From Taxonomy to Boilerplate Development of a Minimum Viable Sharing Platform

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Abstract

This paper examines the development of digital platforms in the sharing economy, advocating a novel boilerplate-based approach for creating Minimum Viable Platforms (MVPs). It introduces a Business Model Taxonomy, allowing customization and rapid development, and demonstrates its effectiveness through two test cases, emphasizing its potential for developing sustainability and cooperative platforms within the sharing economy.

Keywords

Boilerplate application, Taxonomy, Sharing economy, Minimum Viable Platform

Introduction

The sharing economy has emerged as a viable alternative to fulfilling a variety of consumer needs, ranging from prepared meals to cars to overnight accommodations (Zervas, Proserpio and Byers, 2014). It has the potential to further revolutionize the way we access and use resources, leading to increased efficiency and reduced waste. The sharing economy already has positive environmental and social impacts (Frenken and Schor, 2017), through a reduction in the total resources required and simplifying local human contact. For example, vehicle-sharing applications like BlaBlaCar reduce production and emissions as they shifting personal transportation choices from ownership to demand-fulfilment (Mi and Coffman, 2019), and stimulate people driving together and meet each other. However, the full potential of the sharing economy has yet to be realized (Heinrichs, 2013).

As a tool to intermediate transaction, digital platforms within the sharing economy have common functions but also have substantial differences in functionality and the business model that is supported (Derave *et al.*, 2019). Developing a successful sharing economy platform (from now on referred to as sharing platform) requires careful consideration of the needs and incentives of different groups of users (Hasan and Isaac, 2011). It is important to identify the key value proposition for each group and to design the platform in a way that aligns with the incentives of all groups. This may include designing a platform that makes it easy for users to find what they are looking for, providing a safe and secure environment for transactions, and enabling a review system that increases trust between users. Additionally, it is important to consider the business model and revenue streams for the platform company or owner, as well as the potential scalability and growth of the platform.

To launch a digital platform, the software that is needed to operate the platform must be developed. It is recommended to first develop a Minimum Viable Platform (MVP) (Gracia, 2022), which is a version of the platform software that has just enough features to allow business stakeholders (platform owners, potential users, strategic decision makers, etc.) to validate the platform idea and obtain feedback for future extensions and improvements before a full-scale launch (Gracia, 2022). Therefore MVP development focuses on creating a bare-bones version of a platform that can be tested and improved upon (Ries, 2011). This approach allows for faster and more cost-effective experimentation with new business models, reducing the risk of failure.

Presently, there are two approaches to developing an MVP. The first is to develop the MVP from scratch. This approach has disadvantages including the considerable amount of time it takes (Lynn, 2020) and the limited amount of documentation that is created (Adnan and Afzal, 2017). A second approach is using Software-as-a-Service (SaaS) tools for developing an MVP, like Sharetribe Go (Sharetribe, 2022) which supports the development of digital marketplaces and Ever Demand (Ever Corporation, 2022) which supports the development

of on-demand platforms. Even though this approach shortens the time to development significantly, these tools only focus on one specific digital platform type and do not offer enough flexibility to develop a tailor-made MVP that fully addresses the needs of the business stakeholders of the digital platform initiative.

In this paper, we present an alternative to development from scratch or the use of a PaaS tool. We demonstrate how to develop an MVP using a *boilerplate application* such that individuals without programming proficiency can develop the platform software without being constrained to a predefined set of configuration options. A boilerplate application is a pre-built, generic application framework or structure that developers can use as a starting point for building their own applications (Zaveri, 2018). Therefore, boilerplate-based development is a software development methodology that enables rapid application development using graphical user interfaces and pre-built components (similar to SAAS), but still facilitates further software development of other functionality beside the predefined set of configuration options (as for starting from scratch).

The customizability and code structure of the presented boilerplate application is based on a Business Model Taxonomy for digital marketplaces (Derave *et al.*, 2021) which includes sharing platforms and was developed using the method of (Nickerson, Varshney and Muntermann, 2013) by means of a literature review and an empirical analysis of a large sample of existing platforms. The Business Model Taxonomy provides an overview of possible business model variations that digital marketplaces can operate (Derave *et al.*, 2021). The boilerplate allows selecting properties from this taxonomy and through this selection an MVP of a digital marketplace is automatically generated, with the selected business model choices fully integrated. The boilerplate is designed to provide a solid foundation for building an MVP and includes a set of basic features and functionality, while also allowing for flexibility and customization depending on the selected properties of the envisioned platform. The boilerplate application can thus be used as a sandbox that can easily be modified and customized to fit the specific needs of the platform.

In this paper, we demonstrate our approach by developing two different sharing platform MVPs. These test-cases show how our approach can be a viable and better alternative to the use of the aforementioned PaaS tools or starting from scratch. In the next section, we discuss the Business Model Taxonomy and how to select the properties of the envisioned sharing platform. In section 3, we discuss how selecting those properties shapes the boilerplate application into an MVP of the sharing platform. In section 4, we provide our conclusion and future research.

Business Model Taxonomy for Digital Marketplaces

The taxonomy presented in (Derave *et al.*, 2021) is a structured overview of variations in digital marketplace business models portraited by dimensions and values. The dimensions represent the business model choices that the platform company can make. The values within a dimension are the choice alternatives that can be selected to customize the digital platform in line with the envisioned business model. The choices made thus define the platform properties. The taxonomy (Table 1) was based on a literature review of 31 papers and a sample of 47 existing digital marketplaces[1].

TABLE 1: TAXONOMY

Dimension	**Value**			
User Type[m]	Person		Organization	
Listing Type[m]	Good Transfer		Service	
Listing Kind[m]	Physical Good[d]	Digital Good[d]	Offline Service[d]	Online Service[d]
Frequency			One-Time[e, d]	Recurring[e, d]
Quantity[m]	One[e]		Many[e]	
Price Discovery	Set by Provider[e]	Set by Customer[e]	Set by Market[e]	
Price Calculation	By Quantity[d]	By Feature[d]	Auction[e, d]	Quote[e, d]
Conversation System	Listing Conversation		Booking Conversation	
Review System	By Customer		By Provider	
Revenue Stream	Subscription	Commission	Fixed Fee	Listing Fee
Revenue Source	Customer		Provider[d]	

Mandatory: 'm', Exclusive: 'e', Dependent: 'd' and thick boxes, Sharing economy properties: yellow Shading SafaRide properties: grey shading

Besides the taxonomy dimensions and values that were structured by the method of (Nickerson, Varshney and Muntermann, 2013), we also identified a number of constraints. First, a business model choice that defines the basic functionality of the platform is a choice that is mandatory as otherwise the platform cannot be developed. This means that for the corresponding taxonomy dimension, at least one value needs to be selected. For instance, for the dimension 'User Type', at least one value (Person or Organization) needs to be selected as a property. Second, choosing a value for some dimension may exclude the

[1] An overview of the papers and sample can be found on: http://model-a-platform.com/marketplace-business-model-sources/

choice of other values for that same dimension as otherwise the business model will not be sound. Table 1 indicates when such exclusive choice is required. For instance, when selecting the value 'One' as a property in the 'Quantity' dimension, no other value within this dimension can be selected. Third, we also specified business model choice dependencies for situations where the choice made for one dimension is restrained by the choice made for another dimension indicated by the thick boxes. For instance, in our taxonomy, a listing with price set by the provider can only have a quantity-based or feature-based (or both combined) price calculation. As another example, a revenue for the marketplace company in the form of a listing fee (cost for posting a new listing) always comes from the provider side.

Within the established taxonomy, values of three dimensions are obligatory to be selected as properties to position the platform within the scope of the sharing economy, as per the definition provided by (Frenken and Schor, 2017). They articulate that a sharing platform is essentially a digital marketplace that intermediates in the temporary access to under-utilized physical assets between private individuals. Consequently, for alignment with their definition, the taxonomy stipulates that the user must be a person, the type of listing must be a service, and this service must take place offline. These prerequisites are highlighted in yellow shading in Table 1. The under-utilization of the physical asset does not bear relevance to the performance of the software, and therefore, it is excluded from consideration.

One of the sharing platform MVPs that was develop as a proof of concept using our method is SafaRide, which is a platform for sharing seats in a jeep on a booked safari trip. The properties of SafaRide are highlighted in Table 1 with grey shading. SafaRide intermediates between persons (travellers) for an offline service (available seats in a safari jeep) that can occur only one time (each trip offered will only take place once). The price is set by the provider, and a customer can book multiple seats at once with the total price based on the quantity (price * number of seats). The conversation system allows both options with messages before (listing conversation) and after the transaction (transaction conversation). After the safari, a review can be placed by the customer. The revenue stream captured by the platform owner is a commission of the transaction price paid by the customer.

The selection of taxonomy properties representing business model choices is performed via the boilerplate user interface[2]. The user interface enables an admin user (e.g., platform owner or developer) to select taxonomy properties. The choices made automatically customize the boilerplate application in line with the envisioned business model. Hovering over a dimension name activates a pop-up screen with more information concerning the

[2] The properties selected for an Airbnb replica example can be found on:
https://ugmarket.ugent.be/taxonomy,
and an instructive video can be found on:
http://model-a-platform.com/wp-content/uploads/2023/09/video1586819759.mp4.

possible values that can be chosen from. The exclusivity and dependency constraints guide the admin user through the options, greying out the non-selectable values. For example, when selecting 'One', the 'Many' value of the Quantity dimension becomes non-selectable and greyed out due to the exclusivity constraint. When selecting for the Listing type dimension 'Good Transfer', only the values 'Physical Good' and 'Digital Good' are selectable for the Listing Kind dimension due to the dependency constraint. When pressing the 'save' button after selecting the platform properties, the system checks whether all mandatory business model choices have been made. For example, in case no value for the dimension Quantity is selected, a pop-up box will indicate the violation of this constraint.

Generating the Minimum Viable Platform

The boilerplate application was developed with state-of-the-art programming frameworks. For the backend we used *Node.js*, an open-source, cross-platform JavaScript runtime environment that can run on the server-side, and the web framework *Express and Sequalize* as an Object-Relational Mapping (ORM) library for Node.js to provide an abstraction layer that simplifies the interaction with the database. The frontend was developed with *Angular* (Google, 2023) using the Typescript programming language. We utilized the Angular structural directive *ngIf to dynamically present or remove elements within the DOM (Document Object Model) according to the properties selected, allowing us to tailor the user experience by displaying specific functionality based on these properties. For an overview of the documentation, we used *Compodoc*[3].

Name	Goal	Properties	Link
SafaRide	Selling vacant seats within a safari vehicle	Person; Service; Offline Service; One-Time; Many; Set by Provider; By Quantity; Listing Conversation; Transaction Conversation; By Customer Commission; Customer	www.safaride.ugmarket.ugent.be
Sheb	Sport material Rental	Person; Service; Offline Service; Recurring; One; Set by Provider; None; Transaction Conversation; By Customer; By Provider; Commission; Customer	www.sheb.ugmarket.ugent.be

Table 2 shows the platform properties that were defined by the taxonomy-guided business model choices for four fictional proof-of-concept platforms. The table includes the links to

[3] Compodoc documentation of Angular components: http://www.marketplacedoc.ugmarket.ugent.be/overview.html

the MVPs that were generated by making these choices. We illustrate below how each platform has its own goal and functionality (defined by the properties), while all MVPs were generated from the same boilerplate. We like to state that these MVPs, being fictional, have not been validated with stakeholders and are thus primarily intended to demonstrate the benefits of the boilerplate application and our approach.

In the case of SafaRide, the platform simplifies the sharing of vacant seats during jeep rides among individuals. During signup, users are restricted to providing only personal information. The listings page showcases an image, seat pricing, customer reviews, the date of the safari, and the initial departure location. Prior to initiating a transaction, customers are required to specify the desired quantity of seats for rental. The total transaction cost is determined by multiplying the specified quantity with the corresponding seat price. The listing remains active until all available seats are purchased, at which point the listing becomes inactive for further bookings. After the purchase, customers are afforded the opportunity to review their safari experience.

It is important to highlight that developers with at least some basic front-end developing experience can easily alter and configure the MVP beyond the configurability of the selected properties in the taxonomy, and further tailer-make the MVP to the specific needs and requirements of the users and other stakeholders.

Overall, the proposed boilerplate approach can simplify the MVP development process for sharing platforms, making it feasible for individuals without programming proficiency to construct platform software. The use of a taxonomy to define platform properties corresponding to business model choices offers a flexible and customizable approach to developing an MVP, enabling businesses to create sharing platforms that align with their specific needs and incentives. Despite our effort, it is important to note that the boilerplate application proposed in this paper still requires a developer/owner to host their own virtual server. This means that there are still costs associated with running a sharing platform, and this may present a barrier for some practitioners.

Conclusion and Future Research

In this paper we demonstrated two fictional sharing platform MVPs as a proof-of-concept. In future research we will put our method into real practice allowing practitioners preparing to launch a start-up to use our boilerplate application. In this scenario, the MVP they develop will undergo validation from potential users and other stakeholders and upon successful validation, signifying the viability of their concept, the platform can then proceed to the production stage. This way we will be able to evaluate the effectiveness, scalability, usefulness, and usability of our approach on a diverse set of sharing platforms operating different business models.

Furthermore, we are looking into how this boilerplate application can help achieve sustainable development goals. Sharing platforms have the potential to promote sustainable consumption and production patterns by enabling peer-to-peer sharing, reducing waste and creating more efficient use of resources. As we provide an open-source tool that allows practitioners to start their own sharing platforms, we can contribute to the creation of a more sustainable economy. It is also worth considering how to include a more cooperative structure in sharing platforms. Cooperative platforms, where users have a stake in the platform and participate in decision-making processes, can promote greater equality and reduce exploitation. While the boilerplate application does not provide a cooperative structure out of the box, it could be used as a starting point for developing cooperative platforms.

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