Data-Need Fit – Towards data-driven business model innovation

Katrin Mathis, Dr. Felix Köbler

info@katrin-mathis.de
Digital Concepts with Added Value, Freiburg, Germany

Abstract

Today's world is one of growing data, yet few companies have succeeded in leveraging data for novel business models. This paper aims to provide an evaluated approach to understanding what kind of data is available and to matching data with potential user needs for compelling value propositions. For this purpose, the paper introduces, on the one hand, the Data Canvas as a new method for considering data resources systematically in the development of business models and, on the other hand, the Data-Need Fit as a conceptual basis for the established business model innovation process according to Osterwalder, Pigneur, Bernarda & Smith (2014). Applied in a case study, the Data Canvas proved simple to use. Integrated into a service design process, it may help companies to leverage data as a resource in business model innovation.

Keywords: Big Data, Business Modeling, Business Model Innovation, Service Design, Data Canvas, Data-Need Fit

Introduction

The catchword Big Data sums up developments in information technology that have resulted in a situation where the amount of data is growing faster than the technology with which to process it. Despite the growing amount of available data, so far only 4% of German companies have leveraged data to develop new business models (BITKOM 2012).

Contemporary business logics of value creation and processes for business model innovation are introduced to outline the knowledge gap in using data as a key resource in business models. Such business models are understood as data-driven business models (Hartmann, Zaki, Feldmann & Neely 2014). Based on the conducted literature review, we consequently introduce both a method and a process for this purpose. Data Canvas and Data-Need Fit help organizations envision services that use data to help customers achieve their aspirations. This process integrates well with established processes such as Lean Startup which can then be used to refine value propositions based on customer feedback.

Theoretical Background

In recent years, business logics of value creation have changed from a goods-dominant to a service-dominant logic. However, this changing mindset is barely reflected in contemporary processes for business model innovation. Moreover, these processes provide little guidance for leveraging data as a resource in business model innovation.

Contemporary business logics of value creation

"Like all humans, business managers are socialized into a *dominant logic*-shaped by the attitudes, behaviors and assumptions that they learn in their business environments"(Prahalad & Ramaswamy 2004, 37). For decades, a goods-dominant logic has shaped thoughts and actions. In that logic, value is added in a linear value chain and exchanged with the customer in the end. In recent years, goods-dominant logic has been gradually replaced by service-dominant logic (Vargo & Lusch 2004) and the similar Nordic school view of service logic (Grönroos 2006). In that logic, rather than a category of offerings, service is seen as a perspective on value creation with goods as value-supporting resources and services as value-supporting processes (Grönroos 2006).

Apart from functional requirements, customers engage in service for more profound social, emotional and personal aspirations (Osterwalder et al. 2014). The Jobs-To-Be-Done framework can be applied to understand customers' processes. It builds on the understanding that "when customers find that they need to get a job done, they 'hire' products or services to do the job" (Christensen, Anthony, Berstell & Nitterhouse 2007, 38). Bettencourt, Lusch & Vargo (2014) propose a "service lens" (2014, 45) that combines the Jobs-To-Be-Done framework with service-dominant logic. With the service lens, companies support their customers in accomplishing their jobs and realizing their desired outcomes.

Resources possess capabilities that give them value potential, which is realized through service. Vargo and Lusch (2011) distinguish between operand and operant resources. Operant resources are knowledge and skills that produce effects while operand resources require additional operant resources for value creation. Data is a typical operand resource. It requires the application of knowledge and skills to become valuable. During service provision resources of a provider interact with resources of customers.

In an increasingly interconnected world, value is usually not created by a single provider (Vargo & Lusch 2011). In service science, value co-creation configurations are referred to as service systems. In order to innovate, service systems need to understand and match their own capabilities with needs of other service systems (Maglio & Spohrer 2008). Each actor must understand its role in the system as well as its overall configuration and revenue streams (Bettencourt et al. 2014).

According to service logic, value emerges in the customers' processes and cumulates over time. Only customers are able to realize and determine value. For these reasons, Vargo & Lusch (2004) introduce the concept of "value in use". Subsequently, they extend this concept to "value-in-context" to acknowledge the contextual nature of value creation (Vargo, Maglio & Akaka 2008). Value is contextual because customers have unique access to resources, may require different resources in different situations and have unique prior expectations (Bettencourt et al. 2014). With the service lens, value for customers depends on how well their jobs-to-be-done are accomplished. "Value-in-achievement" further extends the concept of value-in-use or value-in-context and moves the locus of value creation even further ahead in time (Bettencourt et al. 2014).

While Vargo & Lusch (2004) argue that when customers determine value in use, providers can only offer value propositions, Grönroos (2006) criticizes the concept of value proposition as influenced by goods-dominant logic. Within the service logic, providers are not restricted to proposing value; they are also able to influence value fulfillment. Thus, a value proposition for a service should be seen as presenting a potential value-in-use and then mobilizing the resources to facilitate value fulfillment.

Contemporary processes for business model innovation

In recent years, different approaches, methods and processes have been developed for business model innovation. With the Business Model Canvas, Osterwalder and Pigneur introduce a framework for business models that they define as "the rationale of how an organization creates, delivers, and captures value" (2010, 14). In nine building blocks, the canvas summarizes how companies intend to generate revenue.

While the Business Model Canvas is useful both for physical products as well as for services, it was developed based on a goods-dominant logic. This becomes apparent as the Business Model Canvas can be visualized in the form of a traditional linear value chain in which value is created by the provider at the left-hand side for customers at the right-hand side of the canvas (Lüftenegger 2014). In addition, co-creation is merely considered a category of customer relationship (Osterwalder & Pigneur 2010). In this structure, it is hard to map how customers and partners impact other parts of the business model (Lüftenegger 2014; Zolnowski, Semmann & Böhmann 2011). Ojasalo & Ojasalo (2015) have refined the Business Model Canvas to reflect service logic. In their Service Logic Business Model Canvas customers are considered in every building block. Trigger questions address both the providers' as well as the customers' point of view.

As an innovation process with a clear focus on the business model, Lean Startup has gained popularity among practitioners in recent years. In the first step of this process, the initial vision of the underlying business is documented in the Business Model Canvas or a slightly adapted Lean Canvas (Maurya 2012). Because this initial idea is solely based on assumptions, startups need a process for customer development along with product development (Ries 2011). First, in the (i) customer discovery phase, startups test if there is a market for the envisioned service. They identify customer segments and perceived value of the solution. Problem-Solution Fit occurs when a value proposition, at least in theory, addresses relevant jobs, pains and gains of customers. In the (ii) customer validation phase, startups experiment with different elements of their business model with the goal to find a repeatable model. Product-Market Fit is achieved when it can be demonstrated that customers are, in fact, willing to buy. Execution starts with (iii) customer creation. Once hypotheses are proven and the product is adequately polished, marketing is called in order to obtain a broad user base. Business Model Fit is achieved when the value proposition is embedded in a profitable and scalable business model. Ultimately, a startup makes the step to (iv) company building in which they transition to a company with functional departments.

For organizations acting under uncertainty, effectuation is a particularly useful decision model. "Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means" (Sarasvathy 2001, 245). Given means comprise physical resources ("Who is the firm?"), human resources ("What does the firm know?") and organizational resources ("Who does the firm know?") (Sarasvathy 2001; Bettencourt et al. 2014). Effectuation is distinct from Lean Startup in that it starts with resources rather than an initial idea. In this regard, both approaches complement each other since an initial vision can be developed through effectuation and then validated through Lean Startup processes. This combination allows companies to experiment with more ideas at a low level of investment.

Knowledge gap in data-driven business model innovation

In practice and in the literature, there are hardly any processes that can be specifically used for systematic design and development of business models leveraging data as a resource. In addition, existing processes are designed to validate and implement an initial vision of a

business model in the marketplace. For organizations however, the challenge is more in how to systematically envision new business models. Service Design generally starts with exploring the needs of users. However, as long as neither audience nor value proposition are defined, organizations are faced with the dilemma of how targeted user research can be initiated and carried out.

Following an effectual approach, possible effects can only be evaluated once "given means" are sufficiently understood (Bettencourt et al. 2014). In this context, "given means" are mainly partnerships and data to which an organization has access. For the most part, businesses and corporations are stuck in a dilemma: Employees and departments of a company who do have an overview of available data are usually not involved in the development of new business models. Conversely, those who are entrusted with the design and development of business models are rarely conscious of all the available data.

While there is no dedicated process for business model innovation, a questionnaire most often guides through the discussion (Zolnowski & Böhmann 2011). A visual representation such as the Business Model Canvas provides a framework of where to insert specific information (Osterwalder & Pigneur 2010). For the systematic development and documentation of partners and their relationships, established methods such as a Stakeholder Map can be applied. However, no established method could be identified from the literature or practice that helps understanding the available data.

The gap that the paper aims to fulfill is twofold: Firstly, the Data Canvas is introduced as a method to systematically collect and document available data. Thus, it provides an understanding of its potential value-in-use for all actors in a service system. The Data Canvas complements existing methods that are orchestrated for the development of business models using the process of Osterwalder et al. (2014). Secondly, Data-Need Fit is introduced as a process to match available data with user needs. Data-Need Fit triggers the established process of business model innovation.

Methodology

The development and evaluation of the Data Canvas and Data-Need Fit followed a design oriented research methodology called Design Science Research (DSR) – creating things that serve human purposes and assessing them against criteria of value or utility (March & Smith 1995). The two basic iterative activities in any design science research are the building and evaluating of a "design artifact" – in our research the Data Canvas and Data-Need Fit. Following the design science methodology, we (i) elicited requirements to ensure real-world relevance for the method and the process; (ii) grounded the development of the artifacts with the help of methods, namely a participative approach including various workshops, and (iii) evaluated the artifacts within a real-world project setting applying mostly qualitative methods.

Because the artifact is aimed to be generally applicable, three experts were interviewed and literature was reviewed in order to understand current processes and obstacles beyond the underlying case project. Due to the lack of a structured approach for the understanding of data sources, the Data Canvas was developed in a collaborative workshop setting carried out with five participants from varying business and technology backgrounds. Participants were two senior data analysts with backgrounds in information technology and statistics, two doctoral candidates in Information Systems with business backgrounds and one of the

authors who facilitated the workshop and introduced prior considerations on an equal level with other contributions.

First, dimensions to describe data sources in order to explore their potential for new services were collected in a silent brainwriting session and then grouped into clusters. This resulted in seven clusters with a total of 35 attributes identified. In a second step, participants each sketched three rough conceptions for a visual representation of those dimensions and then build upon the ideas of others. At the end of the exercise, participants chose their favorite representation from 75 rough ideas presented on the wall through dot voting. The favored conception was further refined by collecting ideas for a visual representation of each cluster. Subsequent to the workshop, the Data Canvas prototype was finalized and applied twice. Before applied and evaluated in a case project it was tested and further improved during an Open Data Hackathon. The prototype was further developed based on discussions at events such as OpenUp Camp Nuremberg, an unconference for innovation, technology, and business.

Results

As a result, this paper introduces a method and a process for data-driven business model innovation. The Data Canvas helps to establish a common understanding of available data in organizations. Subsequently, Data-Need Fit triggers the established process of business model innovation.

Data Canvas

Figure 1 displays the Data Canvas, which is structured along two dimensions: (i) the *origin* and (ii) the *refresh rate* of the data. *Internal data* is the property of the organization while *external data* is supplied by partners or other external sources. *Rotational data* is – depending on the context – data that is updated in certain intervals, e.g., yearly. In contrast *continuous data* is available on at least a daily basis or in real-time.

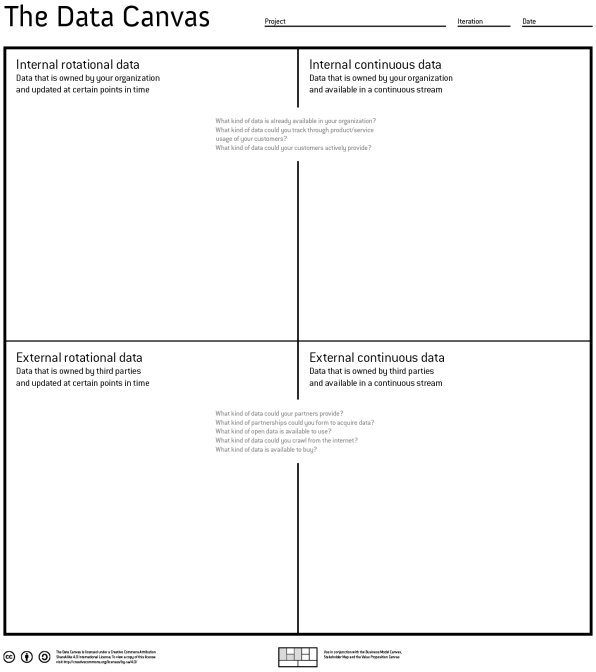

Figure 1. The dimensions of the Data Canvas

These two dimensions were chosen because initially, two factors are crucial for the development of innovative and sustainable business models leveraging data: (i) permanent access to relevant data and (ii) potential for continuous monetization of available data. In principal, continuous internal data is regarded as having the greatest potential for the development of sustainable business models. Companies have full control over the data and a continuous stream of high-frequently retrieved data permits regular monetization. For external data in contrast, it is possible that data is no longer provided or available (e.g., because of changed terms of use in technical interfaces). In addition, competitors usually have access to the same external data and hence could easily copy or improve an existing business model. Thus, we argue that external data has the least potential for business model innovation.

To simplify the use of the Data Canvas for all participants, we suggest utilizing sticky notes. Each sticky note represents a data source that is clearly identified and outlined by its specific thematic and contextual information. If sticky notes in different shapes and colors are available, then these can visualize other data attributes. For example, rectangular sticky notes could be utilized to represent structured data sources and round ones in contrast to represent unstructured data. Green sticky notes could be used to display trusted data sources, such as administrative data. Yellow or red sticky notes could be applied to represent less trustworthy data sources, such as data from social media platforms. Depending on the context, other relevant attributes of data sources could be indicated in the corners of the sticky notes with a legend provided in the right-hand side of the canvas (see Figure 2). One example would be indicating that the use of the underlying data source is associated with an expense.

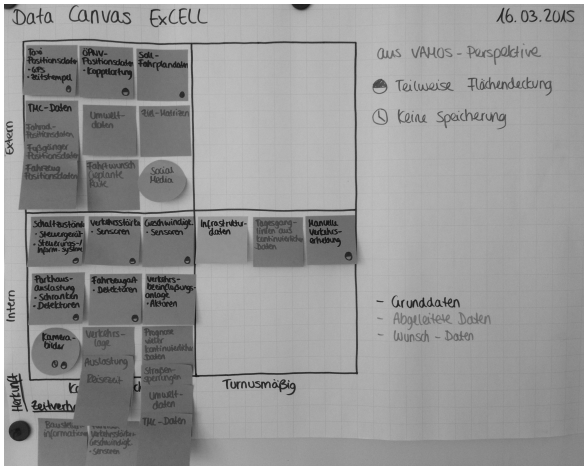

Figure 2. Exemplary Data Canvas.

Completing a Data Canvas ideally in a workshop setting with participants from different departments and diverse expertise reveals potential strengths and weaknesses of data sources available to organizations. It clarifies thematic and contextual priorities as well as limitations on applicability and availability of data. The Data Canvas is not a static document and it should be continuously adapted as data sources change.

Data-Need Fit

Data is a valuable resource in value creation whenever it can be used to help customers achieve their goals. A fit between available data and user needs is vital for a compelling value proposition. From the perspective of data-driven business model innovation, it can therefore be argued that there is a need for another stage before realizing a Problem-Solution Fit. A Data-Need Fit occurs when one or more available data sources have been identified that

have the potential to support relevant customer tasks, alleviate problems, or create benefits for the user.

Once organizations sufficiently understand their available means, they are ready to initiate and carry out targeted user research. For instance, a Stakeholder Map can be used to understand the configuration of service systems and to narrow down actors who are most likely to benefit from available data. Use of a Data Canvas is able to inform user research in terms of a relevant study context. Fields for which particularly high-quality data or multiple data sources are available are worth to explore first.

Depending on the context, different user research methods can be applied, such as contextual interviews, shadowing or cultural probes (Stickdorn & Schneider 2010). The Jobs-To-Be-Done framework represents a useful unit of analysis because customers are able to verbalize what kind of support they would require in order to accomplish their jobs more satisfactorily. Furthermore, Ulwick & Bettencourt (2008) stress that the method is secondary and that any interaction with customers is useful as long as providers are clear about their goals.

Subsequent to user research, patterns can be identified to segment users for example based on the jobs they are trying to accomplish, use context, current barriers, access to resources, and personal attitudes such as desire for control (Bettencourt et al. 2014). Bettencourt et al. point out that in value co-creation "*customer choice* becomes critical to success" (2014, 54). Rather than addressing a mass market, organizations need to find customer segments that are both willing and able to co-create.

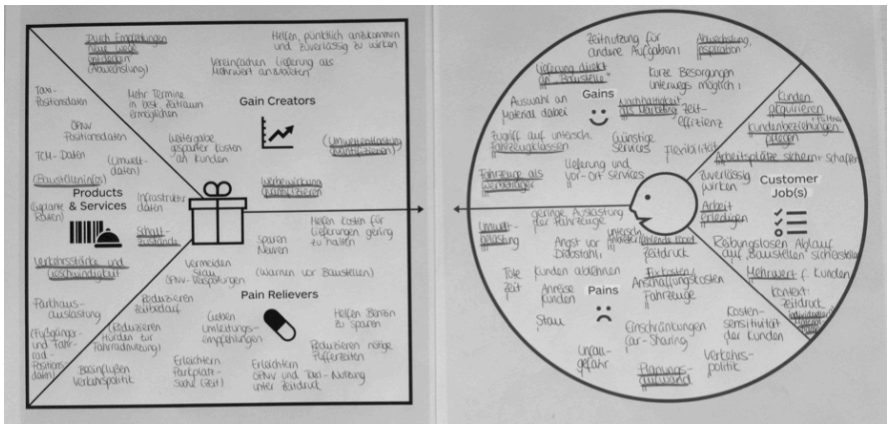

Figure 3. Exemplary Value Proposition Canvas.

The Value Proposition Canvas shown in Figure 3 can be utilized to identify a Data-Need Fit on the basis of a completed Data Canvas and insights collected through user research. For each user segment, the results of the user research are placed in the right-hand part of the Value Proposition Canvas – the Customer Profile – in the form of jobs, pains and gains. Subsequently, the left part of the Value Proposition Canvas – the Value Map – must be completed. In this step, data sources identified in the Data Canvas are considered in place of products and service. In the value map it is shown how data sources create benefits or contribute to easing pain points for each user segment. A Data-Need Fit is found when data sources contribute gain creators and pain relievers that users find valuable.

From Data-Need Fit to a sustainable service provision

A Data-Need Fit is a vital condition for designing a compelling value proposition. The Value Proposition is at the core of a business model and defines the products or services that

create value for a customer segment (Osterwalder et al. 2014). In this case, it describes how data is embedded into an offering that facilitates value creation for users. A second Value Map within the Value Proposition Canvas can be used to describe the service to be developed. If the Value Map, on the basis of results from user research, provides solutions for relevant user problems and creates benefits, then a Problem-Solution Fit has been found. Other elements of the Business Model Canvas such as customer relationship and channels result partly from the value proposition; others such as the pricing model may be experimented with.

Since the Business Model Canvas is initially based on assumptions, early feedback from users is required to learn which of the assumptions hold true. Established processes, such as Lean Startup, offer a systematic approach for validated learning. Through interactions of users with a Minimum Viable Product (MVP), "that version of the product that enables a full turn of the Build-Measure-Learn loop with a minimum amount of effort" (Ries 2011, 77), organizations gain qualitative and quantitative feedback. Failing early allows experimenting with different options. This increases the chance to find a viable business model before running out of resources. Figure 4 visualizes how the Data Canvas and Data-Need Fit are anchored within the established process of business model innovation.

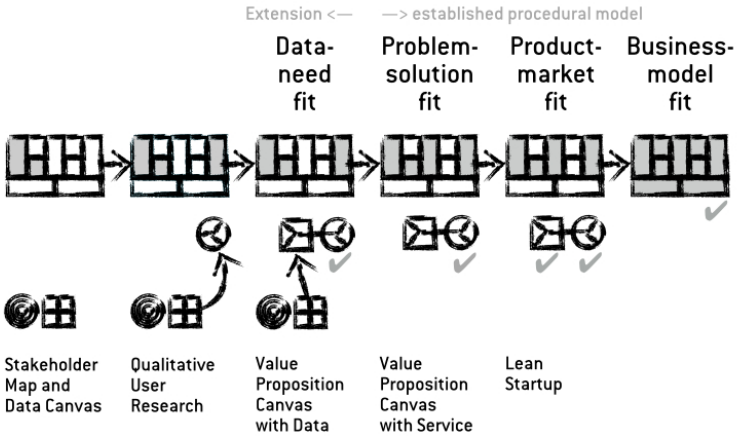

Figure 4. Data Canvas and Data-Need Fit add to the established process (adapted from Osterwalder et al. 2014).

In cases in which service providers directly interact with customers, they are able to influence value fulfillment beyond value propositions (Grönroos & Gummerus 2014). For the purpose of understanding which actions are required from the provider in order to efficiently support the customer journey, Service Design provides useful methods such as service blueprints. These methods should be applied along the business model innovation process so that organizations understand what is required of them and are consequently able to keep promises made by value propositions.

Conclusion and discussion

This paper proposes a structured yet flexible approach to considering data as a resource in business model innovation. Both a method and a process are introduced. Data Canvas and Data-Need Fit are intended to spark a discussion on available data in organizations among diverse stakeholders. The Data Canvas provides trigger questions and a visual representation that help to develop a common understanding of available data. This allows assessing the potential value-in-use of data as well as risks involved in using the data for the development

of business models. Furthermore, gained understanding of available means facilitates targeted user research. Insights from user research subsequently serve as a basis for identifying a Data-Need Fit, the identification of Jobs-To-Be-Done that are relevant for users and that can be supported with data available to the organization. The Data-Need Fit adds prior steps to the established process of Osterwalder et al. (2014). A fit between data and user needs ensures a value proposition that is relevant to target users.

In the case project ExCELL, applying the described process has proven to be efficient. The structured approach of the Data Canvas allowed getting an extensive overview of available data in a limited timeframe. Available data narrowed the scope for user research in terms of target group and topic. Pilot user research has revealed opportunities that may be tackled with the available data. Subsequently, these will serve as a starting point for designing a compelling value proposition embedded into a viable business model.

The Data Canvas has shown to work best with diverse data sources. When data sources are similar in terms of the chosen dimensions, it produces limited insight. With the vast amount of external data sources available to buy or to use for free, it is vital to define criteria beforehand to limit the scope. Desk research may be required to uncover relevant data sources. Even with data sources identified, the difficulty remains to envision what information can be generated from that data. Multi-disciplinary teams are needed to thoroughly discuss data from different perspectives.

Developed and applied in a single project, future research will be necessary to test both the method and the process in more projects and different contexts. Furthermore, it remains to be proven that the two conceptual artifacts have the potential to provide a common language that bridges the existing gap between a technology and a business perspective.

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