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Designing Smart Cities: A Participatory Approach to Business Model Teaching

Tim Mosig[1], Wafa Said Mosleh[2], and Claudia Lehmann[3]

Abstract

This paper presents the design and content of a business model course for executive education. The course is inspired by the Scandinavian participatory design approach, which invites cross-disciplinary and interactive engagement. It demonstrates how a situated learning experience enables a contextual process of inquiry among participants.

Introduction

In recent years, business models (BMs), which support articulating "how a business creates and delivers value to customers" (Teece, 2010, p. 173), have received increased attention in academia and practice (Zott *et al.*, 2011). This practical approach helps explain the underlying economic logic of how businesses can deliver value at a reasonable cost and, inspired by Osterwalder's (2004) BM canvas, how they can be developed and visualized in a structured way.

Although various BM ontologies and frameworks have provided a shared language for the description and visualization of BMs, its development still requires interdisciplinary knowledge from the fields of marketing (customer segmentation), strategic management (value propositions), and procurement and logistics (key resources). Furthermore, as models are simplified representations of reality (Stähler, 2002), BMs' multidimensionality (Evans *et al.*, 2017) and complexity increase as constant technological and socio-economic developments influence business and society. At the same time, globalization increases competitiveness, which requires businesses to remain responsive to the market. Hence, it is necessary for a business to continually question and reframe its BM (Osterwalder, 2004). While BMs were previously the joint affair of management and business experts, interdisciplinary

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1 HHL Leipzig Graduate School of Management – Center for Leading Innovation and Cooperation, tim.mosig@hhl.de
2 Department of Design and Communication – University of Southern Denmark/Danske Bank, wafamosleh@gmail.com
3 HHL Leipzig Graduate School of Management – LF Group Chair of Digital Innovation in Service Industries, claudia.lehmann@hhl.de

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efforts have increasingly proven to be crucial for the development and implementation of new ideas (Buur *et al.*, 2013). Thus, facilitating meaningful interdisciplinary conversations regarding BM development has, over the last decade, increasingly become a key concern for businesses. As a result, BMs have found their way into academic curriculums.

Teaching BMs with the purpose of bridging theory and practice requires us to think of learning as a situated practice that invites participation in activities (exploration, problem-solving, and reflection) that contribute to the development of successful BMs. The activities designed for the course presented in this paper are based on the understanding that learning is situated (Lave & Wenger, 2008) and thereby a contextual process of inquiry. Furthermore, in the spirit of Lave and Wenger's (2008) theory of communities of practice, such learning is not simply an individual experience, but something that emerges between participants. With this foundation, we emphasize that the teaching and learning of BMs cannot be defined as or limited to a cognitive activity. Instead, we understand learning as understanding in practice (Lave, 1997) and as a relational process that emerges as patterns of meaning in the evolving relationships between those involved (Stacey, 2005). Thus, with BM development involving various stakeholders, we emphasize that teaching and learning about it emerges through collaborative inquiry that embraces the participatory design (PD) approach presented as the foundation of our course design.

Developing BMs for smart cities

Based on the above-described challenges and opportunities, we developed a BM course for MBA students (as part of executive education) using a participatory format to explore the topic from an interdisciplinary perspective and facilitate interaction among participants throughout the course (Hains & Smith, 2012). The learning objectives are to:

1. Understand the components of a BM and describe and analyze different types of BM designs,
2. Strengthen their capacity to develop digital and technology-enabled BMs,
3. Gain the knowledge needed to use PD tools to work on new and innovative BMs, and
4. Recognize and reflect on the customer experience journey and apply relevant methods to explore customer needs.

The course was taught at a well-known business school in Europe and was run three times at different lengths: 1) part time across five consecutive days, 2) part time over two days, and 3) full time for one day. Altogether, the three courses involved 122 participants from different geographical locations in Europe.

To ensure a practice-oriented approach for teaching BMs, we chose to ground the course in the concept of smart cities. We contextualized the structure and content around the smart city topic, using the following definition:

> *A smart city is a well-defined geographical area, in which high technologies such as information and communication technology [ICT], logistics, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion, and participation, environmental quality, [and] intelligent development.* (Dameri, 2013, p. 2549)

In addition to this definition, a smart city shows the following dimensions (Table 1).

Dimensions of a smart city	Related aspect of urban life
Smart economy	Industry
Smart people	Education
Smart governance	E-democracy
Smart mobility	Logistics & infrastructures
Smart environment	Efficiency & sustainability
Smart living	Security & quality

Table 1: Dimensions and related aspects of urban life in a smart city (Lombardi *et al.*, 2012)

The word *smart* is stressed in the course material. Each dimension of a smart city consists of numerous products and services (smart components) connected to one another. According to Kulakov *et al.* (2016), smart services utilize intelligent components, such as information, decision provision, and communication, to continuously acquire and apply knowledge. This helps adapt the services to customers' preferences and improves quality, reliability, and user experience.

In terms of products, smart cities have "the ability to communicate and interact with their environment and other smart products by using internet-based services [...] as well as the capability to react in real-time and their potential for dynamic reconfiguration" (Abramovici *et al.*, 2018, p. 734). Thus, a smart city relies on services and products that are interconnected and communicate with its environment. Due to the broad application of ICT solutions and the importance of them in the context of smart city development, it is possible to collect data that may contribute to a citizen-centered, sustainable, and value-creating smart city design.

Using the smart city concept for teaching and training BMs has proven advantageous, as it focuses on the benefits of citizens, implying that participants should take a customer-centric perspective. The customer focus is increasingly taken into account in businesses' strategic considerations. At the same time, a smart city needs to offer different services and facilities, grouped into functional districts (Lee & Lee, 2014), to its citizens, such as education and healthcare (Washburn & Sindhu, 2010). Therefore, each service and functional district requires different input factors, leads to particular outputs, and thereby adds value for the citizens in different ways (Albino *et al.*, 2015). Hence, we can compare the different functional districts of a smart city to businesses that offer various products and services, as both need to keep end customers in mind.

Based on the smart city topic, the MBA course was designed in six different stages, which participants needed to complete as part of their learning process about BM development. In the following sections, we present the methodological approach to the design and structure of the course and the details of those six stages.

Approach

The MBA course design is founded on the Scandinavian PD approach (Sanders & Stappers, 2008), of which the central component is to invite and facilitate participation in co-design processes. As PD represents a growing family of design practices that entails using a wide range of methods, it is difficult to describe it as simply one approach or as tools and techniques that may be applied regardless of the problem at hand (Brandt *et al.*, 2013). Instead, the activities must be strategically organized to serve a particular focus by remaining attentive to the complete experience that the participants will be engaged in. Thus, each activity needs to be coherently linked to the subsequent one to enable participation (Sanders & Stappers, 2008). Brandt *et al.* (2013) suggest the combination of activities that invite telling, making, and enacting to enable participants to influence future ways of living, learning, and being. This, in particular, is what the seminar program encourages through multiple modes of collaborative activity (see Figure 1). Together, these enable engagement of diverse groups (age, organizational hierarchy, functional and disciplinary backgrounds, and prior training) and support different stages of idea development (Sanders & Stappers, 2008).

Inviting participation through these methods encourage the exchange of different perspectives (Andersen & Mosleh, 2020) and professional disciplines in the group work (Burns *et al.*, 2006) and allow for new meaning to emerge. While the MBA course was designed based on a Scandinavian PD approach, participation emerges in the social interaction between participants and not necessarily due to the staging/facilitation of the activities (Mosleh & Larsen, 2020). Thus, participation in the workshop is not understood as an ideal of democratic engagement, which is mediated through specific methods, but rather as engagement that is encourages through the methods and which temporally unfolds in processes of social relating. The activities are an invitation to confront particular themes using particular methods, but the social interaction of participants is improvised, and the outcomes of such engagement are thereby unpredictable. Thus, participation cannot be staged or controlled through specific forms of engagement (Mosleh & Larsen, 2020), which generally challenges more traditional ways of understanding PD practices (Mattelmäki & Sleeswijk Visser, 2011).

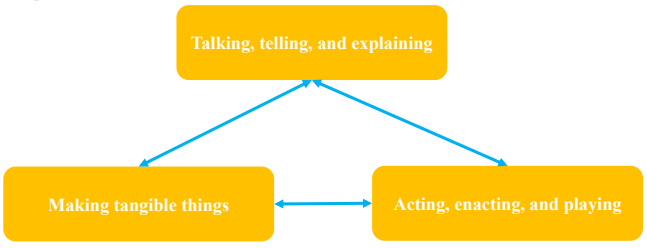

Figure 1: Framework of Practicing PD; own illustration, adapted from Sanders & Stappers (2008)

Methods applied in the Seminar		
	Method	**Comments on how method(s) affect(s) the business model**
Step 1 – Problems and Challenges	• Developing a short interview guide • Conducting semi-structured (customer) interviews • Analysis and discussion of findings • Developing a persona	• *to know who the customer is* • *to address real customer needs and not aspects assumed the customer wants get solved or addressed* • *to later on exactly know what the value is delivered to the customer and to articulate the value proposition(s) for the business model accordingly*
Step 2 – Diverge and Converge	• 6-3-5-method • Group discussions • Iterative process structures of getting feedback and refining ideas as it is also done in Design Thinking	• *to explore as many (business) opportunities as possible arising from customer needs identified before* • *to then choose the options addressing the customer need best* • *to define the activities/products/ services representing the activities*
Step 3 – Connectivity and Sustainability	• Brainstorming • Group discussions	• *to define key resources, partners, and output factors of the business model*
Step 4 – Experience Creation	• Customer Experience Journey • Prototyping with craft materials • Group discussions	• *to create the processes connecting all aspects defined so far for the business model* • *to see what kind of processes make most sense also considering the customer perspective*
Step 5 – Construction I	• Prototyping using: ° LEGO® SERIOUS® PLAY Methodology ° Other craft materials • Group discussions	• *to test the business models, processes, and workflows*
Step 6 – Construction II	• Prototyping using: ° LEGO® SERIOUS® PLAY Methodology ° Other craft materials • Group discussions	• *to implement the business (model) and connecting with external partners*

Table 2: Comprehensive overview of the methods applied throughout the seminar

The application of the described PD approach is realized in the design and structure of the course, where participants are invited to engage with the following six themes: 1) *Problems & Challenges*, 2) *Divergence & Convergence*, 3) *Connectivity & Sustainability*, 4) *Experience Creation*, 5) *Construction I*, and 6) *Construction II*. Notably, these themes involved a variety of methods, such as the LEGO®SERIOUS®PLAY[1] methodology, customer experience journey, and persona development. A comprehensive overview of the methods involved and how they contribute to the understanding of BMs is provided in Table 2. Additionally, in the following paragraphs, the themes, how they are addressed using the different methods, and how they may contribute to the teaching of BMs are delineated.

Before commencing the activities, participants received a brief kick-off lecture on the topic of smart cities. The lecture related to current events and/or economic, technological, or social challenges that are known to influence a company's BM.

Stage 1. Problems and Challenges

The participants were divided into groups of three to five and each assigned to one particular district, e.g., *retail*, *culture and education*, *mobility*, and *health*. The

[1] https://www.lego.com/en-us/seriousplay/trademark-guidelines

groups were asked to develop products, services, and processes to satisfy citizens' needs and solve challenges central to the smart city concept. They also developed the corresponding BM for these districts throughout the duration of the course.

During the first stage, the groups were asked to develop a short semi-structured interview guide (Blomberg & Burrell, 2012) to help them explore the existing challenges and needs of users/citizens in the context of the particular district. Here, the district was viewed as a real-life business situation that the customer establishes contact with. Subsequently, the interview was conducted with either the general public in the streets or some of the other course participants. During the interviews, participants gathered relevant details about the needs, challenges, and reasons as to why those needs are important to the customers/citizens. Finally, they discussed the collected insights and summarized their findings. This led to the development of a persona—a stereotypical person—that they wanted to develop their solutions for in the following stages. In some cases, two personas were developed if the needs and challenges were too diverse to fit into one. Effectively, the goal was to empathize with the customer/citizen and identify real needs that can be addressed and resolved by the BM. In this manner, customer centricity was taken into account.

Stage 2. Divergence and Convergence

During the second stage, participants underwent a process of *divergence and convergence*. The objective was to generate as many ideas as possible within a short time and then to narrow them down to two to three ideas. Each idea needed to be a service or product capable of addressing the previously identified customer need(s). The participants started by applying what we call the 6-3-5 method: six participants in a group passed three ideas around to receive feedback five times. In our case, based on the number of participants, the groups chose the same number of challenges from a set of problems that they identified during the *Problems and Challenges* stage. Each participant was assigned one challenge (a previously identified customer need). To address this challenge, participants were asked to explore three distinct (potentially "smart") services or products. Those ideas were then passed around to other participants within the group for feedback, which, in this case, was mainly a remark on how to develop the idea further. This method was adapted according to the number of participants in each group.

Having circulated the ideas mentioned earlier, each participant came to know all the proposals made by others. In a group discussion, they reflected upon the various ideas and finally agreed on one approach per challenge. In some cases, several ideas were combined. Through the subsequent discussions, participants then delineated the proposals and presented a clear, actionable solution for each challenge chosen. At the end of the discussion, the group agreed upon one product or service they wanted to work with. This needed to be a well-defined solution that clearly explicated how it can help meet a need/resolve a customer's challenge and thereby contribute to value creation in a smart urban environment. Effective and efficient communication was essential as the learning inside the individual participant was shared among all participants within the group via social interplay.

Stage 3. Connectivity and Sustainability

In this stage, participants engaged in addressing value propositions, delivering, and capturing, thereby dealing with the core aspects of a BM. Additionally, they were invited to consider key partners, resources, and channels. As each group addressed more than one customer need for their chosen district, all groups were required to ensure coherence in the value propositions of their proposals so that they were prepared for the subsequent step.

During the *Connectivity and Sustainability* stage, participants considered the underlying value propositions of their proposals (i.e., the services or products). At this point, it was important to determine the different value propositions coherently so that they could narrate a reasoned story to the customer/citizen as to why these offerings are best suited to address a particular need. Accordingly, participants decided how the value was to be delivered to the customer/citizen.

Participants needed to delve deeper into their solution proposals and determine the necessary input and output factors. They discussed the necessary means to realize the solution in terms of key resources and partners and what the outcome of the solution may be. Meanwhile, participants also needed to consider

how to deal with output factors and the number/type of districts they could connect to achieve sustainability. Effectively, participants also dealt with the question of how the value should be captured. Hence, each group developed key elements of a new BM.

Regarding input factors, particular data could become necessary to realize and deliver the service(s) or product(s). However, the data may have already been generated in another district or at another citizen touchpoint. Therefore, at a later stage, participants would need to identify connection points with other districts. In this current stage, they only needed to remain attentive to the circumstances and potential challenges to delivering the solution.

Stage 4. Experience Creation

In this stage, participants approached the first physical artifacts. All considerations they had made, along with their interim results, were now weaved into a story. The participants were asked to design a customer experience journey including all services or products, their related value propositions, and channels in addition to the identified input and output factors. The customer experience journey supported the participants' thinking about how the solutions they developed for their persona might help improve the life of this persona as a citizen in a smart city. Additional questions that needed clarification included how the persona may feel while experiencing the services or products and a mechanism to determine the value propositions. Here, empathy was an important competence to achieve convincing results. The participants needed to clarify the persona's experiences while utilizing their developed services or products using a prototype of a storyboard. The storyboards could be sketched on paper or physicalized through the use of crafting materials. Thus, storytelling became important for the imagination of a personal experience. Working with paper and other tangible materials enabled participants to discuss their ideas and visualize the customer experience journey to pinpoint how their services and products are interconnected and may help them further develop the journey.

Stage 5. Construction I

The fifth stage of the BM development encouraged collaboration within the group to support a deeper level of understanding, explore relationships between different parts of the BM, and discuss their proposed solutions. To make it easier to incorporate changes in their proposed solutions, we integrated LEGO®SERIOUS®PLAY materials alongside other supplies and items that can be assembled and disassembled so that participants can explore the best possible physical representation of their solution.

The predominant focus of this stage was to create a physical prototype. For this purpose, the LEGO®SERIOUS®PLAY methodology was used to build a tangible structure of a conceptual, intangible idea that the participants could discuss, show to others, and further develop in the remaining part of the MBA course (Gudiksen, 2015). The participants were thus asked to construct their smart city district. They illustrated the customer experience journey, extended by constructing facilities, exhibiting incoming and outgoing connections to or from other potential districts, and converting their ideas/solutions for the services or products into a physical representation. Hence, this step further solidified the understanding of the relationship between different facets of the BM and clarified how value is delivered and captured in a customer/citizen-oriented manner according to the value propositions. In doing this, participants may have discovered potential challenges to realizing the ideas, which then also needed to be addressed. At the end of this stage, each group presented their prototype and briefly explained the meaning of the different objects and items embedded in it.

Stage 6. Construction II

The last stage aimed to help participants understand the complexity of the world we live in and that a district in a smart city or a business is just a small part of a much larger ecosystem. This ecosystem only works successfully if all the different parts it consists of are aligned with each other.

Once all groups presented their prototypes, they began engaging with one another. The task at hand in *Construction II* entailed discussion between all groups to imagine a potential setup of a holistic smart city by integrating all the districts constructed by the individual groups. Thus, the prototypes of each district needed to be connected (e.g., via infrastructure and items that signify data flow and exchange between

different districts and throughout the entire city). Again, the LEGO®SERIOUS®PLAY methodology and materials were integrated. Participants considered the input and output factors from which synergy effects might potentially arise. This also meant reconsidering how value is delivered and captured within and across the districts. In the end, the groups presented their overall prototype and explained the setup of all parts of the BM.

Key Insights

The tasks of the six stages were demanding. However, the interactive PD approach helped with structuring and inviting participants to playfully engage in the given tasks. Effectively, the different methods used enabled the facilitator to touch upon various aspects of a BM without having to name them specifically. However, the relation to BMs needed to be made for a sustainable learning outcome. In particular, the participants' reflections at the end of the course established the most important learning, as they, in a situated manner, drew connections between the activities and BM development.

During the courses, several points proved to be important for the best possible outcome. Firstly, the inspirational kick-off lecture should not be too long or specific to avoid participant bias during a later stage. Secondly, each stage should be explained individually and then be carefully carried out by the groups. After each stage, a reflection should take place to elicit a clearer meaning of the steps followed and understand how the tasks align with different aspects of BMs. We found that providing all instructions at once led to irritation and frustration among participants, which in turn adversely affected the desired outcome. Thirdly, most support and additional explanations need to be provided during Stage 3, *Connectivity and Sustainability*. The underlying reason seems to be about the level of abstraction of what a value proposition is and how the transition between the proposed solutions and the value proposition may be.

Lastly, to improve the learning outcome and make it more sustainable, it was helpful to document the interim results and prototypes of each step through photography. The photos can be integrated into the presentation slide deck and forwarded to the participants for documentation purposes.

Reflecting on the limitations of the course design, we found that the number of participants in each cohort should not exceed 40 to ensure that the facilitator is able to provide all groups with sufficient support. Additionally, the quality of the course is dependent on the material and equipment available. In particular, the prototyping material needs to be suitable for the topic at hand to enable the participants to craft meaningful, tangible artifacts. The final point that should be considered is time, with some activities utilizing a fast ideation process to develop as many idea proposals as possible while others demanded sufficient time to think about a particular topic or initiate discussions with other group members. Our findings show that to meet the expectations of well-elaborated and meaningful outcomes and a sustainable learning process, the course should not be scheduled for just one day but should instead last between three to five days.

Discussion and Conclusion

The coherent organization of the PD activities enabled all participants to engage (Sanders & Stappers, 2008) and supported them in imagining future ways of living, learning, and being (Brandt *et al.*, 2013). Within the groups, this combination of activities invited the exchange of different viewpoints (Andersen & Mosleh, 2020), enabling a collaborative and contextual process of inquiry, leading to the emergence of new ideas and meaning. The social interplay between participants supported a situated experience that emphasized learning as a relational process. This structure and content are advantageous for the teaching of BMs, as it gives space for collaborative sense making and activity rather than the sole agenda of completing a BM canvas. The participatory nature of the course helped participants achieve the learning goals in a way that did not limit them to a cognitive activity, as they together simulated and experienced the BM by experimenting with different future scenarios and possibilities using tangible objects, allowing for flexibility and change.

Effectively, this course combines a rich set of different methods adopting elements of design thinking, project-based learning, customer experience journeys,

personas, the LEGO®SERIOUS®PLAY methodology, and an array of other PD techniques. Collectively, these methods provided sustainable learning outcomes for the participants by dealing with the topic of BMs in a detailed yet hands-on manner that supported them developing the content by themselves. Additionally, they were equipped with methodological knowledge to adapt and re-apply in different contexts and to other topics, expanding the value derived from the course. Our findings show that participants were happy with the learning experience, particularly the playful and participatory way of deriving and applying knowledge, which encourages us to develop the design and content further. In the future, we will apply the structure and content of the course to other topics as well, particularly within the field of digitization, using other themes are such as smart homes and buildings, e-/smart government, and advanced manufacturing.

In conclusion, teaching BM in a way that supports a situated learning experience is a challenge, but we found that integrating a PD approach proved helpful, as it enabled participants to collaboratively undergo a contextual process of inquiry and imagine future ways of living in smart cities. The PD approach likewise encouraged the exchange of different perspectives and supported our idea of learning being a social activity rather than a cognitive one. This paper thereby highlighted that teaching and learning about BMs is a collaborative inquiry, which is invited and supported by the strategic organization of PD methods.

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About the Authors

Tim Mosig, M.Sc., is a research associate at the Center for Leading Innovation and Cooperation, a competence center of the HHL Leipzig Graduate School of Management. There, he conducts research on a variety of German and European innovation projects. Additionally, he teaches and provides workshops to international MBA classes dealing with numerous aspects related to digitization. For his PhD, he is working in the field of data-driven business model innovation.

Dr. Wafa Said Mosleh is a post-doc at the University of Southern Denmark. She holds a PhD in participatory innovation and has undertaken research and consultancy work within larger organizations, such as LEGO and Lufthansa Systems. With a background in product design and an interest in the analytical nature of field research, Mosleh combines practices of design and anthropology to better understand organizational innovation processes from the experiences of local interaction. During her PhD, she was involved in developing and delivering education modules on design thinking and innovation for industry practitioners as well as graduate students.

Prof. Dr. Claudia Lehmann is a professor of the LF Group Chair for Digital Innovation in Service Industries at HHL Leipzig Graduate School of Management. Since 2015, she has also been executive director of the Center for Leading Innovation and Cooperation (CLIC), a competence center of the HHL Leipzig Graduate School of Management. Professor Lehmann coordinates numerous German and European innovation projects and designs customized innovation strategies with her team and a broad network of institutions and experts.