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Research Paper

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Abstract

Sharing Economy businesses have become very popular recently but there is little guidance available on how to develop the respective business models. We faced this problem during a consortium research project for developing a service for electric vehicle charging that adopts the paradigm of Peer-to-Peer Sharing and Collaborative Consumption (P2P SCC)—a specific branch of the Sharing Economy. We use Action Design Research (ADR) to develop an adapted version of the Business Model Canvas that is specifically tailored to the needs of P2P SCC business model development. The adapted canvas is then applied to develop a business model for the proposed service. The learnings from the development process are formalized into a set of generally applicable guidelines for the development of P2P SCC business models. The resulting guidelines and the adapted canvas provide guidance for both researchers and practitioners who want to either develop new or analyze existing P2P SCC business models.

Keywords: Business Models, Business Model Canvas, Sharing Economy, Peer-to-Peer Sharing and Collaborative Consumption, Action Design Research

1 Introduction

The Sharing Economy has become ubiquitous in our daily lives. Not only in media coverage on legal disputes and enraged taxi drivers who protest against Uber's latest market entry, but especially on its growing market share: Suddenly, we find ourselves in a world where the largest provider for accommodation does not own a single room and the largest taxi provider does not own a single car (McRae, 2015). Originally describing the communication between two or more computers (Gassmann et al., 2014), technological development like the Internet, personal computers, and smartphones enabled peer-to-peer to become the underlying concept of a plethora of services that enable shared access to almost all thinkable resources, ranging from power tools and 3D-printers (*3dhubs.com*) to private jets (*Sharejetexchange.com*), and even pets (*borrowmydoggy.com*).

We summarize these concepts under the term of Peer-to-Peer Sharing and Collaborative Consumption (P2P SCC). While we see new P2P SCC services being introduced to the market every day, many of them are not made to last and leave the market as quick as they appeared in the first place.

Developing a new P2P SCC service, a proper development and evaluation of the service's business model is crucial for future market success. Business model research has received much attention lately, especially in the field of information systems (Fichman et al., 2014; Veit et al., 2014). Amongst the many frameworks and tools available to support the process of describing, developing, and evaluating a business model, the Business Model Canvas (BMC) by Osterwalder and Pigneur (2010) is very popular. One factor for the BMC's popularity and success lies in its simplicity and its universal applicability to almost all types of business models. When it comes to very specific business models, this advantage may soon become a disadvantage, as important factors cannot be adequately described using the traditional BMC. We find that this is potentially the case for the archetype of P2P SCC business models.

We gained first-hand experience of this issue during the development process of *CrowdStrom*—a novel P2P SCC service for electric vehicle charging infrastructure. At an early point of the development process, team members comprising researchers and practitioners from the consortium research project met in a series of workshops to develop the service's business model. While applying the BMC to describe the business model, we faced several challenges matching the workshops' results regarding the proposed business model to the BMC. The challenges mainly referred to the different customer roles in P2P SCC— the peer-provider and the peer-consumer and the resulting implications for the whole business model. Recognizing special characteristics of P2P SCC business models, we set out to identify aspects that have to be considered when developing a P2P SCC business model. We will thus answer the following research questions:

1. *What are the key dimensions and characteristics of a P2P SCC business model?*
2. *How can the analysis and the design of P2P SCC business models be supported?*

We use the Action Design Research (ADR) method (Sein et al., 2011) that combines the strengths of Design Science Research (DSR) (Hevner et al., 2004) and Action Research (AR) (Susman et al., 1978) to generate design knowledge by building and evaluating information technology (IT) artifacts in an organizational setting (Sein et al., 2011). ADR comprises four stages of *Problem Formulation (1)*, *Building, Intervention, and Evaluation (2)*, *Reflection and Learning (3)*, and *Formalization of Learning (4)* (Sein et al., 2011) which are applied as follows. After having identified the ill fit of P2P SCC business models to traditional tools for business model development (*1: Problem Formulation*), we identified dimensions and corresponding characteristics of P2P SCC services and used them in a series of iterative workshops to derive an adapted version of the BMC specifically designed for the application within the domain of P2P SCC. This adapted version was consequently used to develop the business model for CrowdStrom (*2: Building, Intervention, and Evaluation*). Results from stages 1 and 2 were continuously reflected and led to the extension of the knowledge base (*3: Reflection and Learning*). From the characteristics of P2P SCC as well as project specific learnings from the adapted canvas and its subsequent application to CrowdStrom, we derived a set of guidelines for developing P2P SCC business models as a formalized learning that can be applied to a broader class of problems (*4: Formalization of Learning*) (Sein et al., 2011).

We contribute to research on business models and P2P SCC in presenting the guidelines for the development of P2P SCC. Our contribution to practice lies in the adapted BMC that is easily applicable to any business entity that aims at developing or analyzing P2P SCC business models.

2 Research Background

2.1 Peer-to-Peer Sharing and Collaborative Consumption

In the last decade, the term "Sharing Economy" has gained popularity and has been used to refer to various phenomena. Most businesses that claim their belonging to the Sharing Economy have in common that they enable others access or utilization of an asset. Concrete instantiations are however based on different economic transactions such as "true sharing" (Belk, 2014a), swapping, renting, reselling,

co-owning, lending, or donating (Owyang et al., 2013). While the concept of sharing assets with others has been customary in families or communities for a very long time, the advent of modern IT and information systems (ISs) introduced a new era for sharing and thus the rise of the Sharing Economy (Codagnone and Martens, 2016; Gassmann et al., 2014). The ability to offer an asset via Internet-enabled marketplaces opened up an unprecedentedly great audience and also lead to a sharp decrease in transaction costs (e.g., for information gathering and coordinating the transaction).

Today, the Sharing Economy has grown into a ubiquitous phenomenon and has entered (and sometimes disrupted) many markets like transportation (e.g., Uber), accommodation (e.g., Airbnb), lending (e.g., Lending Club), labor mediation (e.g., TaskRabbit), goods (e.g., sharetribe), and services (e.g., 3D Hubs). Sharing Economy is a relatively young phenomenon and there is a multitude of terms used to describe it or its sub-phenomena, with many of them often used interchangeably and inconsistently (Codagnone and Martens, 2016). Some examples are "collaborative consumption" (Botsman, 2013; Botsman and Rogers, 2010), "access-based consumption" (Bardhi and Eckhardt, 2012; Belk, 2014a), or "the mesh" (Gansky, 2010). An important distinction is whether the transaction results in a permanent transfer of ownership or is just of temporary nature. The focus on transactions that exclude the transfer of ownership and focus on temporary access instead is identified in the literature as a general trend (Bardhi and Eckhardt, 2012; Frenken et al., 2015) and helps differentiating P2P SCC transactions from traditional business transactions like selling or reselling.

The second important distinctive feature is whether the transaction is unilateral or includes some kind of compensation, which is typically monetary. Belk (2014a,b) differentiates "true sharing" that does not involve any reciprocity from "pseudo-sharing" which represents short-term rental activities or a business relationship that makes use of the sharing vocabulary. According to Botsman and Rogers (2010, p.17) "collaborative consumption" can be seen as "traditional sharing, bartering, lending, trading, renting, gifting, and swapping, redefined through technology and peer communities". This also highlights another important aspect—the participation of private individuals (i.e., peers) at both ends of the transaction, which is facilitated by an intermediary. Another categorization by OECD (2015) differentiates Peer-to-Peer (P2P) selling, P2P sharing, and crowdsourcing.

The focus of our research lays on Peer-to-Peer Sharing and Collaborative Consumption that represent a subset of the Sharing Economy. More specifically, P2P SCC transactions do not involve the transfer of ownership and thus exclude sale, swapping, or exchange. They can be further differentiated into sharing (without compensation) and collaborative consumption (with compensation). Hence, P2P SCC can be defined using the following characteristics (Von Hoffen et al., 2015): *a)* an economic transaction between individuals, *b)* that does not involve ownership transfer, *c)* vary on the scale between sharing and commerce, *d)* that is enabled by IT, and *e)* requires a physical object that is owned by a peer-provider who grants access to it.

Figure 1 shows a *morphological box* that provides a structured view on the different economic transactions that can be performed on the IT-enabled marketplaces. Furthermore, it depicts possible P2P SCC transactions and thus represents the scope of this paper. In a P2P SCC transaction, no permanent transfer of ownership takes place, but the type of relationship between the participants of an economic transaction can be either qualitative (*Sharing*) or quantitative (*Collaborative Consumption*). Additionally, a physical resource is involved and required in the transaction. In Figure 1, manifestations that are not considered to belong to the class of P2P SCC are included to show the complete spectrum but are greyed out (i.e., where *resource owner* takes value of "only business" or where *resource* is "intangible")[1].

2.2 Business Models

Business models are a highly researched topic that has become increasingly relevant in business and management in general (Wirtz et al., 2016; Zott et al., 2011) as well as in information systems (Fichman

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[1] To avoid the redundant description of the dimensions within the morphological box, we included the description of the remaining dimensions into the Table 1
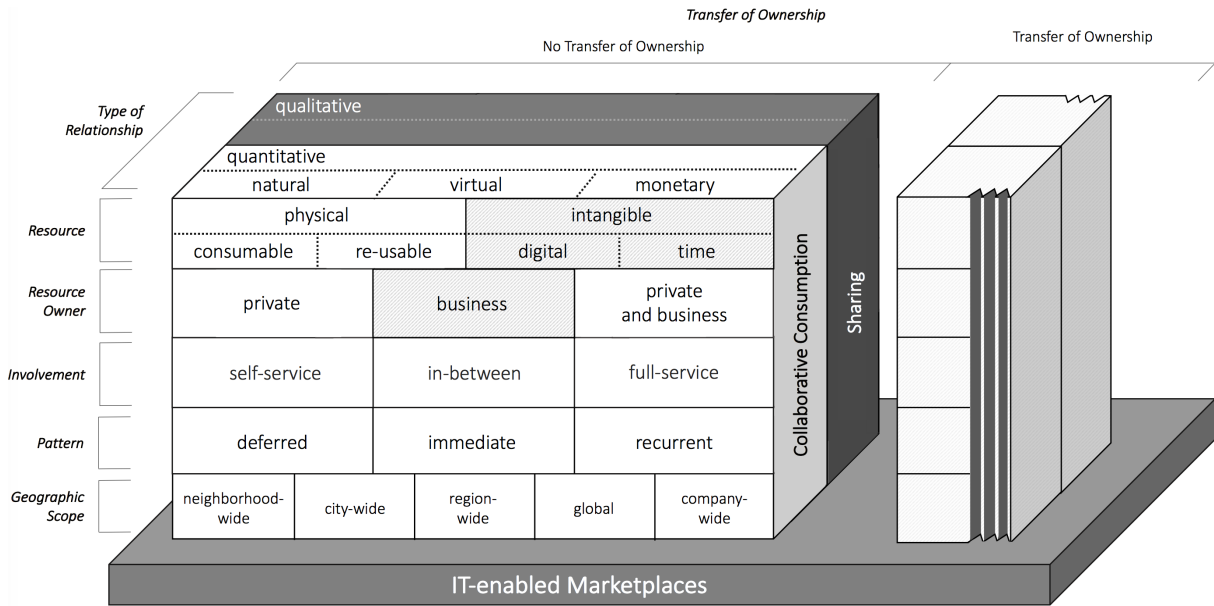
Figure 1.   *Representation of Different Economic Transactions Performed Through IT-enabled Marketplaces*

et al., 2014; Veit et al., 2014). Especially the emergence of new technologies is identified as a driver for the development of new or the transformation of traditional business models (Pateli and Giaglis, 2004; Teece, 2010). The business model concept is not only a management tool for analyzing current business logic and planning strategic decisions, but also valuable for communicating a business's idea to investors (Burkhart et al., 2011).

The literature offers a plethora of definitions of the term business model and while none of them is generally accepted, most have the creation of (customer) value at their core (Fielt, 2013). Chesbrough (2006, p.108) states that a business model performs two important functions: value creation and value capture. We use the definition provided by Osterwalder and Pigneur (2010, p.14), according to which "a business model describes the rationale of how an organization creates, delivers, and captures value".

To better understand, analyze and develop a business model, it is necessary to understand the compositional elements describing what a business model is made-off. There are many frameworks for describing a business model such as the *BMC* (Osterwalder and Pigneur, 2010), the *Four Box Business Model* (Johnson et al., 2006), the *STOF model* (Bouwman et al., 2008), or *Business Model Schematics* (Weill and Vitale, 2001). The BMC is probably the most widely accepted and established framework that can be used for describing, discussing, and designing business models. It supports innovative design techniques and tools like customer insights, ideation, visual thinking, prototyping, or storytelling (Osterwalder and Pigneur, 2010). Moreover, the BMC has a solid foundation in the *Business Model Ontology* (Osterwalder, 2004), which synthesizes most of the other business model frameworks and elements at that time (e.g., Afuah and Tucci, 2000; Hamel, 2002; Magretta, 2002). The BMC (Osterwalder and Pigneur, 2010) consists of nine elements, which are represented in a visual template: (1) an organization serves one or several *Customer Segments*, (2) it seeks to solve customer problems and satisfy customer needs with *Value Propositions*, (3) *Value Propositions* are delivered to customers through communication, distribution, and sales channels, (4) *Customer Relationships* are established and maintained with each *Customer Segment*, (5) *Revenue Streams* result from *Value Propositions* successfully offered to *Customer Segments*, (6) *Key Resources* are the assets required to offer and deliver the previously described elements, (7) by performing a number of *Key Activities*, (8) some activities are outsourced and some resources are acquired outside the enterprise via *Key Partnerships*, and (9) the business model elements result in the *Cost Structure*.

Specific types of business models, such as peer-to-peer sharing, have received considerable attention in past business model research. Business model archetypes have been discussed individually or collectively as part of a classification (e.g., Gassmann et al., 2014; Johnson, 2010).

Early research focuses on peer-to-peer file sharing as the first instances of IT-enabled peer-to-peer sharing (Hughes et al., 2008; Krishnan et al., 2006; Kwok et al., 2002). With the rise of typical Sharing Economy business models, the focus of the research shifted towards specific archetypes of Sharing Economy business models like virtual communities (Lechner and Hummel, 2002), shared mobility (Cohen and Kietzmann, 2014), sustainability (Bocken et al., 2014), or trade between two enterprises (Cho et al., 2014). Sometimes classifications make use of business model frameworks to systematically describe each business model archetype, as abstract presentation or exemplary instantiation, with the help of the business model framework, for example, Osterwalder and Pigneur (2010) use the BMC template to describe the multi-sided platform business model with Google as example. What is missing in research on Sharing Economy business models is a holistic approach to the topic that describes business models from the Sharing Economy or more specifically P2P SCC and offers guidance to researchers and practitioners alike in designing and developing such business models. Putting it in the words of Cohen and Kietzmann (2014, p.294), "there is a dearth of research of how sharing economy business models work, what their sustainability impacts are, and how they are able to align incentives with key stakeholders to ensure longevity of their operations".

A Sharing Economy platform can be seen as a *two-sided market* or *two-sided network* as a platform connecting two groups of users that form supply and demand for a certain product or service (Eisenmann et al., 2006). Although there is vast literature also covering specific aspects of these business models (Eisenmann et al., 2006; Keskin and Kennedy, 2015; Rochet and Tirole, 2003; Rysman, 2009), there is no general overview on how to develop a business model, especially not one that considers the special characteristics of P2P SCC.

3 Building, Intervention, and Evaluation

Analogously to the joint research project's composition, the ADR team consisted of researchers from several departments (Information Systems, Marketing, and Business Administration) and practitioners from the industry partners. The IS researchers also take the roles of designers of the business model as well as developers of the underlying IT solution. After the initial problem had been identified, we searched the literature as well as the organizational experience from the industry partners for existing solutions to our problem. We considered other theories (e.g., on two sided markets), but always came back to the BMC due to its general applicability, its ease of use, and its familiarity with the industry partners. We then decided to alter the BMC so that it would fit to our problem and subsequently followed the stages of ADR to develop the adapted BMC for P2P SCC.

The adapted canvas was developed during workshops in several iterations, where problems and potential improvements were discussed with the ADR team. Based on these grounds, possible design alterations were discussed and a temporary version concluded for each workshop. The temporary version of the canvas would then be more extensively tested by the practitioners whose feedback on the temporary canvas' would then be the basis for a subsequent workshop. Figure 2 shows the stages of ADR that were performed and their respective outcomes. In the following, we present the process and outcomes of the stage of *Building, Intervention, and Evaluation*.

3.1 Dimensions of P2P SCC Business Models

Whereas the morphological box in Figure 1 is intended to provide an overview of different forms of economic transactions taking place in the Sharing Economy, the following Table 1 summarizes and describes individual dimensions of P2P SCC business models. This set of dimensions is derived from the extant literature and is partially adapted and extended to improve the fit to P2P SCC. Moreover,
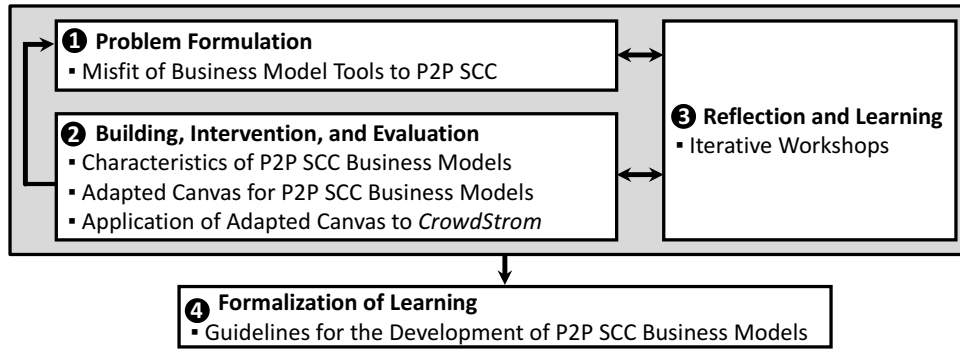
Figure 2.   *ADR Process and Outcomes*

the findings from a comprehensive survey on 517 P2P SCC platforms are taken into account. These platforms were sieved out from a large compilation of Internet-enabled platforms that were listed as Sharing Economy platforms on the two popular Sharing Economy repositories *mesh*[2] and *collborative consumption*[3]. During the sieving process, all platforms were discarded that do not comply with the previously mentioned definition of P2P SCC. After a thorough inspection of the resulting set of platforms, additional and complementing dimensions were identified. Subsequently, these dimensions were combined with the characteristics found in the literature. The resulting dimensions and corresponding characteristics have been evaluated by using them to describe and classify the total of 517 P2P SCC platforms.

Dimension	Description
Resource Type	According to the stated definition of P2P SCC, the resource that is subject to a transaction corresponds to a physical resource that can be either consumable (e.g., something to eat) or reusable (e.g., a car or bicycle). Intangible resources hint at services that do not belong to the class of P2P SCC and can be either digital (e.g., mp3 files) or one's spare time during which a person is willing to do complete someone else's task, comprising all services that to not require a physical resource (e.g., baby-sitting).
Sharing Pattern	Andersson et al. (2013) name the sharing pattern, comprising of the longitude of the planning horizon and the uniqueness of the sharing instance, distinguishing deferred, recurrent, and immediate. Deferred P2P SCC services require an individual planning and longer planning horizon for a unique sharing instance (e.g., ridesharing for longer trips). The pattern recurrent refers to a one-time planning horizon that enables the repeated occurrence of the sharing (e.g., a series of rideshares). The pattern immediate refers to a short planning horizon for every sharing instance (e.g., on-demand ridesharing).
Platform Role	The dimension of platform role describes how the platform facilitates the transaction by bringing together supply (peer-provider) and demand (peer-user) for the shared resource. Hafermalz et al. (2016) propose to differentiate the following three ways a platform can support the sharing activity: As a meeting space, where the platform enables the communication between members and leaves it to them to find a suiting partner for a transaction (e.g., Couchsurfing). On a market place, the platform acts as an intermediary that enables the transactions between peer-provider and peer-user (e.g., Airbnb). When the platform takes the role of a matchmaker, it actively connects supply and demand according to specified criteria (e.g., Uber).
Consumer Involvement	The customer's involvement in the consumption experience can vary (Bardhi and Eckhardt, 2012). The consumer can either have no or limited involvement and receive a full-service, or be actively involved in a self-service like a self-storage.
Money Flow	Payment for the transaction—if involved—is described by the dimension money flow. The payment can either be performed directly between peer-user and peer-provider as a C2C transaction or facilitated via the platform or a service provider attached to the platform as C2B2C. If the platform is operated for profit that is generated by charging either peer-provider or peer-user, it will usually facilitate the payment to easily retain the charged fees per transaction.

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[2] Homepage *mesh*: `http://meshing.it/` (accessed: 2017-04-21)

[3] Homepage *Collaborative Consumption*: `http://www.collaborativeconsumption.com/` (accessed: 2017-04-21)

Sustainability	Sustainability is a very important component of P2P SCC services and is usually distinguished into three categories, namely *environmental*, *economical*, and *social* (Kuhlman and Farrington, 2010). These categories are adopted and used by the platform providers to promote their business. By sharing a resource with others, its utilization is increased, theoretically resulting in less resources being required overall and thus increased environmental and economic sustainability. This is related to a phenomenon often named when talking about the rise of the Sharing Economy: the consumers' shift in mentality away from ownership towards pure utility, e.g., using a car sharing service instead of buying a car. Even though, the theoretical argument of an increased environmental sustainability is doubtful as it may also lead to a higher consumption in total (Verboven and Vanherck, 2016), it is still used for marketing to attract customers (Bardhi and Eckhardt, 2012). Economic sustainability meaning lower prices or higher earnings for platform users is arguably the main motivation for customers. Many platforms also advertise with the community aspect (e.g., to "feel at home everywhere" (Airbnb, 2016a) instead of the anonymity of a hotel), thus addressing their social sustainability.
Resource Owner	The owner of a resource can either be *private*, *business* or *both*. This dimension represents one of the core issues in the current discussion on legal and social problems of P2P SCC services. Many platforms claim to be facilitating the transaction only between private individuals, but drawn from the market success, the boundaries between private and business have become blurred. Private individuals become more and more business-like, e.g., working full-time, paying taxes, and sometimes even employing other people (as seen with Uber drivers). The other observation is that real businesses have discovered the P2P SCC platforms as channel to attract new customers and are increasingly offering their services on the platform as a peer-provider (e.g., a hotel offering their rooms on Airbnb).
Trust	The platform's contribution to trust is a crucial part of P2P SCC platforms in order to facilitate a transaction between two strangers. Trust can be provided directly through or enabled by the platform. Offering value-added services like the provision of an insurance or guarantees, checking the users for certain quality criteria (e.g., peer-provider's cars have to fulfill certain requirements to be eligible for participation in Uber (Uber, 2016)), or facilitating the payment are means for the intermediary to provide trust through the platform. Another possibility is to provide certain tools on the platform which enable the community itself to contribute to trust. Trust on P2P SCC platforms can be generated in three forms that go beyond the common trust in a corporate service provider. These new forms of trust can provide a strong counterpart to established forms of trust in traditional B2C models. *Trust the majority* tools provide transparent insights into the judgements of the majority as one form of trust. Models involve users and are based on their expression of preferences, e.g., by users rating (Keymolen, 2013), vouching for (Lauterbach et al., 2009) or referring each other (Jøsang et al., 2007). *Trust known users* refers to the assumption that users rather trade with known (trusted) stakeholders (e.g., rather rent out their apartment to a friend or a friend of a friend). This is why platforms like Airbnb incentivize the public display of Facebook friends or at least the number of connections (Airbnb, 2016b). Depending on the resource sought after, the trusted pool of "friends" might not be able to provide the required service. In such cases, the concept of *trust users like me* can be used to derive trust by finding an alter ego. These means are not exclusive, but can be combined to establish a higher level of trust. The necessary level of trust highly depends on the type of resource being shared and what possible risks peer-users and peer-providers perceive by sharing the resource.
Market Mediation	If and how P2P SCC platforms are operated for profit is described in market mediation (Bardhi and Eckhardt, 2012). Further differentiating the for profit manifestation, platforms can generate profit indirect through advertisement or customer data or direct by charging the peer-users, the peer-providers, or both. The manifestation of the market mediation is strongly correlated with the type of relationship between peer-provider and peer-user: the only way for platforms facilitating a qualitative relationship (i.e., sharing) to make profit is to charge the user or provider a fee for accessing the platform, since the transactions itself do not include any compensation. Platforms facilitating a quantitative relationship however can make use of all available means to generate profit, especially by charging the peer-provider as well as the peer-consumer a small part of each transaction's value.

Table 1.   *Dimensions of P2P SCC Business Models*

3.2 Adapted Canvas for P2P SCC

In a series of workshops, the ADR team applied changes to the original BMC and evaluated the changes by applying it to CrowdStrom. We present the final outcome of the adapted BMC for the development and description of P2P SCC services. We describe the changes made to the original BMC resulting in the adapted canvas and its impact for the business model as a whole. We distinguish between changes made *of* the canvas and *in* the canvas. Changes of the canvas comprise of changes to the structure, where single elements have been added, edited, or removed. Changes in the canvas are changes related to the content of a single element, where instructions, information, or possible tools and methods are added.

A challenge during the development process of the adapted canvas was to include all relevant changes for P2P SCC, while keeping as much of the structure of the original canvas as possible. As the arrangement of the elements in the original BMC has important implications for the content and application, we tried to assume as many of these arrangements as possible. For any user knowing the original BMC, the adapted BMC will seem familiar in many aspects, which will be helpful when using it for the first time. Two major changes were made in the adapted BMC: First, the differentiation of peer-provider and peer-user with regard to the value propositions and the respective channels and relationships through which this value proposition is realized. Second, the peer-provider has its own small version of the BMC that underlines his need for an own, viable business model. The adapted BMC for P2P SCC is shown in Figure 3.

The elements of *Key Partners*, *Key Activities*, *Key Resources*, *Cost Structure*, and *Revenue Streams* remain unchanged from the original BMC. Regarding changes *in* the canvas, two elements are affected: In *Key Resources*, a special focus is on the IT platform, as it enables the transactions in the first place and takes the central role in connecting or even matching supply and demand. The *Revenue Streams* highly depend on if and how the intermediary plans to generate profit. Revenue can be generated directly from the user and/or provider or indirectly from third parties. The way the intermediary generates his revenue directly influences the revenue and thus possible profits of the peer-provider. Splitting up the *Value Propositions* of the intermediary into one for the peer-provider and one for the peer-user with the respective *relationships* and *channels* is one major adjustment that was made. It enables the intermediary to consider the different goals and needs of the two customer groups. The individual value propositions for the *Provider Segment* and *User Segment* are communicated via the respective *relationships* and *channels*, where the IT platform, again, plays a central role. *User Segment* describes the user, whose role and involvement typically does not differ much from the user in traditional B2C relationships. The *Provider Segment* describes the peer-provider and his role and involvement in the overall business model. It is important to consider the peer-provider's own business model and its viability to safeguard his participation. The peer-provider usually faces costs for providing the access to the shared resource (*Cost Structure*), and, depending on the type of relationship, he also has *Revenue Streams*.

The peer-provider's business model includes his own *Value Propositions* towards the peer-user that is communicated and facilitated via own *Channels* in the *Provider-User Relationships*. A central part of the provider's value proposition is the *Core Resource*, which is the physical resource that peer-provider grants access to (e.g., a room or a whole apartment for Airbnb or a car for Uber). The sharing of the resource is enabled by *Complementary Activities* and *Complementary Resources*. One may argue, the peer-provider's value proposition to the peer-user is already covered by the value propositions of the intermediary to user segments. It is however important to explicitly include peer-provider's value proposition into its business model, as it forces the intermediary to better understand and thus address the peer-provider's goals and needs. Once the provider-user relationship is established, the peer-provider may also try to further expand it outside of the platform with the same or additional resources (e.g., an Uber driver giving the passenger his business card for transportation services or offering extra services like snacks or beverages on board). This conduct has to be considered and may or may not be tolerated by the intermediary.

3.3 Application of Adapted Canvas to CrowdStrom

The motivation in the CrowdStrom project stems from the current lack of a widespread, publicly accessibly charging infrastructure for electric vehicles (EVs) which is, next to immature battery technology, seen as one of the main reasons why sales of EVs remain sluggish in spite of diverse governmental subsidies. Enabling private persons and small business to share their existing charging infrastructure with a broad public via CrowdStrom is seen as one way to address this problem. Not only could it substantially increase the amount of publicly available charging stations for EVs, it may also reduce the total costs of ownership for the charging infrastructure as, by becoming a peer-provider in the CrowdStrom network, the owner can generate additional revenues from an otherwise idle asset. Table 2 presents the CrowdStrom business model by giving a brief description of each element of the adapted BMC.

BMC Element	Manifestation within CrowdStrom Project
Key Partners	Manufacturers of EV charging stations, charging infrastructure providers, roaming providers for charging stations, charging station directory providers, EV car dealers, insurance providers, third-party billing providers.
Key Resources	IT infrastructure: web platform, mobile application, back-end solution controlling charging infrastructure, human resources for IT, service, and administration.
Key Activities	Charging station setup, IT development, IT infrastructure operation and maintenance, customer acquisition and support, marketing.
Cost Structure	Costs for acquisition and maintenance of IT infrastructure, costs for human resources, insurance and marketing. Costs for using third-party billing services. Partnership costs.
Revenue Streams	Retain share of each transaction from peer-provider and peer-user, revenue from referring value-added services from key partners (e.g., insurance companies) and sale of anonymized user data.
Value Propositions to Providers	Offering provider's charging station to a broad network of users, billing process for all charging processes, web platform with individualized functions, overview of charging statistics, setting individual price and opening times, low maintenance effort after initial set-up, dynamic price recommendation mechanisms, efficient marketing of charging stations.
Provider Relationships	Provide right incentives (i.e., monetary and social) for provider to participate, offer services and technical advice for connecting the charging station to the network.
Provider Channels	Web platform, service hotline, and personal support services from technicians. Approaching potential providers through partners who sell EVs by offering CrowdStrom-ready charging stations.
Value Proposition to Users	Access to a broad network of charging stations and a comfortable solution for finding, reserving, and navigating to a charging station. Also convenient billing and parking spots in attractive areas are offered. A rating mechanism allows for rating of charging stations and filtering of providers based on aggregated ratings.
User Relationships	Mostly automated processes, but also personal assistance via service hotline available. Proactively inform about attractive charging possibilities in the relevant area.
User Channels	Web platform, both desktop and mobile applications. Providing a information and support hotline and periodic newsletters.
Provider Segments	Private EV owners with their own charging station and parking space at home, small business offering a charging station to their customers, operators of charging infrastructure looking for a billing solution.
Complementary Activities	Integration of a charging station into charging network, set individual prices and opening times, maintain parking space and charging station, coordinate repairs for own charging station.
Core Resources	Charging station with Internet connection and RFID card reader plus publicly accessible parking spot.
Complementary Resources	Internet access and electricity supply. Type of the Internet access is not important and can be either home Internet connection or a cellular connection.
Providers' Value Propositions	EV owners can use charging station and parking spot for a fee. The offering is time-based meaning that the user pays the charging station owner for the time spent occupying the charging station.
Provider-User Relationships	Usually anonymous because no personal interaction is necessary, but community aspect is important due to same areas of interest (e.g., technical aspects, EVs, environmental sustainability).
Provider-User Channels	Via web platform and in some cases through personal interaction. A major part of the relationship is maintained through the rating and review system.
Provider Cost Structure	Acquisition, installation, and maintenance of charging station and parking space; costs for Internet connectivity, administrative costs, taxes on profits.
Provider Revenue Streams	Fees for the time spent at a charging station. A part of this revenue is however transferee to the intermediary.
User Segments	Drivers of an EV in need of a charging station and businesses operating EV fleets.

Table 2.   Business Model of CrowdStrom *as per adapted canvas*

Peer-provider-related business model elements
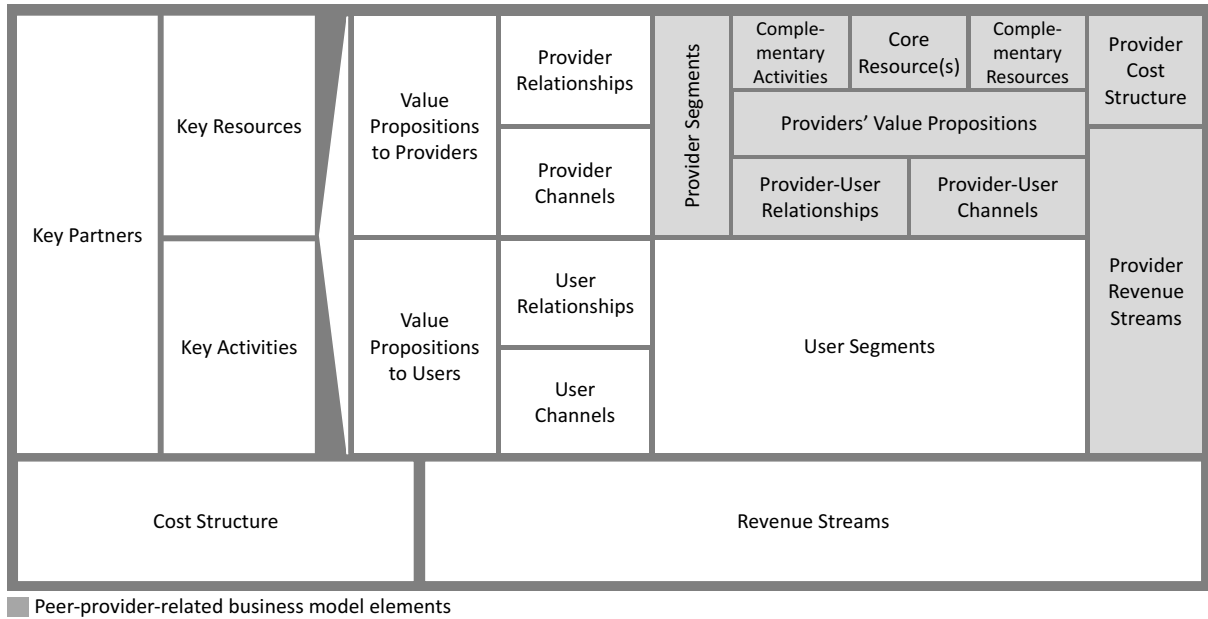
Figure 3.   *The Adapted Business Model Canvas for Peer-to-Peer Sharing and Collaborative Consumption*

4   Discussion of Guidelines for P2P SCC Business Models

In accordance with the ADR method and the principle of *generalized outcomes* for the stage of formalization of learning, we formalize the learnings from stage 3 into general solution concepts applicable to a class of problems—the development of business models for the archetype of P2P SCC (Sein et al., 2011; Van Aken, 2004). Combining the identified dimensions and corresponding characteristics of P2P SCC and the specific learnings from developing the adapted canvas, we derive a set of guidelines for the design and development of business models for the archetype of P2P SCC that could also be characterized as design principles (Sein et al., 2011). Table 3 summarizes the guidelines.

First, it is crucial to evaluate whether P2P SCC is a suitable approach for the chosen business. Although we see an increasing variation in the types of resources available through P2P SCC, not every resource can easily be shared. Factors impeding the sharing may stem from the macro environment in terms of political, economic, social, technological, or legal factors. Nevertheless, we have seen many P2P SCC business model continue to operate despite these impeding factors. Therefore, advantages and disadvantages of P2P SCC for the particular type of resource shared in a particular environment need to be considered (1).

Once P2P SCC is identified as a suitable approach for the planned business, there are high-level design choices to be made, as P2P SCC comprises various manifestations with severe implications for the business model. The platform can either be operated to generate profit or, driven by altruistic or sustainability motives, refrain from profit generation and generate only enough income to sustain itself. If the platform is to be operated for profit, it can be generated in two ways. First, the profit can be generated directly by either charging the users for a transaction (e.g., transaction fee) or periodically for accessing the community (e.g., membership fee). Indirect profit on the other hand can come from leveraging the community itself and the data it generates (e.g., by advertising). Correlating to the way of revenue generation is the type of relationship between the platform's users: a qualitative relationship (no compensation) is usually operated by non-profit organizations (e.g., Couchsurfing). Whether peer-providers expect to be compensated for sharing a resource depends on the type of resource. However, there are examples where the same type of resource is offered without any compensation (accommodation: Couchsurfing, transportation: classical Hitchhiking) or through monetary compensation (accommodation: Airbnb, transportation: Uber). Concluding, if and how profit is to be generated and if the users' relationship

amongst each other is to be of a qualitative or quantitative nature has important implications for the resulting business model (2).

Depending on the exact manifestations of the business model, there can be significant differences between the customer groups of peer-provider and peer-user. While the peer-user often does not differ much from a regular customer in traditional business model archetypes, the peer-provider has special needs and requirements like his aim to generate revenue from participating or the need safeguard the assets shared. Recognizing these differences will allow the intermediary to address the needs of his customer groups of peer-provider and peer-user individually (3).

The major difference of P2P SCC business models to traditional business models is the dependency on the peer-provider in terms of the core resources and possible complementary resources and activities that a peer-provider has to contribute in order to propose a value to a peer-user. Therefore, it is crucial to clearly distinguish between internal parts of the business model of the intermediary and those that are external and belong to the domain of a peer-provider. However, it is important to consider the peer-provider-related business model elements as part of the overall business model. The reason for it lays in the fact that both the intermediary and the peer-provider contribute to a formation of a value proposition to the peer-user. A business model that fails to reflect the exact role of a peer-provider in the process of value creation is prone to failure (4).

The key element of P2P SCC business models may also be its biggest weakness: the dependency on the participation of the peer-provider as was already highlighted in the guideline (3). Incentivizing the peer-provider to participate in the P2P SCC is thus crucial for the intermediary. Analogous to the type of relationship, we differentiate qualitative and quantitative incentives. Qualitative incentives include aspects like being part of a community, improving the social status by participating, or various sustainability aspects, e.g., contributing to a P2P SCC to save resources or reduce carbon emissions, e.g., by offering ridesharing (environmental sustainability). Regarding quantitative incentives (usually monetary compensation), it is important to recognize the peer-provider has his own business model. When deciding whether or not to participate, the peer-provider will consider possible revenues and possible costs to decide on the viability of his own business model. Incentives for the peer-provider's participation can be qualitative, quantitative or a combination of both. In addition, the intermediary can also provide additional support to the peer-provider for increasing its revenues (e.g., by helping the peer-provider differentiate themselves) and/or decreasing its costs (e.g., making it easier to do business so reducing the time) (5).

A specific feature of P2P SCC business models in the Sharing Economy is that they are often staged models due to the unlocking of different affordances, which come with the growing social capital that results from the increased number of users. Against this background, a business model lifecycle for providers can be differentiated into three main stages.

The initial challenge of a Sharing Economy is that its utility correlates with the size of its user base. Thus, a platform in its infancy needs to have a business model with a value proposition of its initial users who derive limited benefits from peer-to-peer interactions. Thus, in this stage, the model has rather the features of a B2C business model. For example, a platform might allow a user to record and analyze a specific set of private data, and the user would derive value from this service. At this stage, there are no network effects as the user interacts independently with the provider. In the second stage, the users would reach out to the growing community of the P2P SCC platform and start interacting with each other. This is the core of the business model and value is now derived within the community. This leads to direct network effects, i.e., the larger the community the higher is the value for the user. In the third stage, once the community derived a reasonable size, it derives a value in its own for third parties. In addition to the internal peer-to-peer interactions, third party providers could be attracted by the nature of the community and develop an interest in offering their community-tailored services. This is the stage of indirect network effects, i.e., the larger the size of the community, the higher is its value for such third party providers (6).

In order to connect strangers and enable them to share or collaboratively consume a resource, it is important for the platform to facilitate trust between peer-provider and peer consumer. Depending on the shared resource's value and how sensitive it is to both parties, the required level of trust may vary. The

platform can facilitate trust by adding services like a warranty or providing tools on the platform that enable the building of trust in between users like rating or vouching (7).

IT is already the core component of every P2P SCC platform, but as it is continuously developing, it offers increased possibilities for the sharing of new resources. While Uber's business model was first enabled by a broad availability of smartphones, the advance of the *Internet of Things (IoT)* will enable plenty of new resources to be shared and thus also enable a multitude of new business models (8).

No.	Guideline
1	Consider advantages and disadvantages of adopting P2P SCC depending on the type of resource shared.
2	Decide if and how profit is to be generated and decide on the type of relationship between peer-providers and peer-users.
3	Recognize and individually address differences between peer-provider and peer-user.
4	Differentiate between internal and externalized (to peer-provider) elements of the business model.
5	Consider appropriate incentives for the peer-provider to participate.
6	Consider the business model lifecycle and network effects relevant for the peer-provider and revenue streams for the intermediary.
7	Enable and foster the building of trust between peer-provider and peer-user and decide upon suitable trust-building mechanisms.
8	Look out for technological developments that enable new resources to be shared.

Table 3.   Guidelines for Developing P2P SCC Business Models

5   Conclusion & Outlook

During the development of a Peer-to-Peer Sharing and Collaborative Consumption for EV charging, we faced the problem that the Business Model Canvas (Osterwalder and Pigneur, 2010) did not perfectly fit to our needs for the description and development of our business model. Looking for guidance in the literature, we found that most research on P2P business models focuses on P2P file sharing or on single constituents like sustainability or mobility and that no holistic approach for the archetype of P2P SCC has been proposed yet. In order to address this gap, we used ADR to develop an adapted BMC, which is well-suited to address the specific characteristics of P2P SCC. The adapted canvas was iteratively refined in the course of multiple applications in a series of workshops with the academic and industry partners of a research consortium. The resulting canvas integrates specific characteristics of P2P SCC platforms that were derived from an empirical survey of 517 P2P SCC platforms. We exhibit the final canvas' fit by applying it to the initial problem of developing the business model of the CrowdStrom research project. Formalizing the learnings from the ADR development process, we derive guidelines that are generally applicable for the development of P2P SCC business models. Through the changes made to the canvas, especially distinguishing the intermediary's value propositions to the peer-provider and peer-user, as well as adding elements to represent the peer-provider's own business model, the adapted canvas provides a better fit to P2P SCC business models.

The guidelines and the adapted canvas are relevant for researchers and practitioners alike, as they provide guidance during the analysis, design and development of P2P SCC business models. However, this research is not without limitations. This research focused on P2P SCC as a subset of business models available in the Sharing Economy and thus excluded other archetypes that are based on the sharing or collaborative consumption of intangible resources or require a permanent transfer of ownership. Business

models that consider the sharing or collaborative consumption of *intangible* resources like digital resources or provisioning of what could be considered neighborhood assistance (e.g., errands or baby-sitting) require a specifically tailored BMC that requires specific adjustments—but our proposed canvas provides a good starting point in this context. For instance, with regard to neighborhood assistance, the element of *core resource* would be superfluous in the canvas.

Certainly, the information system of the organization was identified as the central component for implementing any business model in the domain of P2P SCC services. Against this background, business modeling can be used to deduct requirements and thereby help to develop and design the information system that realizes the business model (Eriksson and Penker, 2000). For the example of CrowdStrom, we relied on the final business model gained using the adapted canvas to derive an initial set of requirements for the IS to be developed.

With regard to future research, one needs to remark, that the adapted canvas has so far only been applied to the one case presented in this paper. Further applications and evaluations are required to confirm its general applicability. In the spirit of ADR and its principles, further applications can be understood as additional iterations of the cycle. For the BIE stage, the principle of *guided mergence* emphasizes the influence of organizational use and new participants on the artifacts initial design (Sein et al., 2011) which may result in new learnings which in turn and can bring about subsequent changes to the canvas as well as the derived guidelines.

Acknowledgement

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