Video Games as Information Systems:

Exploratory Research on What Gamers Want

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ABSTRACT

Video games have been classified as hedonic information systems and thus have a place in information systems research. This paper reviews recent published literature on various aspects of video game development and player experience. A list of eleven concepts related to either video game player satisfaction or video game developer priorities was derived from published articles, and a conceptual model is proposed that can serve as a starting point toward illustrating the relationship between player satisfaction and game developer priorities. The contribution to current research includes the model and the refined list of concepts. The contribution to future research includes a gap analysis and suggestions for further study. There is a call for further research on hedonic information systems, and a plea to journals to publish more studies in this area.

INTRODUCTION

There is a great deal of research being done on the types of information systems that are classified as utilitarian. That is, their goal is to provide productive value to the user (van der Heijden 2004). Another type of information system that receives much less attention in
the field of information systems research is that which is classified ashedonic, derived from
the word hedonism which describes the doctrine that pleasure or happiness is the highest
good (Random House 2007a). Hedonic information systems do not strive to provide utility
to the user beyond that of the interaction between the user and the system itself. Essentially,
the goal of a hedonic information system is to impart enjoyment through the experience
delivered by the interaction with the system. In consideration of that goal, these types of
information systems will typically employ pleasurable displayed images or graphics, pleasing
or exciting colors, sounds, and content, or subject matter designed to entertain and encourage
prolonged use (van der Heijden 2004).

This paper will focus on one type of hedonic information system: the video game. A
video game is a type of game played using a microcomputer or other electronic device with a
keyboard or other controlling device(s) which are used to manipulate, change or otherwise
respond to the action or information on a display screen (Random House 2007b). Although
the term “entertainment software” is advocated by at least one author as a solution to the
confusion regarding console-based and computer-based games (Alpert 2007), the term could
also refer to software that is not game-related, and so will not be used here. Video games
have grown to assume a significant portion of the entertainment market. In 2007, total video
game sales in the US reached $17.9 billion -- a 43% increase over the 2006 sales figure of
$12.53 billion (Peckham 2007). Worldwide video game sales hit $31.6 billion in 2006, an
increase of 14.3% over 2005 (Reuters 2007). With such a market presence, video games have
proven to be an established information system industry.

**RESEARCH PROBLEM**

In this paper the question is asked, “what differences can be found in the research on
video games regarding what players want versus what game developers are delivering?”
This is different than the more market-oriented question, “what kinds of video games do
people want to play?”, which would traditionally be asked through consumer surveys aimed
at video game players. This study is an attempt to discover the voice of video game players
and developers in published research. If that voice were to be silent, then the information
system research community could be said to be deaf to the users and builders of hedonic
information systems. A lack of published research in this area would also consequently
signify a research gap. Conversely, assuming that voice exists, this paper is an attempt to
apprehend the attributes of games that contribute to players’ satisfaction, and contrast that
with the products that game developers are delivering to see how they relate to each other, if
at all. The results of this analysis may help determine whether there is a way to measure
product success in this industry beyond simply units sold. Such a measure would be
beneficial to both player and developer.

This paper represents one way to look at this research question, but does not claim to
be the only way, nor the best way. A comprehensive and thorough answer to this question
will require further research using additional methods, and will be addressed in the closing
remarks.
RESEARCH METHOD

The method used to approach the research question is a review and analysis of recent literature in information systems journals and other relevant publications. The nature of video game development requires a dependence on IT, especially on processing speed, video display speed, and overall machine performance [Allen & Kim 2005; D’Amora, Magerlein, Binstock, Nanda & Yee 2006]. Graphics capabilities for video games played on personal computers have been on an incredible trend of doubling in performance every year for the time period from 1988 to 2003 (Stam 2003). Because of this and other technological trends, the literature utilized for this study will be limited to articles published since 2005.

The criteria for articles to use in this research included top academic research publications in the IS field, and top practitioner publications in technology or business fields. The initial search was initiated through electronic databases and search engines, and refined through manual analysis of the reference lists of relevant articles. The initial combined article search base was over a thousand articles. From those, 245 articles were selected through title, abstract, and high level content analysis as potential sources of literature for this review. Each of these articles was reviewed individually to determine the extent of its relevance to game development or user experience of video game use. Articles not providing commentary, opinion, or research on those topics were discarded. The remaining articles were analyzed and categorized according to whether they contributed knowledge about the products game developers are making, or the kinds of game elements desired by video game players. The references cited by each relevant article were also examined, and several cited articles were added to the collection. The final tally was 57 articles.

Each article was then carefully analyzed for specific concepts related to either player satisfaction, or game development. The concepts were noted and grouped, and those that were similar were combined to form a single concept comprising the attributes of both combined concepts. The resulting list of concepts was combined to form a concept matrix as is suggested for a literature review (Webster & Watson 2002). The concept matrix (Table 1) contains a list of articles on the left, the list of concepts across the top, and letter designations for each article in the middle section. Each article may have one or more letter designations in the matrix depending on whether or not it contributes to one of the concepts found in the list. An article is applicable to a particular concept if it contains a discussion or analysis of that concept from either the perspective of the game developer or the game player. For an article to be designated as a game developer article with regard to a particular concept, the article must reflect game developers’ desire, need, or obligation to actively develop products that have aspects pertaining to that specific category. Similarly, for an article to be designated as a game player article with regard to a particular concept, the article must express game players’ satisfaction with that concept, or their desire to see more development of that concept in future gaming products. Some articles contribute to more than one concept, and some even contribute to both developer and player perspectives on multiple constructs. No single article contributed to all of the concepts. The concept matrix (Table 1) designates which aspect of the concept is reflected in the article through a single letter code: Articles will display a ‘P’ for the game player perspective, ‘D’ for the game developer perspective, both letters if the article represents both perspectives, or will be blank if the article does not contribute to that concept from either perspective.
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<th>Articles</th>
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<th>Game / platform stability</th>
<th>Gameplay</th>
<th>Brand identity</th>
<th>Setting, narrative &amp; aesthetics</th>
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An explanation of the derived concepts is now in order. **Copy / piracy protection** refers to efforts to prevent video games from being duplicated or distributed apart from payment to the developer. **Game / platform stability** is concerned with the elimination of bugged code and machine errors. **Gameplay** is used here to encompass the overall entertainment value of a game, mirroring a concept called “usability performance” used by Allen & Kim, who in turn adopted it from Steven Poole (Allen & Kim 2005). Essentially it refers to the degree to which a game is simple to learn, yet increasing in challenge and complexity as the player progresses, motivating the player to continue to play. **Gameplay** refers to the experience of the user when playing the game, and not to the description of how the game conforms to the rules set up by the developer, as Ang has used it (Ang 2006). This definition better fits the term’s use in gaming circles by players and writers. **Brand identity** refers to commercially marketed intellectual property such as games built around comic book or film characters, and also commercial products and advertising in games. **Setting, narrative & aesthetics** refers to things like the makeup and appearance of virtual worlds, the depth and richness of the premise or storyline of games, and the artistic offerings of games. **User-created or modified content** denotes the practice of designing tools or other means for game players to contribute content to games, either through game design and modification, character modification, or item creation. **Creativity & innovation (technical or stylistic)** is concerned with novel approaches to game design and play. **Graphics & performance** encompasses all efforts and techniques to improve the graphical capability, speed and performance of video games. **Practical application through simulation or learning** refers
to the use of video games to teach lessons apart from the game itself, or to emulate a targeted environment or function for simulation purposes. New revenue sources or models represents any means of money making beyond the typical purchase, rental, or subscription price for the game. Legal issues, virtual goods, property & economy covers game licensing and all aspects of virtual game economics, including legal issues regarding virtual game property, characters, and items.

**FINDINGS**

Analysis of the concept matrix (Table 1) revealed a number of interesting things. First, an analysis of the categories revealed grouping patterns for concepts as topics of concern for players and developers. The concepts that were most representative of game players’ interest did not necessarily hold the same level of interest for game developers (Figure 1, Figure 2). Second, the grouping patterns raised the possibility of the emergence of two separate models: one that could show how certain concepts interact to produce game player satisfaction, and another that could represent concepts associated with the main objectives of game developers. Third, when the concepts were analyzed for logical fit toward either the main objectives of game developers or player satisfaction level, it became clear that the concept practical application through simulation or learning did not fit well in either area. This is most likely because it represents a utility measure of the application of video game technology. Hedonic information systems are typically void of utility measures by definition. Therefore, this category was left out of the model formation.

The possibility of the models emerged from an examination of how the concept categories were distributed for both perspectives. Figure 1 illustrates the breakdown of research per concept from the game player’s point of reference, and illustrates how that perspective was represented in six of the ten concepts, suggesting that there is a lack of research (and possibly a lack of interest) regarding how those four unrepresented constructs affect or are perceived by game players. There were two concepts that accounted for 63% of the research on game players (gameplay and setting, narrative & aesthetics), and therefore there is the suggestion that those were the two most important factors for game player satisfaction, according to the amount of research devoted to them.

Further examination suggested that the remaining four concepts with research devoted to them could fit in a model where those concepts fed into the two primary concepts, ultimately contributing toward player satisfaction with the game (Figure 3). Player satisfaction was coined as a target concept because that term adequately describes the conditions under which players will play a video game. Presumably if a player is not satisfied with a game, they will seek other games or other forms of hedonic activity.

On the game developer’s side, things were a bit more convoluted. There were two concepts that accounted for 54% of the research, but close on their heels were two other concepts that, when combined with the first two, covered 82% of the research. The full results are shown in Figure 2. All four of these concepts taken from the developer’s side also had a part in the game player model, including the two primary concepts. As previously mentioned, there were four concepts that were only covered from the developer’s side with no research done from the player’s perspective. The research distribution for these four items suggests that, while distinct concepts, they may be of relatively similar importance, and
FIGURES 2 & 3: ARTICLE DISTRIBUTION

GAMEPLAY: 37%

SETTING, NARRATIVE & AESTHETICS: 26%

USER CREATED OR MODIFIED CONTENT: 11%

GRAPHICS & PERFORMANCE: 11%

CREATIVITY & INNOVATION: 17.5%

BRAND IDENTITY: 7%

GAME / PLATFORM STABILITY: 7%

COPY / PIRACY PROTECTION: 0%

NEW REVENUE SOURCES OR MODELS: 0%

LEGAL ISSUES / VIRTUAL GOODS, PROPERTY & ECONOMY: 0%

GRAPHICS & PERFORMANCE: 33%

GAMEPLAY: 21%

CREATIVITY & INNOVATION: 17.5%

SETTING, NARRATIVE & AESTHETICS: 10.5%

BRAND IDENTITY: 5%

GAME / PLATFORM STABILITY: 3.5%

COPY / PIRACY PROTECTION: 3.5%

NEW REVENUE SOURCES OR MODELS: 2%

USER CREATED OR MODIFIED CONTENT: 2%

LEGAL ISSUES / VIRTUAL GOODS, PROPERTY & ECONOMY: 2%
therefore may comprise a collection of developer-only concepts that combine to form a model of game developer priorities (Figure 4).

Once the two models were established, way to expand the relationships became apparent. Due to the related concepts used in each model, there were four junctures at which the two models could be joined through conceptual relationships, forming a new model representing at some level a developer/player expectation relationship: First, game/platform
stability directly relates to graphics & performance, which was a topic of research for both developers and game players. Therefore, a relationship between the two concepts was proposed, with stability contributing to performance. Second, copy / piracy protection was recognized as playing a negative role in gameplay depending on the implementation. This has traditionally not been a huge issue for games played on a gaming console (such as Xbox or Playstation), although console piracy exists. Piracy and illegal distribution is widespread for games played on a personal computer. Some forms of computer game copy protection are less invasive than others, such as the cd-key method which entails a series of unique numbers printed on the documentation of a game that must be entered into an interactive window when the game is installed. Certain types of protection have developed a stigma among gamers, such as Valve Software’s (the developer of Half Life and Half Life 2) STEAM distribution tool, and the Starforce copy protection distributed by developers in Russia. STEAM distributed games can require users to register and validate their games before playing, ensuring a valid, licensed copy of the game is owned by the player. When Valve’s highly anticipated title Half-Life 2 was released, hundreds of thousands of users attempted to authenticate their games at the same time, bogging down the authentication servers and leaving many unable to play the game they had just purchased (Gamepro 2004). Starforce installs a hidden device driver to the player’s machine that has been reported to cause system problems which are extremely difficult to track down (Vederman 2006). Many commercially marketed games require computer game players to insert and keep the game media in the media reader for some form of validation, preventing players from listening to an audio cd while playing, for example. Therefore, certain versions of copy protection have the potential to contribute negatively to gameplay, and the possibility of this is represented by a dashed line in the model. Next, new revenue sources or models can affect gameplay either positively or negatively depending on how they are represented. Some players may like the ability to order a pizza from within their online game and have it delivered to their door while they continue to play. Others may not enjoy their playing experience as much due to advertising billboards, audio and video that inundate them in their virtual world. A relationship between revenue models and gameplay is represented in the model. Finally, the entire player satisfaction level of the game should be a priority of game developers, and would affect sales in the form of published reviews and word of mouth among game players. This is a significant relationship that presumably would affect developer revenue more than any other concept since it is directly related to sales. Therefore it is represented by a weighted line from player satisfaction to developer priorities to denote its significance. The finished model is shown in Figure 5.

The model represents a possible research focus that can simultaneously illustrate the game developer’s concern with developing quality games and creating revenue as well as the game player’s concern with having satisfying games to play.

The concept matrix suggests that game players are not significantly concerned with copy / piracy protection, platform stability, new revenue sources for developers, or virtual
goods and property. While a literature analysis such as this cannot be taken too far, the lack of research on those topics from the game player perspective does lend some weight toward the conclusion that they mean a lot more to game developers than to players.

**LIMITATIONS AND FUTURE RESEARCH**

As previously stated, the aim of this paper was to investigate how the voices of game developers and game players were represented in literature. As such, the results should be taken as conceptual information, useful for inspiring further research and generating research ideas.

One interesting observation is that social aspect of gaming was not represented in the literature examined, although this may have a lot to do with the business and IS context of the search criteria which was reflected in the search for articles. Online games are increasingly being designed to have a strong social context with interfaces built to promote virtual social interaction. This is an area that certainly deserves more attention in future studies, and should be eventually represented in the model.

Also, the consumer cost to play games was mentioned in passing in several articles, but it was not found to be the focus of any study within the search results, nor was it ever represented significantly enough to be given consideration as a topic. This is another area that should eventually be represented in the model.
The research method used is but one way to identify what researchers are looking at, and what practitioners are talking about. It is the author’s hope that it delivers a different perspective than the typical survey that asks people what they want.

**CONCLUSION**

In this study, the existence or lack of research on video gaming is treated as an indicator of the interest in such research generated by the end targets of both video gamers and video game developers. A model was generated which can serve as a foundation for future research on video game players and developers, and the relationships between the various factors that affect game developer priorities and game player satisfaction. This model should be tested in future research.

The model represents the derived concepts from one line of study. There are likely more constructs that play a part in the illustrated relationships. It is the author’s hope that these constructs will be located and defined by future researchers on this topic using various methods of research.

Research gaps uncovered in this paper include the lack of study on video game users and copy / piracy protection, platform stability, new revenue sources, and legal issues & virtual property. The surmised relationship between player satisfaction and developer priority should be tested. The proposed negative relationship between copy / piracy protection and gameplay is intriguing and requires further study. The relationship between new sources of revenue and gameplay is predicted to have the potential to be positive or negative, and may turn out to be complex.

Hedonic information systems deserve to be included in the top journals of the IS discipline because of their widespread adoption in our society. The proliferation of this type of information system and the business revenue they generate should vault them into the forefront of modern IS research. Hopefully this paper will serve as a catalyst to trigger new and novel research on this provocative and stimulating field.
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