Modularity Canvas – A Framework for Visualizing Potentials of Service Modularity

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Abstract. Service modularity has been proposed as a possible solution to the dilemma between the customer-driven thirst for individualization and the standardization ambitions of service providers. However, current modularization methods that intend to support the corresponding transformation process remain mostly on a conceptual level with little real-life application. Therefore, we develop the Modularity Canvas – a generic framework for the structured information capturing and identification of potentials for advancing towards a modular service architecture. The artifact is developed following the Design Science Research Methodology. The results include the artifact itself and first insights from five demonstration workshops at industrial service providers from contract logistics, wind energy and automotive engineering sectors. The contribution of the paper lies in the deeper understanding of what dimensions need to be considered when preparing service providers for their move towards a modular service architecture.

Keywords: Service modularity, canvas, framework, modularization method, design science

1 Introduction

In business-to-business (B2B) markets, customer requirements are highly individualized and complex, meaning that the same service value proposition cannot be offered twice to different customers without profound alteration [1]. However, growing competitive pressure also forces B2B service providers to constantly search for cost efficiency improvements by standardizing their resources and processes. In this regard, the concept of service modularity has been proposed as a viable solution to the dilemma between individualization and standardization [2].

A modular system is comprised of smaller parts (i.e., modules) with standardized interfaces and clearly defined functionalities, features, or values, which can be designed, improved and exchanged independently, yet function together as a whole [3]. This way, the provider can try to maximize external variety (i.e., the number of possible variants due to configuration possibilities), while minimizing internal variety

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(i.e., a finite and manageable amount of service elements or modules). Although the concept of modularity has been successfully established in the context of software engineering [4] and manufacturing [5], recent academic discussions on service modularity have often remained on a conceptual level with little evidence for practical adoption [6]. Although there exist several service modularization methods in the academic literature [7], it seems that these are not acknowledged by practitioners, which can be partly ascribed to their abstract and conceptual nature. Nevertheless, it is especially the field of services, in which the concept of modularity is expected to further accelerate [8, 9]. Moreover, recent works also conceptualize service innovation as a "recombination of resources" [10, p. 380] and strongly rely on ideas related to the concept of service modularity.

Against this background, the objective of our research is to develop a framework that service providers can use to create visual models of their status quo in service provision and to identify potentials for developing towards a modular service architecture. We name this framework the Modularity Canvas. Similar to the very popular Business Model Canvas, the Modularity Canvas intends to offer a "shared language for describing, visualizing, assessing, and changing" [11] service modularity in organizations. Our development process follows the Design Science Research Methodology (DSRM) proposed by Peffers et al. [12]. The paper presents our results after the first four stages of the DSRM (namely *1. Problem Identification*, *2. Objective Definition*, *3. Design and Development*, and *4. Demonstration*), leaving the further stages of *5. Evaluation* and *6. Communication,* as well as possible design iterations, for our upcoming research activities. The Modularity Canvas focuses on the very first phase of information capturing at the beginning of a modularization initiative, before service modules are defined. This phase has been identified as being under-researched and not well covered with method support [7]. The theoretical contribution of the paper lies in the deeper understanding of the dimensions (both on a strategic and operational level) that need to be considered when preparing service providers for their move towards a modular service architecture.

The remainder of this paper is structured as follows. Next, we give a brief background on service modularity, canvases, and ontologies, followed by a section on our research approach. We present the artifact in Section 4 and report on our demonstration workshops in Section 5. Section 6 gives a summary and an outlook.

2 Research Background

2.1 Service Modularity

The research on service modularity is still considered to be in its infancy [6]. Pekkarinen and Ulkuniemi [2] were among the first to apply the concept of modularity to business services and highlighted the multi-dimensional nature of service modularity. Ever since, service modularity has attracted the attention of researchers from different academic fields such as marketing, information systems (IS), engineering, and even psychology [6]. The expected benefits of service modularity include, amongst others, efficiency benefits for the service provider [13],

economies of scale and scope [14], the reusability of service elements for future offerings [15], as well as flexibility and faster development cycles [16]. Besides provider-related benefits, modular customization is also believed to directly improve the service experience and the loyalty of customers [17]. To leverage such benefits, Carlborg and Kindström [15] outline different modular strategies based on a distinction between four service types with different process characteristics (rigid vs. fluid) and different customer roles (passive vs. active).

In order to support the transformation process of a service provider from a rather monolithic towards a modular service architecture, scholars have been focusing on the design of appropriate methods. Depending on the underlying service paradigm [18], these methods were either transferred and adjusted from the domain of products [19], developed specifically for services [16], or reflect a simultaneous modularization of products and services due to their inseparability and joint value-creation [20]. A synopsis of existing methods for service modularization is provided by Poeppelbuss and Lubarski [7], who systematize them along, first, an idealistic modularization process (Figure 1) and, second, different types of modular structures. Further pertinent works include the iterative guideline FAMouS for architecting modular services [21], and a list of three trade-offs that are to be tackled when translating modularity into a functional set of design choices for professional services [22].

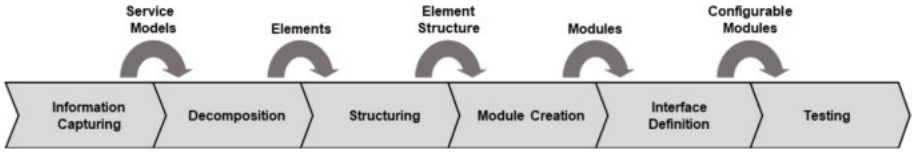

Figure 1. Phases of the modularization process [7]

However, there is little empirical evidence that these strategies and methods have actually been adopted in practice; apart from information given about the testing environments and case studies presented within the papers themselves [5]. In fact, very little is known about whether and how practitioners actually conceptualize and document modular service architectures at all. We see three explanations for this issue. First, the majority of existing modularization methods oftentimes make unrealistic assumptions or define ambitious prerequisites such as the existence of an already decomposed service portfolio or a clear assignment of required resources to operational service processes. Second, due to the academic origin of many modularization methods, they tend to remain on an abstract level and provide rather generic recommendations only. For instance, the FAMouS framework for architecting modular services [21] does not provide practical details on how to actually perform the steps such as “identification of elements” or “analysis of elements”. Third, existing works mostly approach service modularization from the strategic perspective of variety management and disregard the interrelationships with operational sales processes and the quotation process in particular. IT requirements for implementing and communicating a modular service portfolio in marketing and sales activities are hardly discussed, although modular architectures can enable the use of online

configurators and so-called configure-price-quote (CPQ) software. Hence, we assume that practitioners cannot determine easily how their organization can benefit from the concept of service modularity and, more importantly, where to start with their own modularization initiative.

2.2 Canvases and Ontologies

Inspired by the worldwide success and great acceptance of the Business Model Canvas (BMC) [11], both in academia and practice and across various disciplines, we decided to use a canvas representation for visualizing the intended framework. A canvas representation is a concise, easy-to-understand, easy-to-use, and visually appealing overview of the key components required for a specific subject area. One of the first canvases developed in an academic setting was the Strategy Canvas evaluating a company's position within its respective industry based on pre-defined factors of competition [23]. Almost a decade later, the BMC became a role model of how a canvas can have a major impact on both the theoretical discussion and practical application of designing business models. Ever since its introduction, it has been used by various consulting agencies and was further extended and modified to fit specific purposes, including the Service Business Model Canvas [24], for instance.

The BMC was initially presented as a business model ontology [25]. Following Uschold and Gruninger [26], an ontology provides a shared understanding and conceptualization of a domain of interest that can be used as a unifying framework to facilitate knowledge sharing and re-use, as well as inter-operability between different organizational entities and systems. An ontology provides a conceptual framework for modeling domain knowledge and it is specified in the form of definitions of representational vocabulary. While Osterwalder [25] also worked on a formal representation of business models with an own XML-based language, the BMC, as it is known today, mainly offers an informal framework, which is to a large extent "expressed loosely in natural language" [26, p. 6].

Similarly, the Modularity Canvas that we present in this paper is supposed to help organizations in creating a shared understanding of their current service architecture and to derive actions to achieve a (more) modular service architecture thereof. Opposed to previous frameworks that cover the whole modularization process, it mainly addresses the initial phase of modularization initiatives in organizations. Hence, the Modularity Canvas covers the *Analysis* phase of the FAMouS framework of Dörbecker and Böhmann [21] and the *Information Capturing* phase of the classification framework of Poeppelbuss and Lubarski [7] (Figure 1), both of which emphasize the key role of the initial phases for the overall modularization initiative.

3 Methodology

Consistent with Osterwalder [24], we consider the development of the Modularity Canvas and its underlying ontology to be subject of design science and, hence, follow a corresponding research approach. Following the distinction between different

artifact types (constructs, model, method, and instantiation) by March and Smith [27] and Osterwalder's [24] categorization, the different fields of the Modularity Canvas can be considered constructs, and the actual canvas is a model (i.e., the ontology). Our research process follows the DSRM by Peffers et al. consisting of six phases [11]:

1. Identify Problem and Motivate: We extracted the research problem and the motivation for the development of the Modularity Canvas from the current literature on service modularity (section 2) as well as through a pre-study with representatives (mainly managing directors and heads of sales) from industrial services providers in the contract logistics and wind energy sectors [28]. In this pre-study, we conducted 17 semi-structured expert interviews. The interview results show that most of the providers face challenges to display the full spectrum of their services in a structured and understandable way to their customers. This is partly due to the heterogeneity of their service offerings, but also due to the concerns of losing the personal touch towards their customers. However, the majority of the interviewed partners also sees the quotation process (i.e., the preparation of the quotation document containing how and at what price the provider will solve the customer's problem) as a current pain point and a possible area for improvement. They indicate that the preparation of the quote is often made from scratch costing too much effort and time. They further point to the issue of not well-integrated IT systems and a proliferation of spreadsheets, for which the management of master data is obviously a problem. From the interviews, we generally see a relatively poor adoption of the service modularity concept in practice. The experts confirm that the conceptual ideas and methods from academia are hardly known and not used. Therefore, we identify the need for a lightweight and easy-to-use tool in the form of a canvas, as the BMC has shown that a tool of this kind can be valuable to both practice and academia and achieve widespread adoption. As the Modularity Canvas must especially support the early phase of modularization initiatives, which is not well covered by existing method support [7] yet, we also consider a canvas representation as particularly useful. It can guide workshop discussions, which are common in the early phases of such initiatives.

2. Define Objectives of a Solution: As the Modularity Canvas is supposed to support the early phase of modularization initiatives; it is required to support the capturing and visualization of information about the status quo, the search for modularity potentials, and the definition of directions for improving variety management and the quotation process. It is not supposed to support the actual definition of service modules, for which many methods already exist [7]. As the canvas will be used in workshops with board markers and sticky notes, it must offer structure and flexibility alike. This means that it has to provide guidance during discussions and to direct the participants' focus to important aspects and their interrelationships, but also to offer the freedom of annotating notes wherever needed. Further guidance should also be provided for the interpretation of the canvas (e.g., how to identify potentials for designing modular service offerings from the status quo as depicted in the canvas).

3. Design and Development: The findings from our pre-study [28] indicate that there are two layers of service modularity that need to be considered, which include the strategic variety management and the operational quotation activities in sales.

Hence, the Modularity Canvas and its underlying ontology must correspond to these two layers. In order to further populate the two layers, we relied on existing academic literature (e.g., with regard to the dimensions of services offerings) and concepts prevalent in practice (e.g., configure, price, quote, CPQ). We give the detailed reasoning for the corresponding fields in the artifact description in the next section.

4. Demonstration: For demonstrating its usability, we utilized the Modularity Canvas in workshops with five German industrial service providers from contract logistics, wind energy and automotive engineering sectors. We gathered qualitative feedback from the participants concerning the workshops, the Modularity Canvas as a central tool of the workshops, and the documentaries that we provided to them after post-processing the workshop results. We were provided with valuable insights that we will address in a further design iteration of the Modularity Canvas.

This paper presents the current version of the artifact as used in the demonstration workshops. The DSRM further includes the two steps of *5. Evaluation* and *6. Communication*, which we plan to conduct in our upcoming research activities.

4 The Modularity Canvas

The Modularity Canvas provides a framework that organizations can use to create visual models for describing the rationale of how they manage service variety and modularity on a strategic level, and how they organize their corresponding operational quotation process. It comprises eleven fields that correspond to the underlying ontology of service modularity, which we will justify in the following.

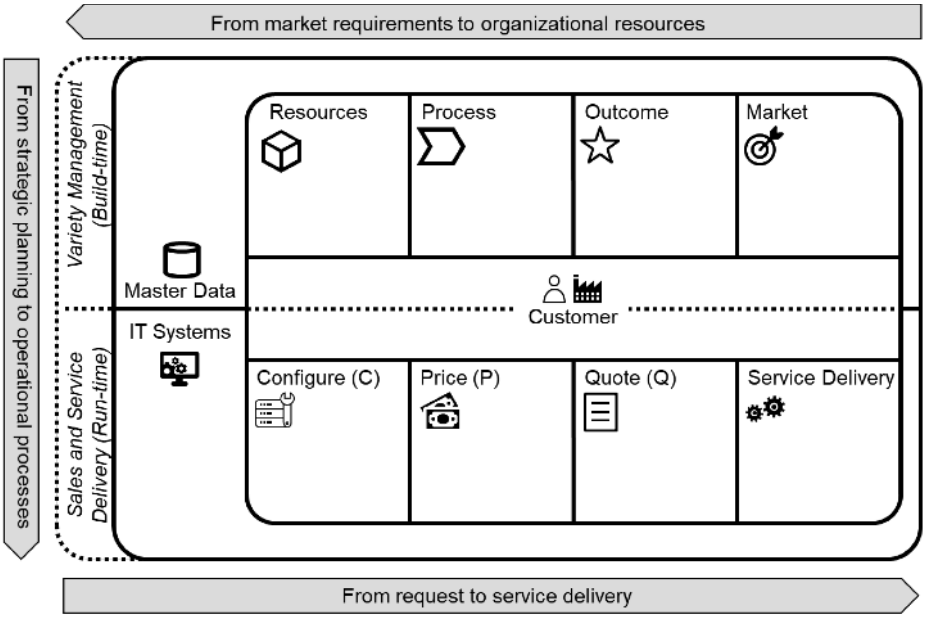

Figure 2. Modularity Canvas

The canvas representation of this ontology (i.e., the Modularity Canvas; Figure 2) comprises two layers: The upper layer focuses on *Variety Management*, which reflects strategic decisions about the modular service architecture made at *build-time*. The lower layer comprises the operational *Sales and Service Delivery* processes at *run-time*. The central field of *Customer* connects the two layers. They are surrounded by the two fields of *IT Systems* (supporting the operational processes) and *Master Data* (defining the service catalog or architecture and its elements).

The recommended order for capturing the status quo about the service architecture in workshops is starting with the strategic layer in the upper right corner, moving from market requirements to organizational resources, moving from the upper to the lower layer, and then moving from the request for quote to service delivery. However, if issues in the operational quotation process are the actual trigger for the modularization initiative, it can also be meaningful to start with the lower, operational layer first. Table 1 gives examples of guiding questions that are supposed to stimulate the workshop discussions when filling out the Modularity Canvas.

The *upper layer* is structured along the four steps towards a strategic service vision according to Heskett [29] and Pekkarinen and Ulkuniemi [2]. These four steps also correspond to four dimensions frequently used to describe service offerings [30, 31]:

1. Identification of target market segments (*Market* dimension),
2. Development of service concepts to address targeted markets' needs (*Outcome* dimension),
3. Codification of an operating strategy to support the service concept (*Process* dimension), and
4. Design of a service delivery system to support the operating strategy (*Resource* dimension).

The *Market* dimension depicts in how far the organization promotes its service offerings to specific market segments or even individual customers instead of an undifferentiated (one-size-fits-all) approach. Becker et al. [30] motivate the need for a distinct market dimension by the fact that service offerings require value co-creation with customers, and, thus, a particular fit with their specific demands. In our canvas, this field is supposed to capture in how far marketing communications and sales activities differentiate between market segments and even individual customers (e.g., through different customer interfaces and sales channels [2]). Correspondingly, the range of different interfaces and channels as well as the set of approaches used for market segmentation and customer insight analytics are noted down here.

The *Outcome* dimension captures the value proposition that the organization offers, which is typically represented by service concepts or product models [30, 31]. Such service concepts and product models comprise a definition of the service contents and a superordinate structure in terms of a service catalog or portfolio [31]. Here, the canvas captures the range of services that are offered and in how far the service portfolio has some structure, or even a modular architecture. The traditional literature on product modularity typically centers around this dimension when parts or components of a product are divided into modules that can be easily interchanged and

replaced, while service modularity has been recognized as a more complex, i.e., multi-dimensional concept [2].

The *Process* dimension focuses on the activities performed by the service provider as well as the customer as an external factor to generate the outcome. "Whereas product models map *what* a service does, process models describe *how* the outcomes of a service are achieved" [31]. Here, the canvas captures in how far service delivery processes are broken down into standardized or customized sub-processes and how the process design allows for quick and flexible responses to varying customer requirements [12].

Table 1. Examples of guiding questions

Canvas field	*Guiding question*
Market	How are different customer segments addressed with service variants?
Outcome	Which service variants exist?
Process	Which process variants exist?
Resource	Which different resources are used?
Master Data	How are the variants represented in the master data?
Customer	How does the customer influence the variance of marketing activities, outcome, processes and resources? What interactions with the customer happen during the quotation process?
IT Systems	Which application systems support the quotation process?
Configure (C)	How is the service offering composed as a response to a request for a quote?
Price (P)	How is the price of a bundle of service modules determined?
Quote (Q)	How are quotation and contract documents designed?
Service Delivery	To what extent is information exchanged between sales and service delivery?

The *Resource*[1] dimension depicts the configuration of the service delivery system. The service delivery system defines how the resource base is organized, including human resources, equipment, organizational units, and supply chains for service delivery; and in how far the resource configurations can be flexibly adjusted depending on specific service cases. In this regard, Pekkarinen and Ulkuniemi [2] refer to the term "organizational modules" that provide standardized ways to organize a service provider's internal and external resources for maximum efficiency. As examples for internal resource modules, they identify teams for specific customer segments or competence areas. Examples for external organizational modules include subcontracting, the use of hired labor, and alliances.

[1] With regard to this dimension, Bullinger et al. [31] refer to a "structure dimension", whereas Becker et al. [30] name it "potential dimension". In their textual explanations, however, both refer to the *resources* required to deliver a service or value bundle, so we opted for the term *Resource* dimension.

The decisions made on this upper layer are typically reflected by the *Master Data* in the organization's IT systems, including customer master data (Market), service and product master data, catalogs, or portfolios (Outcome), process definitions and job instructions (Process), as well as employees, assets and further organizational master data (Resource). The corresponding field in the canvas is supposed to capture what master data is available and how it is managed (including the collection, quality assurance, and distribution throughout the organization).

The master data is used by *IT Systems* to support the operational activities at the lower layer, which typically involve online shops and configurators, customer relationship management (CRM) and enterprise resource planning (ERP) systems, e-mail applications, as well as spreadsheets and desktop tools. The systems in use are captured in the corresponding field of the canvas. As the two fields *Master Data* and *IT Systems* surround the other fields on the two levels, it is recommended to depict which master data is available for which service dimension and which system is used for which phase of the lower layer.

The phases on the *lower layer* are also structured into four fields. The first three fields on the *lower layer* comprise the configuration (C), pricing (P) and quote generation (Q) activities that accompany the operational sales process, which can be supported by so-called CPQ software applications [32].

In the *Configure* phase, the service offering is specified or configured based on customer needs. This can happen from scratch, by adjusting similar specifications from the past, or by already using available service modules. The activities in this phase are typically carried out by a sales clerk relying on her/his discussions with customers about their needs. The feasibility of the specification/configuration has to be assessed and ensured, which may also lead to discussions with internal experts. In case of online configurators, the user can define her/his configuration based on existing modules through a web-based frontend as a self-service.

In the *Price* phase, the sales clerk calculates a price for the specification/ configuration of the service and additional parameters using the pricing engine of a software (or simply a spreadsheet tool, which is very common in practice). Depending on the industry and market environment, the pricing strategies to be implemented by the pricing engine can vary from rather simple cost-based and linear strategies, where the price of the specification/configuration can be determined from the prices as defined for single service components or modules, to more complex competition-oriented and demand-oriented pricing strategies.

In the *Quote* phase, a document with the configuration and the calculated price is generated, which is ready for transmission and presentation to the customer. This document may include additional explanations, illustrations, alternative configurations and options, as well as appendices and disclaimers. The quote document sent to the customer will typically also be stored in the CPQ, CRM or ERP system and/or archived in a document management system.

The *Service Delivery* phase starts when a settlement between the service provider and the customer is achieved. At this point, responsibilities and information are typically transferred from sales to other operational units within the organization. Although this phase typically is much longer and more intensive compared to the

previous three phases, the details of service delivery are not in the focus of the Modularity Canvas. This field is mainly intended to capture in how far specifications and documents from sales determine the service delivery process and in how far these are revisited, e.g., for monitoring and controlling purposes, or for learning from service delivery for future sales activities or revising the service catalog.

Finally, the *Customer* field is in the center of the Modularity Canvas, as we consider customers to have an influence on all the surrounding fields. We expect the organization to make strategic decisions on service variety and modularity with their target customers in mind. Moreover, customers may also provide impulses to overthink and advance existing resource configurations, process definitions, service offerings, as well as sales channels and communications. Obviously, they are also involved in the operational processes in sales from request to quote, and, finally, as an external factor during service delivery.

5 Demonstration

For demonstrating the utility of the Modularity Canvas, we conducted workshops with five German industrial service providers from contract logistics, wind energy and automotive engineering sectors who were interested in advancing their service architecture and sales processes (Table 2). In order to incorporate different views on variety management and the quotation process, the workshops involved two to five members from various departments of each company (e.g., CEO, service portfolio managers, sales managers, IT system architects).

Table 2. Companies at which demonstration workshops took place

ID	*Industry*	*Offered services*	*Firm size (employees)*	*Revenue (million €)*
L1	Logistics	Packaging logistics, contract logistics, project business	200	18
L2	Logistics	Sea, air, and ground transportation; packaging, warehouse management	50	20
W1	Wind energy	Manufacturing of wind turbines, maintenance of onshore and offshore power plants, grid development	8000	5500
W2	Wind energy	Personnel leasing, technical services, technical training	400	5
A1	Auto-motive	Engineering services and consulting projects in the automotive industry	150	20

The half-day-workshops were conducted on-site of the respective company following a pre-defined agenda. Before discussing and filling out the actual Modularity Canvas, the agenda also included a first capturing of objectives and challenges in variety management and the quotation process. While the company members provided input to each of the Modularity Canvas fields (see exemplary notes in the right column of

Table 4), we as researchers acted as moderators and recorders. Hence, we were responsible for steering the discussions along the different fields of the canvas and tracking time. Figure 3 gives some impressions of how the Modularity Canvases looked liked at the end of the demonstration workshops.

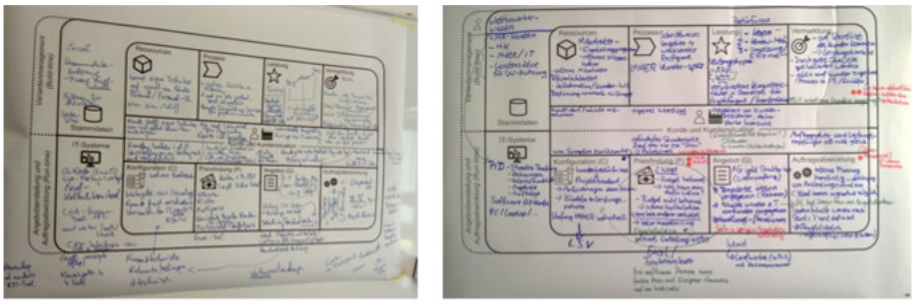

Figure 3. Impressions from the workshops with W1 (left) and A1 (right)

Table 3. Objectives and challenges of workshop companies

ID	*Objectives and challenges of workshop companies*
L1	• Price depends on the solvency of the individual customers • There is a strong motivation to introduce modular services in order to avoid to lag behind the already modular competitors • Knowledge needed for creating a quote exists solely in an employee's head
L2	• Prices are highly volatile (especially in sea transportation) • Completely different quotation processes per business unit • Time losses due to the back-and-forth communication with the customer
W1	• Business is strongly dependent on uncertainties in legislation • Service is offered according to the customer's technical knowledge • New services are identified in a provider-driven, not customer-driven, manner • Service packages are manually composed with no IT-support except for Excel files
W2	• Clear price structures with little room for negotiation • Pursue a clear expansion and internationalization strategy • First standardization approaches (e.g., unified quotation documents) • Rudimentary use of IT
A1	• Low number of highly powerful customers • Strong integration into the customers' development processes • Size of service offerings grow from single tasks to whole development projects • Tenders are fully adjusted to customer requirements, no service catalog with standardized services at the service provider

We conducted post-processing sessions after each workshop in order to discuss the contents of the Modularity Canvases and finally derive modularity potentials that we communicated to the participating companies together with a commented photo documentary of the workshops. We provided a summary of our observations relevant for developing a modularization vision and roadmap (see Table 3 for some excerpts for the five companies). We also explained our ideas for target visions and

modularization potentials that we had derived from the status quo as captured in the Modularity Canvas (see Table 5 for an exemplary extract, here specifically for W1).

Table 4. Exemplary insights from the demonstration workshop at W1

Canvas field	*Guiding question*	*Exemplary notes in the Modularity Canvas from the demonstration workshop at W1*
Market	How are different customer segments addressed with service variants?	No differentiation or segmentation, but very different customers ranging from farmers to large-scale investors.
Outcome	Which service variants exist?	Three different packages (from basic to full-service), which can be fully customized.
Process	Which process variants exist?	Planned yearly servicing, unplanned incidents.
Resource	Which different resources are used?	External resources: cranes and ships.
Master Data	How are the variants represented in the master data?	Complex Microsoft Excel files. Changes in master data result in new, updated Excel files.
Customer	How does the customer influence the variance of marketing activities, outcome, processes and resources?	Customer provides own technicians (human resources) in order to absorb expertise.
	What interactions with the customer happen during the quotation process?	Iterative and long-lasting contract negotiations.
IT Systems	Which application systems support the quotation process?	Microsoft Outlook, Excel-based calculation and process tools, additional CRM system Salesforce.com, MS Sharepoint file sharing for projects.
Configure (C)	How is the service offering composed as a response to a request for a quote?	Initiated from wind turbine (physical product) sales, customer enquires about different service packages (e.g., different durations, basic vs. full-service).
Price (P)	How is the price of a bundle of service modules determined?	Cost plus calculation (not value-based), consideration of error rates, risks, and market prices.
Quote (Q)	How are quotation and contract documents designed?	Initial quote draft of 3-5 pages, later on: 50 pages contract plus 100 pages appendices.
Service Delivery	To what extent is information exchanged between sales and service delivery?	Defined handover-process to order processing department (offices next door) and project reviews.

We gathered qualitative feedback from the participants concerning the workshops and the Modularity Canvas as a central tool directly at the end of each workshop. In follow-up phone calls, we further asked them for feedback concerning the documentaries provided, including our ideas and recommendations. This feedback was generally positive as the participants appreciated the workshops, which in many

cases offered them a new perspective on their own organization; and they also valued the potentials that we identified and explained.

The workshops and post-processing meetings allowed us to reflect on the Modularity Canvas. While the capturing of the status quo with the Modularity Canvas in the workshops seemed to be efficient, we realized that the derivation of the individualized potentials for modularity and the formulation of an overarching modularization strategy is not straightforward and requires a more systematic approach in addition to the canvas, which is currently lacking. Consequently, a design iteration that complements the canvas with a method (or guidelines at least) for more systematically deriving modularity potentials needs to be initialized before the artifact can be evaluated in a broader context.

Table 5. Identified modularity potentials at company W1

Target vision per layer	*Modularity potential*	*Potential actions*
Variety management: "Module catalog covers all customer demands"	• Launch of a modular service catalog • Communication of the modular service catalog to customers	• IT-supported modeling of the module catalog for integration into ERP system • Launch of online configurator
Quotation process: "Accelerated process with integrated IT support"	• Acceleration of processes • Increased understanding of customers • Internal selection support (click & choose) • Reduction of data input into different tools	• Integration of CPQ tool into the ERP system • Simplification of quotation documents

6 Conclusion and Outlook

With the Modularity Canvas, we present a novel artifact that can help organizations create visual models of their status quo in service modularity and identify improvement potentials. It is intended to support the initial phase of modularization initiatives in organizations when the status quo of variety management and quotation processes are captured and analyzed before the actual service modules are defined [7].

The motivation for this research was the limited adoption of the service modularity concept and corresponding methods in practice although a pre-study with experts pointed us to issues with variety management and quotation processes [27]. As it is of a similar complexity like the BMC, we expect our canvas to be a useful and appropriate tool for practice. From an academic perspective, this research also suggests a novel ontology of service modularity that includes both the strategic level of variety management and the operational level of the quotation process. Hence, this ontology offers a new and more holistic perspective on the service modularity concept apart from modularization methods and high-level conceptualizations that have dominated recent academic discussions.

While the general feedback on the current version of the Modularity Canvas from the demonstration workshops was positive, we realized that the derivation of specific modularity potentials and improvement measures during post-processing was not easy. We therefore plan to complement the canvas with a set of guidelines for systematically deriving modularity potentials. Once this is achieved, we also plan to conduct the DSRM steps *5. Evaluation* and *6. Communication*. Following March and Smith [26], the evaluation of the canvas will be directed towards criteria like completeness, simplicity, understandability, ease of use, as well as its fidelity with real world phenomena. The evaluation will most likely take place in a field study [33] together with a consulting company. Using the customer network of this consulting company, the Modularity Canvas will be applied in further real-life business contexts. In such settings, the consulting company will take the role of the moderator and we as researchers will be able to observe the workshops and to record the results. We expect that, with the increasing sample size, further design iterations are possible, leading to potential adjustments of the artifact's structure and improving its usefulness. Once no further adjustments are observable, the artifact together with practical insights will be *communicated* to various stakeholders in academia and practice.

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