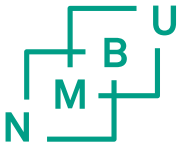
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Foreword

This master thesis marks the final chapter of the master program in Entrepreneurship and Innovation at School of Economics and Business, University of Life Sciences.

Finding a topic for a master thesis can be interesting and challenging. During our time at the master program we were introduced to a wide range of topics within entrepreneurship and innovation. Finally deciding on a topic and excluding other possibilities can be experienced as both liberating and limiting. Though, one must set sail when the wind is picking up, and when the opportunity arose to work as a team to investigate the realm of gamification, we set sails. Handling a boat in storm and on days of tranquility are to separate things affecting the crew accordingly. We experienced days of frustration and days of progress, co-writing and cooperation can be exceedingly challenging and at the same time rewarding when the duo crosses the chasm.

We would like to thank our advisor Siw Fosstenløkken for her patience in guiding us through the process. We would also send a gratitude to all of our classmates at NMBU for making our two years there so joyful and interesting. We are most grateful to all that participated at Playing Lean workshop, answered the surveys and set aside time to be interviewed.

Tore Rasmussen would also like to offer a special thanks to Elin Kubberød and Nils Sanne for encouraging him to investigate Lean Startup further, and a gratitude to Simen Fure Jørgensen for a good collaboration developing Playing Lean.

Tore Rasmussen and Simen Øxseth
Oslo, January 14th, 2016

Abstract

Gamification and the Lean Startup methodology have become buzzwords in academic literature and form the basis for this thesis. The philosophy and method of Lean Startup has received increased attention in entrepreneurship and business practices. Gamification as a concept has recently emerged and entered the field of learning in a range of areas, from business to education. The topic of this thesis is gamification as a tool to learn entrepreneurship and innovation methodology, represented by Playing Lean, a board game innovation developed for learning the Lean Startup Methodology (LSM). There are several studies on learning effects from gamification and on game-based learning, but there are few studies on entrepreneurship and innovation games, and no known studies on games with an emphasis of conveying the Lean Startup Methodology.

The object of study will be Lean Friends AS's application of the board game Playing Lean as educational learning tool for understanding the Lean Startup Methodology, facilitated in workshops with introduction and debrief. The purpose of the research is to reflect upon how gamification works and whether Playing Lean meets the purpose of making people understand the method. We investigated how players experienced playing the board game, how specific game elements and mechanics functioned and the learning outcome of the LSM. The research question we formulated to meet this purpose: *How does gamification contribute to learn the Lean Startup Methodology*? A subordinate purpose is to investigate if this contributes to learning entrepreneurship in a meaningful way.

The qualitative research approach we used was explorative and pragmatic, using mixed methods approach to collect various forms of data to compare. We have collected data from observation, questionnaires and group interviews/focus groups from Playing Lean Workshops (PLW), interviewed five players and one of the creators of the game. We used empirical data and secondary data to reflect on gamification in our discussion. Our results points towards a positive learning outcome in general and that elements like social learning, facilitator and use of storytelling were effective to learn. The PLW was an entertaining experience for the players and a good introduction for beginners. Further research on gamification can assist in improving instructional games for practitioners and game developers.

Sammendrag

Begrepene Gamification og Lean Startup har blitt moteord i akademisk litteratur og står sentralt i denne oppgaven. Lean Startup filosofien har spesielt fått mye oppmerksomhet innen entreprenørskap og forretningsverden. Gamification som konsept er forholdsvis nytt og har entret læringsfeltet på flere områder, fra forretningsverden til utdanning. Temaet for denne oppgaven er gamification som et verktøy for å lære entreprenørskap og innovasjons metodikk, representert ved Playing Lean, en brettspillsinnovasjon utviklet for å lære bort Lean Startup metodikken (LSM). Det foreligger mange studier på læringseffekten av gamification og spillbasert læring, men det er få studier på entreprenørskaps- og innovasjonspill, og ingen studier på spill med fokus på å lære bort Lean Startup metodikken.

Oppgavens fokus vil være på Lean Friends AS sin anvendelse av brettspillet Playing Lean som et utdanningsverktøy for å forstå Lean Startup Metodikken, fasilitert gjennom en workshop som inkluderer en introduksjon og avsluttende refleksjonsdel. Målet med denne forskningen er å reflektere over hvordan gamification virker og hvorvidt Playing Lean oppnår målet med å formidle Lean Startup metodikken. Vi undersøker hvordan spillere opplever brettspillet, hvordan ulike spillelementer og spillmekanismer fungerer og LSM læringsutbyttet. Forskningsspørsmålet vi har utviklet for å besvare dette er følgende: *Hvordan bidrar gamification til å lære Lean Startup metodikken?* Sekundært ønsker vi å undersøke om dette bidrar til å lære entreprenørskap på en meningsfull måte.

Den kvalitative forskningstilnærmingen vi benyttet var eksplorerende og pragmatisk, med bruk av en blandet metodetilnærming til å samle og sammenligne ulike typer data. Vi samlet data gjennom observasjoner, spørreskjemaer og gruppeintervjuer/fokusgrupper fra Playing Lean workshops (PLW), intervjuet fem spillere og en av skaperne av spillet. Vi har benyttet primær- og sekundærdata til å reflektere over spillifisering i vår diskusjon. Våre resultater indikerer et generelt positivt læringsutbytte og at elementer som sosial læring, fasilitator og bruk av historiefortelling var effektive for å lære. PLW var en underholdene opplevelse for spillere og en god introduksjon for nybegynnere. Videre forskning på gamification kan bidra til å forbedre instruksjonsspill for praktikere og spillutviklere.

Table of Contents:

INNHOLD

Figures, Pictures and tables:

Figures

Illustrations

List of abbreviations:

EC	Experiment Card
GBL	Game-Based Learning
GE	Game Element
GM	Game Mechanics
GEM	Game Elements and Mechanics
GP	Game Play
IN	Innovasjon Norge (Innovation Norway)
LS	Lean Startup
LSM	Lean Startup Methodology
PL	Playing Lean board game
PLW	Playing Lean Workshop
OIW	Oslo Innovation Week
OECD	Organization for Economic Cooperation and Development
W1	Workshop 1: Consultancy agency hosting a PLW for a Government Institution
W2	Workshop 2: Private consulting company hosting a PLW for employees
W3	Workshop 3: Consultancy agency hosting a PLW during OIW
W4	Workshop 4: Educational Institution hosting a PLW
W5	Workshop 5: Science Center hosting a PLW for entrepreneurs

1. Introduction

1.1 Background and topic

Entrepreneurship and innovation has increased in interest among practitioners, policy makers and theorist. Lean Startup Methodology (LSM) has emerged as an approach to entrepreneurship and innovation (Blank 2013; Ries 2011). The method has grown in popularity since Ries introduced the concept, and in a Harvard Business Review article Steven Blank makes an argument that LSM can be used when launching a new enterprise regardless if it is a "*tech start-up, a small business, or an initiative within a large corporation*" (2013). The LSM is now being used by both sophisticated entrepreneurs all over the world and world leading companies like Dropbox, GE and Intuit. In academia it is being taught in 25+ universities[1]. Another emerging theory is gamification, the concept of making learning more enjoyable by implementing game elements in a non-game environment (Kapp 2012; Jakubowski 2014). There are many studies on learning effects of gamification (Hays 2005; Ke 2009; Kapp 2012). However, there are few gamification examples of entrepreneurship and Lean Startup, and no studies dedicated to the gamification of the Lean Startup method. Therefore we see the need for scientific research on gamification of this recent entrepreneurship methodology and how a game can promote this knowledge and way of thinking.

Lean Friends AS's application of the board game Playing Lean as an educational tool for learning the Lean Startup Methodology is the topic of this thesis. The founder of Playing Lean played 'getKanban', which is an analog board game that is designed to teach the concepts of Kanban for software development. He then wanted to buy a similar game to teach his clients the LSM only to find that such a game did not exist yet.[2] The idea of using gamification to teach, train and engage employees and clients is not new, but well used by a long list of organizations that include Fortune 500 companies like: Google, Microsoft, Cisco, Deloitte, Sun Microsystems, IBM, L'Oreal, Canon, Lexus, FedEx, UPS and Wells Fargo (Schawbel 2013).

[1] The Lean Startup Circle Wiki, InnovationCourses: [http://leanstartup.pbworks.com/w/page/51233037/InnovationCourses] (Accessed 21.12.2015)
[2] Based on background interview with Simen Fure Jørgensen on 14th of September

1.2 Definitions of concepts and theory

Gamification, a term coined by Nick Pelling in 2002 (Jakubowski 2014), is about making learning fun, effective and relevant (Kapp 2012; Sitzmann 2011). A usual thought is to think of family board games and computer games, mainly built to the purpose of entertaining people. However, "*gamification is not about making a game, but taking what makes games so engaging and incorporating it in other activities*" (Jakubowski 2014:339), and some games are built as instructional games (Hays 2005; Ke 2009;). A definition of gamification suggested by Karl Kapp captures the essence: *"Gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems"* (2012:10). Here we will take use of the concept **gamification** as an instructional instrument (Ke 2009:2), and a definition is given in how Hays advises instructors to view "instructional games as adjuncts and aids to help support instructional objectives" (2005:6). Since we will research on an instructional game played in teams challenging each other, at the same time as they are a group engaged in a collective learning context includes game elements like social learning, facilitator/instructions, and motivation/competition and reward structures, rules and storytelling are **game mechanics (GMs)**, explained by Karl Kapp as "…crucial building blocks used during the gamification process" (2012:11). Throughout the thesis **GEM** will be used as collective acronym for game elements and mechanisms.

Lean Startup (Ries 2011) has become a buzzword for entrepreneurs, startups and established companies, and invaded entrepreneurship, innovation and business management literature. The Lean Startup methodology is a methodology to start a business. It involves taking a scientific approach to the process, creating hypothesis' about a service or a product that can be tested, take learning from these experiments and use the knowledge to proceed or change direction, to alter or maintain service or product, and to formulate the knowledge enhancement in a way similar to keeping a journal. **The Lean Startup Methodology** as defined by Eric Ries, who coined the term 'Lean Startup': *"The Lean Startup provides a scientific approach to creating and managing startups and get a desired product to customers' hands faster. The Lean Startup method teaches you how to drive a startup-how to steer, when to turn, and when to persevere-and grow a business with maximum acceleration. It is a principled approach to new product development."*[3] One could argue that Ries gathered different elements to one coherent philosophy, addressing the '*what is'* Lean Startup. Based

[3] Ries, E. [http://theleanstartup.com/principles] (Accessed 20.11.15)

on this philosophy authors of the Lean Startup methodology literature have provided a number of 'fundamentals', that seen as a whole capture the '*how to execute'* the Lean Startup, and in that process suggesting a LSM. The framework is based on the following seven authors; Eric Ries, Steve Blank, Ash Maurya, Alexander Osterwalder, Yves Pigneur, Nathan Furr and Paul Ahlstrom. The **Lean Startup Methodology (LSM)** framework is what the instructional game seeks to convey. **Playing Lean** is a teaching tool developed by Lean Friends AS. The aim of the game was to teach the Lean Startup methodology, in particular Ash Maurya's approach to the method (2012). The game has gone through a number of iterations since January 2013. The game was designed to be a workshop tool that was 51 percent teaching tool and 49 percent game. Playing Lean should primarily be a tool to teach Lean Startup, but for the educational tool to work optimally it must also be playable. A **Playing Lean Workshop (PLW)** is the three hour long workshop containing an introduction, a game session and a debrief session. **Entrepreneurship** is a concept with many definitions depending on which discipline defines it, economists or organizational theorists have different take on the concept, and how it is interpreted and defined within each discipline (Storey et al. 2010:20-22). In this context we will apply the definition provided by Timmons (1997): "Entrepreneurship is a way of thinking, reasoning, and acting that is opportunities obsessed, holistic in approach, and leadership balanced" (Storey et al.2010:22), seeing it as encompassing elements relevant to this thesis.

1.3 Research questions and methodology

Based on the topic and purpose of this research we have formulated research questions that can be instrumental to investigate the research objective of examining how Playing Lean can convey LSM through gamification. In this process we want to look into research supporting the use of gamification in learning and specific game elements and mechanics. This leads up to trying to answer the main research question of this thesis:

- RQ: How does gamification contribute to learning the Lean Startup Methodology?

Two sub research questions have been formulated to help answer the main research question:

- SRQA: How do game mechanics and elements contribute to learning?
- SRQB: To what extent do players learn from Playing Lean?

In ‘contribute to’ we target the fact that the game is part of an instructional workshop, and designed as an instructional game meant to have a facilitator providing instructions. With ‘learning’ we refer to Kolb’s definition: “Learning is the process whereby knowledge is created through the transformation of experience” (1984:38). We have chosen specific ‘game mechanics and elements’ to investigate and reduced the LSM to eleven key concepts to measure increase in confidence levels addressing the ‘to what extent’ element in SRQB. In answering these sub research questions we can possibly provide answers and indications from findings that can build up to a conclusion to the main research question.

To answer our research questions we have used an explorative research design (Johannessen et al. 2011) with a pragmatic approach of combing a mix of quantitative and qualitative methods in data collection using questionnaires, observations, group interviews/focus groups and in-depth interviews. It seemed as a viable approach to measure the learning outcome of informants attending the workshops and collecting data to answer our research questions. Observing, asking questions and interviewing to investigate how specific GEMs worked, and using questionnaires to measure confidence increase in LSM concepts and the frequency of GEMs facilitating learning of the concepts enabled us to triangulate certain data. Since we want to measure the learning outcome of LSM we have taken eleven key concepts from theory and used them in a pre-game/post-game questionnaire to be able to indicate whether players experienced a learning outcome. We will analyze the data taking use of theory, using four GEMs and the eleven key concepts on the LSM as a framework to organize the data. The majority of data collected are from seven Playing Lean Workshops (PLWs) held between September and November 2015. Additional data was provided by five interviews and a background interview with Simen Fure Jørgensen, a creator of Playing Lean. The PLW will be fully described in chapter 3, the workshop contains three parts, is held in a meeting room or equivalent with maximum twelve players on each game. A consultancy agency wanted a PLW to be held for their customer, a governmental institution. Another consultant agency saw the potential of adjusting Playing Lean with own cases to use with customers. During OIW a PLW attracted 26 curious guests with a wide range of backgrounds wanting to learn more about LSM. An educational institution hosted a PLW for former and current students to introduce the LSM. An agency at Forskningsparken hosted a PLW for entrepreneurs interested in PL and LSM. And two incubators hosted PLWs.

1.4 The relevance and contribution of the thesis

There is increasingly emphasis on the importance of entrepreneurship within societies; since job creation and economic growth are examples of possible results from entrepreneurship. Embracing these notions, societies at large have facilitated for educational programs targeting entrepreneurship. Within the realm of education and work-related courses an emerging tool to increase learning effectiveness and quality is gamification (Sitzmann 2011; Kapp 2012; Jakubowski 2014), but there are not many games on entrepreneurship yet. Hence, we see the need for an empirical study on the learning outcome of gamification of LSM. This is a relevant contribution to gamification theory because there have been no known research on an analog board game aimed to teach this theory before, and it is relevant to gather as much information on learning effects from games that are possible to strengthen the rigor of arguments such as the importance of instructors and storytelling.

This is also a relevant contribution to the trend that university courses focus more on LSM[4] and increased use of gamification in education (Jakubowski 2014), as well as that that IN's has dedicated projects and a web site on lean startup and that the government calls for entrepreneurship learning. Researching if Playing Lean can be an effective learning tool to teach and inspire this method is relevant because it can be included for educational purposes. The findings on game elements and mechanics can inspire others to design games communicating complex theory in meaningful and entertaining ways.

In terms of learning entrepreneurship it will contribute with investigating how well people learn from games and whether there is value in learning entrepreneurship through a game. There are several studies on learning effects from gamification (Ke 2009; Sitzmann 2011) and on game based learning (Burguillo 2010), but board games and games for adults are underrepresented. There are no other games aimed at conveying the LSM as we are aware of and the results will provide interesting findings on whether it is possible to learn LSM from a game or not, and give indications on how well people learn. This can provide insights to what games can contribute with in learning entrepreneurship.

[4] The Lean Startup Circle Wiki, InnovationCourses: [http://leanstartup.pbworks.com/w/page/51233037/InnovationCourses] (Accessed 21.12.2015)

1.5 Outline of thesis

Following this introductory chapter, we will discuss our theoretical approach and link theory to Playing Lean in chapter 2. Then we will present our research approach and method in chapter 3, describing how we collected and how we will analyze the data. In Chapter 4 data from workshops and interviews will be presented and analyzed within a framework relevant to theory. A discussion of data findings and theory will follow in chapter 5. In chapter 6 we will provide a conclusion and suggest implications for practitioners and researchers.

2. Theory

2.1 Gamification theory

This thesis is situated in a tradition of research on game-based learning (Burguillo 2010) and how gamification can change behavior and create positive learning effects. When we look at existing research, we distinguish between two categories: a) meta-analysis, which looks at the aggregated findings from many studies on game-based learning and b) game elements and mechanics (GEMs), which looks at studies that have researched some elements of game-based learning. This secondary source query is not exhaustive and does not aim to be a meta-study of research in the domain of gamification, rather a refinement of the assignment limited to looking at possible learning effects of different play elements previously documented to have effect.

We have therefore in this context decided to confine ourselves to studies which are considered empirical research and studies published in peer-reviewed journals. Based upon these findings, it is this thesis' intention to see if we can rediscover some of these findings in our research. However, correlation is not the same as causation, and our results will not give absolute answers but rather an indication of whether the research questions are answered.

2.1.1 Meta-analysis research on gamification

Inspired by Karl Kapp (2012) we looked into previous meta studies on gamification and learning to see what other researchers have discovered when they have researched the correlation between gamification and learning. Sitzmann's (2011) survey of 65 research papers found that there was a potential enhancement in learning work-related knowledge and skills through simulation games. She lists concrete overall findings as being: *"... declarative knowledge was 11% higher for trainees taught with simulation games than a comparison group; procedural knowledge was 14% higher; retention was 9% higher; and self-efficacy was 20% higher" (ibid:44).* However, Sitzmann (2011:36) points to the empirical evidence in the literature when she counters a popular assumption believed to impact learning, namely that a key feature influencing instructional effectiveness is the entertainment value of instruction. Further, she refers to other scholars suggesting that simulation games as standalone instruction is ineffective and that debriefing/feedback is central for the learning process, there must be a combination of experience and reflection to learn. This might suggest that the facilitators/teacher play an important role. She also emphasized that learning from

simulation games was maximized when the trainees actively learned work-related competencies during game play rather than passively.

Hays (2005) study of 105 research papers discovered four interesting factors that have implications for this thesis. Firstly, the meta-analysis uncovered that an instruction based game will only be effective if it is designed to achieve specific instructional objective and are used as intended. Secondly, Hays uncovered that instruction based games should contain a closing reflection and player feedback loop to game developers. Thirdly, it was revealed that if one instructed the players in how to use the game it increased the instructional effect on game play. Fourth, it is apparent that instruction designers were required to develop games. Further, Hays suggest a list of design recommendations for instructional games. Under recommendations in the 'Instructional Quality' category Hays suggest that instructional games should not be a standalone product, but be part of a larger instructional program (2005:52).

Randel et al. (1992:269) uncovered in their meta-analysis of 68 studies from 1963 to 1991 that looked into the difference between games/simulations and traditional instruction; that in 38 of the studies there were no difference, in 22 studies games/simulations were more favorable, as was the case in 5 more studies, but they were considered questionable by the authors, and in the last 3 studies traditional instruction was favored. They comment that only 68 empirical studies were reported during 28 years, indicating a trend of descriptive studies when comparing games with classroom instruction. Further, they make a note that debriefing might be an important part, but that scholars disagree about the importance of it and whether it should be included in research, if so, it should clearly state what debriefing consist of (ibid.:271-272). Wolfe (1997), as referred to by Kapp (2012), found that a game based approach gave significant higher increase in knowledge compared to traditional teaching methods in his study of 7 research papers.

In a meta-analysis of 89 empirical studies on instructional gaming, Ke (2009:20) found a similar positive effect in 34 out of 65 research papers evaluating the effects of instructional games, showed significant positive effects when compared with conventional instruction. Of the 89 studies, 17 cases involved 'Instructional Game Design', Ke reports that most of them conclude that players need instructional support to learn. This is needed to learn the domain-specific knowledge the game is meant to convey, and not just learn how to play the game. Further, when looking at cases on 'Game-Based Pedagogy' Ke found that the teachers' facilitation played an important factor in order to have an effective use of

instructional games (2009). Looking at four cases that explored the 'Game-Based Cognitive or Motivational Processes' Ke found that game-based cognition was gradually developed to a combined approach from four elements; a) random trial-and-error approach, b) general deductive reasoning, c) rule-based learning and d) purposeful tools usage. Ke's analysis also indicates that 'business management education' seems to be the domain with the most prevalent positive outcomes. Another interesting finding is that games seem to promote higher-order thinking (the examples that are given are 'planning' and 'reasoning') more often than verbal or factual knowledge acquisition (ibid.)

By looking into these research contributions it is apparent that gamification can contribute to learning. However, it must be designed and used within recommended guidelines to be effective. Attitudes towards games versus traditional learning favors games in some of the studies mentioned above, but this can be related to the fact that games more often than not, are associated with entertainment, and that most teaching still uses traditional methods i.e. lectures, group- and self-study.

2.1.2 Game elements and mechanics in gamification theory

There are several research papers supporting the use of gamification in learning as portrayed above. Simulations, role play and natural science learning-games are perhaps more frequently used and researched upon than board games, but as games in general they share a common foundation. In the following we will elaborate on game elements and mechanics, such as abstractions, storytelling, motivation, competition and reward structures, social learning, and rules and game design.

A game is based on models of reality and consists of abstractions of concepts and reality. Karl Kapp is arguing that such an abstraction context provides four advantages over reality in a learning situation. Firstly, it helps players to get an overview of the conceptual area that the game covers and reduces the complexity. Secondly, one can easily identify cause-effect relationship. Thirdly, by abstracting reality one removes the outer factors like sleeping and eating. Fourth, it reduces the time it takes to learn complicated processes (2012:26-27). How a game can inspire to learn are mainly by the use of game elements and mechanics (GEM), in the following we will describe some GEMs we see relevant in the context of this thesis and the Playing Lean board game.

Storytelling

The use of telling stories is a well-known game element. According to Kapp using storytelling can make it easier for players to relate the game to their own jobs. He lays special emphasis on four elements: Characters, Plot, tension, resolution (Kapp 2012:41-42). Characters can be both non-playing characters, controlled by the facilitator or alter-egos for the player like a settler in Settlers of Catan or an army leader in Risk[5]. Regarding the Plot, Kapp makes a point that "*people learn facts better when the facts are embedded in a story rather than in a bulleted list*" (ibid.:64-68). The idea is that a well-made game-based story can help the players, making it easier for them to recall the key learning points when a similar situation occurs in real life, like in a work context (ibid.:41-42). Hence, telling stories help players remember the content better by providing a background to pin them to, and making the stories as relevant as possible without lowering entertainment and curiosity levels helps in making them suitable pins.

Motivation, competition and reward structures

We distinguish between 'intrinsic' and 'extrinsic' motivation. Intrinsic motivation defined in Lepper's take on behavior is "*undertaken for its own sake, for the enjoyment it provides, the learning it permits, or the feelings of accomplishment it evokes*" (1988:292). External motivation on the other hand, as defined in Lepper (ibid.): *"…involved actions undertaken in order to obtain some reward or avoid some punishment external to the activity itself"*. One is thus not motivated by the task itself but an external factor.

Regarding competition in a motivational aspect there are several points from gamification on the use of competition. There are two main branches of board games, the German and the US game development tradition.[6] It is typical for the American tradition that some players may be forced to leave the game several hours before the other players have finished, in that one becomes extinct. An example is RISK where players control their own army and fight for world domination. In the German game developer tradition the competition aspect is less confrontational and all the players are involved until the far end of the game. An example of this tradition is the game Settlers of Catan, where the game is ongoing until one player reaches enough points to win. Competition aspect can have both positive and negative effects when developing games-based learning tools. In a study researching how Competition-based Learning (CnBL) can be used to increase student motivation and performance,

[5] Information from Wikipedia on board games: [https://en.wikipedia.org/wiki/Eurogame] (Accessed 15.10.15).
[6] Ibid.

Burguillo found that most test persons were positive to competition, but notes that it must be friendly competition (2010). Reeve and Deci (1996) argues that being successful in competition increases intrinsic motivation and that it can affect the way a person looks at their own expertise. Hence, being successful in competitions can affect the self-efficacy of the player in a positive way. Competition can also result in negative effects on players. Bryant (1977) mentions the downside of egocentric behavior that can occur in competitive situations, in that it can promote an attitude of players being less likely to help each other. Investigating amongst other hypotheses, a hypothesis that children from competitive learning environments will engage in self-enhancement at the expense of others by means of social comparison and actively discouraging the achievements of others, she found results supporting the first part, that they used social comparison, but not the other (ibid.:891). Furthermore, the competition can also lead to a negative impact on the player's self efficacy, especially if they lose (Chan & Lam 2008). Kapp (2012:234) suggest that 'best practice' in this context is *"if competitive achievements are used in a game, make them available only after players are comfortable with game play and no longer learning the ropes."*

Reward structures can motivate players to perform and in itself be a motivation. Rewards can be bonuses by achieving something or reaching higher levels, it can be access to more resources, employees, soldiers etc. after mastering obstacles in the game. As a game mechanic this can be used to intrigue and motivate players to perform better than with no goals or rewards. The rewards can both be revealed and expected after reaching goals or kept uncertain until someone performs a task. Karl Kapp (2012) suggests that unexpected rewards and achievements have a bigger motivational effect compared to expected achievements and rewards.

Instructions and flow-theory

Instructions are key elements in games, represented by commands in a game or by an instructor (Kapp 2012). For instructional games facilitators are paramount to the instructional effect of the game and the learning outcome (Hays 2005; Ke 2009). Facilitators can hold back information from the player, a technique called scaffolding, which means that the facilitator or the game levels make sure that the player is not overwhelmed. This to make sure that the player can complete certain elements, within the player's capabilities so far in the game, and then gradually build upon that making the game more complex and difficult as they progress (Kapp:2012:66-67).

In ‘flow-theory’ Csikszentmihalyi (1975) defines that ‘flow’ is a mental state where the subject is experiencing completely focused motivation. This is described as the ideal state between anxiety and boredom based on the task’s level of difficulty and the player’s abilities. He suggests that there are eight factors that make this mental state possible, these are: 1) Achievable Task: The task must not be too easy, and not too hard, but rather represent an achievable challenge. 2) Concentration: The concentration need to be total, and call for intense focus. 3) Clear Goals: There should be no doubt about the goal or desired accomplishment. It can however be different strategies on *how* to achieve the goal. 4) Feedback: The feedback needs to be immediate and continual; this helps the subject to stay in the mental state of ‘flow’. 5) Effortless Involvement: This might seem like a paradox considering the subject is doing a challenging task, however the ability to reach the goal, the high concentration, and the immediate and continual feedback creates an experience where involvement is perceived as effortless. 6) Control over Actions: The subject should experience that his/her actions matter and that they give immediate results. 7) Concern for Self Disappears: When experiencing ‘flow’ it is generally reported that the subject loses concern of ‘self’, one don’t stop to eat, sleep or is distracted in any way as long as the state of ‘flow’ is in effect. This is often accompanied with 8) loss of Sense of Time.

Social learning

Social interaction during the game session is valuable, to make the experience fun and engaging, but also to transfer knowledge between players of varying experience by interacting. This is apparent when a story is told or when tactics are employed, then players with experience form the contextual occurrence in the game can share with others and help them understand. From social learning theory we see that Albert Bandura has contributed greatly in our understanding that one can learn from one another by observation with his notion of vicarious experience, learning from live and symbolic modeling (1977:195). This implies that a potential effect from social learning can be increased self-efficacy. This notion was elaborated on under entrepreneurial learning earlier in this chapter. To elevate the importance of cognition in social learning Bandura (1986) later introduced the social-cognitive theory, emphasizing how important the mode and way we learn is. In gamification social learning can be used to elevate the learning environment, in facilitating for interaction between players and, if utilized, between instructor and players, so that a person can learn through live and symbolic modeling by the others.

Rules and game design

Rules are important in games, both to make the game fair and playable, and as an element of learning in itself. Karl Kapp addresses the concept of rules-based knowledge arguing that rules "*express the relationship between concepts*" (2012:177). The idea is that game mechanics and techniques can facilitate in teaching the rules. When using game-based elements to reinforce learning Salen & Zimmerman (2004:80) distinguish four types of rules used in a game: 1) Operational rules: These rules lay the foundation for how to play a game. For Playing Lean these rules describe how many employers one gets to allocate each round, that one must sell to innovators before you can sell to early adopters etc. It is only when one has a basic understanding of operational rules that you start to enjoy the game. 2) Functional rules: These are the underlying structures in a game that set the game functionality. It specifies the functional rules like likelihood of drawing an experiment card that falsies your experiment. This is often abstract rules which only just the maker of the game need to understand and as the player does not need to know. 3) Implicit rules: This means the social contract between the players, also called fair play. In Playing Lean this means that if a player mistakenly observes a different team's *Innovation Account sheet* or flipped *customer tile*, they do not take the information into their strategic consideration in the game. These rules are implied and not formulated in writing. 4) Instruction Policy: These are rules that we want the players to remember and internalize after the game is finished. It is the learning outcomes of the game. One can say that these rules are why the game was made. An example for Playing Lean; whilst building your product it becomes increasingly expensive to add and remove features the more features you have, the team that uncovers this phenomena earlier than other teams are most likely to win the game.

Game design is the use of aesthetics, visual techniques and structuring to communicate how one is to perform actions in the game, how elements of varying importance are highlighted and how a take on reality is best designed to transfer the a intuitive understanding from players. Using colors, borders, dices, spaces and tokens are all elements from this domain, and designing a game needs to address both playability and the relative essence of the game. Kapp urges that the aesthetics of a game should not be underestimated, it can be pivotal to how the game functions regarding to what the intents of the game is (2012).

After this general presentation on gamification research and gamification theory, including certain GEMs and under rules and game design illustrating how rules are embedded in

Playing Lean. We will in the following chapter illustrate further how Playing Lean encompasses gamification and specific GEMs to facilitate learning in combination with entertainment. From gamification theory we have identified and selected four elements that will be used as a framework in the data analysis.

2.1.3 How Playing Lean employs gamification theory

In Playing Lean (PL) gamification theory is used in a range of ways; storytelling, use of facilitator/instructions, social learning, motivation and reward structures are all elements utilized in PL and inspired from the field of gamification. Mentioned above Kapp (2012) argues that there are four advantages to abstracting reality, these advantages are represented in the board game. Firstly, Playing Lean engages players in Lean Startup experiments without having to design the experiments themselves, complexity is reduced and an overview of the LS arena is provided. Secondly, regarding identifying the cause-effect relationship, in reality it could take months or years before experiencing the effects of 'feature creep' or 'technical debt', while in Playing Lean it becomes evident after a few turns in the game. Thirdly, the time it takes to play the game varies between two-three hours, thus time consuming elements like sleeping and eating (besides the served coffee and snacks) are eliminated, ensuring that the essence of the game (learning, having fun and interacting) is the main focus for the players. The fourth point mentioned by Karl Kapp above regards the time spent to learn complicated processes. To start a business and conducting experiments at different stages in the product adoption cycle can be overwhelming and take a long time; Playing Lean simplifies this process and shortens the time span, as well as eliminating the potential disturbing element of risk inherent to starting a business since it is a game.

Playing Lean use **storytelling** both as the contextual setting of the game, as a social media case, and as experiment cards, as well as being represented when facilitators accompany ECs with stories and use own or known business examples to elaborate on topics. The predefined contextual setting of the game the social media case of four social media startups in recent history, this is used because the developers of the game anticipated that most players would recognize and have some knowledge of the case. The experiment cards are used when players investigate the market (if the card indicates success they can flip a customer tile on the game board to receive information about one customer's demand). Here are two examples of storytelling showcased by two game cards with a story, and a connected text that the facilitators tell in addition to the story on the cards:

Based on Friendster. Considered to be the grandfather of social networks, although smaller attempts were launched earlier. Was the first to reach one million users, but ran into serious technical issues. Has gone through many variations since, operations finally stopped in 2015. [7]

Picture 1. Example of Company card

Picture 2. Example of Experiment card (EC)

"Viral" is the name of one of the Engines of Growth. The viral coefficient is the rate with which users recruit new users to your service. If the coefficient is higher than one, each user recruits more than one new user (which leads to exponential growth). If the coefficient is lower than one, growth tapers off. [8]

Motivation and reward structures as GEMs are represented in various ways. Motivation can be found in the rewards of progress the game offers (i.e. getting more employees when making sales, getting many 'tiles flipped' when drawing an experiment card). Motivation can

[7] Based on background interview with Simen Fure Jørgensen on 14th of September.
[8] Ibid.

also occur in the competitive setting of the game since there is only one winning team, as long as the competition is kept friendly, and in the nature of being bonded as a team against other teams too. Intrinsic motivation can be driven by and related to how a player wants to succeed in the task, be an important contributor to the team and wanting to learn the essence of LSM, extrinsic motivation can be exemplified by achieving appraisal by team members, the group or facilitator in successes. Winning the game is of course considered a reward too, the process in doing it can be considered intrinsic and the motivation to win extrinsic motivation since the activity is learning, mastering and having fun. **Social learning** as a is represented by players interacting with each other during the game session, this can be in the nature of helping to understand rules or reward mechanisms, as sharing of experience where one player has more experience from a strategy maneuver, business topic or LSM concept and shares this with the others, and as general mingling of players without previous relation. We observed that the PLW functioned as a meeting arena, people networking, sharing startup frustrations and other experience. The use of **facilitators and instructions** are paramount to the PLW, without them it would be just another board game, they instruct and use own or known business experience to accompany happenings in the game. This connection of general business and LSM knowledge to the game context is the main vehicle of transferring knowledge to the players. The facilitator's main roles are to ensure that rules are understood and followed, and to convey knowledge through themselves and the game elements, to clarify issues of uncertainty and to participate in discussions regarding topics players find interesting.

Having elaborated on gamification literature regarding previous research and specific GEMs, and how Playing Lean take use of specific GEMs, we will now describe the essence of what the game is meant to convey, namely the Lean Startup Methodology.

2.2 Lean Startup

The Lean movement – from Lean manufacturing to the Lean Startup philosophy

The term Lean Startup (LS) was introduced and popularized by Eric Ries in his book *The Lean Startup* (2011) and originated from his blog Startup Lessons Learned[9], where he first coined the term in a post titled "The lean startup" (2008). According to Eric Ries, the intellectual antecedents to LS are among others; Lean Manufacturing, Steve Blank's customer

[9] Blog found at: http://www.startuplessonslearned.com/

development process, and Agile software development as popularized by Kent Beck (ibid). We will now address how each of these elements has contributed to LS.

From the Lean Manufacturing world Ries, according to himself, asked; *which of our efforts are creating value, and which were wasteful?* (2011a). This is the question that is at the heart of the lean-manufacturing, also known as Toyota Production System (TPS), but as it focuses on creating value and eliminating all other elements that are deemed as wasteful. However, it does not offer a systematic approach to how entrepreneurs can identify what creates value for its customers. This is where Steve Blank (2005) enters the stage with his customer development method. Blank was a pioneer in the field and with his customer driven development focus Blank introduced a method for how entrepreneurs could and should test and refine their business hypotheses, by conducting customer interviews and having conversations with potential customers as the first step in validating a business idea. The method consists of four iterative phases, where the first two phases are focused on search, identifying a business model and the two last focuses on execution of the discovered business model.

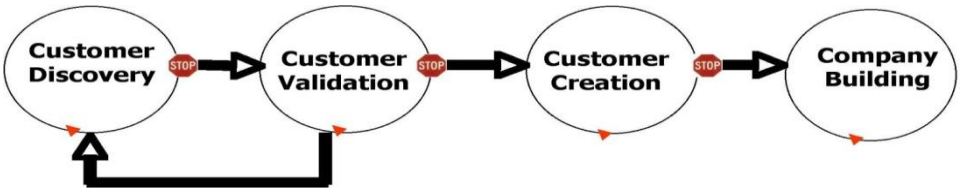

Figure 1 The Customer Development Model by Steve Blank[10]

First, the customer discovery phase concentrates on understanding/and or discovering customer problems and needs. In this phase Blank suggest entrepreneurs should focus on problem/solution fit, proposed MVP and proposed sale funnels. The goal is to Achieve Problem/Solution Fit. Secondly, in the customer validation phase one would work at achieving product/market fit, develop a replicable sales model and validate your business model. Also at this phase the team has to decide whether to pivot or persevere, if your product/market fit include a real validation of the customers' willingness to pay for your product or service. Third, in customer creation phase one test different ways to create and drive end user demands and look at different ways to scale the execution of the entire business model. Finally, in company building phase one focus on scaling organization and operations. The focus is now changed from learning from customers to growth (Blank 2005).

[10] http://steveblank.com/2009/06/ (accessed 21.12.15).

According to Blank (2013) he was in dialog with Ries to invest in his company but one of the condition of his investment was that Ries and his co-founder had to take Blank's course on customer development at Stanford. From Agile software development we can see that many factors have influenced LS, like having cross functional teams, doing retrospectives and do pair-programming and technical workshops. Based on Beck's influence Ries considered naming his method for "agile startup" or "extreme startup, but found that "lean startup" resonated better with entrepreneurs (2008). In comparison to Agile software development LS suggest to do deployment to production on first day, not to do tasks derived from user stories but instead focus on tasks derived from experiments. The LS also do not use estimates to measure progress, but instead use validated customer feedback to measure progress. Other differences from agile is not let backlog tell the team what to do next but instead focus on validated learning to tell one what to do next. Also the LS do not aim for maximum test coverage but aim for optimal statistics about user behavior.

Being exposed for Lean Manufacturing methods, Blank's customer development process, and Beck's Agile software development method Ries was able to mix the combination of these practices and gathered them in one new philosophy that he called the "lean startup." Based on this body of knowledge Ries described the philosophy as 5 principles:

- Entrepreneurs are everywhere: Ries have a broad definition of entrepreneurs as he also has the following broad definition of a startup: "*a human institution designed to create new products and services under conditions of extreme uncertainty*" (2011). This means that entrepreneurs are everywhere and just like Blank claims that the LSM can work in any company regardless of its size and in any sector or industry.

- Entrepreneurship is management: In his book Eric makes a case that a startup is an institution, but compared to traditional business, launching a new venture now often happens under extreme uncertainty, requiring a new kind of management (ibid.)

- Validated learning: In a Harvard Business Review article (2010) Ries argues that startups need a new definition of progress, one takes into account that a

startup need to uncover their customer's needs. Ries calls this unit of progress "validated learning about customers."

- Innovation accounting: Ries (2011) argues that one need to measure progress, have a smart way to set up milestones, and prioritize work. He makes a case that this has to be tailored for entrepreneurs and calls it 'Innovation Accounting'.

- Build-Measure-Learn: According to Ries the goal of LS is to minimize the time through a feedback loop called Build-Measure-Learn. Ries puts emphasis that startups need to iterate rapidly through the feedback loop; build fast measure fast and learn fast (2011).

We would also suggest that LS has embodied 'Double-loop learning'. Management theorist Chris Argyris (1976) greatly contributed to the concepts of 'Single-loop, and Double-loop learning' addressing the difference between correcting a problem and correcting the underlying assumptions regarding the problem. In the LS the Double-loop learning manifests itself as being the pivot. Your initial business model assumptions are what Ries calls "leap-of-faith" assumptions (2011:20). These are the underlying hypotheses your team is testing with your startup's initial idea, or what Maurya (2012) defines as "Document your Plan A". More often than not one could argue that entrepreneurs will find themselves reevaluating these "leap-of-faith" assumptions after interaction with customers. Ries then recommend having a "pivot or persevere meeting" (2011:168). In this meeting, the team has to decide whether to a) persevere and try to optimize the current strategy, b) pivot to a new strategy or c) shout down the business (Eisenmann et al. 2011).

Ries' five principles together with other authors' contributions evolved to a methodology, which we will describe next.

2.2.1 From LS philosophy to Lean Startup Methodology

From Ries' coherent philosophy, other authors of the LS literature have all provided a number of "fundamentals" that further captures how to execute the Lean Startup in practice, in doing so suggesting a Lean Startup Methodology (LSM) framework. The framework is based on the following seven authors; Eric Ries, Steve Blank, Ash Maurya, Alexander Osterwalder, Yves

Pigneur, Nathan Furr and Paul Ahlstrom. We acknowledge that there other Lean Startup practitioners and authors that greatly have contributed to the Lean Startup methodology (LSM) framework, like Trevor Owens and Grace Ng who organizes Lean Startup Machine, and others like Jez Humble, Barry O'Reilly, Joanne Molesky, Laura Busche, Cindy Alvarez, Jeff Gothelf, Laura Klein, Alistair Croll, and Benjamin Yoskovitz. However, in the context of Playing Lean, the main emphasis is on Eric Ries, Steve Blank, Ash Maurya, Alexander Osterwalder, Bob Dorf, Nathan Furr and Paul Ahlstrom, with a special focus on Maurya's work. Suggested through the LSM framework there are four fundamentals, in addition to Ries 5 principles, that are paramount to exercising LSM, these are:

- Get out of the building: This is a key concept in LSM. Entrepreneurs cannot plan their products or service in isolation, but must "get out of the building" and do experiments with real customers. This idea hails from Blank (2005) and is part of the customer discovery phase in his book *Four Steps to the Epiphany*. A famous quote from Blank and Dorf goes as follows: "*founders leave guesswork behind and get out of the building to test customer reaction to each hypothesis, gain insights from their feedback, and adjust the business model*" (2012:28).

- Minimum Viable Product (MVP): Lean Startup or LSM practitioners want to translate their vision into falsifiable hypotheses and test those hypotheses using minimum viable products (MVPs). The MVPs should be designed so that they "*represent the smallest set of activities needed to disprove a hypothesis*" (Eisenmann et al. 2011:1).

- Pivot if necessary: A Pivot is a decision to change one or more of the hypotheses about the company's business model based on learning from customers. According to Blank (2005) entrepreneurs should consider pivoting if they don't have validated willingness to pay in the "search" phase in his customer discovery model. Other LSM thinkers have elaborated on this and presented a typology of pivots where they differentiate between five different types of pivots (Eisenmann et al. 2011).

- Avoid premature scaling: According to Blank (2005) one of the major causes to startup failure is ‘premature scaling’, which means scaling before finding the Product/Market fit. However, this should not be mistaken to stop one from scaling early with network effects. The idea of ‘premature scaling’ should not be translated to not scaling until a product or service has profit. If you are able to scale early with network effects, like for platforms that facilitate user interaction like a social network, one should do it (Eisenmann et al. 2011).

2.2.2 Ash Maurya’s take on LSM

Based on the sum of Ries philosophy of Lean Startup and the LSM fundamentals, a four staged approach to launching Lean Startup projects has been suggested by Ash Maurya (2012) in his book Running Lean. Throughout the four steps one would want to identify the riskiest parts of your plan and systematically test it. The four stages are: Stage 1, Business modeling: At this stage Maurya (ibid.) recommend that you document your Plan A. The focus is rapid iterations on the business model by using Lean Canvas. This is a tool for business modeling, based on Alexander Osterwalder’s Business Model Canvas. Stage 2, Problem/Solution Fit: At this stage one want to identify if one has a problem worth solving. Maurya (ibid.) suggests using ‘problem interviews’ and ‘solution interviews’. The ‘problem interviews’ consist of the interviewer ‘getting out of the building’ and start with gathering demographic data, then open questions about the problem, and finally testing the customer pain by having the interviewees ranking problems. Goals of the problem interview are: Speaking with enough customers (at least 10), identifying an early adopter, identifying a must-have problem and being able to describe existing solutions. Regarding the ‘solution interview’ one would also want to ‘get out of the building’ and speak with some new customers and some ‘early adopters’ from the ‘problem interviews’. This to test ones solution with a ‘demo’ (this might be paper based) and simultaneously test potential customers’ price sensitivity. The ultimate test of the ‘solution interview’ is by asking for commitment by the form of a letter of intent, a preorder or something similar. Stage 3, Product/Market Fit: At this stage one wants to identify if: *Is there a market for your product and whether you can get traction in the market?* Maurya (ibid.) recommends that one Build a Minimal Viable Product (MVP) and release it to ‘early adopters’. This can be done by conducting a ‘MVP interview’, here the entrepreneur tries to sell the product face-to-face to ‘early adopters’, one then observe customers as they are using the product. Furthermore the ‘MVP interview’ can be used to

further test the customer's willingness to pay. Stage 4, Scale: When the product is launched, and the entrepreneur have done business modeling (stage one), have achieved Problem/Solution Fit (stage 2) and Product/Market Fit (stage 3) it is time to start testing how one will accelerate growth. One way to address this is by conducting A/B testing, also known as split testing, to optimize the solution (ibid.).

After elaborating on LS and LSM based on the works of several researchers and practitioners we will describe how a board game conveys the LSM in practice. We have selected eleven key concepts from LSM, and described how these concepts are communicated in the **Playing Lean** board game. These eleven key concepts will be used in the questionnaire to measure learning of LSM.

2.2.3 How Playing Lean conveys Lean Startup Methodology

Playing Lean[11] is meant to teach the Lean Startup Methodology. The game elements itself is interlinked with LSM by design as mentioned above. Here we will present eleven key concepts related to LSM and how the board game conveys those concepts through the gaming experience. These are also used to measure the LSM learning outcome of the game.

- The ***Lean Startup Methodology as a whole*** is represented throughout the game in various elements, such as the Experiment Cards, the choices one takes each round, realizing the value of experimenting on customer demands and making a customer sale based on building a product meeting those demands, and experiencing the need to alter the product according to increasing and varied customer demands.
- The aspect of the ***Build - Measure - Learn*** cycle is addressed by the players drawing an Experiment Card is building an experiment, looking at the face of the Customer Tile is measuring and drawing conclusions about the market on the Innovation Accounting sheet is learning.
- The concept of ***pivoting*** is explicitly mentioned in several Experiment Cards. Some players will also have experienced having to change their product a lot during the game. This is a pivot.
- ***"Get out of the building"*** is a lesson in the game. Players can't plan their products in isolation and guess who to sale to, they must "get out of the building" and do

[11] Documentation of the game is found in the appendix as: Playing Lean Rule Book and Facilitator Guide.

experiments with customers. In the game they draw cards to do experiments and read the example on the card and then how many customer tiles they can flip in order to get customer information.

- The ***Minimum Viable Product (MVP***) is represented on many of the Experiment Cards. It is also implicit in the game mechanics, since players build a small product to hit the market in the beginning. This product must invariably grow towards the end of the game, and is no longer "minimal". Furthermore, MVP interviews are also covered in the Experiment Cards.
- ***Innovation Accounting*** is represented directly by the tear sheets that players note customer preferences on. Like in real life, if you do this job poorly, then the outcome will be bad.
- The concept of ***Fast Iteration*** is covered by the increasing building cost and the remove function on the Company Board's product building section, rewarding teams that recognize the importance of removing product features due to increasing costs.
- Playing Lean also addresses the aspect of ***Technical Debt***. The price of building a new feature increases (exponentially) with the complexity (number of features) of the product. Keeping the product "Lean" without excess features is a good strategy.
- The concepts of ***Problem/solution*** and ***Product/market*** fit is explicitly enforced in the game, since you cannot move to the next level (yellow, orange, etc) without getting a customer on the previous (a 'fit').
- ***Scalability and timing*** is represented by the game board and in building the product on the Company Board. Players should note that the experiments are very different in the red scaling phase than in the green and yellow phases. Game strategy will also be more focused on building the right product quickly, be the first to "cross the chasm", and *Avoid Premature Scaling.*

Additionally to these concepts, Ash Maurya's four steps mentioned earlier are covered by the Experiment Cards, whereas each step towards the center, illustrated by the colors on the Customer Tiles, indicates those steps. Green is ***Business Modeling***, yellow is ***Problem/Solution Fit***, orange is ***Product/Market Fit*** and red is ***Scale***. Besides playing the game and encountering the concepts embedded, players are also encouraged to reflect on the Lean Startup method as a mindset and how it might apply to their own organizations or ideas they might have for the future. Playing Lean reflects Lean Startup Methodology in a thorough

way, and it takes the practical perspective of LSM from Ash Maurya (2012) and mixes it with the more philosophical LS perspective of Eric Ries (2011). The outcome is a board game that can be used to get a grasp of core concepts and the mindset of LSM without risking anything. However, the players do not actually work with problems or ideas of their own so there is no practical application of LSM to really get it under ones skin.

The abovementioned eleven concepts in bold italic are the key concepts we have identified from the LSM literature being central to understanding the method. How the concepts emerge in game-play has been described to showcase that it is possible to embed them in a game. These concepts will be used in the questionnaire to measure the learning outcome.

2.3 Learning entrepreneurship through gamification

Learning entrepreneurship is important to stimulate business establishment and development, entrepreneurship learning encourages people to start own businesses. These businesses can in turn create value in terms of; job creation, provide variety to products and services, support of local communities, increase tax income and economic development to a society or a country (Storey & Greene 2010).

Another point of interest is to see how Game-based Learning (GBL) functions when the element of learning is entrepreneurship. Burguillo (2010) advocates that GBL can combine different learning methods like Problem-based Learning (PBL), Collaborative-based Learning (CBL) and Project-based Learning (CBL). Playing Lean bridges learning methods like PBL and CBL in a GBL model where problem solving and collaboration are central to the learning process. Cope (2005) refers to several theorists when arguing that entrepreneurs learn experientially, and that trying and failing, focused problem solving and exploring new possibilities are inherent to learning entrepreneurship. From the gamification research, commented upon in chapter 2.1.1, we saw that Ke (2009) mentioned random trial and error and general deductive reasoning in relation to game based cognition. This indicates some similarities between how entrepreneurs learn and game-based learning.

An underlying assumption is that attending a PLW can lead to higher self-efficacy on behalf of the player when confronted with work tasks or projects using LSM. Self-efficacy is seen here as the belief a person has on their capabilities to perform a given task (Bandura 1997). One of the four factors that can lead to efficacy expectations mentioned by Albert Bandura (1977), vicarious experience, is to learn by seeing others perform a task, thus making

one believe that it is possible for them to perform the task. An element in gamification we addressed earlier is social learning, learning by seeing others perform and by adjoining a group. This can facilitate vicarious experience, if for instance a player reveals a personal risky business challenge and how they solved it to others, by symbolic modeling, other players can experience increased efficacy expectations if they are confronted with the same challenge (ibid.). As an example it could be how to get funding for a project by pre selling products not yet produced, shared as an experience by a player and influencing other players with good business ideas lacking funding to reflect on the risky method of selling products not yet made. Learning entrepreneurship can be both from the game itself, but also from the social learning effect that can occur during a PLW.

3. Research approach and method

3.1 Research approach and methodology

Doing research sometimes calls for some of the same elements which are inherent to LSM, such as pivoting and fast iteration, here meaning that we needed to change our direction of research objective and quickly alter our research design. There are many ways to address research questions (Booth et al. 2008), choosing a methodology depends on the research question at hand (Silverman 2013) and available resources.

An initial idea was to do action research on the actual board game development process as a user-driven innovation process, but this became obsolete since the game was already produced and the moment of research opportunity had passed. We then started planning an action research scheme aimed at researching self-efficacy in regards to the facilitators and teachers, through how the game was designed and used in instructional education. The aim was altered into wanting to investigate how Playing Lean workshops could stimulate self-efficacy in regards to learning LSM and adopting the mindset in own operations for players. However, through our research process it became evident that self-efficacy was difficult to measure accurately, especially in combination with how individuals adopt the mindset and uses it, and that it made more sense to protrude other aspects of the gamification experience. We will investigate the learning outcome of a philosophy and a method (LSM) through an instructional game applied in specifically designed workshops (Playing Lean Workshop), and to what extent gamification contributed additional attributes to the learning experience by means of game elements and mechanics, such as storytelling, facilitator, reward structures and social learning. Playing a game rather than attending a lecture activates the players in another way, and since there is an element of winning this motivates the players to solve the problem at hand – which again is adopting a Lean Startup way of thinking, hence experiencing the mindset of LSM. However, since self-efficacy was abandoned as the prime research objective and we changed focus to investigating general learning outcome and learning from various aspects of the gaming experience we had to review our research method strategy.

Ultimately, we decided on a pragmatic social research approach, an explorative design (Johannessen et al. 2011; Silverman 2013) taking use of a mixed methods approach to investigate and evaluate the learning experience and outcome of Playing Lean Workshops. We combine qualitative and quantitative research to locate a broader context using data from questionnaires together with qualitative data (Silverman 2006). The mix of methods we ended

up using will be more thoroughly described below. The method will be used to approach the research question and sub questions, and is the research approach we eventually found appropriate to use as a roadmap towards the goal of the research. In the process we will use the two sub research questions; A. *how does game mechanics stimulate learning*? and B. *to what extent do players learn from Playing Lean*?, as operational tools to address the more general main research question: ***How can gamification contribute to learning of the Lean Startup Methodology*?**

We concluded that mixing methods and an explorative design (Johannessen et al. 2011; Silverman 2013) was relevant to provide different angles and viewpoints to the instrumental sub RQs.

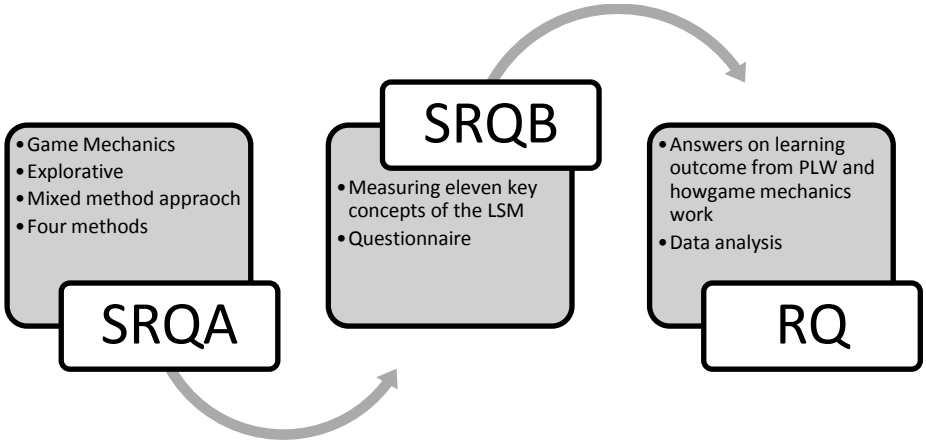

Figure 2 Research model

3.2 Qualitative and quantitative mix – mixed methods approach

Through emerging emphasis on interdisciplinary research and approaches, mixing qualitative and quantitative methods have become common practice. Considering them as separate tools for separate missions, viewing qualitative for hermeneutic and quantitative for empirical-analytical science, are however a tendency in science (Scheyvens et al. 2003:28). However, Scheyvens et al. advocates that one should not categorically choose one approach and neglect the other (ibid.). We have chosen to use mixed methods as approach to explore the learning outcome of PLW, since this provides us with the opportunity of several angels and triangulation of data and methods (Johannessen et al. 2011). This can provide the opportunity of achieving a comprehensive and nuanced impression of the reflections and emotions from people attending PLWs, hence stretching towards a 'thick' description (Geertz 1973) of the learning experience. However, as warned by Silverman (2013:137), pitfalls of striving

towards the ‘whole picture’ can result in under-analyzed data, time/resource issues and problems in analyzing separate data sets in one framework for analysis. Aware of the pitfalls and the fact that the quality of the methods will most likely be lower when using multiple methods we are still intrigued by the possibility to triangulate data and collect as much empirical data we can, since we do not have a narrow approach to our research question.

Hence, we started emphasizing questionnaires to use in workshops, and how observation could be used during these workshops. There was already an intended debrief following the workshops and we saw the used the opportunity in doing them as group interviews/focus groups. Ultimately we used interviews to follow up elements from the questionnaires, observations and group interviews/focus groups. The qualitative methods like observation and interviews are suitable to use on social learning and motivation since they represent ‘forms of social interaction’ and ‘inner experience’ (Silverman 2013:125). The quantitative method can be used to address the learning outcome by means of quantified numbers to compare before and after results of confidence rates. Further we could compare elements in the material collected from all four forms of methods.

Triangulating data between methods are useful to validate the consistency of them (Johannessen et al. 2011; Silverman 2013). If respondents ticks off experiment cards as a reason for increased confidence, and are seen to be highly alert during reading of stories on the cards and expresses the value and learning effect of them in group interview/focus group afterwards, it can be seen as triangulating data and supporting the validity of the given opinion since it is the same in all methods. In the same way this can be used to raise doubt regarding data if they appear as conflicting responses in the various research methods.

3.2.1 Data collection

Questionnaires

During the development of the questionnaires we decided to preserve the inspiration from Bandura’s research on self-efficacy (1977) and on how to construct self-efficacy scales (2006). Since it advocates doing a pre-test/post-test and emphasizes rating levels of confidence on a scale from 0-100 with intervals of ten, measuring learning outcome of specific concepts in the LSM seemed viable using the scale and having a before and after questionnaire. Bandura argues that using a scale with many steps is more reliable and sensitive than using a scale with only a few steps, increasing differentiation since respondents

tend to avoid extremes and there are more intermediate steps, and additionally Bandura urges that: "*In sensitive measures, the responses are distributed over a good part of the range of alternatives.*" (2006:312). In our use it seemed to work well, having a wide range of response variations and seeing that all were used, even the extremes. We included some standard background questions like gender, age, educational level and vocational status in the beginning of the before-playing questionnaire, and an elaborate check-box section inquiring about which specific game elements or mechanics gave insights to the specific LSM elements as the last part of the after-playing questionnaire.

From the first two workshops we only got four completed questionnaires out of potentially 17 respondents. After switching to paper version and handouts before the workshops we got around 95 percent of all respondents to complete the questionnaires. However, the first two rounds helped us into realizing the need of making a Norwegian version in addition to the English version. We thought the English version would suffice, since we knew there would be English speaking/multilingual players in at least two of the workshops. We had tested the questionnaire ourselves a couple of times to see whether some questions were framed in a misleading way or if answering opportunities were lacking or misleading. This testing resulted in some small changes in how we posed the questions. The questionnaire is presented in appendix 1. Respondents were asked to tick off one selection under gender, education and vocational background, rate a number (0-100) for eleven key concepts before and after the game, and to tick off multiple choices on which game elements and mechanics they learned from under each of the eleven key concepts. The reports from the questionnaires are showcased in appendix 3 and 4. Note that in the pre survey there are 78 respondents and 77 in the post survey, this is due to a mistake punching in a report half-finished and forgetting to delete the respondent when making the reports. This affects the comparison of the numbers slightly, but not in a distorting way.

Observation

Doing observation seemed interesting to identify sentiments and attitudes of players during the workshops. After observing the two first PLWs more loosely, trying to get an impression of sentiments and attitudes (e.g. enthusiasm, attention, frustration and boredom), we decided to observe the following three with six predefined parameters to take observation notes on in an attempt to structure them. Even though it is advised to define concrete behavior to observe into codes beforehand to aid recording coded forms of behavior (Bakeman & Gottman 1997),

we found support in the two first workshops to be able to define the six parameters. Since these are mainly observations on social behavior the six formulated notes can be regarded as a socially based coding scheme (ibid.). Opposed to physically based coding schemes where classification rests on objectively measurable factors (like temperature, weight etc.), the classification in socially based coding schemes rests on subjective and cultural interpretations, hence it is easier to agree upon the measuring factors in a physically based coding scheme (ibid.:18). As argued by Johannessen et al. (2011), selective observation/registration and selective interpretations is an integral part of the research process and all information is subject to the researcher's 'filter'. This relates to the notion of having cultural 'lenses' from anthropology, and not being able to see the culture from within (Geertz 1973).

In appendix 2, method overview with interview guide, the six classifying notions are listed, using them to observe should be considered within the mix of methods and not to conclude in any way, they are meant to weight in and provide support for statements (i.e. if most players say they were engaged and enthusiastic during play and we could see that they eagerly discussed and planned actions, statements and observations would converge). The observations were useful in getting an overall impression of the levels of interest and enjoyment of the players.

Group interview/focus group

After the game session ended we held debrief with feedback and asking each player questions about the gaming experience. The feedback from the players contained information regarding strategy, game design and general perspective of the gaming experience. They got feedback on performed strategy and decisions taken when playing the game. We held the 30 minute debriefs as a hybrid form of a focus group and a group interview, both encouraging discussions and asking each participant questions (Silverman 2013). We asked if they felt that they had learned anything and how, and whether they were motivated to learn more on the LSM. After the players had answered the questions we usually had some points that could be discussed in the group. Doing both questions and discussion was challenging due to the short half hour, but it provided the opportunity for all to talk, and let those who had many points to be given time to elaborate in the discussion.

Interviews

After doing five PLW and collecting questionnaires from two more, we interviewed five respondents that had played PL. They were open-ended in-depth interviews (Rubin & Rubin 2005). Having an interview guide helps to structure the interview and function as a reminder to the researcher what to ask and follow up on (Rubin & Rubin 2005; Silverman 2013). First we encouraged the interviewees to reflect freely upon the gaming experience and the learning outcome and then we asked the predefined questions from the interview guide in the end if they were not elaborated on already. This allowed us to probe information that respondents gave during the open reflection part of the interview and to get answers on certain elements we wanted their perceptions on (Rubin & Rubin 2005).

All the interviews were done in Oslo, in a closed setting with no interference in a meeting room or office. The interviewees were first given an introduction to our research and informed of anonymity; we then asked to be allowed to use statements as quotes in our thesis. They participated freely with no compensation and the interviews varied from 40 minutes to one and a half hour. Both of us took notes to compare with each other, and we asked probing questions when interesting elements appeared or when something needed to be clarified. We tried to be active listeners at the same time as we took notes, since we were two researchers this seemed to work well and not to be disturbing to the interview context.

The background interview with one of the creators of Playing Lean, Simen Fure Jørgensen, was aimed at learning about the game and the PLWs, and to get some background information on why and how the game was build. This interview was done 14th September.

3.3 Finding informants and using Playing Lean Workshops to collect data

Selection of informants was based on invitations to facilitate PLW by LeanFriends AS' for the main inviter or hosted by an inviter for a third party. These workshops with a range from 5 to 25 players are the main unit of data collection, questionnaires, observation and focus groups where data collecting tools used in the PLWs. Additionally we interviewed five persons who had played the game. In our perspective the selection of informants are representative for the research purpose. We could always want more respondents and workshops, but the workshops are depending on demand. We collected data from the workshops on various arrangements context where the PLW was invited to be held for employees, students, emerging entrepreneurs and health care workers. From these PLWs we asked several people if interested in giving an interview, five replied and came. Respondents

ranged from 19 to 69 years of age with various educational backgrounds and employment status (as portrayed in chapter 4). There was almost equal balance on gender. Our respondents all attended the Playing Lean Workshops; through the conference OIW (Oslo Innovation Week), arrangements at Forskningsparken and an educational institution offering a workshop for current and previous students, for employees at a consultant agency and at a governmental institute as work related workshops. Two more PLW were held, one in Zürich for entrepreneurs and one in Drammen for emerging entrepreneurs and health care employees. In the latter two PLWs we only did questionnaires. The workshops where the data has been gathered have been conducted in Norway and Switzerland. On two of the workshops there were more than one facilitator, in workshop 3 and 4 there were three and two facilitators respectively.

The workshops had duration of approximately three hours and followed the following format; starting with a 30 minutes introduction to Lean Startup, followed by 120 minutes of game-play and ending in a 30 minutes reflection debrief. In the introduction part of the workshop the facilitator gives a quick introduction to the LSM focusing on Ries' five Lean Startup principles. When playing the game, the facilitator starts by explaining game board and the rules, then how one wins the game. The game starts and all the teams can discuss strategy and take decisions on what to do in their turn. The game is turn-based and after each turn teams make adjustment to their boards according to what they have done/achieved during their turn. During the game-play the facilitator makes sure that all the players pay attention and are quiet when somebody draws an Experiment Card, the player or the facilitator then read the EC out loud and have a short discussion about the card to make sure that all the players understand the example. When the game is over the facilitator asks each player to share their perspectives on learning in a 30 minute reflection session.

3.4 Analyzing the data

From developing the questionnaire we started thinking on how to analyze data, and after the first workshop we started analyzing the data and continually did so until we found a way to structure a theoretical framework. The empirical data will be presented in chapter 4 and analyzed, we have chosen to structure the analysis in relation to theory presented in chapter 2. Analyzing using a theoretical framework as a starting point and examining how these theoretical elements are interlinked is a good way to narrow down the analysis (Silverman 2013). Taking use of certain GEMs from chapter 2.1.2 as a framework to organize and use the

data in meaningful way, this framework will consist of storytelling, reward structures and motivation, social learning and facilitation/instruction. The way we sought to measure learning was to use the eleven key concepts identified in chapter 2.2.3 and do a pre-/post measurement of their confidence levels of these eleven concepts. By structuring the analysis within this framework we hope to capture important findings relating to specific GEMs, and to further be able to find answers regarding whether there was a learning outcome of LSM after playing and which GEMs they learned from. We will then try to see how GEMs and learning of specific LSM concepts are interlinked.

We color coded all statements and observations, from interviews and workshops notes (including observations and statements from the debrief/focus group), in relation to the four GEMs mentioned. This helped us structure all relevant information. Further we organized the questionnaires into tables and diagrams to get overall average numbers making us able to compare pre- and post-gaming surveys and to see how well the different concepts where being learnt and if they varied. Results from the questionnaires could also fit concepts to GEMs reported to learn the respective concept, providing statistics that could be linked to qualitative answers to GEMs.

3.5 Reliability and validity

An aim of academic research is that it can be regarded as rigorous research, in that it fulfills a high degree of reliability and validity. This means being representative, replicable, openly displayed with legitimate interpretations and assuring a high ethical standard (Silverman 2013). In regards to reliability we aim at explaining our research process openly in detail and our ethical concerns. By transparent display of research method and analysis, replication potential of the research is made possible, thus assuring a degree of reliability (ibid.). We would argue that the research process displayed in this thesis provides sufficient information for other researchers to replicate the research by attending PLWs and collecting data from players. The experience of the facilitator and the background and mix of players may vary, but results should come out in a reasonable similar way. We have checked all data twice (Booth et al. 2008), punched the questionnaire data into two separate programs to assure ourselves that there was few to none mistakes. Unfortunately, we made one mistake in the report-making of the quantitative data, one respondent answering the first and only the half of the last survey was included in the report from the before the PLW and not in the after the PLW report.

Validity relates to the legitimacy of interpretations reached (Silverman 2013), thus we will show and portray our interpretations in the analysis chapter to provide credibility to them. We have also triangulated data from observations, group/interviews/focus groups, interviews and questionnaires, and had the ability to validate responses interviewing players after collecting data from the workshops (Silverman 2006). As commented earlier, researchers in qualitative research will usually depend on selective interpretations (Johannessen et al: 2011), and it should be noted that being a qualitative researcher is not the same as objectively recording something. We will strive to reflect upon interpretations and be critical to them. We will showcase variation within the data material and are of the opinion that the respondents are a representative source to the data material.

3.6 Weakness to data collection and analysis

The selection of doing mixed methods provided some challenges to the quality of each method used. We had little experience in analyzing quantitative data and not generous experience with observation, figuring out how it worked best took some trying and adjusting. The best debrief was the last one and observation of workshops evolved from being a general observation into having six pointers to pin observations on concrete behavior to. In the first two workshops we tried to do electronic questionnaires thinking that if respondent could answer with their smart phones this would make it flexible, as mentioned this resulted in low reply rates and this meant that we lost the opportunity of having around twenty more answers.

Using qualitative methods raise questions regarding interpretations of data, a researcher having objective lenses whilst observing social interaction is not possible, and we are aware of the pitfalls of biased analysis and interpretations. Being two researchers helped in the way that we could discuss our personal interpretations with the other and evaluate whether we had arrived at adequately similar interpretations. The number of informants completing the questionnaires could have been higher and done over a longer time-span, providing a larger base of data to refer to. We have not been able to compare data from various learning methods on the same topic such as lectures versus PLW; this would have provided more rigor to the research.

Structuring the analysis in the mentioned way might also lead to missing out on certain learning factors not considered in the planning of the research, and using the eleven key concepts to measure the LSM knowledge is our take on the theory and might not be the optimal way to measure knowledge levels of the LSM. Having addressed these weaknesses to

our research study and explained our decisions, we consider our contribution to be relevant and meaningful

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3.7 Ethical considerations

There are several ethical elements researchers should address in a research project, such as voluntary participation, informed consent, treating comments and behavior confidentially, do not expose participants to risk and ensuring anonymity of participants (Scheyvens et al. 2003; Silverman 2013). In addition David Silverman (2013) addresses urgency of independent and impartial research and it there are conflicts of interest or partiality this should be stated explicitly, we will address one such matter below. We have consistently informed about our research and that participation is voluntary, both orally and on the questionnaires we included a small written section in the beginning. Informed consent was assured orally, in the hindsight we could have included a letter which the participants signed. However, we felt informing that we would observe the informants and their reactions during play and receiving consent to do so (ibid.:173), and informing that collected responses would be used as quotes and reflections on learning during the workshops were sufficient. All interviews were initiated by informing of the purpose and getting consent to participate. By starting all sessions with this we felt that being open and informing about the research established trust between us and the respondents. No participants were paid to participate (ibid.:178).

We do not collect any personal information other than gender and year of birth and will not use data in a compromising way for any of the respondents. All are anonymous and there are no key that connects respondents with list of names stored electronically. We have not stored email addresses when using software to punch in data from questionnaires, opting to manually punching in all replies as test responses in the software. This was mainly due to that we had low response rates when trying to electronically inviting people to do the survey, but also to secure informants from tracing of email addresses through the software. Behavior during play and comments can by no means be traced to respondents, this to assure the respondents confidentiality and anonymity.

With regards to conflict of interest and partiality (Silverman 2013), it must be informed clearly within this context that one of the researchers, Tore Rasmussen, is involved in LeanFriends AS, as a facilitator and owner. To avoid biased information we interviewed Simen Fure Jørgensen 14th September to get information on PL and PLW from a third person.

Additionally, the other researcher involved has no involvement and is impartial to the process and outcome, thus assuring that the skeptical lenses were on throughout the research process.

4. Data presentation and analysis

In this chapter we will present analysis and results from findings. The data collected during workshops and interviews contain information that needs to be structured to meaningfully provide answers to our research questions. As elaborated upon in chapter 3.5 we will take use of a framework consisting of these four specific GEMs: storytelling, reward mechanisms and motivation, social learning and facilitation/instruction; for each of them data from those respective methods finding relevant information will be described and analyzed. The eleven key concepts from LSM will be a recurring element in all game mechanics and will be summarized as a standalone subchapter on measurement. Respondents, informants and players will be used as representatives for the data. When referring to an interviewee number (1-5) will be used, when referring to statement from group interviews/focus groups a code will be used (e.g. R13W2) indicating respondent 13 in workshop 2 and when referring observations players will be used. The questionnaires do not involve statements and will be referred to by tables and diagrams. The workshops will be referred to as W1, W2 etc. (at W3 we had 26 players, three tables and there was not possible to do group interviews/focus groups due to time limitations).

After completing the fourth PLW we saw that responses started to converge with former data collected, however there were still good reflections during the group interviews/focus groups and some of the quotes from the last workshop stood out as more summarizing compared to previous comments. In the following we will present data in relation to specific game mechanics as part of the chosen framework of game mechanics and key concepts of LSM. We will start with storytelling in 4.2, proceed with motivation and reward mechanisms in 4.3, before social learning in 4.4 and facilitator/instruction as the last of the four in 4.5. Then we will take use of the eleven LSM concepts under measuring learning in 4.6.

4.1 General findings from questionnaires

As mentioned earlier we received 77 complete responses from 7 workshops, 78 complete pre-game questionnaires and 77 complete post-game questionnaires. The answers were all plotted into an excel scheme and again in Survey Gizmo to analyze the data and make reports. In general we could see that there was a tendency that confidence levels went up rather than status quo or a decrease in confidence, that some concepts were understood better than others,

and that game mechanics they learned from varied from concept to concept. In the beginning of this chapter we will present some background information of the respondents to illustrate educational levels and current vocational status among the respondents.

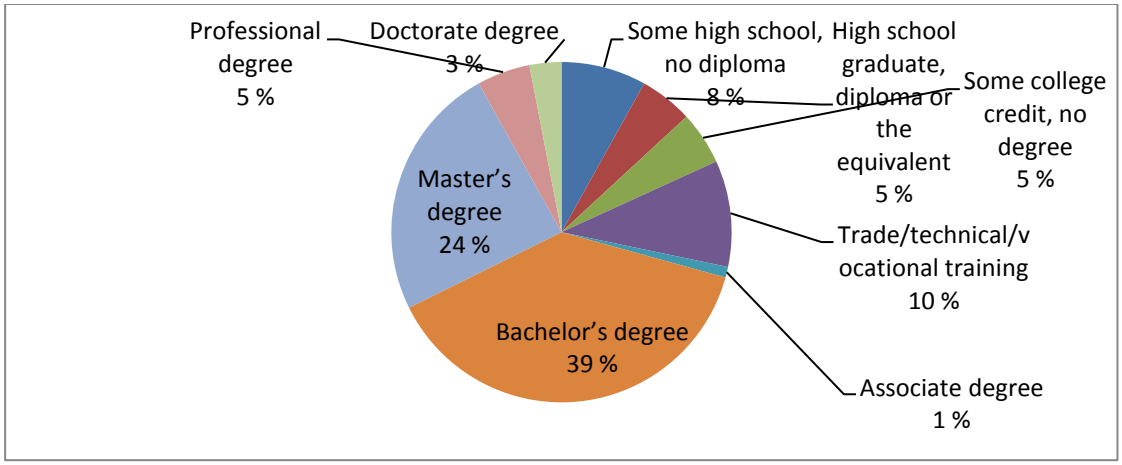

Figure 3 Diagram of educational background of respondents, in percentage of total (78).

In figure 3 we have showcased the educational background of all our respondents (except the one person only answering the post-game questionnaire), 64 percent has either a Bachelor or a Master Degree. Indicating a high educational level of the respondents, this can affect the learning outcome of the measured respondents since it is fair to say that a tendency of higher education is increased skills in problem solving and concept understanding

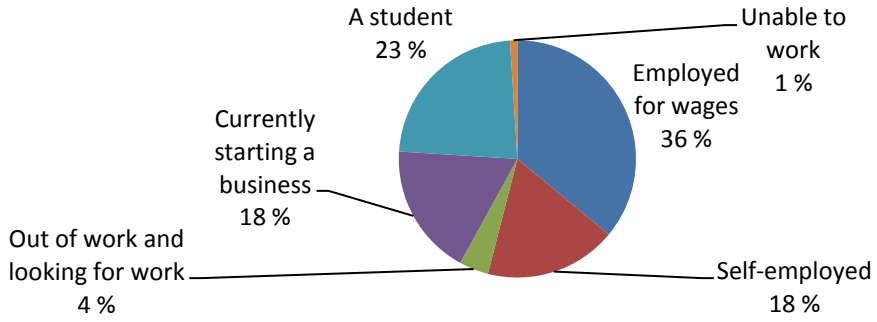

Figure 4 Diagram over employment status spread of respondents

In figure 4 we can see that the majority of the respondents are either employed for wages or students, but there are 36 percent either self-employed or currently starting a business when added together equals employed for wages. This reflects that the context of the PLWs varied from being held at a workplace in W1 and W2, and held mainly for students and graduated

students in W4 and attracting a more varied background when held as arrangement for entrepreneurs in W3, W5, W6 and W7.

Sometimes respondents rate higher confidence in a given concept, but tick of 'None of the above' regarding game elements which could increase the confidence of the given concept, this can be due to the introduction given or misunderstanding the question in the questionnaire. Some commented that they were unsure about the differences between the 'game board', the 'company board' and the 'innovation account sheets'. Hence, they might be unsure what to tick off. However, one could tick of more options than one and this was also apparent when some few ticked off all options. However, after a three hour workshop many were also tired and this can contribute in explaining inconsistencies in the last part of the questionnaires. We had assured all participants that responses were anonymous, that they participated out of free will and that we wanted their honest answers whether they were positive or negative to improve the learning outcome.

4.2 Storytelling

All the stories are good, didn't know all of them, they are an important part of it [the learning experience] *Experiments are fun.* (5)

When asked to reflect upon the game in interviews all respondents pointed to the entertainment and value in the Experiment Cards (ECs*)*. The stories in these cards, together with the plot of the social media case where four teams play four fictive different companies and when the facilitator instructs the social media case and provides stories to the examples on the ECs, are all elements that can be considered as storytelling. Storytelling was the part of the game that was commented upon as being important in facilitating knowledge transfer, and especially when the facilitator came with extra comments or some players had experiences with the topic on the card and shared it with the group. From the questionnaires we can see that out of 847 (11 concepts x 77 respondents) possible times the game mechanics *EC* could have been ticked off, it was done 304 times representing 36 percent of the cases. As commented by one: "*The experiment cards are exciting*" said the interviewee, "[but] *maybe* [the facilitator could] *use the experiment cards more actively, it is only those that transfer knowledge*" (2) *ECs* alongside *facilitator's instructions* are the two choices that are ticked off the most in our questionnaires. As shown in figure 5, in the concept of **Technical Debt,** this is one of the times where *ECs* scored lowest with 14 counts out of 77 possibilities. *None of the above* ranks highest together with *facilitator's instructions* which indicate that this concept

was not one of the concepts covered comprehensively by the ECs in the game, but that *facilitator's instructions* in the PLW covered it to some extent. Since storytelling is both covered by *ECs* and *facilitator's instructions* it is still counted 35 times compared to 21 counts of *none of the above.* However, the facilitator's task is to instruct and to tell stories, not just storytelling.

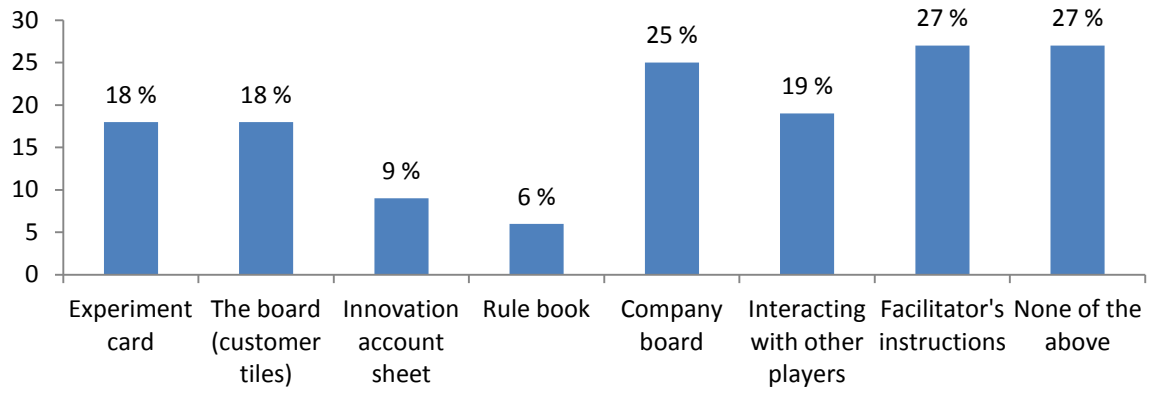

Figure 5 Diagram of game mechanics ticked off for *Technical Debt*.

Further, under observations notes were taken of level of attentiveness towards the facilitator and ECs when they were read out. Generally players were attentive towards all these elements of storytelling. Notes from observations during W2 indicates that *players seem amused by the stories on the ECs when reading them* and from W4 *seems to enjoy the information and facts being read from the cards, short discussions afterwards to clarify information.* The size of the group and previous relation levels provided variation to how much they talked to each other while facilitator instructed or ECs were read out loud. Notes from W2 *starting to seem more occupied by winning and solving the game than listening to ECs,* show how work colleagues can get caught up in competition in a way that impedes learning. And from notes in W1 *seem to get engaged by the game, often discussing when ECs are read out loud,* shows how entertainment and engagement can get in the way of attention to storytelling learning. This gives an indication that size and mix of the group affects concentration levels, and that attention is important to learn from storytelling.

When things go wrong often brought the attention from the players, and example from an interviewee: "[The experiment cards] *binds the concepts to stories of real-life companies which is easier to remember. Especially when things go wrong*." (1). 50 percent of the ECs contain an example with negative effect in the game. These might work as references to concepts for the players, if things go wrong or if stories are funny, or both, could help

building reference, as one explains: "*Experiment cards were sometimes very technical, did not understand all of them. However, when they were funny, like "cats are people too* [example on an EC] *it made me remember it well"*. (1)

Results from storytelling indicate that there are many and positive findings, and that there are some elements to address. From the positive side they seem to amuse, entertain, and function as references to remember and the ECs made it easier to remember due to stories and their content. Of elements to address it is keeping attention on the stories, and that some ECs can be too technical and some have less dramatic and perhaps thus lower chance of remembering.

4.3 Motivation and reward structures

In general most participants greatly enjoyed playing the game, being a game containing strategy choices, competition and winning chances seemed to appeal to all when the rules of the game were mastered. During the beginning of group interviews/focus groups most were eager to reflect upon what they had done and what they could have done differently during the game. It could at times even be hard to have them reflect upon the learning outcome of LSM since they were full on engaged in the strategy elements of the game.

Motivation to learn varied from player to player, at one extreme there is one example from notes on observation in W3 that *one player takes notes on concepts from ECs*, which shows motivation. Most groups and individuals seemed interested, but there were certain workshops and individuals that stuck out as highly motivated. Regarding competition an observation note from W3 was that *rivalry seemed to invigorate players and make them eager to win,* and statements like "*Fun, got the competitive instincts running"* (R9W4) and "…*I had to make plans for the next turn and compete with team-players to win the strategy for the next turn. Fun aspect, like a strategy meeting in real life*." (1) indicated that competition functioned as motivation.

In relation to reward structures players seemed to *get excited when they see the potential of more workers, eager to get more customers and workers* was noted as an observation in W3. When a team had bad luck on their ECs several rounds in a row and experiencing a disadvantage, notes on reaction to reward elements from observation in W5 indicated that they *reacted in a humorous tone* and *the unlucky team does not seem unmotivated.* It seemed like they took it with good sportsmanship.

Results from motivation and reward structures are; that competition as long as kept friendly and sporting seems to motivate players. Reward structures motivate by getting more employees and progressing, an element of luck is tied to the ECs and this can make the game seem unfair for an unlucky few, but not in a deteriorating way.

4.4 Social learning

Social learning is important for the learning process of instructional games using groups. Findings indicate that for some this element was instrumental in learning. In our questionnaires asking for what players learnt from, the *interacting with other players* option was ticked off 220 out of 847 possibilities for the eleven concepts, 26 percent of the total. In workshop 3 we did not have time for debrief, but one player commented on the overall game experience: "*This is an interesting and fun problem solving exercise – good strategy learning. Dynamics between other players and competitors increased the learning process*." (R1W3). This highlights the social learning effect in the PLW and how the element worked in the game, an example given from an interviewee points to what players learnt from each other: *"Selling to adjacent* [customer] *tile was also difficult to understand and relate to real world. Learnt it by hearing one player explaining it to another player with an example of 'having a customer refer your product to another customer*' or*...*" (1). From observation notes it was commented in W2 that it was positive when they wonder about something and asks the group as a whole and in W3 an observation was that *after the first round more between teams talk on strategy and so on* giving indication of an easy and informal tone within the groups. Another observation from W5 was that *teams quickly pick up strategy from each other,* indicating social learning. From debrief in W5 it was commented that "*...not understanding something by oneself is worse than not understanding together in a group."(R2W5)*

Results in general on social learning was that players appreciated learning context from information sharing in the group and by watching others perform actions in the game, meeting challenges together with the ability to discuss within a group was valued.

4.5 Facilitator/instructions

The importance of a facilitator was indicated by how many who ticked off this game element as being a factor for learning in the questionnaires, with a frequency of 303 counts of 807

possible ticking off the option, 35% percent overall, second after Experiment card which had one more count. The question where the *facilitator's instructions* scored the best was on The Lean Startup Methodology as a whole with 53 percent, second to *ECs*. It was scored highest on explaining Pivoting, (40 percent), Minimum viable product (MVP) (39 percent), Technical debt (27 percent) and Problem/solution fit (43 percent). In the five in-depth interviews the facilitator's importance was mentioned, all interviewees mentioned having the facilitator elaborate on the Experiment Cards as being useful. One interviewee had the following to say when commenting freely on the workshop in general: "*The facilitator also gave examples of business and experiments to reflect upon while making choices in the game"* (3).

In no method was the importance of the introduction mentioned, no one commented upon it in the interviews or in the debrief sessions. We did not ask about them in the interviews and they were not told during free reflection from interviewees. These are part of the PLW instructions and most probably aids in grasping the concepts, so this was a rather interesting discovery when going through the data material.

Results in general on the facilitator/instructions GM was that it seemed to be valued, the facilitator accompanied the ECs with stories which were seen as entertaining and learning, but the introduction and debrief of the instructions were hardly mentioned.

4.6 Learning measurement

To measure learning we took use of eleven key concepts from the LSM theory to use as indicators for understanding the methodology. On the account of the different concepts, there were clearly some concepts that players learnt more than others. On the concept ***the Lean Startup Method as a whole*** there were no one ticking off *none of the above* option on which game elements they learnt from, everyone ticked off something. Learning from *ECs* was most frequent with 52 counts out of 77 possible ticking off the option, *facilitator's instruction* was second with 41 counts, which are good since it is an instructional game, and 39 counts on *interacting with other players* indicating good social learning effects. The responses can be seen in the diagram in figure 6 below.

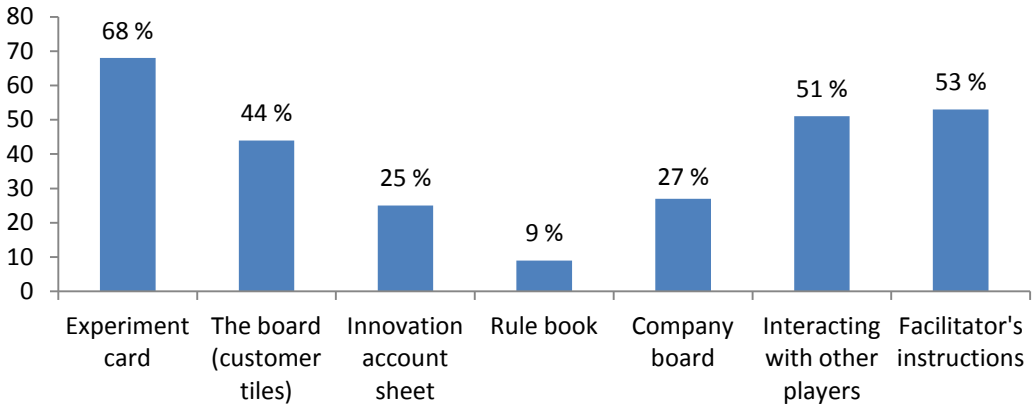

Figure 6 Diagram of game mechanics ticked off for *the LSM as a whole*.

On the opposite side there were 24 respondents ticking *none of the above* on the concept ***Fast Iteration*** and only 20 on facilitator and 13 on *interacting with other players.* Indicating that this particular concept is not so well conveyed through how the workshop is now, it might be better included in storytelling or consciously conveyed by facilitator and include the players challenging them to think about an example of the concept from history or by own experience. This is evident from looking at figure 7 below, displaying how many times respondents have ticked off this specific game mechanic.

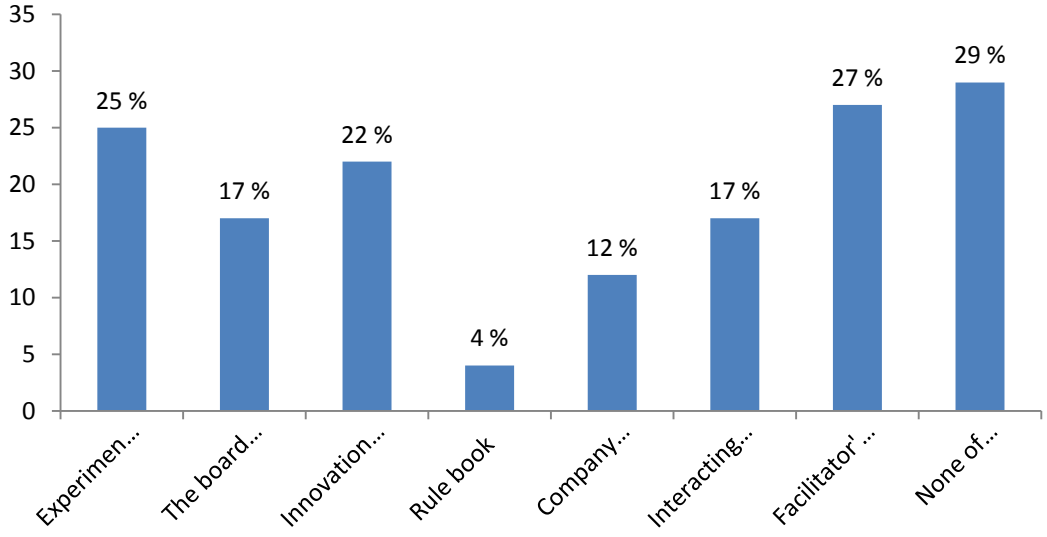

Figure 7 Diagram of game mechanics ticked off for *Fast Iteration.*

Gender was fairly balanced among the 77 respondents, there were 42 male (54 percent) and 36 female (46 percent) respondents. Confidence levels were slightly higher for men before and after. This can reflect that men in general have higher belief in them self compared to women or that the men coming to PLWs had higher experience in advance. We did not ask about background experience on the LSM from respondents so this cannot be concluded on in anyway. Both men and women responded on average a raise in confidence levels. The before and after confidence levels of each LSM concept can be seen below in figure 8, a diagram showing pre-levels of women to the far left, followed by pre-levels of men, then post-levels of women followed by post-levels of men. The columns represent the eleven concepts.

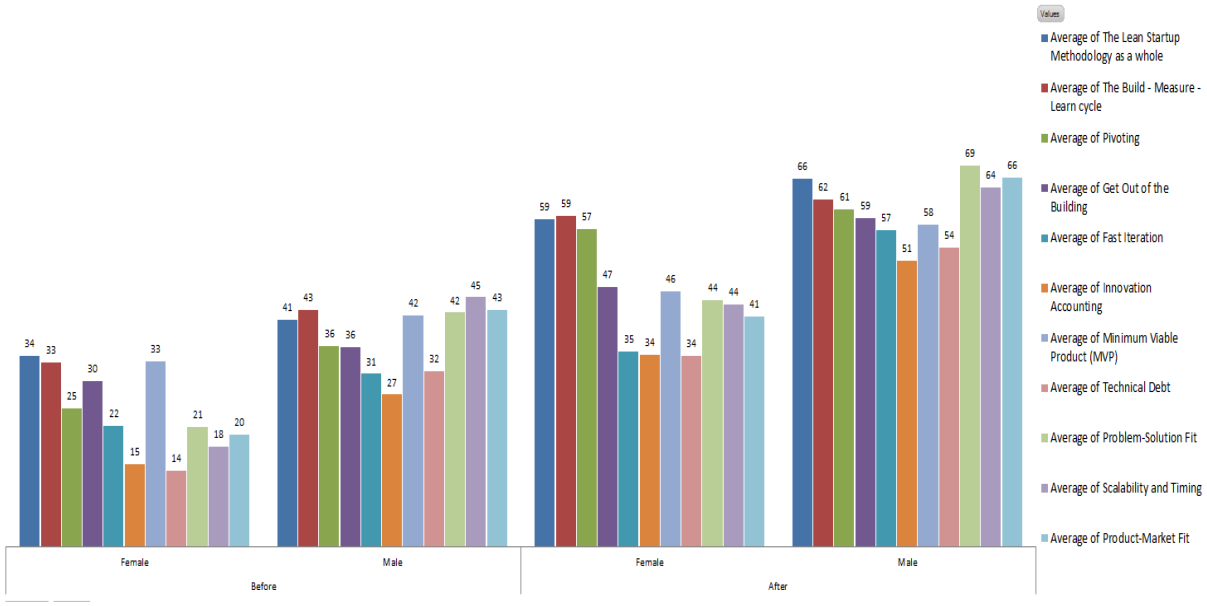

Figure 8 Diagram of gender difference in confidence levels.

Another indication from confidence levels of the concepts was that older male players seemed to learn more, they reported a higher increase in self-confidence after a PLW than younger players. This can reflect that people of age have a more humble assessment of prior knowledge in a given domain, and more experience to relate new knowledge to. However, there were few respondents within this age group (five respondents) so the validity of this finding is questionable. Birth years and number of respondents are listed in appendix 3. Reflected in the diagram in figure 9 below are the three age groups split in gender for each group, and the before and after confidence levels in the concept ***the LSM as a whole***. For this diagram we grouped the respondents in the following demographic age groups:

- 1:1940 – 1960: defined as the "Post–World War II baby boom generation"
- 2:1960 – 1980: defined as Generation X, or to Gen X, the generation that born after the Western Post–World War II baby boom.
- 3:1980 – 2000: defined as Millennial's (also known as the Millennial Generation or Generation Y) are the demographic cohort following Generation X.[12]

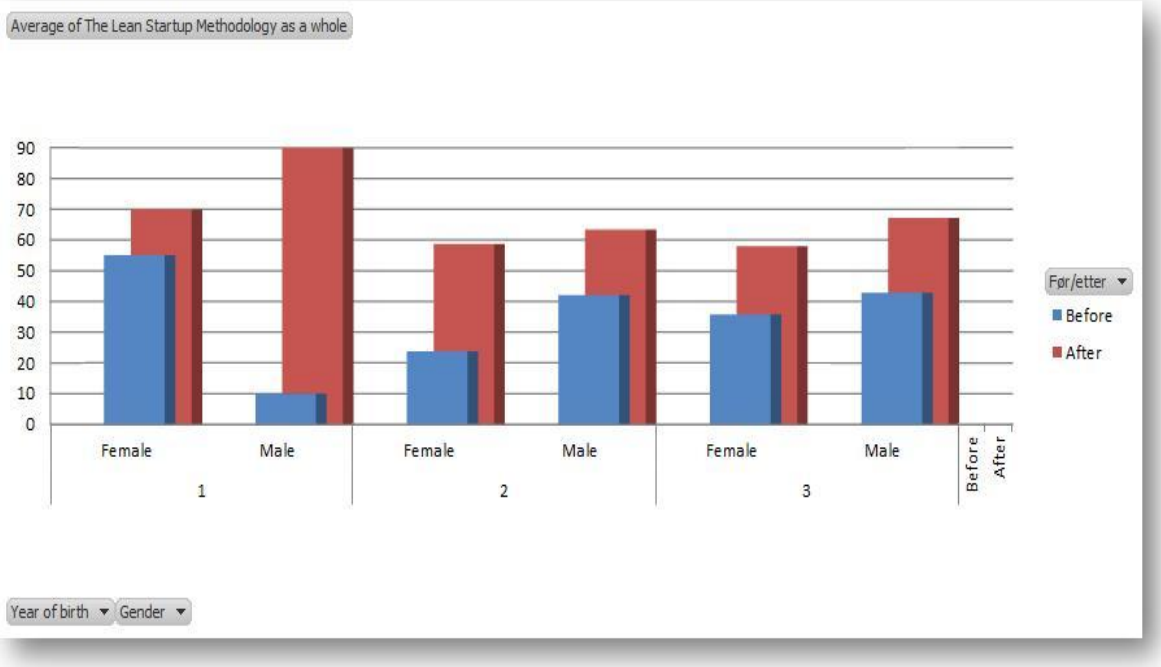

Figure 9 Diagram of confidence in *the LSM as a whole* based on age groups/gender.

Respondents spread on each age group are; 1: 5 respondents, age group 2: 32 respondents and age group 3: 41 respondents respectively.

In figure 9 there is another interesting statistic related to gender, in generation x (age group 2), women had a higher rise in confidence levels than men of the same generation. The significant rise in confidence levels of males in post-World War II baby boom generation (age group 1) compared to women of the same age group is most likely due to a few male respondents unfamiliar with the LSM experiencing a leap in the learning curve.

[12] Wikipedia: Post–World War II baby boom.
[https://en.wikipedia.org/wiki/Post%E2%80%93World_War_II_baby_boom] (Accessed 15.12.15)

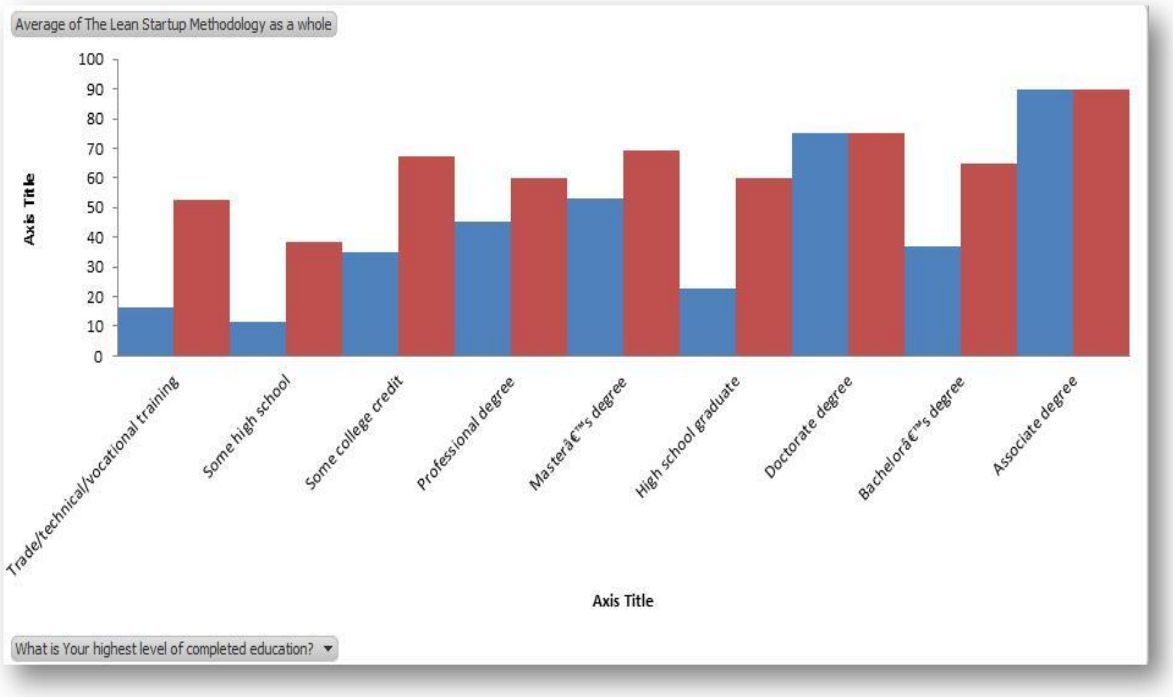

Figure 10 Diagram of confidence in *the LSM as a whole*, before (blue) and after (red) based on educational background.

In figure 10 educational background and confidence levels in *the LSM as a* whole are compared. Educational background variation of respondents are shown in figure 3 and appendix 3, worth noting here is that there are one with a associate degree and two with doctorate degrees. Since they were few and had same confidence levels before and after, this can only indicate that they did not experience a rise in confidence and had quite high confidence levels before coming to a PLW. When entering the data we found that players with a high confidence level in the LSM before PLWs did not report significant increase after. Respondents with Bachelor degree (30) or Master degree (19) were in the majority, but when comparing them, the BAs experienced a higher rise in confidence, but had lesser pre-confidence levels and MAs had higher pre-confidence and experienced reported less increase. This correlates to the finding that high entry-level confidence yielded little progress, but that PLW attendants with low entry-level confidence experienced a higher increase in confidence. It also reflects the obvious; that if two persons attend an introductory course to subject where one holds a doctorate degree in the field, and the other has never studied the matter, the latter one will probably learn more from the course.

When measuring pre- and post-gaming confidence levels in the eleven concepts there is evidence of a raise in the general average of the players. In general the average was rated 20 points higher in the survey after PLW representing increase in confidence levels; this can be seen in figure 11 underneath.

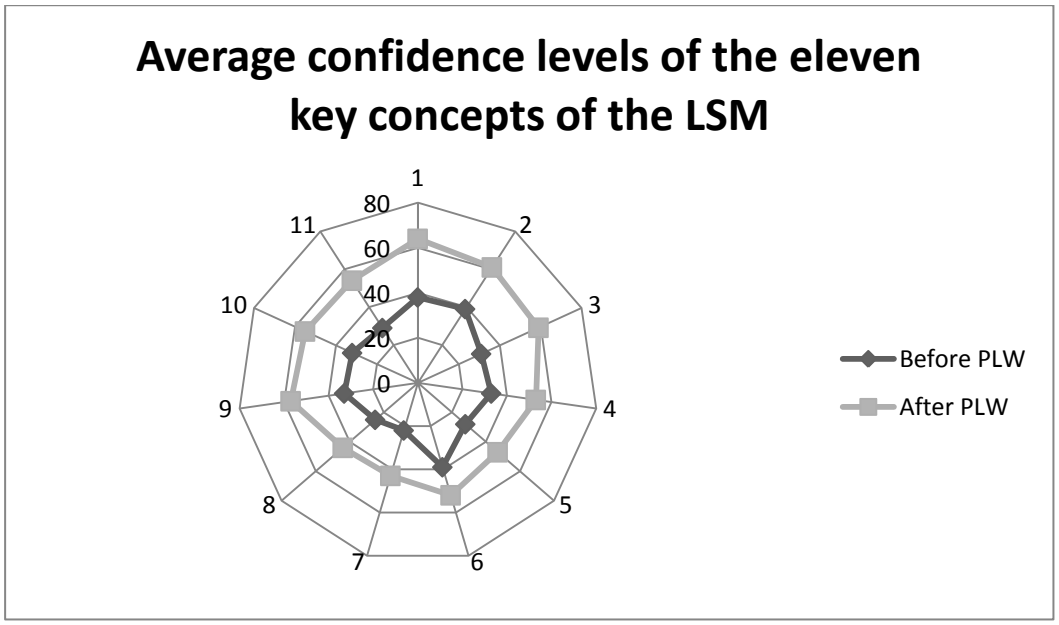

Figure 11 Web diagram over increase in confidence level ratings.

The eleven key concepts in figure 8 are: 1) the LSM as a whole, 2) the Build-Measure-Learn cycle, 3) Pivoting, 4) Get out of the building, 5) Fast iteration, 6) MVP, 7) Innovation accounting, 8) Technical debt, 9) Problem-solution fit, 10) Product-market fit and 11) Scalability and timing.

As seen in figure 11, *MVP* sticks out as being a concept many respondents rated a high confidence level in represented by the average, and that this concept was the one with the least improvement from PLW. As well as that *Innovation accounting* and *Technical debt* are the two concepts respondents rate lowest as an entry-level confidence, but experience greater improvement in confidence after compared to *MVP*. This might point to that MVP is a more general concept compared to the other two, designers are used to prototypes and software developers are familiar with beta versions, and there were some designers and software developers in the PLWs (this we know from talking to the individuals coming before the PLWs started and in coffee breaks).

In general findings from our research are consistent with a positive learning outcome, but there are conflicting data as well. There were 35 out of 847 instances, in the eleven possibilities the 77 respondents were given to either; raise, keep status quo or lower their level of confidence, where the confidence level was lowered after the PLW (not taking into account that a pre test score at 0 would drop to negative confidence in the post test). This could either imply that they forgot what they scored in the pre-survey, that they were tired and did not pay attention do this detail, or that they had learned something, but felt less confident after understanding that there was more to learn. It was possible to flip back and see what one scored in the pre-survey.

Even though there were a general raise in confidence levels, many of the PLW attendants remained on a status quo level of confidence. One player commented in the debrief that: "Need more active use of the concepts during the game to get a sense of ownership towards the concepts" (R16W4), this can be related to that the concepts are told as stories from ECs and not actively used in the game. This can be a notion on how well the facilitator connects concepts to occurring events in the game, and to what degree the concepts are considered abstract elements. A recurring element from the interviews was the lack of relation to real-life and the need for more practical experience to feel more confident in the LSM. One elaborate comment on this from an interview when asked if the interviewee experienced an increase in confidence was: *"No I do not fell an increase in confidence. The game is not real life, reading a book on the subject would not increase my confidence either. I have to use it in a real-life work project…..I would need a workshop with real customer experiments"* (2). This reflects the PLW as a general context and not being tailored to a specific target group or industry branch. It also highlights the lack of real life relation some players experience and the need to use the LSM in a project.

Results from measuring learning outcome is that the mean average was raised in all eleven concepts, that many experienced a status quo on confidence levels and that some felt less confident after attending a PLW.

4.7 Synopsis of findings

Data presented and analyzed here in the framework of four GEMs and eleven key concepts of the LSM are meant to answer SRQA and SRQB as a stepping stone to shed light on our main RQ. Our results indicate that learning from specific GEMs are present and that there was a

raised average in confidence levels in the eleven key LSM concepts. Results also points to that not everyone attending PLWs became more confident and that there were variable factors like; size and mix of group, high or low entry knowledge, age, competency of facilitator, and motivation to learn. Some provided examples of elements in the game as being related to real-life, others made the opposite point. From the interviews there were answers that pointed to the need for real-life work projects or practical usage of the LSM to feel more confident.

5. Discussion

5.1 Gamification of the Lean Startup Methodology

"*Enjoyed getting told things along the way, I really like the "learning by doing" concept*." (3)
In chapter 2.1.2 we investigated several research studies involving meta-analysis and saw that there are research supporting use of gamification in learning, and that there were arguments related to how the games should be instructed and used. In chapter 2.1.3 we looked into chosen game elements and mechanics regarding how games are designed and constructed for best learning potential. In 2.1.4 we described how the game subject to our research take use of these GEMs and further in 2.2.2 how the game conveyed the actual theme, LSM. Findings from the previous chapter have shown that the learning outcome from a Playing Lean Workshop varies, depending on player background, size and type of group, the competency of facilitators, time limitations and motivation for playing.

There are many elements from gamification theory Playing Lean resonates with, such as; storytelling, motivation and reward structures, social learning and instructional facilitators. Our findings indicates that as instructional game PL delivers on many of these accounts and as a game amuses and enjoys, and most players respond an increase in confidence regarding concept knowledge. Hence, the aim of being 49 percent fun and 51 percent learning is by all means relevant. Depending on players and workshop context the degree of learning percentage and fun percentage varies. Based in the results of our findings we could argue that it is possible to 'gamify' LSM and make use of a board game in a workshop to learn the LSM. Several players measured themselves to higher concept confidence after a PLW, and when ticking off what elements they learned from, many ticked off the Experiment cards (storytelling), facilitator (instruction, feedback) and interacting with other players (social learning). These are all GEMs intended to facilitate learning and underpins the fact that they do work, if not optimally, for most players.

5.2 Game elements and mechanics

Storytelling

The use of storytelling was important to learn and create entertainment according to respondents. This resonates with gamification design which postulates using storytelling as an active ingredient when designing instructional games (Kapp 2012). An increased chance of

remembering content and being instrumental to provide a narrative to concepts and topics can be subscribed to storytelling when playing PL, this supports theorists urging the importance of providing a narrative to the content of the games (ibid.).

Motivation and reward structures

Seeing players challenge each other in a competitive and friendly manner on all occasions support the use of competition as long as it does not render players de-motivated or demoralized. Some theorists warned against such a result of competition (Bryant 1977, Chan et al. 2008), but others embraced the positive effects of competition (Burguillo 2010, Reeve et al. 1996). Taking Kapps (2012) advice of assuring that players are confident in rules and game play before competition aspects are weighted can be used to avoid negative outcome of competition. Fortunately in our case the setting of the PLW context was that of interested and willing learners, and there was more emphasis on learning to play and solve the problem of the game than actually winning the game. In a more competitive context instructors and facilitator must be aware of the negative consequences for learning competition can have. Competition triggers engagement, but it can also discourage a few when facing bad luck. Not many players observed seemed discouraged, as described in the findings chapter this can be due to the friendly competition and that most had an overall enjoyable experience.

Reward structures worked like motivational source for the players, especially getting new employees after making the first sale. The effect of having a larger workforce is noticed immediately and this motivates others to get it too. It is possible in the game to invest in company cultures and receive bonuses making reducing the amount of employees needed to perform a task (build and remove, experimenting and sales), which frees up employees to invest more in company culture and reduce employees needed further. Seeing progress through stages of a game and having small rewards along motivates players (Kapp 2012).

Facilitator and instructions

The use of facilitators are paramount to the PLW context, this was intended by the designers of the game[13]. For instructional games many researchers agree upon the importance of instructed gaming compared with uninstructed, the results are improved learning outcome with instructor (Ke 2009, Hays 2005). The inclusion of an instructional program in Playing Lean is what makes it a PLW, this program contains the intro, debrief, in game instructing

[13] Based on background interview with Simen Fure Jørgensen on 14th of September

and the facilitator's guide (appendix 6). In research there are recommendations that instructional designers should be included in instructional game design (Hays 2005), and that experienced instructors are used. Since PLW are relatively new there are not many experienced facilitators yet, but are growing in number. Attracting facilitators with instructional experience is important to provide a well instructed workshop.

Social learning

Learning from group dynamics are a useful tool in education and instructions, knowledge and skills often varies between individuals so if the sharing level is high many can learn from each other. Bandura (1977) highlighted the possibility to achieve higher efficacy expectations by observing other doing uncertain or risky tasks. In the PLWs we observed there was some variation to the extent of social learning depending of the group size and mix. This is an important note to facilitators and instructors; they must aspire players to share experiences and provide a welcoming atmosphere to sharing, this to increase the total learning effect of the game. Good social learning can affect the 'vicarious experience' notion of Bandura (ibid.) and possibly lead to increased self-efficacy of individuals. The PLW also functioned as a meeting arena on those occasions when players did not each other from before; providing an informal setting where people got in contact with others, exchanged entrepreneurial frustrations and ideas, together with learning.

5.3 Entrepreneurship learning and gamification

The task of transmitting knowledge about entrepreneurship is done by both private and public institutions; examples are universities, institutions like Innovasjon Norge (IN), private and public incubator institutions, consultancy agencies and so forth. Public sector increasingly employs innovation in their tasks, and entrepreneurship is encouraged by public institutions for unemployed. The OECD (2008) has emphasized the importance of entrepreneurship by creating policy frameworks to inspire member countries to facilitate for entrepreneurship to grow (Storey et al. 2010). In a policy document the Norwegian Government 'Entreprenørskap i utdanningen – fra grunnskolen til høyere utdanning 2009-2014'[14] indicates that promoting entrepreneurship in education is a dedicated goal for Norway and Innovasjon Norge (IN)

[14] The Norwegian Gov.: [https://www.regjeringen.no/no/dokumenter/handlingsplan-for-entreprenorskap-i-utda/id575005/] (Accessed 30.10.15)

emphasizes assistance to entrepreneurs and Lean Startup as a tool for entrepreneurs[15]. The market for EdTech (educational technology) is rapidly growing[16] and in the publication *The Knowledge Future: Intelligent policy choices for Europe 2050 A report to the European Commission* an expert group claims that "*The very idea that billions were once spent on making games with flying birds or cartoon warriors is quaint; the real money is in educational games*" (2015:37). The report then addresses that developing the indigenous game industry is a priority of industrial policy for the European Union (ibid.). This indicates both a rise in educational technology applied as learning tools and that the Norwegian government value entrepreneurship training in education as well as through their innovation institute IN. In our perspective the LSM can by all means be regarded as entrepreneurship learning, and the PLW can be instrumental as an introductory tool to learn the methodology and as a reflection tool for entrepreneurs. Being introduced to the mindset of the LSM can have an impact on emerging entrepreneurs in the way they develop a business idea and how they go about realizing it.

In relation to learning entrepreneurship we would emphasize that the LSM is associated with many of the same things as in the experiential learning, discovery, and trying and failing mentioned as being central to how entrepreneurs learn (Cope 2005). By comparison the LSM emphasize doing experiments and making MVPs, get out of the building, test, pivot or persist which can be regarded equal to how scholars suggest entrepreneurs learn. Like the comparison in the example above there is the earlier mentioned link between how entrepreneurs learn and gamification in the description from Ke (2009) on how developing a game based cognition involved trial and error and deductive reasoning. In Playing Lean trying and failing is inevitable, it's part of the game and mentioned by respondents as being a point they learned from themselves, and by watching others. In our perspective playing the game and attending a PLW have relation to entrepreneurship learning, but does not incorporate the real-life elements of being an entrepreneur, like risk.

As mentioned by Storey & Greene regarding OECDs (2008) policies on entrepreneurship, entrepreneurship culture and entrepreneurship education are factors that can lead to impact such as job creation, economic growth, and sustainable workforce (2010). PLWs can contribute to entrepreneurship learning; the instructional game and workshop can help people learn the LSM in educational and work related contexts, and can aid emerging

[15] IN: [http://www.innovasjonnorge.no/no/grunder/ideutvikling/forretningsutvikling/] (Accessed 02.11.15)
[16] Chen, A. for Atlantic: [http://www.theatlantic.com/education/archive/2015/11/quantifying-classroom-tech-market/414244/] (Accessed 08.11.15)

entrepreneurs and innovation projects within established companies, being an instrumental tool for, and as, entrepreneurship learning.

6. Concluding remarks

6.1 Conclusion

Reviewing our research question, *how does gamification contribute to learning the Lean Startup Methodology*? we can say that there are indications that point to the value of that. In literature on gamification there are several findings supporting the use of games and game-based learning in education.

In answering our sub research question A) *How do game mechanics and elements contribute to learning*? we found the following: Storytelling, especially the Experiment Cards, played an important role in communicating the LSM and providing entertainment and reference points; reward structures functioned as motivation; competition increased engagement; instructions/facilitator improved the learning experience by explaining the rules, provide stories and bridge them to LSM context and give feedback; social learning helped players learn from each other. In answering our sub research question B) *To what extent do players learn from Playing Lean*? we found in measuring confidence levels in eleven key concepts an increase in the average overall confidence level. The study confirm a general positive effect of the PLW and points to how it should be used in a learning context, we can suggest the use of instructional games in educational programs, courses and projects to learn LSM. PLW works well as an introductory tool to LSM and as an arena for more skilled players to share experience and knowledge. Still it varies a lot between workshops and people attending; some did not become more confident in the LSM afterwards, an indication was that those who had high prior knowledge of LSM had no increase in confidence; some learn quicker than others, due to motivation; some has a background that makes it easier to pick up this methodology and way of thinking, people of age have more experience and references; and some facilitators have more experience affecting the learning outcome. Time was proven limited during workshops of three hours; when a rather comprehensive method containing many concepts is introduced through a game, this is challenging to how well players learn the theory of LSM.

The outcome from PLW was that people learnt LSM to an extent and was introduced to the mindset of LSM. Thus, learning entrepreneurship in a more practical way than reading or taking lectures, and being able to reflect upon the learning with other people in a group. LSM can be used in both entrepreneurship and innovation; it is just as fitting for a startup as an innovation project within a large established company. Hence, the entrepreneurship

learning covered by LSM in the game can have relevance for many, from eager startup individuals to project managers in an innovation department.

6.2 Limitations of the research

This thesis is limited to exploring one board game and its learning outcome. The possibility to compare several instructional board games, or to compare with other types of games, or to compare lectures with games would increase the rigor of the research. Playing Lean is relatively new and changes to the game where done as late as in 2015, we did not have the possibility to compare earlier versions with the last version, which could have been interesting in regards comparing the learning outcome between them. Furthermore, we see the value of being able to evaluate the effect that the game had in practice for players afterwards, to interview players half a year later that had been involved in a startup or innovation project using LSM in their job would have yielded interesting insights.

There are several game elements and mechanics in gamification that we have not looked deeper into in this thesis, such as problem solving, aesthetics and game design. We could have probed deeper into the instructional design literature to investigate this aspect of the Playing Lean Workshops further, and to get a better understanding of the role of the facilitator.

6.3 Implications for further research

Through our process of writing this thesis it became apparent that the field of gamification research is vast. However, there are domains less investigated than others in the literature, instructional board games are less prevalent than simulations, role plays and instructional case based learning-games. Including specific theories or methods as a specific target of learning is done before, but there are no known board games with the aim of teaching the Lean Startup Methodology. Hence, researching the learning outcome of Playing Lean is valuable in itself, investigating whether this specific method (LSM) can be conveyed through gamification, and if the learning outcome is valuable and considerable. As mentioned under limitations, comparing various gaming approaches and games versus lectures could be interesting studies for other researchers since LSM seems to be an approach that will persist, both for startups and for innovation development in established companies.

Other games covering the startup and innovation contexts should be compared to be able to make a more rigorous claim to the effect of gamification in learning. Comparing PLW in the three hour short version with a planned two day long version could also produce interesting findings. Even though there are several studies focusing on how to design and structure an instructional game to harvest the most of the learning experience, there are still elements to explore. Research can contribute to conceptualizing game elements and mechanics, and address key traits of their respective learning effects and limitations; this can again contribute to practitioners in designing and using instructional games.

6.4 Implications for Playing Lean and practitioners

In general our findings support many of the underlying factors contributing to learning through a gamification experience, but for the specific target of learning LSM we have seen flaws in the Playing Lean game and the PLW. There are many issues that can to be dealt with to reach a higher learning outcome; the concepts must be more embedded in the gaming experience, there could be a combination of lecture, game and quiz, and when concepts come up during play they should be linked to the players' real-life working situation, previous experience or another example.

Depending of the future goals of Lean Friends AS these issues can be dealt with in various ways. Feedback from players indicated that it must be more specific to type of business to be relevant, many wanted the setup of the game with the ability to modify it to their specific needs (depending on customers they in turn had or a specific project, or type of business). To be more effective classroom settings should be applied, having the possibilities of using a projector to show the experiment cards drawn and then have short discussions relating the topic on the card to own business, project or experience. This would increase learning output. The length of the workshop should increase from half day to one-two day workshops to be more comprehensive with respect to the learning outcome. Concepts need to be used by the players in practice and related to own experiences to be able to embody the knowledge of the Lean Startup Methodology. Paying attention to, and measure how game elements and mechanics works when testing games are pivotal for game developers and facilitators. Designing and adjusting these to get the 'best practice' out of them are important to facilitate high learning effects and best usage of games.

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Appendix 1: The questionnaire we used

Venue:_____ Participant number:_____

This survey is done in conjunction with a master thesis at NMBU, researching the learning outcome of Playing Lean and the extent of it. All answers are anonymous and it will take approximately 10 minutes to complete it. The survey is divided into two parts, one before the game, one after. We appreciate that You are taking the time to complete both parts.

Survey part 1. Baseline knowledge of the Lean Startup Methodology previous to "Playing Lean".

Question A. ***General questions:***

- Gender? Male: ☐ Female: ☐
- Year of birth? _____

- What is Your **highest** level of completed education?
  - ☐ No schooling completed
  - ☐ Nursery school to 8th grade
  - ☐ Some high school, no diploma
  - ☐ High school graduate, diploma or the equivalent (for example: GED)
  - ☐ Some college credit, no degree
  - ☐ Trade/technical/vocational training
  - ☐ Associate degree
  - ☐ Bachelor's degree
  - ☐ Master's degree
  - ☐ Professional degree
  - ☐ Doctorate degree

- Employment Status - Are You currently? (**Select the most representative option**)
  - ☐ Employed for wages
  - ☐ Self-employed
  - ☐ Out of work and looking for work
  - ☐ Currently starting a business
  - ☐ A homemaker
  - ☐ A student
  - ☐ Retired

☐ Unable to work

Question B.

A number of Lean Startup Methodology elements are described below.
How certain are You in Your understanding of the elements?

Please **rate** Your degree of **confidence** by recording a number from 0 to 100 using the scale below:

0 10 20 30 40 **50** 60 70 80 90 **100**
Cannot do at all Moderately Highly certain

Confidence	(0-100)
The Lean Startup Methodology as a whole	_____
The Build - Measure - Learn cycle	_____
Pivoting	_____
Get out of the building	_____
Fast iteration	_____
Minimum viable product (MVP)	_____
Innovation accounting	_____
Technical debt	_____
Problem/solution fit	_____
Product/Market fit	_____
Scalability and timing	_____

Survey part 2. Measuring improvement on learning after Playing Lean

This survey is done in conjunction with a master thesis at NMBU. All answers are anonymous and it will take approximately 10 minutes to complete it. The survey is divided into two parts, one before the game, one after. We appreciate that You are taking the time to complete both parts.

Question A.

A number of Lean Startup Methodology elements are described below.
How certain are You in Your understanding of the elements?

Please **rate** Your degree of **confidence** by recording a number from 0 to 100 using the scale below:

0 10 20 30 40 **50** 60 70 80 90 **100**
Cannot do at all Moderately Highly certain

Confidence	(0-100)
The Lean Startup Methodology as a whole	_____
The Build - Measure - Learn cycle	_____
Pivoting	_____
Get out of the building	_____
Fast iteration	_____
Minimum viable product (MVP)	_____
Innovation accounting	_____
Technical debt	_____
Problem/solution fit	_____
Product/Market fit	_____
Scalability and timing	_____

Question B.

Which of the following game mechanics have made You more confident in the different elements of the Lean Startup Methodology? (select all that apply):

The Lean Startup Methodology as a whole

☐ Experiment card
☐ The board (customer tiles)
☐ Innovation account sheet
☐ Rulebook
☐ Company board
☐ Interacting with other players
☐ Facilitator's instructions
☐ None of the above

The Build - Measure - Learn cycle

☐ Experiment card
☐ The board (customer tiles)
☐ Innovation account sheet
☐ Rulebook
☐ Company board
☐ Interacting with other players
☐ Facilitator's instructions
☐ None of the above

Pivoting

☐ Experiment card
☐ The board (customer tiles)
☐ Innovation account sheet
☐ Rulebook
☐ Company board
☐ Interacting with other players
☐ Facilitator's instructions
☐ None of the above

Get out of the building

☐ Experiment card
☐ The board (customer tiles)
☐ Innovation account sheet
☐ Rulebook
☐ Company board
☐ Interacting with other players
☐ Facilitator's instructions
☐ None of the above

Fast iteration

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Minimum viable product (MVP)

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Innovation accounting

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Technical debt

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Problem/solution fit

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Product/Market fit

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Scalability and timing

☐ Experiment card

☐ The board (customer tiles)

☐ Innovation account sheet

☐ Rulebook

☐ Company board

☐ Interacting with other players

☐ Facilitator's instructions

☐ None of the above

Appendix 2: Method overview with interview guide

Overview of methods:

Questionnaire:
First developed on SurveyGizmo, low response rate online. Printed out to use in the workshop to increase response rates.
Pre-gaming questionnaire: questions regarding background: sex, age, work and education. And levels of confidence connected to LSM concepts.
Post-gaming questionnaire: Levels of confidence connected to LSM concepts after playing. And questions regarding which elements of the game they learned concepts from.

Observation:
One observer attends all the time, taking notes on some key points.

- Level of engagement and concentration
- Attention to facilitator and when experiment cards are read
- Interaction between players and teams
- Level of attention throughout the game
- Reaction to reward elements
- Levels of raised understanding (remembering from earlier rounds, exp. cards etc.)

.

Debrief/focus groups:
After playing a 30 minute long debrief is held. Question to each player:

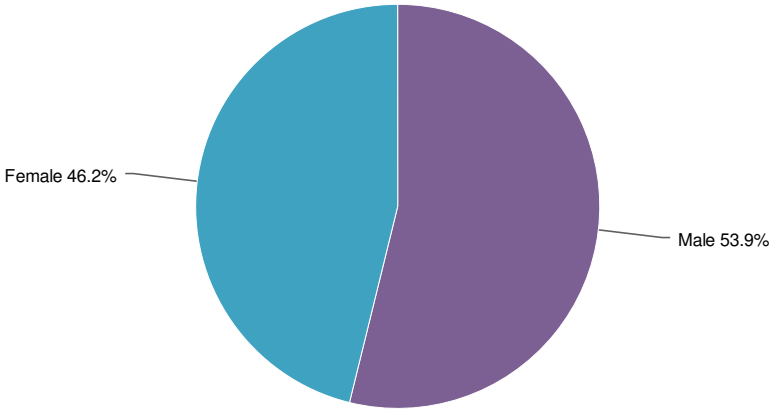
- How did You experience the game and the learning outcome?
- Did this workshop inspire You to learn more about LSM?

Interviews:
Asking more follow up questions from debrief. In-depth interviews, semi-structured.
Where: When: Date and time Who: NN in data presentation.
Inform of the purpose of the interview and receive consent. Open Interview, start by telling about the gaming exp. then follow up with these Qs if not responded on during open talk.

- Level of confidence in LSM increased or not? How and why?
- Specific elements and game mechanics?
- Why did it work/not work for You?
- What could be different?
- Used LSM before? How and why?
- Using LSM now? How and why?
- Will You use it in coming projects? How?
  Theme: Investigate how interviewees see LSM after playing, how they feel about it and how they view the usefulness of having played the game. How they can utilize it in their daily work-life. How they feel about the ability to learn more of the method and whether this has altered after playing.

New Summary Report - 20 November 2015

1. Gender



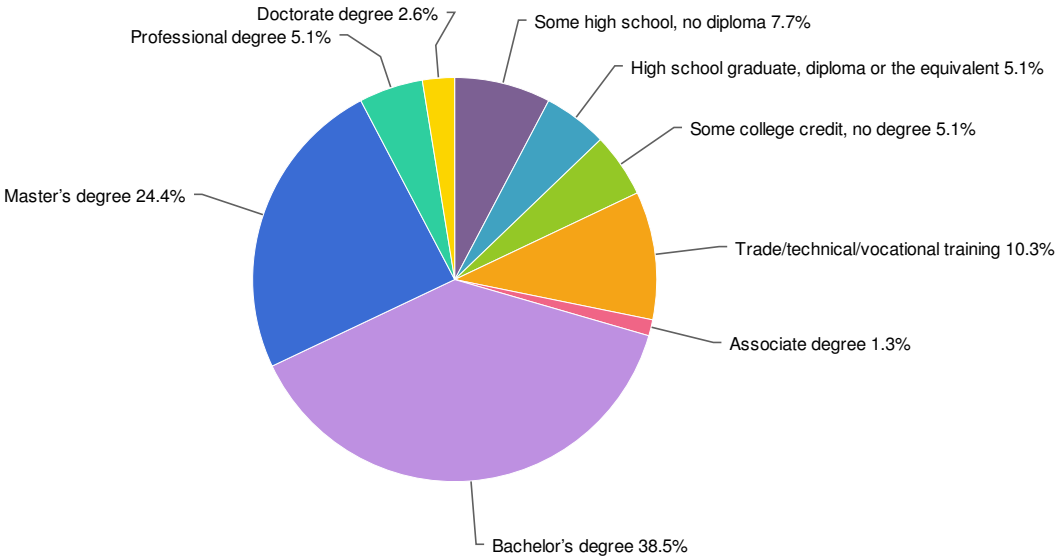
Male	53.9%		42
Female	46.2%		36
		Total	78

2. Year of birth

Count	Response
1	1946
1	1950
1	1951
1	1958
1	1959
1	1961
2	1962
3	1963
3	1964
1	1965
1	1966
4	1967

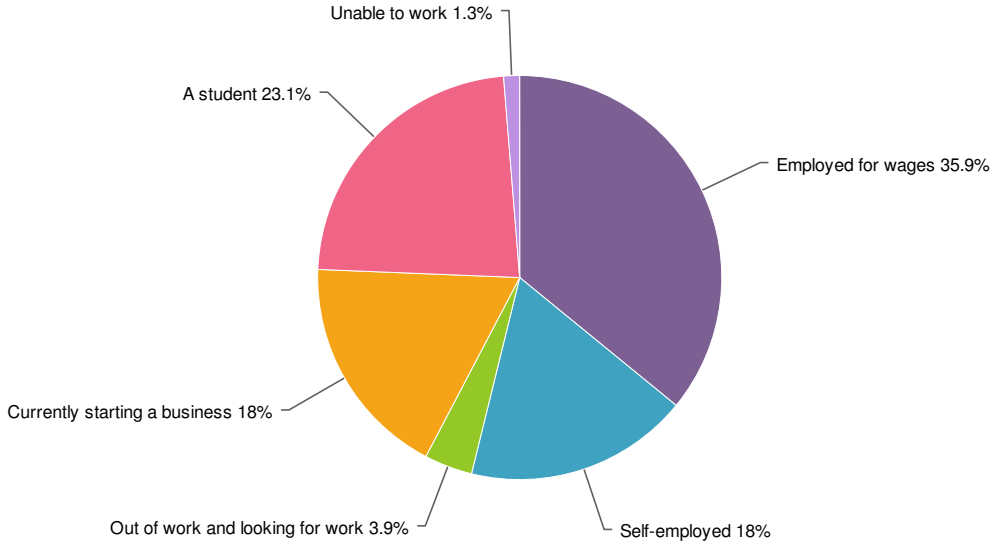
Count	Response
1	1968
1	1970
1	1971
1	1972
1	1973
4	1974
1	1975
2	1976
1	1977
1	1978
3	1979
1	1981
3	1982
2	1983
2	1986
4	1987
4	1988
2	1989
7	1990
4	1991
4	1992
2	1993
6	1997

3. What is Your highest level of completed education?



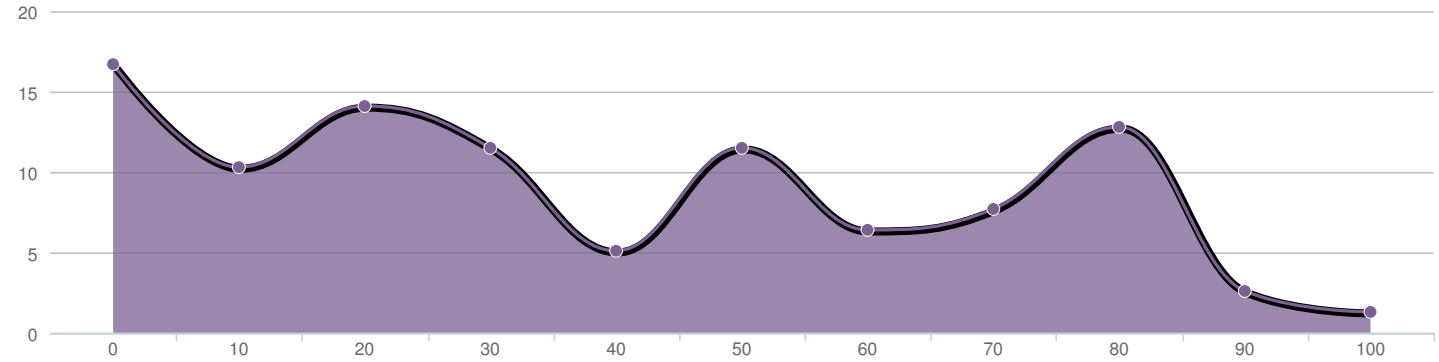
No schooling completed	0.0%		0
Nursery school to 8th grade	0.0%		0
Some high school, no diploma	7.7%		6
High school graduate, diploma or the equivalent	5.1%		4
Some college credit, no degree	5.1%		4
Trade/technical/vocational training	10.3%		8
Associate degree	1.3%		1
Bachelor's degree	38.5%		30
Master's degree	24.4%		19
Professional degree	5.1%		4
Doctorate degree	2.6%		2
		Total	78

4. Employment Status - Are You currently?



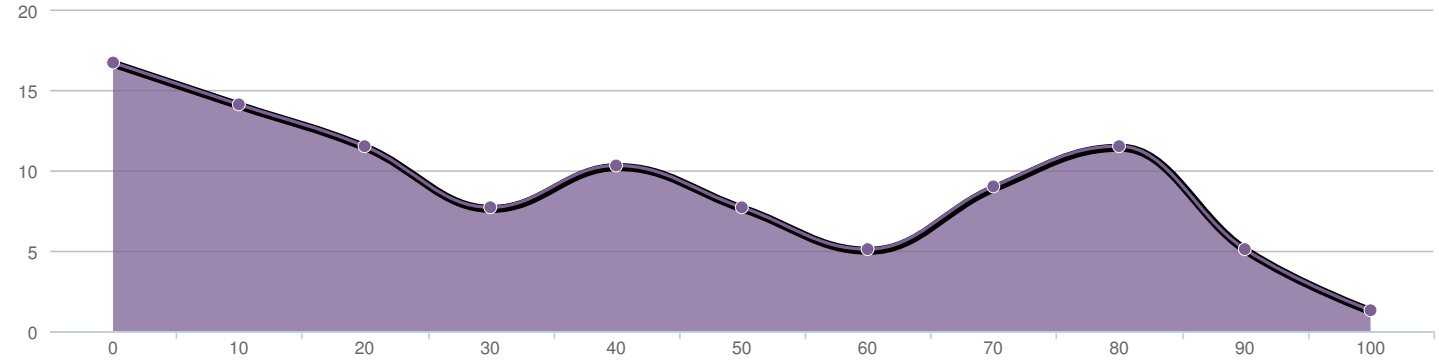
Employed for wages	35.9%		28
Self-employed	18.0%		14
Out of work and looking for work	3.9%		3
Currently starting a business	18.0%		14
A homemaker	0.0%		0
A student	23.1%		18
Retired	0.0%		0
Unable to work	1.3%		1
		Total	78

5. The Lean Startup Methodology as a whole



Statistics	
Sum	2,980.0
Average	38.2
StdDev	29.1
Max	100.0
Total	78

6. The Build - Measure - Learn cycle



Statistics	
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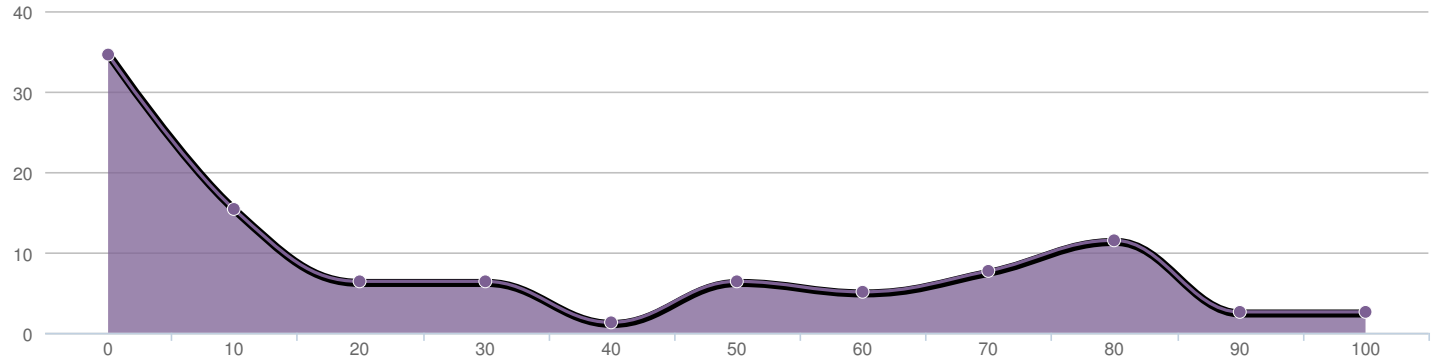
Average	38.5
StdDev	30.2
Max	100.0
Total	78

7. Pivoting



Statistics	
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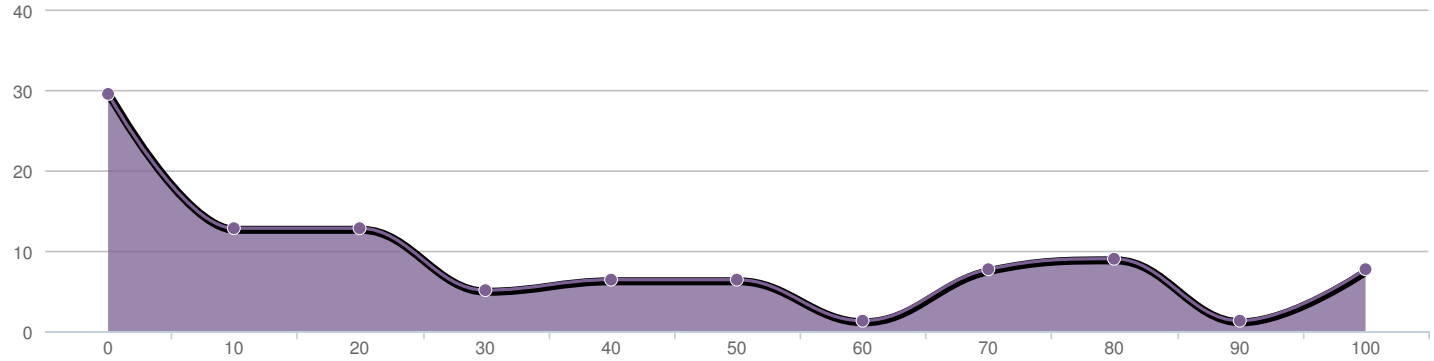
Average	31.0
StdDev	32.9
Max	100.0
Total	78

8. Get Out of the Building



Statistics	
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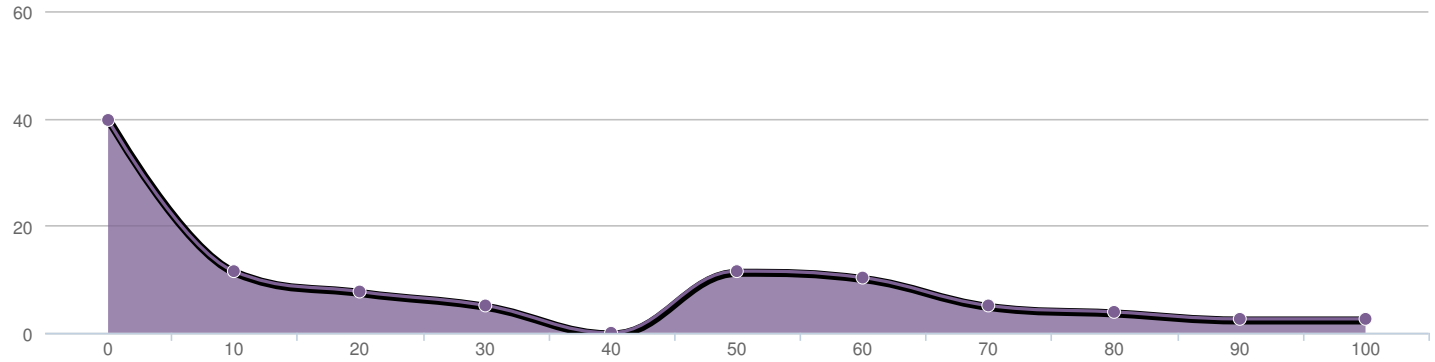
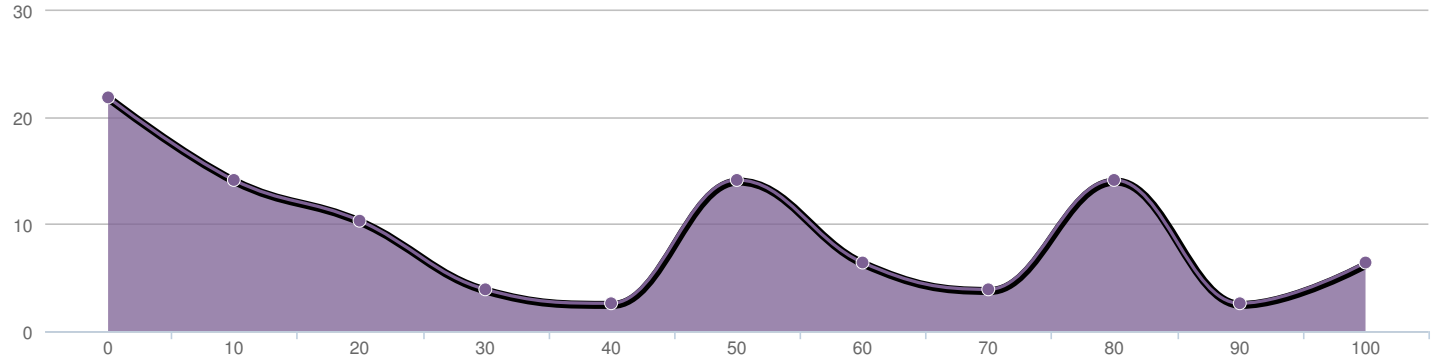
Average	33.3
StdDev	33.7
Max	100.0
Total	78

9. Fast Iteration



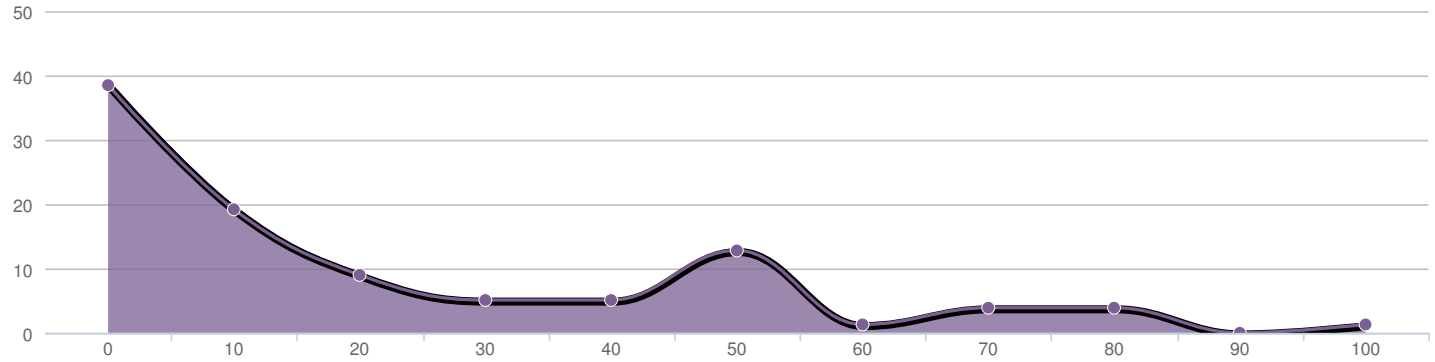
Statistics	
Sum	2,160.0
Average	27.7
StdDev	30.7
Max	100.0
Total	78

10. Minimum Viable Product (MVP)



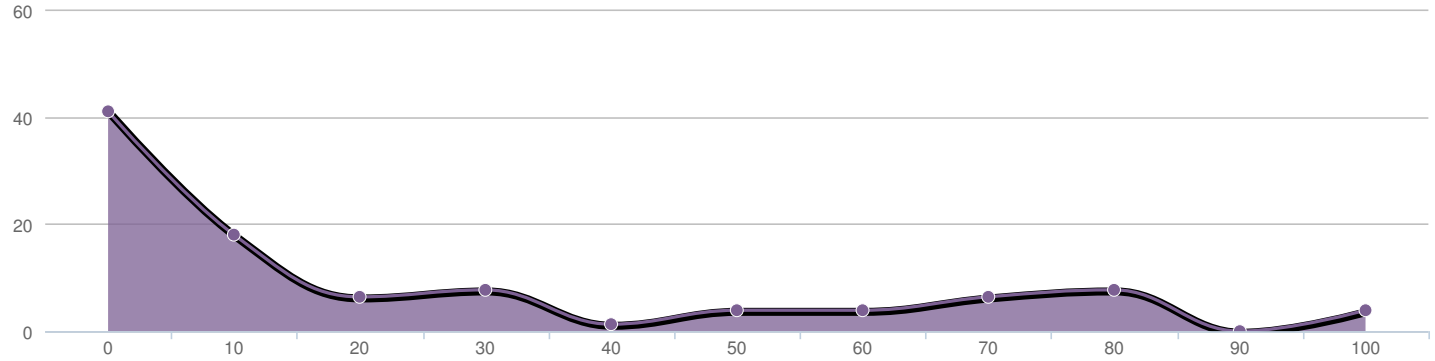
Statistics	
Sum	3,060.0
Average	39.2
StdDev	33.4
Max	100.0
Total	78

11. Innovation Accounting



Statistics	
Sum	1,680.0
Average	21.5
StdDev	25.5
Max	100.0
Total	78

12. Technical Debt



Statistics	
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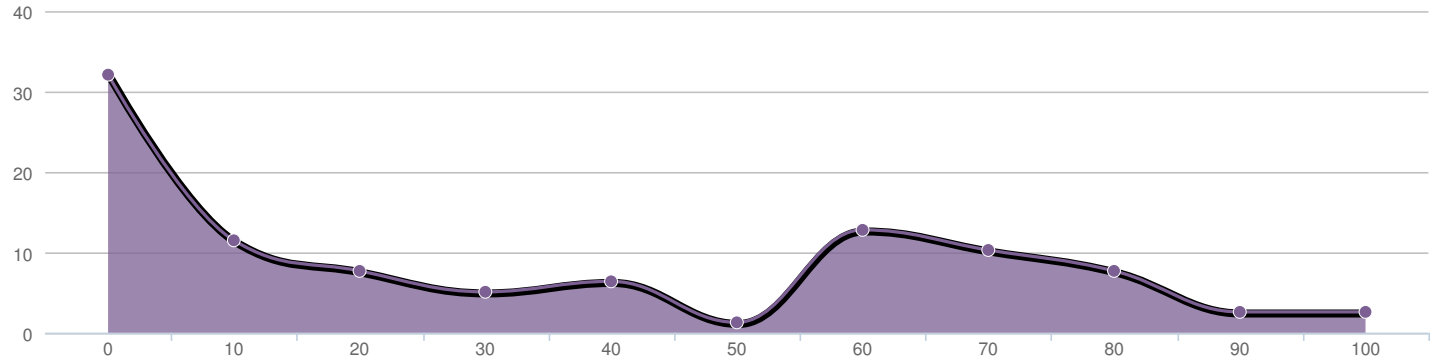
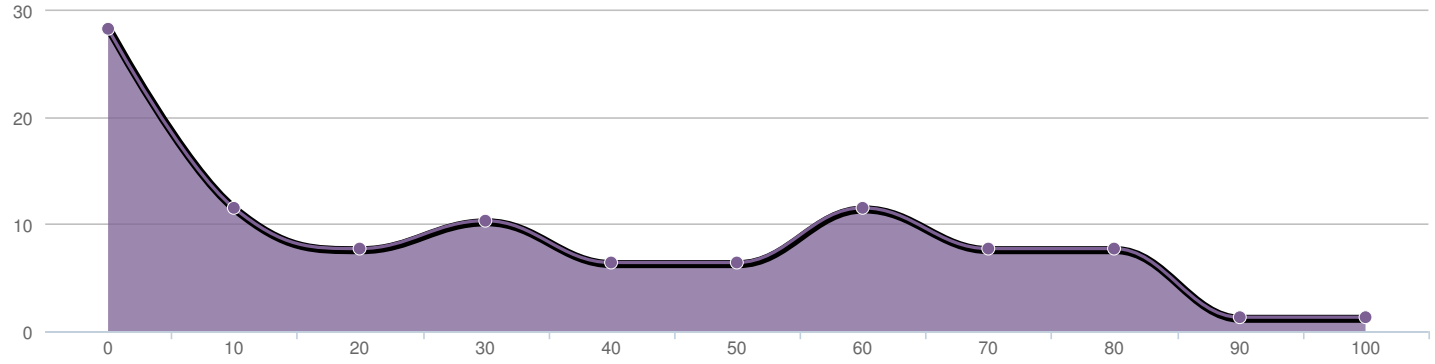
Average	24.6
StdDev	30.9
Max	100.0
Total	78

13. Problem-Solution Fit



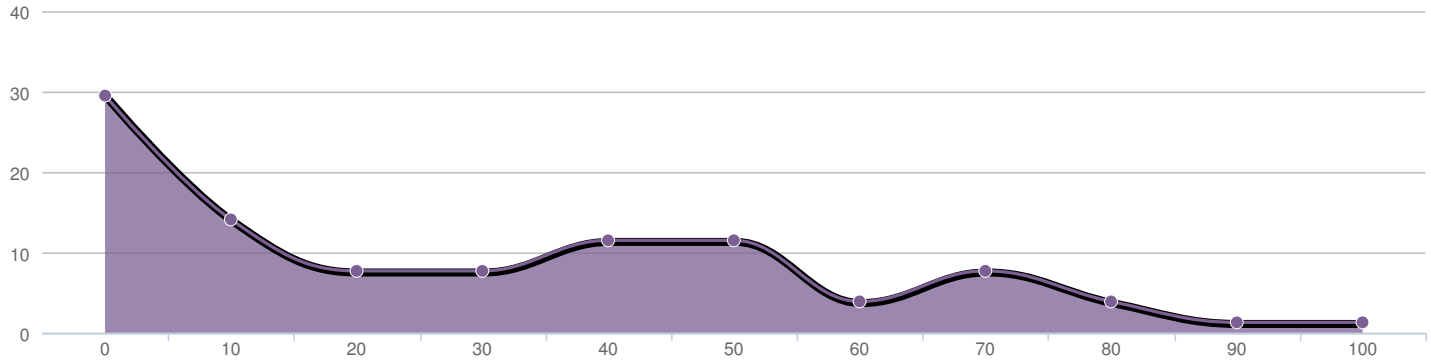
Statistics	
Sum	2,600.0
Average	33.3
StdDev	32.1
Max	100.0
Total	78

14. Product-Market Fit



Statistics	
Sum	2,530.0
Average	32.4
StdDev	29.4
Max	100.0
Total	78

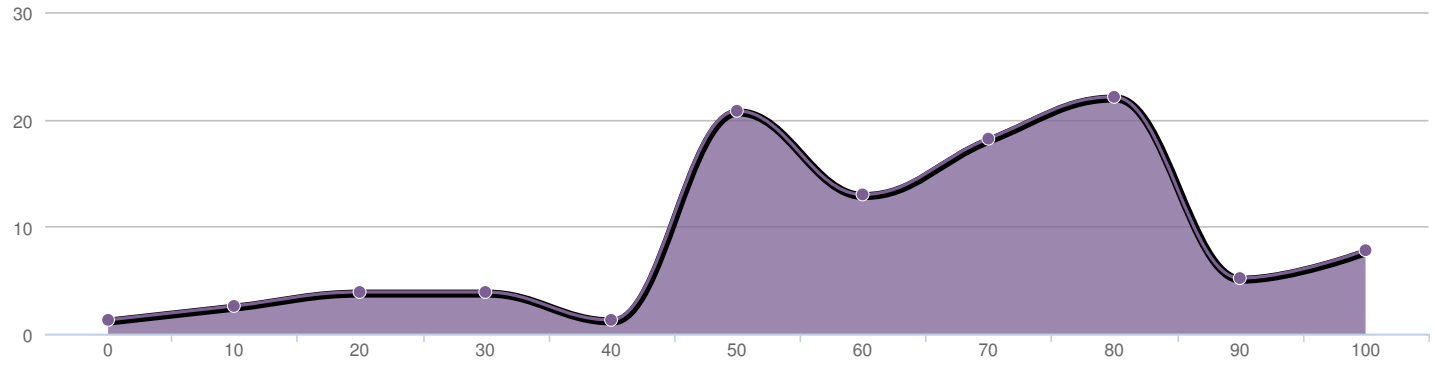
15. Scalability and Timing



Statistics	
Sum	2,250.0
Average	28.8
StdDev	27.4
Max	100.0
Total	78

New Summary Report - 20 November 2015

1. The Lean Startup Methodology as a whole



Statistics	
Sum	4,910.0
Average	63.8
StdDev	22.3
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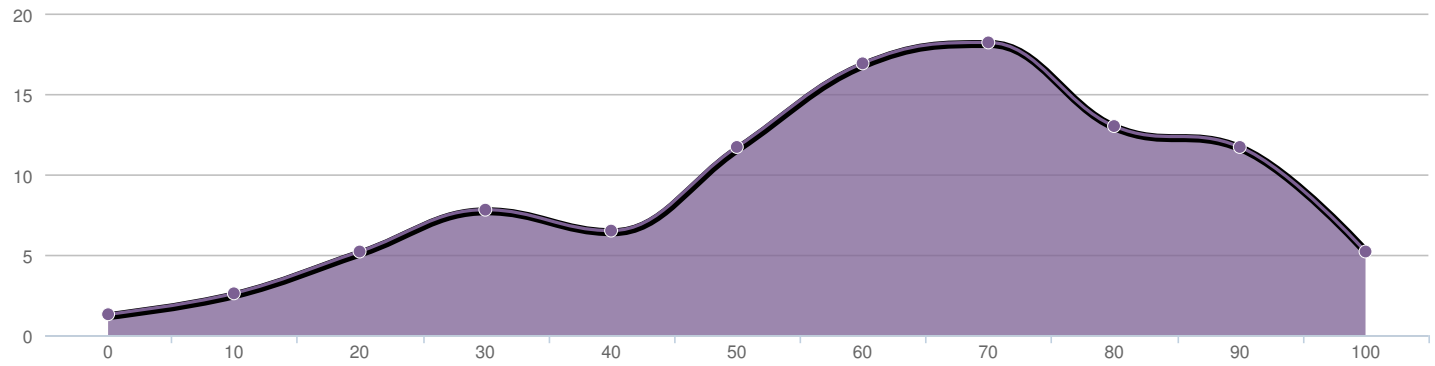
Total	77

2. The Build - Measure - Learn cycle



Statistics	
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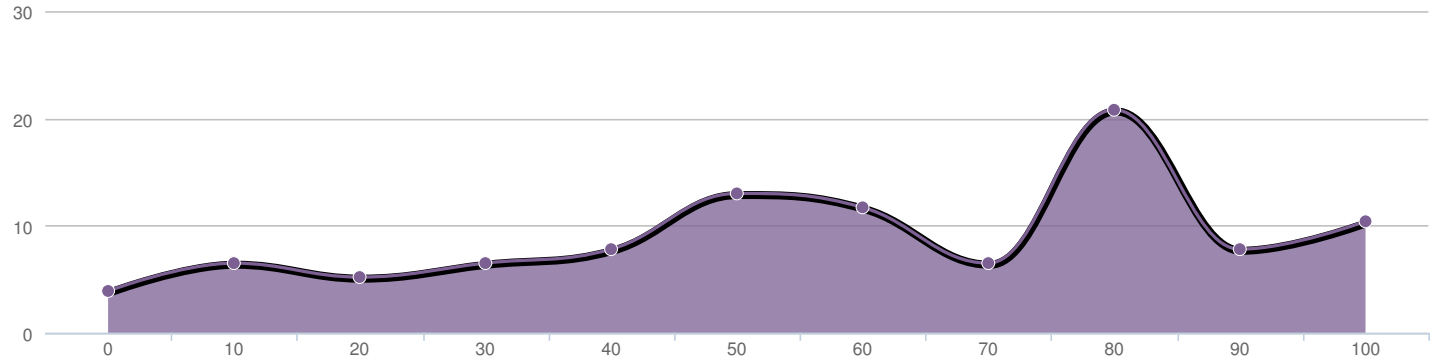
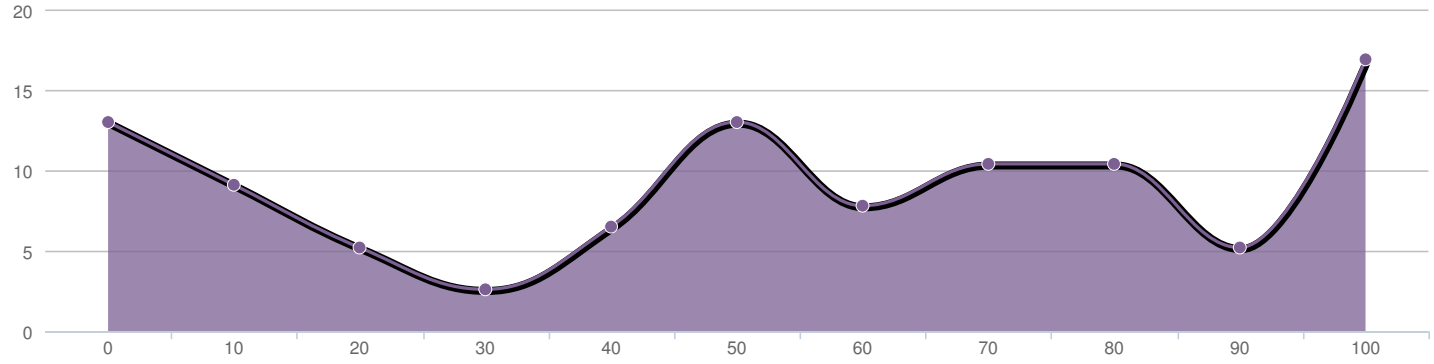
Average	61.0
StdDev	23.7
Max	100.0
Total	77

3. Pivoting



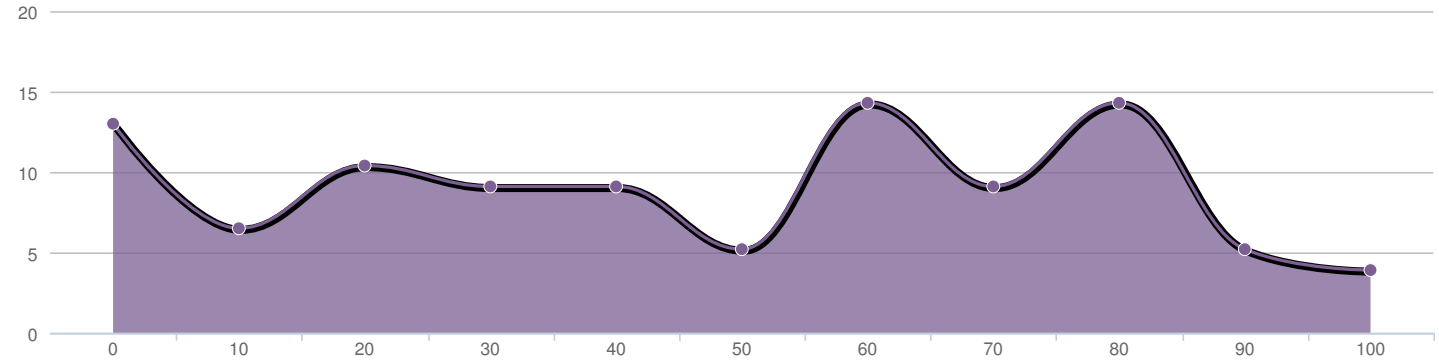
Statistics	
Sum	4,530.0
Average	58.8
StdDev	28.5
Max	100.0
Total	77

4. Get Out of the Building



Statistics	
Sum	4,130.0
Average	53.6
StdDev	34.2
Max	100.0
Total	77

5. Fast Iteration



Statistics	
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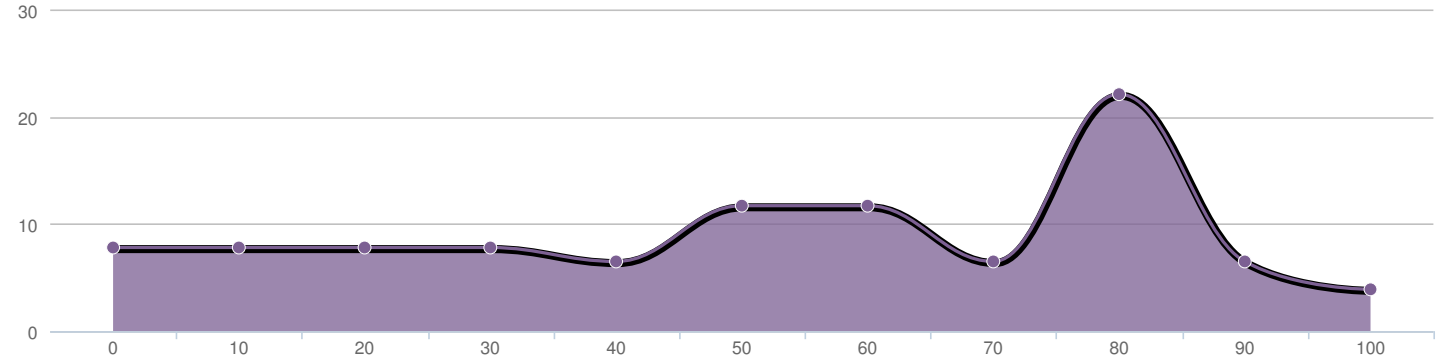
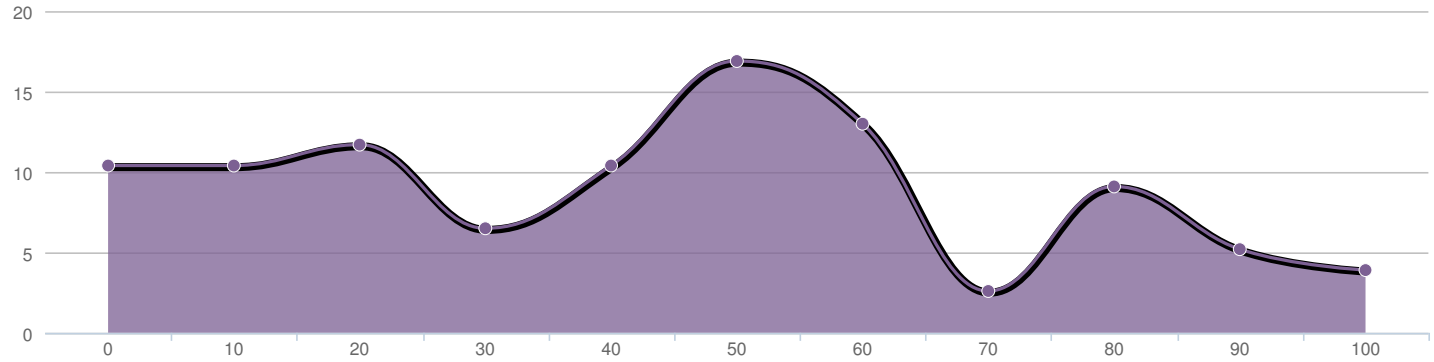
Average	46.6
StdDev	30.3
Max	100.0
Total	77

6. Minimum Viable Product (MVP)



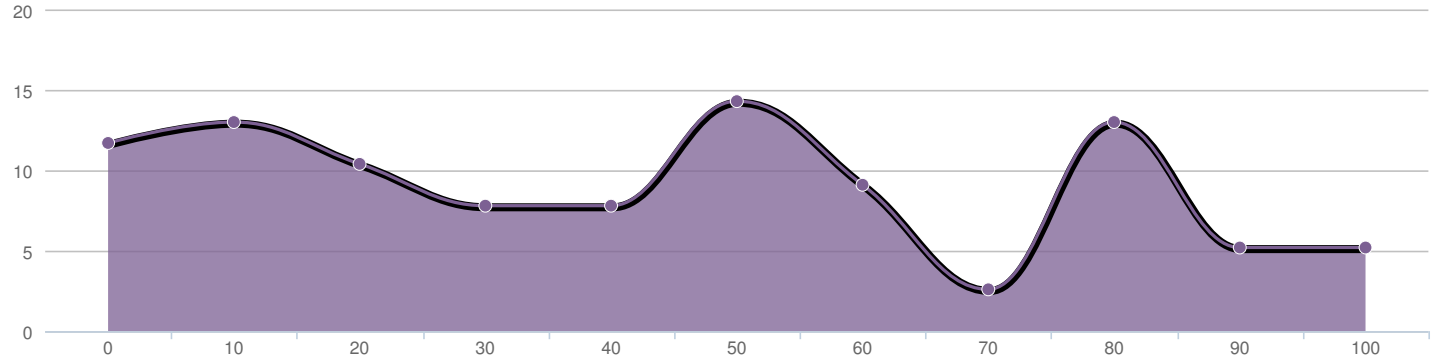
Statistics	
Sum	4,010.0
Average	52.1
StdDev	29.3
Max	100.0
Total	77

7. Innovation Accounting



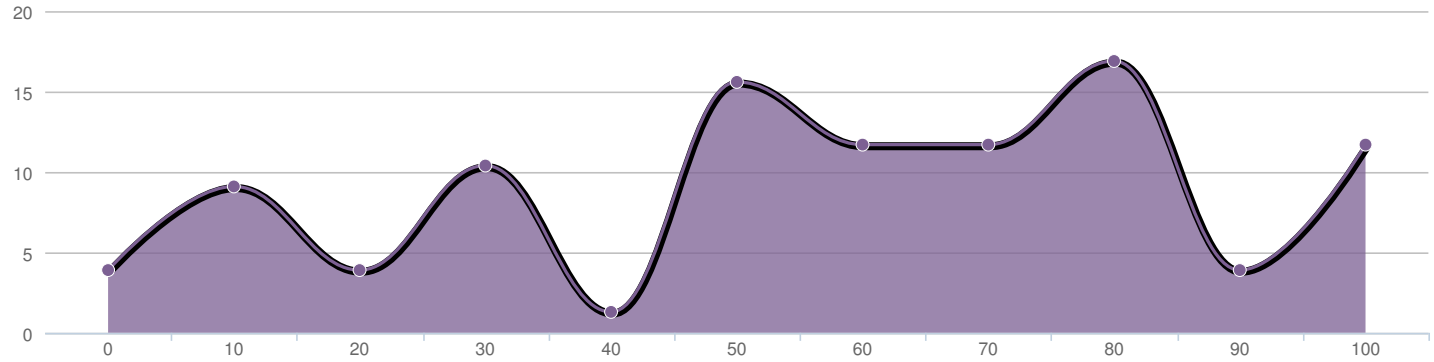
Statistics	
Sum	3,340.0
Average	43.4
StdDev	28.4
Max	100.0
Total	77

8. Technical Debt



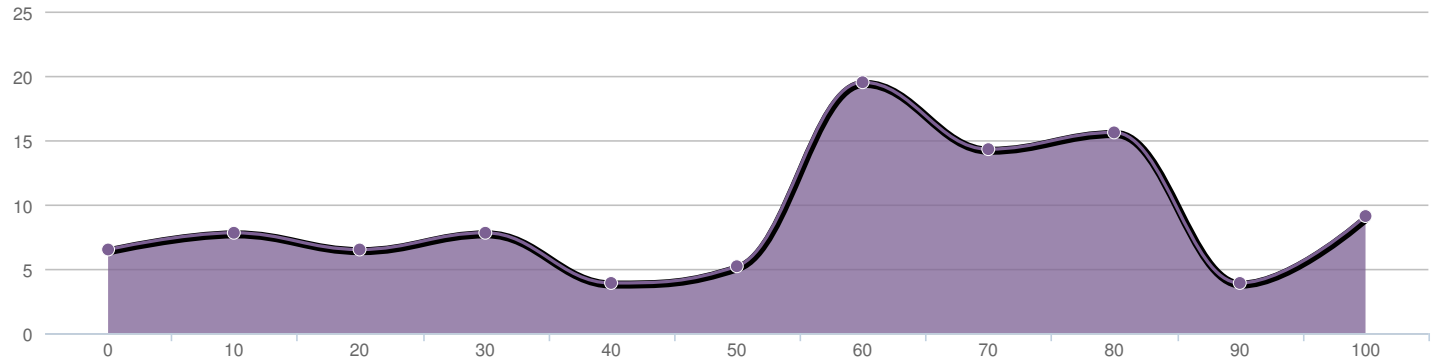
Statistics	
Sum	3,350.0
Average	43.5
StdDev	30.7
Max	100.0
Total	77

9. Problem-Solution Fit



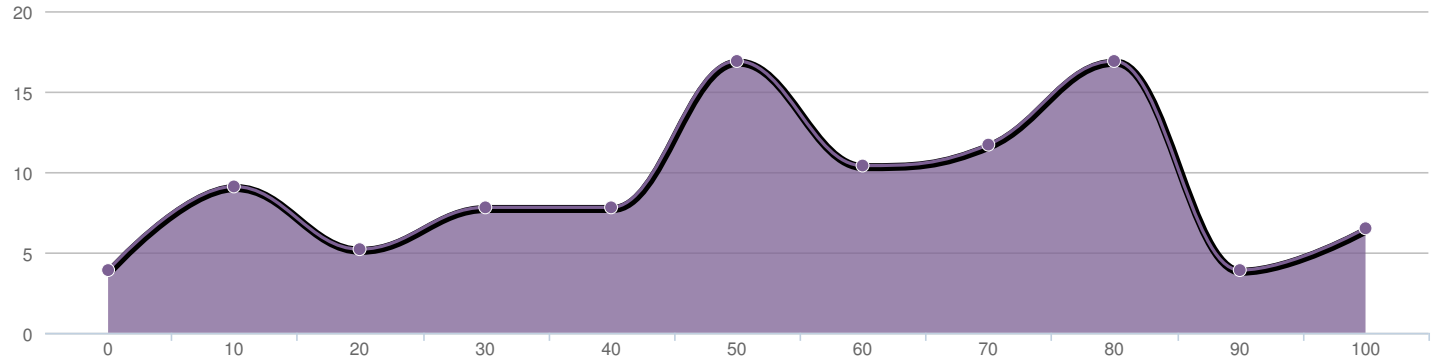
Statistics	
Sum	4,390.0
Average	57.0
StdDev	28.9
Max	100.0
Total	77

10. Product-Market Fit



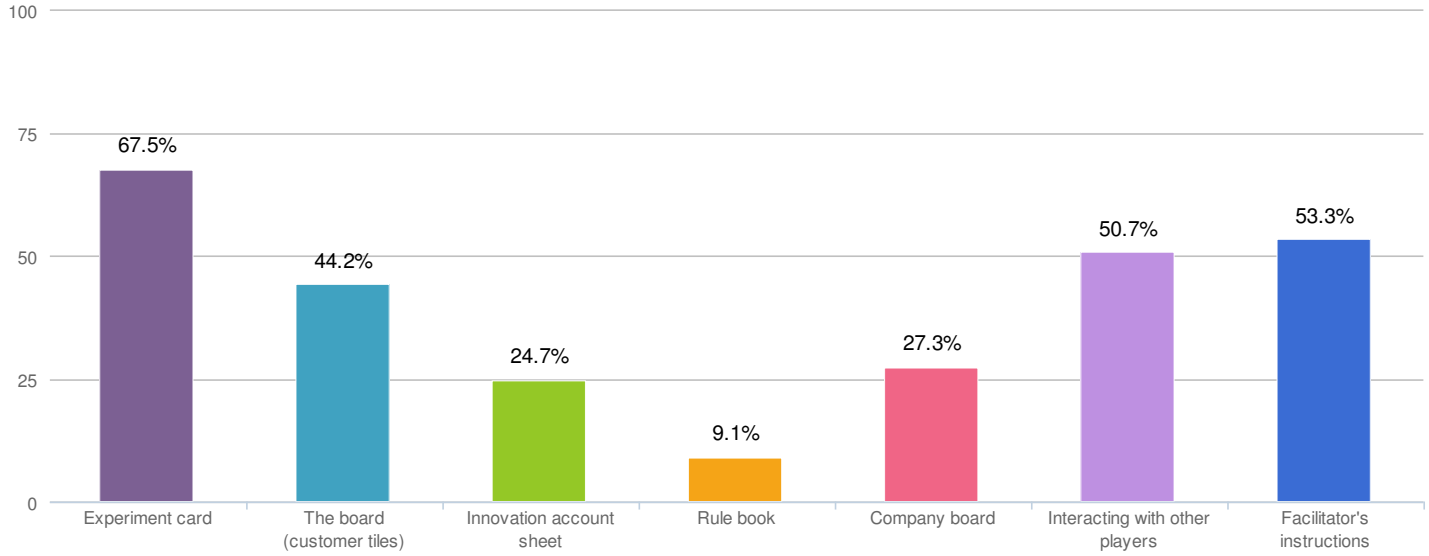
Statistics	
Sum	4,260.0
Average	55.3
StdDev	29.3
Max	100.0
Total	77

11. Scalability and Timing



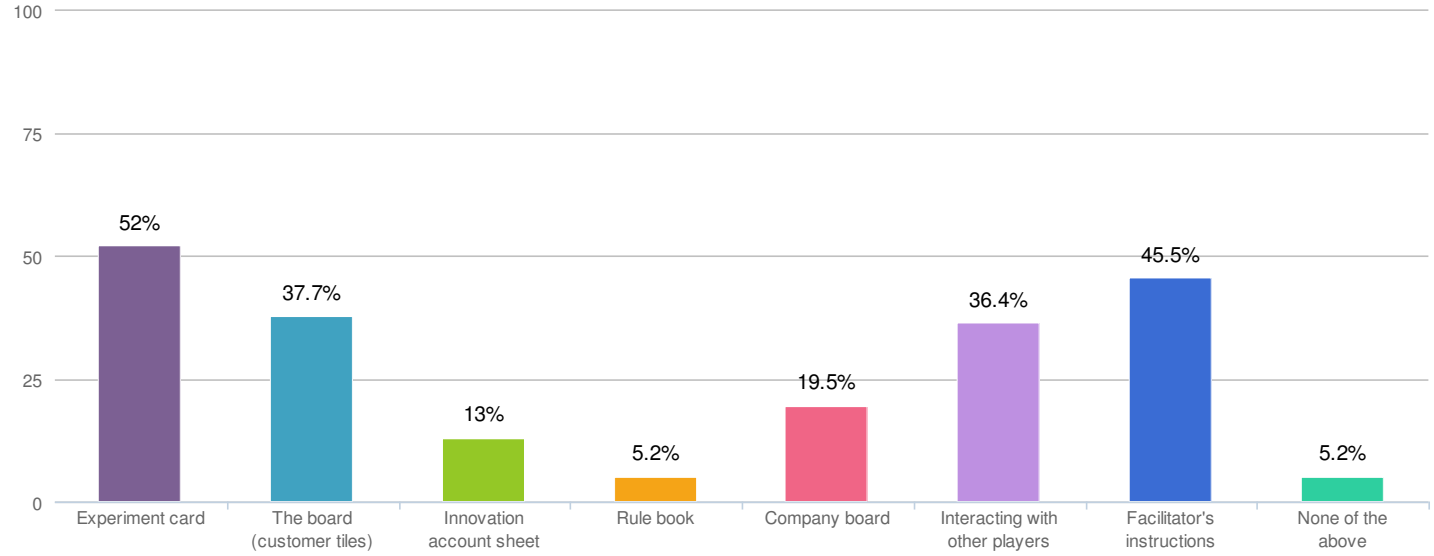
Statistics	
Sum	4,140.0
Average	53.8
StdDev	27.4
Max	100.0
Total	77

12. The Lean Startup Methodology as a whole?



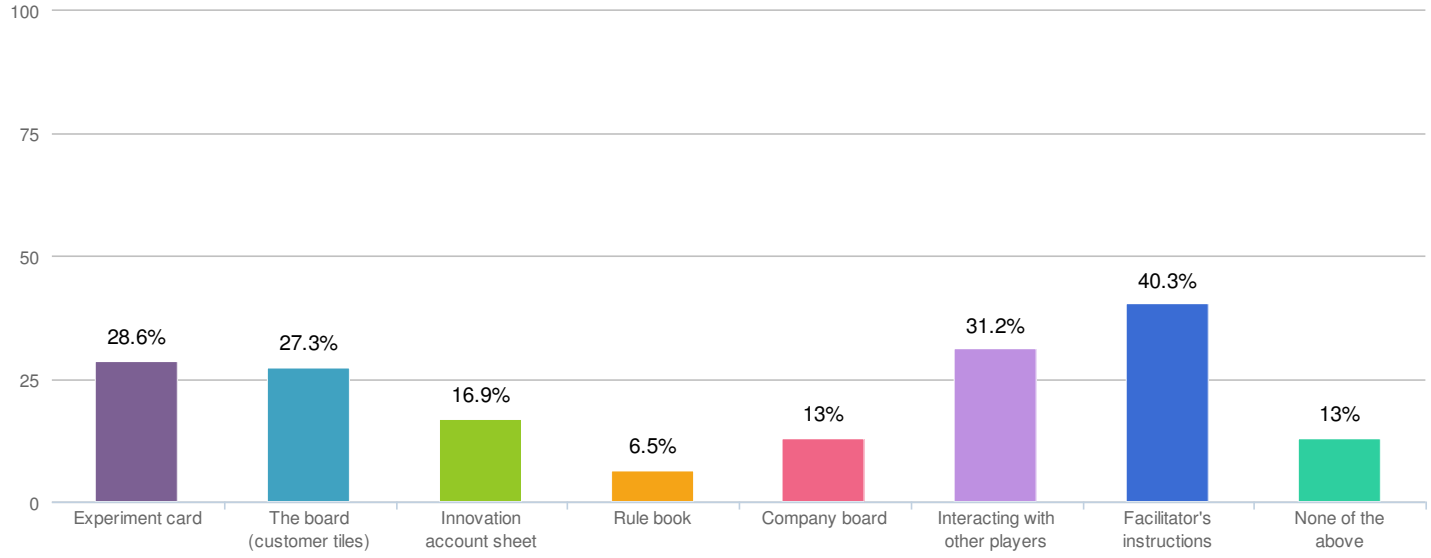
Experiment card	67.5%		52
The board (customer tiles)	44.2%		34
Innovation account sheet	24.7%		19
Rule book	9.1%		7
Company board	27.3%		21
Interacting with other players	50.7%		39
Facilitator's instructions	53.3%		41
None of the above	0.0%		0
		Total	77

13. The Build - Measure - Learn cycle?



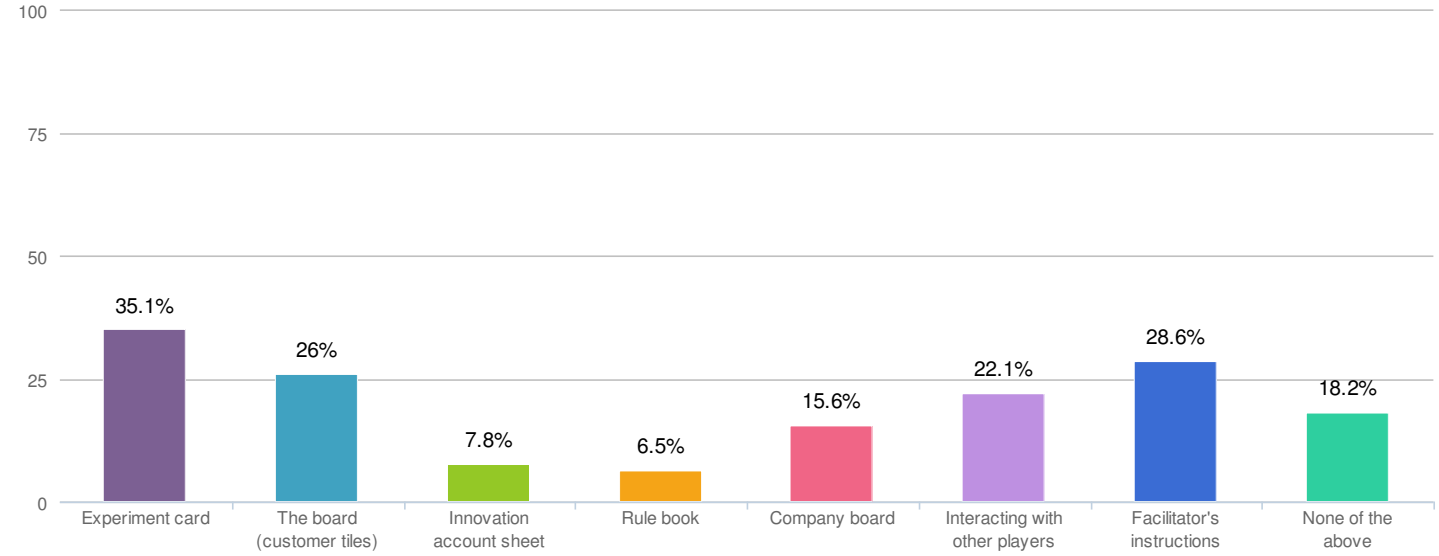
Experiment card	52.0%		40
The board (customer tiles)	37.7%		29
Innovation account sheet	13.0%		10
Rule book	5.2%		4
Company board	19.5%		15
Interacting with other players	36.4%		28
Facilitator's instructions	45.5%		35
None of the above	5.2%		4
		Total	77

14. Pivoting?



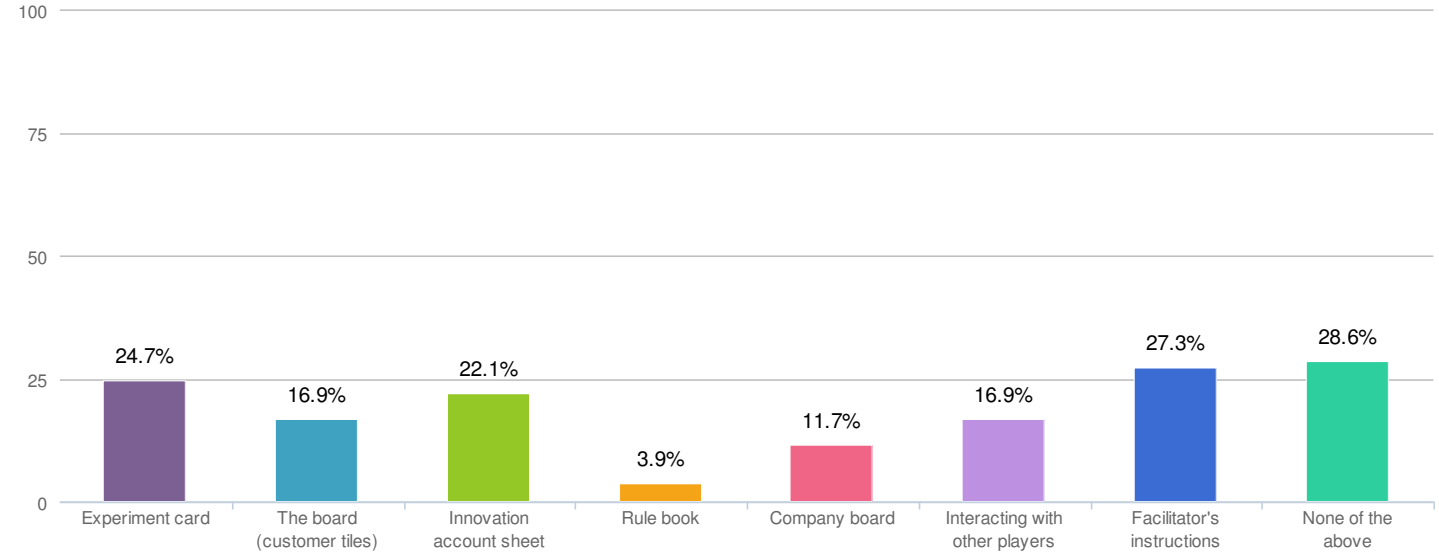
Experiment card	28.6%		22
The board (customer tiles)	27.3%		21
Innovation account sheet	16.9%		13
Rule book	6.5%		5
Company board	13.0%		10
Interacting with other players	31.2%		24
Facilitator's instructions	40.3%		31
None of the above	13.0%		10
		Total	77

15. Get out of the building?



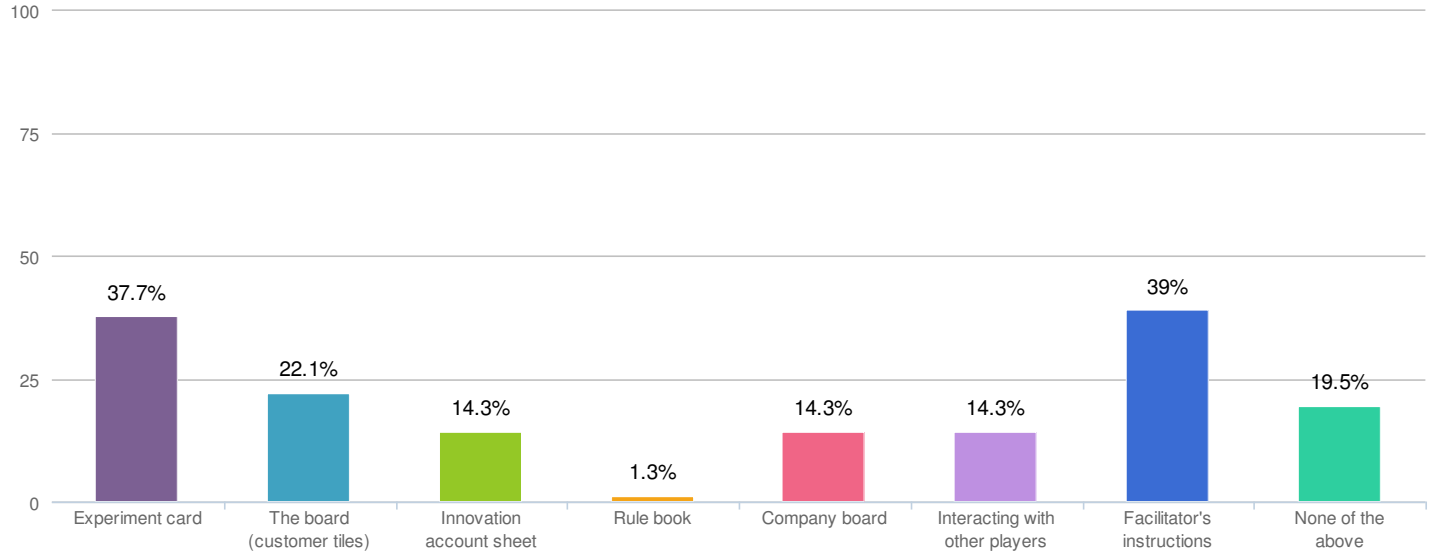
Experiment card	35.1%		27
The board (customer tiles)	26.0%		20
Innovation account sheet	7.8%		6
Rule book	6.5%		5
Company board	15.6%		12
Interacting with other players	22.1%		17
Facilitator's instructions	28.6%		22
None of the above	18.2%		14
		Total	77

16. Fast iteration?



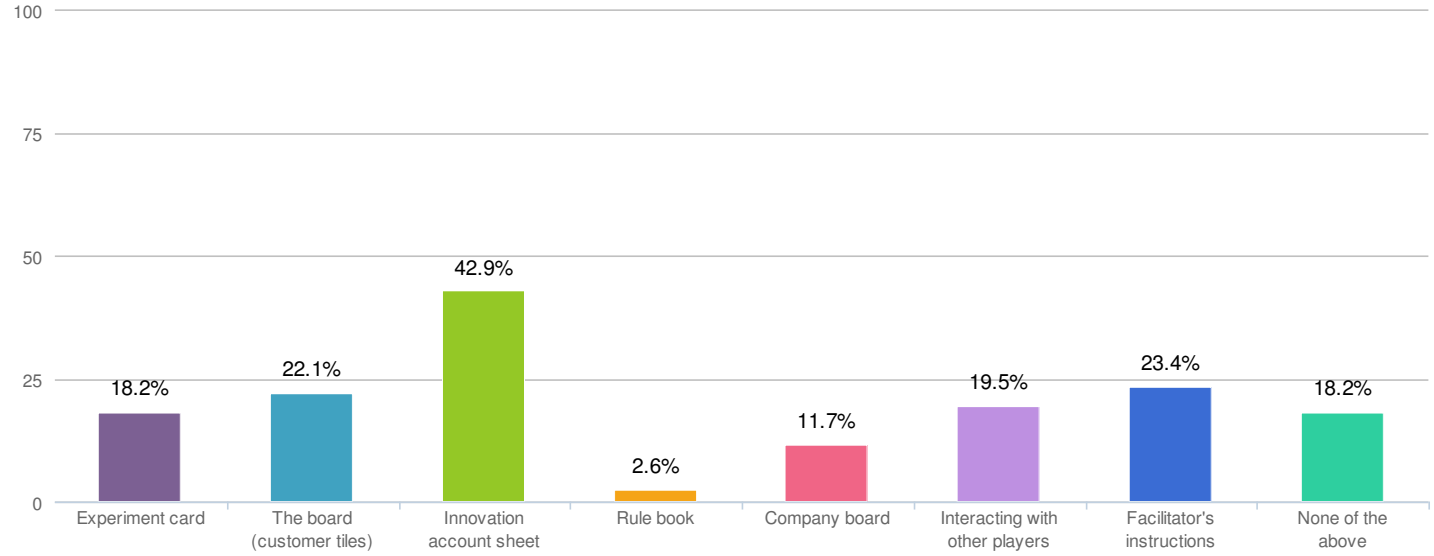
Experiment card	24.7%		19
The board (customer tiles)	16.9%		13
Innovation account sheet	22.1%		17
Rule book	3.9%		3
Company board	11.7%		9
Interacting with other players	16.9%		13
Facilitator's instructions	27.3%		21
None of the above	28.6%		22
		Total	77

17. Minimum viable product (MVP)?



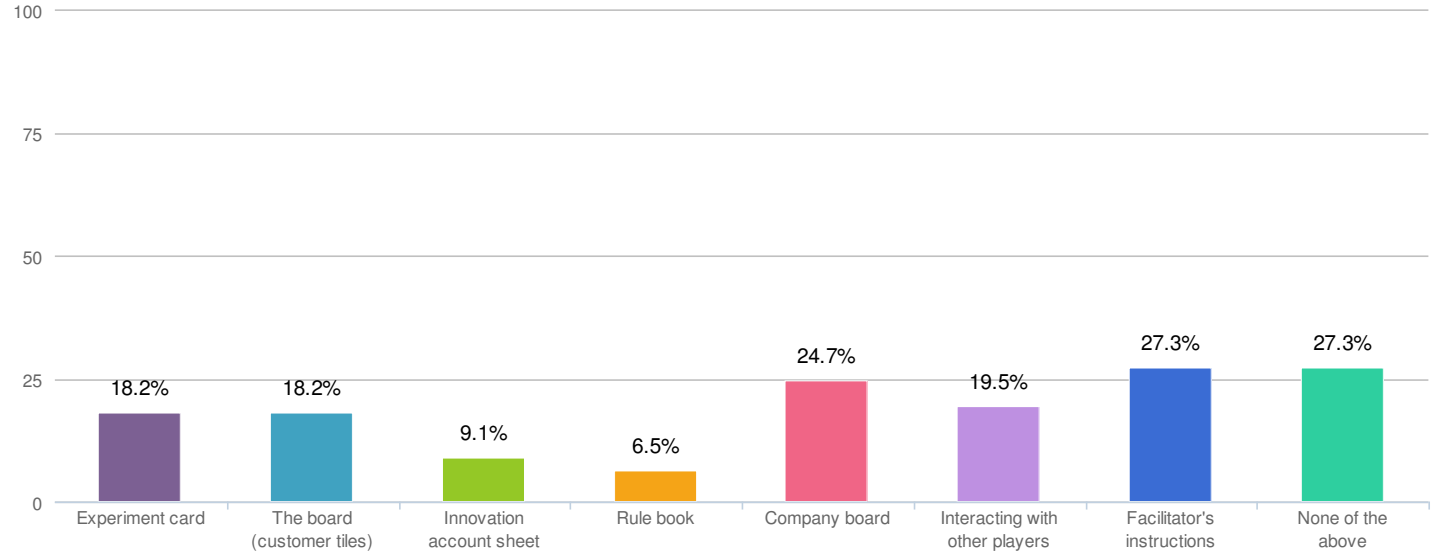
Experiment card	37.7%		29
The board (customer tiles)	22.1%		17
Innovation account sheet	14.3%		11
Rule book	1.3%		1
Company board	14.3%		11
Interacting with other players	14.3%		11
Facilitator's instructions	39.0%		30
None of the above	19.5%		15
		Total	77

18. Innovation accounting?



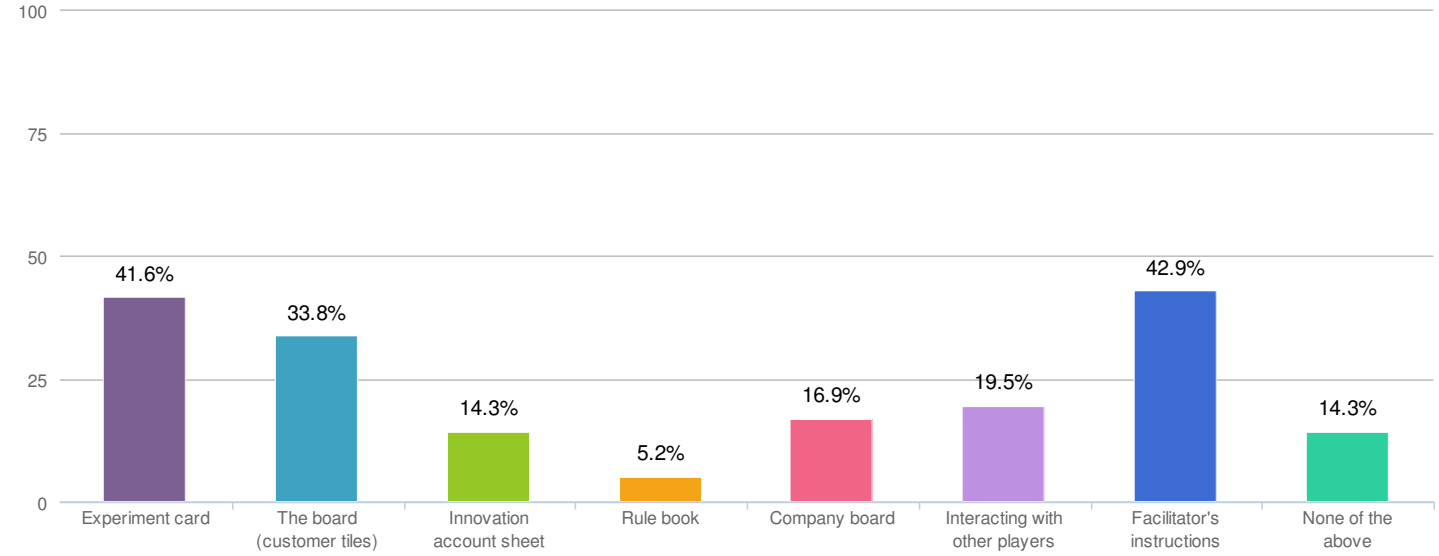
Experiment card	18.2%		14
The board (customer tiles)	22.1%		17
Innovation account sheet	42.9%		33
Rule book	2.6%		2
Company board	11.7%		9
Interacting with other players	19.5%		15
Facilitator's instructions	23.4%		18
None of the above	18.2%		14
		Total	77

19. Technical debt?



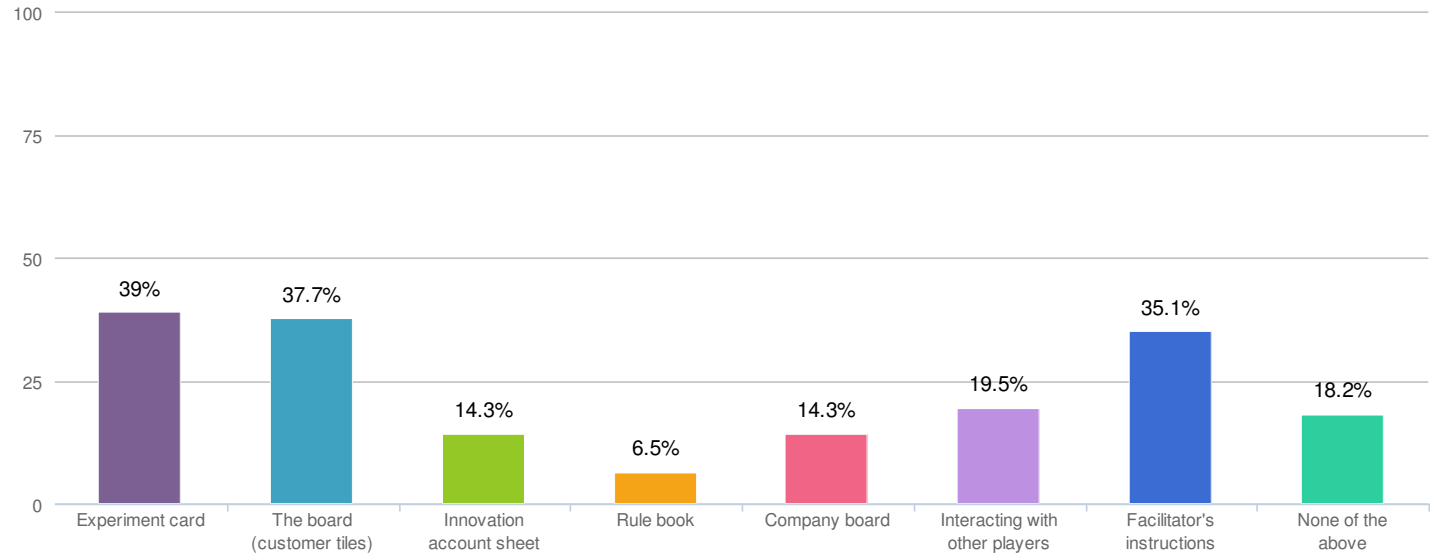
Experiment card	18.2%		14
The board (customer tiles)	18.2%		14
Innovation account sheet	9.1%		7
Rule book	6.5%		5
Company board	24.7%		19
Interacting with other players	19.5%		15
Facilitator's instructions	27.3%		21
None of the above	27.3%		21
		Total	77

20. Problem/solution fit?



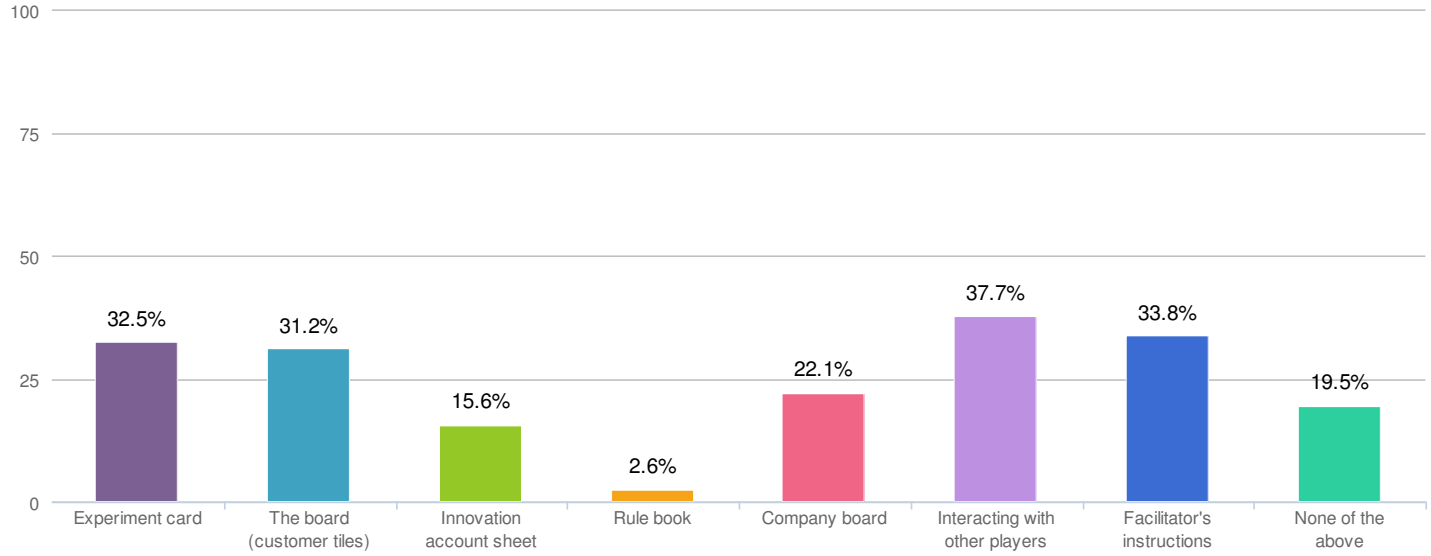
Experiment card	41.6%		32
The board (customer tiles)	33.8%		26
Innovation account sheet	14.3%		11
Rule book	5.2%		4
Company board	16.9%		13
Interacting with other players	19.5%		15
Facilitator's instructions	42.9%		33
None of the above	14.3%		11
		Total	77

21. Product/Market fit?



Experiment card	39.0%		30
The board (customer tiles)	37.7%		29
Innovation account sheet	14.3%		11
Rule book	6.5%		5
Company board	14.3%		11
Interacting with other players	19.5%		15
Facilitator's instructions	35.1%		27
None of the above	18.2%		14
		Total	77

22. Scalability and timing?



Experiment card	32.5%		25
The board (customer tiles)	31.2%		24
Innovation account sheet	15.6%		12
Rule book	2.6%		2
Company board	22.1%		17
Interacting with other players	37.7%		29
Facilitator's instructions	33.8%		26
None of the above	19.5%		15
		Total	77

PLAYING LEAN

THE RULEBOOK

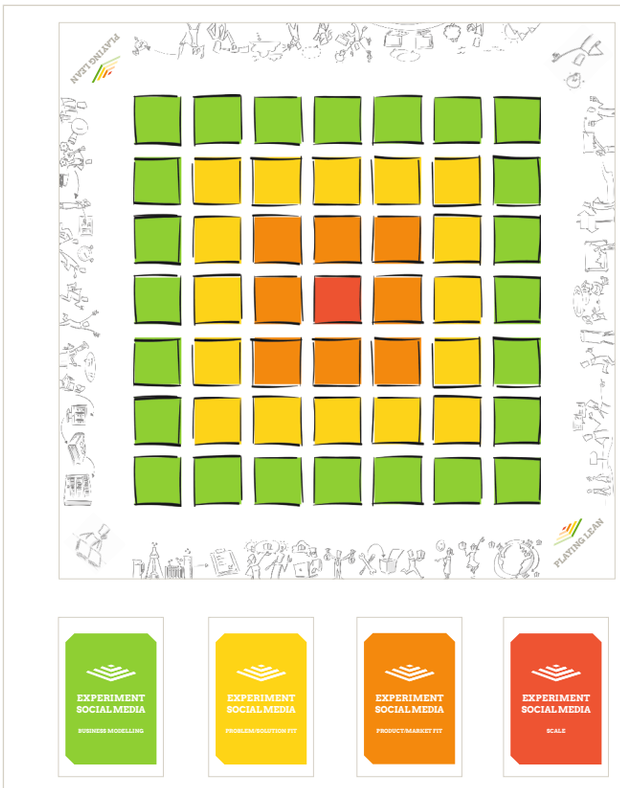
WELCOME TO PLAYING LEAN!

The goal of this game is to teach you the Lean Startup method. You'll be conducting experiments, building and removing your product's features, selling to customers and building your company. Basically all the actions you'd be taking in the real world to take a startup from an idea to a successful business. In the real world, the business that is selling to the most customers is the business that wins, and it's exactly the same in Playing Lean: the first team to take the Red Customer Tile – representing the early majority – wins!

GAME CONTENTS

All the pieces you need to play:

- 1 Board
- 61 Customer Tiles - including 3 red tiles, 12 orange tiles, 20 yellow tiles, and 26 green tiles
- 55 Experiment Cards
- 4 Company Cards
- 4 Company Boards
- 100 markers in 4 different colours
- 40 Employee Tokens
- 1 Innovation Accounting Pad
- The Rulebook (this one!)
- Ash's guide to Playing Lean



Board and Experiment Cards ready

PLAYING TIME

The game takes about 90 minutes to play.

SETUP

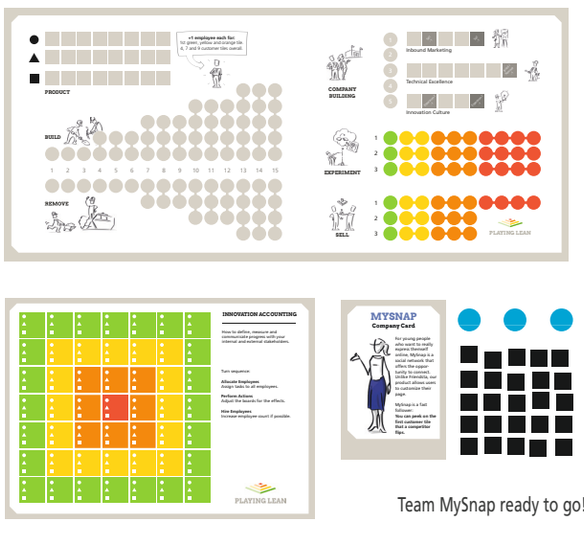
Lay out the board on a flat surface and place the customer tiles on the grid.

Put the Experiment Cards in four shuffled stacks next to the board.

Before you begin, each team should have:

- 1 Company Card
- 1 Company Board
- 3 Employee Tokens
- 25 markers
- 1 Innovation Accounting Sheet

Once you have all of this, you're ready to create your product!



Team MySnap ready to go!

INDUSTRIES

Playing Lean comes with Industries. Each Industry represents one scenario that you can play through. The scenario that is included is called Social Media, so that's the one we'll be talking about here. Each player draws one of the four Company Cards. The cards determine which team will represent which social media in the scenario.

Each team will get a special ability. This may determine the starting order. Social Media starts like this:

1. Friendsta
2. Mysnap
3. Facespace
4. Twittbook

Before the game begins, all teams must read their Company Card out loud.

GAME STRUCTURE

Now start playing. Each player follows this sequence of actions:

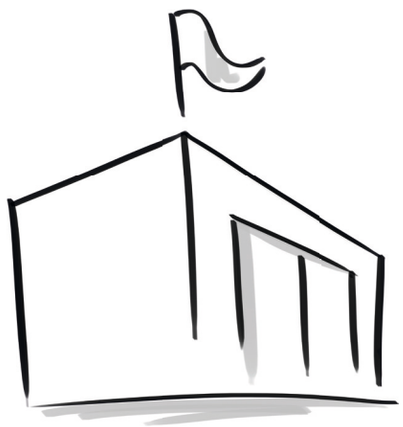
Allocate Employees
Assign tasks to all employees.

Perform Actions
Adjust the boards for the effects.

Hire Employees
Increase employee count if possible.

Each player does the full sequence, then the next player does the same. As the game progresses, players experiment and sell to green, yellow and orange Customer Tiles.

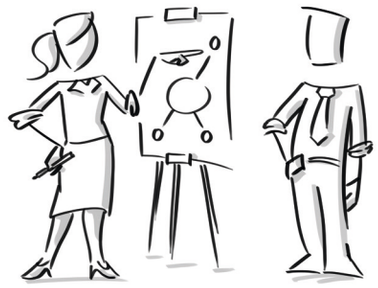
The winner of the game is the first to sell to the red Customer Tile.



1. ALLOCATE EMPLOYEES

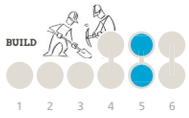
Have a look at your **Company Board**. This is where you create your magic. The circles on the board are where you can put your Employee Markers to work.

How will your employees spend their time this turn? You have the choice of 5 different actions:

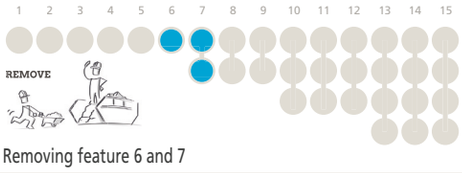


Build

Add features to your product. The number of features (of any type) you have from before determines the cost.



Building feature number 5



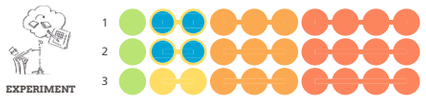
Removing feature 6 and 7

Remove

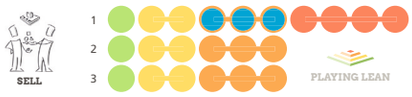
Take features away from your product. The number of features (of any type) you have before remove determines the cost.

Experiment

Try to figure out the preferences of your customers. The cost is determined by the colour of the Customer Tiles you want to learn about.



„Two yellow experiments, please."



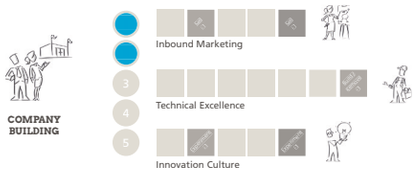
Sell to an orange customer

Sell

Make it YOUR customer. The cost of determiend by the colour of the Customer Tiles you want to sell to.

Company Building

Make your company great. Invest in Inbound Marketing, Technical Excellence or Innovation Culture. Place between one and five workers here to make progress.

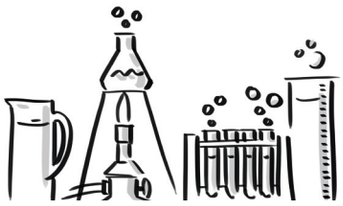


Invest two workers

2. PERFORM ACTIONS

Having all of your employees allocated to tasks, it is time to start working. Before you go, please note that effects of actions are immediate. You choose the order in which you do the actions, and the order matters.

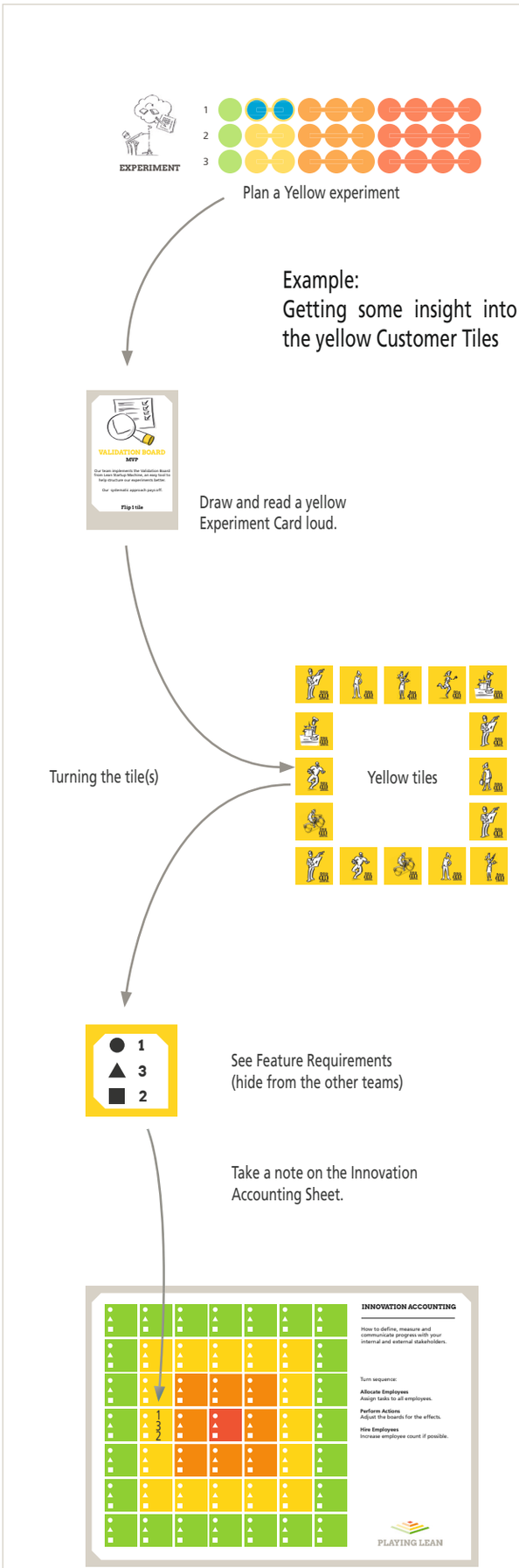
Experiment
Your product needs features to be desirable, but what kind of features and how many? What do the customers desire?



Draw an Experiment Card in the colour you have chosen. Read the card out loud for everyone to hear. Flip the number of Customer Tiles that the card says – in the colour of the Experiment Card. Choose tactically. Which route will you take to win the market? Make sure you only turn the tiles around for you and your team to see, unless the card says otherwise!

Write down the Feature Requirement of the customer on your Innovation Accounting sheet. Be thorough. You're not allowed to look at them again if you forget.

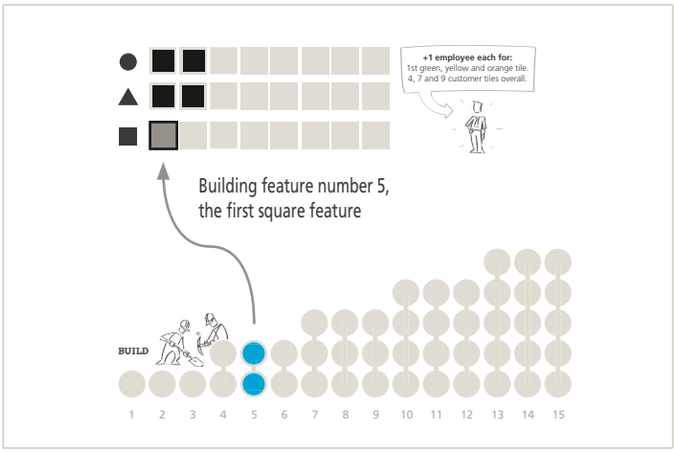
Put the tile(s) back again, face down. Make sure your competitors don't spy on your valuable learning!



Build

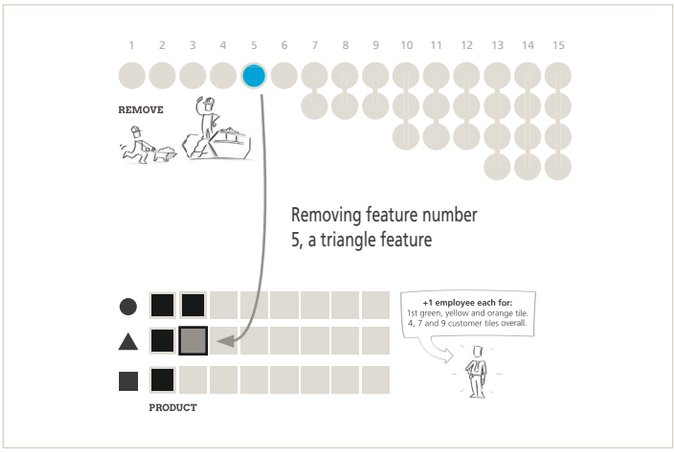
Your product needs features to be desirable, but what kind of features? And how many of each kind?

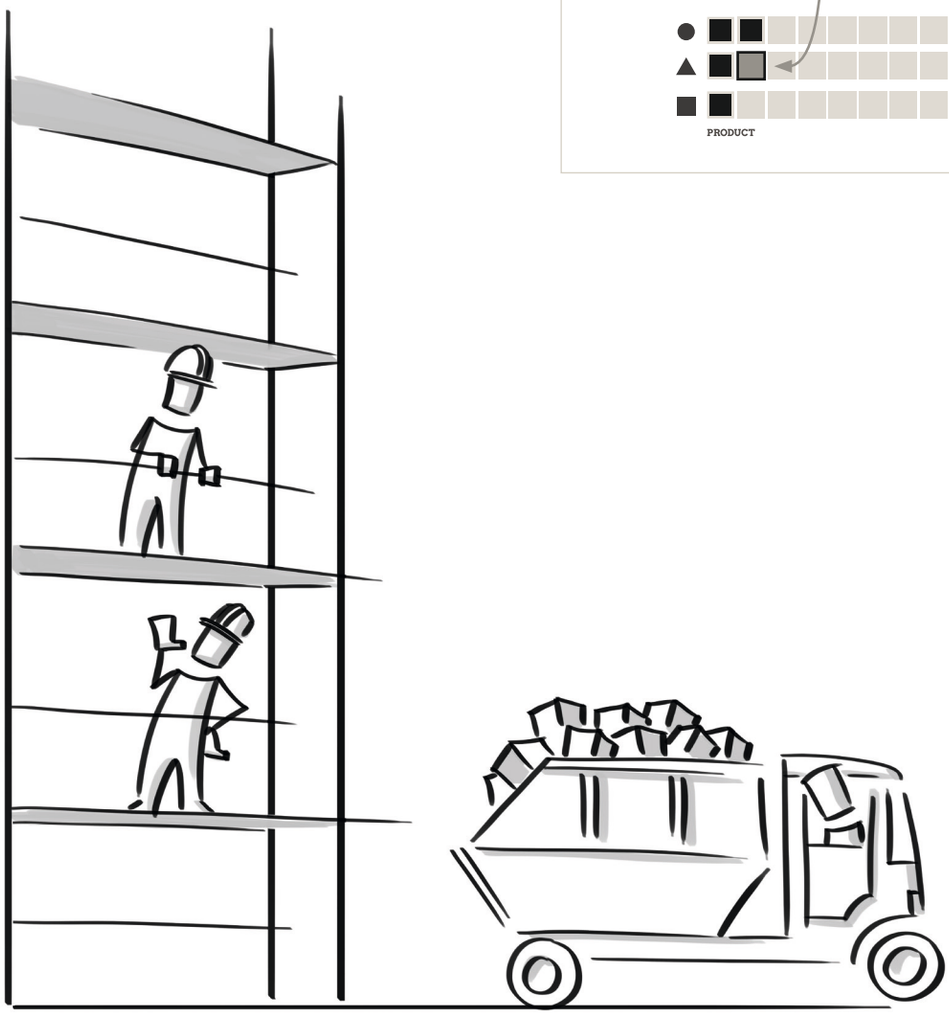
Each Customer Tile has a set of preferences, for instance 4 *round*, 3 *triangle* and 0 *square* features. Your goal is to build a product that satisfies these requirements. Each Company Board has a designated product area. It has a number of spaces for *round, triangle* and *square* features. A product's features need to match the preferences of the Customer Tile in question. It's fine to have more features than what the Customer Tile specifies.



Remove

Having too many features bogs you down. Perhaps you should try to keep your product lean?





Sell
With knowledge of the customers and a product they will pay for, it is time to sell your product to the customers.

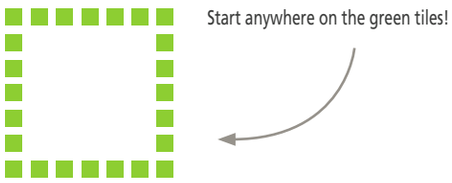
Here's how you sell:

1. Declare which Customer Tile to sell to.
2. Pick up the tile and verify for yourself. Does your product meet the customer's need for *round*, *triangle* and *square* features?

Success: Put the Customer Tile back again face up and put your marker on it. It is yours to keep for the rest of the game.

No Success: You don't have to know your customer to sell it it. You can take your chances and do it blind. If successful, your gamble paid of. If not, the Customer TIle is burnt for your team. Place it back face down and put your marker on it. You can't sell to it again, but other teams can.

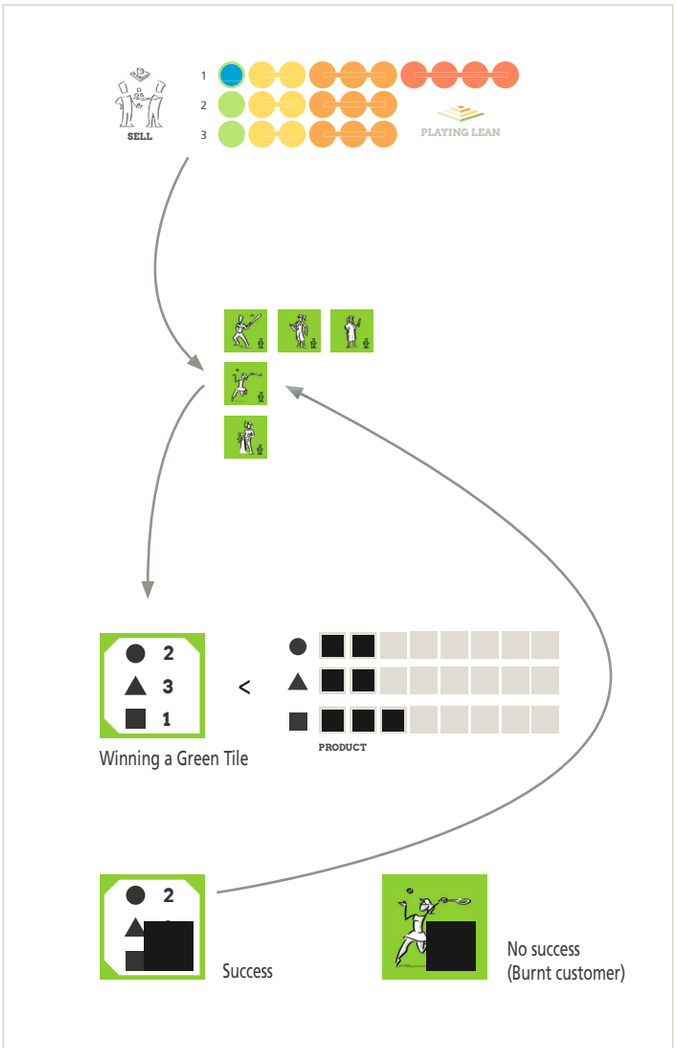
Your first (green) customer
As a fledgling startup, you must work towards individual customers. They are the innovators that will adopt your product first. In the game, they are represented by green Customer Tiles. You can sell to any of them, and you must sell to them first.

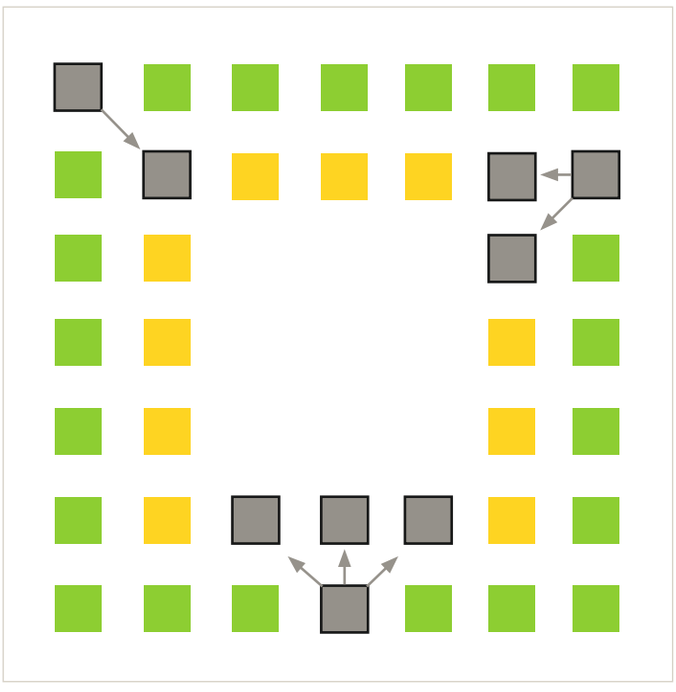


Moving to yellow customers
Once you get your fist green Customer Tile, you will be working toward yellow customers. The innovators open new doors for you. Bigger groups of customers depend on them for referrals. In game terms, you must move from one of your green Customer Tile to an adjacent yellow Customer Tile.

Pitching the orange customers
Once you get your first yellow Customer Tile, you will be working towards the orange customers, the early adopters. You move by referral from yellow customers.

Winning the red tile (and the game)
When you get an orange Customer Tile, don't look back. Go for the victory!

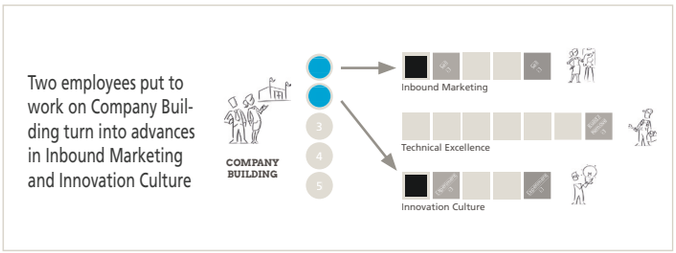




Company Building
All activities are not directly related to your product. You should consider spending some resources into building your company. Invest a little in marketing, push for technical excellence or strengthen your innovation culture.

The investments will pay off. As an example, two markers on Inbound Marketing makes selling one Employee cheaper, so that selling to yellow costs one, orange costs two and red costs three. Green still costs one, because the cost will never be less than one. Five markers on Inbound Marketing makes selling two Employees cheaper, so one for green, yellow and orange and two for red.

Note that the effects of Company Building are immediate. If you get the second marker on Innovation Culture, experiments get cheaper in the same turn, meaning you could have put only one Employee on a yellow Experiment



3. HIRE EMPLOYEES

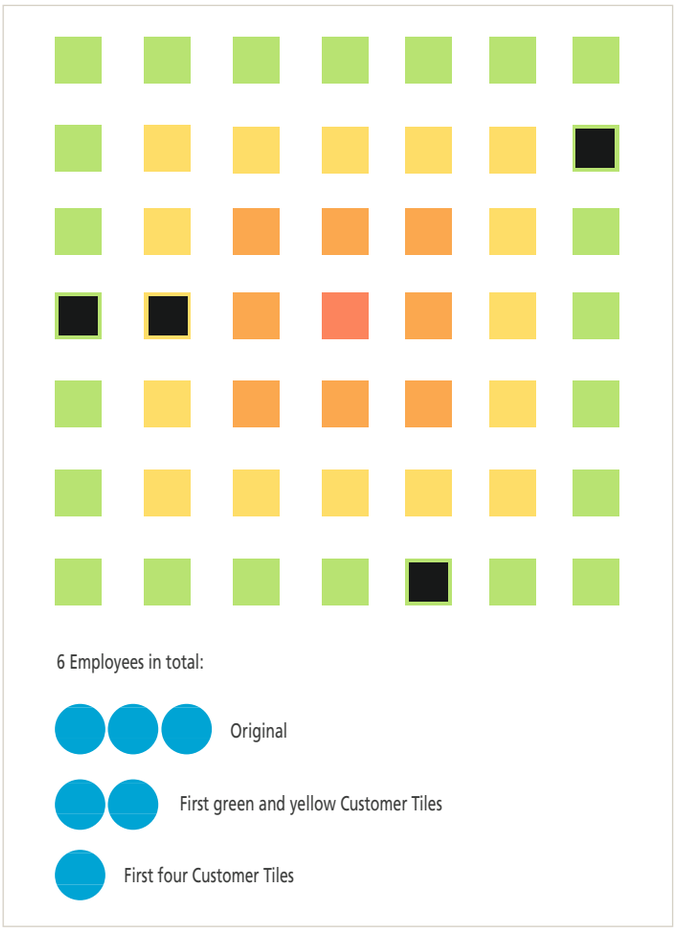
Your company starts with 3 employees. As you grow your customer base, you get to hire more workers. It is possible to get 9 in total.

Did you acquire Customer Tiles this turn? Then you may be eligible for a new hire:

- The first green Customer Tile you flip
- The first yellow Customer Tile you flip
- The first orange Customer Tile you flip

- The first 4 Customer Tiles you flip
- The first 7 Customer Tiles you flip
- The first 9 Customer Tiles you flip

Start planning for your next turn.



Good luck!

PLAYING LEAN

FACILITATOR GUIDE

Ash's guide to Playing Lean

PLAYING LEAN

Facilitator Guide
Contact: **hello@playinglean.com**

Foreword by Simen

This dictionary is meant as a companion for Playing Lean, a quick reference to look up the terms and phrases used throughout the game. Study them before playing (and pass off as a Lean Startup guru) or look up things as you progress in the game!

We're very lucky to have Ash Maurya writing this dictionary. I first worked with Ash in 2012. He served as an advisor at a workshop Iterate had set up, giving precise advice to teams in 10 intense 30 minute sessions remotely.

Where Eric Ries provided the general strategy for modern innovation and product development with The Lean Startup, Ash Maurya provides the tactics necessary to implement the strategy. That's why Ash has been a valued advisor while developing and improving Playing Lean. And that's why he was perfect for making this guide.

Introduction

I was first exposed to Playing Lean on the team's playing tour stop in Austin, TX. I was particularly impressed by the engagement level and risk aversion of other players during the game. A game setting provides the right balance for education and play which I believe is key to both fostering innovative thinking and also why the game works.

Educational board games have been around forever. Both Monopoly, and more recently Cash Flow (by Rich Dad), were created to teach people about finances. So a game to teach Lean Startup made perfect sense to me. The biggest risk, of course, was the game mechanics.

I made a follow-up visit to meet the whole team in Oslo and was blown away by their commitment to continuous iteration even with a board game. After numerous collaboration sessions and game iterations, I was convinced and decided to join the team as an external advisor.

A

A/B testing.
Testing two or more versions of a product to determine which is the more effective. A common technique is to split the traffic coming to a web address (using a cookie) and send visitors to two or more variations of a web page. The variation with the best outcome is the winner of the test. This technique is a form of statistical hypothesis testing.

B

Board Layout.
The game board is populated with Customer Tiles in four colors, loosely representing the first parts of the Technology Adoption Lifecycle. The green tiles represent single customers. They are the innovators, very early adopters who are willing to try out your product before anyone else. As players progress through to yellow and orange layers, the number of customers represented is increased by orders of magnitude. These are the early adopters. The red tile represents the early majority customers.

Build - Measure - Learn.
The basic feedback loop of Lean Startup is the build - measure - learn cycle. Your team builds something, measures its effect and takes in the learning. One cycle around this loop is an experiment. You always work to tighten experiment loops by balancing the optimal intersection of speed, learning, and focus.

Business Modelling,
see Game Phases.

C

Company Building.
As you are busy building your product, are you remembering to build your company as well? Investing in things like branding, technology and culture may not pay off immediately, but you can't afford to put it off for too long since like any investment they take time to accrue a return.

Confirmation Bias.
As an innovator you need to be aware of the psychological traps that lead you astray. As you perform your experiments, beware of confirmation bias: The tendency to overvalue information confirming your ideas and discrediting the information that speaks against them.

Conversion Funnel.
The path a customer takes on your web site that ends in a purchase or signup. See Pirate Metrics.

E

Engines of Growth.
What will drive the future growth and adoption of your product? You should have a clear idea of what your engine of growth is going to be. There are three basic engines. With the Viral Engine of Growth, customers invite new customers on a rate that is higher than 1, leading to exponential growth. With the Sticky Engine of Growth, your aim is to keep your customers coming back for either your existing product or other cross-sell or upsell products. If your product is addictive, even a trickle of new customers can turn into a big hit. Finally, with the Paid Engine of Growth, the lifetime value of a customer needs to be higher than the acquisition cost.

Existing Alternatives.
When you're trying to identify a problem worth solving, your customers usually have some way of solving it today. Existing alternatives are a much more accurate definition of your "true competition". Your job is to find a better way to solve a problem than the existing alternative. Existing Alternatives is also a box below the Problem box on the Lean Canvas.

Experiment.
The way to learn more about your product, customers and engine of growth is through experimentation. With inspiration from the scientific method, you set out to get actual data instead of opinions and educated guesses. An experiment is a cycle around the build - measure - learn loop.

F

False Negatives and False Positives.
When your experiment tells you that your idea wasn't any good, when in reality it would work well, you're dealing with a false negative. If, on the other hand, your experiment tells you that your idea was good, while in reality it would not work very well, you're dealing with a false positive. These may come from a flawed test design, biased selection of test subjects or just plain bad luck. No matter the reason, they may lead your team astray.

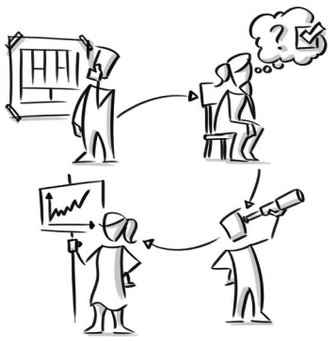
Feature Creep.
New features are being added to the product, but are they adding real value to your customers? Bloated products become over-complicated and hard to use.

G

Game phases.
Playing Lean has four stages, represented by colors on the boards and on the experiment cards. Players must progress through all stages to win the game.

The stages correspond to the four phases of succeeding with a product. The first phase is Business Modeling, where you iterate quickly over your business models. Here it is useful to document your plan A and rank your Business models.

Then comes Problem/Solution Fit. This is the phase where you validate that you actually have a problem worth solving. Afterwards, players move on to Product/Market Fit. In this phase you validate that you have made something people want. Then you have the final stage which is Scaling, where the key question for this phase is: How do I accelerate growth?



H

Hypothesis.
As you set out to build a new business, you will have to make a lot of assumptions about how the world works. These are your hypotheses. You will have to assess which hypotheses are the riskiest and start experimenting. Note that the hypotheses need to be falsifiable. If you cannot fail, you cannot learn.

I

Inbound Marketing.
Promotion of a company through marketing activities that bring people in, rather than buying customer's attention. Examples are blogs, podcasts and social media marketing.

Innovation Accounting.
When progress is measured with what you learn, you have to keep track of your experiments, results and insight to be accountable and transparent.

Innovation Culture.
Great companies work to create cultures that support innovation on every level. Investing in your own innovation culture may yield surprising results.

J

Jobs to be done.
Figuring out what problems you are solving can be hard. It may help to think about what "job" you are "hiring" a product to do instead. This way of thinking was first popularized by Clayton Christensen in his book: The Innovator's Solution.

L

Landing Page.
A page for capturing leads, such as email addresses or signups. Landing pages are often used test different variants of sales copy or design through A/B-testing.

Lean Branding.
Marketing and branding in a Lean Startup context, as described in the book "Lean Branding" by Laura Busche.

Lean Canvas.
An simple and intuitive way for capturing your business model on one page.

Lean Startup Machine.
A three-day workshop where participants form teams around new ideas. The goal is to get out of the building, do interviews with customers and collect "currency" in the form of cash or signups as proof of validation.

Lean UX.
User experience design doesn't have to be all about documents and deliverables. In his book "Lean UX", Jeff Gothelf and Josh Seiden explain how to apply lean principles to the design process.

Local Maxima.
A mathematical term often used to describe a common critique against Lean Startup. If you're guided by customer data and short iterations, you may never leave your little hill of success to climb by the mountain of opportunity that lies nearby. This is why data-driven always has to be coupled with a strong vision to succeed plus a simultaneous consideration of multiple possibilities (or business models) at once.

M

Mechanical Turk.
An internet marketplace made by Amazon, good for crowdsourcing tasks that are best solved with human intelligence.

MVP (Minimum Viable Product).
The smallest possible product that delivers and captures monetizable value from customers. This is the first version of your product that gets to be used by (and sold to) customers.

MVP Interview.
When you have made an MVP, start by selling it face-to-face to customers. Use their feedback to improve your product before making it available to more customers.

P

Pirate Metrics.
Acquisition, Activation, Retention, Revenue and Referral are the five behaviors you should measure, according to Dave McClure. Why "pirate"? Say AARRR out loud and you'll understand.

Pivot.
A change in strategy is a pivot. Changing strategies is often required to realize the full potential of a vision and par for the course. But for a pivot to be effective, it has to be grounded in learning. Otherwise, you are simply following a disguised "see what sticks" strategy. For a typology of Pivots see The Hypothesis-Driven Entrepreneurship: The Lean Startup by Thomas Eisenmann, Eric Ries and Sarah Dillard.

Planning Fallacy.
The tendency to underestimate the time, cost and risk associated with future actions, while also overestimating the benefits.

Premature Optimization.
Prioritizing the wrong work is premature optimization. At any given point in time, there are only a few key actions that yield the biggest impact. Your job is focusing on them and ignoring the rest. An example is focusing on server scalability when you only have 10 customers.

Problem Interview.
It is tempting to pitch your idea when talking to potential customers. Instead, you should focus on learning. The goal of a problem interview is to figure who the early adopters of your product are going to be, what problems you can help them solve and how they solve these problems today.

Problem/Solution Fit,
see Game Phases.

Product/Market Fit,
see Game Phases.

R

Reality Distortion Field.
A term originally used to describe Apple founder Steve Jobs's ability to make employees believe in the products they were making. In Lean Startup, it is more generally applied to describe the ability an entrepreneur has to convince themselves of the greatness of their idea.

Referral.
When a customer convinces another customer to use your product. Beyond the green Customer Tiles in Playing Lean, referrals are the way to grow. You can only reach Customer Tiles that are connected to Customer Tiles you have already sold to.

Remove.
Removing features is an important part of product development.
Both because of Feature Creep and because the cost of writing software (and presumably any other form of product development) rises exponentially with the number of features. Unused features are a form of waste.

Running Lean.
A book and a workshop that that describes how you iterate from your initial plan A to a plan that works using Lean Startup methods.

S

Scale,
see Game Phases.

Selection Bias.
Care must be taken in the selection of customers to interview. If you fail to do it at random (within your customer segment), your results will be skewed.

Selling.
An important part of getting a product into the hands of customers. The cost connected to selling is called customer acquisition cost.

Solution Interview.
When you have conducted Problem Interviews and are sure that you validated your problem, it is time to test the solution with a "demo" before you start building an actual product.

Startup Weekend.
Can you test your problem and your solution, acquiring problem/solution fit just over a weekend? Then you can probably find a Startup Weekend somewhere near you.

Sunk Cost Fallacy.
The idea that a humans likely to continue with a project if they have already invested a lot of money, time, or effort in it, even when continuing is not the best thing to do.

T

Technical Excellence.
Investing in your engineering organization will pay off with faster development time and higher quality.

U

Unfair Advantage.
An advantage that can't be easily copied or bought. Remember that true unfair advantages can only be tested in the face of competition. Until you demonstrate product/market fit and are actually in a situation where you have competitors, this is hard to test.

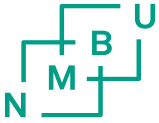
Unique Value Proposition.
A single, clear, compelling message that states why you are different and worth getting attention.

V

Validated Learning.
This is the measure of progress in a Lean Startup.

For everything else, please check the Rulebook.
Have fun Playing Lean!

Your notes:



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