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## Research-by-design: stimulating entrepreneurship and innovation

Sarah Serneels, Francis Dams, Alexis Jacoby  
University of Antwerp, Antwerp, Belgium  
[sarah.serneels@student.uantwerpen.be](mailto:sarah.serneels@student.uantwerpen.be)  
[francis.dams@uantwerpen.be](mailto:francis.dams@uantwerpen.be)  
[alexis.jacoby@uantwerpen.be](mailto:alexis.jacoby@uantwerpen.be)

**Abstract:** Entrepreneurship is important in many ways. On many occasions, researchers have stressed the importance of entrepreneurship for economic growth. As a result, entrepreneurship is stimulated and supported by many initiatives in order to increase the number of entrepreneurs and to increase the success rate of these starting firms. Prior research mentions the drivers and the barriers for individuals to start a self-employed career. Among the drivers the need for independency and the opportunities for a higher income gain the upper hand. On the barrier's side risks and uncertainty prevail. In the group of barriers for starting an enterprise two aspects are important: the need to find a proper business idea and the need to find complementary competences in one or more co-founders.

This paper proposes a research-by-design approach tackling these two important barriers for entrepreneurship. Through the design of a product-service system the potential field of opportunities is scanned and mapped in order to find solutions for the most important gaps, which are -in turn- being evaluated by the process stakeholders. The research-by-design project follows a human-centered approach, integrating divergent and convergent thinking in the early development stages, in which we focus on the user's needs throughout the process of starting a business. The resulting product-service focuses on high potential entrepreneurs with a lot of experience in corporate business, having the skills for entrepreneurship but to whom the final step for a career switch is too big.

The solution integrates 4 important aspects: finding complementary competences, developing and enriching business ideas, designing the business and formalizing the cooperation between co-founders. It also differentiates on required speed in the start-up process and the status of the business idea at that point. Both the research-by-design process and the resulting solution build on the product development methodology in the front-end of innovation in which analysis and synthesis alternate, in order to propose validated solutions for a specific need.

**Key words:** research-by-design, entrepreneurship, cofounder, innovation

### 1. Introduction

Entrepreneurship is commonly accepted to be an important driver for economic growth. Prior research reveals that entrepreneurship has some positive effects on innovation, employment creation and economic growth (Van Praag & Versloot, 2007). The number of entrepreneurs in a certain region is a measure for the economic prosperity of that region. In her 2020 plan, the European commission focuses on the stimulation of entrepreneurship (European Commission, 2013) by funding relevant projects.

Stimulation of entrepreneurship suggests that the focus is on entrepreneurs to be. Ashcroft et al. (2009) make a difference between latent and potential entrepreneurs, both referring to not self-employed persons with a preference to be self-employed of which the first holds no specific business idea and the latter does. Both show a certain propensity towards entrepreneurship.

This research focuses on the barriers for entrepreneurship on an individual level and the way to overcome these barriers, in the specific context of Flanders, Belgium. Existing measures, taken locally by governmental organizations in order to support entrepreneurship (VLAIO, 2018) work in two directions. Firstly, a part of the initiatives focuses on individual propensity towards entrepreneurship with the intention to make potential entrepreneurs take the step into entrepreneurship. A second movement aims at increasing the personal capabilities of the starting entrepreneur in order to support him or her with the required knowledge, attitudes and skills for successful entrepreneurship (Dams, 2018). Our approach, however, focuses on potential entrepreneurs for which the barriers to entrepreneurship are not related to personal capabilities nor the lack of propensity towards entrepreneurship. The research digs deeper in the remaining barriers, offering both insights and practical solutions.

The project is conducted as a master thesis project in integrated product development at the University of Antwerp. The objective of this course, for the student, is to generate new innovative concepts for products or services or the combination of both, and to validate the novel concept with regard to desirability, viability and feasibility, which are seen as the cornerstones of any design thinking project (Brown, 2009). This way, the project serves a double function: to generate an innovative concept for a problem and to add new knowledge to the knowledge base regarding the barriers for entrepreneurship.

## 2. Methodology

This research project follows a design inclusive approach. Horvath (2008) makes the difference between research in design context, focusing on research in design related phenomena and design inclusive research. The latter refers to research activities integrating the design practice and thus, making use of the knowledge constructing power of creative actions. The purpose of a design inclusive research is to generate both new theoretical understandings and practical solutions to multidimensional problems. The design inclusive approach is appropriate for relative complex problems to be addressed in the real world, in collaboration with practitioners, in order to yield plausible solutions. These solutions, then, can be refined through reflective inquiry (Kennedy-Clark, 2013).

The design inclusive approach combines analytical research methods and constructive design methods. The methodology comprises three major phases (Horváth, 2008):

- The phase of explorative research actions, including the analysis of the current understanding of the phenomenon and the formulation of research questions and design problems.
- The phase of creative design actions, in order to solve the design challenge.
- The phase of evaluative research actions, including the verification and validation of the design outcome.

The design phase itself, described by Horváth (2008), is limited to the sequential phases of conception, design and prototyping. The approach during this project follows a more elaborate flow according to the design methodology used in the department of product design and development at the University of Antwerp (Braet & Verhaert, 2007; Jacoby, 2016). The design process consists of a process that runs through 5 elaborated phases:

- The phase of opportunity scouting and need detection consists of the exploration of existing problems and future opportunities with regard to market trends, users and technologies.
- The phase of idea generation, in order to find a multitude of possible options for innovation challenges.
- The phase of product and service definition, including the multidisciplinary analysis that leads to full requirements and specifications and a product or service architecture.
- The phase of system design solutions, integrating and solving the most critical aspects of the design challenge.
- The phase of product or service concept solutions, leading to the final validated concept in which all potential criticalities have been tackled.

Despite the fact that the 5 phases are defined as design phases leading to solutions, every phase consists of both analytical and synthesizing activities, alternating between divergent and convergent thinking and between design and verification.

### 2.1 Explorative research actions

The first part of the design inclusive research process concentrates on the definition of the new challenge. Entrepreneurship is considered a very broad theme so the subject is narrowed to the specific case in which potential entrepreneurs with a propensity towards self-employment are confronted with barriers in order to actually take the step into entrepreneurship. This way the target group of the project is defined and the research actions focus on gaining insights in the specific needs of the target groups within the actual context.

The early analysis comprises three elements:

- Analysis of the target group, by means of expert interviews
- Analysis of the decision-making process, using a Customer Journey Mapping tool (Stickdorn & Schneider, 2012)
- Analysis of the context, including the stakeholders and the existing solutions in the market, using a context-mapping tool. Also, the freedom to operate within the law is checked.

## 2.2 Creative design actions

The creative design actions include the actual design process in which two major questions have to be answered: what is the future product or service (or combination of both) that could answer the needs and opportunities, and how should it be designed in order to meet the specific context and requirements. The phase consists of sequential analysis-synthesis cycles in which firstly different needs are formulated and selected. Secondly, a myriad of ideas are generated and selected in order to come forth with the idea with the largest innovative potential. In a third phase, the full definition is compiled and verified.

As from there the pre-development phases of the innovation design cycle are finished (Braet & Verhaert, 2007) and the project moves on to the actual product or service development in which solutions are formulated for the key partial problems and integrated in a coherent principle solution that meets all the requirements.

## 2.3 Evaluative research actions

Although the specific needs haven been validated throughout the process, it is important to verify whether or not the overall proposed solution meets the requirements.

The evaluative research actions consist of the validation of the design proposal through both feedback by means of expert interviews as through a proof of concept. In view of the fact that the design solution consist of a product-service combination, the first validation concentrates on the service part during a pilot event with both potential and latent entrepreneurs: the co-founder night.

## 2.4 Data collection

Throughout the process, expert interviews have been used for data collection for both exploration and validation. In the first phase, the explorative research actions, 15 expert interviews have been held within different categories (table 1). In the evaluation of the proposals, 8 interviews have been held with entrepreneurs and organizations that support starting entrepreneurs in Flanders, Belgium (table 1).

Data collection was performed through semi-structured interviews with a wide range of diverse stakeholders. The approach can be seen as a grounded theory approach since the data collected was used to conceptualize, new ideas based on the concerns of the stakeholders in order to determine the variables that affect the propensity towards entrepreneurship.

Explorative research actions	Category of experts	# interviews
	Start-up owners	3
	Latent entrepreneurs	5
	Organizations	7
Evaluative research actions		
	Start-up owners	5
	Organizations	3

Table 1: expert interviews

The interviews were analysed without full transcriptions. During the explorative research actions, analysis was based on collecting and comparing relevant statements regarding the barriers and incentives towards entrepreneurship. In the evaluative research phase, statements were collected regarding the proposed concept. In both situations, the rich information was necessary to understand the conditions for which the statements were relevant (Hutjes & van Buuren, 1992).

Although the research approach suggests a clear division between the three main phases, some of the evaluative research actions have been performed in close iteration with the creative design actions, thus leading to an efficient interaction between ideation and verification.

### 3. The design challenge definition

The exploration into the field of potential and latent entrepreneurs leads to the definition of the design challenge or the opportunity for which a design solution could be the answer. During the explorative research actions, following base opportunities emerged:

- How to provide the right trigger or incentive for latent and potential entrepreneurs to actually take the step into entrepreneurship?
- How to support latent entrepreneurs by defining and selecting the right business opportunity to start with?
- How to overcome the perceived risks and uncertainties associated with entrepreneurship?

In order to define the related decision making process, 5 customer journey maps (Stickdorn & Schneider, 2012) were composed with 5 respondents in order to define which stimuli, motives and barriers they encountered in their specific journey from an employed to a self-employed career as entrepreneur. The results of the customer journey analysis provide deeper insights in potential triggers for entrepreneurship. While the unavailability of the right business idea is a potential barrier for taking the step into entrepreneurship, the possibility to act together with a co-founder, having a business idea but not all the required skills, opens opportunities for incentives into entrepreneurship.

Since the opportunities are related to the context in which they might be solved, a context and stakeholder mapping analysis was conducted in order to detect all factors that might influence the relation between the future user and the product-service (Sanders & Stappers, 2012) and thus, leading to boundary conditions for the eventual solution.

The market for supporting entrepreneurship in Flanders consists of a wide range of initiatives. Some of them are private, some of them are supported by the Flemish government. However, by analysing which opportunities were covered by one or more initiatives in the market, it was possible to detect the gaps regarding the above-mentioned opportunities:

- Smart matchmaking with possible co-founders
- Support for development of business ideas, taking into account the actual status of the emerging ideas

### 4. The design solution

Matchmaking with possible co-founders and developing new business ideas are the starting point for the ideation process. The design challenge was stretched with the additional driver to connect both opportunities. In an ideal situation the product-service to develop should integrate both aspects in order to create efficiency and effectiveness throughout the process. Developing business opportunities together is potentially a good way to interact with future co-founders.

The design process consists of different ideation phases in order to determine and evaluate a wide range of options. Since there are no stand-alone criteria to argue whether or not an idea is a good one, evaluation by comparing different ideas is the most appropriate option.

#### 4.1 Ideation

In a first round of brainstorming, conducted in a small workshop with generic creative minds, the design brief was challenged against triggering concepts such as 'engagement', 'inspiration' and 'information'. The quantity of ideas, in this round, is more important than the idea quality (Adañez, 2005). The main purpose of this session is to trigger new ideas and this way, extending the base of actual options. The brainstorm participants were asked to assess the different ideas against feasibility, impact, relevance and novelty.

#### 4.2 Idea enrichment

The roughness of the ideas doesn't permit to actually decide on the final idea to continue with. An idea enrichment phase was introduced to elaborate on the highest ranked ideas and to conceptualize first scenario's associated with these ideas.

1. The first idea is an online inspiration platform that could inspire people to find business ideas. The scenario describes how ideas are gathered and posted, how potential entrepreneurs can reserve

specific challenges and how they are inspired with tips and tools to actually deal with these challenges.

2. The second idea is an online matchmaking platform that supports to link potential entrepreneurs having business ideas to potential entrepreneurs lacking business ideas but having complementary skills. The platform focuses on automated profiling and matchmaking but supports the next step by providing tools and approaches to collaborate on the business ideas in order to actually connect and create an understanding.
3. The third idea is a pop-up environment that focuses on short triggers, mini evaluations and coaching on-the-spot, to stimulate entrepreneurship. It is a concept that lowers the first barriers for entrepreneurship by actually visiting the potential target groups within their proper context.
4. The fourth idea is a personal assistant concept, in which very personal support is alternated with group coaching sessions with fellow potential entrepreneurs. Through an extensive profiling, it is possible to find the gaps that need to be filled in individually.

For each idea, in this stage, was also assessed which potential business models could make these ideas viable in a private or a subsidized market.

Five respondents were asked to provide feedback through a semi-structured interview. They could score the enriched ideas on the predefined criteria of viability, feasibility, relevance, impact, novelty and potential interest. Additionally, they were able to comment on the specific details of the ideas, in order to determine boundary conditions or requirements related to these ideas.

### 4.3 Idea variations, product architectures and product definition

The prior phase has led to a ranking of ideas and additional information on how to optimize the different concept directions. Two ideas withstand the evaluation and again, they are enriched through the definition of alternative architectures. Product service architectures determine the functions of an idea and the way these functions interact with each other (Ulrich & Eppinger, 2008). The definition of the system borders actually determines which functions are included in the proposition and to which external functions it can be linked. Through redefinition of the system borders, alternative architectures can be proposed, leading to alternative solutions (Braet & Verhaert, 2007) for the product service system.

With regard to the matchmaking platform, the alternative architectures show how additional features can be added to the service, ranging from an extended facilitation of possible co-founders, to the facilitating of individual advice and the information on formal aspects of the co-founding trajectory (Fig. 1). The architecture also provides the first options for the underlying business model, showing which parts of the service are free and which involve payment.

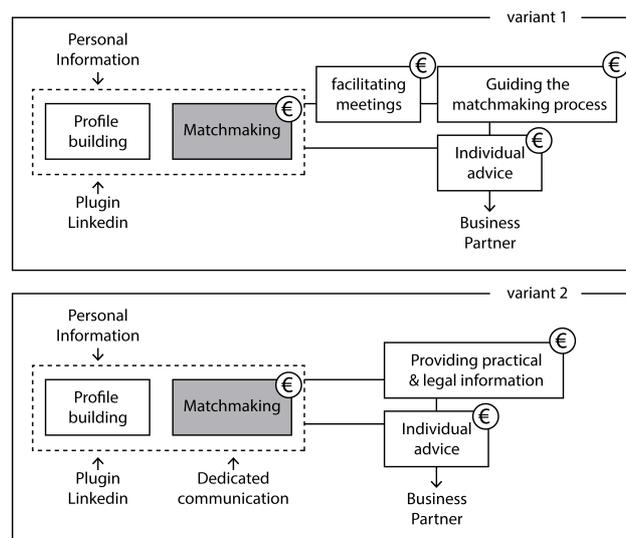


Figure 1: alternative product-service architectures for idea 1

With regard to the inspiration platform, the alternative architectures show different additional functions, related to the base function of providing latent entrepreneurs with business opportunities (Fig. 2). The main

difference relates to the fact whether or not facilitating the further development of the business idea is included in the service. A personal guidance trajectory for further development makes part of the service. Those additional features open possibilities for revenues.

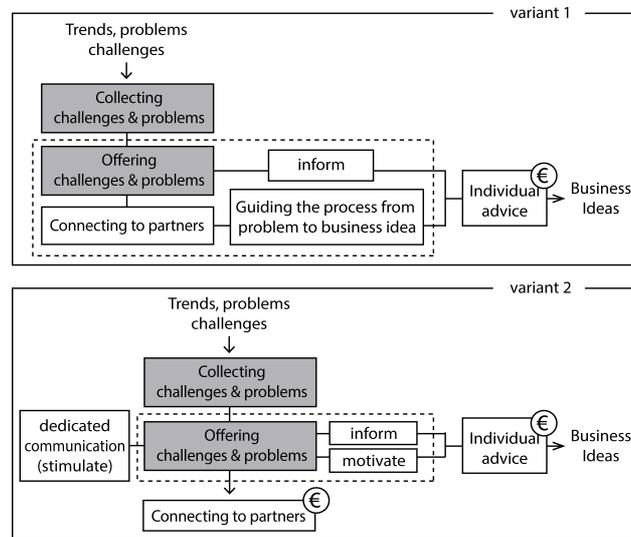


Figure 2: alternative product-service architectures for idea 2

Building on the alternative product architectures, the most important requirements for development are considered. They describe which qualities should be reached in the way the different functions - profiling, matchmaking, facilitation of potential co-founders, guiding the interpersonal connections - are solved. For the inspiration platform requirements are drawn for collecting business ideas and challenges, the way these challenges are translated to the potential entrepreneurs, the communication, the way entrepreneurs can connect with the specific business cases, and the way the entrepreneurs can be supported with the further development of the business idea.

#### 4.4 Product service solution

Previous phases have answered the question why a solutions is required and what the answer should be to the needs detected. In the solution phase, the question turns to 'how?'. Despite the fact that ideas have been generated and defined in a certain direction, the actual result evolves to a new integrated solution. Expert interviews with potential users of the service (Table1) favour certain requirements and specifications but do reject others. As a first step to the actual solution, the product service idea is altered in favour of a combined solution, providing both possibilities to connect with potential co-founders but also, in course of this process, take a firm step forward in the actual development of the business idea.

An essential element, however, in the development of business ideas is the fact that the starting point of business ideas differs to a great extent between cases. Some business ideas are defined as an observed need, some business ideas are defined as a dedicated opportunity and some are defined as a real solution. Starting from a different entrance point, the process for further development requires an adapted approach to those different needs. As such, an essential element of the concept is to differentiate between business idea level, taking into consideration to which extent the idea is actually defined.

A second essential element to the solution is the fact that participants have a different time frame in mind. The expert interviews show that some potential entrepreneurs start slowly. They are only interested to take the step towards entrepreneurship if they find the business idea and the potential co-founder that suits their interest. They are exploring the option but there is no strong urge to take the step. The second group of potential entrepreneurs is beyond this point. They have taken a decision and feel a strong urge to develop their business idea and to find the additional competences needed for their start-up. The product-service solution should take into account these requirements.

#### 4.4.1 Concept description

The final product service concept is a service in which potential entrepreneurs are brought together to connect with potential co-founders. Throughout this process they are encouraged to get known each other and, at the same time, further develop the new business idea one of the co-founders brought into the potential partnership.

The service provides a platform in which potential entrepreneurs can complete their profile. Based on these profiles and potential matches, co-founder nights are organized in which the participants meet with potential partners based on both profile matching and individual choice. The co-founder nights are organized in a way that an innovative mind-set is created towards the business ideas by providing tools and knowledge that can be used to enrich emerging business ideas.

When the co-founder nights lead to specific matches, the potential co-founders have the option to start a stand-alone co-founder process programme focussing on 4 targets:

- Developing and enriching the business idea, broadening the solution space and looking into alternative solutions for the same need or opportunity.
- Developing the business design and business plan
- Considering and deciding on the formal aspects of the partnership
- Learning about the values and drivers of the potential partners.

The programme is supported by a co-founder kit providing the approaches and tools for attaining the above mentioned targets. The co-founder kits have different content for both partners in order to reduce the possibility that they wouldn't work together on the issues. The kit includes both adapted and existing tools and even consultancy options from specific Flemish organizations providing a specific value in this process. Other tools are adapted to suit the specific needs of the co-founder challenge. Figure 3 gives an overview of the entire product-service.

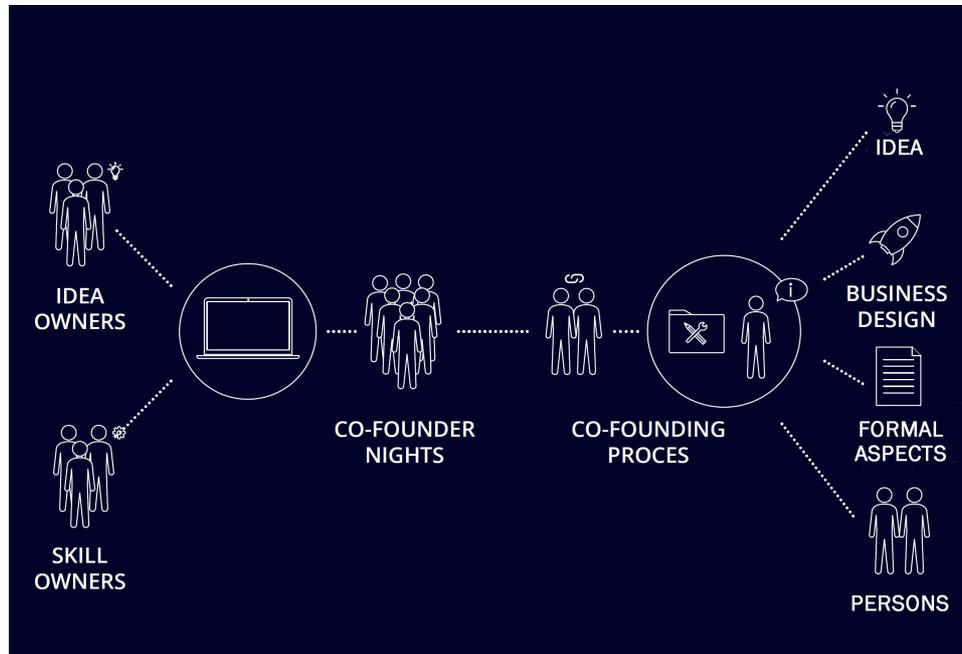


Figure 3: Product-service concept

#### 4.4.2 Business Model

During the definition phase of the design trajectory, a business model is set-up simultaneously in order to define the viability of the product-service. Compliant with a design approach including divergent and convergent thinking, multiple options for viability have been compared in order to define a final viable model. The proposed business model includes both a basic and a premium membership. The basic membership model targets latent entrepreneurs exploring the possibilities for entrepreneurship without having a concrete deadline in mind. Linking to the platform is free but a limited fee is paid for every co-founder night they attend. The revenues are related to the active participation during the events. The premium membership targets potential entrepreneurs with an urgent need for co-founders. They pay a high fee as from the start of the programme but can fully access the database, attend all co-founder events and additional supporting events during a certain period of time.

### 5. Pilot event

In order to validate the first part of the product-service solution a pilot event was organized for co-founders to attend. Through the network of the chambers of commerce of Antwerp, potential entrepreneurs were addressed to join this co-founder event. 48 persons answered positively to this call and filled in the online questionnaire to provide full information regarding their personal offer and needs. 18 profiles were selected to actually join the pilot event. Profiles were selected based on the potential matches between participants and the potential market segments they intend to work in.

The pilot event was organized as follows:

1. Welcome and possibility to look into profile cards attached to the wall
2. Short speed dating with 5 potential co-founders
3. Short break - preparing connections for the next step
4. Joined exercise between two participants
5. Free networking

The different tools for the joined exercise were tested in a preliminary test setting with 12 participants. Six pairs of people, related to each other by the fact that they work for the same employer without knowing each other, were asked to test 2 of the exercises each and to provide feedback on the process of the exercise and the way it serves its purpose: obtaining better insights on potential collaboration with the other party.

The feedback was used to refine the specific exercises.

#### 5.1 Profile cards

During the welcome drink, participants could walk around and look into detail into the profile cards of all other participants which were linked to the personal LinkedIn profiles online. This way, participants could gather extra information regarding the careers of the other participants.

#### 5.2 Speed dating

Based on their potential profile matches, every participant could have a short conversation with 5 other participants. The short speed dates took 5 minutes each. The participants could use a card set with generic but atypical questions in order to dig deeper into the values and characteristics of the conversation partners. After the sessions, candidates could mark their potential matches.

#### 5.3 Short break

The short break was meant for the organizers to actually match potential co-founders for the next step. Meanwhile participants could have a drink, get informed and have informal chats.

#### 5.4 Joined exercise

All participants were matched to a potential co-founder. Every pair received an assignment to work on for half an hour. The assignment combined existing tools used in business definition and innovation workshops but were adapted in order to learn about the tools but also about each other. The tools triggered intense collaboration providing insights on the way the other deals with creative challenges.

## 5.5 Free networking

The evening was closed with a free networking moment where participants could informally meet and talk. All participants were asked to assess the co-founder event in detail.

The results of the assessment provide no validation of the fact that co-founders events actually work but do provide valuable insights regarding the way this co-founder event was designed. Overall, most of the participants were happy with the event and indicated their willingness to participate once again if the possibility would occur.

The specific programme was perceived positively by most participants although a difference could be seen between the participants seeking a very supported approach for meeting potential co-founders and those, seeking a very open, unstructured approach for meeting people, without the supporting tools to actually connect with others.

## 6. Conclusions and recommendations

Our research contributes in two ways. The design inclusive research reveals a new product-service system that supports both the first steps into entrepreneurship and the development of new business ideas along the way. Secondly, it shows that the design inclusive research approach is a valuable approach in order to formulate novel solutions for existing needs. The design itself, but mainly the verification of the underlying principles of the design solution, provides better insights in the way potential entrepreneurs want to be supported in their journey towards entrepreneurship. Although the number of respondents related to the exploration and validation research actions is limited, their feedback provides valuable insights in the way an eventual solution could add value to the process of lowering the barriers to potential entrepreneurship.

The research by design approach follows a path that gradually defines a product-service idea and convert it in a validated product-service concept. Although the way to the solution is not rectilinear, every step taken leads to the right direction and creates a better understanding of the actual problem and narrows down the potential fields of solutions.

Our research definitely points to the need for supporting the process of finding complementary competences in co-founders and, along the way, develop business ideas and decide and agree on formal aspects of future partnerships. The novelty of this concept is to be found in the way partial solutions for several barriers are integrated into one integrated product-service and the way the solution takes into consideration a differentiated entrance point for both skill owners and idea owners.

Our research pointed out that the actual status of the business ideas, together with the diverse intentions and characters of potential entrepreneurs, are the most important aspects to anticipate on. A one-size-fits-all solution provides no answer for the diversity of the needs.

It is our recommendation for future research to actually roll-out this product-service concept on a larger scale and to detect in which way this solution enables potential entrepreneurs to overcome existing or perceived barriers. Due to the fact that the service part of the product-service is highly adaptable, real-life testing provides the best opportunities for improvement.

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