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Assessing the Impact of Open Content Knowledge Production in Web 2.0

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Abstract: The Dotcom-Crash at the end of the millennium has not led to the feared doom of the World Wide Web, but brought about certain new technological applications and services and a new generation of the Internet that is currently subsumed under notions such as Web 2.0 and/or Social Software. Users are now designers and active contributors and are hence treated as co-developers (e.g. "the perpetual beta", O'Reilly 2005); furthermore they are producing content by aggregating, mashing-up, (re-)interpreting and distributing information (ProdUsers) and are hence a central resource of (common, collaborative) knowledge production. Phrases such as "giving the Internet back to the people" characterize these developments towards more user-centeredness; the Time Magazine awarded "You" (as part of any Web 2.0 community) as "Person of the Year 2006". Whereas the early notions of Web 2.0 refer to common actions people undertake in terms of cooperative and collaborative knowledge production, dissemination and storage, we also face a shift towards a new commercialisation of the net (e.g. Second Life, "What is Web 2.0 - Design Patterns and Business Models for the Next Generation of Software", O'Reilly 2005). How does this new trend effect future (cooperative) knowledge production within Web 2.0? Which role do "knowledge as a commodity" versus "knowledge as a commons" play in this context? How will property rights change? The aim of the paper is to assess the impact of certain cooperative movements within Web 2.0/Social Software in order to gain insight on future (open-access) knowledge production processes.

Keywords: Creative Commons, ICTA (Information and Communication Technology Assessment), IPR (Intellectual Property Rights), Social Software, Web 1.0, Web 3.0

> *Like distant islands sundered by the sea, we had no sense of one community. We […] worked apart and rarely knew that others searched with us for knowledge, too…*
>
> *[Vint Cerf 1989]*

IN 1989 VINT Cerf, father of the Internet, wrote these words in his "Requiem for the Arpanet" and continued: "But could these new resources not be shared? Let links be built; machines and men be paired! Let distance be no barrier!" Thereby Vint Cerf referred to those intentions the pioneers had when they invented the network of networks.

For a rather long time, designing and structuring the Internet was reserved to computer engineers and professionals. Since the burst of the dot-com bubble we face a shift of the web. The notions of Web 2.0 and Social Software refer to a new understanding of the web that leaves behind static hypertext websites. New technological applications and increasing computer literacy brought further about a new generation of skilled web users that actively contribute to innumerable communities, blogs, and wikis. As *produsers* [1] they generate content by aggregating, mashing-up, (re-)interpreting and distributing information. Some claim that the Internet was literally given back to the people. This shift of the web towards more user centeredness and user integration reminds of those intentions Internet pioneers had in the last century.

The aim of this paper is to discuss the impact of open content knowledge production. Knowledge is here understood as a threefold process of cognition, communication and cooperation (cp. Hofkirchner 2002; tripleC). Open content refers to the idea of common access to (digital) information, allowing to share, distribute, adapt and remix the content and making it available to all, in particular content that is collaboratively produced by multiple authors.

First I discuss prevailing explanations of Web 2.0 and Social Software. Second I focus on the matter of impact evaluation in terms of traditional approaches in Technology Assessment. Such an approach is valuable when outlining potential directions for future technological, and therefore social, development. Third I argue that a new understanding of Information and Communication Technology Assessment (ICTA) is needed since it conceives the web as a dynamic techno-social system. Such an attempt is often missing in prevailing theories. Fourth, the

[1] The phrase coined by Axel Brun is a merger of *producer* and *user* and refers to the convergence of the traditionally rather separated producer and user roles. The concept is similar to Alvin Toffler's *prosumer* [1980], which indicates the trend towards the convergence of content *producers* and *consumers*.

core of this concept is based on the idea that the web develops from a web that fosters human cognition, through a web that facilitates communication, towards a web that enables cooperation. According to this understanding three evolutionary stages of the web development are outlined, namely Web 1.0 ("read-only") as a web of cognition, Web 2.0 ("read/write") as a web of communication and Web 3.0 as a web of cooperation. The latter is not yet fully in existence but its possibilities and potential can be seen in online cooperation projects like Wikipedia. Five, I discuss the theoretical approaches by referring to Wikipedia as one example of collaborative online open content knowledge production systems and new licence models that provide the necessary basis for open content knowledge production. I will conclude with outlining some preconditions for future open content knowledge production.

Common Understandings of Web 2.0 and Social Software

There are many scientific and even more non-scientific explanations about Web 2.0 and Social Software. Jane Klobas for example points out that Social Software is "software that facilitates social interaction, collaboration and information exchange, and may even foster communities, based on the activities of groups of users" (Klobas 2006, 1). Howard Rheingold and his working group define Social Software as a "set of tools that enable group-forming networks to emerge quickly. It includes numerous media, utilities, and applications that empower individual efforts, link individuals together into larger aggregates, interconnect groups, provide metadata about network dynamics, flows, and traffic, allowing social networks to form, clump, become visible, and be measured, tracked, and interconnected" (Saveri et al. 2005, 22). Tim O'Reilly and his working group at O'Reilly Media created and popularised the term Web 2.0. What they mean with this notion – apart from "design patterns and business models" (O'Reilly 2005, online) – are "applications […] that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an 'architecture of participation', and going beyond the page metaphor of Web 1.0 [...]" (O'Reilly 2005, online).

These quotes are just a few out of a broad range of definitions and explanations from both scientific and non-scientific discussions[2]. The boundaries between the understanding of Web 2.0 and Social Software are blurring. A larger *theoretical* understanding of the new generation of the web, especially as regards impact assessment, is still missing. The notions of Web 2.0 and Social Software generally refer to common actions people undertake for cooperative and collaborative knowledge production, dissemination and storage. An important characteristic is the user integration in terms of networking and content generation, that for example Yochai Benkler (2005) calls "commons-based peer production", i.e. to produce new information goods through participation.

Impact Assessment of Web 2.0: Traditional Approaches Revisited

Understanding and assessing current trends in Information and Communication Technologies, especially when focussing on web developments, one can learn from prevailing approaches in Technology Assessment. One goal of Technology Assessment is to overcome techno-deterministic views, for example by using theories and concepts such as the Social Shaping Approach, governance models and design guidelines. Amongst others, researchers like Nina Degele (2002) or Fuchs and Hofkirchner (2003), criticise, that many approaches in Technology Assessment treat technological change as being independent from the social realm. This refers for example to the Luhmannian understanding of the relation between society and technology. Niklas Luhmann defines technology as something that does not belong to society, but to the environment (cp. Luhmann 2000; cp. Degele 2002). According to Fuchs and Hofkirchner (2003) such an understanding is misleading since technology is part of society, and hence emerges from society. Another system theoretical approach in Technology Assessment might be provided by Thomas Hughes' systemic view: "[...] technologies come not in the form of separate, isolated devices but as part of a whole, as part of a system. […] A technological system [...] is never merely technical; its real-world functioning has technical, economic, organizational, political and even cultural aspects" (Hughes 2003, 10 sq.).

Technology does not invent itself but is created, shaped and (re-)designed by technicians, constructors, designers, engineers and users. Hence, designing and structuring technologies is a social act and technicians can be understood in their social role as experts, hackers, laymen, and common users that adapt to their technical needs. Constructing technology therefore is per se a social act. This becomes especially evident in terms of Web 2.0, when traditionally rather passive users ("readers only") are becoming

[2] For further quotations and a deep discussion on the question of what is *social* and what is *novel* in Social Software please see Fuchs et al. 2008.

even more active *produsers* ("readers-and-writers"). Society and technologies, as subsystems of society, are mutually interwoven. The selected quotes about Social Software and Web 2.0 above show that most of the concepts in this context refer to the societal impact and potential change, rather than to a technological turn. Most of the technologies that today are mentioned in the context of Web 2.0 have a quite long history, as for example Scholz (2008) describes.

Technology is created and designed by society. Hence society has the ability to shape technologies. At the same time technologies influence society, they are both, enabling and constraining. This means for example in terms of Information and Communication Technologies that society on the one hand may benefit from, e.g. the empowerment of citizens, democratisation and participation. On the other hand these technologies have the power to exclude a large number of people in accessing information. People are either lacking the technological infrastructure (digital divides), or the capabilities of using Information and Communication Technologies (computer or media literacy).

Technological progress plays a key role in society, but technologies need to be created, designed and adapted by humans and not vice versa. Very often people tend to arrange themselves with technologies, rather than changing or adapting them. The Social Shaping of Technology (MacKenzie/Wajcman 2003) provides an approach that seeks to mediate deterministic and constructivist views. It has the potential to sublate deadlocked theories in Technology Assessment, such as techno-determinism and pluralistic theories like social constructivism or system theoretical approaches that define technologies as something which does not belong to the social realm (cp. the Luhmanian approach as mentioned above). Systemic approaches in Technology Assessment usually do not take the change of technological development into consideration. According to Nina Degele (2002) there is a lack in theoretical approaches regarding system theoretical and evolutionary approaches (cp. Degele 2002). Both of them are prevailing theories in Technology Assessment, but they are treated independently from each other. With Information and Communication Technologies, i.e. technologies that change rather quickly (especially compared to large-scale technologies) one has to take the dynamics of the technological change into consideration. One attempt in closing this gap is to elaborate a new approach that is based on Evolutionary Systems Theory, i.e. to deceive the web as a dynamic techno-social system.

The Emergence of a Web of Cooperation and its Potential Impact

Since there is a lack in theoretical understanding of the evolutionary systemic approaches in traditional Technology Assessment, the Internet-and-Society Working Group[3] has elaborated a theoretical understanding of the new web generation, where the web is conceived as a dynamic techno-social system (cp. Hofkirchner et al. 2007; Raffl et al. 2008). The approach is based on Evolutionary Systems Theory (cp. Hofkirchner 2005). It sketches the framework of social self-organisation (Hofkirchner et al. 2007; Fuchs et al. 2008). The core of Evolutionary Systems Theory is a stage model (cp. Figure 1 below), that is a phase and a layer model in one. Accordingly, the dynamic of the self-organising web as a techno-social system leads to changes in the overall quality of this system in terms of a temporal succession of stages. In this evolutionary model of the web three stages can be distinguished. The timeline shows different phases of the evolving web that is from Web 1.0, to Web 2.0, towards Web 3.0. Furthermore it outlines the increasing complexity of knowledge processes, i.e. from cognition via communication to cooperation. Each level is the precondition for the next, but does not necessitate the next level. The shift from one phase to another causes the jump from one level to the next. The new level subordinates the old level and reshapes it, it re-ontologises it, and forms, together with it, the system of the new phase (cp. Hofkirchner 2007).

[3] ICT&S Center, University of Salzburg, Austria: http://www.icts.uni-salzburg.at.

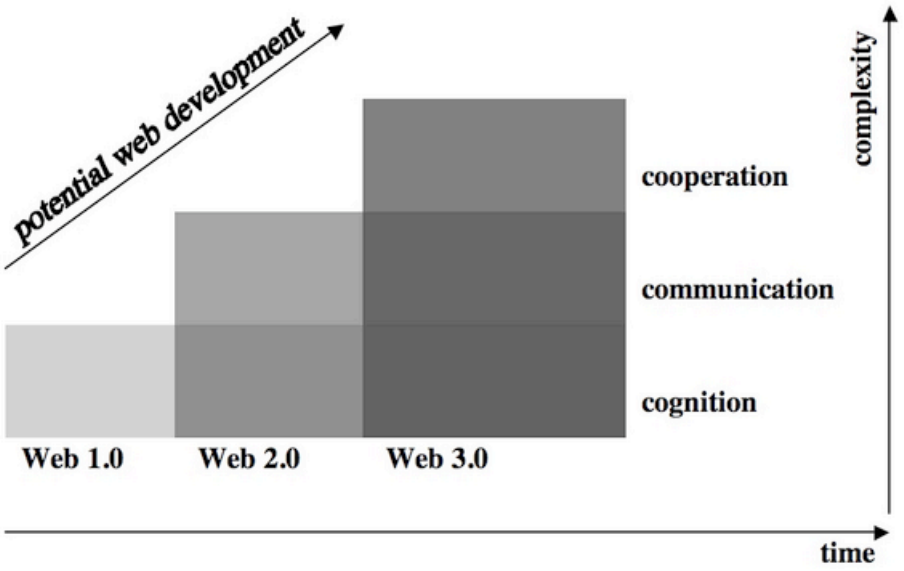

Figure 1: Emergence of Web 3.0 as a Web of Cooperation

In this context Hofkirchner (2007) and Fuchs (2008) argue for a *Critical Theory of Internet and Society*. Being *critical* implies in this theoretical framework that it is normative while doing justice to the factual at the same time. It includes not only an account of the potential given with the actual, but also an evaluation of the potential, which sorts out the desired (cp. Hofkirchner 2007). This means that the future web has the potential to enhance cooperation and its assumed positive effects, but it may also foster competition and social segregation. Technologies per se are neutral: "all that matters is the way societies choose to use them" (MacKenzie/Wajcman 2003, 4). A *Critical Theory of Internet and Society*, i.e. a normative approach, aims at suggesting solutions to global problems and question those forces that hinder such solutions and show how the Internet can contribute to the realisation of positive potentials that are inherent in contemporary society (Hofkirchner 2007; Fuchs 2008). Hence a web of cooperation is not yet fully in existence (neither a net that is based on competition only), but there are potentials for the emergence of a web of (global) cooperation, indicated by online collaboration systems, like Wikipedia, as regards the content, and certain activities within the Free Software and Open Source Movement in terms of code. Cooperation and competition shall not be treated separately. In the report "Technologies of Cooperation" Howard Rheingold and his working group point out, that a "cooperative strategy does not replace competitive strategy; the two are interrelated and co-evolve. A key challenge is learning to understand the dance between the two strategies, their respective range of choices […]" (Saveri 2005, 30). Given the assumption that achieving a cooperative Global Sustainable Information Society (cp. Hofkirchner et al. 2007) as an emerging space of a common knowledge base is feasible and beneficial for society, we have to set the boundary conditions for such a society now.

Share – Reuse – Remix: Foundations for Peer Production

As already mentioned, the notion Web 2.0 indicates a potential social change rather than a technological turn. Tim Berners-Lee, originator of the Web, for example argues that many of the technological concepts we now associate with Web 2.0 have existed since the early days of the Web (cp. Berners-Lee/Lanningham 2006). Web 2.0 is a "label applied to technologies, services and social networks that build upon the Web as a computing platform rather than merely as a hyperlinked collection of largely static webpages. In practice, services dubbed Web 2.0 reflect open standards, decentralised infrastructure, flexibility, simplicity, and, perhaps most importantly, active user-participation" (Stefanac 2007, 237). According to Aaron Boodman, Google web developer "[t]he Web was originally designed to be mashed up" (BusinessWeek, July 25th 2005). "The leading IT encyclopedia and learning center" also focuses on the concept of mash-ups: "Like blogs, vlogs and tagging, mash-ups are part of an ongoing shift towards more […] interactive and participatory Web (Web 2.0) with more user-defined content and services" (whatis?com 2006, online). Mash-ups are amongst others, such as social bookmarking, tagging and blogging, *the* characteristics of Web 2.0. Mashing-up in this context refers not only to a narrow

technological understanding of remixing functions of different websites to create something new (cp. Alby 2007), or as "an exciting genre of interactive Web applications that draw upon content retrieved from external data sources to create entirely new and innovative services", e.g. integrating Google Maps on his or her Facebook profile (Merrill 2006, online). It is more likely to be conceived in a broad sense of "an unusual or innovative composition of content (often from unrelated data sources), made for human […] consumption" (Merrill 2006, online). The concept of mashing-up hence also refers to content production and the remix of content pieces. The increase of open content knowledge by peers, i.e. multiple authors or producers in a broader sense, urged many debates around the question of Intellectual Property Rights and the prevailing licensing models. One approach to meet these challenges was the concept of open content.

The notion open content was coined by David Wiley in 1998 connecting the characteristics and functions of open source in terms of software and the production of digital content, i.e. texts, music, pictures, videos and interactive works. This includes the access to and distribution of digital content, as well as the adaption and the remix of content, in particular of that sort of content that is produced collaboratively by multiple authors (cp. SOCCP 2007). Open content provides an alternative to Intellectual Property Rights and emphasises on the values of knowledge as a commons. The Open Content Alliance (OCA) is a rather young project, founded by the *Internet Archive* in cooperation with Yahoo in 2005, that aims at digitising free multimedia products (cp. OCA 2008).

Lawrence Lessig stresses, that "[…] creation always involves building upon something else. There is no art that doesn't reuse. And there will be less art if every reuse is taxed by the appropriator" (Lessig 2001, 250). Around 2002 Lawrence Lessig and a few other lawyers developed the *Creative Commons* license. The key concept of this licensing model is "Share, Remix, Reuse — Legally" (creativecommons.org, online).

The *Creative Commons Attribution 3.0 Unported* briefly allows to share, i.e. to copy, distribute and transmit the work, and to remix, i.e. to adapt the work under following conditions: "Attribution. You must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work). For any reuse or distribution, you must make clear to others the license terms of this work. The best way to do this is with a link to this web page. Any of the above conditions can be waived if you get permission from the copyright holder. Nothing in this license impairs or restricts the author's moral rights" (http://creativecommons.org/licenses/by/3.0/).

There are several reasons for hindering a cooperative web to emerge. Reasons that dampen such a development can for instance be found in particular regulation systems, e.g. Digital Rights Management or Intellectual Property Rights. Yochai Benkler summarises that strong Intellectual Property Rights diminish the chance of user generated content: "The strength of peer production is in matching human capital to information inputs to produce new information goods. Strong intellectual property rights inefficiently shrink the universe of existing information inputs that can be subjected to this process. […] [T]he entire universe of peer-produced information gains no benefit from strong intellectual property rights" (Benkler 2005, 197). One example of the potential of peer production and collaborative content generation is Wikipedia.

Wikipedia as a Case Example for Cooperative Knowledge Production

Wikipedia is an international open content encyclopaedia in multiple languages. Articles are written collaboratively by a large number of volunteers. Wikipedia is freely available, easy accessible, non-commercial, and intends to foster the participation of users. Wikipedia started in 2001 as an experiment and followed the Nupedia project, i.e. an online encyclopaedia where articles were written by experts only. With Wikipedia everyone – who has access to the Internet and at least little computer competences – has the possibility to read, edit and contribute to this encyclopaedia. Jimmy Wales initiated both projects supported by Larry Sanger. Wikipedia uses wiki software, i.e. a type of software that enables creating, editing and organising content of websites that are created collaboratively. This software was developed first by Ward Cunningham. He started developing the WikiWikiWeb in 1994 (Cunningham/Leuf 2001; Scholz 2008).

According to many authors, e.g. Erik Moeller, Wikipedia is one of the most successful examples of the impact of cooperation. This model of collaboration, once applied to other technologies may lead to a tremendous societal change (cp. Moeller 2005, 188). In the last few years of its existence Wikipedia evolved to the largest wiki, as well as to the most comprehensive encyclopaedia of the world (cp. Pentzold et al. 2007, 63).

Yochai Benkler (2006, 70) identifies three key factors for the success of Wikipedia: First, wiki as a tool for open collaborative authorship. Second, the self-conscious effort at creating an encyclopaedia and third, the GNU Free Documentation Licence (GFDL), an adaption of the GNU GPL, which allows

for open content generation by collaborating actors. This licences was founded in 1999 by Richard Stallman for licensing Software Documentation (cp. Moeller 2005, 171). "The GNU Free Documentation License is a form of copyleft designed for books […]. It can also apply to textual works that are not released in book form. It gives users the right to copy, redistribute and modify the work, just as users have the right to copy, redistribute and modify free software" (Stallman 1999, online). Conceptually Wikipedia meets the above-mentioned criteria. Furthermore Eric Raymond's open source dictum "given enough eyeballs, all bugs are shallow" (2001) partly fits for Wikipedia too: "The more people read an article the more errors are emended" (Voss 2005, 10). This idea was also depicted by Tim O'Reilly (2005) in his definition of Web 2.0 as a "continually-updated service that gets better the more people use it" (online).

The Future of Open Content Knowledge Production?

Although Web 3.0 as a web of cooperation is not yet fully in existence there are some indicators that demonstrate the given preconditions for such a web to emerge. Wikipedia is just one example of the way collaboration has the potential to change our Information Society towards more sustainability, cooperation and less competitiveness (cp. Hofkirchner et al. 2007). Other examples that demonstrate the power of collaboration can be drawn from the Free Software Movement (e.g. Stallman 2002) or the Open Source Movement (e.g. Raymond 2001). Web 2.0 and its potential impact for communication and networking has already changed the way we perceive, design, and (re-)use these technologies. User integration and participation will also have a major impact on the design of the future web.

But such forms of online cooperation require open standards, open access and open content. In his book on the secret Media Revolution (2005) Erik Moeller imagines a future world of social justice, where all kinds of information can be changed, adapted, enhanced and distributed all across the world by everyone, where human beings are not just consumers, but also producers of knowledge, arts and culture. But elites, he is convinced, will try to hinder such a movement (cp. Moeller 2005, V). The online world is not a sphere of its own. Social patterns existing in real space, including social inequalities, are to some extent transferred to web communities. Real-world elites therefore have a major impact on the likewise open structure of the web. Governments, companies, politicians, and the public administration, etc. often conspire against a truly cooperative society to emerge: "There is no guarantee that networked information technology will lead to the improvements in innovation, freedom, and justice that […] are possible. That is a choice we face as a society" (Benkler 2006, 18).

Currently many efforts are undertaken in terms of (global) cooperation, both in the virtual, as well as the real world. But competition is still the predominant paradigm. The technological infrastructure given at the moment both enables and constrains cooperation. It deserves a change in the real-world society to make best use of cooperative tools on the web. Together with technological infrastructure and increasing computer literacy, openness and transparency are the key factors for the free access to information and resources for everyone. Such a movement requires public awareness and the support of empowered people that are not exploited by powerful elites. These people will collaboratively decide upon the success of open source, open access and open content knowledge production and hence build the basis for a cooperative and sustainable society to emerge. Increasing cooperation online might be one indicator that Vint Cerfs vision cited in the very beginning of this article might come true. Users that feel as being part of one community will be enabled to search for knowledge together, sharing, distributing, adapting and remixing content and making it available to all.

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