Second Life : Emergence of swarm communities?

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Introduction: Synthetic Agents within Second Life

In March 2008, Eddie, a new type of avatar, was introduced to the virtual world Second Life[1]. Eddie is unique in that he is an artificial intelligent agent, embodied within a virtual avatar. According to his makers, as an AGI agent (artificial general intelligence) Eddie possesses behavioural, cognitive and emotional abilities equivalent to that of a four-year-old boy (Bringsjord, 2008). In the long term, designers of intelligent behavioural technologies, such as Eddie, hope to create synthetic organisms capable of auto-governance who, able to learn from their own experience, will somehow remain controlled by humans (Bringsjord and Yang, 2007). Such an aim may seem futuristibut intelligent applets are already involved in decision-making activities that influence human scientific, economic and cultural life (Goertzel, 2006). Still lacking the emotive abilities Eddie seems to display, these agents are part of synthetic communities, where they interact with other agents, sorting and analysis data in universes parallel to humans (Park et al, 2004), or interacting with humans in hybrid mediated or physical environments (Nehaniv and Dautenhahn, 2007).

Incorporating synthetic agents into simulation environments such as Second Life adds a layer of complexity to cyberspace that cannot be easily comprehended. Part of the complexity comes from the fact that both technologies represent distinct new media. Since specific new media exist at the intersection of multiple ideological frameworks, mixed multiple new media promises to make muddy our ability to comprehend the scope of change they represent.

1 A virtual word where humans, as avatars, interact with each other and software agents, in a three-dimensional space that uses the metaphor of the real world (Second Life, 2008).

Through a literature review of existing research and interviews with Second Life cultural innovators, I am trying to understand the nature of the various value systems influencing the development of these new media.

This article by no means provides an exhaustive survey of existing thinking. It focuses specifically on media cultures by exploring how the ideologies of visual media, social and experiential media as well as AGI[2], Alife[3] and robotics currently coexist in the development of artificial agents in Second Life. It lays down the theoretical scaffolding of upcoming research that examines the impact of these new media on cultural institutions by using a hybrid methodology that blends discourse and socio-economic analysis.

The first section focuses on new media as a cultural and social innovation. We know that innovators design technologies to mirror the practices of their own culture. But as Latour demonstrated, innovators are social actors that are influenced by various cultures inherent in their multiple networks of relations (personal, social, cultural, professional, technological) which are not intrinsically coherent, and may contain conflicts (Latour, 2005). Actors are more or less aware of these incoherencies and conflicts which will translate into actions that do not correlate with their discourse (Weber, 1930). Another difficulty is that users also reshape these designs to suit their own economic and social purposes (Moeglin, 2004). When introduced within institutions, the various industrial and professional contexts of these institutions will adapt the innovation to serve their existing social and economic models (Gensollen, 2006).

2 Software that tries to emulate human thinking, emotions and learning techniques such as a chess program that memorizes your moves, employs a strategy and makes comments about your tactics. Software programs, browsers, search engines (AGI, 2008).

3 is a field of study and an associated art form which examine systems related to life, its processes, and its evolution through simulations using computer models, robotics, and biochemistry (Artificial Life, 2008).

In time, the interplay between the values of all these various groups gives birth to new practices which will become legitimized as unique workflows. In other words, as socio-constructivist sociologists have demonstrated, the successful adoption of a technological usage within society is the result of the influence of multiple social and technological factors (Flichy, 1995; Miege et al., 1986), which are not all based on dialectics of innovators.

Dialectics refer to the narratives carried via discourse which carry specific societal values. For Hegel and Marx, dialectics signified the transformational dynamics of social history (Heim, 2000). The second part of this article focuses on a discourse analysis which will be useful in understanding the nature of current cyberspace dialectics. But such analysis is not enough to comprehend how these narratives translate into concrete actions. Only field observations within specific social contexts can give a sense of what is concretely developing within cyberspace.

Cultural industries theorists believe that the only way to understand how a cultural innovation influences reality is by observing the nature and viability in the time of its dominant social and economic processes, in other words its socio-economy (Tremblay, 1998; Miège et al., 1986). For this to be possible, the new medium has to have matured into a new media.

1. New Media at the Intersection of Multiple Ideological Frameworks

From a technological standpoint, all new media have in common the combination of multiple media within one platform. This implies the coming together of professional groups who seek to understand how an emerging technological platform can be utilized within their own field. Not only does each group envision the new media innovation within a specific social, historical and cultural frames of thought and action (Helmreich, 2007), they also are unable to share their knowledge with each other since very often disciplines do not share foundational axioms (Penny, 2008).

This explains why the term new media refers to entirely different notions, depending on the social group defining it. In the arts, for instance, some understand new media as a remediation tool that facilitates the mass distribution of broadcasting and photographic content (Manovich, 1999; Bolter and Grusin, 2000). Others see new media as a specific art historical movement, focusing not only on technologies and forms, but also on thematic content and conceptual strategies which involve appropriation, collaboration, and the free sharing of ideas and expressions (Tribe and Jana, 2006). For yet another group, it represents a subversive approach that repurposes industrial standardized technologies for cultural purposes (Whitelaw, 2004).

These differences in definitions also exist between disciplines. If for artists, the term new media usually identifies the use of technologies in relationship to an emerging medium, in other words, new mediated communication or expression forms, for cultural industries theoreticians it refers to the social, economical and cultural usages forming around a developing medium.

Cultural innovations within Second life are influenced by multiple professional cultures including visual, social and experiential media while synthetic organisms innovations are the results of a variety of computer engineering approaches including AGI and Alife to name a few. How are we to understand the impact of new media within what seems to be disjointed contexts? One way to create coherence is by observing how a specific technology turns into a medium; observe how usages and practices develop from the time people imagine its potential, during the period that potential has been realised and finally until the creation of formal organisational structures forproduction activities.

New Media Cultural and Social Innovation Principles

A technology does not automatically become a new media, but some technologies may over a long period of time and eventually mature into a cultural innovation. This process,

which happens over time, is referred to as a cycle of innovation, following steps similar to the ones described below.

Once a technology has become standardized, creative innovators informally experiment with it to understand its potentials as a medium. Within cultural industries, these actors come from fields such as the arts or education, and in parallel, entrepreneurs informally experiment with these platforms to understand their commercial potential. While they all view the innovation from within the dominant value system of their profession, some actors are trying to transpose the activities of their fields to the new platform, while others are attempting to establish alternate communication processes. Through these experiments a new language will emerge that creates expression and communication methods based on the inherent characteristic of a specific technology, and will become the basis of new ways of seeing and perceiving the world, in other words, aesthetics, specific to that technology. A medium is born when social actors have begun to develop a mediated language that uses the creative, aesthetic framework specific to the given platform.

Emerging New Aesthetics

Both Second Life and Alife already possess aesthetic frameworks which are influenced by network cultures and come in direct opposition with the dominant aesthetic of visual media. On one hand, as Simon Penny explains, a new aesthetic of behaviour is developing which is based on the reactive, emergent, generative and interactive aspects of computational arts practices. This implies a fundamental ontological shift from representational to performative narrative modes, which he correlates to a move away representational narratives that are attached: “at a deeper level, to conceptions of authoritative viewpoint and objectivity, linking such aesthetics to (C19th) scientific philosophy, and in turn, back to Descartes” (Penny, 2008). For this author, the behaviour of actors, dancers and musicians in improvisational performance, responding in real time to changes in their environment, structured in some way by pre-agreement, maps

well onto the context of interaction design where the people interact with rule-based systems such as behaviourial software or machines. While still based within an authorship-based mode of communication, Penny echoes some of the oppositions towards the aesthetics of traditional media culture that is developing within Second Life.

Second Life belongs to a category of technologies referred to as social media. These technologies differ from traditional media in that they are developed within the framework of MUDs and MOO[i]s, multi-user dimensions which favour different communication designs. In this context, new media are designed to help individuals participate in the construction and sharing of personal narratives.

Via social media, the public now has direct and free access to the production, distribution and archival systems necessary to disseminate their ideas, values and cultures. These differences carry into how new media practices are designed. Dominant hierarchical institutional values tend to use new media to carry predefined and pre-programmed narratives, while network cultures tend to adhere to a design perspective that assumes that new media are communication tools used by participants to create their own narratives (Ito, 2008). This explains why technologies such as Facebook or Second Life are open-ended and non-narrative, media envisioned to become virtual meeting locations where narratives manifest themselves and evolve from the interactions of participants with each other, who then can choose to document them.

The lack of overarching guiding narrative within Second Life empowers participants to take control of the nature of their virtual experience and to build their own social constructs, in other words to co-create their own social reality. This makes Second Life radically different from representational media. It has become a sociological space, an extension of real life where people contribute to their daily lives within virtual social collectives.

Social media usage have given rise to an aesthetic of dialogue which is based on the emergence of new authorship genres that challenge institutional monopoly over cultural production. For instance, culture jamming and media re-appropriation are now prevalent accepted media practices based on a system of codification that allows a conversation via content between the members of specific peer groups that help develop their collective identities. This aesthetic of dialogue is based on direct communication between people and assumes that the public replaces cultural critique experts as the main source of cultural validation.

In parallel to these evolutions within human systems, similar conflicting ideas vis-à-vis narratives exist within the world of machines. For some, human-based narratives must guide innovation. For researchers such as K. Hayles, artificial agents can only make sense if they operate within a narrative frame, one that must be actively fashioned by programmers, that cannot arrive on its own (cited by Helmreich, 2007). Within this hierarchical perspective, machines can only exist as simulating human narratives that mirror human realities and fantasies. While for others, machine innovations will exceed their source material and eventually formulate their own realities, distinct from humans (Whitelaw, 2004).

For Helmreich, current literature on artificial life from historical, social, cultural, and aesthetic enquiries points to a move from an aesthetic of critique to an aesthetic of conversation within which two modes of conversations are being opened:

> The first mode works through what I will call direct translation (in which artificial life terms are aligned with those in the humanities). The second engages in what I will term allopoietic translation (in which artificial life terms are employed to produce an efflorescence of meanings pertaining to and productive of new, unexpected contexts of usage) (Helmreich, 2007).

New Media Emergence

Given the emergence of multiple aesthetic frameworks, it is clear that synthetic agents and Second Life have already passed the stage of new medium and are now being positioned to obtain new media status by becoming incorporated within formal organizational structures such as public institutions. The introduction of these technologies within cultural institutions is an important moment to observe since implicitly, they integrate, within their aesthetics and organizational structures, ideological representations that carry the interests of specific social classes within the actions of actors (Weber, 1930).

Traditional mediated cultures have evolved within a vertical hierarchical organizational framework, where power is held by a few who protect and promote specific interests. On the other hand, network platforms can connect marginalized individuals and communities and by consequence create lateral, horizontal organisations that bypass traditional institutional power structures. This explains why network-based aesthetics reflect a move away from predefined narrative designs, where cultural institutions and critiques have monopoly over cultural production, to non-narrative designs where the subject (machine or human) forms its own voice, aesthetic and cultural, as well as social, reality.

The mass diffusion of such alternate social representations can affect how citizens understand their world and, by consequence, influence the set of values that governs an entire society. These values, known as societal imaginaries, can affect social change (Castoriadis, 1975). According to Castoriadis, social change cannot be understood in terms of any determinate causes or presented as a sequence of events: it emerges through social imaginaries without determinations. Ideology organizations that have most control over distribution of specific ideological messages, or can amplify their voice, can influence the public's perception of societal evolution and obtain a dominant place in history (Castoriadis, 1975).

With this context in mind, mediated communication is understood as a powerful tool of influence and legitimization of cultural and societal values within a society. This explains why new media are defined as implicit places of power struggles where actors are trying to establish control over the types of dialectics being disseminated (Carroll, 2008) which influence emerging new media cultural, economical and social practices (Moeglin, 1999). But, if new media can help establish alternate dialectics in the public sphere, in order for these voices to be preserved, cultural and social institutions have to acknowledge their importance by integrating them within their cultural systems. Such integration tends to correspond to the industrialisation phase of a new media.

Media Industrialization

As a technology matures, early adopters develop broader cultural, social and economical usages. If considered useful by a broader group, these usages will become more prevalent and eventually be widely adopted, leading to the creation of professional practices. At this point, social actors will start to look for ways to formalize their workflows in order to render them more efficient. This process is referred to as the industrialization phase of a new media. By industrialization process, G. Tremblay (1998) understands a systematic rationalization of production practices aimed at enhancing the efficiency of a system, via its technologization, new work tasks division, and the substitution of work to capital. Industrialization also refers to the existence of an orientation based on productivity and profitability within a given organizational structure.

At this stage, different social actors tend to take the lead. The evolution of the web and the Internet are examples of this phenomenon. The emergence of these technologies was triggered by academic innovators driven by humanistic values who wanted to freely exchange their ideas, knowledge, and technological capacity (de Joode, et al, 2006). As these technologies matured and became popular, commercial industrial actors started to dominate the area of development, in part because until recently, the technological and production infrastructures required to build larger systems required massive

financial investments, but also because the technologies had become mature media that other industrial actors wanted to incorporate into their fields. While some industrial models focused on human aesthetic of dialogue where networks are virtual public spaces that facilitate public conversation and the sharing of information, such as the open source industries, others developed within representational aesthetics frameworks and used the network as a distribution system, giving consumers access to commercial content, such as graphic design industries.

Typically, during this industrialization phase, the ideals of innovators will have to either be adapted to the values of institutions, in order to be integrated within existing social and economic institutions such as education, art or commerce, or they will become the source of new professional fields. In either case, this phase corresponds to the establishment of quasi-standardized organiszational infrastructures that reflect and reinforce creative production and distribution processes particular to specific value systems. Once these standards are established, the new medium will have transformed into a new media, a rationalized production system with maturing industrial frameworks which serve stable technological usages.

Developers of synthetic agents and Second Life are currently attempting to establish these technologies within various social institutions. If widely accepted, they will in time become recognized as a cultural force. As we are currently seeing with photography and film, eventually this cultural status can lead to the desire to conserve and preserve some of the artefacts created for these once new, but now old media, and preserve their ideological voice within history.

2. Coexistence of Various Media Dialectics

This begs the question: what representations are influencing the emergence of new media based on the coexistence of human and machine social networks? In order to examine this question, we need to explore the ideologies influencing the development of

these spaces via study of discourse related to the development of synthetic agents within Second Life. The development of synthetic agents within Second Life interest multiple groups of innovators who, influenced by different professional cultures, call upon various definitions of mediated communication, community and cyberspace.

Representational Media: The Anonymous Public

Virtual worlds, such as Second Life, are often assumed to have been designed to expend the reach of traditional images culture in cyberspace. This usually leads to a dismissal of their importance within the media landscape due to their perceived lack of ability to adhere to visual and gaming aesthetics rules. The assumption is that representational media, visual (filmic or photographic) or experiential (gaming), must operate in accordance to the semiotic codification standards of image practices.

Part of the success of a representational media is its ability to represent reality by weaving a narrative within an aesthetic envelope that engages viewers or entices players into coming back. Mediated communication tends to be equated to the codification of information within media presentations. Networks serve to virtualize communication acts that are entirely objectified within predefined contents.

This notion of communication translates into the organizational strategies of the mass media model that tend to stress the transmission of information and knowledge to an anonymous audience. The personal identity of audience members is irrelevant to the work, since cultural production is the monopoly of cultural experts who disseminate their values and notions to passive observers who consume messages and rarely enter into direct dialogue with the maker.

Social Media: Emergence of Technological Identities

But Second Life is not a traditional visual media. As we saw, it is a social media based on a communication model that encompasses both the dissemination of ideas via

content and dialogue with others. While traditional visual media culture does not consider the personal identity of members of the public as important, social media is built on the belief that cultural meaning and knowledge come from the empathy we develop by engaging in dialogue and sharing authentic narratives with each other (Wesch, 2008). In opposition to the first value system, individuals are seen as powerful, active and autonomous, and as having valuable knowledge that can help the construction and evolution of society. Social media facilitates the development of technological selves, by being environments where people recreate their human identity, capture and share their lived experiences, and represent themselves in relation to the world in which they live (Satchell and Foth, 2008).

According to D. Miller, a virtuality continuum exists which renders the distinction between online and offline obsolete, and the distinctions between reality and virtuality have become blurred as people are incorporating and relying heavily upon virtuality within their everyday personal realities (Miller, 2008). The non-narrative nature of Second Life has allowed participants new opportunities which already influence real life events (Nolan et al, 2008). Within the health sector, for instance, Second Life is used as an informal meeting place by people suffering from chronic depression who can use it to re-accustom themselves to human contact and social rules before re-entering physical social life. As John Palmer explains, such environments do not replace physical therapy and services, but provide an “extra value” to relationships provided by health services (Palmer, 2006). The extra value is access to a peer-to-peer culture built on amateur cultural co-production and informal peer-to-peer communities which, in some cases, have started becoming collective technological identities. Within Second Life, technological selves are not existing in isolation, but within virtual social networks.

Multi-agent Systems: Emergent Collectives

In parallel to these human communities, multi-agent system (MAS) have been developed, composed of multiple interacting intelligent agents. Multi-agent systems can

be used to solve large scale problems which are beyond the capabilities of an individual agent. These MAS form problem-solving organizations, within which agents, specialiszed at solving a particular problem aspect, participate in interdependent problem-solving and coordinate with each other to ensure that interdependencies are properly managed. Emergence is central to the evolution of complex intelligent systems. It refers to the way complex systems and patterns arise out of a multiplicity of relatively simple interactions (Emergence, 2008). Emergence explains how MAS can become self-organizing systems that increase in complexity without being guided or managed by an outside source.

These intelligent technologies have in common with social media such as blogs, wikis, flickr, YouTube to operate within a Cartesian perspective of networks where information is believed to be the principle means of communication. In this context, the technological self is a representation, since

> "The subject remains distinct from the material world: a disembodied mind, a rational, decorporeal eye/I that knows the world by seeing it. The alleged 'nobility' of sight is a function of its detachment from 'the domain of affective causality and sensory proximity' (Hansen 6) and the Cartesian subject functions as an agent by distancing itself from the domain. (Shinkle, 2005).

A Cartesian perspective echoed within MAS research where agents are considered to represent artificial minds functioning only on an intellectual level (Graham-Rowe, 2001).

Experiential Social Media: Post-Cartesian Actualization of Technological Selves

Second Life begins to move towards a post-Cartesian perspective by allowing peers to perceive their existence as embodied[4] within virtual social hierarchies and realities.

4 By embodiment we mean a perceived sense of presence an avatar provides by giving users a representation of a body that is positioned within a three dimensional environment.

This sense of embodiment is unique in that “the digital avatar not only extends the user’s senses, it embodies the user’s extended senses into a representational cyberbody”(Sinclair, 2005). Echoing McLuhan's perspective of technology as an extension of man, the positioning of participants within a coded body leads to a different building of technological identity. From a representational mediated self, we move towards a sense of actualization of mediated self (Skinkle, 2005). Mediated co-production of culture no longer limits itself to the co-construction of content; it becomes about co-action embodied within a networked space. Technological selves can now be telepresent, perceiving themselves in a remote location and with the ability to affect that location. Similarly, within robotics, this post-Cartesian understanding gives rise to thinking machines intelligence that emerges from learns from its physicality instead of from cognition (Pfeifer and Bongard, 2006).

Mixed Reality Continuum

Second Life is also a mixed realities platform that facilitates the merging of real and virtual worlds, a new environment where physical and digital objects coexist and interact in real time (Mixed Reality, 2008). Presently, my research assistant has demonstrated that it is technically possible to control real world objects from within Second Life and vice versa (Parker, 2008). Actualized digital embodiment could take on another dimension and no longer be limited to virtual space. It is quite probable that humans will become embodied within robots that they control from within Second Life. Embodiment will move from being a representation to being an actualization within a physical object.

These could lead humans to become telexistent in the real environment through a virtual environment. In other worlds, individuals could have a real-time sensation of being at a place other than where they exist, be able to interact with the remote environment, and perform remote tasks dexterously with the feeling of existing in a surrogate robot working in a remote environment. This actualization of self and agents is transforming what we understand the potential of cyberspace to be.

Cyberspace as an Interface to Telexistent Self-organizing Smart Mobs?

Technically, cyberspace refers to the non-physical space where interaction takes place between computer networks (Cyberspace, 2008). The current shift from representational to experiential social media also implies a radical transformation in the way in which cyberspace is defined. Within a representational social media, cyberspace is similar to a noo-sphere, a platform that generates a collective consciousness emerging from the interaction of human minds (Teilhard de Chardin, 1964). In this context, members of virtual intellectual communities share their knowledge with the group. Within this Cartesian optic, synthetic agents will partake in the creation of a universal mind formed by interconnecting agents sharing their knowledge (Goertzel, 2007).

Embodiment transforms cyberspace into a place of action: a metaverse, a space where humans or machines are embodied within avatars that they use to interact with machines and each other by exchanging messages and objects, and more importantly, to coexist, co-produce digital artefacts via bodily interactions with each other (Stephenson, 1995). The network can be used by people to connect to information and others, and allow social coordination amongst peers or machines.

Cyberspace can also house emergent systems. Within human context, such systems can take the form of ”smart mobs,” technology-mediated forms of self-structuring social organization that are virtual intelligent emergent behaviours (Rheingold, 2002). For H. Rheingold, the existence of these collectives

> …will lead to a third computing revolution[5] in which individuals once again have the power to put themselves together in collectives of their own choosing. Witness, he says, the way the Seattle WTO protests were organized, and how

5 The PC being the first revolution, and the advent of the Internet the second.

> the anti-Estrada movement in the Philippines was coordinated by cell phone; how websites were being updated from the streets by Net-connected phone" (cited by Koman, 2003).

These smart mobs form self-organising systems, spontaneous emergence now referring to evolution within human technological social networks. These smart mobs are socially intelligent. They can become a form of human swarm intelligence, a group composed of autonomous agents that do not follow commands from a leader, or some global plan, but collaborate with each other (Liu and Passino, 2000).

These could lead to synthetic agents that become self-reproducing organisms within artificial life ecosystems. Cyberspace is then understood as a digital ecosystem: a type of technosphere born from the coexistence of humans and synthetic organisms as artists Jane Prophet and Gordon Selley attempted to build in 1995. A place where users from around the globe can create digital ecologies by creating creatures and release them into virtual environments.

Finally, combining synthetic agents to Second Life can also lead to the construction of a self organizing or organic virtuality continuum which this time combines synthetic as well as human mixed social realities that will alter our physical realities in unpredictable ways. As R. Ascott explains:

> *We are simultaneously present in many realities: physical presence in ecospace, apparitional presence in spiritual space, telepresence in cyberspace, and vibrational presence in nanospace. Second Life is the rehearsal room for a future in which we endlessly create and distribute our many selves. What we build today in cyberspace, we'll build tomorrow in nano space. The new art media is immaterial and moist, numinous and grounded, while the technoetic mind both inhabits the body and is distributed across time and space. Art and reality are becoming syncretic as these contradictions are reconciled, and differences*

> *melded. Syncretic reality emerges from the cultural coherence of intensive interconnectivity, from quantum coherence at the base of our world-building, and from the spiritual coherence of our multi-layered consciousness* (Ascott, 2007).

If for Ascott, humans will become spirits via technologies, for other authors, machines themselves can become spiritual (Kurzweil, 1999).

As we just saw, many discourses coexist in regards to how synthetic agents and Second Life can evolve. Human collectives can extend current human life by mirroring physical reality, create new realities or marry machines and humans collectives within one space. Similarly, the evolution of synthetic agents could lead to robots who exist to mirror human reality (Bringsjord, 2008), or, within a humanistic framework, agents may remain companions that share data with humans (Nehaniv and Dautenhahn, 2007), or within an organistic framework, they could become living organisms that exist independently from humans and coproduce their own reality (Whitelaw, 2004).

In the end, agents in cyberspace will mostly likely evolve into multiple hybrid forms incorporating and reconfiguring some aspects of these and other systems of thoughts. But reality rarely creates a direct correspondence to these grand or meta-narratives. How can we know into what these synthetic and human mixed realities will transform?

3: Emergence of Collective Intelligences

A socio-economics analysis can help understand what is concretely developing since it studies the relationship between economic activity and social life. Focused on the social impact of economic change, socio-economic analysis examines how a new phenomenon affects patterns of consumption; change distribution of incomes and wealth; the way in which people behave; and the overall quality of life. Current field research is demonstrating that social media such as Second Life have direct effects on

social attitudes and norms which have translated network culture into new forms of social activities.

Second Life has been designed as a sociological system that operates within such a network culture framework. Philip Rosedale, the creator of Second Life has stated “that his goal with Second Life was to demonstrate a viable model for a virtual economy or virtual society. In his own words, ‘I'm not building a game. I'm building a new country.’” (Terdiman, 2006). This virtual society operates according to a web economy that uses swarm intelligence: ”an alternative way of designing ’intelligent‘ systems in which autonomy, emergence, and distributedness replace control, pre-programming, and centralization” (Bonabeau, 2003). By broadening the social context of individuals to include self-organizing informal collectives, social media have given rise to new social and economic models centred on collective cultural co-production.

Two human knowledge-sharing and co-production models coexist in cyberspace. In the first case, the social network becomes a collective intelligence (Levy, 1995) and in the second, a connective intelligence (deKerkove, 1998). In both cases, knowledge is distributed amongst the members of the social network who become nodes but these two models differ in how we are to perceive the individual in a world where the collaborative/collective is increasingly valued.

Collective intelligence places the collective first, whereas connective intelligence gives priority to the needs of the individual node first (Siemens, 2008). Connective intelligence permits us to retain ourselves and our ideas in our collaboration with others, while collective intelligence results in an over-writing of individual identity. For Siemens, one form must dominate the other. But within a hybrid sociological system, they represent the action processes of different groups who have different economic and social purposes. Collective intelligence is extremely valuable to different social scenarios honing on the power of groups to advance normally marginalized social or economic objectives.

Virtual collectives can become political forces when they mobilize large numbers of participants to the same cause by unifying people at different geographical locations. The Obama election has demonstrated this phenomenon. For the first time in American politics, social media was used to raise the funds legally necessary to enter the presidential race and then promote voting amongst minority groups, and eventually helped lead to the election of an alternative political voice.

Some virtual social groups have now levied the power of informal communities to create official and legally binding social organizations that legitimize and protect the values they cherish. An example of such structures is Creative Commons which has emerged to protect humanist values and the right to share information and content.

Industrial enterprises have also derived substantial value from informal collectives and user-created content. Businesses are honing upon this process and softening the boundaries between their institutions and the public sphere. Users are invited to participate in the economy as an equal, co-creating value with peers and companies to meet their personal needs (Tapscott and Williams, 2006).

Social activists have collapsed commercial and social interests by using their individual buying power and their social networks to put pressure on institutions and influence their actions. Social activists also take advantage of the fact that reputation influences market shares by becoming political consumers who convert the apolitical marketplace into a site of contestation at the intersection of globalization and individualization (Micheletti, 2003) that influence corporations, international organizations, general labour and production practices (Stolle et al., 2005).

As we previously saw, machines also operate in accordance with a form of swarm intelligence developed through the collective behaviour of decentralized, self-organized systems (Beni and Wang, 1989). Agents follow very simple rules, and although there is no centralized control structure dictating how individual agents should behave, local

interactions between such agents lead to the emergence of complex global behaviour. Originally, AI systems were designed to simulate human social systems. But as they mature, their own organizations are growing in ways that are no longer simulating the human world and, as such, are becoming their own type of social order. Similarly to AI, robotic agents have also been developed into swam robotic systems made up of a population of simple agents interacting locally with one another and with their physical environment.

Some engineers speculate that agents will become autonomous designers of one or multiple societies. Giving agents the means to become aware of their mutual interaction will give birth to new types of agents and societies out of their collective activity and will lead to the creation of environments capable of showing spontaneous emergence (David et al, 2002). Machines already operate within their own communities within Second Life (Carleon Island). While many machine social organisation have been created to mimic human networks, others are unique to agents processes. So far, within cultural sectors, their use remains marginal. But many groups are working on converting these technologies into new media. If these initiatives succeed, the virtual social worlds will transform once more radically. Like other media, multiple contradicting values will continue to animate their development. The research in the socio-economy of machine social interaction does not yet exist, but it is clear that it needs to be undertaken.

Conclusion: Socio-constructionist Innovation Adoption Model

The current evolutions of social media such as Second Life are changing how scientists understand how social and technological innovations are widely adopted. The last decade has seen digital networks blur the boundaries between Personal-Informal-Professional social networks (Gensollen, 2007) and in the process eliminate the distinction between makers and participants, potentially blurring the boundary between consumers and producers (Mann, 2006). Since current social applications have become simultaneously market place, public and intimate spheres, hybrid social and economic

approaches have emerged that combine opposite value systems and create new combinations which have reversed the institutional-individual relationship. This unique shift in social territories has increased the realm of influence of the public on cultural innovation.

For many researchers, this phenomenon is the source of an imminent cultural revolution within our social and cultural institutions (Gauntlett, 2007). But such discourse does not take into account traditional social constructivist innovation models which consider that change within cultural institutions is an evolutionary process based on the hybridization of older and emerging ideas (Tremblay, 1998; Moeglin, 2004) as well as the convergence of multiple socio-technical agendas (Latour, 2005) both internal and external to institutions.

What is certain is that the beginning of a convergence between the values of peer-to-peer and hierarchical ideologies is underway within cultural institutions. The existence of personal narratives culture seems to indicate a passage from modern to post-modern times, leading to the crisis within cultural institutions which in the past relied on meta-narratives (Lyotard, 1979) and metaphysical philosophy. Meta-narratives are considered the main tool of legitimation of modern society where cultural superstructures (social organizations such as school, churches or media) serve to create ideology, which in turn affects individuals' notions of reality (Althusser, 1971). Current digital informal cultures have reversed this process by establishing the alternate ideological representations of network cultures and philosophies, which have now become the source of new social and economical organizations.

Because of this reversal, a social constructionist framework (Berger and Luckmann, 1967) is gaining theoretical relevance. This model is based on the idea that the multiple values, cultures and contexts of user entrepreneurs, who create their own social and economic realities (Shah and Tripsas, 2007), are starting to become a central influence

on institutional change. The next few years will show us how this shift will participate in reshaping social and economic frameworks.

If emerging web economies have established themselves within virtual society, how deeply will the reach of this web culture infiltrate our current cultural institutions? In the long term, can swarm intelligence overpower institutional vertical hierarchies? Current social events and field research would suggest that it has already begun.

As current emerging new media, Second Life and synthetic agents have in common allowing for the telepresence of technological selves (machines or humans) within collectives that exist in mixed social realities. These selves can either be represented within mediated spaces, embodied within robots or other technologies. These technological selves will evolve within mixed realities that offers them the tools necessary to create their own social and economic realities while bypassing institutional social hierarchies.

Currently, a “We generation” is budding, a peer-to-peer youth culture whose understanding of identity is mainly build via their community (Olsen, 2007). By the time the generation enters adulthood, mixed reality spaces will most likely have become globalized capitalistic environments in the form of “data commons” that can alter the way our democracy functions by becoming places where individuals express their social and political values as much through consumption choices as they do through voting (Cuff, Hansen and Kang, 2008) both within physical and virtual worlds. Already, Second Life facilitates the creation of virtual societies that resemble the autonomous societies Cornelius Castoriadis envisioned: self-governing societies within which citizens explicitly participate to the development of new imaginaries (Castoriadis, 1987). What will young generations do with these autonomous societies?

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[i] A MOO (MUD object oriented) is a text-based online virtual reality system to which multiple users (players) are connected at the same time.(Wikipedia, 2008)