Next-Gen design thinking. Using Project-based and Game-oriented approaches to support creativity and innovation

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Abstract. In this paper, we would like to share the experience of using Design thinking methodology in the university classroom to boost a creativity process. This paper explores the current developments in the field of Design Thinking, provides future directions of Design thinking, aka Next-Gen Design thinking approach. Finally, we will review a successful case study on how universities plan to implement Design thinking strategies to support project-based education of graduate students, will provide the analysis of Academia - Industry-sponsored Design thinking projects.

Keywords: Creativity, Design thinking, Next-Gen Design thinking, Project-based learning, Games, Prototyping, Innovation.

1   Introduction

There are numerous approaches to study and support creativity. From our understanding, despite other factors, creativity is strongly related to corporate culture, team coordination, social factors. The detailed study of the integrative approach to creativity presented Mark Runco [15]. Another approach to Creativity and Design introduced by Donald Norman in his book Emotional Design [11]. Emotional Design is a crucial

element when generating ideas for human-centered opportunities discussed in detail and prove to be extremely useful. Unfortunately, understanding of creativity and innovation will require a better understanding of practical oriented method and experimental prototyping. A recent study of Harvard Business Review [24] discusses a creating of a culture of experimentation, the importance of cultivating curiosity, and to active use of experimentation platforms. It is imperative to test the idea to realize the transformative power of experimentation fully. Such an approach is a key to the Stanford Design method approach, aka Design thinking.

Design thinking methodology is a useful tool for addressing "wicked problems" that do not have simple, clear answers [4][3][8][9] Although the design-thinking approach is not a new concept and has been around for many years [8], it has recently gained fantastic popularity as companies have realized its value.

Design Thinking is an approach that aims at creating innovative ideas that solve customer-defined problems and therefore considers the customer's needs and expectations throughout the whole product development cycle. Namely, Design Thinking represents a means of investigation that heavily relies on understanding how the result of the design exercise will be used. While traditional development approaches follow a procedural method of different sequential phases, Design Thinking (Stanford d.school version) [8][18][21][22] allows to move between the various steps and as a result, enables to deliver human-centered solutions for a given problem in a structured form, thereby following six iterative stages: (1) to observe the user, to empathize user needs (2) define the problem; (3) generate ideas to solve the issue taking into consideration the actual user behavior; (4) built a prototype; and (5) test the prototype. The design thinking stages (Stanford d.school) is presented below (Fig 1).
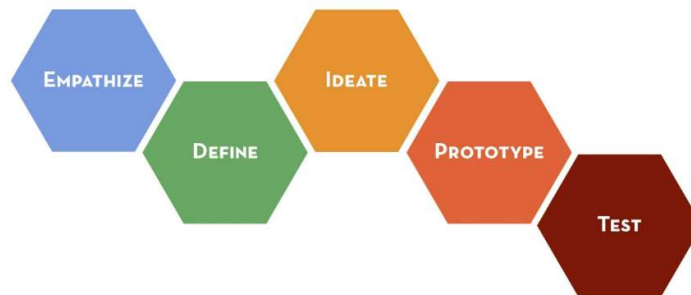
Fig 1. Design thinking process (Stanford d.school)

2 Next-Gen design thinking

Next-Gen Design thinking approach is to extend the human-centered focus of traditional Design Thinking to include new tools that enable deep insight into where companies and organizations have come from, that they might act and innovate to be

ready for uncertain futures. Traditional Design Thinking is well conceived as human-centered, as a way of delivering deep insight into people's needs and wants, reconciling these with business feasibility and technological viability, to deliver successful innovation. Next-Gen Design Thinking augments and expands the scope of Design Thinking with a broader perspective on the human and cultural components to innovation, creativity, and strategic decision making with tools to implement this more comprehensive perspective.

At the methodology level, the Next-Gen Design thinking is further development of Design thinking (aka Stanford Design Method), based on significant new understanding of Ideation and Prototyping stages, novel approach of use storyboards (for example SAP Scenes) and finally Gamification approach [2][10] [16] [20] as a possible way to improve learning motivation and engagement specifically for millennials and post-millennials students. According to primatologists and anthropologists research, play behavior is based on a peaceful society. Many bonding rituals are rooted in play[13] laying games help to bond communities, open mind, and ideate.

During Design thinking stages, is it very efficient to use of IDEO methods cards [6], NOVA tool [12], Tangible Business Processes Modelling tool (TBPM) [5], and other approaches to support Design thinking approach [5][7].

SAP Scenes [17][18] is another excellent example of free of charge available tool and a method developed by SAP AppHaus Heidelberg to create storyboards about products and services. The Scenes Basic Set includes generic illustrations that can be adapted to a wide variety of use-cases but has a limited industrial specific. It is why SAP AppHaus decided to create Scenes add-ons - a set with additional illustrations focusing on a particular topic or Industry. We want to stress that the storyboard method is a compelling approach for understanding the problem, to move to the Ideation stage of Design Thinking, and to create and analyses different scenarios. Such an approach is also much applicable for management education projects that will allow sharing student's ideas with industry sponsors. The authors implemented SAP Scenes as part of the EMBA teaching process as well to train Masters in Business Informatics in one or two days of teaching modules. Scenes include a set of pre-defined illustrations that can be physically or digitally combined in stages to create a visual story and presented below (Fig 2).
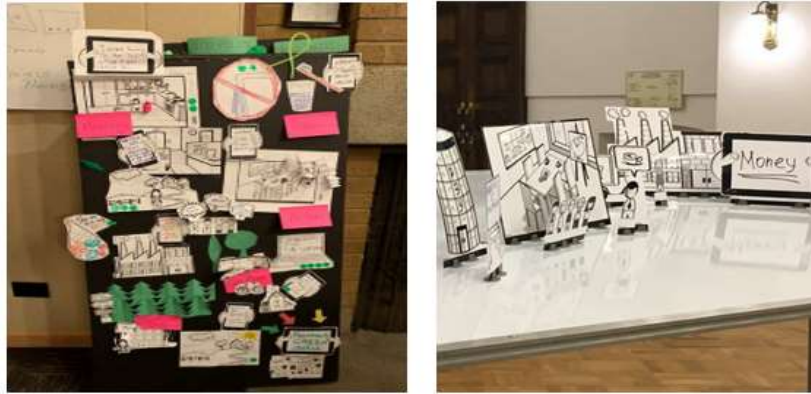
Fig 2. Use of SAP Scenes for Ideation and Prototyping

Harmonization of current game-oriented software-based approaches for a better understanding of business processes [16] and physical card/storyboards such as SAP Scenes method can be a very effective way of bringing management education in Innovations to the new level. We use a hybrid approach specifically for MBA, EMBA, and MSc in Information Systems students they are very much capable of dealing with mobile apps as part of day to day business, and physical cards are a great tool to create a tangible experience. In fact, tangible experience is an essential ingredient for successful Design thinking management education. Below, some examples of storyboards cards and games (Fig 3).

Fig 3. Business storyboard cards and games.

Further, the ideas selected during the Design thinking process are embodied in prototypes. Prototyping is an important, iterative process. In the course of it, one can generate new ideas, improve old ones, get a vision of the problem, and to find a possible solution. A prototype can be everything that can interact with: physical prototypes, including previously mentioned storyboards/games/sets; software prototypes; sketches on paper; role scenarios, etc. Specifically, MBA and EMBA students, it is essential to show the critical difference between Marketing studies methods (customer-oriented elements) and Design thinking as (human-centered and prototype oriented), to stress the importance of prototyping stage for not only for physical product but also for service design [19].

Prototyping tools examples are presented below.

Fig.4. Prototyping tools

Specific attention to Ideation (storyboards implementation) and Prototyping stages of Design thinking, the overall the Future Design thinking process is also required a better understanding of how people and new technologies will change the way people and computers will interact, to structure the successful Design thinking project.

It is also essential to pay specific attention to the way how to structure project teams, how to use team members with managerial, engineering, liberal arts backgrounds as one team. It is exceptionally very important to create a strong empathy across team members. Empathy - the ability to look at the world through the eyes of other people, to understand their needs, desires, and the tasks they face. In other words, Empathy is the necessity to understand, so to speak, the vocabulary of people, because in this way the respect is shown to them-it shows that they are expressed in

one language [23]. That is why it is also essential to have an interdisciplinary team of students with diverse educational and cultural backgrounds.

The next part will stress the importance of a Project-based approach to education, using the current Stanford ME310 Project as an example.

3 Project-based approach. Stanford ME310 course

Stanford ME310 course is a great example when two teams: US University - Stanford and International University (or Universities) will need to work together and to deliver the results for Industry partners. For today, Universities from USA, Germany, Switzerland, France, Austria, Japan, China, Latin America are part of the ME310 community. It is a unique opportunity to work on real challenges from Industry.

Stanford ME310 project has length nine months, graduate-level only (Engineering, Management and IT, Master level students), and provided significant intercultural experience for participants.

As the results, project-based learning is an integral part of the whole studying process as while correctly working at the project, and the students gain skills in solving the critical practical tasks, get the knowledge and skills, which can be used in further educational and professional activity. In our case, we will review the current Project Stanford ME 3103 project, sponsored by the consortium of Austrian companies and SAP SE. Seven students (MBA program, Engineering, Business Informatics backgrounds) from Stanford University, Vienna University of Technology, and University of Muenster are engaged in the research on the future of workspace. One solution students plan to explore first is the use of a virtual reality environment for a better understanding of a user creates and specifies the space, furniture, and services desired. The overall product vision is a platform that can easily match people's "dream" environment with existing offerings. Platform users can find out things that were not previously planned in this process as well. Space, appliance, and service providers then learn with the user what the user wants and provide AI-powered tools to help the user with the build. After the virtual environment is created, a database for existing settings will be searched, and a few closest matches will be provided for the user to choose from.

Project is possible next steps include getting data for existing spaces and services from industry partners, prototyping VR devices for usability, and doing more integration testing. As a result, the aim is to build a platform for next-generation residential/office developers and service providers to engage potential users quickly, and for customers to have a perfect journey creating and accessing the dream environment.

While the project is still in progress with the final results that will be presented in June 2020, it is already clear that the Design Thinking approach used in this project showed it is clear viability and effectivities for multidisciplinary team. More details will be reviewed and provided after the project's finalization.

4 Conclusion and future work

In this paper, we briefly analyzed the current developments in the field of Design Thinking, defined a foundation for the Next-Gen Design thinking.

Also, the paper elaborates on project-oriented education, which, being embedded into university programs, enables senior engineering and management students to develop Design, project, and entrepreneurial skills while working on real-life innovation challenges formulated by an industry partner. The paper concludes with further research directions specifically to the use of VR hardware as part of project-based design education and shared initial research results.

We believe more attention required to understand the fundamental issues behind team culture, communication, and stress, language issues. Some initial research presented in [1], and we plan to extend such research further to use Next-Gen design thinking as foundational.

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