

Marrying HCI/Usability and Computer Games: A Preliminary Look

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ABSTRACT

The fields HCI/usability and computer games have existed for a few decades with virtually no mutual interaction. However, in recent years, a number of exchanges have appeared, both in academia and in practice. This paper presents a preliminary account of this development. Exchanges in both directions seem viable: evaluation methods from HCI/usability towards games and interaction techniques and supporting user communication from games towards HCI/usability. The paper concludes with a discussion of the differences and similarities between the two fields.

Author Keywords

HCI, usability, computer games, video games, interaction.

ACM Classification Keywords

H5.2. User Interfaces.

INTRODUCTION

The two fields HCI and computer/video games have been around for a few decades. Both have gained substantial foothold and have definitely come to stay. In computer science curriculae in the US, HCI has become one of the ten most popular areas [9]; every system developer knows about usability but does not necessarily agree or abide with it; a vast number of usability activities are conducted every day; numerous textbooks in HCI and usability have appeared; and a good number of conferences are held every year.

Similarly, the area of computer games has exploded in the last decade: a large proportion of the population plays re-

gularly; allegedly, the game industry in the US is the fastest growing sector in IT and is now economically equivalent to Hollywood; and massive multiplayer online games with hundred of thousands or even millions of players have appeared - such as Everquest and Lineage.

A generic feature of the two fields is the dedication to providing the users with what they want, but nevertheless there has been very little interaction between them. An exception in the HCI field is the 1982 paper by Malone [10] addressing how software can be made more enjoyable by adopting ideas from games. Another exception is the extremely popular game *The Sims* developed by Will Wright. Rouse [13] comments on this game

"The Sims' user interface is a beautiful example of how to do an interface correctly - the user interface is so simple and intuitive and the tutorial addresses how to play the game, not how to manipulate the interface ... no doubt the result of rigorous playtesting"

An interview with Will Wright reveals in fact that the user interface went through 11 iterations with about 100 play-testers where the developers sat down and watched players' mistakes and misconceptions [13].

But within the last few years, a remarkable change has emerged. In the game industry, Microsoft established a Playtest group a few years ago with quite remarkable results [11]. In academia, an article in the respected journal *Human-Computer Interaction* based on a Ph.D. thesis by Fabricatore appeared [7]. In spite of these developments, Pagulayan et al. conclude [11] *"This relationship between theories of game design and traditional HCI evaluation methods has yet to be defined but definitely yields an exiting future."*

This paper shares this point of view and takes up this challenge. First the paper outlines the background and a framework. Next contributions from usability to game and vice versa are outlined, followed by a discussion of the differences and similarities of the two fields. On a related note, usability has recently been applied successfully to interactive art by Höök et al. [8]. This is relevant as many computer games do have an element of artistic expression.

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NordiCHI '04, October 23-27, 2004 Tampere, Finland
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BACKGROUND AND FRAMEWORK

In software engineering and the emerging field of HCI/usability¹, a host of books on user interface design and the underlying academic disciplines emerged in the 1980's and 1990's. One would imagine that techniques and hints from the realm of games would be mentioned in these books in order to make software more satisfying or even enjoyable. Not so – even in spite of the recent focus on enjoyable and emotional aspects of computer applications.

Similarly, in game development, many books have seen the light of the day since Crawford's seminal book *The Art of Computer Game Design* from 1982 [4]. The concerns of the players/users are key to these books – and the terminology of HCI/usability is indeed visible: A count of the terms *user interface*, *usability*, *user friendliness/friendly* in the index of three recent books on game development resulted in

- Crawford (2002) [5]: On Game Design 3
- Rouse (2001) [13]: Game Design 21
- Rollings & Adams (2003) [14]: On Game Design 29

Contrasting the situation in software development, it is striking that - to the best of my knowledge - no books on interface design in games have appeared although the players' interactions in games is so intense and that game interfaces and game universes have developed so dramatically since the first primitive ASCII-character-based games. This is not unlike the state in the 1980's where some books on software engineering included sections of user interface design, while others did not.

An interview with the highly experienced game designer and author Ernest Adams [1] provides a strong indication of the realm of game design:

"I've been working for a major game developing company for 8 years and I've never seen a methodologically sound study of who the players are game design is based on common wisdom and guesses - designers build games for themselves."

Against this background the paper illustrates the state of art by discussing five recent examples of exchanges between HCI/usability and computer games, see table 1 below. The selection of material included warrants a comment. I have focussed on the contributions in the literature that best support the points made in the paper. I do acknowledge that other work in the field exists, for example by Melissa Federoff, and also that other fruitful avenues between the two fields exist such as having the card game Solitaire integrated in MS Windows that will familiarize novice users with the mouse.

¹ I have chosen the awkward terminology "HCI/usability" - as opposed to either HCI or usability - as both areas are relevant in the discussion.

Paper	Contribution	Route Usability Games
Pagulayan et al (2003) [11]	Evaluation methods	⇒
Christensen et al (2003) [2]	Participatory Design methods	⇒
Rouse (2001) [13]	User needs/conceptions	⇐
Dyck et al (2003) [6]	Interaction techniques & player communication	⇐
Fabricatore et al. (2002) [7]	Empirically founded design guidance	⇔

Table 1
Selected examples of HCI/usability-games interaction

ROUTES FROM USABILITY TO GAMES

Pagulayan et al. [11] report an impressive endeavor undertaken at Microsoft Game Studio in Washington. The rationale for their work is that games *are* doing very well on the market, but would in all probability do even better if the games were more usable. There is also a growing recognition that even successful games such as Halo suffer from poor usability, for example in terms of tutorials and weapons control [3]. Established in 2000 and employing a handful of game developers, psychologists and HCI specialists, the Playtest group has tested more than 70 games with more than 10.000 participants. The group employs quantitative and qualitative methods and address initial player experience as well as deep gameplay. The group is also involved in development of the games. They employ an iterative approach denoted RITE: Rapid Iterative Testing and Evaluation based on short cycles. The following example illustrates their work [12]. In a combat flight simulator most players had difficulty with the term "AI level" in the difficulty presets (meaning "Artificial Intelligence level"). Several interpretations were offered:

- "A one level ... ?"
- "AI level ... ?"
- "Altitude level ... ?"
- "Anti aircraft ... ?"

The redesign solution was to rename "AI level" to "Enemy level" in three settings: rookie, veteran, ace; this remedied the problem completely. Did anyone say "*Classic usability wisdom: 'Speak the users' language'*"? To the best of my knowledge this endeavour at Microsoft is the only example of major game developers having seriously taken up usability approaches.

Christensen et al. [2] report on using techniques and methods from Participatory Design and usability in developing a hybrid game called Takkar. Takkar combines

live action role playing games with virtual role playing games, allowing playing on-line inbetween the much less frequent live action role play sessions that take place outside with dresses, equipment, scripts, roles, etc. a few times a year. The development included substantial prototype development, numerous playing sessions both on-line and in the real world, expert reviews, and in-depth debriefing interviews. The iterative development revealed a range of issues such as walking and talking simultaneously with your fellow players. This is *completely* natural in the real world while not at all easy to transfer to the virtual game world due to game engine constraints.

ROUTES FROM GAMES TO USABILITY

The opening chapter of Rouse's book *Game Design – Theory and Practice* [13] is delightful reading. It is called *What users want*. It lists 16 principles such as *Players want a challenge* and *Players expect to fail* – much like principles or guidelines in HCI/usability literature. A considerable overlap with conventional HCI/usability approaches appears, but the differences are far more striking: The description – almost a narrative - entails the player in flesh and blood. It is clearly written by a highly experienced game designer who knows both the design and the play side of gaming. Contrasting this, most HCI/usability textbooks perceive users in the light of cognitive science: mental models, memory capacity, attention span, features of the human visual system, etc. The Rouse opening chapter is the chapter I always wanted on users in HCI/usability books. On this note, I believe that many HCI/usability books are written by researchers with little or no design experience.

Dyck and colleagues [6] undertook a comprehensive study of interface features of contemporary computer games. The background to their study is the observation that games developed in their own direction, e.g., no windows and no widespread standards, and there is a strong focus on novelty, user performance and user satisfaction. Thus, games can be seen as adopters of new interaction technologies. Dyck and colleagues studied 13 games while employing 5 methods: game playing, keeping diaries, observations, reviews, and analysis sessions.

Their findings address four areas:

- *Effortless community*. Games makes it easy to form, join, and participate in communities of users. An example is the successful integration of the natural community in the game world in massive multiplayer games.
- *Learning by watching*: gamers help people learn the application by watching 'over the shoulder' of more experienced users. As an example, in multiplayer games all players can readily observe other players' actions and thereby reduce obstacles in learning.
- *Deep customizability*: games give users the power to modify and extend any aspect of the user interface and allow them to share those modifications. As an

example, in Everquest, players can readily store an action sequence in a new button with a few mouse clicks as opposed to for example Microsoft Word, where 7 actions are required to record a macro and 5 more to place it in a toolbar.

- *Fluid system-human interaction*: games communicate information to users in ways that do not demand the users' attention and do not interrupt the flow of work. As an example, in many games, system messages are delivered in an unobtrusive way and do not require the player to acknowledge or dismiss them.

Dyck et al. conclude that games provide a wealth of successful radical and novel interaction concepts that might benefit users of productivity software. On a final note, I should add that some find that these conclusions paint a too glamorous picture [J.H. Smith and L.J. Christensen, personal communication, June 20th, 2004].

ROUTES BOTH WAYS

Fabricatore and colleagues [7] asked the question: *What do players want?* and answered it by empirically addressing players' playability preferences. They selected the genre action game and selected 39 popular games. They had 53 experienced players play each of these games for roughly two hours while tape-recording their comments, logging their interactions, and conducting interviews after the sessions. The results were analysed in depth and resulted in a *game reference model* with 3 categories (entities, scenarios, and goals) broken down further. The guidance includes mandatory prescriptions and voluntary recommendations. An example from the category *role* (part of *identity* and *entities*) is the prescription *Allow the player to understand the role easily* and the recommendation *Offer the player the possibility of selecting the initial role of the protagonist*.

This work is groundbreaking in that it provides an empirical basis for design guidance by way of a comprehensive study of actual player behaviour. Hence Fabricatore and colleagues supplemented the experience-based game design evidence with systematically, empirically derived design evidence. As the evidence has been established in a fashion acceptable by the HCI community, one might hope that the evidence may flow back to HCI/usability and support designers looking into ways of making productivity software more enjoyable.

DISCUSSION AND PERSPECTIVES

As indicated above, exchanges in both directions seem viable: for example evaluation methods from usability towards games and interaction techniques and supporting user communication from games towards HCI/usability.

There are a range of commonalities between productivity software and computer games (and more broadly entertainment software): learning, motivation, mental models, control, interaction, feedback, spatial navigation, linguistic

and visual expressions etc. These seem to be within the scope of traditional usability approaches in both camps.

There are, however, also substantial differences that call for thorough consideration when trying to marry usability and games. The most important is probably that of *challenge* in games by way of an intended difficulty. This is witnessed by the game design slogan *easy to learn but difficult to master*. This is basically handled by balancing the gameplay – a feature that can be compared to usability efforts towards meeting the users’ needs in terms of effectiveness, efficiency, and satisfaction.

Another striking difference is freedom of use and acquisition. Productivity software is largely used mandatorily, typically in work settings. In acquiring and using productivity software, the user or consumer has little or no choice due to de-facto market standards (in web-applications, the range of choices is, however, often somewhat wider). Contrasting this, use of computer games is featured by being almost exclusively voluntary and hence Darwinism in the marketplace has a more pronounced role at the low level. However, as in the early days of computers and computing, the quality usability of games seems so far to have had little impact in the market.

In many computer games, huge virtual universes are created and players can contribute substantially to these universes. In spite of the richness, diversity and vastness of these universes, the action takes place almost entirely *within* these universes, encompassing both the digital world and the real world (with player communities, buying/selling avatars and objects, exchange of level designs, etc.). In productivity software there are substantial implications *beyond* the software: “*Can I finalise the budget for the next quarter before the management meeting tomorrow morning?*” and “*Did I manage to get the right plane ticket on this odd airline web-site?*”

The implications of these differences – and other fundamental differences between productivity software and computer games – are currently not clear in terms of the potential of usability methods in development of games and the other way: what productivity software can learn from computer games re. engagement and enjoyment. Perhaps a starting point can be the maxim in computer games (and indeed games in general): *easy to learn, but difficult to master* that reflects and contrasts conventional usability evidence *easy to learn and easy to master*. This is where the *substance* is regarding purpose of the software: the fundamental *challenge* for the player and the fundamental *utility* for the user.

On a final note, Marc Wouters [personal communication, Nov. 5th, 2003] suggested that games would be used as metaphor for personal computers in 2010 leaving the

desktop metaphor behind – indeed an interesting and spectacular interaction between HCI/usability and games!

ACKNOWLEDGMENTS

I am grateful for insightful comments to an earlier version of this paper from Jonas Heide Smith, Gonzalo Frasca, Laust Juul Christensen, and two anonymous reviewers. I also thank one of the anonymous reviewers for the example with the game Solitaire.

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