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What is a Minimum Viable (Video) Game?

Towards a research agenda

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Abstract. The concept of Minimum Viable Product (i.e., MVP) is largely adapted in the software industry as well as in academia. MVPs are used to test hypotheses regarding the target audience, save resources from unnecessary development work and guide a company towards a stable business model. As the game industry is becoming an important business domain, it is not surprise that the concept has been adopted also in the game development. This study surveys how a Minimum Viable Game (MVG) is defined, what is reported in extant literature as well as present results from a small case study survey done to nine game development companies. The study shows that despite popularity of MVG in the industrial fora, the presented views on the concept are diverged and there is lack of practical guidelines and research supporting game companies. This study points out research gaps in the area as well as calls for actions to further develop the concept and to define guidelines.

Keywords: Minimum viable product · Minimum viable game · Game business.

1 Introduction

A key characteristic of the modern business world is *speed* [10]. An often repeated argument claims that the pace of business is going to even increase in the future [7, 19]. The requirement for speeding up is visible also for start-ups, which aim to

quickly find a repeatable and scalable business model [4]. As it is frequently stated, start-ups are lacking time and resources [12], and therefore, it is crucial for them to find quickly whether their product or service is suitable for markets.

In the beginning of the 2010s, the so-called *Lean Startup* methodology (LSU, hereafter), by Eric Ries [31], started to gain popularity. The methodology aims to through continues hypothesis-testing to validate whether there are business potential in the product or service. One of the methodology's cornerstones is the concept of *Minimum Viable Product* (MVP, hereafter). The concept was first defined already in 2001 by Frank Robinson (c.f. [25]), yet it become widely known with the raising popularity of the LSU [5]. According to Ries ¹, "*the minimum viable product is that version of a new product which allows a team to collect the **maximum amount of validated learning** about customers with the **least effort**.*"²

The MVP concept can be seen as continuum of Blank's [3] *Customer development* methodology. In this methodology, Blank's key advice, for new entrepreneurs, is to face potential customers early upon—informally referred as the '*Get out of the building*' principle [4, 14]—to collect valuable information on what customers wants and is willingly to pay for. As the objective of the LSU is to avoid of building a complete product before learning that it is not valuable for the customers [31], the concept of a minimum viable product fits well to test the suitability of product before it has been finished. In addition, it allows a company to redirect its product and strategy to areas that are the most fruitfull for the company.

As the global video game industry is estimated to reach the total revenue of over USD 80 billion ³ by the year of 2018, it is not surprise that also game development companies and advocates have been interested towards the MVP. For example, a senior manager ⁴ of Zynga Inc. revealed in an interview that *FarmVille*, a hugely popular Facebook game, was initially launched as a 'minimum viable product'. In addition, the popular *Pokémon Go* mobile game, by Niantic Inc., is in the grey

¹ Eric Ries (August 3, 2009) Lessons Learned: Minimum Viable Product: a guide. <http://www.startuplessonslearned.com/2009/08/minimum-viable-product-guide.html> Last accessed June 26, 2018.

² Emphases added by the authors of this paper.

³ Statista (2018) Value of the global video games market from 2011 to 2020. <https://www.statista.com/statistics/246888/value-of-the-global-video-game-market/> Last accessed June 26, 2018.

⁴ Matt Purslow (February 28, 2011) FarmVille launched as a "minimum viable product". Took 32.5 million users in one day. <https://www.pcgamer.com/farmville-launched-as-a-minimumviable-product-took-32-5-million-users-in-one-day/>. Last accessed June 26, 2018.

literature often claimed⁵ to be an example of a successful MVP usage in the video game industry.

However, there are a few remarkable differences between utility and game software that should be acknowledged when the concept of MVP is adapted to new domains. First, while utility software solutions can be used for several years or even decades without major changes, the expected life-cycle of a computer game is much shorter. For example, the average length to complete the ten most popular games in the HowLongToBeat⁶ service range from around 20 hours to a bit over 100 hours.

While there are of course games which core game play can be repeated *ad infinitum*, games are, on average, disposable products that have to impress gamers quickly.

Second, whereas the utility software—such as a spreadsheet programme or a fitness tracker—should aim to help users in all possible ways, the games, instead, should aim to *challenge* the users [39]. Yet, too challenging as well as too helpful games create frustration [36]. Thus, the games aim to reach a *flow* experience [9]. However, this should be done with little or no delay as a gamer might get annoyed and switch game to another. Thirdly, the user experience and playability—i.e. overall quality of gameplay—is everything. Whereas small irritating mistakes in a utility software can be tolerated for years, these can be fatal in a video game.

These contradictories between video games and utility software turns our focus on the use of the minimum viable product concept in the game industry. The MVP was initially promoted for utility software solutions where adding a new feature or pivoting product's strategy would be more feasible approach than in the game industry. While MVPs in the software industry have been previously addressed (e.g. [14, 25, 29]), to the best of authors' knowledge, only a little of using MVPs—or *Minimum Viable Games* (MVGs, hereafter)—in the game industry discussed in the extant literature (e.g. [18, 32]).

The objective of this paper is to study how computer game start-ups perceive and use MVPs in their businesses. The study's approach is explorative, aiming to shed light on the current practices and extant knowledge. We use a recent structured review as a starting point and present an unstructured literature review on the area. As empirical data, we use a large global survey done to software start-ups (c.f. [22]). In total, the survey received 86 start-up stories and more than 23 000 data-points. In this study, we focus on the subset of the start-up companies identified to be video game companies. To the best of authors knowledge, this study presents first

⁵ E.g., Paul Frazier (August 12, 2016) Pokémon Go is a Minimal Viable Product. <https://www.itx.com/ITX-Blog/Article/408/Pokemon-GO-is-a-Minimal-Viable-Product>. Last accessed June 26, 2018.

⁶ How long does it take to beat your favorite games? <https://www.howlongtobeat.com> Last accessed June 26, 2018.

empirical observations from using MVPs in the game industry. Based on the problems arisen from the empirical material as well as from the extant literature, we discuss needed future research actions and lay some building blocks for further inquiries.

The remaining of this paper is organised as follows. Section 2 presents a review of literature as well as positions our view of a MVP. It is followed by a description of empirical research process used as well as an overview of the result in Section 3. Discussion is presented in Section 4 and finally, Section 5 concludes the study.

2 Review of Literature

According to the recent systematic mapping study on the evolution of the minimum viable product concept by Lenarduzzi and Taibi [25], the concept was first discussed by Frank Robinson as early as 2001 and then brought forth and popularised by Eric Ries and Steve Blank. Altogether, Lenarduzzi and Taibi [25] found 22 different definitions for a MVP which were mostly published between 2012 and 2015. However, they also pointed out that most of those definitions were not referred or used by other than by the authors themselves.

In this study, we follow the market-oriented line of definitions, e.g., those given by Ries as a part of the LSU methodology. For instance, in his book, Ries [31, p. 93] elaborated MVP's concept more by stating that it "*[i]s not necessarily the smallest product imaginable; it is simply the fastest way to get through the Build-Measure-Learn feedback loop with the minimum amount of effort.*" Also, Moogk [26] emphasise the value of a MVP to a new venture for engaging new customers and testing the product's value proposition.

In addition, it is worth to note that we draw a distinction between a *prototype* and a MVP. In our use, the former refers a product version that is used to test the product inside the organisation. The latter refers to a product version that is used to collected validated learning from potential customers and users. That is, in our use, an MVP aims to maximise learning from real customers—and therefore, from the market—with the minimum amount of effort needed. However, in the extant literature, differences and similarities between these two concepts are not always clear (c.f. [25]).

In the extant literature, several studies have focused on different aspects of minimum viable products. For instance, Hokkanen [14] studied interweaving user experience design to the development of a MVP. Hokkanen, Kuusinen and Väänänen [15] presented a framework for start-up companies for design Minimum Viable User Experience (MVUX).

In addition, Münch et al. [27] studied the creation of MVPs in industry-academia collaboration and Bosch et al. [8] as well as Björk et al. [1] have discussed on the usage of MVP as a part of software development model in early-stage start-ups.

Furthermore, in a large survey to more than 4,000 companies, Wang et al. [38] found that early-stage start-ups list MVP as one of the key challenges.

However, a number of empirical studies reporting the use of MVPs in the industry is small. For example, Ngueyn-Duc and Abrahamsson [29] studied the usage of MVPs in five software start-ups and showed that the concept seems to be useful as a design artefact, a boundary spanning artefact as well as a reusable artefact. Khanna, Ngueyn-Duc and Wang [20] reported a case study on how two start-ups selected hypotheses they wished to test with their MVPs. The study showed that the relationships between business goals and hypotheses tested in MVPs are complex in their cases.

When the focus is narrowed down to the game industry and in the domain of computer games, the research in new companies and product launches are remarkable scarcer. This is a clear contradictory to the practice as games form a major part of, e.g., most installed and sought mobile applications [16] as well as are located among the most used mobile applications [6]. Furthermore, there is lack of academic research about using MVPs in the game development. However, there is a series of work in grey literature devoted to characterise and guide on using MVPs.

For example, Tyler York⁷ discusses on applicability of LSU methodology and MVPs in the game industry. In addition, some companies has reported their company's approach on using a MVP^{8,9}. However, also alternative views and critique have been presented – the director of developer relations of Chillingo¹⁰, the publisher of mobile games such as *Angry Birds* and *Cut the Rope*, stated that it is disrespectful from game developers to publish unfinished products and force gamers to wait for major features. In addition, while *Pokémon Go* has been praised as an example of

⁷ Tyler York (April 17, 2012) Making Lean Startup Tactics Work for Games. https://www.gamasutra.com/view/feature/168647/making_lean_startup_tactics_work_.php. Last accessed June 26, 2018.

⁸ Juha Vainio (March 15, 2015) Starting up a game business: Working with Minimum Viable Products. https://gamasutra.com/blogs/JuhaVainio/20150903/252860/Starting_up_a_game_business_Working_with_Minimum_Viable_Products.php. Last accessed June 26, 2018.

⁹ Alew Wavro (October 30, 2015) Astroneer's ex-AAA devs explore a strange new world of indie life. https://www.gamasutra.com/view/news/257267/Astroneers_exAAA_devs_explore_a_strange_new_world_of_indie_life.php. Last accessed June 26, 2018.

¹⁰ Brendan Sinclair (November 19, 2015) "Minimum viable products are dinosaurs" <https://www.gamesindustry.biz/articles/2015-11-19-minimum-viable-products-are-dinosaurs>. Last accessed June 26, 2018.

publishing a MVP game in the grey literature, it has also been labelled to be a launch failure due to technical problems and lack of content early upon¹¹.

In the extant literature, only Järvi et al. [18] and Rosenfield Boeira [32] have discussed on the use of MVPs in the game development. Järvi et al. [18] presents a conceptual design for video game start-up accelerator and discusses on central concepts related to the accelerator program. They define a minimum viable game as a product version “*that implements the core game mechanics leaving out everything else*. In addition, they state that “*games are holistic products and it is not trivial to know what contributes to the players’ experience and what can be left out of the game*”. Finally, they also emphasise the difference between the MVG and MVP concepts as adding and removing new features in the latter is easier than in the former. In the case of MVG, the authors underlines the importance of keeping the gameplay in balance with every changes made.

Rosenfield Boeira [32] discusses how MVPs can be used in the gaming industry and gives advice for the practitioners. The study notes the concepts of MVP and MVG, yet it presents a minimum viable game as a synonym for a MVP in the video game industry. Furthermore, Rosenfield Boeira [32] draws a line between a MVG and a prototype, stating that MVG aims to deliver value to the client whereas a prototype delivers to the development company. That is, the prototype focuses on technical and the MVG to the commercial viability. For the sake of simplicity, we follow this divisions in the remaining of this study.

A classic example, often seen in the grey literature, is to consider the most minimum viable game of *Super Mario Bros*. Its minimum viable version, according to e.g. [32], would include only abilities for walking and jumping over the holes. While the basic game mechanism can be tried with this kind of a version, the question remains what kind of validated learning a game company would be able collect. The skeleton, left after stripping off everything extra, would be a yet another side-scrolling platform video game and we argue that testing it with customers would not bring much new information. To depart from the existing side-scrollers, the minimum viable version of a new game should contain enough content to validate whether the ‘core fun’ is exiting and enticing. Similarly for a totally new kind of a game, there should be enough content to test whether the hypothesis on the core gameplay mechanism hold.

To summarise our review of extant literature, it can be stated that an important question remains mainly unanswered. That is, what would be a *minimum viable game* for gathering the maximum amount of validated learning with minimum amount of extra effort? For example, music and audio are an important part of any

¹¹ Derek Anderson. 5 Steps for Creating a Minimum Viable Product (and the case of the Pokémon GO app). <https://sphereinc.com/5-steps-for-creating-a-minimum-viable-product-and-the-caseof-the-pokemon-go-app/>. Last accessed June 26, 2018.

game experience, yet they might not be an essential part for validating the core mechanisms and fun factors of a game. As our review of extant literature show, not much has been done regarding this area. Therefore, the remaining of this article will first focus an empirical survey on whether video game start-ups are utilising MVGs in their work. Finally, we identify and present research gaps regarding the concept of MVG in the game industry.

3 Empirical Research

3.1 Research Process

This study uses a case survey method as a tool for data collection [24]. The case survey method combines case study with a survey [21, 30], thus allowing an in-depth analysis of a larger number of cases. For this study, we used a large questionnaire designed to survey development practices in start-up companies. During the design phase, the survey was externally reviewed by 10 researchers and it was tested with four software start-ups [40].

The final questionnaire contains 85 questions in 10 sections¹².

The questionnaire was globally marketed to former and current software start-ups in social media, industrial events and by personal contacts. In addition, respondents were recruited with the help of, e.g., Software Start-up Research Network¹³. The data was collected from December 2016 to June 2017. In total, the questionnaire received 86 usable responses from Europe, North- and South-America as well as from Asia. Some initial results of the survey on the technical debt's impact on software start-ups have been reported in [40].

For this study, all responses of the survey were went through by two researchers independently. From the set, they selected game companies for further analysis. A game company is defined as an organisation which main product or service is a digital game. The game can be for, e.g., educational or purely a leisure purpose. Finally, the selected case companies and their approaches to the MVGs were analysed.

¹² <http://startupcontextmap.org/exp-survey/woifenw2>
¹³ <https://www.softwarestartups.org/>

3.2 Companies

Out of the all response cases, nine were categorised to work in the field of game development. In Table 1, a short description of each company is given. In the following, each company's development approach is briefly described.

Company A produces animations and related educational games for pre-school aged children. They have been able to stabilise their product and market size. Their products were mainly based on own ideas as well as analysis of similar educational games. The company followed a Waterfall-like development process and acquired most of the software development work from subcontractors. The company does not report of using prototypes or any kind of MVGs.

Also *Company B* works in the educational game sector; however, their focus is on school-aged children. They have not published their product yet to the market. Requirements ideas are based on market research, literature review and user studies. Customer interviews were video recorded and used for requirements validation. The company uses user-testing for its prototypes and an agile development model, but they did not have formal plans or actions for any kinds of minimum viable versions.

Company C develops mobile games for modern smart phone platforms. Ideas for their own games are gathered by following market trends and recent developments. In addition, the company does work-for-hire game development for other companies. Feedback is gathered with face-to-face interviews with players. The company uses 'MVPs' for collecting feedback from related partners such as publishers and partners. *Company C* acknowledges the need for using 'MVPs' to test fun and core game mechanisms of the game.

Company D works also with casual mobile games. Their main product has already reached a stable market position. Also they gather ideas for their own games by following market trends and development. The company uses prototypes but does not actively

Table 1. Companies included into the analysis and their overall characteristics.

Company	Domain	Development model	Ideas sources	Requirements elicitation	Perceived successful
A	Animations and group of educational Flash-based games targeted for pre-school children.	Waterfall-like	Internal sources, analysis of similar products.	N/A	N/A
B	Augmented reality educational games for school-aged children.	Agile	Internal sources, literature reviews, market research, potential customers.	Observations, customer interviews, analysis of similar products, brainstorming, prototyping.	N/A
C	Mobile games for adults and young adults.	Iterative	Internal sources, analysis of similar products, market trends, potential customers.	Customer interviews, observing, (internal) prototyping.	Fairly successful
D	Casual mobile games for all ages.	Iterative	Internal sources, analysis of similar products, market trends, potential customers.	Observing, analysis of similar products, prototyping.	"Good enough"
E	Arcade mobile games.	Ad-hoc	Internal sources, analysis of similar products, market trends, potential customers.	Customer feedback, observing monetization, similar products.	Successful
F	Gambling game.	N/A	Internal sources, standards.	Customer interviews, observing, MVGs.	N/A
G	Mobile games for "midcore" gamers.	Agile	Internal sources, analysis of similar products, potential customers.	Customer interviews, observing, prototyping.	Very low
H	Educational games for school-aged children.	Agile	Internal sources, analysis of similar products, customer tests.	Customer surveys, observing, analysis of similar products, MVGs.	N/A
I	Video games for all kinds of players.	Agile	Internal sources, analysis of similar products, market trends, potential customers.	Customer interviews, observing, analysis of similar products, prototyping.	Successful

In the table, N/A stands for information not being available, not wanted to disclose or not known by the respondent.

utilise customers in requirements validation; however, they use a selection of modern mobile game metrics to measure the game.

Also *Company E* develops mobile games and they, similarly, report of using market trends and previous experience as a source for the requirements ideas. The company users 'MVP' approach in its development, yet they the scope of the 'MVP' is based on a gut feeling. The company uses A/B testing for fine-tuning KPIs while the product is measured based on profit metrics (such as average revenue per users).

Company F develops a game for easy and fast gambling. On the contrary to the other cases, they did not report of using similar products as a starting point for requirements engineering. However, the company extracted requirements from brainstorming sessions as well as observations, crafted a MVG and tested the game. In addition, the company reports of using customer interviews for feature prioritisation.

Company G develops games for a smart phone platform, focusing on people, who want games that requires ability to succeed, but who does not have time. They have already published two titles. The company also uses similar products as a baseline for requirements gathering. They also report of using Lean start-up and Agile methods. However, while the company demonstrate prototypes to customers, they do not report of using actively any kinds of MVGs.

Company H builds an educational game, for a mobile platform, targeted to children aged from 7 to 12. They have not yet published the product. The company uses benchmarking against published solutions and brainstorming for creating requirements. The idea is tested with a MVG and target audience. The company reports prioritising game-play features and using MVGs to verify that core of the games has been captured successfully.

Company I focuses on development of video game to casual and hardcore players. The company uses a wide range of techniques to gather ideas and document requirements. In addition, they are verified with internal prototyping and using A/B testing when features can be verified with customers.

3.3 Analysis

There are some observations that should be noted from the case companies. Firstly, all of the companies reported that they had at least adequate experience working with similar kinds of products. For example, *Company C* reported that all members had worked earlier in different game development projects. Thus the case selection can be considered consisting of experienced developers and possible deviations due to inexperienced developers should not be present.

Secondly, only two companies (*F* and *H*) reported explicitly that they had used minimum viable products to test the game mechanisms and flow with the target audience. In addition, *Company E* and *Company I* are using a A/B testing to fine-tune different aspects of a mature product, such as e.g. monetisation. While A/B testing

can be used as a part of a MVG, in these cases the testing seems to be used in a mature product; thus, it seems not be used to guide the development of the product.

However, several companies reported that they had created prototypes as a part of their development process, yet those prototypes were used mainly for in-house testing and testing with “*a small group of friends from the industry*” as reported by *Company*

C. Nevertheless, MVGs, as vehicles of gathering validated information from the target audience, are infrequently utilised by the sample companies.

Furthermore, *CompanyC* and *CompanyE* reported that they had developed an ‘MVP’, but only for in-house use. Thus, this is more closely related to a in-house prototype than a product version used to gather validated information from the target audience.

Nevertheless, this emphasises the confounded views on the concept in the field.

Thirdly, the few companies, that used metrics to measure their products, reported that they measured the successfulness of by revenue and number of downloads. This is in line with findings by Koskenvoima and Mäntymäki [23] who found that game start-ups do not use analytics as a source of competitive advantage but rather a risk management tool. However, it also shows that the case game companies do not heavily rely on the LSU methodology, as the use of using analytic tools together with MVP are listed as the corner stones of the methodology. In addition, to fully utilise the potential of MVGs, the companies should measure and analyse different aspects of customer behaviour.

4 Discussion

4.1 Key observations

We recapitulate our key observations from the study in the following:

- Review of literature shows that there is disputed view on the concept of ‘minimum viable product’. On one hand, MVP is used to refer to any kind of a prototype. On the other hand, the concept refer to a product version used by the target audience in order to gather validated learning.
- Similarly, in the context of game industry, grey literature often emphasise a MVP—or a MVG—as the most simplistic version of the game. That is, this reflects more a technical prototype used in-house to test the game mechanism than a version offered to the target audience.
- There seems to be lack of discussion of minimum viable games and their development in the computer game field. However, there is a series of work devoted to game design [33, 34, 35]; yet, the focus is on designer’s perspective and often omits, e.g., financial aspects.
- The empirical inquiry revealed that although a few of the case companies were indeed using a MVG-like approach with the target audience, a clear majority of

game companies were not. Instead, they were using more traditional style led by development of a technical prototype and its in-house testing.

To summarise the observations, there is surprisingly little done for the defining and guiding of designing MVGs in the game industry. Furthermore, the empirical inquiry shows that case companies are not fully utilising MVGs in their game development.

4.2 Towards a formation of a research agenda

Our key argument is that game development companies and the game industry would benefit from the usage of MVGs for gaining validated learning with minimum amount of effort. This would allow saving resources from unnecessary development tasks. Yet, there is a little of academic work done; thus, this area offers clear research gaps and fruitful questions for the researchers. In addition, while there is a growing interest towards software development practices in software development companies (c.f. [11, 37]), there is hardly any work done on investing software development practices in start-up game companies.

The game industry's special characteristics make the field challenging. For example, video game development can be seen as a cooperation of three different viewpoints [13]: *design* or humanistic perspective, *business* perspective, and *constructive* or software engineering perspective. Therefore, it differs remarkably from regular software engineering projects and, for example, favours 'cowboy coders' more than traditional software engineering projects [28]. It is also worthy to note that a 'minimum viable game' needs to intertwine all these three perspectives together.

First, there are existing literature of game design patterns and best practices [2], yet testing the game mechanisms with the target audience is an important step [35]. As discussed above, the game cannot be too challenging or too easy, and it should aim to reach the flow experience. In addition, the core game mechanism should lure players. While the basic game mechanisms can be tested with, e.g., pen and paper, defining what is needed for a minimum viable game is much more complex task. For example, should music and audio be included for evaluating the flow of a MVG?

Second, the game should also be financially viable; it should be able to earn enough profit to cover its development costs and provide a stable revenue stream to the development company. During the last years, different kinds of freemium models have gained popularity among the mobile game developers [17]. In addition of testing playability, a MVG should also help to address different financial aspects of the game.

For example, is there a market for this kind of a game?

Third, construction perspective involves questions from the software engineering field and research of software start-ups (c.f. [37]). For example, how to build a MVG efficiently with existing components? However, as discussed in Section 2, even the

concept of MVP is still a infrequently addressed theme in the extant literature and further work is needed for understanding how a MVG should be effientcly created.

Finally, this study request formation of a research agenda to address the different facts of minimum viable games as well as briefly discusses on a few starting point for this work. This study is naturally limited with a small sample of case study companies found as well as the use of unstructured literature review. Nevertheless, this study shows that not much academic work have been done in this domain.

5 Conclusion

This study surveyed extant academic and grey literature on the concept of a minimum viable product in the game industry, that is minimum viable games. The results show that the concept is used in various ways from a synonym to a in-house prototype to a vehicle to test customer hypotheses. In addition, the results of a case study survey on nine start-ups were used to show that also new game companies are infrequently using MVGs in their work development work. Yet, a few companies were successfully utilising MVGs,

indicating that the concept could be useful also for a larger number of companies.
Thus, this study request a research agenda to be formed to further advance this
research area.

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