Pet Empires: Combining Design Thinking, Lean Startup and Agile to Learn from Failure and Develop a Successful Game in an Undergraduate Environment

Danielly F.O. de Paula[(✉)] and Cristiano C. Araújo

Post-Graduate Program in Computer Science, Universidade Federal de
Pernambuco Center of Informatics (CIn), Recife-PE, Brazil
{dfop2,cca2}@cin.ufpe.br

Abstract. Startups are able to produce software products with a strong impact on the market, significantly contribution to the global economy. However, eight of ten software startups fail within their first three years - the main failure is caused by the high cost of getting the first customer and the even higher cost of getting the product wrong. In order to reduce these failures, more recent research has focused on combining the approaches of Design Thinking (DT), Lean Startup and Agile to develop and scale new products. This research aims to offer new insights on how startups can benefit by combing the approaches above to developing new software products. As a result, this paper provides a model which demonstrated good potential to be used by startups.

Keywords: Design thinking · Len startup · Agile methodology · Software development

1   Introduction

Nowadays, Design Thinking has been implemented in many different organizational settings, most notably Information Technology (IT). However, we still don't know how the appropriate combinations of design thinking with common IT development models look like (Lindberg et al. 2011). To address this gap, this article aims to analyze the introduction of Design Thinking practices to IT development in a startup environment. Initially, the team followed an existing model to develop a mobile game, and then to better fit in a startup context the model was adapted.

In order to introduce the DT concepts, the Nordstrom model (Grossman-kahn and Rosensweig 2012) was chosen because it seemed to be an easy way to introduce DT practices in IT teams using just a few steps. Furthermore, its features included the more recommended practices, such as Design Thinking, Lean Startup and Agile, for developing new software products in a startup environment (Paternoster et al. 2014) (Grossman-kahn and Rosensweig 2012). The startup was composed by three computer science undergraduate students working at BlackBerry Tech Center Recife (TC). The TC aimed to offer a place where undergraduate students could learn how to create innovative software solutions by experiencing a simulation of a startup environment.

They used to work with Lean Startup and Scrum, but had no experience with DT. Thus, the team faced two big challenges: learning how to work with DT and developing their first game. Overall, this study contributes to the HCI literature by presenting new insights on how to introduce DT practices in IT undergraduate teams that already follow Scrum and Lean Startup. In addition, it contributes to the improvement of the Nordstrom model by putting more emphasis on the use of DT.

2 Background and Related Work

2.1 Combining Design Thinking, Agile Methodology and Lean Startup

Ever since Design Thinking (DT) was used as the title of Rowe's 1987 book many researchers have attempted to validate the nature of design thinking in the business context (Martin 1995). Brown (2009) has defined design thinking as "bringing designers' principles, approaches, methods, and tools to problem-solving". The idea behind this approach is to employ practices that help organizational participants to reevaluate fundamental assumptions about the way their organization's function and to develop thus appropriate solutions to novel problems (Boland and Collopy 2004).

In comparison with design thinking, agile shows some strong parallels: core features like iterative learning and development processes, and extensive team communication (Lindberg et al. 2011). However, agile has some restrictions: (a) there is less emphasis on interdisciplinary creative collaboration than in design thinking; (b) agile seems to have a tendency to avoid divergent thinking in order to maintain the overall view on what to do next and (c) Agile assumes that teams already start with a product vision and a product backlog without a clear picture as to where that vision will come from (Lindberg et al. 2011).

Similar to design thinking, lean is also focusing on users or customers; however, does not provide guiding principles on how to find out what is valuable to the customer (Kowark et al. 2014). There are good reasons why both Lean and design thinking make particular sense together: (a) developers in business software companies are often not actual users of their own products. Hence, the empathy phase from DT is needed (Kowark et al. 2014). There is still no model widely accepted by the literature; however Grossman-kahn et al. (2012) recently released a model combining the three approaches.

The Nordstrom Model. Grossman-kahn et al. (2012) argue that the development of a new product must start with practices of Design Thinking, because the team needs at the earliest find out the needs of users, identify problems and propose solutions (Fig. 1).

All practices of Design Thinking follow the Human Centered Design Toolkit[1] from IDEO. Only after performing step-by-step manual of IDEO, the team is able to start the practices of Agile, following the philosophy of Lean. The model was positively validated by the laboratory team of Nordstrom.
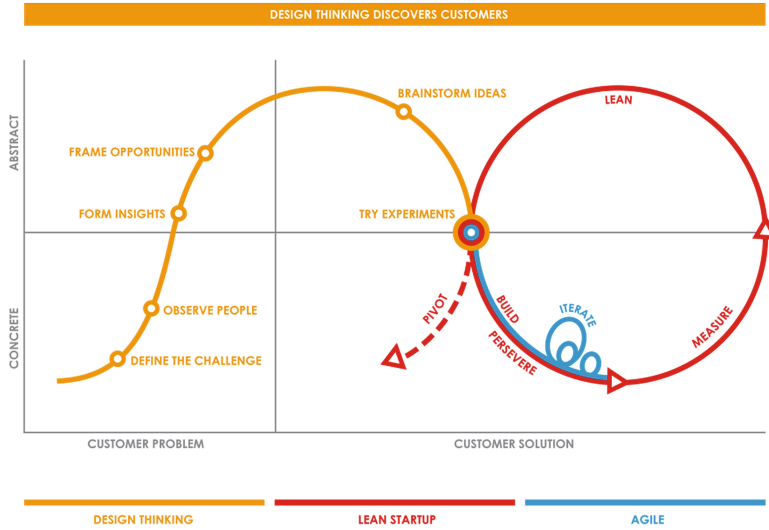
---

[1] http://www.designkit.org/.

Fig. 1. Nordstrom model (Color figure online)

3   Method

This study aims to offer new insights on how startups can benefit by combing Design Thinking, Lean Startup and Agile Methodology to develop new software products. The following questions served as guide to conduct the research:

RQ1: What are the challenges of introducing the Nordstrom model to an IT team?
RQ2: How can we improve the Nordstrom model to fit better in an undergraduate environment?
RQ3: What is the impact of applying DT, Lean and Agile in an IT team?

In order to answer these questions, the Nordstrom Model was introduced in one IT team which was incubated at BlackBerry Tech Center Recife (Brazil). The team was composed of two developers and one designer. The Tech Center was chosen because of the possibility to monitor teams in daily activities for one year. Although the research was carried on a small sample, the authors were present in all phases of the development process. The decision of having a small sample was made because the authors would like to be as close as possible to the team in order to evaluate better the introduction of the model.

An action research (Susman and Evered 1978) was carried out because it emphasizes collaboration between researchers and practitioners. In addition, the action researcher is concerned to create organizational change and simultaneously to study the process. The Nordstrom Model was chosen because it uses DT, Agile and Lean to cover the entire process of developing software. The team followed this model to develop a mobile game - Pet Empire game.

4   Testing the Model

4.1   Pet Empires – 1st Cycle

The first cycle lasted three months, and the startup followed the Nordstrom model. In this time, the team didn't receive a brief from Blackberry. Thus, they had to think what challenge would be addressed. The option chosen was: How can we develop an interesting game?

The team went through all the model's steps. As a result, a mobile game was developed in which cats and dogs would fight against each other in turns (similar to chess). The value proposition was to deliver a quick game for people who have little time available to play. To verify if the final product was good enough to be released, the game was presented to the International Game Developers Association Recife (a local group of game developers). Pet Empires received a bad evaluation by the community due to its poor gameplay. The team analyzed the reasons that led to the errors pointed out.

Firstly, the team noticed the gameplay was very complex, and one match could last weeks. This result contradicts with the game's value proposition which was to deliver a quick and easy game for busy people. Secondly, the team analyzed the development process to find out what exactly pushed them away from the users' need. Further analysis showed that the team did not consider the users' needs throughout the implementation phase. This was caused mainly because the Nordstrom model did not offer enough support to contrast the new findings against previous reports about the users.

4.2   Pet Empires – 2nd Cycle

The second cycle aimed to solve the previous problems, this time the Nordstrom model was modified to use DT practices in the entire process, not only in the beginning. The game was released in four months, and it is available on Kongregate. To evaluate the game, the team organized a launch event where more than 40 people who no previous knowledge of the game had participated in a competition. All those people who attended the event completed a questionnaire about the game. Moreover, they were observed while playing to identify facial expressions of satisfaction or dissatisfaction. A total of 93 % users would play again which shows how the user experience was highly positive. In addition, the game was challenge and difficulty in a right level to a casual game. Because of that, most of the users felt satisfied with the game.

Although the second cycle took more time, the result was better than the first one. The use of design thinking in the entire process offered a better way to solve micro problems since it provides a set of techniques on how to approach the users in case of doubts. Thus, the team stopped guessing, then started to collect more precisely answers. The modifications done in the Nordstrom model resulted in (a) game with greater acceptance from the users, and (b) an easier way to understand the "insights" and "frame opportunities" phases.

5   Conclusion

This study investigated the challenges of applying the Nordstrom Innovation Lab's Model to IT development. The model was used by a team of three Computer science undergraduate students to develop a game. The main results suggest that: (a) during the prototype phase the team should validate the user experience by using an interface that is closest to the final product, and (b) Design thinking should be used in the entire process of the Nordstrom Model. Understanding the challenges faced by IT teams to combine Design Thinking, Agile and Lean Startup is critical to help the industry and literature on how to improve software development. For IT teams, knowing how to overcome the challenges when adopting design thinking will help them to improve their software development processes and launch more innovative products. For the literature, this study contributes on (a) how a combination of design thinking with IT development would look like; (b) the implications of the adoption of design by undergraduate students; (c) the improvement of the Nordstrom Innovation Lab's model.

Future work should focus on using the model to develop new software, thinking about monetization, hence try to sell it. Besides that, to help teams understand design thinking, a set of tools should be developed to teach and support the process.

References

Brown, T.: Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. Harper Business, New York (2009)

Boland Jr., R.J., Collopy, F.: Design matters for management. In: Boland Jr., R.J., Collopy, F. (eds.) Managing as Designing, pp. 3–18. Stanford University Press, Stanford (2004)

Grossman-kahn, B., Rosensweig, R.: Skip the silver bullet: driving innovation through small bets and diverse practices. In: Leading Through Design, 815 p. (2012)

Kowark, T., Hger, F., Gehrer, R., Krger, J.: A research plan for the integration of design thinking with large scale software development projects. In: Leifer, L., Plattner, H., Meinel, C. (eds.) Design Thinking Research. Understanding Innovation, pp. 183–202. Springer International Publishing, Switzerland (2014)

Lindberg, T., Meinel, C., Wagner, R.: Design thinking: a fruitful concept for it development? In: Meinel, C., Leifer, L., Plattner, H. (eds.) Design Thinking. Understanding Innovation, pp. 3–18. Springer, Heidelberg (2011)

Martin, R.: The Design of Business: Why Design Thinking Is the Next Competitive Advantage. Harvard Business School Press, Boston (1995)

Paternoster, N., et al.: Software development in startup companies: a systematic mapping study. Inf. Softw. Technol. **56**(10), 1200–1218 (2014). Elsevier

Susman, G.I., Evered, R.D.: An assessment of the scientific merits of action research. Adm. Sci. Q. **23**, 582–603 (1978)