

Towards a Card Game for Creative Solution Ideas: InnoCards

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Abstract

Stakeholders are involved in the co-design of software ideas to design more user-centered solutions. However, co-creation frequently leads to relevant but not highly innovative ideas. Therefore, we propose InnoCards as a tool for stimulating creativity in workshops. Its assembly of card types invites participants to employ a blend of the force-fit principle and best practices of user experience design in a playful, yet structured environment. This allows forming solution ideas to address a predefined problem with a combination of specific card types. The current decks “CityInnoCards” and “LandKarten” focus on problems in urban and rural areas, respectively. Compared to existing card games, we share the idea of guiding the user to new approaches and innovative ideas by force and providing prompts, so-called triggers, proposing a more user-centric mindset that includes relevant topics, scenarios, and stakeholders. Additionally, we propose including less-common interactions and trends to increase the innovativeness of the ideas. We encourage the holistic creation of services that genuinely resonate with diverse user needs regarding a specific topic. We conclude that InnoCards should be tested for its ability to lead to novelty and useful ideas in a fun environment. Furthermore, the game’s structural variabilities for different project stages and its accessibility should be evaluated.

Keywords

Creativity, Innovation, Product Design, User-Centered Design, Smart City, Workshop

1. Introduction

Co-creation is a helpful method in projects to include stakeholders in the design process of a service [1–3]. The early integration of all relevant stakeholders manifests itself in the establishment of a user-centered product as well as their buy-in for the respective solution idea. This is also of great relevance for the later local implementation of a service, as participants become highly engaged by being part of the process [4]. A common way to co-create are creative workshops, as they allow all project participants to develop a solution together [2, 5, 6]. But even though co-creation is known to enable highly relevant solutions, such workshops are only moderately innovative [7]. In addition, there are two conflicts: being biased by

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technology already known (and the context in which it is being used) and overestimating familiar things and their relevance [8].

In different projects with cities and municipalities in which Fraunhofer IESE has been involved, we noticed that stakeholders often stuck to their previously defined ideas, and therefore the emerging solution ideas were (from an expert viewpoint) conventional and uninspired, and neglected the user of the solution [9–11]. In these projects, problems were either discussed from individual viewpoints or discussed in a way that was too generalized. As creative workshops are an important part of working with project partners, especially in the context of smart cities as discussed above, we identified the need to address how stakeholders can contribute innovative ideas in workshop formats that explicitly consider the users of solutions.

Rosson and Carroll suggest using concrete material, as this is interpreted more easily and more thoroughly than abstract material, to foster innovative thinking [8]. To make this idea applicable in practice, we propose a scenario-based approach that uses haptic materials that can be utilized as an aid for giving directions and security, but still provide a joyful experience, as creativity needs a certain setting and mindset to flourish [8, 12]. We developed InnoCards with the aim of fostering innovative and creative software solution ideas. In addition, we developed a specialized set of cards, CityInnoCards, for the context of urban and rural areas. CityInnoCards was developed to simplify the co-creation of cities and their suppliers.

In the remainder of this paper, we will first introduce related work and findings that influenced the development of InnoCards (Section 2) before describing CityInnoCards in detail (Section 3). We propose our research questions as well as potential benefits (Section 4) that need to be evaluated in future research. We conclude the paper with a summary in Section 5.

2. Related Work

To address the problem of ideas resulting from workshops with stakeholders being hardly innovative, we first asked ourselves what is creative, innovative, or novel at all, as these characteristics are not trivial to measure and highly argued about [13]. Also, we looked into table and card games that address the creation of innovative ideas [14] and future scenarios [15] to learn from their practices.

Innovativeness refers to interindividual differences in how people react to new ideas and accounts for their success or failure [13]. Nguyen et al. introduced three stages of novelty: new for an individual, new for an involved (expert) group, or new for everyone [14]. Similar approaches to categorizing levels of creativity are proposed by Boden, with “historical” creativity for pioneering ideas [15]. While “new for everyone” seems most promising, ideas fostering community innovation can also have an impact for many people in a group, making this stage, too, a target of our research.

The force-fit principle [16] is a common method for generating novel ideas. It involves creatively combining two seemingly unrelated concepts or ideas to spark innovation. This technique begins by merging different ideas or objects to explore potential solutions. It demands creativity and open-mindedness, pushing individuals beyond conventional thinking patterns and prompting mental provocations. Essentially, it involves combining elements that at first glance do not seem to fit together in a way that generates new perspectives or unexpected solutions. These ideas are then combined in different ways to check whether they result in viable solutions. Inspired by this approach, we integrated “trigger” cards into InnoCards to

encourage innovative thinking. The entire game randomizes area-specific prompts, challenging players to forcibly combine them to get unique solutions.

Card games that are already available and correspond to our vision are IDEO method cards [17] and "The Thing from the Future" [18]. IDEO method cards are a design tool that helps designers explore new approaches. Each card contains a design method and an explanation of when to use it. The intention is for designers to gain new perspectives and explore something new. "The Thing from the Future" card game encourages players to think creatively about the future. It is a fun yet valuable educational tool consisting of four different card types. The goal is to generate a story that incorporates all elements in a coherent and imaginative way. This serves as a tool for speculative thinking, encouraging players to consider how society and technology might evolve.

3. InnoCards

In this section, we demonstrate the integration of our findings into InnoCards, beginning with an overview of the cards, their intention, and an explanation of how the game is played.

Originally, InnoCards focused on the challenges in rural areas [19]. The current deck "CityInnoCards" is designed for urban contexts. In the future, we will distinguish between InnoCards as the concept and specific InnoCards adapted to different contexts. The dedicated cards display text and descriptive icons and are divided into six different card types: topics, scenarios, stakeholders, trends, triggers, and conflicts. Each card type represents a field of interest [3] and an important part of the solution idea, as described in Table 1. The goal of the game is to ideate a digital solution in a specific scenario that keeps the user of the solution in mind.

To bring game design elements into a non-game context [20], we suggest CityInnoCards as a lightweight starting point in co-creating with partners. We aim to free municipal stakeholders from predefined thinking patterns. Building on the idea of transporting the players into a concrete scenario (force fit), we wanted a solution adapted to the specifics of our stakeholders and pursued mainly a human-centered design. Hence, we combined several aspects of the mentioned solutions and added our own requirements: concrete scenarios that playfully encourage new solution ideas, paired with adaptation to a specific group of people and their life influences, which keeps the game user centered. Furthermore, we wanted ideas to be questioned and iterated throughout the process. However, each phase stands for itself – first the development of ideas, then the critique of these ideas. Originally, the players are considered to be municipal stakeholders, but they could also be stakeholders of the problem (stakeholder cards) and therefore potential users of the future solution.

The cards are drawn according to a predefined pattern to create a specific combination of card types, but a random scenario. If we were confronted with the question of how to reduce the usage of cars in cities, an idea using the cards "Health & Care", "At the cash desk", "Monday morning", "Cyclists", "Make people laugh", "Think about tomorrow (Sustainability)" and "Wearable" could look like this: "Sunshine tracker bracelet This colorful wearable uses solar cells to collect energy while you ride your bicycle. At the checkout, it works as a contactless payment method and the hours of sunshine collected can be used as a discount. The small display shows jokes and fun facts about cycling and sustainability while you wait, making the wait a pleasant one." One round involves the creation of an idea, challenging the idea through

the conflict card, and its iteration. Unlike other cards, the conflict card is not drawn but chosen to create maximum conflict.

In the current version, the game concludes with an evaluation of the ideas by sorting them into a Bet-Cost-Matrix (BCM), designed by Hias Wrba [22]. The BCM offers a good overview by using the prices of everyday items (from the price of a pair of socks to that of a house) to evaluate on the x-axis how much each player would be willing to invest and, on the y-axis, estimate its actual implementation cost. The aim is to calculate personal value and check whether it exceeds financial capacity. This activity is meant as an aid to check the novel ideas for their practicality and prioritize them for further work. Also, prior deconstruction of the individual solution elements with subsequent rating is conceivable and probably expedient.

When using CityInnoCards for the first time, we recommend group sizes of two to four people and the support of a trainer providing guidance through the rules. In the current game play, we expect about three ideas within one hour. It is not important to incorporate every card perfectly, but rather to perceive each card as a new impulse.

As we live in a fast-moving world, solution ideas must be convincing, but also unique – finding a niche, a new approach, or a clever twist in a common field can make a difference. While conventional thinking manifests unconsciously, breaking these patterns is challenging. InnoCards encourages out-of-the-box thinking by deliberately combining unrelated cards, breaking common thought patterns, and incorporating fresh approaches into unconventional contexts. While digital solutions are preferred, our cards do not limit ideas to this realm. Even if the resulting idea is analog, the cards have still fulfilled their purpose. We believe they can also help identify situations where a digital solution might exclude stakeholders, leading to a more inclusive solution.

Accordingly, InnoCards does not claim to find the final solution, as the cards should be considered an intermediate innovation helper. To stimulate creativity, InnoCards should support filling a blank page and take away the pressure to directly think towards perfect solutions. The cards should provide a direction from which the user can also deviate. We want to encourage participants to use InnoCards to find new connections, new ways of thinking collaboratively.

In our workshops, participants frequently suggest similar solutions for various problems, such as the allrounder app. We aim to cultivate a user-centered mindset through these cards, encouraging players to think about diverse user groups and their needs when designing services. [3]. InnoCards is a card game for crafting innovative solution ideas, drawing from design experience with rural areas and Smart Cities [9, 10]. Our approach is user-centered because InnoCards includes situations, stakeholders, and conflicts we encountered during our projects with cities and rural areas.

Table 1: CityInnoCards card types, their intention, examples, as well as the number drawn.

Card type	Intention	Examples	#
Topic	The clever combination of topic areas may result in solution ideas that enhance the original service. These so-called synergies are what make digital ecosystems so powerful [21]. Example: Uber as a mobility service brings people to their destination, but also delivers food (local supply).	Shopping & Local Supply Event & Tourism Mobility & Logistics	1

Scenario	The scenario cards create a vivid image in the player's minds by putting them into a place (P) and a circumstance (C) to imagine how the solution would be helpful in this context. This makes the problem and the solution space concrete.	P: In social media At the office C: When it rains By candlelight	2
Stakeholder	Who is involved in the solution? How can the target group either assist or be assisted in overcoming a problem?	Start-ups The Elderly Activists	1
Trigger	The trigger cards provide mental provocation. They provide completely new ideas and impulses. They enhance an idea by implementing a what-if aspect in the scenario and therefore triggering an immediate variation of the idea.	Think about tomorrow! Offer it for free! Make people smile!	1
Interaction and Trends	The interaction cards ensure that one looks beyond the usual forms of interaction such as mobile or web applications and considers relevant trends. Even if the final solution will be implemented as an application, thinking beyond it may make it more interesting and could lead to a variation that was not considered before.	AI Robots Virtual Reality Wearables Blockchain	2
Conflicts	The conflict cards critically scrutinize the existing idea. By picking the most critical conflict card, the idea is challenged and must be evaluated. Conflict cards are the synthesis of our own projects and experiences. We have faced recurring challenges. By being handled early on, they can enhance the solution idea and avoid a solution that is impractical or impossible to implement.	It's not inclusive! No one will use it! That's only relevant for young folks!	1

4. Research Questions

InnoCards is currently being tested internally within our research projects. Hence, we want to share our initial impressions regarding the cards and the research questions we want to answer.

So far, the game has been played by people who are used to working creatively and who are also active within the Smart City sector. The feedback and evaluation from these rounds show us that the force-fit approach has the desired effect. Also, the concrete scenarios created by the cards ensure that the problem has been viewed from an unusual angle. However, the feedback also shows that the game mechanics or the introduction need to be improved to enhance ease of use. Although we were able to achieve good internal results, it should be questioned whether local authorities can achieve comparable results, as they are less used to creative work and therefore, whether the cards will enable them to experience new ways of thinking.

In the next step of our research, we want to use the cards in workshops with stakeholders from cities and rural areas and address questions regarding the gameplay and its results as well as their perceived usage. As InnoCards was designed for this group, it is very important to know how well it can work with them independently. This includes observing how well they come up with innovative ideas. Therefore, we propose the following research questions:

- **RQ₁: Novelty – How novel/innovative are the ideas created with InnoCards?** How innovative are the ideas compared to expert ideas? How innovative are the ideas compared to “normal” ideation sessions?
- **RQ₂: Usefulness – How well do the solution ideas fit the problem space?**
- **RQ₃: Timing – In which project stage (searching for a problem vs. concretely stated problem space) should the cards be utilized?** How can the gameplay (time, group size, collaborative vs. competitive, number of cards, predefined pattern) be adjusted to support different project stages? In which project stage do they have the most impact?
- **RQ₄: Usage – How easily accessible is the game?** How well can people who do not feel creative benefit from the cards? How much fun is the gameplay? Does the game need a moderator? Should the game be a single activity or be embedded into a workshop? Which activity follows its usage?

5. Summary

Based on our initial question of how stakeholders could contribute more creative, user-centered solution ideas in creative workshops, we developed InnoCards – a haptic and engaging tool to be integrated into co-creation processes. We investigated existing solutions and concluded that we wanted a more user-centric approach. Deviating from similar solutions, CityInnoCards sticks to a specific subject context as our goal is to design solutions together with our stakeholders. Also, the cards are based on our knowledge from projects with city and municipal authorities. The game’s target is to find many innovative ideas in order to broaden the solution space by iterating ideas throughout the game. Even though we have already been able to gain positive impressions with the cards internally, they have yet to be used by the target group. As the current feedback comes from people who mainly work creatively in their day-to-day work, it must be ensured that the cards can also be used by people who work and think differently. With further results, we want to address our research questions regarding the game output and its workflow in order to find out more about the possible benefits of the cards.

References

- [1] What Is the Holistic Design Approach and How Can You Adopt It? <https://www.eleken.co/blog-posts/what-is-holistic-design> (2024). Accessed 5 February 2024
- [2] Hess, A., Magin, D.P., Koch, M.: Co-Creation in den Dörfern – Ein Living Lab für ländliche Regionen (2017)
- [3] Koch, M., Hess, S., Hess, A., Magin, D.P.: Digitale Innovationen von Bürgern für Bürger - Design Thinking oder Citizen Science? UP 2016 (2016). <https://doi.org/10.24406/publica-fhg-298229>
- [4] Ramaswamy, V.: Co-creation of value – towards an expanded paradigm of value creation. Thesis (2009). <https://doi.org/10.1007/s11621-009-0085-7>
- [5] Jones, P.: Contexts of Co-creation: Designing with System Stakeholders. In: Kijima, K., Jones, P. (eds.) Systemic Design. Theory, Methods, and Practice, vol. 8. Translational Systems Sciences Ser, vol. 8, pp. 3–52. Springer, New York (2019)

- [6] Geschka, H.: Creativity Workshops in Product Innovation. *J of Product Innov Manag* (1986). <https://doi.org/10.1111/1540-5885.310048>
- [7] Mahr, D., Lievens, A., Blazevic, V.: The Value of Customer Cocreated Knowledge during the Innovation Process. *J of Product Innov Manag* (2014). <https://doi.org/10.1111/jpim.12116>
- [8] Rosson, M.B., Carroll, J.M.: Scenario-Based Design. In: *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications.*, pp. 1032–1050
- [9] Fraunhofer-Institut für Experimentelles Software Engineering IESE: Smart City: Wir gestalten die digitale Stadt - Fraunhofer IESE. <https://www.iese.fraunhofer.de/de/trend/smart-city.html> (2024). Accessed 1 February 2024
- [10] Digitale Döfer – Vom Land fürs Land. <https://www.digitale-doerfer.de/> (2024). Accessed 1 February 2024
- [11] Koordinierungs- und Transferstelle Modellprojekte Smart Cities (KTS) | Smart City Dialog. <https://www.smart-city-dialog.de/koordinierungs-und-transferstelle-modellprojekte-smart-cities-kts> (2024). Accessed 5 February 2024
- [12] Vandenberg, B.: Play, problem-solving, and creativity. *New Directions for Child and Adolescent Development* (1980). <https://doi.org/10.1002/cd.23219800906>
- [13] Goldsmith, R.E., Foxall, G.R.: The Measurement of Innovativeness. *The International Handbook on Innovation* (2003). <https://doi.org/10.1016/B978-008044198-6/50022-X>
- [14] Nguyen, L., Shanks, G.: A framework for understanding creativity in requirements engineering. *Information and Software Technology* (2009). <https://doi.org/10.1016/j.infsof.2008.09.002>
- [15] Boden, M.A. (ed.): *The Creative Mind. Myths and mechanisms.* Second edition, vol. 2. Routledge (2004)
- [16] Souder, W.E., Ziegler, R.W.: A Review of Creativity and Problem Solving Techniques. *Research Management* (1977). <https://doi.org/10.1080/00345334.1977.11756427>
- [17] Method Cards | IDEO. <https://www.ideo.com/journal/method-cards> (2024). Accessed 26 January 2024
- [18] Situation Lab: The Thing From The Future. <https://situationlab.org/project/the-thing-from-the-future/> (2024). Accessed 25 January 2024
- [19] LandKarten – Digitale Dörfer. <https://www.digitale-doerfer.de/landkarten/> (2024). Accessed 26 January 2024
- [20] Deterding, S., Dixon, D., Khaled, R., Nacke, L.: Proceedings of the 15th International Academic MindTrek Conference Envisioning Future Media Environments. ACM Other conferences. ACM, New York, NY (2011)
- [21] Lin, S., Wu, R., Yang, F., Wang, J., Wu, W.: Spatial trade-offs and synergies among ecosystem services within a global biodiversity hotspot. *Ecological Indicators* (2018). <https://doi.org/10.1016/j.ecolind.2017.09.007>
- [22] Wrba, H.: Ideenbewertung mit der Bet-Cost-Matrix. UX&I GmbH, 18 January 2021. <https://www.uxi.de/artikel/ideenbewertung-bet-cost-matrix>. Accessed 25 January 2024