The evolution of advergames development

A study in the Netherlands

Floor Aarnoutse, Linda Peursum, Fabiano Dalpiaz

Department of Information and Computing Sciences
Utrecht University, the Netherlands

Abstract—**Despite our exposure to advergames, and studies about their effects, we know very little about the other side of the coin, i.e., advergames developers. In this paper, we report on a study of advergames development companies in the Netherlands. After deriving statements concerning the advergames market through three interviews, we cross-validate these statements with eight companies. Several statements are statistically significant, including the following: advergames are increasingly becoming cross-platform; the technological platforms for developing advergames have changed considerably; an increasing number of clients demand social media components in their advergames; budgets for advergames will increase; the intermediary role of advertising companies will become less prominent; companies will make more strategic choices regarding advergames; advergames that can be played for an extended period of time will become more popular and ensure customer loyalty.**

Keywords—advergames; game studios; empirical study

I. INTRODUCTION

Companies are increasingly adopting advertising games (*advergames*) in their marketing strategy [6]. This trend started in the Eighties with early adopters in the United States [18]; since then, advergames have become popular worldwide, and there is evidence that the growth will continue [27].

Advergames have been researched from different angles, including their efficacy as an advertising tool [4][25], the advertised content in the food domain [10], and their potentially harmful effect on children and adolescents [2]. It has also been shown [6] that, although consumers born after 1985 obtain most of their information from the Internet [17], the investments in online advertisement are lower than those in media such as television, radio, newspapers, and magazines.

These studies, however, ignore the perspective of the studios that design and develop advergames. These studios are key actors in the advergame ecosystem, along with the advertised brand company, existing and potential customers, and advertising companies. Due to such deficiency in the literature, the community has only anecdotal knowledge on topics such as the evolution of advergames development, the effect of technological trends, business models, etc.

In this paper, we present work towards addressing the research question "*How is the field of advergame development evolving?*" We enrich the body of knowledge on advergames through results from an empirical study of the evolution of the advergames development industry in the Netherlands. Despite the limited geographical focus, we provide insights on this not-so-explored field, including history and trends, as well as predictions from the practitioners on its future evolution.

To answer our research question, we followed the following approach: (i) we identified six key aspects for studying the advergames development industry; (ii) we refined these aspects into a semi-structured interview that was conducted in three companies; (iii) the main findings were turned into a set of statements about advergames development; (iv) to determine the generality of the statements, we created an online questionnaire where eight companies expressed their (dis)agreement, using a 5-point Likert scale; (v) we analyzed statistical significance and drew our conclusions.

The rest of the paper is structured as follows. Section II reviews the relevant literature about advergames; Section III details our research approach; Section IV reports on our interviews; Section V describes our cross-validation using the online questionnaire; finally, Section VI draws conclusions, discusses threats to validity, and outlines future directions.

II. LITERATURE

The term 'advergames' was coined in 2000 after the name of a company founded by Anthony Giallourakis. However, the first advergames appeared already in the 1980s. One of these early examples was Coca-Cola's Pepsi Invaders [7]; in this game for Atari, the player had to shoot the letters of the name of Coca-Cola's main competitor. The player had unlimited lives so that victory was certain. Most advergames around the same time focused on the food and the automobile industries, including Domino's pizza, Pepsi, Ford, Kellogg's [18].

More recent examples, such as Formula Face [19], exploit advanced technologies, such as character control via head tilting and facial expressions, and embed social features like in-game photo sharing via Facebook. Despite these advances, however, the purpose of advergames remains unchanged [24].

There is an active debate on the definition of an advergame. Some studies [22] include not only games that are built for advertising a brand or a product, but also in-game advertising (like the perimeter ad boards in soccer games). Other works make an explicit distinction between those concepts [13].

The study of their effectiveness as an advertising means is still in its infancy. David Deal has shown [4] that brand recall (the capability to recall an advertised brand) was significantly higher for advergames than for in-game advertising. However, Deal's study considers just two games. Another study [26] has shown how in-game advertising is effective in terms of explicit

memory (brand recall), while it has very little effect on implicit/unconscious memory for brand names. The efficacy of advergames seems to be good when the advertised brand is already known to the player, but negligible otherwise [25].

The effects of advergames on children and adolescents show how advergames are hardly recognized as advertising by children, even when a distinct advertising break is introduced [2]. On the other hand, exposure to games that advertise healthy food has led to positive effects on children [15].

The advergames industry has been investigated to a very limited extent, and mainly by means of content analysis studies of advergames. Among the most interesting results, it was confirmed that the food industry makes a massive use of advergames, especially as a means to prolong the visits of children to company websites [3][8][10].

Prominent researchers in advertising [23] suggest that more research on advergames is needed. We contribute to this aim with an empirical study on the evolution of the advergames development industry in the Netherlands. Our aim is to shed some light on the perspective of advergame developers.

III. RESEARCH APPROACH

We outline the research approach that has guided our empirical study. We illustrate the approach in Figure 1.

A. Identify the main aspects of the study

Starting from the limitations of the literature and our own experience in the field, we have identified six aspects upon which we build our study of the advergames development industry. These aspects are the following: (i) definition of advergames as perceived by the development industry; (ii) feasibility of an advergames-only business model; (iii) state and evolution of the market; (iv) technological evolution and its effect on the industry; (v) relationships with advertising companies and with clients; and (vi) predictions for the future.
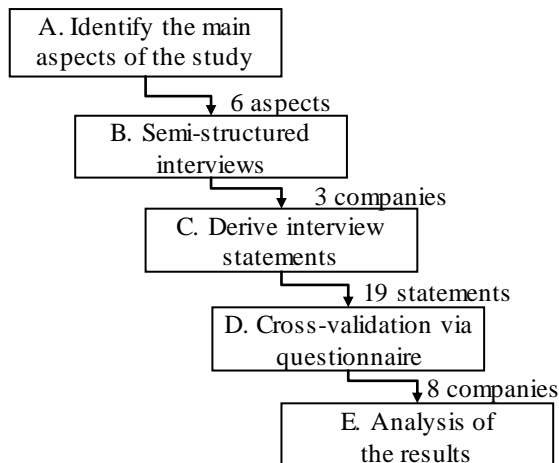

Figure 1: Research approach overview

B. Semi-structured inverviews

We have refined the six main aspects into a semi-structured interview consisting of twenty open questions. The interview

was conducted in three different advergame development companies. The first interview (with $Comp_A$) was a pilot, and was later retained as a regular interview as it did not lead to any change in the interview protocol. All of our questions can be found in our online appendix [1]. All the interviewed companies are of small size, in line with the demographics of the Dutch game industry [5]:

- $Comp_A$ was established in 2007, has currently 6 employees, and develops advergames, serious games, and entertainment games.

- $Comp_B$ was established in 2008, has currently 13 employees, and develops games with a purpose, including advergames.

- $Comp_C$ was established in 2007, has currently 1 employee (but relies on contractors), and develops advergames, serious games, and casual games.

All interviews were recorded on a personal device, to enable accessing the original answers in the analysis phase. The interviews with $Comp_A$ and $Comp_C$ were conducted via Skype, while the interview with $Comp_B$ was conducted on site.

C. Derive interviews statements

We analyzed the answers to our questions, and we summarized them as a set of statements concerning the field of advergames. A statement was created when one or more of the interviewees expressed a definite opinion on the field. We identified 19 statements that are reported in Section IV.

D. Cross-validation via questionnaire

In order to obtain a more comprehensive overview of the Dutch advergames development industry, and to assess the generality of the obtained statements, we created an online questionnaire where the statements were slightly rephrased— without affecting their meaning or content—to enable respondents expressing their agreement or disagreement with those statements using a 5-point Likert scale.

The cross-validation questionnaire included the 19 statements derived from the interviews as well as 2 additional statements that refined other statements from the interviews. Companies were given the opportunity to justify their (dis)agreement with every statement via a free-text field. The statements can be found in the online appendix [1].

The questionnaire was sent out to all the Dutch advergames development companies that we could find on the Internet. Out of the 14 invited companies, 8 participated in the questionnaire (response rate: 57%). We included the three companies interviewed earlier (step 2), for each of those company was aware only of its own statements, and had no access to the statements made by the other two companies.

E. Analysis of the results

The collected responses were analyzed to identify their statistical significance, in order to determine whether a statement could be generalized with confidence to become valid for the Dutch advergames development industry. We obtained statistical significance for 9 of the 19 statements.

IV. INTERVIEWS WITH THREE COMPANIES

We report the main results from the interviews conducted with the three companies. As mentioned in Section III, the interview with $Comp_A$ was a pilot study. After conducting this interview, no question was removed or added, and we could therefore keep the results as part of the actual interviews. The only change we made was the order of the questions, in order to get a more logical questions flow in the interview.

Each of the important interview questions and the associated answers are discussed below. We exclude the questions concerning the company context and personal questions about the interviewee (e.g., "what is your role in the company?" and "do you like to play advergames yourself?"), and trivial answers. The statements that we derived from the interviews are listed in Table I.

A. Definition of advergames

The first set of questions concerns the definition of advergames. This is key to ensure that the interviewer and the interviewee have a compatible understanding of the studied construct: advergames. The provided answers were along the same lines. $Comp_B$ defined advergames as "games with an advertisement purpose". The interviewee from $Comp_C$ extended this definition by stating that an advergame "is a marketing game that includes a message concerning the client company". Notably, unlike some existing definitions such as Svahn's [22], all companies deem in-game advertising as not being part of advergames. They explained that advergames are built with the primary intent of doing advertising, as opposed to including advertisement within entertainment games. These answers led to the formulation of two statements: advergames are games with an advertisement goal (S_1), and in-game advertisement is not a part of advergames (S_2).

B. Advergames-only business model

All of the interviewed companies develop advergames besides other types of games. Thus, we asked why they did not develop uniquely advergames. The companies indicated that a main reason is that they like diversification in their work. Moreover, they also noted that the marketing budgets for advergames are often lower than the budgets for serious games. The interviewee from $Comp_B$ stated that "[…] for advergames you have to work 'lean and mean' […] design concepts that do not require high effort and sell for a small price", and later in the interview indicated that the average budget (around 10k euros) is entirely spent on staff and property. Both $Comp_B$ and $Comp_C$ started their business relying only on advergames development, but have later expanded its market to other types of games too. These answers resulted in our third statement: developing advergames only is not sufficiently profitable to sustain a business (S_3).

C. State and evolution of the market

We also posed questions on the state and evolution of the advergames development market in the Netherlands. To such extent, we have initially made a set of questions to investigate the attractiveness of the market, followed by questions to determine whether any noticeable trend is going on.

TABLE I. STATEMENTS OBTAINED FROM THE INTERVIEWS

S_1	Advergames are games with an advertisement goal
S_2	In-game advertisement is not a part of advergames
S_3	Developing advergames only is not sufficiently profitable to sustain a business
S_4	The advergame market is currently shrinking
S_5	The advergame market is not yet mature
S_6	Budgets for advergames have increased over the years
S_7	In the future, budgets for advergames will increase
S_8	In the last few years, the technological platforms for developing advergames have changed considerably
S_9	In the last few years, an increasing number of clients wants social media components in their advergames
S_{10}	Nowadays, advergames are increasingly cross-platform
S_{11}	A client company's decision to buy an advergame is not based on its strategy
S_{12}	In the future, companies will decide on whether to buy an advergame based on their strategy
S_{13}	Advertising companies are an important intermediary for the development of advergames
S_{14}	In the future, advertising companies will play a less prominent role in the advergames market
S_{15}	In the future, advergames which can be played for an extended period of time will become more popular
S_{16}	Advergames that can be played for an extended period of time will increase customer loyalty
S_{17}	Gamification elements will become increasingly popular in advergames
S_{18}	In the future, more advergames will blend physical and virtual worlds
S_{19}	In the future, large companies will have an employee who specializes in developing advergames

We asked about the difficulty of entering the market (one of Porter's five forces [16] of market attractiveness). None of the companies experienced difficulties, due to different reasons: $Comp_C$ had past experience in the field, $Comp_A$ was open to different kinds of games since the beginning, and $Comp_B$ succeeded due to good ideas, high-quality designs, and effective products. The companies did not agree on the number of startups currently entering the advergames market, i.e., threats of new entrants [16]. $Comp_B$ did think there are many startups, while $Comp_C$ had a completely different opinion. About the bargaining power of the customers [16], the advergame studios agreed that companies can negotiate to some extent, but often the studios themselves have to pitch an idea with the associated price to the client. According to $Comp_C$, when the client selects an advergames studio, no or very little negotiation is possible. While these answers helped to get a more in-depth understanding of the field, they were not sufficiently homogeneous to formulate any statement.

We then posed questions on the evolution of the market, beginning with an enquiry on whether it is growing or shrinking. $Comp_A$ stated that "[…] the advergame market has shrunk over the years but did become more mature. The

advergame hype from a few years ago is almost over now". The other two companies also stated the advergame market has been shrinking in the past few years. The explanations range from the increasing costs to develop an advergame, to the threat of substitute advertisement channels. The increasing costs of advergames are due to the request by many clients to have their advergame playable on mobile phones, which costs effort, time, and money (more than the clients are eager to provide) to get the application accepted by app stores. The substitute advertisement channels are Facebook and Twitter, which enable cheaper and easier-to-conduct advertising.

The interviewees could not confirm whether or not the shrinking of the advergame market had an influence on the spending of companies on advergames. They either stated that it remained constant, or that it slightly increased, due to the maintained interest of some clients. The interviewees could not foresee how the budgets for advergames will evolve in the future. Two statements were directly derived from the interviews: the advergames market is currently shrinking (S_4), the advergames market is not yet mature (S_5). Moreover, other two statements were formulated in order to explore—through the cross-validation with online questionnaires—two aspects that the interviewees could not agree upon or were uncertain about: budgets for advergames have increased over the years (S_6); in the future, budgets for advergames will increase (S_7).

D. Technological evolution

We asked our interviewees about technological trends, and how their companies responded to changes in the field. All companies mentioned the shift in the development and distribution channel. $Comp_C$ provided the most comprehensive answer: "The first advergames were burned on CD-ROMs, and soon advergames became downloadable. The online era came next: advergames should all be played online. This was followed by requests of Facebook games, and then the mobile era began. Currently, all clients want a mobile game and they want it to be cross-platform". Additionally, $Comp_A$ stated that clients increasingly demand advergames for mobile devices, but then also wanted their game to get viral, thereby making social media integration an essential feature.

This change in the execution environment affected also the development platform. The market shifted from C++ games to Flash games, in order to support online advergames. Currently, a large number of advergames have to be mobile and/or cross-platform; as such, all three companies stated that they switched to the Unity game engine. These answers resulted in three statements: in the last few years, the technological platforms for developing advergames have changed considerably (S_8), in the last few years, an increasing number of clients want social media components in their advergames (S_9), and nowadays advergames are increasingly cross-platform (S_{10}).

E. Relationships with advertising companies and clients

We then posed questions concerning the relationships with both advertising companies and clients. Both $Comp_A$ and $Comp_B$ indicated that advertising companies are still an important intermediary. Unfortunately they "have no time, no money, and lots of wishes", which makes the collaboration hardly prolific. $Comp_A$ foresees a future where the importance

of advertising companies diminishes: "When we [advergame studios] directly handle with the clients, a larger budget is available [no share goes to the advertising companies]. We can make better games with that money, resulting in a more prolonged relationship with the clients".

$Comp_B$ foresees a future where clients will make strategic decisions about advergames: "For example, Coca Cola and Nike have a good cross-platform branding of their products. They carefully examine and evaluate all options before they decide to include an advergame in their advertising campaign".

We derived the following statements from these questions: a client company's decision to buy an advergame is not based on its strategy (S_{11}), in the future companies will decide on whether to buy an advergame based on their strategy (S_{12}), advertising companies are an important intermediary for the development of advergames (S_{13}), and in the future advertising companies will play a less prominent intermediary role (S_{14}).

F. Predictions for the future

We concluded our interviews with an open question regarding the future trends that the interviewees would foresee. Several predictions were made. $Comp_B$ and $Comp_C$ indicated that they expect gamification elements to contribute more significantly to the advergame market. $Comp_C$ stated that "[…] gaming will not only take place using a computer or a mobile phone at home, but also in the supermarket or in the streets".

Another prediction comes from $Comp_A$ and is supported by $Comp_C$: they thought that there will be a rise of advergames with a longer life span. As an example, they mention KLM's Aviation Empire [12], a simulation game in which the gamer builds an airline corporation, which is a "genuinely nice game" with good longevity. $Comp_A$ thought this kind of advergames with a longer time span will boost customer loyalty to a game, for they are having fun while playing. $Comp_C$ noted that these long life span games are very new, and it still has to be proven if they reach the desired outcome. However, both companies agreed this could well be a trend for the future.

Furthermore, $Comp_B$ stated that hiring good game designers is a growth opportunity for large companies that want to advertise their products or brands through advergames.

$Comp_B$ also hopes that the combination of online and offline games will prove to be successful for advergames in the future, as they foresee a gamified life experience. For example, while buying a product in a store, the buyer will play with it in some sort of online virtual world. They hope the digital world becomes more a lengthening piece of the real world. $Comp_B$ sees that more studios have these kinds of hope and dreams, but cannot develop it yet because the market is lagging behind.

These answers led to five statements: advergames which can be played for an extended period of time will become more popular (S_{15}); advergames that can be played for an extended period of time will increase customer loyalty (S_{16}); gamification elements will become increasingly popular in advergames (S_{17}); more advergames will blend the physical and virtual worlds (S_{18}); large companies will have an employee who specializes in developing advergames (S_{19}).

Starting from the statements in Table I, we devised a questionnaire in order to obtain a deeper understanding of the Dutch advergames development industry. This cross-validation questionnaire contained 21 statements—a rewriting of the statements in Table I using an easier-to-understand wording— that respondents could rate on a 5-point Likert scale: 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree. For every question, respondents were given an optional field for explaining their response.

To avoid confirmation bias [14], questions were randomly positively or negatively stated. The cross-validation questionnaire was sent out to the 14 Dutch companies that we could identify as active in the advergames market. Eight companies responded within a timespan of two weeks. The three initial participants did participate in the cross-validation, for many statements that we derived were not shared by all of them, and also to get a further confirmation of their opinion.

The questionnaire and the aggregated results are in [1]. Below, we denote the arithmetic mean with $\bar{x}$, and the standard deviation with σ. We summarize the obtained results grouped according with the six aspects of our study.

A. Definition of advergames

Seven of the eight companies (strongly) agreed with statement S_1: advergames are games with an advertisement goal ($\bar{x} = 4.38$, $\sigma = 1.06$). One participant commented that "we see advergames as games that are deployed within a campaign context, so with a limited duration and ephemeral goal". Other companies mentioned that they strongly agree with the statement, but "only if the advergame is built for a specific advertising purpose. It must not be confused with a branded game, in which the ad/branding is incorporated in a more generic game". One respondent disagreed with S_1, for this company considered an advergame as something broader than advertising: marketing, communication, and branding.

We obtained mixed results about statement S_2 (in-game advertisement is part of advergames). Four participants (strongly) disagreed with S_2, three participants stated that they do agree with the statement, and one company did not agree nor disagree with the statement. One of the disagreeing companies stated that the advertising of a product within a game, which does not have any relationship with that game, should not fall within this category. None of the companies that agreed with the statement provided a motivation. The statistics for S_2 ($\bar{x} = 2.63$, $\sigma = 1.30$) show that the companies are slightly inclined towards agreeing with the statement that in-game advertisement is not part of advergames.

B. Advergames-only business model

The results concerning statement S_3 on the profitability of an advergames-only business model did not lead to an agreement. Three companies answered this question with neither agree nor disagree; out of the other five companies, three were more inclined towards disagreement, while two leaned towards agreement. The statistics show an arithmetic average below the scale average of three ($\bar{x} = 2.75$, $\sigma = 1.04$).

One of the companies explained that "there are multiple reasons why it is hard to sustain a business model based solely on advergames. First of all, the web as a marketing channel is quickly losing its relevance due to the shift towards mobile platforms. Secondly, there is a wide number of young game developers and other service providers that offer games and game development services below cost. Thirdly, traditional advertising agencies have little knowledge of the opportunities offered by online and mobile games. International top brands still think they could get a good online/mobile game with a budget below 10,000 euros".

C. State and evolution of the market

We initially investigated statement S_4, to (dis)confirm if the advergame market is shrinking at the moment. The results led to an arithmetic average $\bar{x} = 3.00$—which corresponds exactly to "neither disagree nor agree"— , and a standard deviation $\sigma = 1.41$. One of the companies that strongly disagreed with the statement commented "Exactly the opposite. There was a shrink in the market. But we are starting to notice that clients are socially quenched and are starting to seek alternatives again. This gives rise to the advergame market". Supporters of statement S_4 did not provide any explanation. Hence, we cannot draw any definite conclusion concerning this statement.

The statement that the advergame market is not yet mature (S_5) was re-stated positively in the questionnaire. Results show that the majority of the respondents thought the advergame market is not yet mature (disagree). Two respondents rated this statement with neither disagree nor agree. Only one company stated that the advergame market is mature. Statistically, we note a slight inclination towards disagreement: $\bar{x} = 2.50$, $\sigma = 0.76$.

About statement S_6 on the increase of the budgets for advergames, four companies stated that they neither disagree nor agree with it. They left similar comments, including "they [budgets] increased for serious/top customers, but many normal customers did not increase their budget". Three companies stated that they did not experience any increase in the budgets for advergames over the years. One of them explained this by saying that "Budgets for advergames decrease, while budgets for the use of serious games within social and loyalty systems did increase. However, not every company in the game sector is ready to become a long-term strategic partner for a brand". One company did see an increase in the budgets for advergames. Statistically, the average is in between disagreement and neither agree nor disagree: $\bar{x} = 2.75$, with standard deviation $\sigma = 0.71$.

The follow-up statement on whether budgets for advergames will increase in the future (S_7) lead to a positive skew towards agreement ($\bar{x} = 3.43$, $\sigma = 0.53$). One company did not answer this question. Out of the remaining seven respondents, four indicated that they neither agree nor disagree with the statement, and three indicated that they agree with the statement. In the provided comments, one company stated that "budgets will inevitably have to increase in the future due to the amount of work that is required to support games for multiple platforms and with 3D content, which are becoming increasingly common requirements".

D. Technological evolution

The statement that the technological platforms for developing advergames have changed considerably (S_8) was largely agreed upon ($\bar{x} = 3.75$, $\sigma = 0.89$). Six out of the eight companies (strongly) agreed. One company did neither agree nor disagree, because "the real changes are not that significant. Flash is indeed being replaced by Unity and HTML5. However, a more significant evolution is that from browser-based advergames towards dedicated adverapps". One company disagreed with the statement. The company that strongly agreed with S_8 provided the following motivation: "Unfortunately Flash died. HTML5 is a pipe dream, but none of the major parties care about this (Microsoft, Apple, Android). Multiplatform native apps are the future, and as such, games based on Unity".

There was a significant agreement on statement S_9: over the last few years, an increasing number of clients want social media components in their advergames. Seven out of eight companies (strongly) agreed with S_9. One provided explanation was that mobile games are the biggest drivers of social media, besides social media itself. Only one company stated that they did neither agree nor disagree. The statistic measures about S_9 clearly indicate agreement: $\bar{x} = 4.50$, $\sigma = 0.76$.

We obtained a conflicting result on the statement about whether advergames are increasingly cross-platform (S_{10}): four respondents agreed with S_{10}, two of them picked the neutral answer, one disagreed, and one strongly agreed. The arithmetic average is inclined towards agreement: $\bar{x} = 3.63$, $\sigma = 0.92$.

E. Relationship with advertising companies and clients

Statement S_{11} indicates that client companies do not base the decision on whether to buy an advergames on their strategy. This statement was positively portrayed in the questionnaire (companies do base the decision on their strategy). Four companies agreed, of which one strongly, with the fact that this is a strategic choice. Only two companies did in fact agree with the original statement, i.e., that this is not a strategic choice yet. Two companies neither agreed nor disagreed with the statement. The statistical results ($\bar{x} = 3.38$, $\sigma = 1.06$) indicate that the respondents' opinion is between neutrality and agreement with the statement (thus, between neutrality and disagreement with S_{11}).

When confronted with the similar statement about the future (S_{12}), the opinion of the companies was much more homogeneous: seven companies did agree with the statement, while one company replied with neither agree nor disagree. The opinion ($\bar{x} = 3.88$) is slightly below agreement, and the standard deviation is low ($\sigma = 0.35$), indicating that the respondents have a very similar opinion.

The statement on whether advertising companies have been, and still are an important intermediary for the development of advergames (S_{13}) turned out to be inconclusive: $\bar{x} = 2.75$, $\sigma = 1.39$. Four companies agreed with the statement, while four disagreed, two of which strongly. One of the companies that strongly disagreed commented that "this is not true in the last few years, since they [the advertising agencies] have focused completely on social media. It is easier for us to get an advergame job when we directly interact with the client". Thus, the respondent suggests that advertising companies are not going to push the client for adopting an advergame.

When presented with statement S_{14} (future advertising companies will play a less prominent role in the advergames market), five companies stated that they (strongly) agree. One company disagreed, but did not provide any motivation. Two companies did neither agree nor disagree. The statistical results show a positive skew towards agreement ($\bar{x} = 3.63$, $\sigma = 0.92$).

F. Predictions for the future

The statement on the future increasing popularity of advergames that can be played for an extended period of time (S_{15}) was largely agreed upon: four companies agreed, three strongly agreed, while one disagreed. The statistical results indicate agreement to strong agreement ($\bar{x} = 4.13$, $\sigma = 0.99$). Some respondents commented that this is not a one-step process, and requires experience and building a loyal community. The company that disagreed explained that "it is not about playing a game longer. It is about the added value of playing a game longer". We obtained similar results concerning statement S_{16} – advergames that can be played for an extended period of time will increase customer loyalty: $\bar{x} = 4.13$ $\sigma = 0.99$. Seven companies (strongly) agreed, while the company that disagreed with S_{15} did disagree with S_{15} as well.

The statement on the increasing popularity of gamification elements (S_{17}) was agreed upon by most companies: four companies agreed, two strongly agreed, one did neither agree nor disagree, and one disagreed. This implied a statistical result slightly below agreement: $\bar{x} = 3.88$, $\sigma = 0.99$. However, the comments highlighted that our statement was ambiguous: "A game is already a game. How would you gamify a game?". Our intended meaning was in fact whether gamification elements could be used in real life to create offline (non-digital) advergames. Due to this inaccuracy in the statement formulation, we ignore S_{17} in the rest of our analysis.

The statement concerning the blending between virtual and physical worlds in advergames (S_{18}) was explained with the aid of an example of a digital game that continues in the real world. Three companies disagreed, four companies did neither agree nor disagree, whilst one company indicated that they agreed with the statement. The statistical results are below the average score and inconclusive: $\bar{x} = 2.75$, $\sigma = 0.71$. One of the companies that did neither agree nor disagree indicated that "offline is indeed very important, but it will always be a niche, for the advantage of mobile gaming is enormous. I can't make a direct purchase from a board game, but digitally this can be done by merely swiping your fingertip".

The last statement (S_{19}) about whether large companies will have an employee who specializes in developing advergames was also inconclusive: three companies disagreed, three did neither agree nor disagree, and two agreed. The results are dispersed around the middle, and the mean indicates a value ($\bar{x} = 2.88$, $\sigma = 0.83$) slightly below the scale average of 3. One company said they don't think a specific person will be hired, but the role will become part of an existing marketing function.

G. Statistical significance of the results

We analyze the statistical significance of the results outlined above, so to generalize the statements. To such extent, some assumptions (A1-A4 below) have to hold.

A1. The dependent variable shall be at least at the interval level. This holds for all dependent variables, that we measured via a 5-point Likert scale.

A2. Data must be independent. Participants did not work for the same companies and were not informed of each other; thus, we assume they did not influence each other.

A3. All dependent variables should be normally distributed. The Shapiro-Wilk test [21] shows that five variables are not normally distributed (see [1]). For those variables, we will conduct the Wilcoxon non-parametric test.

A4. The assumption of no significant outliers must be met. Boxplots show no outliers for all dependent variables.

Due to space limitations, the complete results of the statistical significance analysis are presented only in our online appendix [1]. We have executed one-tailed or two-tailed tests depending on whether or not the two directions in the scale can be considered equally likely (two-tailed when "extreme" means either sufficiently small or sufficiently large).

TABLE II.   STATEMENTS WITH STATISTICAL SIGNIFICANCE

S_1	Advergames are games with an advertisement goal	$p_{Wilcoxon} = .021$, 2-tailed
S_7	In the future, budgets for advergames will increase	$p_{Wilcoxon} = .0415$, 1-tailed
S_8	In the last few years, the technological platforms for developing advergames have changed considerably	$p = .048$, 2-tailed
S_9	In the last few years, an increasing number of clients wants social media components in their advergames	$p_{Wilcoxon} = .007$, 2-tailed
S_{10}	Nowadays advergames are increasingly cross-platform	$p = .0475$, 1-tailed
S_{12}	In the future, companies will decide on whether to buy an advergame based on their strategy	$p_{Wilcoxon} = .004$, 1-tailed
S_{14}	In the future, advertising companies will play a less prominent role in the advergames market	$p = .0475$, 1-tailed
S_{15}	In the future, advergames which can be played for an extended period of time will become more popular	$p_{Wilcoxon} = .030$, 1-tailed
S_{16}	Advergames that can be played for an extended period of time will increase customer loyalty	$p = .015$, 2-tailed

We obtained no statistical significance (p or $p_{Wilcoxon}$ above 0.05) for several statements; the cross-validators did not converge on a homogeneous agreement or disagreement. Nine statements are however deemed significant, and can thus be considered as useful and agreed upon statements in the context of the Dutch advergames development industry (see Table II).

VI. DISCUSSION AND OUTLOOK

In the following subsections, we draw conclusions from our study, describe threats to validity, and outline future research.

A. Conclusions

This research aimed at the identification of past, current, and future trends in the Dutch advergames development industry. This study is an initial step towards a better understanding of the advergames development industry, which is currently largely unexplored.

Nine statements on the market were found to be statistically significant. These can be used to characterize the Dutch advergames development industry, and may serve as a basis for further studies on a worldwide scale.

The statement about the definition of advergames (S_1) showed significant agreement on the fact that advergames are *games with an advertisement goal*. Interestingly, this contrasts with some definitions from the literature, e.g., Svahn's [22].

We identified three statements about the past trends with statistical significance. The usage in technological platform for the development of advergames has changed a lot (S_8): advergame studios often started coding in C++ or Flash, and they are increasingly relying on HTML5 or the Unity3D game engine. Their rapidity in switching to new technological trends may indicate that, if alternative technological platforms emerge in the future, it is possible that the advergame studios will change their developing platform accordingly. Moreover, clients do increasingly require advergames to be cross-platform (S_{10}), so as to support multiple mobile phones, tablets, etc. In the past few years, an increasing number of clients demands social media components in their advergames (S_9). This demand relates with the interviewees' statement that clients are demanding their advergame to get viral: social media are a prominent means to deliver viral marketing [11].

The other five significant statements are predictions of the future. The interviewees and cross-validators agreed that client companies will make more strategic choices regarding advergames (S_{12}). This will result in more involvement of the clients within the projects, possibly higher budgets, and more time for game development. Our study did also confirm that the participants foresee higher budgets for advergames (S_7). Thus, it will be likely possible for advergames developers to create the advergames that suit the problem best, as opposed to being limited by low budgets. Advertising companies will play a less prominent role in the advergames market (S_{14}), allowing the development companies to get higher budgets, without intermediary fees that are given to advertising companies. The participating advergame studios think not only that advergames that can be played for an extensive period of time will become more popular in the future (S_{15}), but also that this type of advergames will result in higher customer loyalty (S_{16}).

These significant statements provide (Dutch) advergames development companies with useful information for their strategic decision-making. The rapid evolution of the development platforms requires the companies to ensure their developers are flexible enough to learn and adapt to new technologies. Moreover, it is the right time to grab the

opportunity to develop games that can be played for an extended period of time: very few of these games exist, but large companies are slowly investing in this type of games.

B. Threats to validity

The conducted study suffers from some threats to validity. First of all, we did not use a random sampling for our interviews: we chose the subjects based on convenience sampling, i.e., on the basis of their accessibility. Also, we only interviewed Dutch companies. Thus, our exploratory study applies only to the Dutch advergames development industry. Moreover, in order to confidently generalize the results, we would need a larger set of companies. Also, we assumed no influence exists between interviewees and respondents, but we could not control their independence, also due to the relatively small size of the Dutch advergames market and the eagerness to communicate of people in the game industry.

Some threats to construct validity exist as well. Interviewees indicated that the field of advergames is very young: thus, the exact nature, extent, and boundaries of the field are not well defined yet (see also the discussion on whether in-game advertisement can be considered as part of advergames). Moreover, we did not define a precise measure to determine "market maturity" and "few years". From our interactions with interviewees and respondents, however, we did not perceive any sign of ambiguity on their part.

C. Future directions

The obtained results constitute the first attempt to characterize the current state and the future of the advergame development industry. Further studies are needed to generalize our statements, including the conduction of more interviews, as they are better suited than questionnaires for obtaining new statements about the market. Also, we would like to involve a higher number of participants in the cross-validation step.

Additionally, our analysis can be extended beyond the Dutch market, in order to determine whether and to what extent our obtained statements are confirmed worldwide. This would include performing side-by-side market comparisons between the Netherlands and other countries.

Finally, the perspective of advergames development companies could be complemented with the viewpoint of another key actor in the advergames ecosystem, i.e., the brands that use advergames in their marketing and advertising campaigns. Their opinions may be very different, especially with respect to budgets and strategic decision-making.

REFERENCES

[1] F. Aarnoutse, L. Peursum and F. Dalpiaz, "Online appendix for 'The evolution of advergames development'", http://goo.gl/m2cHMn, 2014.

[2] S. An and S. Stern, "Mitigating the effects of advergames on children," *Journal of Advertising*, vol. 40, no. 1, pp. 43–56, 2011.

[3] J. Culp, R. A. Bell, and D. Cassady, "Characteristics of food industry web sites and 'advergames' targeting children," *Journal of nutrition education and behavior*, vol. 42, no. 3, pp. 197–201, 2010.

[4] D. Deal, "The ability of branded online games to build brand equity: An exploratory study," in *Proceedings of DiGRA 2005 Conference: Changing Views--Worlds in Play*, 2005, pp. 1–7.

[5] Deloitte, "Dutch games industry: ready for growth," 2011; http://www.onlineinnovation.nl/files/uploads/Customer_Mobility_Dutch_Games_Industry.pdf.

[6] DFC Intelligence, "Advertising and video games," 2011; http://www.dfcint.com/wp/?p=313.

[7] D. Djaouti, J. Alvarez, J.-P. Jessel, and O. Rampnoux, "Origins of serious games," in *Serious Games and Edutainment Applications*, Springer, 2011, pp. 25–43.

[8] A. A. Flowers, K. Lustyik, and E. Gulyás, "Virtual junk food playgrounds in Europe: advergames in the UK and Hungary," *Journal of Virtual Worlds Research*, vol. 3, no. 2, 2010.

[9] Heineken beer game. [online]. The Netherlands: Heineken, 2008.

[10] Á. Hofmeister-Tóth and P. Nagy, "The content analysis of advergames in Hungary," *Qualitative Market Research: An International Journal*, vol. 14, no. 3, pp. 289–303, 2011.

[11] A. M. Kaplan and M. Haenlein, "Two hearts in three-quarter time: how to waltz the social media/viral marketing dance," *Business Horizons*, vol. 54, no. 3, pp. 253–263, 2011.

[12] Aviation empire. [Android, online]. The Netherlands: KLM, 2013.

[13] G. Marolf, *Advergaming and in-game advertising: an approach to the next generation of advertising*. VDM Verlag, 2007.

[14] R. S. Nickerson, "Confirmation bias: A ubiquitous phenomenon in many guises," *Review of general psychology*, vol. 2, no. 2, pp. 175–220, 1998.

[15] T. A. Pempek and S. L. Calvert, "Tipping the balance: use of advergames to promote consumption of nutritious foods and beverages by low-income African American children," *Archives of pediatrics & adolescent medicine*, vol. 163, no. 7, pp. 633–637, 2009.

[16] M. E. Porter, "The five competitive forces that shape strategy," *Harvard business review*, vol. 86, no. 1, pp. 25–40, 2008.

[17] M. Prensky, "Digital natives, digital immigrants part 1," *On the horizon*, vol. 9, no. 5, pp. 1–6, 2001.

[18] G. Purswani, "Advergames, their use and potential regulation," *Asia Pacific Public Relations Journal*, vol. 11, no. 7, pp. 57–63, 2010.

[19] Red Bull formula face. [online]. Austria: Red Bull, 2011.

[20] J. Schell, *The Art of Game Design: A book of lenses*. CRC Press, 2008.

[21] S. S. Shapiro and M. B. Wilk, "An analysis of variance test for normality (complete samples)," *Biometrika*, vol. 52, no. 3–4, pp. 591–611, 1965.

[22] M. Svahn, "Future-proofing advergaming: a systematisation for the media buyer," in *Proceedings of the Second Australasian Conference on Interactive Entertainment*, 2005, pp. 187–191.

[23] C. R. Taylor, "Hot topics in advertising research," *Advertising*, vol. 32, no. 1, pp. 7–12, 2013.

[24] R. Terlutter and M. L. Capella, "The gamification of advertising: Analysis and research directions of in-game advertising, advergames, and advertising in social network games," *Journal of Advertising*, vol. 42, no. 2–3, pp. 95–112, 2013.

[25] W. Tina and K. Buckner, "Receptiveness of gamers to embedded attitudes towards product placement," *Journal of Interactive Advertising*, vol. 7, no. 1, pp. 3–32, 2006.

[26] M. Yang, D. R. Roskos-Ewoldsen, L. Dinu, and L. M. Arpan, "The effectiveness of 'in-game' advertising: comparing college students' explicit and implicit memory for brand names," *Journal of Advertising*, vol. 35, no. 4, pp. 143–152, 2006.

[27] M. Yeu, H.-S. Yoon, C. R. Taylor, and D.-H. Lee, "Are banner advertisements in online games effective?," *Journal of Advertising*, vol. 42, no. 2–3, pp. 241–250, 2013.