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Social computing – Implications for the EU innovation landscape

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Introduction

The trends and innovations under scrutiny in this paper—blogs, podcasts, wikis, social networking websites, search engines, auction websites, games, VoIP and peer-to-peer services—exploit fully the connectivity dimension of the Internet. In so doing, they support the creation of networks of people and content. The user has become an active participant: (s)he co-produces content (e.g. blog, wiki, Flickr, MySpace), shares tastes and gives relevance (e.g. Amazon, de.li.cious, Google pagerank), builds reputations and provides feedback (e.g. eBay, TripAdvisor), shares storage and server capacity (peer-to-peer), expands connectivity (e.g. wifi-sharing, mesh networks) and the user is a part of collective intelligence (e.g. business web2.0). Time Magazine's selection in December 2006 of 'You'[1] as the person of the year, may be viewed as a recognition of the new digital democracy. The people behind the social computing trends go mainstream.

There has been a rapid growth of social computing applications, both in terms of number of users and subscribers, and in terms of usage patterns. This leads to the fact that the social computing is also increasingly being considered by policymakers, both as a tool and an object for policymaking. As a tool, it is used to communicate with and connect citizens and other stakeholders (e.g. the weblogs of European Commissioners[2]). As an object, social computing could play a role in information society policies, as Viviane Reding, the European Commissioner responsible for Information Society and Media, recently noted[3] There are some important policy issues that are behind the development of Web 2.0, such as neutrality, governance and quality control issues, however the future definitely lies in a European approach towards a web-based economy[4].

The paper aims to analyze the rise of social computing applications and to discuss its implications for the EU innovation landscape. It observes an exponential growth in the rise and take-up of social computing applications and discusses the changes this implies on the role of users in the innovation process. It also provides evidence on both social as well as economic relevance of social computing and discusses its implications for innovation and competitiveness. Moreover, the paper points to both challenges and opportunities for research and policy.

1.The exponential growth of social computing applications

An extensive desk-based survey of secondary data carried out since 2005 showed very clearly that the diffusion and use of social computing applications have been growing dramatically[5]. In many cases the growth is so fast that it reminds us of Metcalfe's law (square growth of network utility), or even Reed's law (exponential growth of group-forming networks)[6]. The

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[1] Grossman 2006.

[2] Blogs of the European Commission.

[3] The disruptive effect of the social computing phenomenon with reference to IPTS work has been mentioned in a recent speech by Commissioner Reding. See Reding 2006

[4] 'Digital Europe: the Internet Mega-trends that will Shape Tomorrow's Europe', European Internet Foundation Special Event "A view of the Digital World in 2025" Brussels, 13 November 2008 http://tinyurl.com/nqcpwb .

[5] Pascu et al. 2007

[6] Robert Metcalfe originally coined Metcalfe's Law to describe the potential of network effects (the value of a communication network is proportional to the square of the number of users); David Reed then proposed that the value of networks that allow formation of groups grows proportionally with 2^n; Seely Brown proposed that total value of network is proportional to the square of the number of user communities (rather than only users); Recent work (Bob Briscoe, Andrew Odlyzko, Benjamin Tilly) proposes a logarithmic model for modelling growth http://spectrum.ieee.org/jul06/4109

service gets better as more people use it. More content leads to more traffic, which leads to more edits which generate more content[7].

As of September 2008, there are more than 130 million blogs (the number nearly doubled since 2007)[8]. More than 1 billion photos and 40 million videos user-created are uploaded in photo- or video-sharing sites; tens of billions of objects are created by the users in Second Life; voice has been an integral part of Second Life experience since it launched in 2007 but today (May 2009) Second Life is , according to Linden Labs, one of the largest VoIP providers in the world: over 50% of SL residents use voice everyday, 97% of Second Life regions are voice enabled and residents are now consuming voice at a rate of over 1 billion minutes per month. Social tagging is on the rise - millions of photos tagged in Flickr, videos in YouTube (see Table 1 and annex)[9].

Application	State of diffusion	Rate of creation of new content
Blogging	>100M blogs and doubling every 5-7m or the last 2 years **Between 20 and 50% Internet users read blogs**	120000 new blogs created daily Slowing down in the doubling of the size of the blogosphere and in the rate of posts created per day since Oct 2006
SNS incl. Multimedia sharing	Over 250M profiles on-line >1billion shared images on-line >40M shared videos on-line **25-50% of Internet users visit SNSs**	Growth in number of profiles in MySpace slowing down ~1M new images uploaded daily in Flickr (growth levelling off); 15 hours of video uploaded every minute in YouTube, the equivalent of Hollywood releasing over 86,000 new full-length movies into theaters each week (Jan 2009)
Podcasting	>100,000 active podcasts worldwide <10% of Internet users listening/downloading podcasts. (Statistics vary much)	No. podcasts growing rapidly, up from 10.000 in 2004 (IDATE Aug 2007)
Collaborative content (wikipedia)	9.25 million articles in all combined Wikipedia sites (Oct 2009) **30% of global Internet users visit Wikipedia**	Growth in number of articles EN wikipedia tailing off since Sep 2006
Social tagging	Lots of content tagged **30% of US Internet users tagging**	>3M geotagged objects in Flickr (May 2009)

Table 1 - State of diffusion of SC (source: Pascu 2008)

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[7] See for instance a modelling of wiki growth and predictions at
http://en.wikipedia.org/wiki/Wikipedia:Modelling_Wikipedia%27s_growth
[8] Technorati's 5th Annual State of blogging (September 2008) http://www.technorati.com/blogging/state-of-the-blogosphere/
[9] For more updated figures, see Pascu 2008

Sometimes this explosive growth is due to the very small starting base (wifi-sharing, blogs, social networking). In some cases, it is still more a future projection than a reality, like podcasts. However, their growth has generally been continuous since 2005 and cannot be considered just a passing trend. Furthermore, some of these trends have already reached the mainstream of Internet usage. In terms of penetration, most Internet users rely on search engines to find information, at least a quarter of European Internet users visit social networking websites, visit blogs or play games online and a third of them use Wikipedia[10]. With regard to the intensity of usage, social networking websites are the most visited websites in terms of page views.

Recent surveys show that the use of social networking sites has only risen in 2008[11].
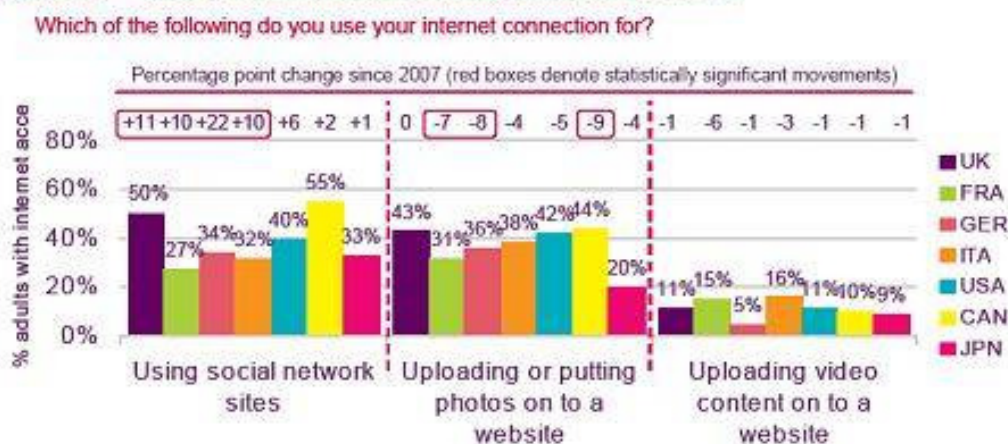
Figure 1 – The growth in content creation in selected European countries (Ofcom 2008)

Some commentators argue that only a minority of users appears to make active use of these applications, by writing blogs, contributing to Wikipedia, creating podcast and videos, and offering goods for sale on eBay. The majority simply 'lurks' in the background[12]. In Europe, roughly a quarter of Internet users make use of Social Computing (SC) with a third of them using SC content, a tenth providing feedback or sharing content, and only 3% are 'creators'[13].

These figures are nevertheless only a snapshot of a highly dynamic phenomenon. Secondly, one shouldn't underestimate the creative use that the information acquired by passive users might have inside and outside the virtual space. In fact, increasingly, the behavior of passive users is being explored via technological means. For instance, Amazon has the recommendation system of *"people who bought this book, also bought these other books"*.

In other words, there is the so called 'read wear'[14] effect. Read wear means the simple activity of reading or using material while leaving traces as an anonymous way of sharing preferences and interests. It is increasingly seen as a way of exploring the community of passive users.

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[10] Pascu 2008 & Osimo, 2008
[11] Ofcom. (2008a). The international communications market 2008 (Research Document)
[12] Marham 1998
[13] Pascu 2008
[14] Hill, Hollan, Wroblewski and McCandles 1992.

2.The changing role of users

A particularly powerful characteristic of social computing applications is that users are becoming much more deeply involved in production and service innovation[15]. The distinctive roles of producers and consumers are beginning to blur and even to merge. People are increasingly both producers and consumers. This idea of the prosumer is of course not new. It was coined by Alvin Toffler in 1980 in his book 'The Third Wave'. What is different however, is that now, the idea is becoming a reality.

First, the user is a supplier of content. Social computing applications such as blogs, podcasts, wikipedia, YouTube and orkut enable the user to easily publish and share text, audiovisual content, and contacts in social networking websites. The impact of this phenomenon on the media industry should not be underestimated.

Second, the user supports the distribution of content and services. In peer-to-peer networks and wifi-sharing, the user is a provider of the transport infrastructure and services. Third, the user plays a fundamental role in finding, selecting and filtering the relevant content and services. Search engine ranking relies on other websites' links in order to estimate the relevance of the search. Wikis rely on users to evaluate and select the quality of content. Tagging and taste-sharing by users, and finding out what other users like, is a fundamental way to share and find interesting information and content like music over social networking websites. Feedback by users is the basis of the reputation management system of eBay.

In every application mentioned above, the role of the user is essential to the service in its production, distribution, as well as selection and retrieval of content and services. A common 'dream' for many communication technologies seems to become as close to reality as possible. *"Every sender should become a receiver and every receiver a sender"*[16].

In addition, users are becoming more powerful in economic terms. The 'cluetrain manifesto'[17] noted that *"a powerful global conversation has begun. Through the Internet, people are discovering and inventing new ways to share relevant knowledge with blinding speed. As a direct result, markets are getting smarter—and getting smarter faster than most companies"*.

These new areas of innovation lay at the crossroads of an increasingly complex process of both tacit and codified knowledge production. As such, the authors believe they contribute substantially and directly to shaping the emerging Knowledge Economy and Society. The Value Map underneath depicts this new dynamics.

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[15] In 1976, Von Hippel published its seminal work on innovation. See Von Hippel 1976

[16] "Broadcast has to be changed from a system of distribution into a system of communication. Broadcast would surely be the perfect means of communication in the public sphere, […] if it were able not only to receive, but also to send – which is to make listeners not only to hear, but also to speak, and insofar not to isolate them but to put them into relations." Brecht 1932.

[17] The Cluetrain Manifesto is a set of 95 theses organised and put forward as a manifesto, or call to action, for all businesses operating within what is suggested to be a newly-connected marketplace. The ideas put forward within the manifesto aim to examine the impact of the Internet on both markets (consumers) and organizations. Available at http://cluetrain.com/
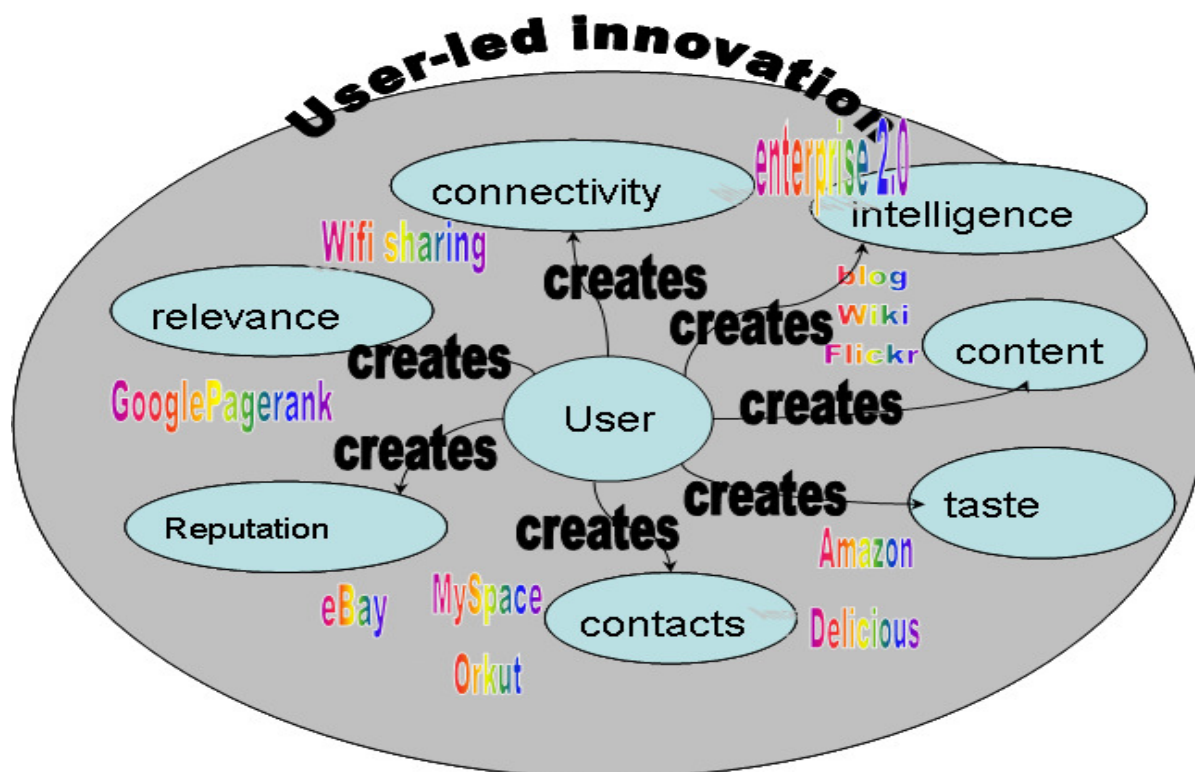
Figure 2 – Value network map

The reasons for which people are actively contributing go beyond the simple monetary rewards. Rather, it seems that people are taking up the possibilities of social computing applications to do things differently, to do things in ways that have not been available before and that make sense to people. As Benkler (2006) also argues, "*personal computers, camera phones, audio and video editing software and similar utilities are examples of tools whose value increases for users as they are enabled to explore new ways to be creative and productively engaged with others*".

3.Towards a new Techno-Economic Paradigm

The spectacular growth of social computing and the changing role of users do seem to indicate that things are being done differently. These new dynamics are highly relevant both socially and economically. The combination of all these factors is leading to what can be described as a new techno-economic paradigm.

3.1.Social relevance

Customers and users are becoming more aware and demanding as a result of the horizontal sharing of information, mainly through blogs. Information, content and services are increasingly available for free or at a low cost, thanks to either advertising or piracy. The users are becoming more selective in what they are ready to pay for. With the help of technical solutions such as RSS (Really Simple Syndication) and news aggregators, every user is able to build his/her own personal newspaper. The idea of a 'Daily Me' was also put forward by MIT Media Lab founder Negroponte in his book 'Being Digital'[18].

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[18] Negroponte, N. (1995).

Bloggers are influencing the way public opinion is shaped, particularly in terms of agenda setting. They focus attention on issues that would not otherwise be considered by mainstream media. Blogs played a major role in the 2004 American elections. An Internet study explored the potential influence of blogs in the French referendum on the EU constitution, The study showed that the 'No' campaign set up 161 of the 295 sites on the constitutional debate, which helped redress a bias towards the ' Yes' campaign in the mainstream media[19].

Moreover, as people become more networked and interconnected through the use of ICT, new forms of social organisation are emerging which are different from the ones known in traditional societies, i.e. traditional social relations based on physical proximity and close social ties, such as the extended family. These issues echo the still ongoing debate in social sciences, that dates back to the 19th century, regarding the changes in community life due to economic and technological advances. Some feel community life has been 'lost' due to the emergence of the industrial society. Others, who look beyond locality as a defining characteristic of community, point to transformations in social life and the emergence of a 'liberated' community[20]. The breakthrough of the communicative use of ICT is well illustrated by social computing applications. These are clear signs that people are indeed building new social ties and new social networks (e.g. communities of interest). This will possibly lead to greater social engagement and provides the basis for a 'glocal' civil society that is simultaneously global and local[21]. The digitalised social networks allow people to construct and maintain digital identities and provide what Giddens called 'ontological security': a basic trust and confidence in the world you live in, through physical proximity and traditional ties in earlier times[22]. It is this trust and confidence that is being developed in ICT-mediated communications that has an important impact on the social fabric of society.

3.2.Economic relevance

Social computing is economically relevant in numerous ways. First, some 'net-native'[23] companies, like Google and eBay , have become big corporations that show huge profits. The wave of emerging Web 2.0 applications has also shaped the economic landscape by initiating various buyouts, mergers, acquisitions and partnerships. For example, Yahoo bought Flickr, Google bought YouTube[24], eBay bought Skype, and News Corp. bought MySpace. The strategy involves the building up of a large customer base and then selling[25].

Many small websites are also generating revenues now, mainly through advertising. In this way, even a small but well written blog can become a source of revenue and a full time job for its owner. In a similar way, trading on eBay has become a full-time job for many of its users: about 1 million people rely on it as primary or secondary source of income[26].

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[19] Two-thirds of the websites & blogs devoted to France's recent referendum about the European Constitution favoured the 'No' campaign; the original dataset contained 12.000 sites, of which only 295 sites commented on the referendum. See Financial Times article: Thornhill 2005.
[20] Quan Haase and Wellman 2004.
[21] Van Bavel et al. 2004.
[22] Giddens 1993.
[23] 'Net Native' services is a term describing services that were built specifically for and are solely resident on the Internet; the term 'net native' or 'digital native' has also been used by some authors to describe those, the first generation, born and raised completely wired e.g. 'Born Digital: Understanding the First Generation of Digital Natives' by John Palfrey and Urs Gasser, Feb 2008
[24] See for instance, a timeline of acquisitions for Yahoo, Google at
http://www.shmula.com/blog/timelines/google-microsoft-yahoo/g-y-m.htm
[25] See Lindmark, Ulbrich and Bogdanowicz 2008.
[26] http://biz.yahoo.com/bw/080929/20080929005677.html?.v=1

Second, many social computing applications and players represent a direct threat to established industry leaders such as telecommunications and content industries, and this in different ways for different products. VoIP, for instance, puts the revenue sources of telecom operators at risk with regard to voice traffic. Wifi-sharing threatens the revenue streams of Wireless Internet Service Providers for home connections and consumption fees for nomadic hotspot connections). And a combination of wifi with VoIP might well change the whole operator business for good.

With regard to content industries, freely available user-produced content (blogs, wikis and podcasts) is competing for audience and advertising with content produced by established providers (broadcasters, newspapers, encyclopedias). Also, the degree to which the sharing of audiovisual content through peer-to-peer platforms threatens the revenues of content industries can currently not be underestimated[27]. With regard to the software industry, the threat is perhaps less immediate and less visible. However, Google, for example, has just launched several web-based collaborative applications (Google Apps service), which could become competitors of MS Office.

Third, social computing applications are already being used for professional purposes. Blogs and wikis are increasingly used in the corporate world to collaborate inside and outside the company. Peer-to-peer is being used by companies, especially in the media sector, to distribute content efficiently. Most broadcasters distribute content via podcasting. Google Earth has been used in the aftermath of the Katrina hurricane to support the relief effort. And of course, as this paper shows, researchers increasingly rely on Wikipedia, Google Scholar etc. as a reliable source for their work.

Last but not least, social computing applications change the relationship between final customers and suppliers by reducing the information asymmetries. Thanks to horizontal sharing of information between users, customers become smarter, more demanding, and more aware of the choices – in one word, empowered. 'Blog-like' feedback and customer reviews are now standard in e-commerce websites. Bloggers, for example, were instrumental in drawing attention to faulty consumer devices and companies were forced to recall them.

4.Implications for innovation and competitiveness

Digital technologies have lowered the costs and complexities of content production and distribution to such a degree that, potentially, every individual or group could become a content producer. The technologies thus offer an important development potential for Internet-based start-ups. However, with the burst of the Internet bubble, it appeared that low entry barriers alone do not necessarily guarantee start-up survival in the longer term. They must be accompanied by a viable business model based on real revenues[28]. Although this seems to be the case today as in contrast to the situation 7 years ago, it remains to be seen if the business models for many applications are sustainable in the longer run. Nevertheless, the economics of social computing look much less shaky than the economics of applications during the Internet bubble. Although a second Internet bubble is possible, the authors assess it as unlikely. Social computing companies tend to have a smaller cost base, since they rely on users for a large part of their output. The companies have more viable business models, real

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[27] although it is uncertain how long this will persist in the future, bearing in mind the increasing numbers of legal complaints by the audiovisual industry.
[28] Punie, Burgelman and Bogdanowicz 2002.

markets, and they are much more closely integrated with the old economy. The income streams are consequently also increasingly predictable.

In addition, the basics of social computing consist of networking and communication between humans. It is quite unlikely that services that address the social needs of interacting with people will diminish or disappear. It has been proven many times in the past that the driver for information society has been the need for communication rather than information. This can be illustrated by comparing the growth in the take up of communication facilities (email, mobile) with the failure of information services such as WAP[29]. Additional indirect evidence for the importance of communication is that communication services have registered the highest growth over the last few years as a category of expenditure in household consumption[30].
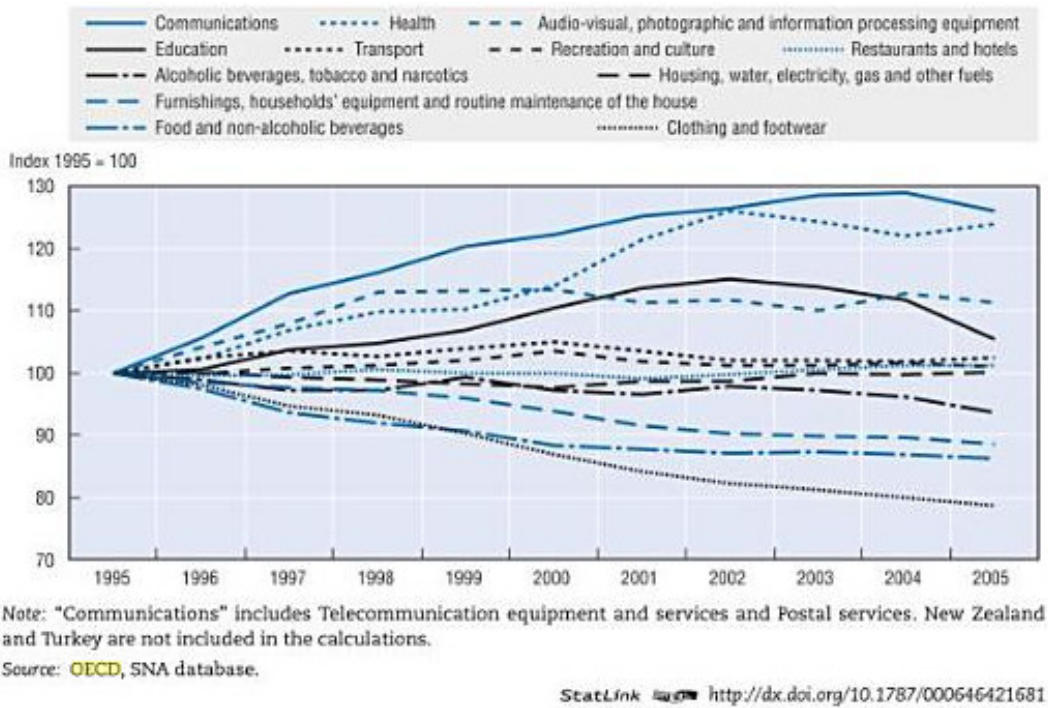
Figure 2 – Change in household expenditure in OECD countries
(source: OECD Communications Outlook 2007)

Social computing developments do not only give signs of societal re-engineering such as the development of friendships, dating relationships and collective action. The emerging and dominant role of the user in the innovation process , its disruptive impact in the economic system (–what has been called as the 'democratisation of innovation'[31]) generates and accelerates the 'creative institutional destruction'[32] where new players emerge to address the shift towards participation and new community practices; while old actors who refuse to adapt to the new environment,will disappear.

The emergence of social computing has significant impacts on the value chain of affected industries. In particular, the role of platform providers is fundamental. Platform providers attempt to integrate downstream and upstream in the value chain and will hereby influence the

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[29] Silverstone and Sorensen, 2006.
[30] OECD 2007. OECD Communications Outlook 2007; New edition forthcoming mid-2009
[31] As described in Von Hippel's seminal work on innovation. Von Hippel. 1976.

alignment of different layers of the ICT industry[33]. A key issue seems to be thus what the competition model will look like on these emerging markets, especially in the integration of vertical chains and the emergence of new horizontal markets.

The impact on the creative content industries, in particular, can be observed across the whole value chain. For *content creation* (lowering the barriers to entry, blurring the boundaries between 'creators' and 'users' and bypassing the need for intermediaries e.g. publishers); *distribution (*trend towards disaggregating in constituent parts e.g. singles, emergence of new aggregators and integrated platforms and of a whole new range of attention services); and finally *user interaction (*new channels for user feedback, self-publishing paradigm)[34].

The 'economy of abundance'[35] is challenging for businesses. The abundance of information causes scarcity of attention on the users' side which, in turn, has consequences along the entire value chain. Recommendation systems like Amazon, last.fm, Pandora and others address the relevancy issue. They guide the user to relevant content by generating recommendations based on user preferences such as the music they are listening to. Approaches fall into two categories: personalised recommendations are based on the individual's past behavior, while social recommendations are based on the past behavior of similar users. However, issues like standards and infrastructure for building attention services need to be addressed.

A particular issue for innovation-led growth in ICT is Intellectual Property Rights (IPR) protection. Anyone is technically capable, for example, to post a video on YouTube for everyone else to see yet without the permission of the owner. People can exchange potentially copyrighted material in MySpace. Current IPR systems need to be adapted to the special features of the social computing trends. Alternative licensing frameworks such as Creative Commons (hereafter: CC) have emerged. CC enables owners of copyright-protected material to publish and license their work online to users free of charge, but with conditions ('Some Rights Reserved'). The BBC implemented a similar model - BBC's creative archive[36] - that released online nearly 500 clips, programmes and audio tracks for the public to license and share in different ways.

5.Final reflections

Social computing applications have displayed a viral growth over the last past several years and the trend is not likely to stop here. The applications are responding to the underlying societal trends and have already visible social and economic impacts.
For research and policy, social computing applications represent both a challenge and an opportunity. More research is needed on what areas will be most impacted, and to how and what extent. The authors assess that low technological and financial entry levels, key contribution of the users and viable business models make the applications likely to stay, despite possible mini-bubbles. However, more research is needed to assess whether these

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[33] See for instance Fransman's web page on telecom visions at
http://www.telecomvisions.com/articles/pdf/FransmanTelecomsHistory.pdf
[34] More on the impact on the Creative Content sector in "European Perspectives on Information Society- The impact of ICT innovation on the furute of the Creative Content sector in Europe" – EPIS study (http://epis.jrc.es), forthcoming 2007
[35] See for instance Chris Anderson of Wired blog at
http://www.longtail.com/the_long_tail/2006/10/the_economics_o.html
[36] http://creativearchive.bbc.co.uk

developments would become mainstream, the positioning of Europe and the importance for Europe to have a base in social computing applications.

New research approaches are required to capture the new innovation dynamics and to translate them into a holistic approach to policy-making (in terms of R&D, deployment policies, business, education, regulation). The development of social computing applications opens a wealth of policy-related research questions. Here, some examples:

> *Users as creators and innovators* - The role of users is a key driver and shaper of the current technological revolution. This would mean that policies need to be more open to user-led innovation and to provide the right context and platforms that would favour user-led, bottom up innovation. In addition, there is a role for policy-makers to educate and raise skills so that as many people as possible are able to play the role of creators and innovators.

> *Innovation and technology* - Investment in R&D is even more important, however it needs to be adapted to new realities.

> *Competition-friendly environment - New business practices and different business 'mindsets'.* Businesses need to address the shift towards participation and new community practices. A key issue seems to be how the competition model will look on these emerging markets, especially in the integration of vertical chains and emergence of new horizontal markets.

> *Creating IPR- and DRM " friendly" environment.* The move towards stronger IPR and DRM protection needs to be balanced between the interests of producers and users. A new model of innovation is emerging, which is open, collaborative, multidisciplinary and global. New regulatory frameworks have also to ensure an adequate balance between protection and the use of content. Potential solutions could be Creative Commons, or new DRM forms such as forensic DRM[37]. Harmonisation of IPR throughout Europe is also an issue.

There are important implications of Social Computing for health, learning, inclusion, innovation and governance amongst others. Social computing is enabling greater transparency, efficiency, user involvement, empowerment and real-time engagement. It thus may lead to fundamental changes in the nature of (EU) policymaking as it has implications for all policy areas, as well as for business and everyday life[38].
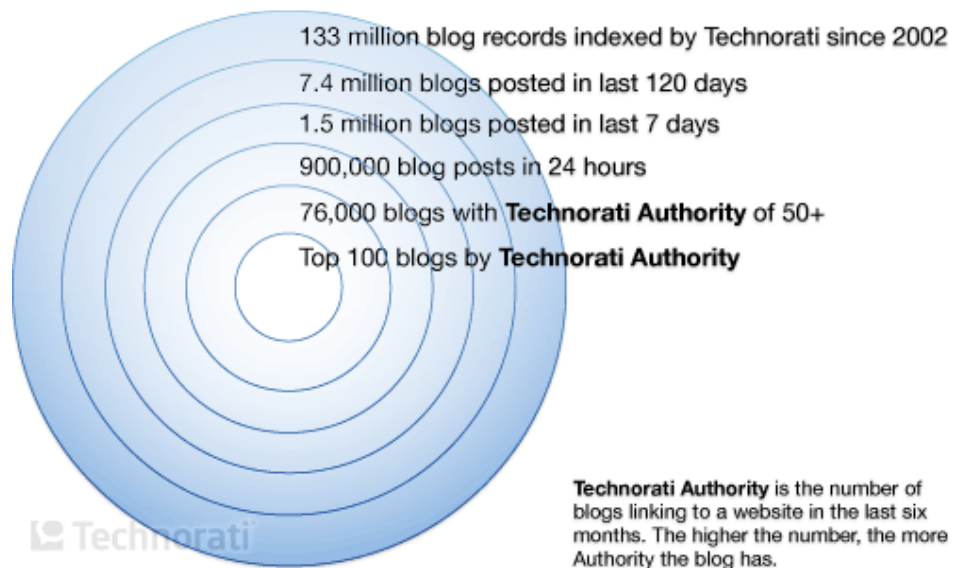
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[37] Forensic DRM comprises technologies which help to identify actual end-users of digital content, such as fingerprinting and watermarking

[38] IPTS research is now being compiled into a JRC Reference Report that will provide input to a wide spectrum of policy makers

Annex – Growth patterns of some selected web2.0 developments

Blogs   *More than 130 million Blogs (Nov 2008)*

133 million blog records indexed by Technorati since 2002

7.4 million blogs posted in last 120 days

1.5 million blogs posted in last 7 days

900,000 blog posts in 24 hours

76,000 blogs with **Technorati Authority** of 50+

Top 100 blogs by **Technorati Authority**

Technorati Authority is the number of blogs linking to a website in the last six months. The higher the number, the more Authority the blog has.

Technorati

Wiki   *Wikipedia has currently more than 9.5 million articles in all combined wikis (250 languages) and maintains a growing base of over 1.5 million registered users.*
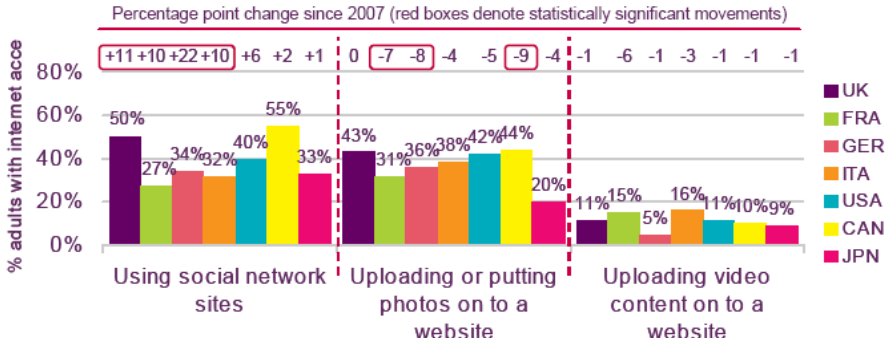
Number of articles
on en.wikipedia.org
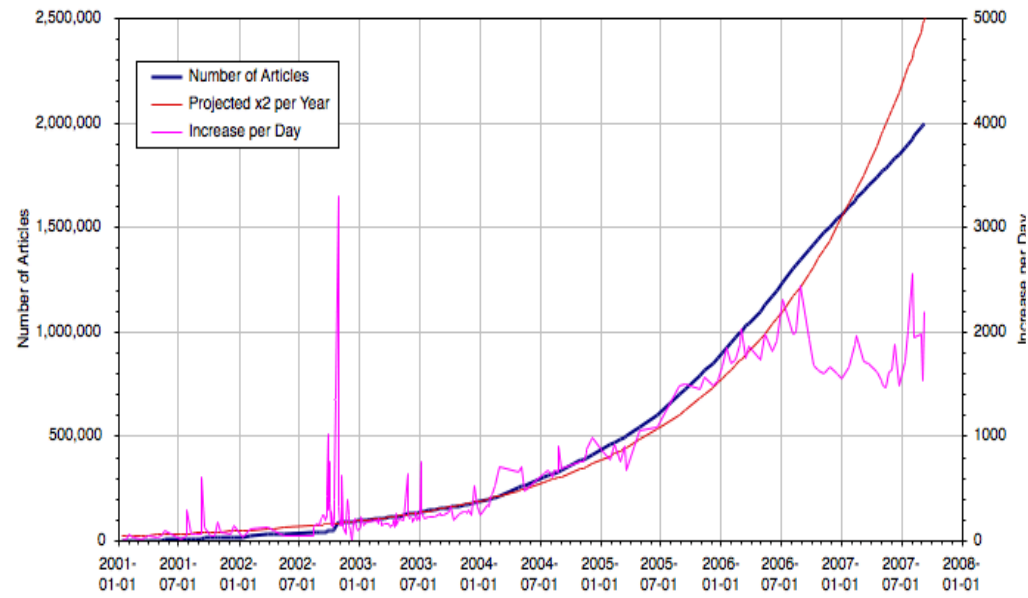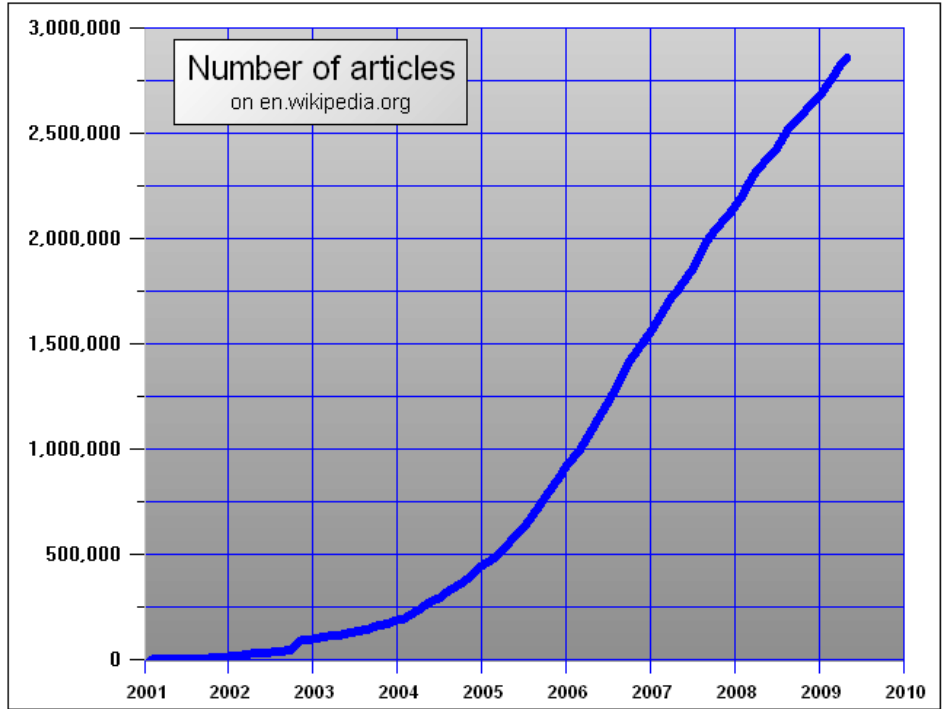
| Social networking | *~45% of total web users visits these sites, usage is increasing (Ofcom2008); YouTube: In Jan. 2009, 6.3 billion videos viewed online (Mashable) YouTube also, accounts for 91% of the incremental gain in the number of videos viewed* |

**Figure 3.8   Use of the internet for user-generated content**

Which of the following do you use your internet connection for?

Percentage point change since 2007 (red boxes denote statistically significant movements)

+11 +10 +22 +10   +6   +2   +1   0   -7   -8   -4   -5   -9   -4   -1   -6   -1   -3   -1   -1   -1

Using social network sites
50% 27% 34% 32% 40% 55% 33%

Uploading or putting photos on to a website
43% 31% 36% 38% 42% 44% 20%

Uploading video content on to a website
11% 15% 5% 16% 11% 10% 9%

UK FRA GER ITA USA CAN JPN

Source: Ofcom Understanding International Communications Behaviour research, October 2008
Base: all adults aged 18+ use the internet(UK 1001, France 1000, Germany 1002, Italy 1003, USA 1010, Canada 1000, Japan, 1003)

Social gaming	*In September 2008, just over 15 million accounts were registered, user base is growing and the virtual economy is booming [39](Linden Lab statistics in 2009); In 2007, Europe took lead in Second Life users (54% of active users)*	
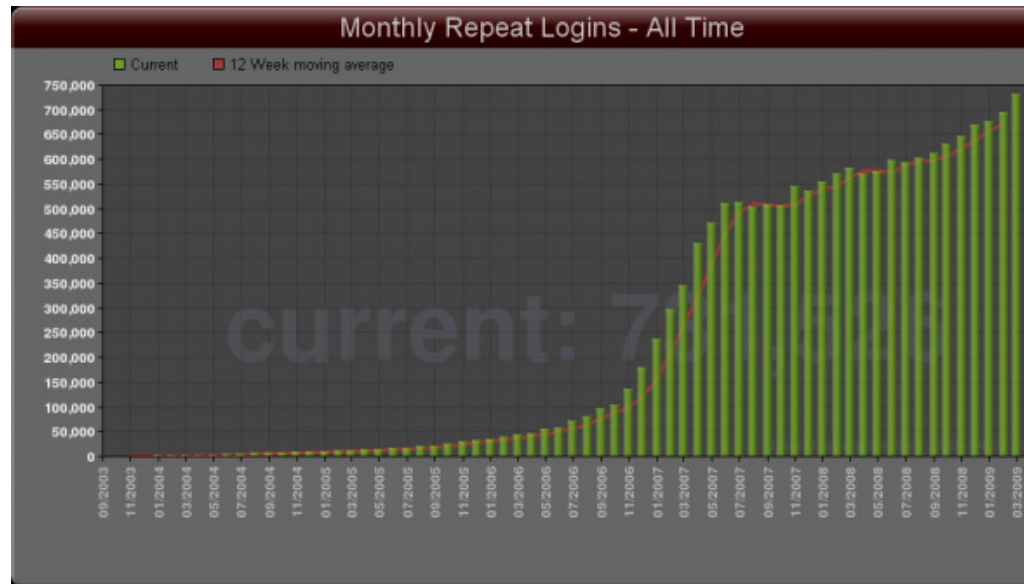
Table 2 – Growth Patterns of selected web2.0 developments

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