Meaningful Game Elements for Personal Informatics

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Abstract  
Thanks to the advancements in wearable technologies, Personal Informatics tools can reach now the larger audience represented by common people. However, their integration in users’ everyday lives poses a variety of issues that should be addressed. This research proposes to look at the world of video games to find new insights for improving personal informatics applications and devices.

Author Keywords  
Personal Informatics; game elements; ethnography

ACM Classification Keywords  
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction  
The advancements in wearable technologies are opening new horizons for Personal Informatics (PI) systems, defined as “those that help people collect personally relevant information for the purpose of self-reflection and gaining self-knowledge” [12]. The act of collecting data on one’s own behavior is known as self-monitoring in clinical psychology [10]: conceived as an assessment method to gather information about behaviors that only the patient could observe and record, it has become an intervention technique,
because of its reactivity. Reactivity occurs when the process of behavior recording causes the behavior to change [15]. Personal Informatics tools improve self-monitoring activities: thanks to wearable technologies, they allow people to track data potentially everywhere at every time; then, data can be aggregated, organized and visualized on mobile apps or web applications. Many academic studies have been conducted over the years to investigate how PI systems can promote user’s self-knowledge or change her behaviors in a specific direction. HCI researchers designed and developed wearable devices to facilitate people in collecting and visualizing personal information for therapeutic and rehabilitation purposes, or for promoting behavior change towards healthier or more sustainable habits. For example, PSYCHE [18] is a mood monitoring system for patients affected by mood disorders, which uses smart fibers and interactive textiles. Ubifit [2] is an interactive system composed by a glanceable display, a mobile app and a fitness wearable device to foster individuals to self-monitor their physical activity and incorporate regular activity in their daily lives. Rofouei et al. [17] developed a non-invasive, wearable neck-cuff system capable of real-time sleep monitoring. Recently, the commercial availability of many wearable devices for self-monitoring boosted the popularity of personal informatics outside the circles of therapists, academic researchers, technology enthusiasts and Quantified Self members (i.e. a community of users and makers of self-tracking tools). PI tools can now reach the larger audience of common people, widening the possibility of their widespread adoption and their integration in everyday life. Ad hoc wearable devices, such as Jawbone UP, Fitbit, the Nike+ Fuelband, track users’ behaviors and feed information back to them, allowing visual exploration of the data gathered. The spreading we described also opens for discussion a variety of new issues mainly related to the integration of this kind of technologies in people’s everyday context. Up until now, some research were conducted to discover how PI tools are used, but they were mainly focused on users already familiar with them [9, 12, 13]. In this new context characterized by an enlarged user base, which is mostly unfamiliar to PI systems and wearable technologies, how are the limits and potentialities inherent to these tools appreciated? May the users be affected by unrealistic expectations, by not knowing exactly what kind of efforts these technologies may require and which benefits they can provide? Should PI systems be rethought in order to better fit the needs and constraints of people’s daily lives?

Starting from these issues, my research aims at finding how PI tools that leverage wearable technologies can be better integrated in people’s everyday life, by identifying specific barriers that may prevent their widespread adoption and finding new solutions to overcome them. My idea is that useful insights to improve actual PI systems can be found in the world of video games, provided that we push ourselves beyond the present idea of gamification. In fact, gamification, intended as the use of game design elements in non-game contexts [4], is currently affected by a variety of problems, which have to be overcome if we want to really exploit what games can offer to the design of interactive systems. My final goal is to find new ways to address design elements commonly employed in video game environments to the field of personal informatics.

To summarize, my research questions are:

**RQ1**: Which kind of problems may people encounter when using, for the first time, PI tools during their everyday activities?
**RQ2**: Which kind of insights can video games provide to improve the design of wearable technologies addressed to track personal information?

**RQ3**: Which are the best ways to design engaging and motivating PI systems and support their long term usage, by exploiting the opportunities inherent to video games?

The main expected contributions of my research are:

1) understanding problems that common people may experience when using PI tools is essential to improve design for their widespread adoption;
2) finding new ways in which game elements can be used outside their original context can enhance, by and large, the design of interactive systems;
3) defining a series of design strategies for personal informatics and wearable technologies, grounded in the video game world, will allow developers to create more engaging and motivating tools.

My research is structured as follow:

1) In the first phase, I wanted to investigate how common users perceive PI tools and which problems may arise in their everyday use. For this purpose, I conducted a diary study, requesting participants to use a Jawbone Up bracelet during their daily practices.
2) In the second phase, I wanted to find a solution for the main problems arisen in the first phase. For this purpose, I looked at video games as a source of inspiration to discover novel ways for engaging and motivating people. In order to identify new game design elements useful to leap over the current gamification techniques, I carried out an ethnography in World of Warcraft, trying to understand how video games succeed in deeply involving their players and whether these experiences may be recreated in other environments.
3) In the third phase, my aim is to define a set of design guidelines for personal informatics, grounded in the data gathered in the previous research phase and apt to answer to the issues found in the first phase. The expected result at this stage is a series of design strategies that can enhance PI tools capabilities of providing an engaging experience, promoting self-awareness and supporting behavior change.

**Phase 1: identification of open issues**

To investigate how common users perceive and use PI tools leveraging wearable technologies, I conducted a *diary study*. Diary studies are a method of understanding users’ behaviors in their everyday context, allowing to capture information in situations that would be hard to be observed because of social or physical reasons [1]. 14 participants took part in the study. All of them had neither previous experience in using PI tools and wearable technologies, nor a specific interest in self-monitoring their own behaviors. They also did not have any special need for recording their physical or psychological states, such as chronic diseases, or desires for changing their behaviors (e.g. to stop smoking). Participants had to use PI apps (e.g. Moves, Sleepbot, etc.) and a Jawbone Up bracelet with its related mobile app for a minimum of two weeks with the opportunity to extend the study up to one month, in relation to their availability and interest. Participants were asked to fill in a diary during the day and in the evening, when they had to retrace their daily experience, noting their thoughts, problems and needs related to the usage of the assigned device. On the day after the completion of the diary, participants were interviewed for one hour. Findings highlighted a variety of issues related to tracking, managing, visualizing and
using data through this kind of technologies. Some of the main findings can be summarized as such: i) After an initial curiosity, the task of self-monitoring was perceived not only as a distraction from the users’ everyday activities, but also burdensome and scarcely engaging; ii) participants highlighted how this kind of technologies bump into social and “fashion” issues, like their integration with one’s personal style, and interfere with many practical activities; iii) wearable devices were perceived as suited to technological enthusiasts or people with special needs in tracking their behaviors (e.g. athletes, patients); iv) Lack of integration and correlation among different data and an excess of abstraction in their visualization prevented participants to find useful insights in what they have tracked; v) Low cost/benefit perceived ratio.

Phase 2: investigation in video game world
Gamification is commonly employed in designing interactive systems to enhance user engagement and motivations, or to trigger processes of behavior change [8]. However, existing gamified systems have received several criticisms on diverse accounts [5]: e.g. they add stand-alone game mechanics, instead of embedding systemic design strategies; or leverage exclusively extrinsic rewards, ignoring users’ intrinsic motivations and meanings; or limit the game elements employed to points, badges and leaderboards, without exploring more complex possibilities. Actually, it seems that the opportunities that games can provide to the design of interactive systems are not yet fully exploited. Game elements employed in current PI tools, such as Nike+, are focused exclusively on competition through points and leaderboards, and bumps in all the problems highlighted above. To overcome these issues, I propose to change the perspective commonly applied in gamification studies, adopting a new approach and starting from the players’ point of view instead of that of the game designers. Up to now, to my knowledge, no ethnographic study in video game environments has been conducted to investigate how games can improve design in non game contexts. I suggest to look at Massively Multiplayer Online Role-Playing Games (MMORPGs) to carry out an ethnographic research addressed to this aim. Fostering social relationships, favoring players’ immersion and ensuring a long game longevity, MMORPGs create an enduring involvement, which does not have equals in the world of video games. Among these, World of Warcraft (WoW) is still the most popular MMORPG available on the market. Players live and fight in a fantasy world, battling monsters, engaging in duels and meeting in groups for accomplishing instances and raids. Over the years, WoW has become synonymous with MMORPGs: for the uninitiated WoW is the virtual world par excellence while for game designers WoW set the MMORPGs "genre standards" [3]. Since it was also considered as “a game that 'hits on all cylinders motivationally', creating a deep and enduring loyalty in its audience” [16], WoW is the empirical case that most approaches the ideal type (as Max Weber [19] intended it) of a MMORPG capable of creating a deep engagement in its players.

I conducted an ethnography in World of Warcraft for a period of one year and a half to discover how MMORPGs are able to deeply engage and motivate their players. I played WoW intensively from October 2012 to March 2014, participating in guilds, accomplishing instances and raids and engaging in a variety of in-game activities, from trading to farming. Adopting a reflexive
Phase 3: definition of design strategies
In this phase, I aim at taking the findings gathered during the ethnographic research, mold them in design strategies addressed to the personal informatics context and concretize them in the concept design of features for PI tools that leverage wearable technologies: these design strategies should suggest new ways to engage users for a long time and promote a change towards better habits. This activity will be conducted in the last year of my PhD program.

Objective for attending the ISWC DS
During the Doctoral School I expect to discuss the preliminary results of my research, receiving suggestions on how I can strengthen my findings, whether they need further investigations and which kind of direction my future works could take. ISWC community can help me in contextualizing what emerged from my ethnographic research in the field of the wearable technologies, thanks to its deep knowledge of their potentialities and their current intrinsic limits. Also, I expect to receive insights on how some of the design elements I am encountering can be exploited, by and large, by persuasive technologies.

Brief Biographical Sketch
I am currently enrolled in the PhD Program in Sciences of Language and Communication in the Computer Science Department at University of Torino. The program started in January 2012 and is expected to end in December 2015. I am working under the supervision of Anna Goy and Federica Cena, Researchers at the Computer Science Department at
University of Torino. My main research interests are about technologies for behavior change, wearable computing, qualitative user research applied to HCI and game design.

References