GUEST EDITORIAL PREFACE

The Importance of Scenarios in the Prediction of the Social Implications of Emerging Technologies and Services

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BACKGROUND

Emerging technologies can be defined as those cutting-edge technological innovations (process or product) that are currently being developed and deployed in a variety of fields, such as bioinformatics, material science, and robotics. In the information and communication technology (ICT) space, high-tech examples of emerging technologies include: sophisticated forms of automatic identification using motion analysis, location-based services with real-time activity monitoring and tracking, wearable computing with embedded point of view (POV) cameras, and implantable devices which can perform condition monitoring and measure physiological characteristics in living things (Michael & Michael, 2009). Emerging services usually stem from the integration and convergence of two or more emerging technologies and are radically changing the way we live and work and relate to one another via social computing (Michael, 2004). Consider the use of an embedded global positioning chipset on board a 3G smart phone with the ability to geotag photographs and video taken at a scene anywhere in the world, and to verify who in fact took the picture via an identification implant under the skin.

Most emerging technologies have been developed by the military for the military. Outside military purposes, these emerging technologies are adopted by government to protect their citizenry or to enhance whole-of-government approaches, or to equip police forces with the latest high-tech gadgetry to streamline operations. These emerging technologies once tried and tested in secret and utilized for some duration by defense, find themselves commercialized for enterprise use, and finally packaged or bundled as emerging services for the every-day consumer. This
transition from a defense-oriented to a commercial-oriented emerging service delivery usually occurs when public agencies (e.g., intelligence agencies) develop close associations with third party private organizations (i.e., research oriented companies funded by venture capitalists). There is nothing wrong with introducing new technologies into the marketplace used in a given context that will reap some kind of economic value. But the “value” that is brought to life by an innovation must be useful (Rogers, 1962), must be needed by its users, and must be forward thinking so that it incorporates the feedback of the very consumers it will affect and have an impact on. Modern innovation cycles no longer follow typical s-curves and user adoption of high-tech services follow different path dependencies deviating from such traditional models depicted by Rogers (1962).

SCENARIOS AND THE PROOF-OF-CONCEPT STAGE

One mechanism by which the scientific elite who are responsible for the research and development of new innovations can ensure that the technologies they are building have safeguards inbuilt into their design is to consider all the possible ways that their technology can be used or misused. The methodology of “scenario planning” implemented using “stories” plays an important role here (Artz, 1998). Scenario planning is not about predicting the future verbatim but about exploring the possibilities: “[i]f you are aware of what could happen, you are better able to prepare for what will happen” (BREFI, 2011). This is a safe environment within which designers can postulate how the technology can be used in the very best way or the very worst way. Here “what if” style questions can be asked about the application of the technology, how it might affect both operational and non-operational stakeholders, and what types of socio-ethical implications might ensue. Despite the rush to be first to market, to capture the first mover subscriber base and the greatest part of the market share we cannot be deploying “proof of concepts” for real-time consideration without having done the necessary investigations beforehand.

Proof of concepts are model “mock-ups”, they are ideas that have taken some form and shape. The proof of concept can show the design team and the client a view of the specification and preliminary design (University of Queensland, 2004). It provides a vehicle for discussion; it is not the final product in all its glory. It allows us to see what the potential use cases are, where it might work, where it might fall over, where it might actually cause devastating impacts or for that matter where it might be extremely beneficial. The evaluation of the proof of concept may result in adjustments to the specification and design to better meet the needs of the client and their end-users. After the proof of concept has been accepted in principle, there is an acceptance and sign-off at the design stage- this provides the go-ahead for the product/package to be further developed.

Part of the problem today is that innovations are diffused into the market without a client base- the “build and they will come” mentality is firmly engrained in the Web 2.0 way of thinking. The excuse for some online products being in a perpetual beta state has to do with limiting the amount of time one spends on development by ensuring that the key elements work properly initially and then to be concerned about feature driven changes as they are needed. For example, social networking companies will often default settings to open access/public view because it is in their best interest to do so. Unless end-users demand a change in this approach to switch all settings to limited access/private view or for new privacy-based settings to be introduced, any significant changes will not take place. It is akin to the “all-you-can-eat” model.
PREDICTING THE TECHNICAL AND SOCIAL RISKS OF EMERGING SERVICES

When conducting technology assessments it is important to be mindful to separate the various layers of innovation (Grin & van de Graaf, 1996; Porter, 1980). First there is the idea or invention stage, and then there is the innovation stage, and finally the diffusion into the market where the product or process is commercialized (Lindley, 1997). For emerging technologies and services in the ICT space there is an onion-peel effect—a system of systems—not just one large orange peel. It is the “confusion” of these two distinct processes, we might say somewhat loosely between the Aristotelian and the Platonic approaches to “design”, that can lead to some apparently insurmountable problems. Emerging technologies and services are complex systems because they are increasingly hybrid in nature. A smart phone does not just simply possess a single transistor. In one respect it is a hybrid of a mobile phone and personal digital assistant (PDA) offering both voice and data access. In another respect, it has hardware and software components and there are many stakeholders that contribute to its development. The complete smart phone requires diverse vendors that specialize in central processing units (CPUs), a baseband chip to connect with the 3G network, other communication chips like Bluetooth, GPS and Wi-Fi, a graphics processor and onboard camera, storage capacity to power the operating system, applications, content, and user data.

Now, each technology provider of each chipset cannot ponder about the effect of their individual componentry until the larger super-product is formed when they might simply justify their innovation by its functionality, e.g., a GPS chipset will allow a product to communicate with satellites and thereby perform a locate represented by X and Y coordinates. There is a push-pull effect at this point where multiple stakeholders form alliances or partnerships so that a given GPS chipset can be used in a given smart phone. Standards are relevant here as is forward-looking interoperability where vendors collaborate to ensure their product’s survivability. And it is at this point that a product has a use, that scenarios can be meaningful. A GPS chipset on its own cannot achieve anything of value (MacKenzie & Wajcman, 1999)—at best it would look like a sophisticated piece of electronics—some of them as tiny as three square millimeters which could fit neatly in the volume of a single match head. But placing a GPS chipset within a phone or a USB stick or a computer, we come closer to the knowledge of its ultimate trajectory. Then comes the all important software development process, conceiving of the specific applications that might be built around recording a response after a satellite has provided a location fix. The data can be represented as text, in a graphical or spatial format. It is at this stage of the process of innovation that we can with clearer lenses speculate on the possible ways that a product might be exploited—for good and for bad. These terms though considered too metaphysically loaded by a large group of researchers, are not redundant and must not be overlooked.

To carry the analogy a little further, let us maintain that we have been tasked with developing new and emerging location-based services. Let us imagine now that we have conceived for the first time that location-based services can be fused with social networking applications to offer location-based social networking. We walk into a brainstorming session with our fellow application developers and begin to ponder on how location based social networking might be used by smart phone subscribers in the future—location-based emergency services, location-based child protection services, location-based family/friend finder, wander alerts for carers of sufferers of Alzheimer’s Disease—the picture looks great for the usefulness of location-based social networking. That is, of course until another colleague mentions the term advertising and another marketing and another fleet management and customer relationship management. It does not take long for someone else to ponder that these technologies can be equally used to stalk oth-
ers, for theft, for blackmail, to monitor employees and much more (Fusco, Michael, & Michael, 2010; Perusco & Michael, 2007). But these negative potential social implications are put to the side because proof of concepts are mainly ensuring that the proposed solution is technically practical and that other related technical risks and issues are identified to be addressed in future stages of the systems development life cycle (SDLC) (Microsoft, 2004). We also too readily convince ourselves that the benefits of moving forward outstrip the costs because progress after all is progress, and one cannot and should not stop the advance of science.

**CHALLENGES AND CONCLUSION**

And here is the classic problem faced by developers – as an entity that is focused on developing new products how concerned should I be with how a technology is applied by a member of society? Can I really stop someone from using a butter-knife as a weapon instead of using it to spread jam on toast? Here it is important to distinguish between the technology itself and that which fashions the technology in a given application (Ellul, 1964). In the end developers and their clients will very often, if not most of the time, pass the buck when it comes to accountability and social responsibility. Deep down it has to do with the approbation or not, of business ethics (Fisher & Lovell, 2009). Do we acknowledge that our products might have been better introduced into the market with more safeguards or are we of the “come what may” ideology that says that the law (and the courts) will deal with deviants who will harm others by the misappropriation of a given piece of software? The dilemma with emerging services, however, is that they push the boundaries of laws, that every jurisdiction has its own regulations and that systems are being deployed physically between numerous countries. Location-based social networking is an excellent example of an application whose users might be thousands of miles away from one another, and yet “friends” can do look-ups to see one another instantaneously with servers sprawled all over different countries. Leaving it to the law, when the law cannot deal with the subtleties and intricacies of emerging services, means that society will invariably lose out.

Part of the solution has to do with working at Web-speed responsibly—that organizations take a good look at their current practices and consider whether they are doing the right thing by their clients and their end-users. And on that point – there must be real clients. It is also to build emerging technologies and emerging services with an ethical backbone. Computer ethics cannot be bolted on to products; it must permeate through the whole process of development (Gotterbarn, 2003). Computer ethics cannot be taught to company employees over a two-day workshop; it must be imbued in individuals from the beginning of their employment, indeed as a freshman studying in their first few years at college, even earlier in elementary school as a more general concept (Herkert, 2000). Today there is a great emphasis on corporate social responsibility and information technology practices, but much of it is lip service, clouded in a twisted kind of superficiality which keeps employers happy and employees believing they are doing the right thing (Cohen & Grace, 1994). When corporate misdemeanors are found out, one or two individuals are blamed and used as scapegoats, and government or legal enquiries at best will slap the hand of the perpetrators and move on choosing to both forgive and forget. But more must be done to hold stakeholders accountable, some form of enforceable industry pressure at first and then ultimately government regulatory measures. According to observers like Chris Pounder of Amberhawk, the “right to forget” simply does not work (Pounder, 2008).

We are not for a moment trying to stifle innovation- great ideas come from creative thinking. But we are advocating the need for more user-centered software/hardware development
processes where the makers spend a commensurate amount of time thinking about “emerging implications” as they do about their designs. One of the principal keys to unlocking the potential of emerging technologies and services are “scenarios”. When developers and the companies they work for are mindful of what might happen if a given product was used in ways that it was never intended, they just might be able to prevent the inevitable by introducing a few additional layers of security or defaulting to feature-set values that were less harmful to minors for instance. Of course the problems that we have raised will never be eradicated completely, but this is not the point we are trying to make. The point is that we can do things a great deal better and that the Web-speed spiral we are all caught up in needs to be quickly and fundamentally redressed.

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REFERENCES


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