquete, e-mail
5) How do you make sure that a mutual understanding is reached about relevant customer need(s) with partners?
   - Goal: To get an insight in the contextual understanding of the customer and the interaction with partners about it, in order to better understand the customer.
   - Expected answer: briefing session, frequent, collective and reciprocal interaction, and dialogue.
   - Input: Knowledge from the customer
   - Output: Knowledge from the customer is updated and a shared image is created
   a) PROBE: How is this translated into sharable CK?
      - Goal: How is the obtained knowledge handled
      - Expected answer: it is written down and shared with relevant persons, it is not handled, it is put on intranet
   b) PROBE: How is this verified with partners?
      - Goal: If the CK is written down is it checked again and how
      - Expected answer: Not verified, due to already close collaboration, Meetings, Feedback via e-mail/intranet
   c) PROBE: Through which channels do you interact with the partner?
      - Goal: To find out how they communicate with partners to establish a mutual understanding
      - Expected answer: personal interaction, e-mail, meetings, sharing vision and mission statements

6) Do you have any IT connection with your current partners?
   - Goal: To find out if there already exist IT connections
   - Expected answer: No, not interested. No, however desired. Yes, small IT connections.
   - Input: Need or desire for IT connections
   - Output: established IT connections

7) How do you combine existing CK to develop new solution offerings?
   - Goal: To find out if they combine existing knowledge to find out new opportunities.
   - Expected answer: They don’t. They do, however, apply practices as sorting existing knowledge.
   - Input: Knowledge about previous experiences
   - Output: New knowledge
   a) PROBE: How is this supported by IT?
      - Goal: To find out what IT tools they use
      - Expected answer: data mining techniques, CRM analytics

8) How do you make sure that the customer is properly informed about the solution during the deployment phase?
   - Goal: To find out how the customer is supported in using the solution.
   - Expected answer: There is a network routine or training. Social media interaction, meetings, help desk. Outsourced to a different partner.
Input: Explicit knowledge of the EBA and partners.
Output: The customer understands what the value of the solution can be, and can use this knowledge accordingly.

Questions to take into account!!
1. Can you explain the buying process of your customer?
   a. **PROBE**: Via which channels does the customer gather information?
2. Can you explain your process of attracting customers?
   a. **PROBE**: Which channels do you use?

Storage/Retrieval:
9) How do you determine which CK to store?
   • Goal: To find out if there is some protocol/routine for handling CK or even storing CK
   • Expected answer: There is (not) a protocol. Each phone call is summarized in CRM. There is an idea box for interesting topics.
   • Input: Knowledge creation, knowledge aggregation
   • Output: Valuable knowledge
   a) **PROBE**: What policy do you have with regard to individually picked-up relevant CK?
      • Goal: how individuals are suppose to process relevant CK, throughout the organization and value network
      • Expected answer: statement is made in the CRM system, there is no policy, discussion with superior.
   b) **PROBE**: What steps do you go through when storing customer knowledge?
      • Goal: This question covers a more specific area, and might provide the answer that was not received after the first question.
      • Expected answer: There is (not) a protocol.

10) What kind of arrangements did you and your partners make to make sure that there is a unified access to CK data?
   • Goal: To find out if there are a formal standards for storing CK, authorization agreements
   • Expected answer: Formal CK representations, standards and routines. Cloud. There are no arrangements.
   • Input: Scattered tacit/explicit data
   • Output: Shared explicit data
   a) **PROBE**: What kind of IT support is established based on the arrangements?
      • Goal: What the impact of arrangements are on IT support.
      • Expected answer: Authorization, use of IT channels, use of the same [data] format

Transfer:
11) How is CK transferred in the EBA’s value network?
   • Goal: To get a general idea of the knowledge transfer activities and control.
• Expected answer: Regulations
• Input: Accessibility of knowledge.
• Output: Accessibility of knowledge.

a) **PROBE:** How is this supported by IT?
• Goal: How IT is used in CK transfer
• Expected answer: e-mail, intranet, cloud, nothing, website

12) How do you make sure the right CK is available at the right time for all value network actors?
• Goal: To find out how CK is timely presented to partners and customers.
• Expected answer: Intranet. Cloud. On request (e-mail). Search engine. Helpdesk
• Input: CK request
• Output: CK

a) **PROBE:** Which IT tools do you use to transfer the information in a secured and timely manner?
• Goal: If the previous question is not answered sufficiently regarding the IT tools topic, this probing question might bring the wanted answer.
• Expected answer: Intranet. Cloud. On request (e-mail).

13) Are there formal meetings to discuss market developments? And who arranges them?
• Goal: To find out if tacit-to-tacit knowledge transfer is facilitated and by who
• Expected answer: Central node arranges meetings, Knowledge lunch (kennislunch [dutch]), diverse department interactions, inter-organizational interaction
• Input: individual/partner tacit knowledge
• Output: Shared tacit knowledge

a) **PROBE:** Are similar topics discussed in informal meetings?
• Goal: To find out if tacit-to-tacit knowledge transfer occurs spontaneously
• Expected answer: Yes, during lunch or coincidental encounter. No, closed departments or closed organizations.

Application:
14) How is the obtained CK used to develop and update the integrated solution?
• Goal: To find out what is the application of obtained knowledge
• Expected answer: Improved network routines, directives.
• Input: CK
• Output: (improved) Integrated solution.

General remarks
• Do you have any additional remarks on CKM in the value network?
• Do you have any advices for us to focus on in the latter part of the project?
• Can we contact you if we would like additional information?
- Do you have any other colleagues that might be interesting for us to interview?

Thank you for your time and have a nice day!

Supportive figures:

![Diagram of VN-CKM lifecycle](image)

**Figure 10.1** The VN-CKM (Value Network Customer Knowledge Management) lifecycle

![Diagram of IDEF and SECI models](image)

**Figure 10.2** IDEF-model and SECI-model

### 10.3.2 Explanation of interview protocol

The interview protocol consists of four parts. At first the introduction, the interviewer is introduced, the overall research approach explained. Next, the research is introduced, and the scope delineated. Followed by the purpose and structure of the interview. At last it is asked if the respondents is fine with recording the interview, and he is notified that his responses are handled confidentially and used anonymously. Secondly, some general questions are asked to get a grasp on the terminology used, outline the context, determine the level of VN-CKM culture, and to test if the respondent understood the research objective and scope. The third part is collection of data and consists of the KM processes creation, storage, transfer, and application. Fourth the interview is concluded with remarks and tips from the respondent.

The third part of the protocol encompasses the bulk of data collection. The questions are primarily based upon the theoretical framework of Bagheri et al. (2015b), since it represent a good reflection of academic insights. The four processes of KM have been used as general topics in the outline of the interview. The questions are based upon the activity and objective columns
of the article and supported by sub questions to identify the resource and control variables. Additionally questions are formulated concerning IT support for VN-CKM aspects. In the creation process, questions are focused on knowledge gathering, knowledge type translation, alignment, and informing customers. In the storage process addresses what knowledge to store, how to store and how this can be access. In the transfer part it is tried to get a view on how knowledge is shared, what are the relations and how knowledge is made available where needed. Assuming the EBAs make use of knowledge, in the application part the focus is on how it is used and with what purpose. For all developed questions a short notice of goal, expected answer, and input/output was added, this clarifies the questions.
10.4 E-mail Conversations

In the following the e-mails send for invitations are presented.

10.4.1 Orientation interviews invitation

Orientation e-mail Case B

Beste meneer ..., 

Mijn naam is Luc van Merrienboer en ben een master student aan de TU Eindhoven (we hebben elkaar al ontmoet). Onlangs ben ik mijn afstudeer stage begonnen bij de IT afdeling van Alliander voor mijn master thesis. Mijn begeleiders, u misschien beter bekend, zijn Claire ... en Jeroen ...

De reden om u te contacteren is om te zien of de EBA Hoom past bij de afstudeeropdracht van mij. Graag zou ik met u een oriënterend gesprek plannen om hier dieper op in te gaan.

Eerder heb ik al Dirk ... proberen te contacteren, maar tot op heden heb ik nog geen reactie van zijn kant. Claire heeft me uw naam ook doorgegeven als mogelijke respondent.

Voor mijn afstuderen zou ik graag een paar case studies doen in vervolg op een artikel van een PhD studente van de TU/e. Het doel is om te kijken hoe de IT afdeling van Alliander de EBAs beter kan ondersteuning in relatie tot IT integratie met andere partijen/partners van de EBAs en klanten informatie deling. Een eerste stap hierin is om een gedachten van de context van de EBA te krijgen, in termen van service/product dat geleverd wordt, wie de klanten zijn, wie de partners zijn enzovoorts. Naast het zoeken van informatie op het intranet en internet zou ik daarvoor graag een interview met een persoon bij de EBA houden.

Ik zou het waarderen als u me zou willen helpen en een plaats, datum en tijd voor zou kunnen stellen.

Als u nog vragen hebt mail of bel mij dan gerust. Alvast bedankt en hopelijk hoor ik snel van u.

Met vriendelijke groeten,
Luc van Merrienboer
06-30257811

10.4.2 Semi-structured interview invitation

For the semi-structured interviews the following e-mails have been send.

Semi-structured invitation e-mail Case A

E-mail send by Jeroen ... to Case A employees

Gents,

Ongetwijfeld zijn er wat vakanties gepland of aan de gang, maar voordat de mijne begint (morgen J) hierbij een verzoek aan jullie.
Vanuit de TU Eindhoven studeert Luc van Merrienboer bij ons af. Hij doet een onderzoek naar partner/ecosystemen in relatie tot IT. Zijn focus lag in eerste instantie op de EBA’s, maar omdat die allemaal in een wat prematuur stadium van volwassenheid zijn, lijkt het ons goed om dit onderzoek ook te doen bij een volwassen BU. Daarbij zoeken we naar een plek waar een werkend ecosysteem is, of uitgebreid wordt. En ra ra, ik kwam bij IFS uit. Zouden jullie zo vriendelijk willen zijn de komende weken tijd vrij te maken voor Luc, zodat we een prachtig afstudeeronderzoek tegemoet kunnen zien? Luc kan zelf heel goed uitleggen hoe en wat, en ik weet dat hij in max. anderhalf uur interview eigenlijk alles weet wat hij wil weten.

Dank alvast!!!!

Met vriendelijke groet, Kind regards,

...Jeroen
Manager Energy Transition & New Energy Business Models
Alliander IT

E-mail send to ‘klant en markt’ for marketing respondent Case A

Beste mevrouw Derksen,

Mijn naam is Luc van Merrienboer en ben een master student van de TU Eindhoven. Momenteel doe ik mijn master thesis bij de afdeling van Jeroen Scheer. Het onderwerp van mijn master thesis is het creëren van een klanten ervaring met andere bedrijven in de markt en wat voor karakteristieken belangrijk zijn om klanten kennis deling te creëren. Graag zou ik een interview houden met een medewerker van Klant & Markt om hier meer inzicht in te krijgen.

De focus is vooral gericht op de samenwerking met andere bedrijven. In het begin heb ik gekeken naar hoe dit bij EBA’s ingericht is, echter om de vergelijking te kunnen maken met een volwassenere organisatie heb ik Liander er ook bij betrokken. Specifieker kijk ik naar de slimme meter en hoe omtrent dit onderwerp Liander de klant ervaring probeert te verbeteren (ontdekking van klant behoefte/ feedback van hen) en hoe zij de partners erbij betrekken (creatie, deling en implementatie van de kennis). Onlangs heb ik drie interviews afgenomen met personen die meer op de inhoudelijke zaken zaten, om meer inzicht te krijgen in klanten behoefte of klanten waarde zou ik graag een interview houden met een medewerker van de afdeling Klant & Markt. In het interview met Rens Berntsen, werd ik daarvoor doorverwezen naar Jan van Oorschot.

Aangezien ik niemand ken bij Liander of de afdeling Klant & Markt, vroeg ik mij of u mij zou kunnen helpen met het vinden van een geschikte werknemer om mijn interview te houden? Mijn ervaring is dat directeurs druk zijn, vandaar dat ik u een mail heb gestuurd.

Als u nog vragen heeft ben ik via de e-mail maar ook telefonisch bereikbaar.

Graag hoor ik van u.
Met vriendelijke groet,

Merrienboer, Luc van Stagiair

E-mail send to partner of Case A

Beste meeneer/mevrouw,

Momenteel ben ik bezig met mijn afstudeerproject aan de TU Eindhoven, dit doe ik voor een deel bij Liander. Via Rens ... ben ik aan uw emailadres gekomen als onafhankelijke dienst aanbieder rondom de slimme meter. Graag zou ik met u een interview willen houden over het netwerk rondom de slimme meter. In een document zag ik de naam Huub ... staan als contact persoon hiervan.

Mijn afstudeerproject focust zich op het managen van klantenkennis, klanten feedback, markt ontwikkelingen en hoe dit wordt gedeeld met partners om de slimme meter succesvol te maken. Kortom hoe is de samenwerking rondom de slimme meter. Hierover ben ik momenteel input aan het verzamelen via interviews om het daarna te analyseren.

Op dit moment heb ik mijn interviews binnen Liander afgerond en zou ik graag een extern perspectief op de zaak hebben, om zo mijn bevindingen meer kracht bij te zetten. Zou u mij daarbij willen helpen?
Ik zou graag een interview met u houden over klantenkennis en hoe dit wordt verwerkt in de samenwerking met partijen in relatie tot de slimme meter, hiervoor hoeft u niks voor tebereiden. Uit mijn ervaringen met vorige interviews is gebleken dat het interview iets langer dan een uur duurt.

U zou mij erg helpen bij mijn afstuderen mocht u een ruim uurtje tijd kunnen maken. Ik ben mobiel en kan altijd naar u toekomen. Zou u mij een of twee tijdstippen kunnen doorsturen waarop u eventueel tijd heeft?

Met vriendelijke groet,
Merrienboer, Luc van Stagiair

Semi-structured invitation e-mail Case B
E-mail send to employees of Case B

Beste Roel,

Op dit moment ben ik bezig met mijn Master Thesis bij Alliander. Hierbij kijk ik naar klantenkennis management bij de EBA Hoom met hun partners. Ook besteed ik in dit project aandacht aan de ondersteunende IT hiervan. Ik doe dit project in samenwerking met nog twee bachelor studenten (Bram van der Linden en Tim Schillemans), zij hebben beide een
andere EBA(MPARE en Smart Society Services) waarbij zij onderzoek doen. Aangezien de opzet van de onderzoeken hetzelfde is werken wij veel samen.

Om uiteindelijk een advies uit te brengen aan Hoom verzamelen we op dit moment informatie zodat we deze kunnen analyseren. Graag zouden we een interview met u houden om inzicht te krijgen in wat voor klantenkennis er gemanaged wordt in het netwerk van Hoom en hoe de ontwikkelingen er uit zien naar de toekomst toe. Ron ... heeft ons daarvoor uw naam doorgespereld. Zou u één tot anderhalf uur tijd kunnen en willen vrij maken om met ons dit interview te doen. Hiervoor hoeft u zelf niks voor te bereiden, de vragen zullen gaan over de huidige situatie en de mogelijkheden in de toekomst.

Zou u een of twee momenten kunnen voorstellen waarop dit interview zou kunnen plaats vinden? Mijn agenda is bijgewerkt mocht u daarin willen kijken en ook reizen is geen probleem. Omdat wij interviews altijd in duo's doen zal ik regelen dat een van de andere twee studenten er dan ook bij is.

Hopelijk horen we snel van u.

Met vriendelijke groeten,
Luc van Merrienboer

E-mail send to partner of Case B

Beste meester Doornbos,

Momenteel ben ik bezig met mijn afstudeerproject aan de TU Eindhoven, dit doe ik voor een deel bij Hoom. Via Robert ... ben ik aan uw emailadres gekomen als Bouw en Installatie partner van Hoom.

Mijn afstudeerproject focust zich op het managen van klantenkennis, klanten feedback, markt ontwikkelingen en hoe dit gedeeld wordt met partners vanuit Hoom en andersom van partners naar Hoom. Kortom hoe is de samenwerking tussen partners en Hoom. Hierover ben ik momenteel input aan het verzamelen via interviews om dat daarna te analyseren en uiteindelijk Hoom te adviseren.

Op dit moment heb ik mijn interviews binnen Hoom afgerond en zou ik graag een extern perspectief op de zaak hebben, om zo mijn bevindingen meer kracht bij te zetten. Zou u mij daarbij willen helpen? Ik zou graag een interview met u houden over klantenkennis en hoe dit behandeld wordt in de samenwerking met Hoom, hiervoor hoeft u niks voor te bereiden. Uit mijn ervaringen met vorige interviews is gebleken dat het interview iets langer dan een uur duurt.

U zou mij erg helpen bij mijn afstuderen mocht u een uurtje tijd kunnen maken. Ik ben mobiel dus kan altijd naar u toekomen. Zou u mij een of twee tijdstippen kunnen doorsturen waarop u eventueel tijd heeft?

Met vriendelijke groeten,
Luc van Merrienboer
06-30257811
10.5 Value Networks Bachelor Cases

This chapter gives a short description of the studied Cases C and D, which are in detailed analysed in the Bachelor reports of respectively Van der Linden (2015), and Schillemans (2015).

10.5.1 Case C

In the earlier days energy related companies determined what was relevant for customers, the product-centred view. Currently they are placing the customer more in control of their own energy. In combination with the national introduction of the smart meter, MPARE puts the customer in control of 'energy consumption insight modules'. Besides focusing on customers with a smart meter, they made their business suitable for conventional meters as well.

The service delivered by MPARE includes three parts. At first an 'Energy Data Box', which collects the energy consumption of the customer or building. Next multiple applications, these translate the collected data into information to mostly a graphical format. Linking both parts is the ENDAX, an online platform that distributes the collected information to the assigned application. The customer can control what information the Energy Data Box collects, for example collecting generated electricity by solar panels is approved, but gas consumption is not. In addition, the customer is able to delineate what data an application receives and therefore as well what data is not.

A graphical representation of the relationship diagram is given in figure 10.3. In order to put the customer into control, different actors are involved. Based upon the interviews the network configuration is characterized by independence of the partners. MPARE takes care of the online platform ENDAX, and is concerned with privacy issues, the format of data, and quality of data, CK is mainly used for solving concerns. The application developers develop applications linked to the ENDAX format, based upon their market and customer experience. The hardware developers are concerned with the development of hardware to collect the data and put the customer in control of collection. The roles might develop themselves separately, however alignment between them is crucial in providing services to the customers. When new ideas pop-up, other partners might need to adjust their product to make it suitable for information display.
Sharing CK activity conclusions is the primary focus in the value network, where creating support for the idea is necessary.

More detailed information is given in the Bachelor report of BSc. B. van der Linden (2015).

### 10.5.2 Case D

![Diagram of Case D](image)

The grid provider as semi-government has the responsibility to help society in making the transition to an affordable, sustainable, reliable and safe energy supply. An integral part of this aim is sustainable development of public spaces. To support this goal the fourth case is concerned around the development of an ‘open smart grid platform’. Via this platform “diverse installations in the public space can be easily monitored and controlled with any application and via any communication infrastructure” (Open Smart Grid Platform). This provides public organizations with the freedom to do business with any supplier on the market, without being obligated to use additional software and applications. Which increases the opportunities to choose the right solution for the situation.

In comparison with the previous cases, the focus is here on a business-to-business market (B2B). A graphical representation of the value network is presented in figure 10.4. Smart Society Services (SSS) is the linking partner between the platform and development for the customer.

According to the dimensions named by Tax et al. (2013), the value network can be classified as being a formal network, with contracts among partners. Together with fixed hardware and software partners, is investigated how the platform, hardware or software needs to be aligned in order to support the customers needs. The platform knowledge is provided by SSS, application developers take care of the interface for customer, and hardware developers provide input of their products or alter their products to the platform.

As a prerequisite for an open platform, the platform should be made available for everyone who would like to use it. Therefore a foundation is established, which takes care of the development of the platform and its features. SSS and its partners operate on the current platform version. Concerning VN-CKM the foundation is excluded from the research, since it develops upon developments in the market through partners not via customers.

More detailed information is given in the Bachelor report of BSc. T. Schillemans (2015).
10.6 Value Network Versions of Case A and B

Since the initial entity-relationship diagram was based on a document research, some modifications have been made based upon the orientation and semi-structured interviews. In the next subsections, first the different graphical representation version of the value network of Case A are presented and next the ones of Case B. For an elaboration of the Cases C and D it is recommended to look at the reports of respectively Van der Linden (2015) and Schillemans (2015).

10.6.1 Value network versions of Case A

Version 1

The initial version has been developed based upon documents and an orientating interview.
Based upon the interview with the realization manager, new insights have been added. He explained all interrelations and partners that influenced the smart meter solution offering. However in follow up interviews it became clear not all mentioned organizations actively participated in the value network. For example the Dutch government, which is an influencing party since it regulates the roles and responsibilities of grid providers and energy suppliers. However, offering the smart meter and development of energy modules were the responsibilities of respectively the grid providers and energy managers. These influenced the customer experience, not the activities of the Dutch government. The final version is shown in the report.
10.6.2 Value network versions of Case B

Version 1

The initial version has been developed based upon documents and two orientating interviews. They clearly highlighted which partners were involved with the solution offering. Based upon the interview with the marketing and coordination manager EDSN was excluded since it had no added value towards the customer, its activities were aimed at supporting Energy Worx. Corporations were added to the value network, since they sometimes contact Hoom for new initiatives in neighbourhoods. They provide CK like who to approach and a preselected number of interesting sustainable solutions.
10.7 Case A

This part of the Appendix contains the gathered data and analysis of Case A. First the VN-CKM framework is given. Second the summary of the case responses of individuals to all questions. Third the ‘raw’ quotes related to the questions are given.

### 10.7.1 Case A specific framework

<table>
<thead>
<tr>
<th>P</th>
<th>I/O</th>
<th>Main activities</th>
<th>Resources</th>
<th>Control</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>T/T</td>
<td>Running customer-approach pilots to enhance acceptance rate; panel to obtain customer experience and uncertainties; experience of customer evaluation through customer interaction; communication when customer has issues; contact on customer expectations (++)</td>
<td>-</td>
<td>Pilots; panels; customer interaction; issue communication; feedback; discussion (+)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; municipalities (++)</td>
</tr>
<tr>
<td></td>
<td>T/E</td>
<td>Survey analysis after implementation; monitoring the experience of the smart meter and analysis; feedback is analyzed and used to improve services; scanning social media to obtain concerns of customers and debug wild stories; a website to obtain reviews of customers; customer journey mapped and evaluated; use of user-voice to evaluate services; Roles and expectations should be clearly described; failure codes are agreed to enhance the efficiency (++)</td>
<td>Monitoring experience; scanning; survey; roles and expectations; failure codes (++)</td>
<td>Meetings; social media (++)</td>
<td>ODAs; Milieu Centraal; Netbeheer Nederland; EDSN (++)</td>
</tr>
<tr>
<td></td>
<td>E/E</td>
<td>Informative folder about the smart meter; additional information, services and reviews can be found on websites; a magazine to inform about sustainable living; video’s online about the smart meter and applications; user box and e-mail to communicate about service issues; translating technical language (++)</td>
<td>Multiple websites; agreements on procedures, letters, folder, magazine (++)</td>
<td>Collaborations; customer interaction (+/-)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies; media concern (+)</td>
</tr>
<tr>
<td>S</td>
<td>E/E</td>
<td>Informative websites; portal at EDSN (++)</td>
<td>(--)</td>
<td>(--)</td>
<td>(-)</td>
</tr>
<tr>
<td></td>
<td>T/E</td>
<td>Publishing reports of research; publishing minutes of meetings; compose informative folders; compose informative letters; compose sustainable energy magazine (++)</td>
<td>Reports; minutes; procedures (++)</td>
<td>Pilots; interviews; meetings; discussions (++)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies; municipalities (+)</td>
</tr>
<tr>
<td>T</td>
<td>E/E</td>
<td>Informing customers through letters, folder, magazine and different websites; minutes of meetings shared via e-mail; reports of researches shared via e-mail or websites; agreed failure codes; special requests are received via website (++)</td>
<td>Agreements on informing customers; developing and maintaining websites; sharing of minutes; contracts; sharing of reports; failure codes (++)</td>
<td>-</td>
<td>E-mail; websites; letters; folder; magazine; minutes; reports; contracts (+)</td>
</tr>
<tr>
<td></td>
<td>T/T</td>
<td>Customer-installer contact about smart meter (installation); telephone contact between customer and ODA; meetings to discuss developments and suggest changes; telephone contact about customer or data issues (++)</td>
<td>-</td>
<td>Face-to-face communication; meetings; telephone conversation; customer interaction (+/-)</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies (++)</td>
</tr>
<tr>
<td>A</td>
<td>E/E</td>
<td>Alteration of strategy and vision; improvement of customer approach; alternation of energy data related processes; improved communication to customer and partners (++)</td>
<td>Processes; strategy and vision; contracts (++)</td>
<td>-</td>
<td>Customers; ODAs; Milieu Centraal; Netbeheer Nederland; EDSN; construction companies; municipalities (+)</td>
</tr>
</tbody>
</table>
### 10.7.2 Case A response summary

<table>
<thead>
<tr>
<th>General questions</th>
<th>Summary; Manager realisation</th>
<th>Summary; Customer &amp; Market facilitation</th>
<th>Summary; Marketing and strategic partnership</th>
<th>Summary; ODA partner</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I had a quick look and understood the connections. I did miss partners like Netbeheer Nederland, which is the national organization of grid providers. They perform the communication between the grid providers and monitor the public opinion. The de-central and central government have a role in the implementation of the smart meter. The central government gave the order to implement the smart meter, the de-central government could play a role in the support of the implementation. Additional I missed the manufacturers of the smart meter.</td>
<td>Yes the ODAs (Independent service provider), energy suppliers, and the construction parties indeed. The customer himself of course. I do have some doubt about the smart meter supplier, since we developed the requirements for the meter so what is his role.</td>
<td>The value network seems to be fairly complete. What might be good to know is we collaborate with cooperation as well; they focus on facts, knowledge etcetera.</td>
<td>I had a look at your network, and I do understand the connections and I think it is a good overview. I am curious, but you will go into more detail I guess.</td>
<td>The first version was quit well, though some alterations were needed.</td>
</tr>
<tr>
<td>2</td>
<td>The collaboration is limited; the value for the customer comes from additional services.</td>
<td>I work together with partners who are my customers, which are energy suppliers and ODAs. When the exchange of a smart meter has been done weakly I contact the construction partners and send them back. I receive e-mails and join meetings with Netbeheer Nederland, EDSN, and ODAs.</td>
<td>Together with Netbeheer Nederland and a cooperation we set up a website to communicate and inform the customer about the smart meter. The services of Energy Managers are displayed there as well.</td>
<td>We collaborate of course with Liander and the customer. To obtain some subsidy we work interact with local governments. With energy suppliers most often when the customer has some troubles. We try to work together with some cooperatives. With Netbeheer Nederland we have contact when there are issues.</td>
<td>The collaboration is limited and most often with energy suppliers, ODAs, Netbeheer Nederland, EDSN, and cooperatives.</td>
</tr>
<tr>
<td>3</td>
<td>The collaboration is limited; the value for the customer comes from additional services. Due to governmental regulations it is hard for us to create customer value. Service partners should do so, though are not very active in this area.</td>
<td>ODAs always want that we deliver our data on time. This however is not always possible. Though I experience working with the small and flexible ODAs as joyful.</td>
<td>With Milieu Centraal we have a good collaboration. As Grid providers it is our role to inform the customer, energieverbruiksmanagers.nl is a good tool for this. We would like to see that this role is taken over by the energy managers in the future.</td>
<td>Liander is the best grid provider of the Netherlands and the collaboration goes well. With other grid providers we have a good collaboration as well, though with Stedin a bit less. With respect to the customer experience we might have some issues on the transfer and application phases.</td>
<td>Due to regulations we are limited in creating a customer experience, our commercial partners should do so. Working with the small and flexible ODAs is experienced as joyful. With Milieu Centraal, to inform customers, there is a good collaboration. Issues might be surrounding the transfer and application phase.</td>
</tr>
<tr>
<td>4</td>
<td>For the moment it is limited, due to the high acceptance rate. When this rate would be lower, I suspect a closer collaboration and more information sharing. For now the customer is open to the smart meter, though it should not trouble them too much. Maybe the government could be more active to promote the smart meter</td>
<td>As Liander we do not have end-user information since we are not able to store this information. Our customers exist of energy suppliers and ODAs</td>
<td>Customer insight is key, everything you do starts with customer needs as focus point. For the moment there is a lack of this approach.</td>
<td>I think it is always important, we should try to establish a process or procedural approach. Since we have multiple grid providers, this is a bit difficult though the more important. For example the communication about smart meter errors, this is rather diffuse.</td>
<td>For the moment it is limited due to the high acceptance rate, though should be key. It might be translated into process or procedures</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>As Liander we do not have end-user information since we are not able to store this information.</td>
<td>The platform we use (energieverbruiksmanagers.nl) is an IT solution, but overall IT is booming and it is source that provides great opportunities.</td>
<td>IT is not always the solution but definitely a part of it, there needs to be a balance between man and machine. Keep it simple is my advice. The customer is also getting more acquainted with IT so maybe we should develop a portal for him.</td>
<td>IT is booming and creates opportunities to improve the customer experience. The development should be kept simple</td>
</tr>
</tbody>
</table>

#### Creation

| 1 | Currently we are performing pilots to see what approach is | The end goal is to install the smart meter; we | We do a lot of customer researches, around the smart | For now customers start to contact multiple parties when | Information about customer approach and objection is |
We do some pilot studies with the smart meter and what issues are further interesting or should be clarified.

In relation to data delivery we have some issues which reflect on the ODAs and in the end on the end users. We could improve this.

A large remark is that our customers are the ODAs and energy suppliers, we hardly interact with the end user. The best ODA or energy supplier wins the market and in perception of the customer delivers the best experience. The smart meter is not that interesting it is the experience afterwards with additional services that creates value for the customer. To create this experience ODAs are the experts due to their flexibility and speed.

BAM and Intech are not contacted with regard to the development of the smart meter, they are responsible for the exchange, and maybe internal construction departments are contacted. What we can do for the customer is to plan accurately; this can only be done when you know upfront the situation.

The partners have information what like do customers value the most as application tool in creating insights and what are the customer experiences with the application. The partners have information on energy savings and steps to be taken in this regard. And they work on the cooperation, which would like to start new initiatives.

I know Liander has quite a large failure monitoring system at the technical side. Further they actively send out surveys, so I assume this gives insights. Besides Netbeheer Nederland is quite active on social media to answer questions and resolve misunderstandings. In the P4 portal meeting we try to share information. Every now and then we receive some information from the Rijksdienst Nederland.

The branch organisation of grid providers does some research around the smart meter and send out these reports. Together with corporations we do some pilot studies and evaluate the results, corporations form the voice towards the customer. We have information what the customers value the most as application tool in creating insights and what are their experiences with the application. ODAs have more information on energy savings, steps to be taken and opportunities in green energy.
The smart meter individually has no value, it is a sensor, and through additional services it gains value and becomes smart. Therefore, I assume collaboration is very important between different partners. Through support of the central and de-central governments, and netbeheer nederland we could understand customers needs better.

A partner between commercial and non-commercial businesses should be established to link both roles. For the moment we do not make real use of our partners since the implementations goes very well.

Since ODAs are flexible and agile they adapt fast, it is nice to work with. When we need to discuss something we invite them over or call them.

With EDSN we have a formal meeting once every six weeks, attended by grid providers, ODAs and Energy suppliers. Where we discuss developments concerning data collection, distribution, KPI, changes in protocols and services. Partners can express their concerns or wishes, which are taken into account and might be implemented. Though these most often are not concerning the end user.

Some years ago we made agreements with involved partners about how we will work together, like applying a data request or error codes to improve the communication. Agreements on the requirements of the smart meter have not been discussed with partners, it was up to grid providers to specify them.

Collaboration is very important, when others promote your business you grow stronger. Together with the grid providers branch we developed a website to communicate in a uniform way with the customer. In a same way we developed a website to communicate about ODAs and their services. Developing and approaching customers is a task of ODAs, where Sanoma helps us in transforming the technical information towards more understandable information for customers.

I certainly think it is good to inform one another about the market developments. We see that the current way of offering additional services or the kind of services does not increase very much, maybe we could address this with partners.

Besides would a better collaboration improve the customer experience? In the current situation if the smart meter is not working, the customer calls a grid provider, next the call us since the grid providers cannot see the failure, then we need to call the grid provider, and then the issue will be resolved. This could be improved and makes us able to inform the customer better. I would even suggest to give us access to the OAD data; here we can look up information about the smart meter ourselves. It would increase the verification as well, now it is a mess and certainly not watertight. We have to believe what the customers tell us.

Sometimes customers have to wait two months for their data and insights, this takes to long and they rate us and the smart meter badly. This definitely should be improved. Further we should better define our roles, since this creates confusion for the moment. Some grid providers deliver free services, where commercial parties charge some costs. At EDSN we do can find some procedures on a SharePoint location.

Informing the customer about additional service goes quite well, though if you relate the total amount of smart meter connection possibilities to the number of subscriptions there is some discrepancy.

We had some round-table discussions with them and we have a planning of our activities which is available to them. Actually we do not. The development of the smart meter we did together with other grid providers, after implementation we do not monitor customer experiences. In relation to

We use the platform/website energiebruiksmartmanagers.nl to communicate towards the customer about opportunities and give customers the ability to provide feedback about services and experiences. The

For the moment we interact inadequate with the customer, only when they have some trouble. We might inform them about the data process with a picture for example. It is hard to

Inadequate since the customer does not know what he wants; Concerning the technical development there is no attempt made; Regarding the implementation a planning is made available, pilot studies are
With ODAs we have e-mail and telephone contact to discuss issues. Every six weeks we have a meeting, though this is not really focused on the customer experience. We discuss topics surrounding data collection, data distribution, KPI, changes in protocols and changes in services. It smoothens the process when issues occur and establishes a certain level of operations. A basis for these topics and processes is five years ago established, together with the ODAs and energy suppliers. If changes are desired, these will be discussed and a change plan be made.

About services and the related context we have no discussion, since ODAs know better what to develop for customers. I do not know if they are following our implementation plan.

Construction and failure partners are not connected in relation to the development of the smart meter.

Some of our partners perform analysis and do surveys some we receive via email, our they are discussed in meetings. Together with Netbeheer Nederland and MilieuCentraal we support the website energieverbruiksmanagers.nl, developments and contextual understanding are discussed in meetings, stated in contracts and shared via e-mail. Together with a media concern we are translating the technical approach and terminology into a more user-friendly terminology this is shared in meetings. To boost innovation we organized a hackton, where data was provided and firms/individuals could experiment with it and extract new combinations or trends. On our website we have made the exchange planning of the smart meter publicly, here for example ODAs could respond on with certain actions. With ODAs I do not have much interaction and alignment with them is not established. Though they do collect customer knowledge and needs.

Also here we experience some troubles, everyone is busy with improving his processes and no active collaboration exist. For example we should better define the different roles and responsibilities.

In the P4 meetings we discuss, with energy suppliers and grid operators, issues and suggest improvements. Together we also build some webpages to inform the customer, for example about privacy issues. During the meetings we also discuss technical issues like the performances of smart meters.

Besides the meetings we sometimes have contact with Netbeheer Nederland, in which we inform each other about new developments or opportunities.

With different ODAs we have mainly e-mail contact, to inform about smart meter failures for example. It however does concern me that ODAs do not always actively contact a grid provider by failures, I sometimes need to activate them.

Meetings are organized to discuss long-term topics and developments;
Direct issues are solved via telephone or e-mail conversations;
Performed analysis and surveys are shared via email, or discussed in meetings; A website is supported energieverbruiksmanagers.nl;
Together with a media concern the technical terminology into more user-friendly terminology this is shared in meetings; A hackton is organized to experiment with data and extract new combinations or trends; the implementation planning is online available;

feedback is analysed and used to improve our services. This platform is set up together with MilieuCentraal.

Besides the platform we and our partners perform customer surveys, customer interviews and developed a customer journey to monitor the experience with the smart meter. Customer interaction is essential to feel what is going on in the market. Due to the rise in social media communication, we also monitor this and respond to wild tales.

Next to the experience with the smart meter we also monitor the implementation phase. How is the customers’ experience with the exchange, afterwards we also leave a folder and maybe the installer tells something.

ODAs are for after the implementation phase but due to their small size, they have less capabilities to inform customers and monitor the market.

On a short notice we will start a pilot in which we include the municipalities in informing and monitoring the customers.

determine the context of the customer since he does not know what he wants, he would like to know how much energy he has consumed and would like to check his energy supplier. Our customers are, however, quite active in providing feedback on our application. Based on the feedback we try to improve our services. Further there is a limited interaction performed and experiences monitored; After installation a folder is left behind; Additional services are communicated via a website and feedback is received on these services from customers; customer surveys and customer interviews are held to monitor the experience with the smart meter; on a short notice a collaboration with municipalities will start to inform and monitor customers; Due to the rise of social media it is monitored and responded to in order to limit the wild tales; based on feedback ODAs try to improve their application

additional services we are limited by the government, though ODAs are better in it as well.

We try to inform construction or failure partners as good as possible about the situation they will be confronted with.

With ODAs we have e-mail and telephone contact to discuss issues.

For the moment this is not done, I proposed it several times though due to the high acceptance rate there is no response. Maybe an in-between market partner could facilitate this.

With the smart meter manufacturers we have a structured way of communicating, which is about materials not the customer experience.

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With the smart meter manufacturers we have a structured way of communicating, which is about materials not the customer experience.
Together with Netbeheer Nederland we do not have a close interaction about the customer context, more about how we can efficiently meet regulatory events. With the aim to stay cheap.

I guess you might categorize it as Excel, since the information does not change often.

We do have to a limited extend a SAP connection concerning work orders, though this is mainly internal.

Bee the city, though I am not

websites and might organise notification in their paper or

We send them a notification letter. Next we send them a planning letter and if necessary an absence letter.

It might be that de-central governments make notification in their paper or websites and might organise informative meetings.

For the general acceptance of the smart meter it is mainly general marketing. Again the government might take a role here and set up a ‘postbus’.

We developed together with the smart grid organisation and cooperation a platform/website over which we communicate towards the customer, but can also extract information for ourselves.

Further we communicate via e-mail, through which we receive reports, notifications and can send request for information.

There is no shared database or central storage point. Towards the ODAs we would like to open up our user data, so they can experiment with it. But this is a future idea, for now we opened up our planning on which ODAs could act.

We would like to have some IT connections, for example with the CAR this would resolve around 90% of our questions about smart meter connections. We need to call grid providers or energy suppliers less.

EDSN has a web portal where we can look up some procedures or thinks like that.

I would also suggest a central system where the customer can arrange its energy issues. This way he can arrange with one click its own preferences.

The customer is in control and the grid provider can control/regulate it. This would improve the verification phase, since one thing about e-mail is sure it is not lost. And it would speed up the connection to data by ODAs.

IT systems are not integrated; e-mail and telephone contact for quick communication is important. We might communicate in a uniformly way with the customer; e-mail to communicate about reports, notifications and send requests for information; shared planning of implementation via websites; there is no shared database or central storage point; Suggestion to develop a central system where the customer can arrange its energy related issues.

Conclusions of reports might be combined, though I am not aware of these activities.

We provide anonymous energy data for businesses that would like to use it. Firms like ODAs are must better in using it than we are, so we do not combine data.

We would like to open up the collected data so ODAs can experiment with it and develop new applications. We as Liander do perform some analysis on the collected data.

We gather some information from user about our service from which we obtain some trends. Grid provides send out surveys as well and I assume they identify some trends as well.

But I do not think it is useful to make data publically available, we should focus more on a communication system.

A future idea is to open up anonymous data for partners, service providers are better in this activity and might find it useful; some analysis are performed based on surveys; though no combined partner information.

Maybe it is even better to not inform customers about the smart meter and just advice them for some reason.

Informing the customer starts three months before placing the smart meter, through an announcement letter, and an appointment letter. The customer can find further information on the internet. Next you have the contact points during placing, where afterwards customers receive a folder with possibilities. Afterwards the interaction is limited.

I do not have an indication if ODAs provide their services short after our implementation. But maybe next year this will be more interesting for them when we scale up.

We developed together with the smart grid organisation and a cooperation multiple platform/website, over which customers can look up additional information, additional services and can review and read these reviews.

Additionally our partners and we developed a magazine, from which customers can extract information about the smart meter and tips for a more sustainable home.

Further we monitor social media to respond on user issues and remarks.

It is the role of the ODAs to inform the user about the use of their service and as well over the possibilities with the smart meter. We direct the customer to the website so they can find additional services, through the distribution of a brochure after installation.

About the installation we inform the customer via letters and our website. After installation we leave a folder behind with additional information.

The website energieverbruikersmanagers.nl is a promotion channel, to inform customers about additional services. Where we try to explain the privacy concerns as well, but on additional websites this is also addressed. After the installation of the smart meter a flyer is left behind, where customers can find additional information. Though most of them do not read this.

To resolve issues during the use of the services we have telephone contact with them. For less severe issues or questions about our service a user box is included through which the customers can communicate with us, within 24 hours I try to respond.

For a while we kept an eye on the planning of the smart meter implementation, though for our strategy this is not suitable so we stopped it.

We do not really invest in adverse or any advertisement campaigns at all, it is hardly notification letter - planning letter - absence letter; during implementation contact; informative folder; additional information, services and reviews can be found on websites; a magazine to inform about sustainable living; scanning social media; telephone, user box and e-mail to communicate about service issues.

maybe it is better not to inform customers about the smart meter just by letter; maybe de-central organizations inform end-users in meetings or on their websites/papers.

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### Storage

| 9 | We are not allowed to store information; at most we can conclude something on connection-level. Reports might be stored on a content server, though I think it goes mainly via e-mail. Concerning the reports, in the end their conclusion is important.  
During the six weekly meetings topics are discussed and if relevant act upon via a change request. Besides minutes are made about these meetings.  
We do customer surveys, interviews, surveys through which we receive the customer knowledge. We perform pilots to see how the smart meter is received. This is all translated into reports.  
We have an entrepreneurial mind and therefore do not want to store unnecessary information that we need to manage. Due to this we do not store a lot of information. We never delete the energy data of persons. Besides, we store our user voice feedback. This way we can look back from where we came and how we are doing now. 
We also receive minutes of meetings via e-mail.  
Minutes of P4 meetings and send by e-mail; research and reports are stored (though only conclusion is important); ODAs are small and stored little. |  
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| 10 | We post insights on the website, where our implementation planning can be found as well. New insights of partners we receive via e-mail. With de-central governments it is more customized work and related to matching approaches, which is a face-to-face activity. Minutes have been shared amongst participants via e-mail, though I can imagine that they are accessible via a SharePoint at EDSN (organiser of the meetings). Not really, we communicate via meetings and via e-mail we receive reports or minutes. But over five years no one can trace these back I guess. What I would suggest is to make a portal so everyone is up-to-date about the customers and relevant actors can access it. EDSN has a web portal, some kind of SharePoint so everyone can look up procedures or additional information. There are issues we could solve quite easily, with for example a CAR connection. Actually only the energy data is structured and documented around how to communicate. Minutes and reports concerning the context are send by e-mail, and it might be not even to everyone. |  
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### Transfer

| 11 | Mainly e-mail and website, sometimes an application connection to communicate the planning. Basic codes and syntax formats are agreed concerning data request and data distribution. Sometimes you meet people on fairs or mutual visits are arranged, where topics are discussed. You have informing the customer through letters, a folder, different websites, but the visits of the installer as well. We have six weekly meetings to exchange information and highlight relevant topics; minutes of these are transferred via e-mail and probably are accessible on share point of EDSN. Via the website/platform users and partners can gather information from one another. Over social media we try to respond on questions or remarks made. We also inform our customers via a newsletter, magazine and e-mail if they subscribe. Over the development of the website/platform we have discussions with our partners. Our arrangements are noted in contracts. In meetings with partners improvements are proposed and remarks or findings discussed. Reports and minutes we receive via e-mail. You can also always contact a colleague or send e-mail. Specifically towards ODAs we communicate via websites, like the planning and open data. Towards the customer we transfer knowledge in different ways, when issues occur we have some telephone contact or they send us e-mail. For less severe issues they can contact us about the application via a user box, within 24 hours I try to respond to them. Since the customer is becoming more acquainted with IT we might develop a common portal, so he can more easily communicate with us and arrange its agreements. Due to the developments in social media we can also pick up remarks of customer there and resolve them. There are also multiple information websites online, where the customer can read about the opportunities and functioning of the smart meter, data and additional services. After installation the customer is given a flyer, which he most often does not read. With our partners we communicate also via telephone to solve issues quickly, or send them an e-mail to inform about a failure. For larger issues and to update about development we have P4 meetings with energy suppliers and grid providers. Afterwards | E-mail; basic codes and syntax formats are agreed concerning data request and data distribution; informing the customer through letters, a folder, different websites, visit of the installer; P4 meeting; websites; magazine; contracts; meetings; reports and minutes send by e-mail; request for information via e-mail; web portal |
We established a basic communication language in codes and standardized data request.

Towards the customer we communicate via letters, a folder and a reference to websites for further information. Besides the installer can explain things during installation.

EDSN has a share point where information can be found by the grid providers, minutes of meetings I assume as well. Though these minutes are send by e-mail as well.

For the customers we have multiple websites where we inform them about different opportunities, additionally we compose a magazine with tips and tricks. We scan social media and respond to questions and remarks for immediate feedback. Letters have been send concerning the implementation, where afterwards a folder is handed over.

With our partners we interact via meetings, e-mail, face-to-face contact, telephone. But the developed websites are valuable as well of course. For the ODA's we would like to open up our collected data.

In case of failures we e-mail or call relevant parties, for some we even implemented failure-codes this improved the communication. I would like to have access to the CAR this would decrease the number of questions we have.

EDSN provides a web portal through which we can look up relevant procedural arrangements and a like.

For customers we set up websites, we can have telephone contact or e-mail us. I would even encourage developing a portal they could access. Some partners are even active on social media to respond on issues or remarks in a timely manner.

In relation to our application we have a user box where customer can post their question, I shall try to respond in 24 hours.

On a more long-range time scale we have the P4 meetings in which we discuss developments and suggest changes. Minutes and change reports are send to us by e-mail. When we would like additional information from a partner we send them e-mail.

With related ODA's we also have some e-mail contact and discuss topics like current or recent failures.

Regular meetings; informal contact about website and meetings with ODAs

Letters are send to inform customers; special requests are received via website; flyers and websites for services after installation; interaction with installer; share point; e-mail and telephone contact; magazine; monitoring social media; face-to-face contact; minutes and reports are send by e-mail.

In the regulatory six-week meetings partners can address their issues or proposals for improvements. If this is relevant a change request will be set up and

Yes, the smart grid operator organizes a meeting once every three or four months. Where we discuss the progress, issues, improvements etc. Informal I have contact about the websites and sometimes I

We have the formal P4 meetings of which we receive a minute afterwards. Though really customer experience is not discussed.

Most recently we had a smart meter award, where you talk

Together with Netbeheer Nederland, de central organisations and Uneto-Vni we organize meetings. Meetings together with construction partners are bi-weekly, to discuss the

In particular situation Liander does the communication, the request for a smart meter is received via 'aansluitingen.nl' and contractors will do the installment.

I would like to have access to the CAR this would decrease the number of questions we have.

Most recently we had a smart meter award, where you talk

Meetings together with Netbeheer Nederland or corporation, we can contact them by e-mail or telephone to receive some information actively this is hardly shared.

EDSN does have a web portal via which we can access some important documents. However, for the verification of customers we still use e-mail, and one thing is sure about e-mail it is not save. A connection to the CAR would also resolve a lot of communication, though this is not the case yet.

With some ODAs we have contact or we inform them via e-mail.

Sometimes we meet our partners at award gala's or fairs.

In particular situation Liander does the communication, the request for a smart meter is received via 'aansluitingen.nl' and contractors will do the installment.

In relation to our application we have a user box where customer can post their question, I shall try to respond in 24 hours.

On a more long-range time scale we have the P4 meetings in which we discuss developments and suggest changes. Minutes and change reports are send to us by e-mail. When we would like additional information from a partner we send them e-mail.

With related ODA's we also have some e-mail contact and discuss topics like current or recent failures.
<table>
<thead>
<tr>
<th>progress and issues</th>
<th>evaluated</th>
<th>meet ODAs on conferences</th>
<th>to people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Though no contract exist about this.</td>
<td>There is of course e-mail and telephone contact.</td>
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</table>

**Application**

<table>
<thead>
<tr>
<th>14</th>
<th>We might change the strategy or vision regarding the smart meter. Or alter processes if necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>We adjust our approach towards customers if needed, in order to place more smart meters.</td>
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<tr>
<td></td>
<td>When remarks in the six weekly meeting are relevant a change request is set up and later evaluated. When it is put through the changes should be implemented by all related actors</td>
</tr>
<tr>
<td></td>
<td>Improvement projects are started concerning the smart meter, the process, the customer contact, flyers, communication etc.</td>
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</table>

| Most recently we did an update of failure codes, since some were unclear and needed specification. |
| A statement of what we would like to achieve with the smart meter, since now it is all unclear. Centralization might be better to prevent errors. |
| To my opinion we should improve our processes and procedures, this way we could also faster and in time inform customers. |
| Since the customer is able to lookup and arrange a lot of things online we might develop a portal where he can arrange its energy issues. This would improve the security, communication and informing of all actors. |

- Strategy and vision alteration;
- customer approach improved;
- energy data related processes altered;
- communication improved to customer and with partners;
- enhance efficiency;
### 10.8 Case B

This part of the Appendix contains the gathered data and analysis of Case A. First the VN-CKM framework is given. Second the summary of the case responses of individuals to all questions. Third the 'raw' quotes related to the questions are given.

#### 10.8.1 Case B specific framework

<table>
<thead>
<tr>
<th>P</th>
<th>I/O</th>
<th>Main activities</th>
<th>Resources</th>
<th>Control</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formal</td>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>T/T</td>
<td>Elicit customer needs in neighbourhood meetings and house visits; evaluate products or new value propositions with customer focus groups; obtaining customer complains via telephone conversations; obtaining local knowledge, opportunities and approaches provided by cooperatives and municipalities; customer-installer interaction</td>
<td>-</td>
<td>Neighbourhood meetings; customer visit by energy advisor; focus groups; contact with municipalities and cooperatives; telephone contact</td>
<td>Customer; independent advisors; construction companies; cooperatives</td>
<td>A clear picture about the different types of customer and what they value; reach mutual understanding with the customer about the solution; Enhance customer context understanding</td>
</tr>
<tr>
<td>T/E</td>
<td>Analyse focus group meeting and update processes, propositions, etc.; energy advisor takes notes of the situation (an app is being developed for this); pictures taken of the situation by energy advisor; solution proposition established and reviewed with the customer; e-mail with pictures and order explanation send to construction partners; clear agreements about roles and expectation with partners; work method contracts with partners; established policy with partners; partner portal development with partners; document customer contact</td>
<td>Contracts with customer and partners; agreement on roles and expectations; work method/framework; policies; measuring/evaluating performances, and customer satisfaction; notes</td>
<td>Meetings; focus groups; discussion</td>
<td>Construction companies; customers; energy advisor; Energy Worx; camera (photo and video)</td>
<td>Efficiency improvement in service provision; improved processes and collaborations with partners; improved quality delivery; prepared tender and solution implementation plan; improved process satisfaction; evaluate products and new value propositions; inform partners about new strategy or platform</td>
</tr>
<tr>
<td>E/E</td>
<td>Inform customers via neighbourhood meetings about options; explain solutions and effects to customers, during visits of energy advisor; offer comparable tenders; inform customer about order of event during execution; additionally inform customers by coaches over telephone</td>
<td>Work method</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>E/T</td>
<td>Development of partner portal; development of customer portal; document house characteristics</td>
<td>Contract about using the partner portal; fixed communication pattern via the partner portal; receive and communicate tenders to partners via the partner portal</td>
<td>-</td>
<td>Partner portal (web portal); photos; tenders</td>
<td>Uniform way of CK sharing; flexibility; enhanced efficiency in the value network</td>
</tr>
<tr>
<td>T/E</td>
<td>Document customer interaction in Sales Force; document collaboration evaluation with partners; record and store focus group sessions; store sustainable solution context information/photos</td>
<td>Customer interaction documentation; evaluation reports about partner collaboration; reports and videos on focus groups; survey</td>
<td>Customer phone call; visits; focus groups; dialogue</td>
<td>Energy advisors; construction companies; Hoom; customers</td>
<td>Ensure future access to tacit CK in the value network</td>
</tr>
<tr>
<td>E/E</td>
<td>Share tenders via partner portal; share photos via partner portal; notify construction companies via partner portal; e-mail with energy advisors and EnergyWorx; notification e-mail towards customer; website</td>
<td>Contract on using partner portal; agreements on the process of communication; partner portal; customer module; documents</td>
<td>-</td>
<td>Partner portal; e-mail; website</td>
<td>Efficient sharing of similar CK; decrease throughput time; timely informed customers and partners</td>
</tr>
</tbody>
</table>
### 10.8.2 Case B response summary

<table>
<thead>
<tr>
<th>General questions</th>
<th>Summary; Realization Coordinator</th>
<th>Summary; Marketing and Communication coordinator</th>
<th>Summary; IT consultant Alliander</th>
<th>Summary; Solar panel partner</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All the relations presented exist and no links are missed. The one that is not included is the collaboration with corporations and municipalities. Hoom does a customer need research in collaboration with them.</td>
<td>All the relations are correct. What should be added is the relationship with corporations, they provide us with opportunities and contact persons, and we provide them with knowledge about the sustainable solutions.</td>
<td>Right! We developed it together</td>
<td>Yes, from the view point of Hoom it is correct. When I focus on this firm, I have also different partners for myself.</td>
<td>The connections in the first value network were correct. Only one addition should be made, corporations, neighbourhood initiatives and municipalities (corporations)</td>
</tr>
<tr>
<td>2</td>
<td>Independent advisors do a home recording; as well do internal 'Hoom' advisors. The difference is the independent advisors take a whole house and give an advise, where the Hoom advisors take only specific solutions into account. We would like to facilitate the market, not distribute it. Therefore, we facilitate the relation between Construction companies and private home owners.</td>
<td>With the customer, which is very important to us. We work together with the local construction companies, which have an interaction with the customer during implementation. Independent Advisors have a less significant role now, but might be important in the future. Sales Force is our CRM system, but not the persons behind are interesting. One of the most important partners of Hoom are local initiatives, corporations and municipalities, they inform us about opportunities and approaches where we deliver them the knowledge about sustainable solutions.</td>
<td>The construction companies facilitate the implementation and the independent advisors facilitate the energy advise. The de-central government has an opportunity role and support Hoom in their commercial activities. Alliander has an advisory role in the network and tries to support Hoom in its development. Sales Force is facilitated by Alliander and Alliander has the advisory role here. Energy Worx is a more difficult story since this collaboration is not well established, though important and the collaboration is developing.</td>
<td>For the moment only with Hoom, in discussing the customer needs and provide an offer.</td>
<td>Hoom collaborates with the Construction companies to execute the solution; with the independent advisors to provide an energy advise; with Sales Force to store customer information; with Energy Worx not yet it is a future feature, the relationship is becoming important; Alliander has an advisory role; and the customer the focus of the proposition.</td>
</tr>
<tr>
<td>3</td>
<td>Good in circumstances where we can offer them a lot of work, and have more interaction with the partners. When they collect less assignments in comparison to the number of offers they put out, the partners are less satisfied. However, we try to facilitate them as good as possible with market feedback. So it is more of a wave interaction, dependent upon the load of work.</td>
<td>The way we contract the customer and partners is positively evaluated. When a partners wants to collaborate with us, they need to open up a bit and this might be though for some of them. We would like to facilitate the market and give customers a comparison between equal offers. In the early beginning an efficiency improvement was needed in both construction and advisory processes. Now the collaborations are improving.</td>
<td>On my own experience I cannot judge about the collaboration with construction companies, independent advisors and de-central government. The collaborations with Alliander is good in providing advice. The same accounts for Sales Force, which is facilitated by Alliander. There is a low collaboration around Energy Worx, it is important for the service provision of Hoom and therefore we attracted an external consultant with knowledge about Energy Worx. Soon this will start to develop</td>
<td>I honestly must say, I am not aware of what Hoom does after I applied my offer based on Hoom its data. For now customer decided on lowest price, since the customer is not aware of the world behind solar energy. Just because Hoom selects us does not mean everything is of quality, their are service and quality issues as well to decide on. It is also given that the advisors are not as well informed as we are, so their talk with customers might be less qualitative. This however you cannot blame them.</td>
<td>Overall the collaboration goes well; when there is more interaction the satisfaction is increased. From the partner point of view there are some questions.</td>
</tr>
<tr>
<td>4</td>
<td>Very important, we see each customer as custom work and</td>
<td>In my opinion it is always important to consider</td>
<td></td>
<td></td>
<td>Very important, eventually you want to deliver quality. So you Very important, to deliver a good quality</td>
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</table>
therefore need to take their needs into account. On the other hand we try to see our solutions as general. In collaboration with our partners the quality of the solution should be improved.

customer knowledge, Hoom has multiple forms of knowledge about and from the customer. Further we try to back-up qualitative data with quantitative data. Based on the customer knowledge we try to improve our processes and collaborations with partners.

must inform your customers well and we as suppliers have the knowledge to train Hoom in doing so. Further would it be beneficial for the partners of Hoom in delivering quality. Overall I can conclude that with a good experience you get more customers due to chit chat in the neighbourhood.

To a limited extend we use IT. Now we arrange neighbourhood meetings, personal intake conversation, and on paper noted comments. These are not automated or analysed in a particular way.

We use multiple IT tools and systems with regard to CK. We use the CRM system Sales Force, to analyse we use BinNote and MotivationMentality, we send out surveys, to inform customers we have a website. We even are trying to link them.

For the moment it is limited. However, when the different portals go live the role of IT will grow. Customers will be more active and we can gather more information and feedback through IT. But, I would not make the IT factor more important than supportive.

The partner portal you should start with immediately. You even could generate before calculated offers, which we only need to confirm.

Limited, but in the future it will become more important.

To prepare our offer and solution implementation we gather customer context specific information like; building year of the house, what type of home, and adjustments over the years. In a ten-questionnaire a first assessment of possibilities for Hoom is made. The advisor eventually takes notes on specific solutions, to inform our partners and to estimate the saving potential.

We also carry out a satisfaction-survey after each implementation or when a customer decides not to continue in the process. In order to see where we can improve. The research focuses on how satisfied they are with the implementation, what did they think about the service of Hoom, throughout time, knowledge level of persons. These are measured on a 1-5 scale, since we want to analyse the figures and not necessarily the feedback. This is again input for the BSC evaluation of partners.

To inform our partners about their performing and evaluation of the customer we ask some customers over the phone why they pick on partner over another. Further needs are identified through information evening and meetings with the customer during house observations/inspections.

customer complaints are handled over the telephone, whether about the partner or the solution, (not recorded)

At the moment we have a clear picture about the different types of customers we have, what do they value, and what is possible. Now we are shifting our focus towards the evaluation of our performance and that of our partners in terms process satisfaction, timeliness etc. we are also try to combine these insight to create a learning curve.

Upfront we send out a little survey to collect information about customer complaints to evaluate the opportunities, a need-survey. Besides we try to collect a lot of house information to improve our service and estimation of the opportunities.

We also have individual customer information like what improvements they chose, their house type, history of communication with remarks.

We also perform focus groups with customers to evaluate our products or new value propositions. Discussion with partners helps us improve our processes.

Their are different types of quality, we discussed assortment, project briefing about what should be done and what are obstacles for customers, approach towards the customer, and after sales issues.

In relation to assortment you can show de different colours, the capacity of solar panels and transformers. For the approach you should consider explaining the different options and their pros and cons. You can identify their needs in communication with the customer, which should be the job of the advisors. This adds to the project briefing towards the customer. After sales is about apps or quality control by moving out of the house in a sort of certificate.

For now I focus on more on price issues in the case of Hoom, due to the low differentiation form them between the different partners. However, there is a larger world behind it.

The independent advisors deliver their observations, customer remarks/wishes and pictures of the house.

We expect from our partners that they monitor the market on innovation and give us tips about it. This can be communicated over the telephone. Its not really about customer knowledge, we receive feedback. For the moment they

They do not collect a lot of information. The corporations provide us with information about approaches and people to contact. Our construction partners help in developing the partner portal, which should improve the customer experience.

Limited, when we look at SF, Alliander and Energy Woks not at all. The primarily deliver the software. I assume that the energy advisors and construction companies do gather some customer knowledge, since they have a direct contact as well.

The identification of the customer his needs is to low, to have knowledge about six different solutions is hard. Now we receive a picture of the situation and the offer Hoom made them. To be better in providing a solution we visit them again to see the real situation and to diminish the real issue of the customer, the interior process.

Besides, we receive little...
also do not hint us on opportunities, which we would like of course to increase the customer experience. We did give the construction companies the opportunity to provide feedback on the offers we provide to them, is it possible or not or even better tips. Municipalities or corporations contact us to see if we can arrange an neighbourhood meeting and investigate the opportunities there.

<table>
<thead>
<tr>
<th>3</th>
<th>When our agreement with the customer is correctly performed by the construction partner it all goes very well and the customer experience is enhanced. When not, it definitely has a negative effect on the customer (experience, but on the relationship with the partner as well. He will remained the negative experience and new trust needs to be established. So there has to be a clear agreement with the partner about who performs what or what is expected. Collaborations with municipalities and corporations goes well, we have new opportunities and if they support us more people are interested.</th>
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<tr>
<td>4</td>
<td>The three general contact point are relevant here. First the need investigation and neighbourhood meeting, where is look at the possibilities and needs, this goes mainly face-to-face. Second when the customer would like to continue an (independent) advisor visits their house, and suggests and agrees upon some solutions. These are within five days reviewed with the customer, to make sure the right thing is asked from the construction partners (they are developing an app to videotape the solution). A lot of face-to-face communication. Third, at the end a customer satisfaction-survey is send to them by e-mail. To evaluate what their experience was This is done as well for customer that drop out earlier.</td>
</tr>
<tr>
<td>5</td>
<td>We organize neighbourhood meetings to elicit the needs of customers, which are sometimes in collaborations with municipalities and corporations. We have contracts with partners about a work method, however most often they did not perform as agreed and we call them to inform about it. Once every three months, when we collected enough reviews, we go and visit the partner, to discuss performs and</td>
</tr>
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| feedback on what we are or are not chosen. |
|---|---|
| They perform the solution and If the work is performed properly the customer experience improves. Their expertise helps in better approaching and manage the expectations of customers. |

<table>
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<tr>
<th>3</th>
<th>We seek for an active collaboration with the corporations and neighbourhood initiatives; we deliver the expertise and knowledge about sustainable solutions where they provide us with local knowledge, opportunities and approaches. Our proposition is to facilitate the market and provide customers comparable though qualitative firms. The partners eventually do the work.</th>
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<tr>
<td>4</td>
<td>To communicate with the corporations, which might inform their customers about our business. We perform customer cases in focus groups to capture what customers need and try to reach an agreement on this. We send out surveys to monitor what the customer experience within the process was. If customers have questions they can contact the Coach of this a report is made in Sales Force.</td>
</tr>
<tr>
<td>5</td>
<td>Most often through conversations with our partners. By establishing a policy with the involved partners, and also some kind of instruction framework so each partner provides the same service. Communication via the partner portal could make this possible for example.</td>
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</table>

| 3 | I do think so, for example Energy Wors has a lot of experience in data transfer and the smart meter. From them we can learn how to approach customers and deal with the sensitive data, but about the smart meter itself as well. Sales Force, helps us in, for example, reducing the throughout time of customers. They have experiences with other companies and therefore have some “best practice” knowledge. |
| 4 | It starts with the neighbourhood meeting, where I visit once. Next we receive the customer need from Room and then visit the customer ourselves, you do not want any surprises. Develop a project briefing about the internal process, install the solution and deliver some after sales services. It is a lot face-to-face contact with them, in order to increase the experience. |
| 5 | For now we receive e-mails and with pictures and the order explanation. I would encourage them to start as soon as possible with the partner portal. We once encountered in a situation where we upgraded the solution towards the customer, over telephone I discussed with Robbert that is was ok. In order to make the offering better towards the customer and have less contact, due to a better alignment, I should suggest l |

<table>
<thead>
<tr>
<th>3</th>
<th>We use them mainly to collect orders, to enhance the customer value we are more up to date since we work each day in the solar sector. We know better what customers want and what their issues are.</th>
</tr>
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<tbody>
<tr>
<td>4</td>
<td>First a neighbourhood meeting is organized; second an advisor visits the customer; third the customer is contacted to agree on the solution; contracts customer-satisfaction survey; Focus groups; website</td>
</tr>
<tr>
<td>5</td>
<td>Meetings are organized to inform the partners; a partner portal is developed; three-monthly meetings are organized to reflect; informal contact due to issues; telephone; contract</td>
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<td>Page</td>
<td>Text</td>
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<td>6</td>
<td><strong>We developed a partner portal</strong> to communicate with our construction partners, through which we communicate about offers and share photos of the houses. Before this went through multiple channels, like sales force or e-mail, now we try to limit it to one channel. A next step is to automate the communication with the independent advisors, so everything is in the computer immediately.<strong>&lt;br&gt;Since we collaborate with multiple partners and those all have their own way of working, we decided to develop the partner portal.</strong>&lt;br&gt;Right now to a limited extent, we do have some application integrations with Sales Force and Energy Worx. Though with advisors and construction companies we do not have a connection, but the partner portal will be one in the future.<strong>&lt;br&gt;We do not have a specific connection. The communication goes via telephone and e-mail, but I would encourage the use of a partner portal.</strong>&lt;br&gt;<strong>E-mail; telephone; partner portal</strong></td>
</tr>
<tr>
<td>7</td>
<td><strong>Continuously, the feedback from customers and partners is evaluated and applied if it seems valuable. With the customer satisfaction survey we ask questions on a 1-5 scale, analyse this and update within three months our processes.</strong>&lt;br&gt;<strong>For now to a limited extent, we do actively combine multiple sources. I do monitor some information streams but it is based on my experience and the customer journey. For now the customer base is also to small but bit by bit we are improving. We always do try to back up the gathered qualitative data with quantitative data.</strong>&lt;br&gt;<strong>From Sales Force you can extract some query and by logic reasoning you can find the links between patterns. After an analysis you always will do another examination in the field, therefore we are not going to automate the analysis of patterns.</strong>&lt;br&gt;<strong>Sales Force is the main source of information, though combinations of explicit data is limited; No data of partners is used</strong></td>
</tr>
<tr>
<td>8</td>
<td><strong>This has to do with expectation management; via e-mail we send them we will visit them at that date. Sales Force triggers this.</strong>&lt;br&gt;We have face-to-face contact with them, during the neighbourhood meeting, the intake meetings and after the intake meeting a short telephone conversation.<strong>&lt;br&gt;Additionally we are developing an application through which we can record what solution we will be implementing, in order to agree better with the customer.</strong>&lt;br&gt;Further when the customer needs a bit more information, he can contact our coaches by telephone. On the internet a general explanation can be found, but for more customer specific information they will call us.<strong>&lt;br&gt;If you start in the orientation phase, we try to provide the basic information through our website. Next the customer is more serious and we inform him through the coaches and try to identify his needs. This is done via telephone or e-mail mainly. When people now a lot about it you easily can go to a solution, where others might want to have their whole house measured. In the next step it becomes more concrete and we visit them. During the implementation we inform them about for example the throughput time and payment days.</strong>&lt;br&gt;We have the website, telephone, the coaches, the neighbourhood meetings. In the future we will have a MyHoom portal for the customer, than you are going to support customers more digitally. And we use advors now.**&lt;br&gt;<strong>Before we start installing the solar panels we visit the customer, to scan the reality and limit the uncertainty.</strong>&lt;br&gt;<strong>The orientation the website and telephone is the main source of information; if the customer is interested an advisor visits their home situation to explain and measure, for more in-depth questions they can call Hoom; during the implementation an intensive contact with the partners and notifications via e-mail and telephone; in after sales we evaluate with them about there experience.</strong></td>
</tr>
<tr>
<td>9</td>
<td><strong>Some information is necessary for us to operate, this we ask from the customer and document it. Sometimes even photos are taken to clarify the situation.</strong>&lt;br&gt;We make a call-report if customers call us, however this is not closed. We are not able to analyse the number of complaints for example, we take**&lt;br&gt;<strong>From my marketing point of view, we store as much customer knowledge as possible and try to link it to persons in SF. If questions come in through the contact point we send them to the coaches.</strong>&lt;br&gt;<strong>It depends upon the business which you determine where you can find the information and collect it there.</strong>&lt;br&gt;<strong>We do not actually store any CK, it is context dependent what is needed. You could say we save the offers and photos.</strong>&lt;br&gt;<strong>There is no protocol; Information is stored when it is relevant about the customer; information is stored about the individual customer; offers and photos</strong></td>
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<tr>
<td>10</td>
<td>We did not agree really specific the formats we use, now [before the partner portal] we make a zip file with [JPEG photos]. This is agreed upfront in the selection procedure of the partners. Besides we have developed a partner portal, through which we can communicate with partners more efficient and equally. Here the photos are presented and what the customer has asked.</td>
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<tr>
<td>Transfer</td>
<td>Towards our customers we communicate via e-mail. For the moment we are developing a offer module for the customer, so he or she can log on and see their offerings. Still we have the meetings, advisors and telephone contact.</td>
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<tr>
<td></td>
<td>Towards our partners we communicate via the partner portal about the customer offers. In the three monthly meeting we address feedback from the market. and in the six monthly meeting we address our own progress with them. For the independent advisors we do not have much automation, its more paper work and face-to-face contact.</td>
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<tr>
<td>12</td>
<td>Through the partner portal we timely provide the customer offers. Further we have our website, neighbourhood meetings and telephone as contact points.</td>
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<td>13</td>
<td>Yes, once in every three months we visit our partners to discuss issues or complement them. In the six monthly meetings we discuss the new features we developed or present our new strategy. In these meetings we do not discuss innovative ideas or so. Partners can call us for this input.</td>
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<tr>
<td>Application</td>
<td>It is not enough used. We do receive some feedback but this is not noted down or translates in processes or so. Just to a limited extend. From the satisfaction-survey we do receive some information to see where we can improve, this we do if needed and translate into our processes. However the response is very low on the survey.</td>
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</table>
### 10.9 IT section

In the following additional information can be found with regard to the orientation of IT.

#### Table 10.7 IT analysis Case A, B, C, D

<table>
<thead>
<tr>
<th>Source</th>
<th>Compatibility</th>
<th>Interoperability</th>
<th>Integration</th>
<th>System Integration</th>
<th>Data Compatibility</th>
<th>Indirect Communication</th>
<th>Direct Communication</th>
<th>Meeting Management</th>
<th>Map People and Skills</th>
<th>Sharing of Context</th>
<th>Capture and Locate Tacit and Unstructured Knowledge</th>
<th>Common database</th>
<th>Analytical ability</th>
<th>Evaluation ability</th>
<th>Alertness</th>
<th>Decision Communication</th>
<th>SCRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panetto and Cecil (2013); Panetto and Molina (2008); Gottschalk (2009); Vernadat (2010)</td>
<td>Everyone has its own system no sharing of data discussed</td>
<td>Everyone has its own system no sharing of data discussed</td>
<td>-</td>
<td>A common definition of databases among energy suppliers, grid providers and energy manager could benefit the collaboration</td>
<td>Ways of sharing energy data have been agreed; error codes have been agreed</td>
<td>E-mail, websites, SharePoint</td>
<td>Telephone</td>
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<tr>
<td>Saeed et al. (2011); Gottschalk (2009); Panetto and Cecil (2013)</td>
<td>Everyone has its own system no sharing of data discussed</td>
<td>Added value is recognized</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>E-mail; partner portal; website</td>
<td>Telephone</td>
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<tr>
<td>Chi and Holsapple (2005); Krucken and Meroni (2006)</td>
<td>Everyone has its own system no sharing of data discussed</td>
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<td>E-mail, website</td>
<td>Telephone</td>
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<tr>
<td>Saeed et al. (2011)</td>
<td>Everyone has its own system no sharing of data discussed</td>
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<td>E-mail, Github, content server</td>
<td>Telephone</td>
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<tr>
<td>Ramesh and Tiwana (1999); Krucken and Meroni (2006); Chi and Holsapple (2005)</td>
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<td>Enlarge the contextual understanding during sharing of offerings by photos</td>
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<td>Alt (2012); Trainor (2012)</td>
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<td>Github for the platform and documentation; content server to share documents, requirements and contracts; considering to develop their own content server</td>
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