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RESEARCH PAPER

How do business model tools facilitate business model exploration? Evidence from action research

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Abstract
Business model tools are commonly used to describe and communicate business model ideas. However, studies do not sufficiently address whether and how business model tools support the early, exploratory phase in which new business models are initiated, conceptualized, assessed and planned. In this exploratory phase, offerings and addressable markets are highly uncertain, which requires extensive idea generation, reframing, comparison and evaluation. This paper examines whether and how business model tools facilitate the process of business model exploration. Through action research, we find three ways in which business model tools can better facilitate the process of exploring, reframing and comparing alternative business models. The paper contributes to business model literature and managerial practice by providing empirical evidence on how tooling facilitates business model exploration.

Keywords Business model exploration · Business model tooling · Action research · Business model innovation

Introduction

Tools for describing, presenting and communicating business models are emerging rapidly, both in practice and academia (Szopinski et al. 2019). Business models describe how companies create value for users and stakeholders (e.g. De Reuver et al. 2013; Teece 2010; Khanagha et al. 2014). Business model tools are `boundary objects' that facilitate exchanging business model ideas between stakeholders (Bouwman et al. 2018b). Business Model Canvas is particularly popular (Osterwalder and Pigneur 2010), and has become the de facto standard tool for documenting and sharing business model ideas. Studies show that canvas-based business model tools help to describe, document and communicate business model ideas (Chandra Kruse and Nickerson 2018).

For our study, we focus on the notion of business model exploration, in which uncertainties are great and new business opportunities emerge. Business model exploration comprises processes of developing initial ideas for a new business model (Cavalcante et al. 2011), (2) conceptualizing alternative business models (Sosna et al. 2010), (3) exploring and assessing alternatives (Heikkilä et al. 2016), and (4) formulating concrete actions to implement the selected business models (Baden-Fuller and Morgan 2010; McGrath 2010). In this way, business model exploration goes beyond describing, documenting and communicating business model ideas.

The goal of this study is to examine how business model tooling facilitates business model exploration. Thus, this study aims to answer: *How do business model tools facilitate business model exploration?*

We use action research as a methodology. Action research involves researchers and practitioners working together through activities of problem diagnosis, intervention, and reflection (Susman 1983). Action research is suitable for our purposes since it allows applying interventions (i.e. business model tools) in a real-life setting (i.e. a project aimed to develop business models for a new offering) throughout a long-term and unstructured process (i.e. business model exploration). We conduct our study within an innovation project

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aiming to design technology-enabled services for improving safe driving. The innovation project is partly supported by government funding. As required by the action research methodology, the authors of this manuscript were actively involved as members of the project team. We observe how business model tools facilitate business model exploration by reflecting upon the actions taken with business model tools, the purposes of taking these actions, and the achieved outcomes. Based on our analysis, we recommend how business model tools could be designed to facilitate the business model exploration process.

This study contributes to the literature on business model tooling (Teece 2010) by studying how tooling facilitates the processes of business model exploration. In this way, we go beyond the use of tools to describe, conceptualize, communicate and store business model ideas (Chandra Kruse and Nickerson 2018). Managerially, our study provides lessons on how to facilitate a process of business model exploration with tools, in settings where innovation project teams pursue new business model opportunities with high uncertainties.

The paper is structured as follows. First, the theoretical background is provided for our study. Next, the methodology is provided, and the findings are analysed. After discussing the findings, we conclude the paper by answering the research question and listing limitations.

Background

Business models

Business models describe the core logic of how an enterprise creates and captures the value of innovations (Kallio et al. 2006; Linder and Cantrell 2000; Fielt 2014). Business models are considered essential for experienced and established organisations (Magretta 2002), as they contribute to competitiveness (Demil et al. 2015) and help commercialize relevant offerings such as products and services (Simmert et al. 2019). Scholars describe different building blocks that constitute a business model (e.g. Osterwalder and Pigneur 2010). A widely known and used one is proposed by Osterwalder and Pigneur (2010), comprising nine building blocks: value proposition, partner networks, customer segment, customer relationship, channel, key resources, activities, revenue streams, and cost structure.

Organizations focus on business models to stay competitive and profitable (Bucherer and Uckelmann 2011). Examples of drivers to change business models are poor firm performance, innovative use of resources (internal), the introduction of new services in the market (external), or simply a new idea (De Reuver et al. 2009). Regarding business models in times of change, scholars mainly discuss established organizations that have to innovate their existing business model due to a new market (e.g., Landau et al. 2016) or uncertainty (Schneckenberg et al. 2016). In this context, designing a business model is challenging, as many components of the business model are unknown up-front.

Making changes in business models requires competencies such as adaptive and flexible decision-making capacity, entrepreneurial experience and diverse knowledge. We argue that creating a business model is not a one-off task, but requires extensive exploration until an assumed-to-be viable business model is reached.

Business model exploration

Business model exploration is an iterative process through which business models are proposed, compared and subjected to experimentation until a revised and presumably successful business model is reached (Sosna et al. 2010). Through business model exploration, companies generate new business model ideas (Baden-Fuller and Morgan 2010; McGrath 2010). Further, scholars argue that exploring and experimenting with business models improves the consistency of the resulting business model (Demil and Lecocq 2010), helps overcoming obstructions to change (Chesbrough 2010), creates a competitive advantage (Eppler et al. 2011), and improves performance (Andries et al. 2013). A systematic approach to business model exploration enables enterprises to obtain new (or revised) business model ideas (Baden-Fuller and Morgan 2010; Hoffmann et al. 2011) and create competitive advantage (Hoffmann et al. 2011).

Only recently, scholars started to study empirically how business models are being developed (Foss and Saebi 2017). Sosna et al. (2010) find that the exploration phase of business model innovation consists of initial designs and trial-and-error improvements, which may last for several years. Cavalcante (2014) distinguishes business model experimentation (i.e. researching technical challenges and performing new practices) from business model learning (i.e. acquiring new knowledge, discussing new ideas and interacting with and contacting others). Achtenhagen et al. (2013) find that business model experimentation consists of retrieving information about the environment, encouraging new ideas, and learning from mistakes.

We consider four main activities of business model exploration, which need not be linear and sequential: (1) develop initial ideas on the new business model (ideate) (Cavalcante et al. 2011), (2) conceptualize alternative business models (reframe) (Sosna et al. 2010), (3) explore and assess alternatives (envision) (Heikkilä et al. 2016), and (4) formulate concrete actions to implement the business model (action-formulation) (Baden-Fuller and Morgan 2010; McGrath 2010). See Fig. 1 for an illustration.

We argue that these four activities take place within an iterative process of 'trial-and-error' improvements (Sosna et al. 2010). In this process, initial assumptions on the business model are being tested. If assumptions are not confirmed, a

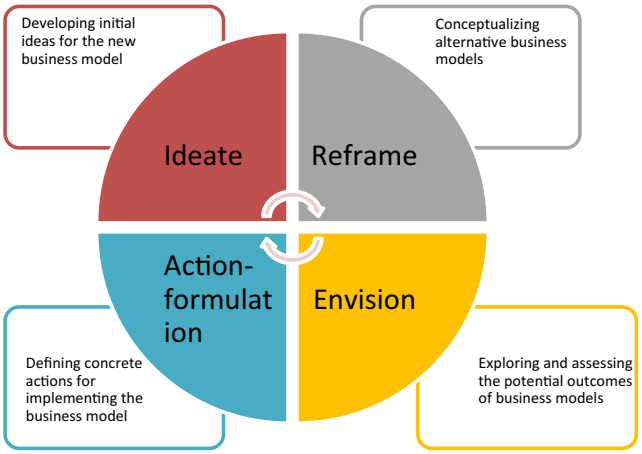

Fig. 1 The four activities of the business model exploration

new round of testing takes place, until a suitable solution is reached.

Business model tools

Business model tools are boundary objects that enable companies and stakeholders to describe and communicate business models (Bouwman et al. 2018a). The literature on business model tools is expanding rapidly (De Reuver et al. 2016). Business model tools can take many forms, such as printable templates (e.g. Business Model Canvas), printed cards (e.g. Foresight cards 2018; Haaker et al. 2017), apps (e.g. Osterwalder and Pigneur 2010), and websites (e.g. E3 Value 2017). Some scholars integrate tools for specific purposes, such as creating a start-up company (Heikkilä et al. 2016). In the practitioner area, tools are being developed, ranging from highly advanced (e.g. VDMBee[1]) towards click-and-fill-out tools (e.g. Canvanizer[2]).

Whereas some tools cover the full scope of a business model (e.g. Business Model Canvas), others focus on one specific aspect (e.g. Value Proposition Canvas). Tools also differ regarding the level of detail. For instance, one array of tools provides patterns that represent solutions or `proven' configurations of specific business model components (e.g. Lüttgens and Diener 2016). Another set of tools follows a fill-in-the-blank approach, whereby users need to add information manually, for instance to a canvas or framework.

Classifications and taxonomies of tools are scarce in the literature. Online repositories are available, such as BMToolBox.net and BusinessMakeover.eu, which categorize business model tools based on their purpose, helping users to select the most suitable tools for their needs. Bocken et al. (2019) review 13 tools for circular business models, finding a variety of functions, such as (card) games, frameworks, canvases and structured question lists. Täuscher and Abdelkafi (2017) conduct a systematic literature review, categorizing 95 visual business model representations into a framework based on their contents. Szopinski et al. (2019) create a taxonomy of online business model tools, focusing on their modelling, collaboration and technical characteristics. None of the existing taxonomies or overviews focuses on business model exploration specifically.

[1] https://vdmbee.com/
[2] https://canvanizer.com/

Method

Action research

Action research allows researchers to develop and test theoretical ideas on the efficacy of specific actions, through a process of interacting and intervening with practitioners in a naturalistic setting (Baskerville 1999). As the process of business model exploration is iterative, action research is particularly appropriate. The interventionist nature of action research further allows us to test the efficacy of business model tools in facilitating business model exploration.

We opt for action research rather than design science research or action design research since we do not aim to create an artifact. Similarly to action research, action design research focuses on solving a practical problem, with researchers and practitioners working closely together in iterative cycles (Sein et al. 2011), in order to generate knowledge (Collatto et al. 2018). The main difference is that action design research generates design knowledge by `*building and evaluating ensemble IT artifacts*' (Sein et al. 2011). Yet, in our case, we develop a business model, which we view as a group of conceptual elements or ideas without any intrinsic IT component. Therefore, we use action research rather than action design research as our methodology.

We structure our research based on the action research cycle provided by Susman (1983), comprising steps of *Diagnosing*, *Action Planning*, *Action Taking*, *Evaluating*, and *Specifying Learning*, see Fig. 2. According to Baskerville (1997), the research environment of action research is constituted by a client-system infrastructure. Two types of actors take part: the researchers and the practitioners (the 'clients'). This client-system infrastructure allows collaboration between the researcher and the practitioners, based on mutual interests (Baskerville 1999).

For our research we focus on an innovation-based project conducted by four businesses and one university, taking place in 2017. The project was partly funded by an independent organisation of the European Union, and partly by the businesses involved. The project aimed to create a start-up that offers a commercially viable product, with many uncertainties over what the eventual product would be. In this way, the project fits the notion of business model exploration as conceptualized previously. Within the project, the five

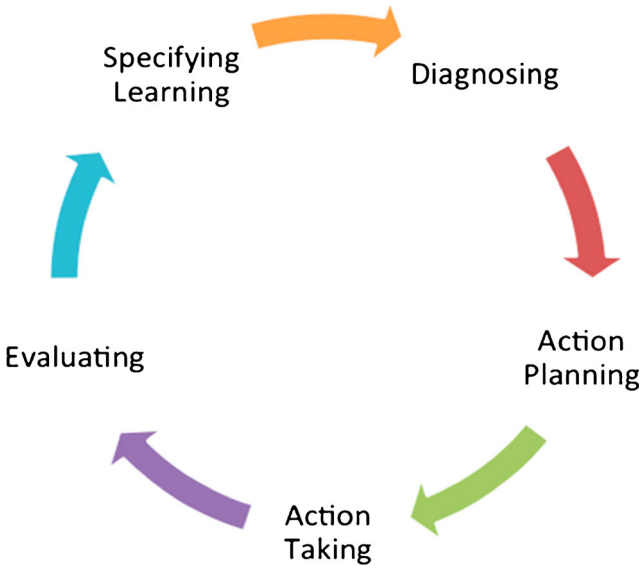

Fig. 2 The action research (based on Susman 1983)

organisations collaborated in order to develop and test the product and underlying business model.

The authors of this manuscript participated in the project, taking the five steps of action research (Susman 1983): diagnosing the problem, planning and taking specific actions, evaluating the outcomes, and formulating what we learned from the process. The direct involvement allowed the authors to actively intervene, collect data, and gather feedback. The project partners were meeting monthly in a face-to-face or online setting to discuss updates, and arrange action points for the upcoming month. Between the official monthly meetings, bilateral meetings were held between partners when necessary. Other activities included promotion of the project in European events, focus groups with potential users, workshops evaluating the products, and interviews with potential stakeholders.

Data collection

To increase the validity of our research, we document our actions throughout the process (Avison et al. 1999). We collected data in different formats, see Table 1. Key informants (project partners and other involved individuals) validated the interview transcripts and minutes from meetings. Key informants also participated in workshops, in which each presentation by the researchers was followed by an open discussion.

The overall purpose of the project was to create a start-up (after 12 months) that promotes a road safety culture. Specifically, the goal was to make sense of attitudes and choices of young drivers, in order to generate a deeper understanding of the `why' behind risky driving behavior. Based on the initial plan for the project, the ultimate goals for the project were: (1) making a product, described as a digital toolbox that improves the road behavior of young people, (2) creating a start-up that will offer the developed product on the market. The initial product idea was to create something that stimulates safe driving behavior by young people. Ideas for the product were to create online communities of young drivers, to model driving behavior based on data collected in the communities, and to offer gamified systems to educate road safety to young drivers. However, within this broad scope, it was not clear what the final product would be, what problem the product would solve, and to what customers it would be offered.

The research setting involved five organizations: one technical university (The Netherlands), one public research and innovation institute (Italy), two private consultancy companies (The Netherlands, #1 and France, #2), and one private research and design studio (Italy). Only the university and the Dutch firm were familiar with business model innovation. At the initial project meeting, the tasks of the partners (researchers and clients) were defined (see Table 2).

At the end of the project, the product was defined to be a 'toolkit' including (a) an online community that will share ideas and feedback on the topic of road safety and (b) an engaging `gameful' app for young people that gathers data about their decision-making and attitudes in a structured form.

Analysis

To describe the action research cycle, we follow the five steps from Susman (1985) and Baskerville (1997).

Table 1 Collected data

Data sources	Amount of produced documents
Email messages on business model exploration	365 (97 related to business model topics)
Minutes of interviews with potential stakeholders and customers (e.g. driving associations; municipalities, insurance companies)	13 documents (39 pages)
Minutes of project meetings	12 documents (66 pages)
Workshops with project partners	4 documents
Presentations with intermediate results	9 documents

Table 2 The teams of the project, and the assigned tasks

Teams	Tasks	Organizations involved
Management	• Project management • Communication and Dissemination • Product user evaluation • Start-up creation	• Public research and innovation institute
Business Model Team *(the researchers were part of this team)*	• Market research • Business Modelling • Mock-up business evaluation • Product business evaluation	• Technical University • Private consultancy company #1
User research	• User engagement, User analysis • Mock-up user evaluation	• Private research and design studio • Technical University
Design and Development	• Product design • Product implementation • Product user evaluation	• Private consultancy company #2 • Technical University

Diagnosing

During the diagnosing phase (Month 1–2), the collaboration with the other project partners was intensive. Physical and online meetings, presentations, discussions and brainstorming sessions took place. The partners had two main assumptions about the scope of the project. First, mobility behavior is difficult to capture among young people because they are less willing to be monitored. Even if monitoring technologies are in place and accepted by young drivers, collected data tell *what* happened (e.g. driving style), but not *why* it happened (e.g. perceptions, norms and beliefs affecting driving behavior). Second, participants agreed that the ultimate product should leverage their existing technologies and knowledge from research-focused projects, such as gamification approaches and psychographic models on norms and beliefs affecting driving behavior. However, apart from these generic starting points, the project participants did not know what the final offering should be, and could not envision a business model for the start-up company. The initial diagnosis indicates that:

a) a start-up should be launched as a prerequisite of the funded project, based on a viable business model,

b) the offering and target group are not defined or developed, and, hence, it is difficult to define a specific business model.

Action planning

Next, we planned specific actions (Month 2–5). These actions were derived from the diagnosis phase and informed by theory on business model exploration. Specifically, our working hypothesis (cf. Baskerville 1997) was that *business model tools facilitate business model exploration*. We planned to take actions throughout the time period we had, solving the problem we diagnosed with the overall aim of creating a start-up.

We collaborated with the practitioners to plan a specific set of activities to take towards the desired future state, that is, the release of the start-up (Month 12). First, we divided the responsibilities among the different partners. Then, we defined the following goals for using the business model tools, in close collaboration with the partners:

- investigate what could be new markets;
- identify potential competitors;
- design potential business models and discuss the building blocks that are missing;
- create potential business model scenarios;
- involve potential stakeholders;
- plan feedback sessions with potential users;
- discuss with potential users and stakeholders what could be a valuable product;
- discuss potential revenue models, including their risks; and
- develop the business model in parallel to the product and other activities of the project

Fig. 3 presents the initial division of responsibilities. The dashed shapes indicate the activities for which the researchers were responsible. The resulting plan was discussed with all other partners.

Notes: Dashed lines indicate activities that the authors of this manuscript participated in.

We planned to use business model tools in each activity to be carried out. We decided to use a broad portfolio of tools, covering the diversity of existing tools. Based on our own interpretation, we selected tools covering the four activities of business model exploration. We also selected tools that differ in terms of scope: tools that cover the business model as a whole (e.g. business model canvas) and tools that focus on one specific business model component (e.g. value proposition canvas). Finally, we selected tools with different forms: cards, canvases, checklists, and process descriptions. With

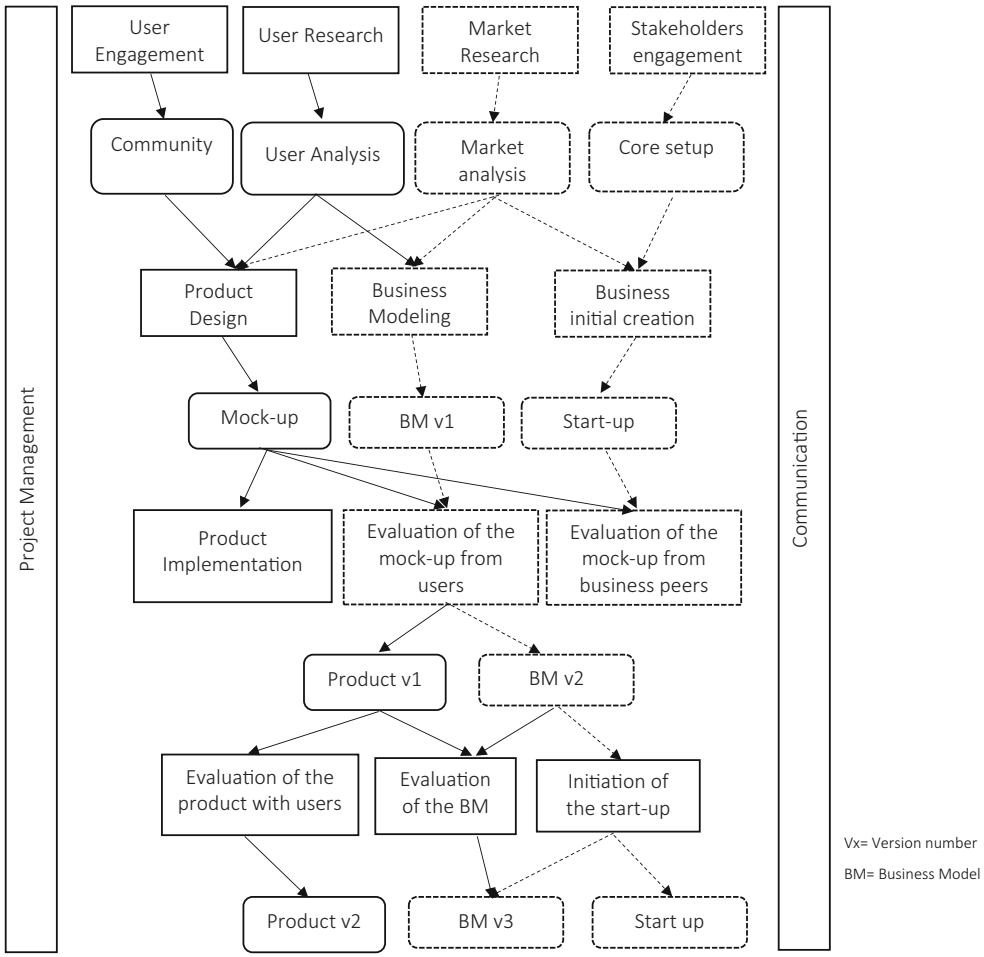

Fig. 3 Initial division of responsibilities

these minimum criteria for coverage in mind, we selected tools according to the needs in the action setting. For coherency purposes, we selected tools from an available repository of tools (businessmakeover.eu). We present the business model tooling and the business model needs we used them for (see Table 3), and the links of digital business model tools (see Appendix).

Action taking

During the action taking, we implemented the planned actions (Month 5–11). Baskerville (1997) argues that different strategies can be adopted during action-taking. The intervention strategy that we adopt is the one where 'the research 'directs' the change' (Baskerville 1997, p. 27). In essence, the researchers 'directed' the change with the introduction of different business model tools, based on the action plan. In some cases, tools were applied in workshops that took place with the partners. In most cases though, the researchers interacted with the other partners through meetings to distil information needed to fill out the tools. The distilled information was then rationalized into, for instance, a filled out template. The results were then discussed with the other partners.

We used tools to support the four activities of business model exploration. For the ideate activity, we used the widely used business model Canvas tool to create a first overview of the business model of the start-up, the Persona tool to identify potential stakeholders and the STOF business model to collect ideas of project participants. While the business model Canvas tool is user-friendly, it was challenging for the project partners to fill out the empty template as the offering was not yet defined. We had to create alternative versions of the business models, with different versions of the offerings, revenue models and involved stakeholders. We ended up with five different initial versions of the business models, all illustrated with different business model canvas versions. Regarding the STOF business model tool, it was not directly usable, as the level of detail of the checklist of questions in the tool requires a solid understanding of the offering and the stakeholders involved. We, therefore, used a simplified version of the tool,

Table 3 Selected business model tools

Tool	Targeted business model exploration activity	Type of tool	Scope of tool	Purpose in the action setting
Persona-Organisata	Ideate	Process description	Specific component	Identify potential customers for the offerings
Business Model Canvas tool	Ideate	Canvas	Business model as a whole	Initial design of the business model Revision into multiple alternative versions, to reflect the changes made in the product definition
STOF Business Model	Ideate	Checklist	Business model as a whole	Collect ideas of project participants for the initial version of the business model
Focus Group	Envision	Process description	Specific component	Evaluate potential product features with prospective users (i.e. young drivers)
Business Model Cards	Envision	Cards	Business model as a whole	Identify potential revenue models
Competitor analysis	Reframe	Canvas	Specific component	Analyse existing offerings in the market and map them as competitors
Business Model Roadmap	Action-formulation	Canvas	Business model as a whole	Create a practical action plan for launching and scaling up the future start-up
Pricing Strategy Cards	Action-formulation	Cards	Specific component	Develop alternatives for pricing models

asking four basic questions related to each of the four STOF domains (service, technology, organization, and finance) in a workshop setting. During the workshop, project partners proposed different alternatives for each domain (4–5 different suggestions per domain on average). The brainstorming session showed the need for tools that do not expect clear and specific answers regarding the business model components. The use of the Persona tool helped to identify potential stakeholders, even unexpected ones. For instance, we found the need to involve local businesses (e.g., cinema, cafeterias), which are not related to the driving context but do attract young people.

For the *reframe* step, we used the Competitor analysis and Thinking hat tools to understand the current situation of the market and competitors. These tools helped identify potential competitors (e.g. governmental initiatives, commercial products of international companies, and add-on products). Knowing the unique characteristics of the competing offerings allowed the project partners to focus on the added value of the start-up's offering. We assumed that competitors of the start-up would also offer some form of a tool or game. We identified competitors based on what they offer, their target group, their revenue model, and their strategy for differentiation. By using the tools, we found out that: (1) most of the competitors offer directly to consumers; (2) most competitors are interested in collecting data; (3) insurance companies are important stakeholders; (4) game users need to be rewarded. The tools were useful for the *reframe* step, as we did not have a clear overview of the market and the competitors. Based on the market and competitor analysis, we revised the alternative business models once more.

For the next processes of *envision* and *action-formulation,* we used tools to explore potential solutions and to design business models for later phases of the start-up. The tools we used to explore the potential solutions allowed us to create value propositions and features of the offerings, as well as to evaluate these with potential users. For the *action-formulation* process, we used business model tools like the business model roadmap and the pricing strategy cards to design a plan for the future of the start-up.

We presented the alternative business models to the project partners. They rejected one business model as not feasible and made recommendations, upon which we revised the business models. After multiple iterations and discussions between the product and business model teams, we reached a final business model for the start-up (see Fig. 4).

Notes: We used the online tool as available via businessmakeover.eu. For confidentiality reasons, some text is removed (indicating the name of the start-up).

Below, we discuss the tools, regarding the requests from the project partners **(purpose),** the activities we performed **(actions),** and the achieved outcomes and results **(outcomes**), see Box 1.

Box 1 Overview of the actions, purposes and outcomes of using the business model tools

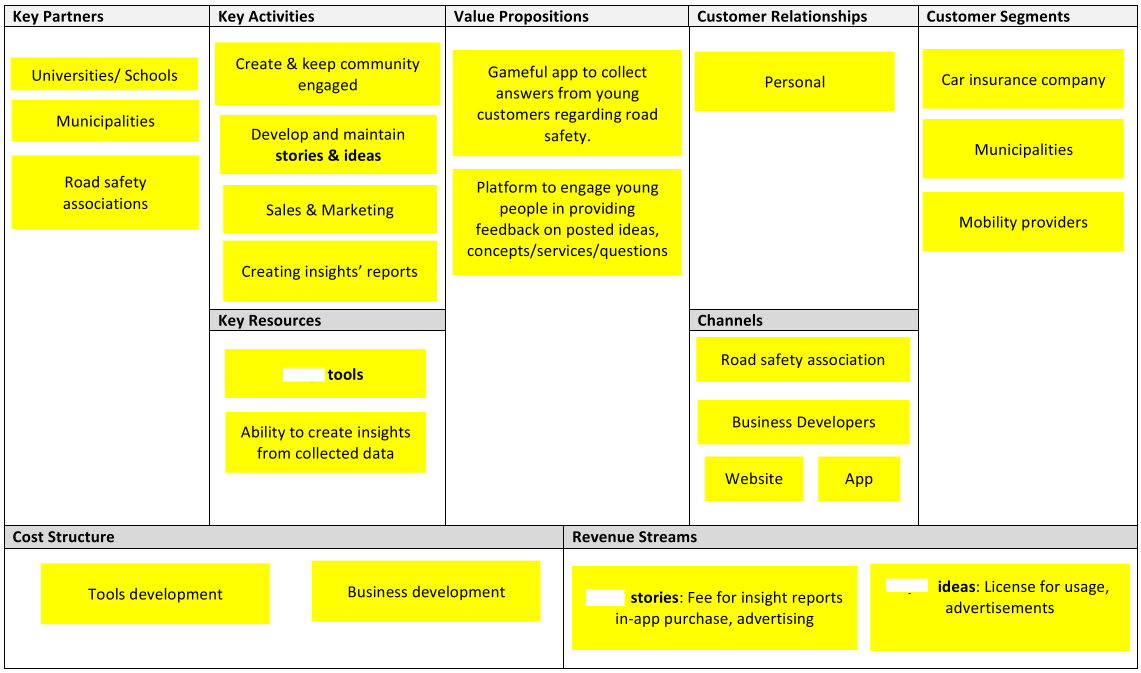

Fig. 4 The final business model Canvas after iterations (adapted from Osterwalder and Pigneur 2010)

1. **Business model tool: Persona-Organisata**
   a. **Purpose**: Identify potential customers for the offerings.
   b. **Action(s):** The project partners (with the support of the business model team) were divided into groups, which were randomly assigned to a group of similar stakeholders/users/customers. Then, the members of each group presented their own ideas regarding the offering.
   c. **Outcome(s):** The tool allowed the members of each group to think about potential customers. Based on the brainstorming session during the kick-off meeting, we decided to focus on specific stakeholders (i.e., insurance companies, municipalities, driving associations) and helped the stakeholders to gain the insight that additional market research was needed to support decision-making.

QUOTE: '*We are perfectly fine [to do market analysis], even if I must admit that we are not familiar with that kind of activity'.* (Quote extracted from email list)

2. **Business model tool: STOF Business Model**
   a. **Purpose**: Collect ideas from project participants for the initial version of the business model.
   b. **Action(s):** Brainstorming workshop on business models. The participants were introduced to the basic business model questions in the STOF tool and expressed their initial ideas.
   c. **Outcome(s):** Alternative ideas for several business model components were created. A fully complete business model was not created; instead, project partners made suggestions on what can be included in the business model components.

***QUOTE**:'[our aim is to] to push the rest of the partners to answer the basic business model questions'* (Quote extracted from an email exchange between business model team members).

***QUOTE**: 'Since the product was not fully defined and no launching customer was present at the start of the project, a lot of valorisation scenarios could be considered. Hence, it was decided to first define assumptions on the […] offering as well as high-level scenarios that specify the value proposition and paying customer/ sponsor.' (Quote extracted from official deliverable)*

3. **Business model tool: Business Model Canvas tool**
   a. **Purpose**: Initial design of the business model. Revision into multiple alternative versions, to reflect the changes made in the product definition
   b. **Action(s):** We created multiple alternative versions, to reflect the changes in the potential product descriptions. An intermediate version of the business models was discussed with the product team, which elicited feedback that made the business models more focused.
   c. **Outcome(s):** Product team and Leader stated which business model designs were more suitable for the project. We created multiple business models with Business Model Canvas as alternative business models were required.

QUOTE: '*Give us some business models' (Quote from face to face meeting)*

4. **Business model tool: Focus Group**
   a. **Purpose**: Evaluate potential product features with prospective users (i.e. young drivers)
   b. **Action(s):** A focus group was organized with young drivers to discuss the product features.
   c. **Outcome(s):** With this tool, we were able to identify what the users think of the offerings. Also, it led to the realization that there were alternative ways of using technology in the business model.

QUOTE: '*The students [i.e., the users] were rather critical, but gave some good, constructive feedback for the next design iteration.*' (Quote extracted from email database)

5. **Business model tool: Business Model Cards**
   a. **Purpose**: Identify potential revenue models
   b. **Action(s):** We identified and presented alternative revenue models to the project partners
   c. **Outcome(s):** We identified potential revenue models but could not make decisions.

(continued)

QUOTE: *'How do we decide which one?', 'You are the business model researchers; you can make better decisions. How do we make money?'* (Quote extracted from meeting minutes)

6. Business model tool: Competitor analysis

a. **Purpose**: Analyse existing offerings in the market and map them as competitors

b. **Action(s):** We used the tools and performed desk research on (potential) competitors. After we discussed the results within the business model team, we presented the results to the project partners.

c. **Outcome(s):** We decided to create alternative business model scenarios and present these to the project partners

QUOTE: '*Since it is not clear what the actual product or service will be and on what aspect it will focus (e.g. measuring and changing driving behaviour and/or social behaviour, or a platform to measure where the insights will be sold, etc.), it is too early to start a brainstorm about the VPC [Value Proposition Canvas] and to create a business model.' (*Communication between the business model team members, *quote extracted from email database).*

QUOTE: *A finding from this initial step was that the added value from the [product] was not clear immediately, partly because the product was still under development […] Partly as a consequence of this finding, the product development task increased their focus on chat / gamified survey functionalities for collecting perception / psychographic data that complements factual sensor data.'* (Quote extracted from official deliverable)

7. Business model tool: Business Model Roadmap

a. **Purpose**: Create a practical action plan for launching and scaling up the start-up

b. **Action(s):** We created a roadmap for different phases of the start-up. The idea was that the business model as designed at that point would not sustain in the long-run, and required to be changed in the future. We defined a roadmap between the 'current', 'near-future' and `long-run future' business model.

c. **Outcome(s):** Finding a viable and scalable business model was a challenge, requiring more extensive interaction with (external) stakeholders.

QUOTE: *'Create a practical action plan for launching and scaling up the future start-up.' (quote extracted from email database).*

QUOTE: *'The belief is that the current final business model will not sustain in the long-run. Therefore, different business models are needed in the future. In the long-term future, the [product] could be offered as a white label for any application domain in which young people are to be involved proactively in creating stories. […] In addition, [the offering] could be integrated with third-party apps or advertisements can be added.'* (Quote extracted from official deliverable)

8. Business model tool: Pricing Strategy Cards

a. **Purpose**: Develop alternatives for pricing models

b. **Action(s):** Based on the pricing strategy cards, we identified six alternative pricing patterns and examined how they could be applied for the specific case.

c. **Outcome(s):** The project partners were not able to make decisions.

QUOTE: *'The results of this analysis were intended to make the new start-up more aware of the available options when deciding how to price their services in different contexts and which revenue models could be used.'* (Quote extracted from official deliverable).

Evaluation

As part of the project, a start-up has been initiated that will exploit the results. Based on the business model development results, finding a viable and scalable business model was still a challenge, and would require continued interaction with stakeholders. Several scenarios were explored through interviews with various paying customers, from insurance companies and parcel delivery companies to municipalities and road safety associations. Initial evaluation with stakeholders shows that, in principle, there is interest in the offerings.

A challenging part of this project was that the offering was not clearly defined up-front. As no launching customer had been defined either, there was much room for creativity but also a wide-ranging set of business model designs. In some instances, the business model team triggered the other teams to make decisions regarding the offering. For instance, the creation of different potential business models triggered the design team to make an overview of potential offerings. The market and competitor research was instrumental in finding out the competitive edge of the offering, which in turn steered product development. When the results were presented to the other project partners, discussions led to rejecting certain business models, while retaining others. After several iterations, an offering was decided upon.

The use of the tooling helped to make the business model design more specific, which was the main challenge in this project. The tooling also helped to communicate the results to the project partners. Developing the product and the business model in parallel resulted sometimes in challenges. The product was not clearly defined in the early stages of the project; hence the initial business model designs do not fully match the final product. Additionally, there was not always a clear distinction between paying customers and end-users. Early in the project, it was clear that the role of the (paying) customers and user roles should be separated as young drivers are not willing to pay; however, the available tools do not always make such distinction. Another challenge was that the business model tools are not made for businesses that are still exploring. Active and iterative business model experimentation was needed as the offering was not clearly defined and new technologies enabled new value propositions.

Specifying learning

While specifying learning is the activity described the last, it was an ongoing process in practice. What we learned was that

when the offering is not clear, the potential stakeholders, customers and target group are not clear either. Project partners were asking the researchers to suggest a business model, whereas this was challenging without a specific offering. While we did not fully answer to their request, we created ***an initial business model that was adopted throughout the project***. From the whole process, we realized that the business model exploration is becoming more focused when there is an initial business model to work upon. The initial business model allowed iterations that provided advantages. For instance, the market and competitor research was instrumental in finding out the competitive edge of the offering, and thereby steered product development. These advancing decisions were continuously reflected in updated versions of the business model design.

We learn that ***when the offering is not clear, alternative business model scenarios are needed***. Exploring the alternatives can give ideas and reduce the possibilities when one idea is not feasible. That helped project partners realize that they did not need to focus only on the 'obvious' customer groups. Customers from other fields are possibly interested in the product as well. Also, ***revisions and flexibility are important when experimenting with business models.***

Using business model tooling from the start of an innovation project allows identifying questions that need to be answered, thus ***providing more direction in subsequent steps of business model development***. The tools were useful especially when the business team wanted to communicate findings to the other partners, as partners had no prior experience with business models. Furthermore, ***business model tools helped make the design process more focused.*** In most instances, the researchers used the tool and then presented the results to the other partners. The other participants acknowledged that the use of the tools made the process easier and more focused.

The project partners often asked for our opinion on what option or business model alternative to select. Deciding upon a business model or choice within a business model component (e.g. which pricing model or product offering) is a challenging task in a setting of start-up creation. ***Existing tools supported creating alternative models but did not sufficiently facilitate the decision-making process.*** What we realized is that most of the existing business model tools follow a fill-in-the-blank approach, whereby users need to add information manually. In some cases, users lack knowledge of what type of information is actually needed, which implies that creativity is needed on how to fill in the blanks (Szopinski et al. 2019). Additionally, the evaluation of business models is not sufficiently addressed as the existing business model tools do not have features that support the evaluation of business model changes and alternative business models.

Discussion

For our research, we actively intervened in an innovation project aiming at creating a start-up that improves the mobility behavior of young people. The start-up is officially launched with some of the project participants as its shareholders. The start-up is based on the delivered business models. We, the researchers, are not participating as shareholders of the start-up and thus we are not able to access financial data. It would be interesting to follow the created start-up as it goes to market, and track the dynamics of the business model design and the implemented business model over a longer period of time. The time passed after the project end is not sufficient to make conclusions on whether the start-up is successful or not. The survival rate of European start-ups is 80% while the year-on-year survival rate is gradually falling with less than half of the enterprises surviving after five years (Eurostat 2018). At the time of writing (2020), the start-up is operational and promotes the marketable offering in events throughout Europe.

We found existing business model tools mainly facilitate the creation of single business model designs. Existing tools do not support the design of alternative business models, which is necessary when offerings and target market are not defined. More specifically, existing tools are not tailored to illustrate alternative business models. Eventually, we made and iterated multiple versions of business model canvas descriptions. The use of multiple business models canvases was not sufficient, as it was difficult to compare the business model components, to discuss the business models, and to record subsequent changes. Also, during the brainstorming sessions, we had difficulties to compare the models and to keep up with suggestions from project partners. Our experience indicates that future business model tools need to be more automated, allow the creation and comparison of multiple business models, without creating a large number of versions of the same business model template.

Finally, our experience with the business model tools is that they support the design of a business model, but largely do not support comparing and deciding upon the most suitable business model. We suggest that future business model tools should have features that support the decision-making between business model alternatives.

From our analysis, we made three observations on how business model tools facilitate business model exploration. From these observations, we provide our recommendations on how existing tools could facilitate business model exploration. We also provide recommendations on what future business model tooling should support, see Table 4.

We can compare our findings to the existing literature.[3] We found business model tools are difficult to use when faced

[3] Note that we do not consider here specific branches of literature that focuses on how business model tools can contribute to specific goals of interest, such as sustainability, as this is not the focus of our paper (e.g. Bocken et al. 2019).

Table 4 Recommendations for the development of future business model tools

Facilitating business model exploration with existing business model tools was challenging...	Recommendations on facilitating business model exploration with available business model tools	Future business model tooling should...
... because participants requested explanations on what the elements (or building blocks) mean and examples of how they can be filled out	Use examples of business models created with tools such as Business Model Canvas or STOF business model. Use different business model tools to gradually advance understanding (Heikkilä et al. 2018).	...support the design of business models even when the building blocks are not clearly defined
...as multiple alternative business models had to be explored, since initial offerings and target markets were not defined	Since users had to repeat the process to create alternative business models, it was not obvious to them how to create alternative business models. Implementing multiple business model templates to design multiple business models is challenging. Future work on more complex business models is needed.	... facilitate creating alternative business models within the same template
...as decisions had to be made on what alternative business models to retain. Practitioners were not confident to make decisions regarding which business model to choose	The involvement of experienced consultants would facilitate the guidance of the project partners throughout the process.	... have features that support the decision-making regarding business model alternatives

with high uncertainty and ambivalence over the offering. This finding differs from the study by Täuscher and Abdelkafi (2017), who suggest that brainstorming webs help in the ideation phase. The need for tools to support creating multiple alternative business models resonates with ideas from Augenstein and Maedche (2017), who develop a configuration tool to quickly make and evaluate changes in business models. Our findings indicate that available business model tools provide limited support to decision making. Available business model tools such as Business Innovation Kit (which offer techniques such as voting or pitches) could be used. However, it should be kept in mind that Eppler and Hoffmann (2012) found that digital business model templates lowered creativity and willingness to adopt the developed business models, whereas physical objects do not perform better than providing an empty sheet.

Our finding that business model tools helped to communicate between the business model team and other teams is in line with other studies. For instance, Ebel et al. (2016) and Simmert et al. (2019) find that business model tools help to design business models collaboratively in a virtual environment.

Conclusions

In this study, we examined how existing business model tools facilitate the process of business model exploration, in settings where companies actively create new business model opportunities. Similarly to Iriarte et al. (2018), who argue that additional research is necessary on how managers in practical settings can choose and use tools for service value proposition design, we argue that additional research on the business model tools can be useful to improve the business model innovation process. The results are important for understanding the scope in which existing business model tools can be applied, as we show that existing tools do, to some extent, facilitate business model exploration. Further, our results inform future tool development, through the three requirements that we derived. Specifically, we found that tools for business model exploration should allow defining business models when initial building blocks are unclear, should facilitate creating alternative and multiple versions of business models, and should facilitate decision making while comparing business model alternatives.

As with any other qualitative interpretive study, action research has limitations. A limitation of our paper is that the results are based on one single project. Action research as a method is conceptualized as '*fit a specific purpose*' rather than '*fit all purposes*' (Melrose 2001). A specific characteristic of our setting is that the dynamism in the mobility-for-young-drivers domain is particularly high at the moment, with both regulatory dynamics (e.g. policies for reducing smartphone use in cars) and market/technology dynamics (e.g. connected cars). This environmental dynamism led to high uncertainties over offerings and competition, which may have made exploration even more important than in other settings. Additionally, for our study, we did not consider that different users apply the same tool in different ways. Also, in a realistic setting, how well a business model tool is used, depends on the user. For instance, a very experienced user might use a tool in more apt ways than an inexperienced user.

While the results were grounded in entries systematically collected in a logbook, memos, minutes and emails, the active

and personal involvement of the authors in this action research project could be a source of bias. To increase the validity of our results we communicated to and received feedback from the project partners after each activity (e.g. by giving presentations, virtual meetings, face-to-face meetings.

The final limitation is related to the iterative nature of business model exploration, which we do not discuss in detail. We argue that an agile approach could support the iterative process of business model exploration, especially within innovative projects in which researchers, managers and consultants collaborate (Bouwman et al. 2018b). Future studies could investigate the role of agility as a supportive method for business model exploration.

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Tool	Link to the business model tool format
Persona-organisata	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1580afbbf8dx-7c32
Business Model Canvas tool	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1580afbbf8dx-7b23
STOF Business Model	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1581e85462dx20a5
Focus Group	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1580afbbf8dx-6763
Business Model Cards	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1580afbbf8dx3880
Competitor analysis	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1580afbbf8dx4747
Business Model Roadmap	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1580afbbf8dx5b56
Pricing Strategy Cards	https://www.businessmakeover.eu/platform/envision/tool-detailed-view?id=f6a1edce7ea84edex-515e165ex1581e85462dx5190

Appendix

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