Exploring the Design Space of Innovation Canvases

THORING Katjaab; MUELLER Roland M.c and BADKE-SCHAUB Petraa

a Delft University of Technology, The Netherlands
b Anhalt University of Applied Sciences, Germans
c Berlin School of Economics and Law, Germany
* corresponding author e-mail: katja@thoring.com
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Designerly innovation tools, such as canvases, are widely used for facilitating team and collaboration processes. This paper outlines the potential design space of such innovation canvases. Based on a systematic analysis of 123 existing canvases we developed a morphological box that distinguishes between six different parameters identified as relevant: (1) addressed process step, (2) involved media, (3) sequence of use, (4) available instructions, (5) number of elements, and (6) design specifics, as well as possible choices among them. The analysis also yielded several research gaps. Furthermore, we present an in-depth discussion of the possible theoretical underpinnings of innovation canvases and summarize them in a theoretical framework. The results of this paper provide references for other researchers and practitioners to better understand working mechanisms and fields of application of existing canvases and for developing such visual innovation tools for their own purposes.

Keywords: Visual Innovation Tools, Canvas, Design Management, Innovation, Review Paper

Introduction

Since the introduction of the ‘Business Model Generation’ book in 2010 (Osterwalder & Pigneur, 2010), the related poster-based Business Model Canvas (BMC) is widely used in companies and startups for “describing, designing, challenging, inventing, and pivoting business models” in a co-creation approach (Strategyzer, n.d.). The Business Model Canvas is a poster-based graphical framework consisting of several boxes (‘building blocks’) that can be filled by the users according to printed prompts. The provided framework deconstructs the overly complex task of developing a business model into smaller components, which simplifies the process also for non-experts. This novel approach completely changed the way how business ideas and business plans are developed. Writing an entire business plan had been particularly challenging for startups and founders who did not have a business background, whereas the BMC provided some sort of guided shortcut.

We consider the Business Model Canvas a designerly innovation tool because (a) it guides the creation of something new—in this case an innovative business model, (b) it is presented in a designerly form—a graphical framework, and (c) it facilitates co-creation processes with different stakeholders or within diverse design teams—an approach typical for the design thinking and service design disciplines.

The Business Model Canvas has become a quasi-standard innovation tool for founders and innovators who want to flesh out their business ideas. According to the inventors, by today the Business Model Canvas is used by more than 5 million people worldwide (Strategyzer, n.d.). It comes as no surprise that the canvas approach has been picked up by innovators from various disciplines. As of today, Roberts (2016) has collected a total of

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100 canvases for different purposes in his Blog. It seems that there exists a canvas for almost any business- or innovation-related activity.

We define a canvas as a two-dimensional, poster-based tool that guides a heterogeneous team with a particular challenge or task. Typically, it is presented a graphical framework that decomposes a complex topic into several smaller clusters, and hence offers simplification and guidance. A canvas provides blank areas to be filled by the users, in order to invite co-creation activities and team work. However, the overview of 100 canvases collected by Roberts (2016) revealed that although many canvases follow the basic structure of the BMC, there exist minor or major differences in number of boxes, alignment, use of symbols or visual metaphors, use of color, provided instructions, and so on. This design space is the focus of our study. We define a design space as the conceptual solution space including various design parameters and the possible choices among them (Maclean & McKerlie, 1995).

However, relatively little research has been undertaken yet, to deconstruct the visual elements of a canvas and to explain their working mechanisms and theoretical underpinnings. Such information might help users identify the appropriate tool for their own innovation purposes and hence improve their innovation efforts. This paper tries to provide the readers with the required information for these tasks. Hence, the following research questions guided our study:

1. What parameters and possible design choices (that is, the design space) exist for visual innovation canvases?

2. What are possible theoretical underpinnings that could explain the impact of particular canvas designs?

3. What research gaps can be found when looking at existing innovation canvases?

We start this paper by presenting a brief overview of related work on visual canvases. Afterwards, we describe our methodological approach: We developed our data source of 123 canvases by expanding the existing list of 100 canvases (Roberts, 2016) through a systematic literature search to include also scientifically developed canvases. Subsequently, we describe the artefact analysis process of the included 123 canvases. The contribution of this paper is spread over the subsequent three sections: (1) The section Design Space of Innovation Canvases presents a morphological box that outlines the design space of visual canvases, according to six emerging categories. This morphological box was derived iteratively by a systematic artefact analysis of 123 existing canvases. (2) In the section Canvas Analysis Results we report on insights gained from the quantitative analysis of the 123 canvases and present several identified research gaps. (3) To illustrate the possible benefits and working mechanisms of a canvas, we present a Theoretical Framework of Canvases that constitutes a bricolage of related theories that form the theoretical underpinning of the impact and usefulness of visual canvases. We conclude by discussing the limitations of this work and potentials for future research.

Related Work

Many visual innovation tools follow the example of the Business Model Canvas (Osterwalder & Pigneur, 2010) and present a one-page, poster-based canvas with several graphical boxes and prompts to be filled with specific information, either handwritten or using sticky notes. They are often intended for collaborative team work (involving approximately 5–6 people) and displayed wall-mounted. Often, they are accompanied by printed instructions—in the case of the Business Model Canvas, the users are offered an entire book (Osterwalder & Pigneur, 2010), explaining the usage of the canvas in detail. When looking at other innovation tools there are several that also follow a canvas-approach and a similar layout as the Business Model Canvas but address different topics. For example, the Project Canvas (Habermann, 2014) was developed to strategically plan a project, Business Model You (Clark, Osterwalder, & Pigneur, 2012) facilitates some sort of self-reflected career planning, The Team Alignment Map (Avdiji, Elikan, Missonier, & Pigneur, 2018; ‘Team Alignment Map’, n.d.) facilitates team building, and the Value Proposition Canvas (Osterwalder, Pigneur, Bernarda, & Smith, 2014) focuses on identifying user needs and matching the benefits of the service or product.

In the design field, graphical frameworks and poster-based canvases are commonly used tools for example to elaborate intangible services, such as Service Blueprints (Shostack, 1984), or to map user journeys. Some approaches expand the canvas paradigm further in various directions. For example Joyce and Paquin (2016)
added several vertical and horizontal layers to the Business Model Canvas in order to expand its scope. But there are also visual innovation tools that follow a completely different layout and involve different media. For example, Lego® Serious Play (Lego Serious Play, 2006; Kristiansen & Rasmussen, 2014) makes use of Lego bricks in order to build three-dimensional representations of business ideas or other mental models, working with metaphors. Usually it needs a trained facilitator to guide the very flexible approach. The method does not provide templates or canvases but rather suggests to work in three-dimensional metaphors and spontaneously create one’s own canvas, if required. SAP Mosaic (SAP AppHaus, n.d.) lets users create their own canvas on brown paper. Some tools also involve other media, such as digital extensions, stickers, or inspirational card sets.

For the user this broad variety of existing canvases and other innovation tools can be quite confusing. It might be difficult to choose the appropriate tool for one’s own purpose, and even more challenging to develop one’s own tool, if an appropriate solution is not yet existing or if a customized tool appears to be necessary. Avdiji, Elikan, Missonier and Pigneur (2018) suggest three principles for developing visual canvases, such as the Business Model Canvas, namely (1) ontology-creation, (2) creating a shared visualization, and (3) provide collaboration possibilities. However, they do not provide any particular guidance on how to exactly design those tools. Eppler and his colleagues (Martin J. Eppler, 2003; Martin J. Eppler & Hoffmann, 2013; Martin J. Eppler & Kernbach, 2016) presented various research studies on visual representations with a particular focus on digitally enhanced visual tools. Eppler (Martin J. Eppler, 2003) discussed the advantages of visual metaphors in templates for the communication of knowledge. Eppler and Kernbach (2016) introduced the term ‘Dynagram’ for dynamic, software-based diagrams that facilitate team interactions in design thinking processes. Specifically, they investigate a diagram’s capability to capture knowledge, to facilitate team discussions, and to provide added value in the joint analysis. Eppler and Hoffmann (2013) presented a set of visual solutions for developing business models, found in literature. To the best of our knowledge there exists no systematic overview of different parameters for visual canvases, which we present in this paper. Our suggested morphological box can be considered a foundation for the future development of canvases by outlining the relevant parameters and possible design options.

**Methodology**

*Data Source of 123 Canvases*

The sample of 123 canvases that were included for our analysis were selected based on a three-step search process, as shown in Figure 1: First, we included the 100 canvases provided in the ‘Canvas Collection’ by Roberts (2016), which he collected based on a co-creation approach together with the readers of his Blog. Second, we conducted a systematic literature search within the Scopus database with the search terms “Canvas AND innovat*”, which resulted in a total of 315 sources. Through this procedure we wanted to identify additional innovation-related canvases that were discussed (but not developed) by the scientific community. In a third step, we conducted another literature search in the Scopus database with the search term „Canvas AND Introduc*“, which returned 393 sources. Through this step we wanted to identify additional canvases that were newly developed by the scientific community.

The resulting 708 additional sources were narrowed down to 49 through discipline filtering within Scopus and through title- and abstract-based analysis (selection criteria A). We excluded non-related disciplines (such as medicine, music, or chemistry), sources that addressed canvases in a metaphorical, artistic, or archaeological sense (e.g. “painting on a blank canvas”), as well as sources that discussed canvases in different media (“human skin as a canvas for tattoos”, “textiles as canvas for embroidery”, “digital canvases”, etc.). This step left us with 20 sources, which were then analysed through full-text analysis (selection criteria B). Here, we excluded sources that simply applied existing canvases such as the BMC (e.g. as a case study), as well as sources that misleadingly labelled other types of diagrams as canvases (e.g. simple metrics or synthesis models that were not intended for poster-based printouts and collaborative activities). Any variation of an existing canvas was considered a new one. An additional co-citation analysis yielded in another 7 sources that were included. Finally, we excluded 4 redundant papers from all three steps (selection criteria C). this entire process yielded in 123 canvases that were included in our final analysis. Figure 1 illustrates our systematic search and analysis funnel.
**Artefact Analysis**

Subsequently, we followed a systematic artefact analysis process as suggested by Froschauer and Lueger (Froschauer, 2009; Froschauer & Lueger, 2016), which consists of three steps: (1) Descriptive analysis of the artefact (materiality, inner structure, and conditions for existence), (2) Analysis of embedded meaning in the organisation (social relevance, contextual analysis), and (3) reconstruction of underlying organisational structures (production, effects and functions, use). In the first step we analysed the visible structure and appearance of the 123 canvases (number of elements, layout, colours, etc.). In the second step we analysed the artefact in terms of its social context and meaning. This step involved interpretations of assumed usage scenarios, based on given instructions (if any), and the canvas title. More specifically, we located the intended usage of the artefact in one particular stage of the innovation process. In the third step, we analysed potential team behaviour and motivations through the canvas, based on visible prompts, trigger questions, and visual metaphors (if any). Insights about the production process of the canvas could be inferred through the presence of supplementary publications (if any). If a production date was mentioned on the canvas or in the publication, this was recorded as well.

The artefact analysis was conducted by two researchers in an iterative process. While going through the list of 123 canvases we coded each canvas according to emerging categories. These categories were recorded in a table and updated iteratively, whenever a new category emerged. Any disagreements between the two researchers were discussed until an agreement was found.

The artefact analysis revealed that several canvases were not related to any innovation activities or processes. Instead, they addressed general managerial issues, such as project planning, team building, or change management, as well as other topics unrelated to innovation, such as ethics. We excluded a total of 55 canvases that addressed such unrelated areas from our final evaluation, because we were particularly interested in the capabilities of a canvas to facilitate innovation processes. Figure 1 illustrates the entire literature search and analysis funnel.

![Flowchart](chart.png)

**Figure 1: Illustration of the search and analysis process.**

In the following section, we summarize the resulting insights from the artefact analysis of 68 innovation-related canvases in a framework. The emerging categories identified as relevant were aligned in a morphological box that constitutes the *Design Space of Innovation Canvases*. It can be used to analyse and localise an existing canvas, or to develop ideas for a new canvas design.
The Design Space of Innovation Canvases

This section presents the design space of visual innovation canvases as a framework outlining six design parameters: (1) the addressed step within the innovation process, (2) involved media, (3) sequence of use, (4) provided instructions, (5) number of elements, and (6) design specifics. These categories were developed iteratively by extracting the respective occurrences from the analyzed 123 canvases. Figure 2 shows the framework as a morphological box that outlines the design space of visual canvases and serves as a tool to guide canvas-related design decisions. The six categories are described in the following subsections.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Possible Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Step</td>
<td>FFE Research</td>
</tr>
<tr>
<td>Media</td>
<td>Handwriting/Sketching</td>
</tr>
<tr>
<td>Sequence</td>
<td>Numbers</td>
</tr>
<tr>
<td>Instructions</td>
<td>None</td>
</tr>
<tr>
<td>Elements</td>
<td>3–6</td>
</tr>
</tbody>
</table>

Figure 2: Morphological box, outlining the different categories that constitute the design space of visual canvases

Step of the Innovation Process

The first category locates the canvas within one or more process step of the innovation process. According to Koen et al. (2002) the innovation process can be divided into three phases: the fuzzy front end (FFE), the new product development (NPD), and the commercialization (C) of the innovation. Each phase is characterized by several sub-steps that could be facilitated through a visual innovation tool. According to this, we distinguish between nine process steps. Within the FFE phase we define (1) research, (2) analysis and synthesis, and (3) ideation; within the NPD phase we define (4) idea refinement and selection, (5) idea prototyping, and (6) evaluation and iteration of a developed solution; and within the commercialization phase we define (7) risk assessment, (8) business model generation, and (9) sales and marketing. This list does not imply that the process steps are to be executed consecutively. Instead, they can also include iteration loops, as suggested for example by the design thinking process (e.g. Brown, 2008). In that case, switching between canvases to elaborate different steps of the process, is possible and encouraged. Nevertheless, it is important for the tool to clearly address one or several process steps in order to communicate to the users, when to use the tool for what purpose. Also, the targeted process step might determine specific design decisions of the tool. For example, research or ideation tools will need empty spaces to be filled with insights or ideas by the users, whereas analysis or evaluation tools will need a more structured presetting like checkboxes or assessment frameworks.

Media / Additional Input

This category distinguishes between different media input. The simplest form of working with a canvas would be to write or sketch manually into the given areas. However, many canvases allow to use more flexible post-it notes and hence provide boxes that match the standardized post-it size. Only a few canvases provide additional tools, such as exemplary pictures, stickers, card sets with trigger questions, or the like. Another form of media support could be digital enhancement. Some canvases provide a digital counterpart or extension, to allow customizing of labels or remote team work.

Suggested Sequence

This category includes three possible options: Some canvases suggested a specific sequence of filling the different areas by either providing (1) strict numbers, or (2) more subtle graphical indicators, such as arrows or hierarchical flow charts. (3) Other canvases did not suggest any particular order but rather a flexible and spontaneous sequence, as the participants would see fit.
Instructions

Most innovation canvases need some sort of instructions. These could be (1) printed within the boxes itself, (2) added as a legend outside the canvas elements, or (3) provided as separate guidelines, for example as printed brochures or books, or as a video tutorial.

Number of Elements

Many canvases follow the example of the BMC and provide exactly 9 elements, either as building blocks or other shapes, each addressing one issue within the overarching canvas topic. Other canvases address simpler topics, and hence limit the number of elements, whereas canvases for more complex issues need more elements. The range spans from a minimum of 3 to a maximum of 28. In the morphological box we decided to provide five clusters, according to the identified distribution outlined in our analysis (see subsequent section, Figure 5).

Design Specifics

The analyzed innovation canvases involved various design elements: (1) Icons and symbols provide a visual reference and help to support the meaning of specific canvas areas. (2) Checklists, checkboxes, and rating scales invite the assessment of existing solutions as well categorical or ordinal input. (3) A color code (for example through the use of colored Post-It notes, stickers, or colored areas on the canvas) might add meaning and structure to the entered data. (4) Visual metaphors can activate a specific mind-set or motivate participation. Moreover, they might help users to better understand the goal of the canvas and provide connections between the individual elements. (5) Integrated (subordinate) graphical frameworks provide structures that can help organize information within or in between elements.

Figure 3 illustrates the applicability of the morphological box by exemplarily mapping it to the Business Model Canvas. The used choices of the BMC are marked in dark grey. Similarly, the reader can use the morphological box to analyze any other existing canvas, as well as for selecting possible options when designing a new one.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Process Step</td>
<td>FFE Research</td>
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<tr>
<td></td>
<td>FFE Synthesis</td>
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<td></td>
<td>FFE Ideation</td>
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<td>NPD Refining</td>
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<td>NPD Prototype</td>
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<td>C Business Model</td>
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<td>C Sales</td>
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<td>Media</td>
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<td></td>
<td>Stickers</td>
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<td>Cards</td>
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<td></td>
<td>Computer Support</td>
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<tr>
<td>Sequence</td>
<td>Numbers</td>
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<tr>
<td></td>
<td>Arrows</td>
</tr>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Instructions</td>
<td>None</td>
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<tr>
<td></td>
<td>Printed within Element</td>
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<td></td>
<td>Printed outside Element</td>
</tr>
<tr>
<td></td>
<td>Supplementary Guide</td>
</tr>
<tr>
<td>Elements</td>
<td>3–6</td>
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<td></td>
<td>7–8</td>
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<tr>
<td></td>
<td>Exactly 9</td>
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<tr>
<td></td>
<td>10–14</td>
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<tr>
<td></td>
<td>15+</td>
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<tr>
<td>Design Specifics</td>
<td>Icons</td>
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<td></td>
<td>Checklists</td>
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<td></td>
<td>Color-Code</td>
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<td></td>
<td>Visual Metaphor</td>
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<td></td>
<td>Integrated Framework</td>
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</tbody>
</table>

Figure 3: The design space of the Business Model Canvas (respective design choices marked in grey).

Canvas Analysis Results

The following section presents selected insights from the artefact analysis. Figure 4 shows a bar chart outlining the addressed process steps within the innovation process, or other addressed aspects, respectively. It reveals that 68 of the analysed canvases are intended to facilitate some steps of the innovation process. Most of them support the development of business models (n=24) and the idea refinement phase (n=24), followed by synthesis/analysis canvases (n=13) and canvases addressing the sales/marketing stage (n=12). Only a few canvases addressed the research phase (n=3), risk assessment (n=2), ideation (n=8), prototyping (n= 5) and test/iteration (n=8), which shows a persisting potential for new tools in these areas. For the subsequent analyses we include only the 68 innovation-related canvases and exclude the remaining 55 unrelated sources.
Figure 4: Distribution of canvases addressing different process steps; more than one possible (n=123).

Figure 5 shows the distribution of the number of building blocks or other elements on the different canvases. It illustrates that most canvases follow the example of the BMC with exactly nine elements. The maximum number of elements on one canvas was 28 (the “Big Idea Canvas”, the minimum number was 3 (the “Requirements Engineering Canvas”).

Figure 5: Number of elements on the different canvases (n=68, innovation canvases only).

Figure 6 illustrates the average number of elements on a canvas according to the targeted process step. It becomes evident that some tasks might be more complex and hence require more elements, such as the Testing/Iteration phase (average number of elements = 15), whereas other tasks seem to be less complex and manage with fewer elements, such as the Research or Risk Assessment phases (average number of elements = 7).
The following other insights could be derived through our analysis: A sequential order was only suggested on roughly one third of the innovation canvases (n=21). Half of the innovation canvases made use of icons or symbols (n=34) whereas the rest did not make use of any visual support. The potentials of color-coding and visual metaphors seemed to be not utilized to their full potentials (use of color-coding: n=18; use of visual metaphors: n=7). While the vast majority of canvases was using the standard rectangular building blocks (n=57), 11 canvases abstain from the typical building block structure and use other shapes, ranging from abstract diamonds, pie elements or (semi) circles, to concrete figures like a bridge or a face. 27 canvases showed a combination of rectangular boxes and other shapes. Some canvases also incorporated subtle structuring elements, such as arrows indicating a specific direction of use, or process maps that suggested a particular arrangement of data.

All these aspects warrant further investigation and consideration. The possible impact of variations in color-coding, visual metaphors, sequences, or instructions could be investigated through experimental studies. The analysis of any correlations between aspects (e.g. the appearance of particular design characteristics in different process steps) also warrants further investigation and is dedicated to future work.

A Theoretical Framework of Canvases

As pointed out by Avdiji et al. (2018), most developments of visual canvases are not following a scientific process but serve more a trial and error approach. In an application situation it might be sufficient to know what kind of tool is working in which context and under which conditions. However, if we want to know why one tool works in one situation and not in another we need to find out more about causal relationships of tools and human behavior. There is not one single theory but rather an abundance of theories on human behavior, developed from different disciplines with different foci, such as psychology, sociology, ethnography, and many more. In addition, different units of analysis such as individuals, groups, and organizations need to be addressed. Based on this ‘bricolage of existing theories’, we claim three inter-connected theoretical frameworks contributing to building the skeleton to understand, explain, and predict human behavior.

In the following subsection we extend this theoretical framework by seven possible functions or working mechanisms of a visual canvas. Figure 7 juxtaposes these functions with the existing theories in a framework, consisting of 3 main categories and 7 subcategories. Additional literature is presented that might be able to explain those suggested working mechanisms of an innovation canvas.
Cognitive-Perceptual Level of Information Processing.

This level includes memory, learning, and knowledge acquisition, as well as cognitive biases such as fixation, which is the inappropriate repetition of existing solutions (Purcell & Gero, 1996; Cardoso & Badke-Schaub, 2011). Dalsgaard (2017) provided a framework of ‘instruments of inquiry’, in which he outlined that tools or instruments can guide the designers’ perception and understanding of design problems and solutions.

(1) Extended memory. The visual canvas can serve as an extended memory. Knowledge and information can be captured and visually stored. The externalization of previously tacit (design) knowledge on a canvas facilitates knowledge exchange between team members and facilitates memorization of relevant information (Müller & Thoring, 2010). Moreover, a canvas can serve as some kind of checklist that ensures that no step will be forgotten (Gawande, 2010).

(2) Thinking facilitator. The visual canvas can act as a facilitator for the thinking process, for example, by providing a step-by-step instruction when to do what. In this case, the tool should provide clear guidelines, such as a numbered order of subsequent steps. Similarly, it can be a source of inspiration, for example by providing trigger questions or exemplary solutions. However, one should be aware that such inspirations can also limit or manipulate the creative output of the users, which can lead to fixation (Purcell & Gero, 1996). Moreover, a canvas might act as an ‘eye-contact deflector’ (Kajimura & Nomura, 2016) and that way protect certain cognitive control processes from turning off during group work. Furthermore, according to the Dreyfus and Dreyfus model of skill acquisition (Dreyfus & Dreyfus, 1980), templates and step-by-step instructions can be useful for novices whereas experts often prefer an intuitive approach to problem solving. As Liedtka (2018) pointed out „structure and linearity help managers try and adjust to […] new behaviors“, which she called “the beauty of structure”.


The emotional-motivational level of individual needs includes the mutual influence of persons how to feel accepted, and also the need for control. For an overview of individual needs structure, Maslow’s motivation theory (Maslow, 1943), and ‘motivation theory reconsidered’ (Landy & Becker, 1987) can serve as a reference.

(3) Platform for ideas. A visual canvas can serve as a platform for ideas and insights by providing (empty) space(s). People often express a tendency to fill a given space to make it look complete, a phenomenon similar to the ‘Zeigarnik effect’ (Zeigarnik, 1938), which suggests that people feel the urgency to complete an unfinished task. If, for example, a canvas provides a fixed number of boxes to be filled, the user might want to fill all of these boxes. Hence, the size of the tool itself might also determine the amount of output. The rectangular shape of building blocks can be easily filled with post-it notes, whereas differently shaped areas might hinder this attempt.

(4) Motivator. A well-designed visual canvas might be able to increase individual motivation. It can encourage people to share their ideas and insights and increase engagement and commitment. For example, a canvas might be able to motivate all participants to share their ideas, also those who are shy or reluctant. This assumption can be supported, for example, by studies suggesting that brainwriting outperforms brainstorming (Heslin, 2009). If the tool itself demonstrates some designerly effort, the chances are high that the users will also spend their own effort when filling it. The co-created output might also increase loyalty towards the team and the result, because one might better relate to the jointly developed solution. When designing a visual tool, you might want to consider options to engage all involved participants, for example by providing dedicated space per participant, or by assigning specific team roles.
Social Influence and Mutual Interaction.

The level of social influence (Flache et al., 2017) and mutual interaction includes the communication of and within the team. Here, all three streams come together—the individual need for control meets the need for a shared understanding in the team and the exchange of information according to the respective goal of the innovation tools.

(5) Shared mental model. The visual canvas can facilitate the creation of a shared mental model. According to Badke-Schaub et al. (2007) mental models are simplified (not necessarily accurate) representations of the real world in our heads. If a team performs on a joint innovation project, a common understanding and a synchronized mental model is crucial for the project success. A visual tool can facilitate the creation and balancing of such a shared mental model.

(6) Boundary object. A visual canvas can facilitate team discussions and serve as a boundary object. Boundary objects are information that are plastic enough to be adapted and interpreted differently by different communities, but robust enough to maintain informational integrity (Star & Griesemer, 1989). They are standardized forms that provide a shared format for solving problems across different functional settings (Carlile, 2002) and hence support distributed cognition by eliciting and capturing tacit knowledge through interactions with the object (Henderson, 1991). A visual canvas represents such a standardized form that can help a team to produce records of mental thought outside of the individual memory, by providing means for others to interact, critic, and build upon the ideas, and by establishing a common language of understanding (Fischer, Giaccardi, Eden, Sugimoto, & Ye, 2005). This can allow knowledge sharing and coordination of a discussion in heterogeneous teams, even without consensus (Becky, 2003), by allowing sketching and visual framing of concepts that can then be discussed. Moreover, giving and receiving explanations (Ross & Cousins, 1995) through interaction with a canvas might be able to enhance mutual understanding of the problem.

(7) Presentation and communication tool. The visual canvas can be used as a presentation or communication tool, for example to justify an idea towards clients, co-workers, or superiors. In this case, the visual tool should provide a clear structure, outlining possible benefits, and encourage legibility (e.g. of handwritten notes). Moreover, a canvas can facilitate storytelling and hence foster the exchange of organizational knowledge (Connell, Klein, & Meyer, 2004). Team discussions along a visual collaboration tool can facilitate abductive inference (Lombrozo, 2012), which is the main component for innovation. At the same time, a visual canvas can gather people together and involve different stakeholders in workshop settings. According to Conversation Theory (Pask, 1976), participants engage in conversation where everyone finds a ‘corner’ (a building block within the canvas) and a space for getting to say (or teach) something to the group. Participants are not only filling boxes, but learning from the group and encouraged to teach something back to the group.

Discussion

Implications

As outlined above, visual innovation canvases can provide various benefits. They can facilitate information processing, individual motivation, and team interaction. A canvas might increase the quantity of a team’s output as well as their time-efficiency. Visual structures and prompts can invite participation and reduce unnecessary discussions on what strategy to pursue (because this is already suggested by the tool). Complex tasks are simplified, which facilitates thinking processes. Interdisciplinary teams, who do not have a common understanding and possibly different levels of expertise, might find a canvas helpful to facilitate communication and foster engagement. The same applies for presenting concepts to clients or other stakeholders.

However, the vast choice of existing canvases might overstrain the user. The question, which of the existing tools would be the right choice for a specific purpose, how to use those tools, or how to adapt them for one’s own requirements, might become a challenge. Sometimes it might be inevitable to design a new visual tool, because an adequate solution is not yet available. Although there exist many canvases for various aspects, our analysis showed that the available tools for particular tasks of the innovation process (e.g. research, risk assessment, etc.) are limited. Consequently, with regards to our research questions stated earlier, this paper provides the following theoretical and practical implications:
(1) The presented morphological box outlines the relevant parameters that mark the possible design space of visual canvases, and hence provide a guidance for other researchers and practitioners to either select or design an innovation canvas. It helps the users to identify which aspects are relevant for their task and compare these with existing canvases. When designing a new canvas, they can select from the provided parameters and compose them into a desired template for their own purposes.

(2) The presented theoretical framework of visual canvases provides helpful insights on the working mechanisms and theoretical underpinning of canvases that allow for a goal-oriented and appropriate application and development of canvases.

(3) The results of the canvas analysis yielded rich insights on existing research gaps that could be tackled in future research.

Risks and Challenges

Despite the apparent popularity of visual innovation tools and their helpful benefits that we discussed in this paper, we would like to pose some critical thoughts. Developing a visual canvas requires a lot of skills in terms of both, conceptual and designerly expertise. Avdiji et al. (2018) expressed their concern about the lack of scientific rigor for the development of many visual canvases that are available today. Our systematic literature search showed, though, that a multitude of canvases is in fact scientifically developed, evaluated, and published in peer-reviewed sources. Nevertheless, we want to emphasize that a reflective development of a canvas, possibly involving an evaluation study following an action research approach (Lewin, 1946), can secure a rigorous foundation. For a well-grounded conceptual base for developing such visual tools, we refer the reader to Kolko’s work on visual synthesis models (Kolko, 2011). Adding to that, we would like to express our concerns about the possible lack of aesthetics and design expertise for some existing visual tools. The list of 100 visual canvases collected by Roberts (2016) reveals the oversimplified design of some of these canvases, partly neglecting basic design rules that could be found, for example, in the seminal works of Tufte (1990, 2001) and Bertin (2011), or in the work of Moody (2009). Bresciani and Eppler (2015) outlined several pitfalls of visual representations, for example, over-complexity or over-simplification, as well as misleading or cryptic decoding challenges. Furthermore, we see a tendency—especially in the design thinking field—of what we like to call ‘templatism’—the overly use of templates for almost any given task without questioning or reflecting on its appropriateness. This might be reflected by the illusion that the right tool would magically solve the problem without any additional effort of its users—a phenomenon called the “Candy Man effect, where executives longing for easy, sure-fired innovation” (Barry, 2017). We argue that a template can only guide a thoughtful process but cannot compensate for a possible lack of conceptual underpinning and careful research. Finally, we would like to emphasize the risk of fixation effects when relying heavily on visual innovation tools. The concept of fixation describes inappropriate repetition of existing solutions; (e.g. Purcell & Gero, 1996; Cardoso & Badke-Schaub, 2011). Rigid structures of a visual tool might limit the creativity of the users and lead to foreseeable or biased results.

Limitations and Future Work

One limitation of this study is that it partly relies on the rather arbitrary canvases collection by Roberts (2016). However, to the best of our knowledge, there exists no other compilation of canvases, yet. We expanded the existing canvas collection through a systematic literature search, which yielded our final list of 123 included canvases. We argue that this number of analyzed sources was sufficient to develop a theoretical framework and to derive criteria for canvas designs, even if the list of included canvases might not be exhaustive.

Potentials for future research can be found in exploring the opportunities of digitally enhanced canvases. Digitally supported tools might allow for easy individualization and mass-tailoring of visual tools. Also, team-based discussions with a large number of participants, time-delayed and/or simultaneous discussions, and remote interactions would be possible through digital facilitation. Comi and Eppler (2011) demonstrated in an experimental study that software-supported visual facilitation outperforms poster-based collaboration in terms of team performance and participants’ satisfaction with the inter-organizational meetings. Similar results were presented by Eppler, Öste and Bresciani (2013). These studies warrant further research into developing software-based visual innovation tools.

Furthermore, additional research is needed to investigate the conceptual impact of innovation canvases. The question whether such tools actually improve innovation processes and the outcome’s quality, is not yet fully
answered. However, the evaluation of the effectiveness of the 123 analysed canvases is beyond the scope of this paper and will be tackled in future work.

Finally, we want to distill the insights of this study into some basic design principles for developing innovation canvases. This would extend the presented morphological box and theoretical framework towards a more practical tool for applied research and practice.

References


Andi Roberts website: http://masterfacilitator.com/canvas-collection/


Team Alignment Map. (n.d.). Retrieved 15 June 2018, from Team Alignment Co | Home of the Team Alignment Map website: www.teamalignment.co

