From Fun Technology to Serious Applications: Lessons from a Few Exemplar Cases

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Fun and pleasure play a fundamental role to life. With the proliferation of computer-based entertainment technology, software systems designed for leisure became and are still becoming a part of our common experience [Monk *et al.* 2002].

Not only, the commercial success of high-end mobile devices has brought the possibility to ubiquitously communicate and exchange data with each other, profoundly changing our habits and creating what sociologists call *homo mobilis*: a person, moving around the physical world, while using digital information in a pervasive way. But it has also widened the already existing digital divide, i.e. the gap between those who can take full advantage of the new technologies and those who cannot, either for economic, cultural, physical or social reasons.

An inspiration to solve this conundrum comes from those applications that literally get better the more people use them, harnessing network effects not only to acquire users, but also to learn from them and build on their contributions. Indeed, it is clear how the success of Web 2.0 services such as Google, Amazon, Wikipedia, eBay, YouTube, Twitter, and Facebook is co-created by their respective communities of connected users.

It is hence clear how Web 2.0 is all about harnessing collective intelligence and, today, we can do much more. The smartphone revolution has moved the Web from our desks to our pockets. Collective intelligence applications are no longer being driven solely by humans typing on keyboards but, increasingly, by sensors. Massive amounts of data can be generated in real time through our phones and cameras. Motion and location sensors tell information such as where we are, what we are looking at, and how fast we are moving. Our profiles and interaction with the Internet, the real world, and other users reveal what we like and which are our intentions. Data can be collected, presented, and acted upon in real time thus increasing the scale of participation by orders of magnitude. As a result, the Web opportunity is no longer growing arithmetically; it is growing exponentially; hence the name: *Web*^{2} (*Web Squared*) [O'Reilly and Battelle 2009].

In this context, social networking is paired with online games as they represent the two most prominent trends emerged in the Web 2.0 era, both started as independent applications and now evolving with cross-contamination. Think for instance to the social community of World of Warcraft players or, specularly, to the popularity of games such as Farmville in Facebook.

In essence, a significant portion of our social interaction now takes place in virtual environments. Nonetheless, these virtual environments for users' interaction are strongly criticized for their frivolousness, arguing that it is quite disappointing to see all this technology and massive participation by users directed toward selfish and entertaining aims. One would suggest redirecting it toward addressing more crucial problems for humanity [Ferretti *et al.* 2010]. Yet, the technological platforms utilized to support these virtual environments for users' interaction also embody a resource for more serious goals.

This is not a completely new statement; in recent years, social platforms such as social networks and online games have attracted many researchers specialized in various disciplines to tackle their technical challenges. Research in this apparently frivolous topic is often scientifically justified not only with the success of social/gaming applications but also with the promise that their devised solutions could be exported to other, classic, computer science fields. However, one may wonder whether this is just propaganda or there is some real potential for technology transfer. We are strongly in support of the latter and to demonstrate it we summarize here some representative examples of technology transfer from frivolous to serious employment, one case study for each among three entertainment related topics: sensors for games, communication, and social communities.

Starting with sensors for games, the success of Nintendo's Wii game is very well known. Now, even games for mobile phones are more and more exploiting users' real movements to interact with the game (i.e., rotating the iPhone to have a virtual car steering). Sensors, of course not just movement sensors, represent the current frontier for games. Yet, the same technology could be exploited to implement pervasive healthcare systems. For instance, wrist rehabilitation is currently accomplished through very expensive and bulky machinery that cannot be moved from hospitals or through exercises that the patient is supposed to perform at home but with no way for the doctor to verify the patient's dedication or performance. Instead, DroidGlove is a serious game for Android and iPhone platforms that proposes to the users several movement tasks [Deponti *et al.* 2009]. The user can perform the exercises anytime and anywhere, the smartphone can remind her/him to exercise with a certain frequency, while the gyroscope is utilized to determine the accuracy of the user's movements so as to assign a score. Both the assigned movement exercises and the accomplished scores can be exchanged in real time between the player and its doctor for a comprehensive supervision.

As a second representative example we consider communication technology developed to connect mobile users. In this context, even the ultimate mobile communication frontier, vehicular networking, has not remained immune from the gaming revolution and a solution to ensure fast propagation of every game event in the vehicular network has been proposed [Palazzi *et al.* 2007]. The solution is based on the assumption that message transmissions in the network have to be limited as much as possible as network congestion causes transmission delays. Therefore a distributed algorithm to choose the most appropriate forwarder for every game event has been proposed. At the same time, the problem of fast message delivery is shared by other serious applications such as, for instance, traffic alert message propagation. Therefore, the solution developed for gaming has been adapted to be used even in this context with the important result of significantly reduce the number of cars involved in case of accidents [Palazzi *et al.* 2010].

Finally, consider social communities and their ability to gather millions of users around the world. This ability, currently dedicated to entertaining social interaction, also represents an enormous potential for creating useful serious applications for the whole society. Indeed, the combination of games with social networks, crowd-sourcing and mobile users with sensor-equipped smartphones could create a major force able to tackle serious challenges that can be considered too complex for single users and even for computers. As an example, imagine how a serious game could help visually impaired users. Revisiting the Google Image Labeler serious game [Google 2007] and bringing its concept into the real world, we could design a social community where users help each other by appropriately labelling the surrounding environment (e.g., crossroads, architectural barriers, parks, stores). Again, this could also be organized as an online

game, with players obtaining game points if they label the same real object with the same label. This way, they will add digital tags to real objects, creating a social community similar to Panoramio [Panoramio 2006]. The serious advantage would be that of having a participative, augmented reality environment where a visually impaired person could perceive the surrounding real world through her/his mobile device able to retrieve the aforementioned digital labels and transform their format (text, image, video, etc.) into audio, thus improving her/his autonomy.

We can hence forget all doubts and welcome research dedicated to entertainment technology: eventually, the whole society will gain serious benefits from it.

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