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Towards a definition of Web 2.0 – a comparative study of the 'wiki', 'blog' and 'social network' as instances of Web 2.0

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A research report submitted to the Faculty of Arts, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Arts.

Johannesburg, 2008

I declare that this dissertation is my own unaided work. It is being submitted for the degree of Master of Arts in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

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Belinda A. Lewis

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Abstract

Web 2.0 was a phrase coined in 2004 to describe the characteristics of web sites which survived the original Dot-com crash. Despite the discussion of this phenomenon in a wide variety of both academic and mass media sources, it's exact definition remains unclear. The relative contributions of technology and social participation to this phenomenon are particularly confused. The primary aim of this research report is to provide a clear and comprehensive definition of Web 2.0. This definition is determined through a combined social and technological analysis of blogs, wikis and social network sites, through their particular manifestations in Boing Boing, Wikipedia and Facebook respectively. It is the finding of this research that Web 2.0 is primarily the result of a natural evolution from Web 1.0 technologies and attitudes, and that Web 2.0 is essentially a social phenomenon. This research provides separate definitions for Web 2.0 technologies and Web 2.0 platforms. A Web 2.0 technology is any technology that aids and encourages simple intuitive user interaction through an architecture of participation. These technologies enable user feedback, and are thus constantly improved and exist within the ethos of a perpetual beta. Web 2.0 technologies embrace re-mix and mash-up philosophies. A Web 2.0 platform is a read-write Web platform designed to enable and encourage User Generated Content and interaction. These platforms can be built with any set of technologies, and their primary characteristics are social in nature, but the platforms must allow users to interact with the technology at either an open-source, network or appropriation level. These platforms become more powerful and richer the greater the number of people using the platform, and ultimately result in the formation of Web 2.0 communities.

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Towards a definition of Web 2.0 – a comparative study of the 'wiki', 'blog' and 'social network' as instances of Web 2.0

> "Web 2.0 is a massive social experiment, and like any experiment worth trying, it could fail. There's no road map for how an organism that's not a bacterium lives and works together on this planet in numbers in excess of 6 billion. But 2006 gave us some ideas. This is an opportunity to build a new kind of international understanding, not politician to politician, great man to great man, but citizen to citizen, person to person. It's a chance for people to look at a computer screen and really, genuinely wonder who's out there looking back at them. Go on. Tell us you're not just a little bit curious."
>
> "Time's Person of the Year: You" Time Magazine, Dec, 25, 2006.

Chapter 1: An introduction to Web 2.0

Web 2.0 was a phrase coined by Tim 'O Reilly and Dale Dougherty in October 2004 in an attempt to describe the characteristics that web sites which survived the original Dot-com crash[1] had in common (O'Reilly, 2005, 1). Two years later Time magazine published their 'Person of the Year: You' issue focussing on the empowering nature of the Web 2.0 platform for the general populace. Less than four years after the terms was first described a Google search provides over 47 million web links and 688,000 citations in peer reviewed journals (Google). Despite this mass uptake of the term, its exact meaning remains unclear. Even O'Reilly, the creator of the term, describes Web 2.0 as a phenomenon without a hard boundary,

[1] The Dot-com crash refers to the technology sector market crash of the 1990s, which occurred after a bubble of technology stock investments, brought about by excitement around the commercial uses of the Web, yielded low returns (Maness, 1).

but rather one with a ‘gravitational core’ of surrounding concepts (O’Reilly, 2005, 2). Some proponents of the new Web provide detailed lists of the technological advancements (Garrett, Miller), some believe that it is an attitude towards technology (Davis, 2005, 1) while others focus on the social participatory aspects of Web 2.0 (Maness). Even descriptions that combine the technological and social standpoints tend to be unclear as to which characteristics are results of technology and which result from user participation (O’Reilly, 2005). If the common feature of components of the Web that survived the Dot-com crash is that they are examples of Web 2.0, a more clear and comprehensive definition of Web 2.0 is necessary, both to assess the current state of the Web, and to plan the future of the Web. Without an understanding of the intrinsic characteristics of Web 2.0 its lessons can not be used to prevent a another economic crash, its social impact can not be determined and its features can not be properly harnessed in the design of new Web 2.0 platforms. In addition, if the current Web is not succinctly defined it will not be possible to identify entirely novel features not inherent in current Web 2.0 technologies, and the importance of these new technologies in shaping the next stage in Web evolution may be lost. The primary aim of this research report is thus to provide a clear and comprehensive definition of the Web 2.0.

While there is currently no standard technique or body of theory with which to examine the Internet and the Web (Wakeford, 2000, 31) theoretical frameworks for this topic fall into two broad categories: those surrounding the sociological aspects of the Web and those surrounding the technological aspects. These frameworks are not mutually exclusive and some theories, like those of technological determinism and socially mediated technologies, influence and inform studies of the Web as a whole.

Technological determinism, like all deterministic theories attempts to explain social and historical phenomenon in terms of a single determining factor (Chandler,

1). Technological determinists believe that technology shapes culture and society, and follows a path largely outside the influence of either (Burnett and Marshall, 2003, 10, 11). The influence of humans and their social interactions are seen as secondary in this technology-led theory of social change (Chandler, 2). The functional 'laws' of the medium itself both create and confine the social interactions possible within it, and its history is seen as one of intrinsic progress (Whittaker, 12). It is this highly reductionist approach that makes it a useful tool for investigating technological phenomenon, as a number of historical, social and cultural components are reduced to a single causal factor (Burnett and Marshall, 2003, 11).

Technological determinism, in its purest form, is in opposition to the body of theory known as the social construction of technology, which states that social structures are embedded in all technologies and that these technologies don't shape, but are products of, society and culture (Bijker, 1993). It is now widely accepted that media and mediums, like the Internet and Web, not only influence, but are also products of social forms (Lister et al., 190). In addition, technologies, no matter what their original purpose, may be appropriated by users, and through this participation both the purpose and meaning of the technology may change (Mackay and Gillespie, 1992, 1). Holistic social construction theories do not insist that technologies are purely neutral, and accept that they may have inherent ideological biases (Chandler, 7). Neil Postman argues for five ideological biases within media such as the Web. (Postman, 193) These are as follows:

1) Emotional and intellectual biases due to the symbolic forms in which information is encoded
2) Political biases due to the accessibility of information and the speed with which it can be accessed
3) Sensory biases due to their physical forms

4) Social biases due to the conditions under which media are engaged with, and
5) Content biases due to their technical and economic structures.
This means that individuals will experience identical phenomenon differently according to their specific economic, political and social backgrounds.
However, an acceptance of the non-neutral stance of technologies does not mean that the inherent characteristics of these technologies drive the way in which they are used, but simply that the certain social biases are embedded within them. An acceptance of these social biases is necessary in order to understand the different ways in which individuals interact with and experience the Web 2.0. This is important due to the diversity of people from different nationalities, and social and cultural backgrounds who are now online and interact with the Web.

As a holistic and comprehensive definition of Web 2.0 must take into account both its technological and sociological aspects, a technologically deterministic approach is not a useful starting point. Such an approach would pre-suppose that all characteristics of Web 2.0 are a direct result of the technologies from which they are created. This mono-causal reasoning would not accept the influence of users of technology on the technology itself, and it would thus not be possible to investigate both the influences of technology on society and society on technology. While this technologically deterministic approach may be problematic for studies of the Internet and Web generally, it is particularly problematic for the investigation of a social phenomenon like Web 2.0. For this report the premise of a socially influenced Internet and Web will thus be accepted, but each stage in the history of these phenomenon will be examined to determine the relative weighting of technological and social factors in their formation and function.

This report will thus explore the concept of Web 2.0 both as a technological and a sociological phenomenon. Such an investigation will begin with a history of the

Web 2.0 from the early days of the Internet to its present incarnation as Web 2.0. At each stage in its history a technological analysis will describe its characteristics in terms of hardware and software, and identify the most important advances or features within this technological growth. A social analysis will then investigate the influence of society and commercial forces on the growth, direction and technologies of these historical precursors to Web 2.0.

After this history has been examined this report will specifically examine features of the blog[2], wiki[3] and social network site[4], through their particular manifestations in Boing Boing, Wikipedia and Facebook respectively, both as examples of Web 2.0 and as social participatory platforms. Wikipedia contains more articles than any other encyclopedia (Voss, 1), has over 6 million registered users, and contains 9 million articles, in over 250 languages (Wikipedia:About). Between 50 and 85 million blogs exist on the Web (Shmidt, 2). The Boing Boing blog is rated the most popular blog in the world by Technorati.com[5], and contains over 677 098 links and 20 657 individual blogs (Technocratic.com). Boing Boing also won the Lifetime Achievement and Best group blog award at the 2006 Bloggies ceremony (Technocratic.com). Millions of users all over the world have profiles on social network sites, in 2007 1 in every 7 American babies had photos of themselves posted to a social network site before they were even born (TechRadar). Facebook alone has over 70 million registered users (Facebook statistics) which represents a 3 fold increase since March 2007 (Facebook statistics). The global importance of these platforms is thus indisputable. Blogs, wikis and social network sites are widely cited

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[2] The blog is defined on page 53.

[3] The wiki is defined on page 40.

[4] The social network is defined on page 63.

[5] Technorati.com is a blog search engine that currently tracks and ranks over 112.8 million blogs (Technoratic.com: About).

as examples of Web 2.0 platforms (Anderson, Davis, O'Reilly, 2005, Maness, Stern). Once again a two-fold technological and social analysis will be conducted with the overall aim of determining the relative importance of technology versus social interaction in these particular Web 2.0 manifestations. The technological analysis will once again describe each platform's characteristics in terms of software and the most important features. The social analysis will examine the way in which the technology allows for and/or limits 'social participation' – a working definition of which will be determined through this research. These analyses of Boing Boing, Wikipedia and Facebook will then be directly compared in order to determine which features, technological or social, exist on all three platforms, and therefore contribute to a definition of Web 2.0.

As Tim 'O Reilly was the first person to use the term and views Web 2.0 as a technological phenomenon, an attitude and approach towards using technology, and a social phenomenon, he provides an excellent starting point for an investigation into Web 2.0. As all other definitions of Web 2.0 either clarify, or refute O'Reilly's stance his particular view point must first be described in full. The figure below shows the 'gravitational core' of concepts that O'Reilly believes relate to a Web 2.0 platform (O'Reilly, 2005, 2).

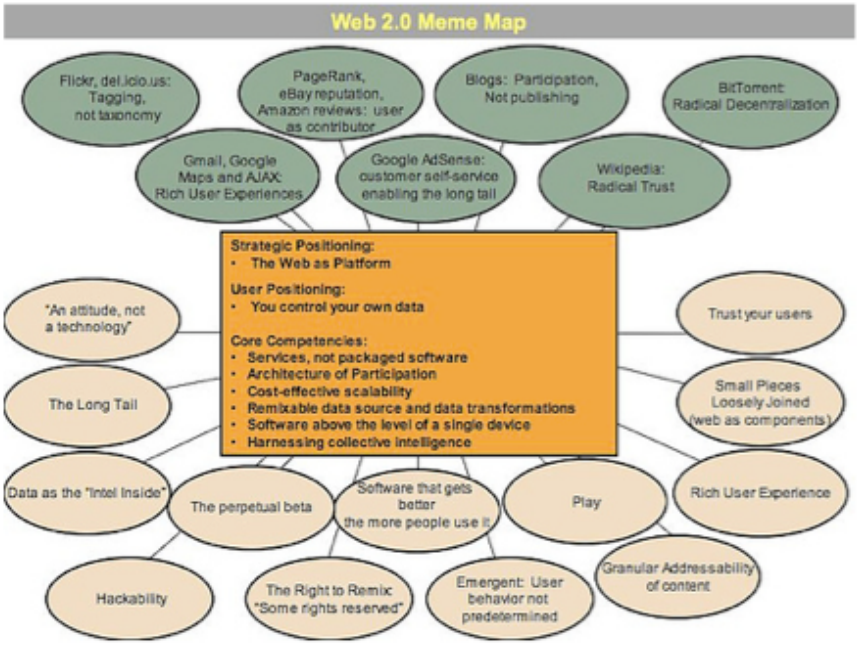


Figure 1: O'Reilly's Web 2.0 Meme Map, O'Reilly, 2005, 2.

O'Reilly's first defining characteristic is that Web 2.0 sites use the Web as a platform, they live on the Web and provide services from it (O'Reilly, 2005, 3). He cites Google as the primary example of an application that has completely escaped traditional software paradigms to use the Web as a platform. Google is housed solely on the Web and thus is never sold, packaged or licensed (O'Reilly, 2005, 3). This lack of software paradigms means that Google can exist in a 'perpetual Beta' (O'Reilly, 2005, 9), and new features can constantly be added or improved without necessitating re-releases of software. O'Reilly believes that changes in this 'perpetual beta' are then typically driven predominantly by users of the platform, allowing them to shape the platform's evolution through their user patterns and requirements (O'Reilly, 2005, 10). In addition, in this approach to creating Web services there is a shift from viewing 'software as an artifact' of the Web service to 'software as the service '(O'Reilly, 2005, 9). This approach to software results in the use of dynamic scripting languages like PERL, Python, PHP and Ruby, which are

suitable tools for building dynamic living platforms that are constantly updated (O'Reilly, 2005, 9).

O'Reilly believes that Web 2.0 sites are built within 'an architecture of participation', that is one in which user interaction is encouraged, desired and made simple (O'Reilly, 2005, 4). This allows sites to harness the power of the collective intelligence of crowds[6], and these services automatically get better the more people use them (O'Reilly, 2005, 4). This user participation allows for much larger networks to be built up from the collective power of smaller sites, or even from individuals, such as the case in eBay[7] and Napster[8] (O'Reilly, 2005, 4). The phrase 'architecture of participation' takes into account Larry Lessig's extended metaphor of architecture as politics, in which the architecture of systems is understood to have a large effect on the system itself (Lessig, 2000; O'Reilly, 2004, 4). At first glance Larry Lessig's argument may seem like a technologically deterministic one, in which the way in which a Web platform is coded determines how the system (in this case the technology and the people using it) as a whole will operate (Lessig, 2000). However this architecture not only allows for, but actively encourages, user feedback into the technologies and thus can not be part of a pure technological determined approach. An important feature of such an architecture is not only that it allows for participation, but also that it allows the majority of users of that platform to participate.

O'Reilly believes that Web 2.0 technologies are designed in such a way to encourage not just interaction with the platform but also interaction between users of

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[6] The central proposition of the collective intelligence of crowds is that a large number of diverse independent individuals are collectively better able to make decisions or predictions than single individuals or experts (Surowiecki).

[7] eBay is a online auction site where users of the site can list, sell and purchase anything from furniture and computer games to services. The site relies entirely on users for content. (eBay: About).

[8] Napster was a peer-to-peer music file sharing service. It allowed its users to upload and share MP3 formated music with each other, which eventually led to the original service being shut down for copyright violations (Leyshon et. al.).

the platform. He thus states that database management is a core competency of Web 2.0 platforms as they provider services that involve up to date relevant content (O'Reilly, 2005, 8). These services are concerned with syndicating data outwards and not the control of this data when it reaches its destination ((O'Reilly, 2005, 11). He cites that another distinguishing feature of all Web 2.0 technologies is that they are not developed at the level of a single device but for the Web as a whole (O'Reilly, 2005, 11). This means that these Web 2.0 technologies are developed not for a specific brand of home computer, game console or portable music player, but are developed to be used on multiple devices. These technologies also converge towards providing Web applications with desk-top equivalent interactivity through the use of JavaScript[9], DHTML[10] and Flash[11] (O'Reilly, 2005, 11). These Web applications with rich user interfaces are typified by Google's Gmail and Google maps and have been collectively termed Ajax (O'Reilly, 2005, 11). As Garrett points out in his description of Ajax; "Ajax isn't a technology. It's really several technologies, each flourishing in its own right coming together in powerful new ways" (Garrett, 1). Ajax combines XHTML[12] and CSS[13] presentation, with asynchronous data retrieval through XMLHttpRequest[14], manipulation of this data with XML[15] and XSLT,[16] and dynamic display and interaction using the Document Object Model[17] all bound together with JavaScript (Garrett, 1). The primary benefit of these groupings of

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[9] Defined in technical glossary.

[10] Defined in technical glossary.

[11] Defined in technical glossary.

[12] Defined in technical glossary.

[13] Defined in technical glossary.

[14] Defined in technical glossary.

[15] Defined in technical glossary.

[16] Defined in technical glossary.

[17] Defined in technical glossary.

technology for the user is that there is no time spent waiting while elements or data are loaded from the server, as in Ajax platforms client and server side communications take place asynchronously. O'Reilly gives the following definition for Web 2.0:

> Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those 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 to deliver rich user experiences (O'Reilly, 2005b, 1)

John Musser, another member of the O'Reilly team defines the Web 2.0 as:

> a set of economic, social, and technology trends that collectively form the basis for the next generation of the Internet—a more mature, distinctive medium characterised by user participation, openness, and network effects (Musser, 4).

Despite O'Reilly and other members of the O'Reilly team's detailed breakdown of Web 2.0 characteristics, and these later proposed compact definitions, there is no hard boundary around what people accept as a definition of Web 2.0. Paul Miller agrees with O'Reilly's basic principles and believes that Web 2.0 is about the freeing of data in modular virtual applications that allow for participation, sharing, communication, community and trust. Miller believes these Web 2.0 applications are smart, remixable and work for the user (Miller). He writes that Web 2.0. incorporates

old technological standards but focuses on user empowerment and can be seen ‘as comprising equal parts of evolution and revolution’ (Miller, 2). However, in Miller’s perspective the ‘revolutionary’ aspects of Web 2.0 are to do with the focus of these applications on participation and sharing, while the technologies involved are a natural evolution from Web 1.0. In this perspective the primary characteristic of Web 2.0 is definitely social. He believes that from a social perspective Web 2.0 applications are built on trust, and that this trust ranges from trust in individuals to trust in data and its uses and appropriated uses (Miller, 3).

Many of the social principles inherent in Miller’s description of Web 2.0 platforms arose from the original open source software movement as proposed by Richard Stallman in which both users and the software itself benefit from an open participatory system (Stallman, 1985). Miller describes some of the most important Web 2.0 characteristics as freely available manipulatable data and shared codes, concepts and ideas – all ideals straight out of the beginnings of the open source movement (Miller, 3).

In common with Miller, Ian Davis regards the Web 2.0 as an attitude not a technology (Davis, 1). He believes that true Web 2.0 platforms both enable and encourage participation through open applications and services (Davis, 1). He believes that this ‘openness’ must be two-fold. On the one hand technologies must be ‘open’ so that users can participate with and appropriate the platform at a code level, or combine it with another platform, but he believes that social ‘openness’ is more important (Davis, 1). Davis describes this social ‘openness’ as the rights granted to users to use the application/services and other content in entirely new contexts (Davis, 1). Davis believes that this social and technological openness will lead to the type of user participation cited by O’Reilly as a necessary characteristic of Web 2.0 (Davis, 1).

Hal Stern, however, refers to Web 2.0 as the read-write Web (Stern, 1). He believes all the inherent principles of Web 2.0 are to do with users writing data to the network (Stern, 1). Stern believes that the defining characteristic of each of O'Reilly's Web 2.0 features is that they represent a writeable Web and that all other Web 2.0 concerns around rights, relationships and derivative uses hinge off this characteristic (Stern, 1).

Jack Maness agrees in principle with Stern's read-write Web as the defining feature of Web 2.0 but expands this into what he refers to as the user-centred Web (Maness, 1). This user-centred Web is filled with dialogues and not simply monologues (Maness, 1) as a function of this ability of users to publish content. Similarly the the Web 2.0 is populated not with publications, but 'multi-sensory communication' (Maness, 1).

By contrast, Tim Burners-Lee, the creator of the first Web seems to believe that Web 2.0 is simply:

> a name to describe how the files using the Web work. You have user-generated content, and you have people logging in Web sites and tagging things, uploading a photograph, making community sites. So Web 2.0 is about the community-based Web sites." "I designed the Web as a foundation for all things. With Web 2.0, social networks and all kinds of things happen on top of it." (Moon).

He feels that the distinction is unnecessary, and that all characteristics of Web 2.0 are extensions of the original ideals of the Web 1.0:

> Web 1.0 was all about connecting people. It was an interactive space, and I think Web 2.0 is of course a piece of jargon, nobody even knows what it means. If Web 2.0 for you is blogs and Wikis, then that is people to people. But that was what the Web was supposed to be all along. And in fact, you

know, this 'Web 2.0', it means using the standards which have been produced by all these people working on Web 1.0

(Anderson, 5).

This opinion is particularly valid when one takes into account the fact that the original World Wide Web as designed by Tim Berners-Lee was in fact a read-write Web which users could both view and edit (Berners-Lee, 1999). This ability to edit HTML[18] files was removed in order to speed up adoption within the CERN[19] community. This means that the original Web was designed to encourage User Generated Content.

The Web 2.0 has been compared to both the semantic Web[20] (Fensel and Musen, 2004) and the Incremental living Web[21] (O'Reilly, 2005, 7) and while it makes use of these principles it has a much broader scope than either term.

From a purely technological perspective Web 2.0 makes use of synchronous messaging (more commonly referred to as instant messaging), the streaming of video and audio media, and systems and technologies making use of Blogs, Wiki's and Mash-ups[22] (Maness, 2006). Web 2.0 technologies include RSS feeds, which allow a subscription to a specific page and notifications of each change in that page (O'Reilly, 2005, 7).

From this survey of the literature it is clear that Web 2.0. does indeed have no cohesive agreed upon definition but there is a definite 'gravitational core' of concepts that focus on open easily appropriated technologies and the social participation that

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[18] Defined in technical glossary.

[19] CERN is described on page 25.

[20] The Semantic Web is a way of structuring data on the Web so that this data is understandable, and can be shared and re-used across applications and communities (Palmer, 3). At this stage the Semantic Web is still largely a theoretical construct.

[21] The Incremental Living Web is one in which content is a result of multi-way dialogue and is never static (O'Reilly, 2005, 7). Many Web 2.0 platforms have this characteristic.

[22] Mash-ups are defined on page 89.

they make possible. The mind map below portrays some of the features, technologies, design principles and attitudes of Web 2.0.



Figure 2: Markus Angermeier's Mind Map, Kosmar blog.

This mind map is not peer reviewed and thus not academically sound, but this mind map appears in one of the top three search results of the term Web 2.0. on Google, Wikipedia, Digg, del.icio.us and StumbleUpon showing its importance in the public domain. These holistic mind map approaches, while offering no conclusive descriptions or definitions, do give an idea of both the scope and confusion around the Web 2.0 concept. This map tags the technological features of the Web 2.0 such as Ajax, the marketing ethos behind it such as Pay per click, as well as attitudes towards the Web 2.0 such as Remixability and Web Standards. It is unclear under what criteria the creator assigned large and small tags, although the majority of technological features have been deemed secondary.

Chapter 2: Technologies and attitudes - a history of the Internet and the World Wide Web

The purpose of this chapter is to tease out the history of the Internet and the Web into their social and technological components. A combined social and technological analysis of these phenomenon must take into account the technological environment, development in the management and operations of global networks, their social aspects, and the effects of commercialism (Leiner et. al., 1). This chapter will therefore attempt to touch on the significance and influences of all these factors.

The Internet is 'a network of networks that connects computers all over the world' (Young et. al., 1999, 4). It is made up not only of the physical computers and cables, but also the software protocols of data exchange, various communicative media, such as the World Wide Web and email (Whittaker) and it can be viewed both as a medium for data dissemination and for collaboration and interaction between individuals (Leiner et. al., 1).

The World Wide Web, or Web, is a sub-network of the Internet consisting of online documents written predominantly in HTML (Hypertext Markup Language)[23] and connected by hypertext[24] (Berners-Lee et. al., 1994). While Tim Berners-Lee, the Web's creator calls it "a universe of global, network-accessible information," (1996, 1) this definition could just as easily refer to the Internet itself. The term, the Web, generally refers to the area of the Internet viewable through a graphical user interface using a Web browser (Whittaker). The Web is housed within the Internet, operates on complimentary software for the Internet, and is a much later invention.

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[23] Defined in technical glossary.

[24] Hypertext is defined on page 24 and 25.

2.1. Before the Internet

As a function of the Internet is communication free from geographical constraints, a pre-history could start in the 1800s with the invention of the telegraph and thus the world's first telecommunications network (Whittaker). However, the possibilities for human interaction created by the Internet and Web are so far beyond those provided by these initial media, that their discussion provides little value in understanding either phenomenon. This is because the Internet and the Web offer synchronous and asynchronous communication, group communication, and communication that goes beyond voice and even the written word in terms of the sharing of both concepts and media. There are however conceptual pre-cursors to the Internet that should be examined and understood, including Vanevaar Bush's 'Memex' and J.C.R. Licklider's 'Galactic Network.'

The 'Memex' was an imaginary machine capable of retrieving information based on the content of the current file of information (Bush). Vanevaar Bush first described this machine in 1945 as a means of storing knowledge through an organic process of association that retains not only the actual information but the flow of association pathways through this information (Bush). While Bush's machine was pre-digital, and all this storage and searching took place through purely mechanical means, Bush had essentially described both the Internet itself and the hypertextual processes of finding and browsing through information on the Web (Burnett and Marshall, 84).

While Bush does mention sharing both the information stored in the 'Memex' and the associative pathways created while mining this information, his 'Memex' does not have the feel of a social tool. Rather the 'Memex' acts as a personal external 'hardrive' storing knowledge and thought processes that through the sheer volume of information available to the modern individual could not otherwise be

retained. It is the conceptual precursor to the physical and technological networks that the modern Internet is composed of. However, this conceptual precursor ignored the social possibilities of these networks, and the social and community forming aspects of these networks have their beginnings in Licklider's 'Galactic Network.'

The possibilities of a "network of networks" as a tool for social interaction and collaboration is first described in the memoirs and papers of J.C.R. Licklider, the first head of the computer research program at ARPA, the Advanced Research Projects Agency (Leiner et. al., 2). His 'Galactic Network' concept was defined succinctly in his 1968 paper where he described his network as one in which "each secretary's typewriter, each data-gathering instrument, conceivably each dictation microphone, will feed into the [Galactic] network" (Licklider and Taylor, 19). Licklider, and his colleague Robert Taylor, were extremely positive about the social possibilities of such a network believing that "in a few years, men will be able to communicate more effectively through a machine than face to face" (Licklider and Taylor, 1) and that "life will be happier for the on-line individual because the people with whom one interacts most strongly will be selected more by commonality of interests and goals than by accidents of proximity" (Licklider and Taylor, 21).

In this 'Galactic Network' the physical connections provided by technologies were secondary to what individuals could do with the network. In Licklider's idealistic vision these social implications were not constrained or limited by the technologies themselves, access to the necessary hardware or the skill sets necessary to use them.

While Licklider and Taylor envisioned the social and communicative possibilities of the 'Galactic Network' less than a year before the actual inception of the Internet, much of the Internet's early history is essentially one of technologies and protocols in which little of the potential of this social interaction is realised.

2.2. ARPANET - The beginnings of the Internet

The Internet and the technologies behind it were described and created created in the 1960s as a military driven initiative funded through DARPA, the Defense Advanced Research Projects Agency, partially as a result of the interest generated in the concept by Licklider (Leiner et. al., 2).

The theoretical process for data transfer called ‘packet-switching’ was first published in 1961 (Klienrock) and while the process has been refined, it remains the current predominant file transfer technology used on the Internet because of its efficiency in moving data. Packet-switching software divides files into smaller components that can be sent via different hosts, allowing for maximum data transfer even if a single particular host is destroyed (Whittaker, 16). These discrete ‘packets’ of data are routed between these connection nodes and arrive at their target with variable delays. This focus on data security during transfer is the part of the legacy of an Internet with military beginnings. Data transfers over a military Internet must be resistant to hacking, disruption and arrive with perfect integrity.

In 1969 ARPA began to fund a multi-million dollar computer network, called the ARPANET, that used these packet switching technologies to share data (Whittaker, 16). The first node of this system, Klienrock’s Network Measurement Centre at UCLA, was selected due to Klienrock’s contribution to the technological protocols involved (Leiner et. al., 2). A second notable node was the Stanford Research Centre (Leiner et. al., 2) chosen predominantly because of Douglas Engelbart’s work on providing frameworks within which to develop new technologies dealing with large bodies of information, in a way that is meaningful to their human users (Engelbert). At the end of 1969 there were four nodes on ARPANET, (Leiner et. al., 2), and while the numbers of nodes and users steadily increased by 1979 there were still only a few hundred users, mainly consisting of academics interested in computer research

(Whittaker, 16). There was no global control over the Internet at an operations level, and each network was able to exist in isolation from other networks (Leiner et. al., 4)

During this period the standard protocols for data transmission, namely File Transfer Protocol (FTP), which allows bulk data transmission, and Transmission Control Protocol/Internet Protocol (TCP/IP), which ensures that packages are re-assembled in the correct order at their intended target, were refined and put into place (Whittaker, 16). A major user benefit of these technologies, combined with remote log in abilities, was that resources hosted on separate networks could now be shared (Leiner et. al., 5). These protocols, as they were designed for the networks themselves, and not standalone applications, continue to provide a general infrastructure on which layers of the Internet and the Web are built. However, in terms of the user, the most important application from this era was probably email[25] which allowed users to send and receive written messages. The original message send and receive software was created in 1972 by Ray Tomilson (Leiner et. al., 3). This software was motivated by the need for a simple co-ordination mechanism between ARPANET developers (Leiner et. al., 3). Later that year the software was improved with functionality that allowed users list, file, forward and respond to messages (Leiner et. al., 3).

2.2.1. Technical Analysis

In this phase of Internet growth the Internet is best described and defined in terms of its technological advancements. The technological backend through which data can be shared across networks, the defining characteristic of the Internet, was established. The developers built ARPANET in an open-architecture network, where the individual networks may be separately designed and developed, and each may

[25] Defined in technical glossary.

have its own unique interface (Leiner et. al., 3). In this way the technological infrastructure could be appropriated for any purpose. This open framework can be seen as the technological precursor to O' Reilly's architecture of participation which he cites as a necessary characteristic of Web 2.0 platforms (O'Reilly, 2005 & 2004). This suggests that at least some of the key technical characteristics of Web 2.0 were features of the Internet from its earliest incarnation.

2.2.2. Social Analysis

Although from a technological perspective the Internet underwent rapid growth in this period, its possibilities as a social platform were severely limited. This was predominantly because of the barriers to using the ARPANET, both in terms of computer skills required and costs of and access to hardware necessary for linking to the network. While it can be said that a community of ARPANET users existed, as these users no doubt communicated online with 'sufficient feeling' (Rheingold, 5) to be described as such, its small exclusionist user base fell far short of Licklider's 'Galactic Network'. In addition, this community cannot really be said to be free of geographic restrictions as while these nodes were spread all around the United States they were still selected in part because of their physical locations.

One important social phenomenon, however, of long distance collaboration and digital communication did begin in this period. The sharing of data across geographical distance combined with the use of email meant that for the first time in human history long distance, highly complex, and almost instant communication was possible. Electronic mail combined the complexity and accuracy of the written word with the long distance capabilities of prior telecommunications capabilities to create an entirely new means of person to person communication. While these interactions were severely limited by the tiny number of people on the network this

communication changed the face of collaboration and enabled academics from geographically distant institutions to collaborate in a meaningful way in a relevant time scale. If Web 2.0 is about applications powered by connections between people, email was the first step in that direction even though it generally occurred on a one to one basis.

2.3. The Internet's next steps

The structure of the Internet began to change in 1983 when the MILNET, the military component of the ARPANET split from the ARPANET proper so that the ARPANET would be free of the security restrictions necessary for a military network (Abbate, 185).

The next phase in Internet development is largely a result of two things; the rise and spread of personal computers in the late 70's and 80's (Whittaker, 17) and the creation of PhoneNet, a set of dial-up telephone connections that opened access to institutions unable to afford permanent data connections (Abbate, 184). PhoneNet was developed as part of CSNET, another network within the Internet, that linked to a number of ARPANET hosts (Abbate, 184). CSNET membership was open to academics, and non-profit and government institutions, although commercial use of the network was prohibited (Abbate, 184).

In 1973 Metcalfe devised the Ethernet, which allowed for Local Area Networks between computers themselves thus increasing their potential as networking tools (Abbate, 187). This resulted in an increase in both the scale of the Internet itself and the management issues associated with it (Leiner et. al., 6). Because of this increase in scale this period in Internet history saw the implementation of the Domain Name System (DNS), which is essentially a hierarchical system that allows for searching for IP addresses through a series of progressively larger and de-localised networks

(Wittaker, 193). This conceptually simple process means that every single server no longer had to store the IP address of every computer on the Internet (Whittaker, 193). This was becoming increasingly important, as by 1989 there were over 100,000 Internet hosts (Whittaker, 19). This growth also necessitated the creation of a hierarchical model of routing which is the process of selecting pathways for data transmission. Prior to this phase a single algorithm was deemed sufficient, but increased numbers of hosts and users meant that two separate protocols became necessary, an Interior Gateway Protocol (IGP) used inside regions and a Exterior Gateway Protocol (EGP) used between regions (Leiner et. al., 6).

At this stage the Internet consisted of a large number of networks working both in isolation and in conjunction to each other with no single purpose or direction. This lack of a single body defining Internet growth, management and structure did mean that this phase of Internet evolution was multi-directional, so much so that Burners-Lee found it a ‘chaos of conflicting standards’ in the 1990s (1999). The Internet composed of more and more sub-nets began to expand in capability and geographical space (Whittaker, 18). During the 80’s many networks arose NSFNET, EDNET (Abbate, 192), BITNET, EUNET, JANET and notably USENET, which encouraged the transmission of information in an totally open uncensored forum with files arranged in hierarchies of categories (Whittaker, 19).

USENET is one of the best examples of an early Internet community success story, and is one of the few networks created in this period that was not purposefully built for a community of academics and researchers (Leiner et. al., 7). Despite being created in 1980 it still has a large active community and makes use of an asynchronous Bulletin Board or conferencing system (BBS) for all interactions (Smith and Kollack, 5). These BBS systems refine previous email interaction in that users of the system are able to create topical groups in which each asynchronous message

from all participants are stored in chronological sequence (Smith and Kollack, 5). Access to USENET was unrestricted, except by the hardware necessary to obtain a connection (Whittaker, 19). USENET encouraged the transmission of information in an open uncensored forum with files arranged in hierarchies of categories (Whittaker, 17). This focus on neutrality and openness meant that USENET was used by a variety of individuals and not just academics. This resulted in a shift from an academic to a social Internet, where communication began to exist for communication's sake and the sharing of non-academic files became popular.

In 1988 the commercial and economic possibilities of the Internet were first taken into the mainstream with a series of National Science Foundation (NSF) initiated conferences on the "Commercialisation and Privatization of the Internet". This was also the year of the first Interop trade show in which representatives from 50 companies came together to showcase products that they had developed for use on and with the Internet.

2.3.1. Technical Analysis

The direction of this phase of Internet development was driven predominantly by technology, most noticeably the spread of hardware in the form both of personal computers, dial up network connections and the decreased security associated with a non-military network. However, in this stage of Internet development we can begin to see not only the effect of technology on society, but also the affect of social pressures on technology. Cheaper hardware and PhoneNet meant that more individuals had access to the Internet, which meant that the technological capabilities had to grow in order to handle this additional traffic. These social pressures necessitated the development of DNS, IGP and EGP technologies. These technologies of course then facilitated larger number of individuals on the network.

The technological social feedback loops, in which society creates technology which shapes society which shapes technology, seen in this stage of Internet development highlight the importance of a holistic social construction approach to determining a definition of the Web 2.0 phenomenon.

2.3.2. Social Analysis

The withdrawal of military governance of the Internet allowed it to evolve in a much less restricted fashion, and this combined with the technological updates allowed for the birth of the Internet as a truly social phenomenon. In groups like USENET, users of the platforms began to appropriate technologies for uses other than the collaborative research purposes they were designed for. This ability to appropriate technologies is a competency associated with Blogs and Wikis (Mee, Cunningham) both of which are Web 2.0 technologies. In addition, non-academic focused online communities like USENET are arguably the precursors of purely social social networking sites.

During this period the Internet's potential as a commercial tool had been discovered its commercial possibilities were still very much in the conceptual phase.

While the social aspects of this phase of the Internet was not the driving force of its development, it is in this stage the at the Internet as a purely social phenomenon was born. At this stage in the Internet's history a large percentage of the online community engaged in purely social discourse through groups like USENET and through email.

2.4. The World Wide Web version 1.0

In 1990 Berners-Lee wrote a "point and click hypertext editor" called the WorldWideWeb (Berners-Lee, 1998, 1). Conceptually 'hypertext' as an automated

system of interconnected texts dates back to Bush's 'Memex' (1945). The term was used to describe relationships between digital files by Ted Nelson in 1965 (Burnett and Marshall, 83). 'Hypertext' more closely mimics the essentially non-linear processes of thoughts and concepts (Burnett and Marshall, 84) than traditional hierarchical systems of storing information. A goal of Tim Berners-Lee in the creation of the Web was that the "interaction between person and hypertext could be so intuitive that the machine-readable information space gave an accurate representation of the state of the people's thoughts, interactions and work patterns" (Burners-Lee, 1996, 2). The first hypertextual online systems consisted of lists of underlined texts, and from 1992 onwards these systems were combined with graphical user interfaces that made online navigation simple and intuitive (Burnett and Marshall, 85). This intuitive process of structuring and accessing information may, at least in part, explain the success of the Web as a modern 'Memex' for human knowledge, and explain its prolific use by such a large portion of the population (Burnett and Marshall, 85, Moulthrop, 697, Nielsen, 14).

Berners-Lee's WorldWideWeb, a text based browser, together with the first Web server was made available to his local scientific community at CERN[26] in 1991 (Berners-Lee, 1998, 1). It was intended to be a collaborative "pool of human knowledge" allowing for collaboration between geographically isolated people (Berners-Lee et. al., 1994). In accordance with Berners-Lee's vision of a common global information network, Web technologies from their inception have included the use of Universal Resource Identifiers (URI), HyperText Markup language (HTML), and HyperText Transfer Protocol (HTTP) to encourage wide-scale adoption of the Web platform (Berners-Lee, 1996, 1). URIs are strings used as the addresses of objects on the Web (Burners-Lee et. al., 1994, 793). These identifiers are generic

[26] CERN is the European Organization for Nuclear Research, one of the world's largest centres for scientific research (CERN public site).

and the power of the Web is that it can use these identifiers to point to any document or resource of any kind (Burners-Lee, 1996, 4). HTML is a simple formatting language that uses tags to denote formatting options used to create pages in a Web browser (Whittaker, 196). HTML was chosen to encourage adoption of a new global information system as it resembled SGML, Standard Generalised Markup Language, which was already used by both the software documentation and hypertext communities ((Burners-Lee, 1996, 4). HTTP is a series of rules governing online file transfer (Whittaker, 196). While the FTP standard of transfer already existed this process was deemed too slow and not sufficiently rich in features for the Web (Burners-Lee, 1996, 4). A notable feature of HTTP is that it allows a client to specify preferences in terms of language and data format from a generic URI (Burners-Lee, 1996, 4).

Despite this emphasis on ease of adoption and adaptability, and its creators' awareness of its possibilities as a social network, the original Web was designed with no input from potential users beyond those directly involved in the project. CERN continued to develop the Web, but it was still essentially an academic tool consisting of only 1,500 Web servers by the end of 1993 (Whittaker, 20).

The first boom in the use of the Web by the general populace, at least in the developed world, came in 1993 with the development of a graphical browser that displayed both text and images called MOSAIC (Burnett and Marshall, 85, Whittaker, 20). From 1994 to 1997 the load on the first web server grew exponentially at a factor of ten per year (Burners-Lee, 1996, 5). The success of MOSAIC led to the formation of another browser called Netscape in 1994 by Sun Microsystems (Burnett and Marshall, 85). The structure of this browser became the template for all Web page design, and Netscape had a monopoly on the market until 1996 (Burnett and Marshall, 85). In 1994 a National Research Council report was released entitled

“Realising the Information Future: The Internet and beyond” which anticipated a number of concerns on the use of the Internet and the Web including issues surrounding intellectual property rights, software architecture and Internet regulation (Leiner et. al., 8). In the same year the World Wide Web Consortium was formed to prevent a fragmentation of Web standards that might threaten the commercial and technical developments of the Web (Burners-Lee, 1996, 6).

By 1996 AOL had developed a Web browser, as had Microsoft (Burnett and Marshall, 85). In the next 6 years Microsoft’s ‘Internet Explorer’, which was bundled together with their Operating System, would dominate the browser market, and less than 10% of consumers continued to use the original Netscape (Burnett and Marshall, 86).

Societal and government pressures resulted in the formation of the Platform for Internet Content selection (PICS) initiative, which allows parents and schools to filter content viewable by children on the Web (Burners-Lee, 1996, 7). These decentralised machine-readable labels are an early example of an online technology developed for purely social reasons, and it is interesting to note that this early pressure was to restrict the flow of content when, since the separation of MILNET, most technologies thus far had worked to ease its propagation.

From 1996 the increase in eCommerce[27] resulted in the creation of a number of additional protocols to ensure confidentiality, authentication and integrity during the online transfer of funds (Burners-Lee, 1996, 8). Another result of the boom in commerce resulted in Web architectural developments in terms of hardware and data replication that ensured a stability not deemed necessary to earlier Internet groups (Burners-Lee, 1996, 8).

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[27] Defined in technical glossary.

Post 1995 a large number of companies began to develop commercial content and applications for the growing network. This shift can be seen in the changes in distribution of domain names. In 1996 the commercial .com and .net domains had 1.8 times as many hosts as academic .edu domains, by 2000 this ratio had increased to 6:1 (Mowery and Simcoe, 20). What followed next is often referred to as the 'Dot.com bubble' (Maness, 1). Due to excitement in the Web, its increased uptake by the population at large, and a realisation of its potential as a source of revenue a 'bubble' of Web sites and technology stock investments occurred in the late 1990s. (Maness, 1). Information and corporate technologies attracted a great deal of interest and corporations acquired these technologies in order to penetrate new markets with radically new business models (Dutta et. al., 4). Investors, expecting high returns, pumped a great deal of money into these industries (Dutta et. al., 5). The commercial expectations from these technologies were unrealistically high (Dutta et. al., 4). These expectations resulted in a stock market bubble, a self-perpetuating rise in the share prices of stocks (Mahajan et. al., 3). These bubbles occur when investors note the fast increase in value and decide to buy in anticipation of further rises, typically many companies thus become overvalued (Mahajan et. al., 3). In 2000 this Dot.com bubble burst, share prices dropped drastically and several Dot.com retailers filed for bankruptcy, shut down their operations, or had their stock de-listed from the stockmarket (Mahajan et. al., 2).

2.4.1. Technical Analysis

In the early Web 1.0 the focus of technology was on creating a global system, one that operated with standard principles so that it could be used and added to by developers all over the world. This can be seen in technologies like HTTP that allow users to select both language and data preferences from a single resource. While

this development operated within what we would now term traditional non-open source software paradigms, with no input from users, this focus on the development of global standards means that Burners-Lee understood the necessity of creating software that could, at least in theory, be added to, or re-mixed[28] by a 3rd party.

In the later Web 1.0 technological developments were driven predominantly by social and economic forces. This resulted in architectural developments in terms of hardware and data replication that ensured Web stability and the protocols to ensure confidentiality, authentication and integrity during the online transfer of funds.

2.4.2. Social Analysis

The predominant shaper of this stage of Web growth was definitely the economic drive to create revenue through the Internet and through investments in Internet technologies. This force caused the Internet to grow both as a technological phenomenon and a social one much quicker than it would have in a non-economic setting.

The most important technological advancements from a user perspective were the Graphical User Interface (GUI) and displays that allowed for images and graphics. These advancements encouraged uptake by the populace at large. This allowed a wide range of people without technological backgrounds to make use of the Web. Post this mass adoption of the Web, its growth was mainly determined by societal pressures. Interest in its potential as a revenue source, and as a mass marketing tool led to the formation of hundreds of Dot.com corporations (Dutta et. al., 4).

At this stage the majority of sites on the Web contained read only databases of information, at least for the vast majority of the populace. While isolated content

[28] Re-mixing in this regard refers to the combination of two software functionalities to create a new software product with different functionality.

producers did exist, the number of producers, due to technological skills gaps and the expense of Internet connections and hardware, was still exceptionally low when compared with content consumers. This meant that the majority of Web 1.0 users formed a passive audience.

It was during this rapid expansion of Web that users of the Web first became concerned with restricting the type of information that was displayed on the Web, and who had access to this content. The PICS initiative allowed parents and schools to decide what content would be viewable to children on the Web. This was the first major initiative to restrict the flow of content on the Web, and access to it. The entire technological and social history of the Internet and Web since the separation of MILNET and ARPANET had until this point, been concerned with easing the propagation of data and sharing resources. This focus on restricting content arose because the technological framework of the Web and its GUI made the use of the Web simple and intuitive enough for even a child to use.

Despite the use of this version of the Web as a mass marketing tool, and academic collaboration, the power of the medium as a means of connecting individuals to individuals was largely unexplored. And while communities of connected users did exist[29], the technological platforms and softwares that they used for these connections were not designed with peer to peer communication as their core competency. Email, in fact, remained the dominant form of peer to peer communication despite its focus on individual to individual connections.

2.5. A comparison of Web 1.0 and Web 2.0

A comparison of Web 1.0 and Web 2.0 platforms is complicated by the fact that O'Reilly used the term to describe the characteristics that web sites which

[29] For example USENET and WELL.

survived the original Dot-com crash had in common (O'Reilly, 2005, 1), meaning that there were sites that could be described as Web 2.0 in existence at least four years before the term was defined. In addition, some technologies that appear to embrace the ideals of Web 2.0, such as USENET which relies solely on User Generated Content, aren't technically Web applications at all since they aren't accessed through a Web client (Madden and Fox, 1). This comparison is further compounded by the fact that the most verbose comparisons are from the O'Reilly Network, and thus focus on economically valid variables such as Web 1.0 domain name speculation vs. Web 2.0 search engine optimisation, page views vs. cost per clicks and DoubleClick vs. Google AdSense advertising models (O'Reilly, 2005, 1).

A holistic comparison of Web 1.0 and Web 2.0 means a comparison of both the technological advancements between the two Webs and a comparison of the attitudes towards technologies and the way that they enable users to interact with other users.

The table below compares Web 1.0 technologies with their Web 2.0 counterparts:

Web 1.0 technology	Web 2.0 technology
Dial up connections	Broadband connections
Wired connections	Wireless connections
HTML	AJAX
Portals	RSS
Web forms	Web applications
Content management systems	Wikis
Personal Websites	Blogs
Taxonomic organisation	Folksonomic organisation

Web 1.0 technology	Web 2.0 technology
Static content publishing - the read Web	Dynamic editable content - the read/ write Web

Table 1: A comparison of Web 1.0 and Web 2.0 technologies

Compiled from O'Reilly (2005) and Madden and Fox (2006)

The table below shows the differences in attitudes, the social aspects and the user experiences created by Web 1.0 and Web 2.0 platforms:

Web 1.0 social	Web 2.0 social
Software release by version	Perpetual beta
Publishing	Participation and User Generated Content
Focus on companies	Focus on communities
Focus on client to server relationships	Focus on peer to peer relationships
Data ownership	Data sharing
Static experiences	Interactive experiences
Single versions of platforms	Customizability
Passive audiences	Active audiences
Text	Multimedia
Read	Dynamic editable content
Experts	The wisdom of crowds

Table 2: A comparison of the social aspects of Web 1.0 and Web 2.0

Compiled from O'Reilly (2005) and Madden and Fox (2006)

The fact that the Web 2.0 is widely described in terms of attitude means that a number of sites pre-dating the Dot.com crash can arguably classified as Web 2.0,

while a number of sites that make use of Web 2.0 technologies are arguably still examples of Web 1.0. Ebay and Slashdot[30] pre-date the Dot.com crash (Ebay Company Overview, Slashdot History) but their reliance on User Generated Content and the editable interactive nature of their sites means that they could be classified as early adopters of the Web 2.0.

As these examples demonstrate, until Web 2.0 is succinctly defined, both in terms of the minimum technological and social requirements, it is impossible to accurately determine which sites are Web 1.0 and which are Web 2.0, or to compare the two versions of the Web.

[30] Slashdot is a technology related current news Web site which consists entirely of user generated articles. Article content is evaluated by an editorial team prior to publication, and a points system involving 'karma' ensures the fairness and accuracy of user content and comments (Slashdot.org).

Chapter 3: Living digitally

The analysis of all computer-mediated communication falls into the broad tradition of communications theory and sociology (Lister et al., 165). The power of the Internet as a communicative medium is that it provides for both the wide distribution of knowledge over space and the preservation of knowledge over time (Burnett and Marshall, 2003, 13). Early work on the influence of the Internet on communication, identity, culture and community suggested that the Internet radically deconstructed these phenomena (Burnett and Marshall, 2003, 62), and that without some grasp of cultural studies the Internet could not be understood (Lister et. al, 165). This is because the Internet is a socially and culturally constructed phenomenon. There are two issues with studies around the use the Web as a social and communicative tool (Lister et. al, 165). One is the increasing tendency towards a homogenous viewpoint of the Internet and the Web i.e. the World Wide Web is the Internet (Lister et al., 166). This lack of differentiation between the two phenomenon is largely the result of a new generation of users whose only experience of the Internet is through a Web browser (Lister et al., 166). The second issue is much of the body of computer mediated communications theory deals with a pre-Web Internet (Lister et al., 166). This means that no standard body of theory acts as an academic reference to Web specific communications studies. The Internet and Web, and indeed the different platforms and applications within these, are intrinsically different phenomenon. They result in distinctive types of communication with various potentials for types and depths of social interactions and community formation. The text based chronologically ordered topic centred experience offered by a community such as USENET (Leiner et. al., 7) on the Internet is very different to the people centred multi-media experience offered by a community such as Facebook through the Web (Boyd and Elisson, 4) and these experiences can not accurately be assessed within the

same theoretical paradigms. Care must thus be taken when extrapolating pre-Web theories around identity and community to Web studies.

The Web platform and the applications within it influence how we portray ourselves online and thus how we communicate and interact (Lister et al., 166). This chapter will attempt to investigate three platforms widely cited (Anderson, Davis, O'Reilly, 2005, Maness, Stern) as examples of Web 2.0 in terms of their technological and social components in an attempt to determine the relative weighting of these aspects to the success of the platform and thus to a definition of Web 2.0. This chapter will examine 'wikis', 'blogs' and 'social networks' in their incarnations as Wikipedia, Boing Boing, and Facebook respectively. As a precursor to this assessment, online identity will be investigated as a prerequisite to, and shaper of, online communication. This report will then look at online communication and communities and from this determine a working definition of social participation that specifically deals with Web 2.0 platforms. This report will then discuss the chosen platforms in case studies that investigate their technological aspects and the way in which they allow for and or limit social interactions.

3.1 The digital self

Before it is possible to communicate, interact socially or be part of a community through the Web or other digital medium, it is necessary to have a digital identity, a representation of self in the digital realm. This representation can be as simple as an email address or as complex as a profile on a social networking site. However even a simple email address can provide information about interests, personality and geographic location. While offline identity is also at least partially constructed, as we project ourselves as we'd like to be seen through dress, speech and mannerisms, the online self is a much more intellectually and purposefully

constructed phenomenon. This ‘freedom’ from embodiment in the digital realm means that it is theoretically possible to escape the constraints of gender, race, class and physicality. Writers like Turkle (1995) and Stone (1996) argued for the liberating effects of the constructed identity possible on the Internet. “The things it [cyberspace] changes are the arbitrary constraints on interaction. Distance is not an impediment. Race doesn't matter. Being a big strapping male or a nubile female won't affect the amount of deference you get.” (Wright, 5). Bolter and Grusin believe that this ‘remediation’ of self is in fact the primary cultural function of online communities like MUD’s (Multi-user domains) and chatrooms (Bolter and Grusin, 35). This ‘remediated’ online self would then obviously remediate interactions between individuals and groups. In this viewpoint who we are both on and offline is created and transformed by how we communicate online (Bolter and Grusin, 35). This view point is post-structuralist[31], and therefore assumes that while the online and offline self are inseparable they are not the same thing (Sarup, 12). This technophiliac perspective, in which cyberspace is an alternative social reality, is in opposition to the paradigm that cyberspace is not a distinct social realm but exists as part of a larger pervasive social reality (Lister et al., 168). In this second paradigm, political, economic and material resources shape online identity and experiences as they do offline social realities (Lister et al., 168). While in the authors’ personal experience the digital self does indeed inform and influence the real world self, this is because of the amount of time that the author has spent creating and interacting with these technological extensions of identity - a direct result of her real world economic situation, cultural background and education. A holistic approach to online identity and communication, particularly one that seeks to examine these phenomenon as

[31] In post-structuralism it is accepted that while the signifier and the signified are inseparable they are not the same phenomenon (Sarup, 12).

both technological and social platforms, must take into account the real world influences and barriers to the creation of the digital self.

3.2. Online communities, social participation and the Web

Pre-digital communities were defined by interactions amongst close-knit groups of people living in a single geographic location (Preece and Maloney-Krichmar, 1). Social interaction thus took place predominantly through face-to-face encounters between a limited set of individuals (Preece and Maloney-Krichmar, 1). This type of definition became less useful with the development of public transport, early telecommunications networks and becomes almost obsolete when dealing with phenomenon like the Web. Early investigations into digital communities tended to focus on the strength and natures of relationships between individuals (Preece and Maloney-Krichmar, 1). Howard Rheingold regarded an online community as one in which individuals communicate with 'sufficient feeling' (Rheingold, 1995, 5). More modern research has analysed these communities in terms of ethnography, linguistics, social psychology, anthropology or software (Preece and Maloney-Krichmar, 2-3). This multi-disciplinary approach is further compounded by the fact that online communities seldom, if ever, exist in isolation from real world communities, as communication between individuals is hardly ever restricted to a single medium (Preece and Maloney-Krichmar, 3). Combined with these multiple types of communication all Web platforms need to be assessed against theoretical notions of active vs. subjective audiences (Lister et al., 185). While subjective audiences merely consume media, active audiences will participate, influence and re-interpret media in a two-way flow of communication. An active audience, as found in many platforms described as Web 2.0, infers that the platform is not just the medium through which interaction takes place, but an interactor in, and a member of, that

online community. This is because an active audience will not just participate with other members of the audience, but also interact with and influence the platform itself. The medium itself is a member of the community. For this reason research that takes into account the underlying technologies of the community cannot be based on definitions that ignore the platform itself, and this makes a universal definition of 'online community' much more difficult to describe. Such a technological approach also necessitates investigation into the overall architecture design of the platform in question, as this influences and restricts the potential of individuals to interact both with each other and with the medium (Lister et al., 185). This necessitates a definition of an intrinsically 'Web 2.0 community' against which to analyse the Web 2.0 phenomenon. For the purposes of this report a 'Web 2.0 community' is one in which individuals come together for a particular purpose, or as a result of a specific interest, to form bonds with each other in a self-regulating forum where a certain degree of trust between participants is necessary, on a virtual platform supported by specific software that both supports and adds to a users' experience of the community. This definition of a Web 2.0. community was adapted from O'Reilly and Rheingold (O' Reilly, 2005, 7, Rheingold, 5).

The working definition of "social participation" against which the case studies in this research report will be assessed include four levels of participation with the online platform:

1). How does the platform construct and limit the digital self?

2). Can users participate by creating, manipulating and propagating content on the platform?

3). Can users participate with, and influence and change, the platform's technology? This can occur on an open source software level, in which users actually manipulate the functionality of platforms or on a network level where the power of the

platform is determined by the networks of its users or at an appropriation level, where the original function of the technology is changed.

4). Does user participation with the platform lead to the formation of a Web 2.0 community?

This definition was adapted and complied from several sources in an attempt to identify the key social features of a Web 2.0 (Davis, Miller, O'Reilly, 2005 and Rheingold).

3.3. The wiki

Wiki software was created by Ward Cunningham in 1995 and is in his own words software for “the simplest online database that could possibly work” (Tonkin, 1; Voss, 1). The first WikiWikiWeb, a Web page created using wiki software, called Wiki for short, was created for the Portland Pattern Repository in 1995 (Chawner and Lewis, 1). The word wiki is from the Hawaiian word for ‘fast’ or ‘quick’ referring to the speed with which wiki content can be accessed and a wiki web site populated (Chawner and Lewis, 1). Wiki was first accepted as an English word in its technological context in March 2007 (Wikipedia:About). Ward Cunningham created the first Wiki with 10 design principles in mind (Cunningham). Wikis should be ‘open’ in that any reader of a page could edit the said page as they saw fit. Wiki growth should be ‘incremental’ so that pages cite other pages, even ones that don’t yet exist. Wikis are ‘organic’ so that their structure and content are open to evolution and growth. Wikis are also ‘universal’ in that the mechanics to create and edit content are the same as those used to write any text, meaning that anyone can be an editor or an author. It is specifically this feature of Wikis that results in a true loss of the author[32] as envisioned in early theoretical notions of hypertext.[33] Wikis are ‘overt’ in that the formatted output suggests the input used in its creation. Page names in Wikis must be ‘unified’ in that no additional context is necessary to understand the names, and ‘precise’ so that these names reflect context meaningfully and are not duplicated. The wiki realm must be ‘tolerant’ of all input and all input must be ‘observable’ to all members. Lastly, Wikis grow ‘convergently’ so that duplication is avoided through group editing (Cunningham).

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[32] The loss of the author refers to the tendency of new media forms to de-emphasis the importance of notions of authorship and ownership (Burnett and Marshall).

[33] Hypertext is defined on page 24 and 25.

Wikis are essentially collections of hyperlinked documents that can be directly edited by anybody (Voss, 1). Individuals can use wikis to create concept maps and the creation of collaborative documents is possible between individuals through asynchronous online interaction. Wikis use a simple text syntax for creating new pages and cross-links between internal pages. These simple mark-up rules can be used to denote headlines, lists, emphasis, or image inclusions (Aumueller, 1). The Wiki mark-up language essentially strips HTML to its most basic form, which means that users of wikis need to learn only a few formatting tags in order to create content (Lamb, 38). Well known Wikis webs include WikiWikiWeb1, UseMod.com, MoinMoin2, Wikipedia.org's MediaWiki, TWiki.org, JSPWiki.org, and ZWiki.org and each has individual characteristics and features. (Aumueller, 4). A common feature to all wikis is the 'backlinks' mechanism, which calls all pages linked to the current page (Aumueller, 4). While the original wiki was programmed in PERL, many different scripting languages have now been used to create them (Chawner and Lewis, 2). There is no standard unified set of software characteristics that is shared by all wikis and they vary in approach and architecture from Wiki to Wiki (Lamb, 48). This lack of structure means that content can not be easily migrated from one system to another, and lack of standards in Wiki mark-up language means that migrated content will not necessarily be displayed correctly (Lamb, 48). As a consequence multiple wikis are needed to view wiki content. A wiki is implemented as a website component or any similar server-side scripting technology for which numerous free open source software options exist (Aronsson, 3). The wiki script then manages the wiki pages that are stored as plain text files (Aronsson, 3). Each page has a unique name, and this name makes up part of the URL when the wiki is displayed on the Web (Aronsson, 3). These text files can then be edited and new versions saved. The power and speed of Wikis is that the process of reading and editing in a wiki are

combined (Lamb, 38). As wikis are editable by anyone, anonymity in wiki creation is common, and concepts of ‘authorship’ and ‘ownership’ of intellectual work are radically deconstructed by the medium (Lamb, 38). A modern addition to wiki software, in response to the growing number of users of wikis, is that all revisions are saved and any version can be viewed along with the name of its reviser (Tonkin, 1). Depending on the size of the wiki many wikis are also fully searchable in order to facilitate finding useful information on the wiki in question (Aronsson, 4).

The multiple links between wikis pages create networks of concepts (Voss, 9) which often mimic mind maps, a common visual technique for representing information (Tonkin, 3). Wikis are similar to the Web itself as both are composed of interlinked hypermedia systems (Tolksdorf and Simperl, 79).

Wikis are social software in that they are designed for online collaboration, but their ultimate function is not normally a social one. This software is neither technologically or conceptually novel, and no great leap has been made in either regard between Web 1.0 and the wiki. The original purpose of the Internet itself was long distance collaboration, and the concept of hypertext had been around for over 50 years. Wikis tend to mimic the Internet both in the open nature of collaboration, and in aesthetics and design (Lamb, 44). However wikis are created within an architecture of participation, that is a system that is designed specifically for user contribution. Such an architecture is cited by O’Reilly (2005, 4) as a vital component of Web 2.0 platforms. In addition, wikis adhere to the writeable Web principles, in which users can both read and create content, described by Stern as necessary for a Web 2.0 platform (2003, 1) Wikis thus provides an excellent starting point for an investigation into Web 2.0.

3.3.1. Case study: Wikipedia

Wikipedia is an international online, free (to anyone with access to the Web), collaborative open source encyclopedia (Voss, 1). It exists in multiple languages and has more article entries than any other on or offline encyclopedia (Voss, 1). Wikipedia is designed to be useable, expressive, flexible, and scalable (Volkel et. al., 586). It originated as a side-project out of Nupedia, an online encyclopedia created by Jimmy Wales under a GNU Free Documentation License (Voss, 2005, 2). Nupedia was closed in 2002 when interest in Wikipedia led to the formation of the Wikimedia Foundation as a separate institution (Voss, 2). This shift resulted in a change to a .org domain name to emphasise the non-commercial nature of the new Wikipedia Foundation (Wikipedia:About).

In order to deal with the issues around authorship and copyright affected by Wiki software all Wikipedia content is still under GNU Free Documentation licenses (Voss, 2). Each contributor is granted copyright to their own contributions, but they are informed that pressing the "save" button constitutes an agreement to make the contents available under this licence (Aronsson, 4). In essence such a licence means that anybody is free to copy the text and use it for other purposes, provided they grant the next user access to the editable text (Aronsson, 4).

Wikipedia has over 75,000 active users, who have contributed to its 9 million articles, in over 250 languages (Wikipedia:About). These active users, however, do not all create and edit content, and many users use Wikipedia mainly as an online reference tool.

Theoretical debates around Wikipedia are mainly those surrounding issues of authorship and the controlled propagation of knowledge, its use as an academic referencing tool and the amount of trust users place in its content (Chesney, 2006;

Lih, 2004). Within the Wikipedia project, the neutral point of view, NPOV, has been adopted as an explicit and official policy to deal with the integrity of content created on the site (Aronsson, 4). This is the most mentioned and discussed aspect of Wikipedia (Voss, 4). In essence, the NPOV, means that no article should be presented from a singular point of view, but rather from multiple perspectives to eliminate bias as much as possible (Aronsson, 4). In addition, no original research is allowed on Wikipedia as it is intended as a receptacle of commonly accepted, already peer-reviewed knowledge (Aronsson, 4). However the strictest controller of content integrity and accuracy is the Wikipedia community at large. Incorrect, biased articles or articles with no references are edited or deleted by other Wikipedia users and editors. Anyone who builds a reputation as a competent Wikipedia editor may become an editorial administrator who then are responsible for reviewing articles for quality or looking for vandalism (Wikipedia:About). One thousand five hundred and ten of the 6,573,057 registered users have 'earned' these administrative privileges and responsibilities (Wikipedia: Special Statistics).

3.3.2. Wikipedia - a user's experience

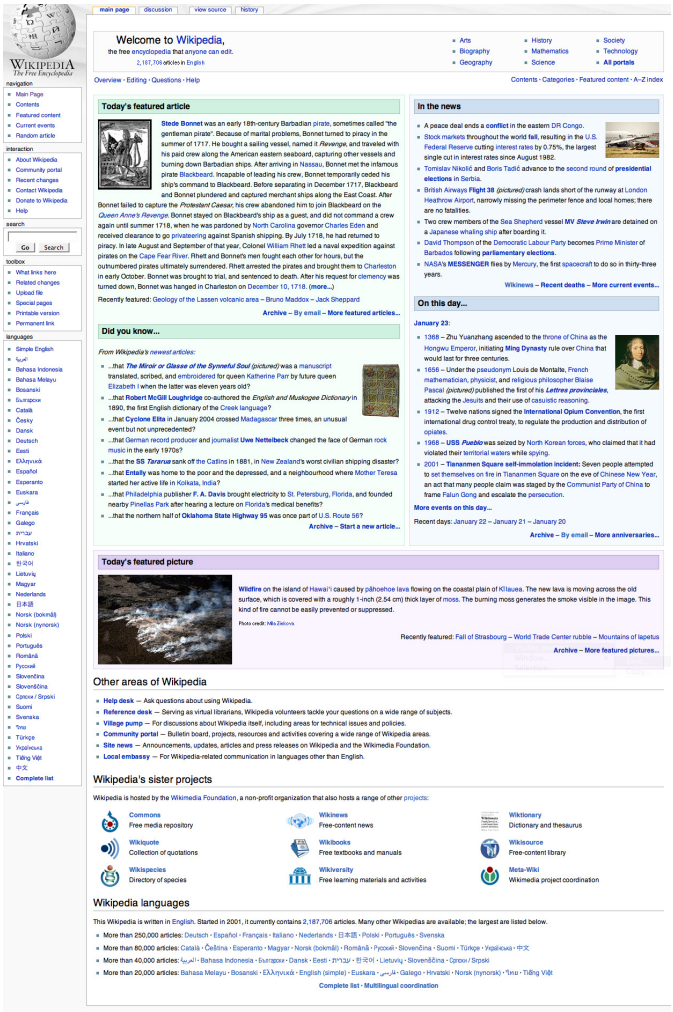


Figure 3: Wikipedia home page

Any user of Wikipedia can use it as an online read only reference. The main navigation options of the site allows you to browse its Contents page (which is sorted alphabetically and by category), examine Featured content (the best articles and images as determined by the Wikipedia community), view Current events (from Wikinews) or read a Random article.



Figure 4: Wikipedia navigation options

A search function adds to this navigational offering and allows users of the site to easily find articles on a specific topic.

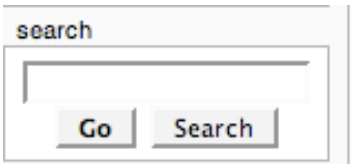


Figure 5: Wikipedia search

A separate list of 'interaction' menu options allows the user to learn About Wikipedia, access the Community portal (the section of Wikipedia that lists tasks that need to be performed, and lists groups, news and events), track Recent changes, Contact Wikipedia, Donate to Wikipedia and access the Help menu.

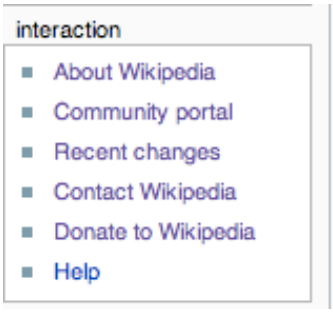


Figure 6: Wikipedia interaction menu options

In order to engage with Wikipedia in a read-write way that enables the user to edit articles users must first create an account. These accounts result in user profiles

hosted on Wikipedia and are demarcated under the heading ‘User:User’ name on the site. As these profiles aren’t profiles that are pre-defined by the system, but standard Wikipedia pages, they totally customisable by each user, and Wikipedia accepts any profile framework supported by the Wikipedia platform. Because of this there is no standard list of variables associated with a user page and the information displayed on them ranges from ‘in real life’ biographical information, lists of articles that the particular user has created or substantially contributed to, awards they have received, their ‘peeves, their alternate identities (alternate user names), to custom built graphical descriptions of the user.

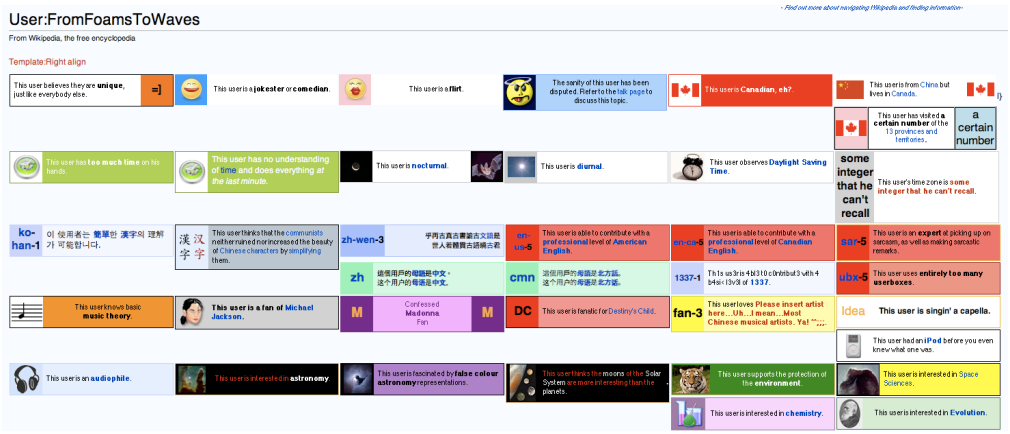


Figure 7: A custom built graphical description of User: FromFoamsToWaves



User:Toddst1

From Wikipedia, the free encyclopedia

Contents [hide]

1 Articles I've created or substantially contributed to
- 1.1 Biographies
- 1.2 Places
- 1.3 Buildings
- 1.4 Other

2 Awards
- 2.1 You're a true Defender of the Wiki
- 2.2 Suicide Note

3 Peeves

4 Alternate identities

Articles I've created or substantially contributed to

Biographies

- Joshua Barney
- Ezell A. Blair Jr.
- Jonathan Boucher
- Oden Bowie
- William Duckett Bowie
- Samuel Chase
- James Bonard Fowler
- Jacob Henderson
- Gustavus Hesselius
- Jimmie Lee Jackson
- Carol D. Leonnig
- Benjamin Ogle
- Samuel Ogle
- Thomas C. Parramore
- James T. Woodward
- William Woodward, Sr.
- William Woodward, Jr.

Places

- Collington, Maryland
- Murfreesboro, North Carolina
- Queen Anne, Prince George's County, Maryland

Figure 8: A more standard Wiki page format for User:Toddst1 detailing only contributions to Wikipedia

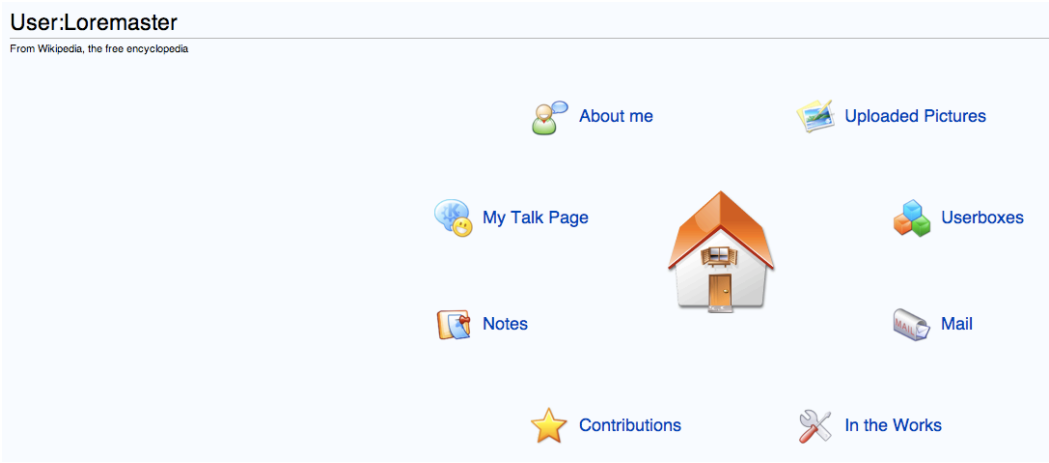


Figure 9: A custom built graphical menu for information on User: Loremaster

It is only possible to navigate to these user pages through the history of edits on the articles themselves, and there is no single list that details all users of Wikipedia.

Users with accounts are then allowed to edit as well as read articles. At the top of each article tabs allow the user to view the article, read or contribute to discussion on the article, to edit the page and to view the history of these edits.



Figure 10: User options for each article in Wikipedia

The history page of each article is a very important feature of Wikipedia. Each time the page is edited the date, name of the user that made the edit and whether this edit was a minor or major edit is stored by Wikipedia and made visible to users of the site.

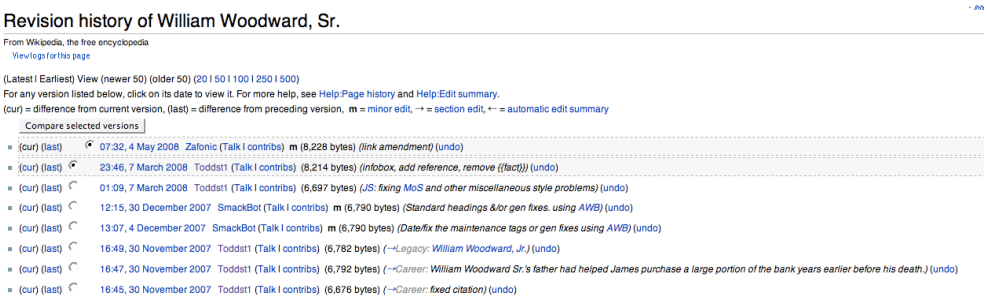


Figure 11: Revision history of each article in Wikipedia

This history means that users are accountable for their edits, and users who vandalise entries can be barred from the site.

A further set of tools for registered users of the site allows them to find the links associated with each page on Wikipedia, view the changes associated with any page, upload files, view the special pages (those detailing information specifically for users and that can not be edited), print articles, determine the permanent link to a

specific article and to subscribe to a RSS feed notifying them of any changes to a specific page.

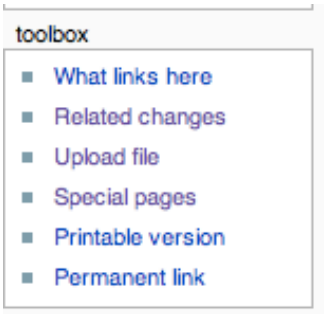


Figure 12: Wikipedia tool box

3.3.3. Wikipedia's technological platform

Originally created using UseModWiki software programmed in PERL by Clifford Adams (Aronsson, 2), Wikipedia now uses MediaWiki software created specifically for Wikipedia. MediaWiki is written in PHP: Hypertext Preprocessor, which is a server based scripting language that is used to generate Web pages dynamically (Whittaker, 198). It is both free and open source (Wikipedia: MediaWiki). MediaWiki offered Wikipedia four features necessary to an encyclopeida of this nature and not found in existing Wiki software. MediaWiki retains spaces in page and sections titles, so a page can be accurately titled Wikipedia Wiki Software instead of WikipediaWikiSoftware. MediaWiki allows for rich multimedia content and file uploads. Pages built with MediaWiki can be sectioned into headings and sub-headings. Lastly, MediaWiki allows for more customisation in appearance and formatting and extendibility in function that many other Wiki languages (Wikipedia: MediaWiki). These features mean that Wikipedia is much more visually appealing than most Wiki based Web platforms.

The Wikipedia database backend is controlled by MySQL and Wikipedia uses a Apache Web server (Wikipedia:MediaWiki).

3.3.4. Wikipedia and social participation

While Wikipedia allows users to post information about themselves, the lack of standard variables associated with users and/or navigation options to view all users of the site means that the focus of the site is not on online identity formation. Indeed, the philosophy of Wikipedia appears to negate the importance of both the virtual and offline self at least in terms of ownership and authorship. The majority of user pages contain no biographical information except detailing the users' contributions to Wikipedia.

Wikipedia, like all Wikis, is built for users and this architecture of participation allows users to create, manipulate and populate content with ease. The technological skills barriers to this activity are small, and the text based Web page means that high bandwidth is not necessary to view or create pages in Wikipedia. This however limits the channels for communication in Wikipedia to predominantly text, with a few pictures, and external links to other media types.

While all Wikipedia content is editable, including the home page, it is not possible to influence and change the platform's technology from within Wikipedia itself. While Wiki software generally can be appropriated for any mind-mapping or collaborative purpose, due to its user based architecture, a pre-existing Wiki like Wikipedia cannot be re-appropriated to another use. Wikipedia, and Wikis in general, are highly focussed around a specific area of collaboration, and deviations from this focus, in almost all circumstances, will result in the removal of such content, and not in a shift in functionality.

The Wikipedia community is an active audience who participate with the Wikipedia technological platform. As Wikipedia software itself shapes and restrains the collaborative process it is a fully-fledged member of the community. In fact

individuals of the platform interact more with the Wikipedia site than with each other, the lack of content ownership and asynchronous content edits means that each individual is in fact engaging with Wikipedia itself, interaction between community members is highly limited. No communication channels for peer to peer communication exist except those mediated by the basic functionality of the Wikipedia site which is to view, edit and store articles. This means that Wikipedia users can only communicate with each other by reading and editing articles and flagging vandalism and abuse. Despite this lack of peer to peer communication Wikipedia is an excellent example of a self-regulated purpose driven Web 2.0 community. Not only do users of the site operate within a framework of trust, and regulate the site as a community but the technologies with which Wikipedia is built both support, enhance and in fact necessitate these social interactions.

3.4. The blog

Blogs are hypertextual web logs which combine hypertext, multi-user discussion lists and the mass syndication ability of XML and email to create an online experience (Kahn and Kellner, 91). The term weBlog, later contracted to blog, was first used by blog writer Jorn Barger in 1997 (Blood, 1). In 1999 the first blog creation tool called Pitas was launched (Blood, 1) This was followed by the release of Blogger, Edit This Page, and Velocinews (Blood, 1) all of which allowed for the relatively simple creation of blogs by individuals with no programming background. Between 50 and 85 million blogs existed as of June 2007 (Schmidt, 1).

Entries typically contain a main body of text and a date/time stamp and are chronologically organized (Mee, 2006, 31). They make use of RSS (Rich Site Summary or Really Simple Syndication) which is a document type that lists updates of Blogs available for syndication (Mee, 31). Essentially this means one is able to subscribe to a blog and be informed of changes through a permanent two-way link. RSS is one of the most significant advances in the fundamental architecture of the Web and this characteristic has been cited as a feature of Web 2.0 and is often referred to as the incremental or living Web (O'Reilly, 2005, 7). RSS language is based on RDF (Resource Description Framework) language which is the basis of the machine-understandable Semantic Web, which many cite as the next step in Web development (Cayzer, 2006, 2). These permanent links, or permalinks, between blogs and referenced or other sites allow for much of the peer-to-peer communication and discussion vital to the participation architecture of Web 2.0 platforms (O'Reilly, 2005, 8).

"For the first time it became relatively easy to gesture directly at a highly specific post on someone else's site and talk about it. Discussion emerged. Chat emerged. And - as a result - friendships emerged or became more entrenched. The

permalink was the first - and most successful - attempt to build bridges between weblogs" (O'Reilly, 2005, 6). RSS also means web content no longer has to be viewed through a Web browsers, while some RSS aggregators are web-based, others are desktop based and some use portable devices like mobile phones (O'Reilly, 2005, 6).

70% of blogs are personal journals written by a single person and their purpose is primarily for self-expression (Quian and Scott, 1). Blogs however, exist not only as sites for democratic self-expression and journaling, but also important sites for technoactivism and critique on global culture and media (Kahn and Kellner, 2004, 91). Bloggers are no longer tied to desktops but can send and update content from PDAs or cellphones and include video, pictures and audio content, which means that blogging is part of the writeable Web where Web users easily become content producers.

Blog posts are often characterised by their colloquial tone and personal language (Hourihan, 1). The ability to comment on individual blog posts, as found in most blogs, and the organisation of blogs into initial posts and comments, creates discussion between the blogs primary (those that write the blog itself) and secondary authors (those that read and comment on the blog) (Hourihan, 2). This means that readers of a blog are an active audience. Each blog post can therefore be seen as a self-contained, topic centred dialogue between individuals. Although communication is asynchronous the chronological order of blogs, their regular occurrence (often daily or weekly) (Anderson,7) and their time stamps give a feel of immediacy and connection between individuals not found in traditional Web pages (Hourihan, 2) or Wiki based collaborative processes.

Many blogging practices have their conceptual roots in Bulletin Board Systems and online communities like USENET, however the differences in functionality

allowed by blogging technologies means that it is easier to interact and engage with content. In addition, blogs are often more people centred than topic or theme centred which may make them feel more authentic to both primary and secondary blog users.

In general two distinct types of blogging software exist, blog services and blog script packages (Shmidt, 7). Blogging services host blogs on their servers and are very simple to use, although the ultimate design and appearance of the blog in greatly limited (Shmidt, 7). Examples of these sites include LiveJournal, blogger.com, or twoday.net (Shmidt, 7). Blog script packages, like MovableType and Wordpress allow for much greater control over blog appearance, personal blogger identity and blog content, but require a certain level of technological skill (Shmidt, 7). Blogging services are generally free and blogging software generally open-source (Shmidt, 7), which is in line with proposed Web 2.0 principles (O'Reilly, 2005 & 2004). Open Application Programming Interfaces (APIs) on other platforms also allow for the cross propagation of content between Blogs and other sites for example the insertion of Flickr photos into a blog post (Shmidt, 8).

3.4.1. Case study: Boing Boing

This report will specifically look at Boing Boing, a generalist cultural and technological site that is rated the most popular blog in the world by Technorati.com[34], and contains over 677 098 links and 20 657 individual blogs (Technocratic.com). Boing Boing also won the Lifetime Achievement and Best group blog award at the 2006 Bloggies ceremony (Technocratic.com). This blog was selected as it is not only the most popular in folksonomy terms but also because it is an open blog with multiple authors and thus highlights the most important aspects of Web 2.0 in terms of participation. All Boing Boing content is licensed under a Creative Commons licence, which

[34] Technorati.com is a blog search engine that currently tracks and ranks over 112.8 million blogs (Technoratic.com: About).

permits non-commercial sharing with attribution (http://www.boingboing.net/), this shared licensing of content further embraces Web 2.0 ideals surrounding the sharing of information.

The Boing Boing Blog began as the Boing Boing magazine in 1988, it became a website in 1995 and a Blog in 2000 (http://www.boingboing.net/). The blog is co-edited by Mark Frauenfelder, Cory Doctorow, David Pescovitz, Xeni Jardin, John Battelle and Joel Johnson (http://www.boingboing.net/). These co-editors describe themselves as "a writer[35]", "an activist, writer, blogger, public speaker and tech person[36]", "an editor and research director[37]," "a tech culture journalist[38]," "a writer on the intersections of search, media and technology[39]," and "a technology writer[40]" respectively. They are all however interested in and informed by the human-technology interface and all the implications thereof.

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[35] http://boingboing.net/markf.html

[36] http://craphound.com/bio.php

[37] http://pesco.net/bio.html

[38] http://xeni.net/

[39] http://battellemedia.com

[40] http://joeljohnson.com/

3.4.2. Boing Boing - a user's experience

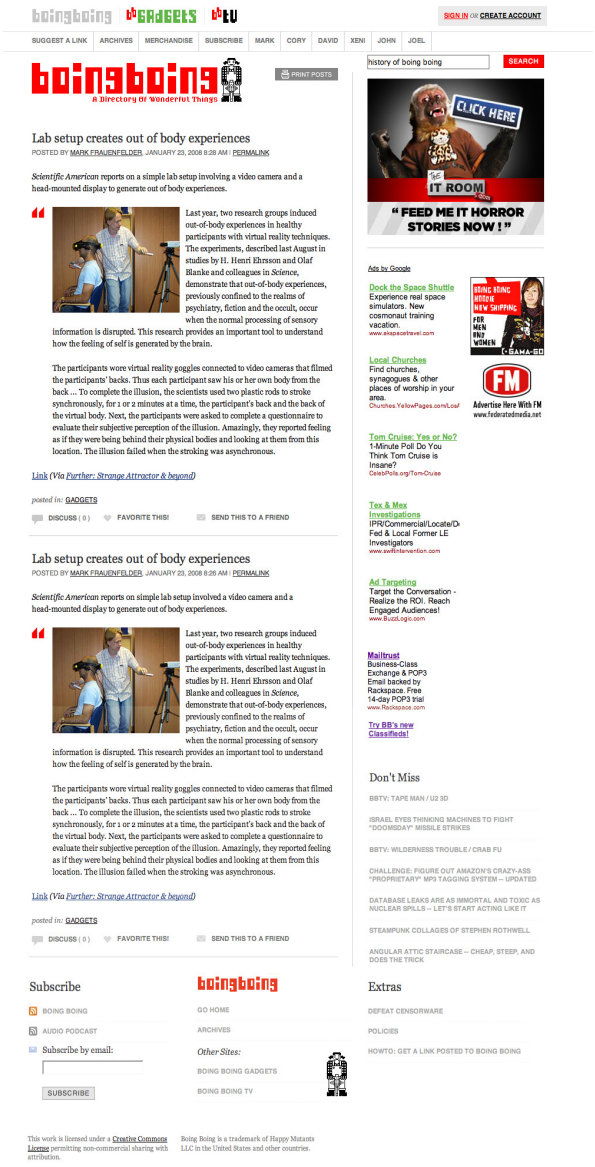


Figure 13: Boing Boing blog home page

Boing Boing blog posts are not open to the general public, but run by a group of dedicated co-editor bloggers who contribute up to 30 new blog posts each day on as diverse a range of topics as pop-culture, technology, history media and art. These editors will no doubt have a totally different user experience to all other users of the site. While the experiences of the editors can not be described specifically, the

general experiences of the creators of blogs are described in the section of blogs and social participation.

The image below lists the main navigation options for other, non-editor users of the site.



Figure 14: Boing Boing navigation options

The suggest a link button allows registered users to suggest content for the Boing Boing blog, by submitting interesting links through an online application form. The Archives section lists all previous Boing Boing posts. These archives can searched by week, by category and by category and week. The merchandise tab links to Boing Boing branded products, mainly apparel. The subscribe tab enables user to subscribe to the Boing Boing RSS feed. The Mark, Cory, David, Xeni, John and Joel tabs link to the internal or external biographies and blogs of each of the main editors. The Boing Boing Gadgets button links to the Gadget specific Boing Boing blog, while the Boing Boing TV button links only to blogs that include video.

Registered users of the site have a standard profile that allows for an image, a biographical description and or a link to the users website. This profile also lists their recent comments, favourite posts and friends. These profiles have a link that allows another user to add them as a friend.

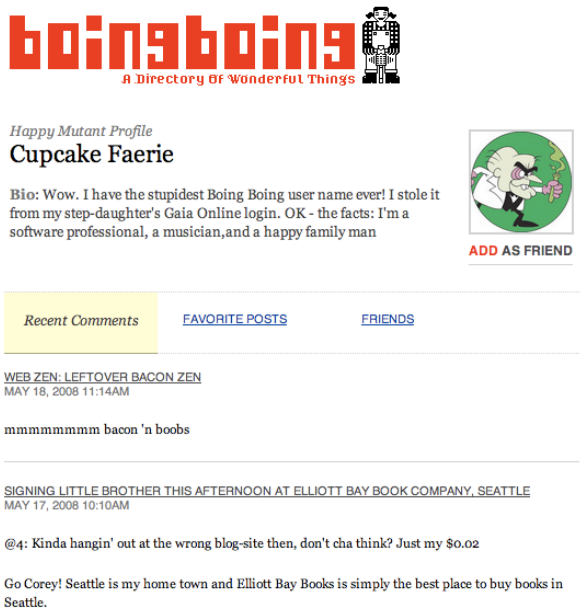


Figure 15: A Boing Boing user profile

As on Wikipedia there is no way to search for users, or to view lists of users and users can thus only be viewed when they comment on Boing Boing blog entries.

Each Boing Boing entry contains the body of the text, a permalink to the post, all external links as clickable hypertext, which part of the site the content falls under eg ‘Gadgets’ or ‘Art’, and generally, an appropriate image. User can then ‘Discuss,’ Favourite’ and ‘Share’ the post.

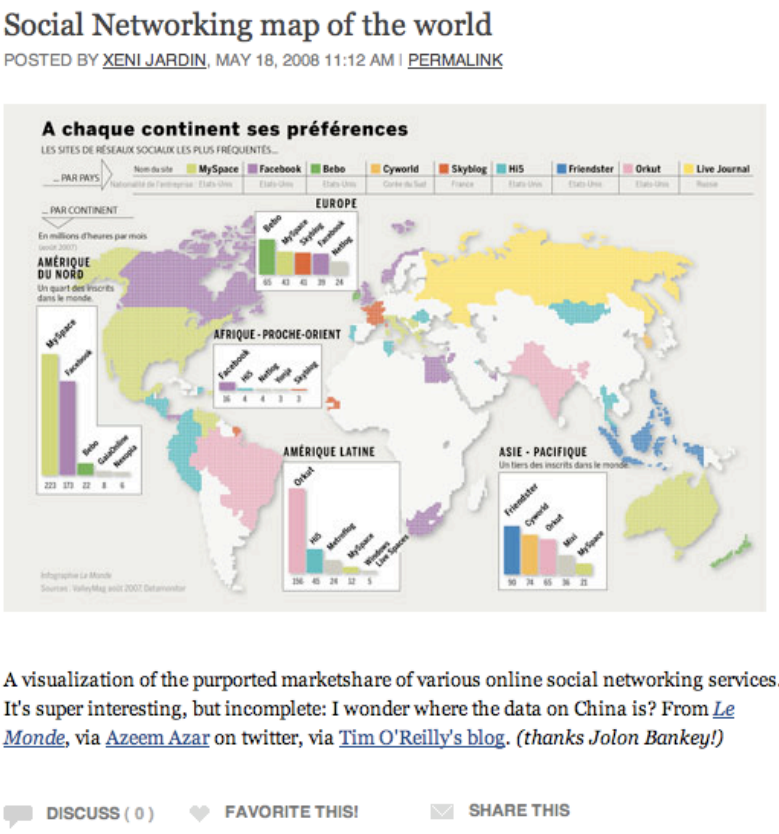


Figure 16: A typical Boing Boing post with user interaction options at the bottom

The 'Discuss' option refers to commenting. Commenting on each of these posts is however totally open and unmoderated for any user who creates an account with Boing Boing. Anonymous comments are allowed but are subject to moderation.

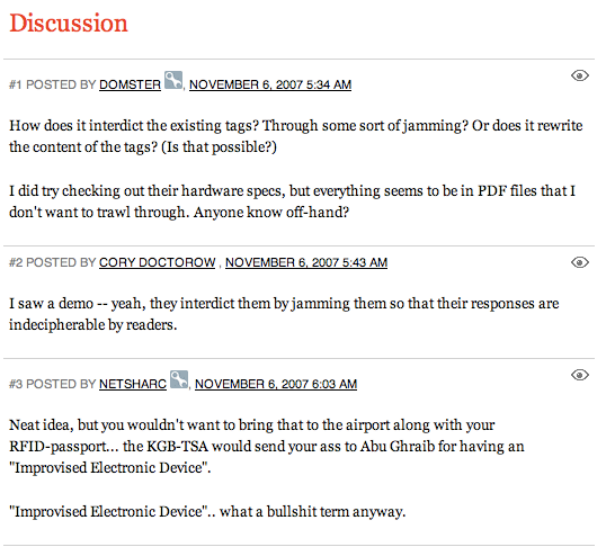


Figure 17: A typical Boing Boing discussion

‘Favorite This’ allows user to rank posts based on their interest to individuals and thus the Boing Boing community as a whole. It is not necessary to be logged into the system or a member of it in order to rate posts, but only a single vote is allowed per blog per user post to encourage fairness. The ‘Share’ option allows you to send the post to another site like Digg or to email it to a friend.

While these interaction offerings appear fairly simple, when combined with interesting engaging and regularly updated content, the Boing Boing blog becomes an online space to which many users will return daily, to interact with or just to browse the blog. The primary function of blogs in non-primary creators’ lives still appears to be as a source of information and entertainment. However, blog structure allows them to be active audiences to this entertainment and information, and thus provides an authenticity and immediacy to this entertainment not found in traditional media.

3.4.3. Boing Boing’s technological framework

The exact exact technological framework of the Boing Boing blog is not part of the public domain. For the purpose of this research report the technologies associated with blogs in general will be discussed in the comparative analysis of wikis, blogs and social networks.

3.4.4. Boing Boing and social participation

While blog services typically offer a range of anonymity options from totally anonymous, pseudonymous, or totally identifiable (Quian and Scott, 1), all primary creators of the Boing Boing Blog have biographies on Boing Boing, or links to their personal web pages. Boing Boing is a general interest site with multiple authors,

however 70% of Blogs are personal journals written by a single person (Quian and Scott, 1). The primary purpose of these personal journal blogs is an extension and re-mediation of self into the digital realm, even when such blogs are published under an assumed name. While this identity is generally limited to text, and occasionally images, the dialogue between primary and secondary authors allows for a greater and more interesting remediation of self, despite the lack of peer mediation effect of authenticity in anonymous blogs.

In totally identifiable blogs like Boing Boing this openness and the resulting peer mediation results in a greater trust between primary creators and secondary creators on the site. This trust means that secondary creators are more likely to have trust in the reliability of the content in the Boing Boing posts, and thus find them more engaging and interesting to interact with.

The profiles of these secondary creators or commentators on the Boing Boing blog extend this trust between members of the commenting community, as only users who take ownership of their comments are allowed to do so without moderation.

The Boing Boing blogging service allows primary users of the platforms to create, manipulate and propagate content with little effort or skill base. Secondary users have a much more restricted ability as to the type of content that they can produce, but this content creation still requires little to no technological background.

Open-source blogging software gives individuals the ability to deconstruct the functionality and thus ultimate purpose of their blogs and the sheer range of diverse blog topics, themes and functions shows that the structure of blogs as a technological platform is open to appropriation by individuals for a number of purposes (Shmidt, 8). However, as with wikis, it is not possible to appropriate an existing blog like Boing Boing for another purpose.

The Boing Boing blog does not necessarily become more powerful with more users of the system, particularly secondary users of the site. While the Boing Boing content rating system makes information more interesting to the community as a whole, a larger community does not necessarily mean that the content will be more interesting to an individual user. In addition the result of this ranking process on future Boing Boing posts is in no way made visible to secondary users of the site. The fact that over 70% of primary blog users create blogs in isolation (Quian and Scott, 1) means that there is no real benefit of larger blogging networks to primary users either, except in terms of community.

Two tiers of community exist in a blog like Boing Boing. The first tier is the community experienced by the primary content producers or writers of the actual blog, and involves themselves, the secondary content producers and the blogging platform. This community is quintessentially Web 2.0, it as these primary creators experience the Boing Boing blog through the blogging platform, can appropriate it for their own use, and get feedback and affirmation from the rest of the community in a self regulating system. The second tier of community is that experienced by the secondary content producers, or readers and commentators of the blog. The community for these individuals made possible by Boing Boing involves interaction with other secondary producers and the primary producers but their relationship with the platform differs. These users interact with the platform essentially through commenting, permalinks and RSS feeds. This does not allow them to either appropriate the platform for their own purpose or engage with it at an open source software level. While commenting does mean that the Boing Boing audience is an active one, and an online community does develop, this isn't a Web 2.0 community as defined earlier in this report.

3.5. Social network sites

First it is necessary to define what is meant by social network sites, as all Internet and Web platforms are inherently social as they create communicative links between people. However, for the purposes of this study this report uses the term as it is defined by Boyd and Ellison (2007). In this definition a social network site is a Web-based service that allows individuals to create public or semi-public profiles within a bounded system (Boyd and Ellison, 2). Users of the system can then select, and articulate the selection of individuals with whom they share a connection, and then view connections between themselves and other individuals (Boyd and Ellison, 2). Boyd and Ellisson then further distinguish social network sites, where the emphasis is on connections with individuals already in one's real world social sphere, and social networking sites, where emphasis is on meeting strangers with whom one has no real world connection (2). For the purposes of this research report the distinction is not necessary as the basic technological and social characteristics of the platforms are very similar, and the two terms will thus be used interchangeably.

Social network sites use a wide variety of technological backbones to run, but their structure is generally very similar. The precursor to social interaction in all social network sites is the creation of an online profile where one 'type[s] oneself into being' (Sunden, 3). This profile is generated through a online form that requests information about the user in various categories, including general descriptors like age, gender, interests, location. These profiles can then be personalised through multi-media content additions, basic html updates, or modular add ons (Sunden, 4). The relative privacy of these profiles varies from social network to social network, in some they are fully open and browsable through search engines, some restrict visibility within the platform due to membership type and some offer the option to restrict profile access to ''friends only' (Acquisti and Gross, 5, Gross and Acquisti, 7).

Users of the platform will then indicate their social relationships with other users of the site, allocating these individuals as ‘‘friends’’, ‘contacts’, ‘fans’, ‘followers’, or some other site-specific identifier (Marwick, 4). These lists of relationships are then made visible in a site specific way. Despite the fact that these ‘‘friends’’ are not necessarily ‘friends’ in the traditional real world sense of the word these public displays of relationships both help individuals to navigate the digital social realm, and to validate information presented in profiles (Boy and Elisson, 9, Lin, 3,). This validation has removed much of the distrust traditionally associated with the digital realm, particularly of non-users, and allowed for a much larger uptake by the mainstream population (Lin, 4).

Different social networks then offer different mediums and means to interact with fellow users of the site. Most offer private messages and public commenting, some allow instant messaging, some have photo or other file sharing abilities, some allow for blogging, some are mobile specific and some are Web based but support mobile interaction (Boyd and Elisson, 3, Sunden, 5). While most social network sites tend to attract an initial heterogenous user base, it is not uncommon for user to form groups that segment this user base along the same lines as those that segment society (Hargittai).

The first social network site according to the above definition, SixDegrees.com, was launched in 1997 (Boyd and Elisson, 3). Earlier sites lacked either profiles or visible relationships between users. Sixdegrees.com closed down in 2000, following complaints by users that there was little to do, in part as most users did not have large groups of online real world friends to interact with in the digital realm. Between 1997 and 2003 as number of social network sites were created

including AsianAvenue[41], BlackPlanet[42], MiGente[43], LunarStorm[44], Ryze[45] and the still popular Friendster[46] (Boyd and Elisson, 6). In 2003 a wave of social networking sites were launched that appealed to the broad social networking community or specific interest groups (Boyd and Elisson, 6). The popularity of these sites led to adoption of social networking site features by other media sharing platforms, and these platforms became social networks themselves (Boyd and Elisson, 6). The most popular examples of these include Flickr[47], Last FM[48] and YouTube[49].

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[41] http://www.asianave.com

[42] http://www.blackplanet.com

[43] http://www.migente.com

[44] http://www.lunarstorm.co.uk - this site is no longer in existance

[45] http://www.ryze.com

[46] http://www.friendster.com

[47] http://www.flickr.com

[48] http://www.last.fm

[49] http://www.youtube.com

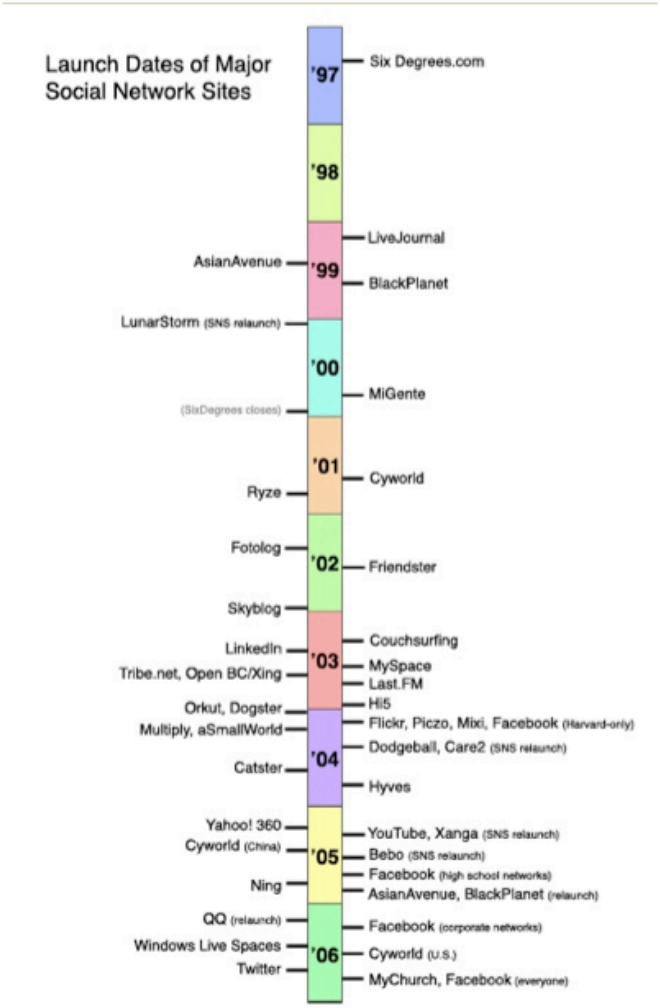


Figure 18: Social network sites timeline, includes re-launch of other community sites with social network features, Boyd and Elisson, 2007.

The most notable of these new social network sites was MySpace[50], due to its huge (although predominantly American) user base, its regular addition of features requested by users of the platform and its customisable profiles through the additions of HTML code (Perkel, 4). Much of this profile customisation can be performed through cut and paste limiting the technological skills needed to fully engage with the platform (Perkel, 4). MySpace was the first social network site to attract mass media attention due to both negative press around interactions between adults and minors (CBS News, Shreve, Poulsen), and its purchase by the News Corporation in 2005 for

[50] www.myspace.com

$580 million (BBC news, 19 July 2005). This prolific growth in the number of social networks and their users prompted both economic interest in these sites as a mass marketing tool, and the blocking and banning of these sites by government institutions and corporations (Boyd and Elisson, 8). While a number of institutions have also banned employee access to specific blogs, and sites with social network features such as YouTube, no other Web 2.0 technology, except arguably pornography, has been deemed as detrimental to employee performance, and thus banned, on such a global scale.

This shift of online communities from group or topic centred hierarchies, like those used by USENET, to egocentric communities, like MySpace and Facebook which are built around people, seems proportional to their mass uptake by the online population. This is in part because this type of hierarchy more closely resembles real world social relationships (Boyd and Elisson, 8). In addition social networks are generally based on a common idea drawn from social networking analysis: that publicly articulated social networks have utility (Marwick, 3). That is, enabling actors to codify, map and view the relational ties between themselves and others can have useful and positive consequences. (Marwick, 3).

Wright wrote of the Internet; “it’s the promised land for amateur anthropologists. Never has there been a way to observe people and groups so accurately and unobtrusively. As a place to eavesdrop cyberspace is without peer in all of human history.” But it is in the people centred approach of social network sites that this ‘promised land’ is finally realised as social network sites are the first sites entirely about people.

3.5.1. Case study: Facebook

Facebook was launched in 2004 as a social network site for Harvard college students only (Boyd and Elisson, 8). Originally called The Facebook it was founded by Harvard psychology student Mark Zuckerburg (Phillips, 1). Even when the system was opened up to other universities, each user of the site had to have a valid university email address, making it essentially a private community. From September 2005 the site began to open up to the online community at large, first through the integration of high school students and professional institutions (Boyd and Elisson, 8). Use of the site is free and is now open to anyone with an email address. Since 2005 the number of users of the site have increased exponentially, and South Africans, who previously showed little affinity for social network sites, make up the 6th largest network on the site with over 600,000 users (Facebook.com).

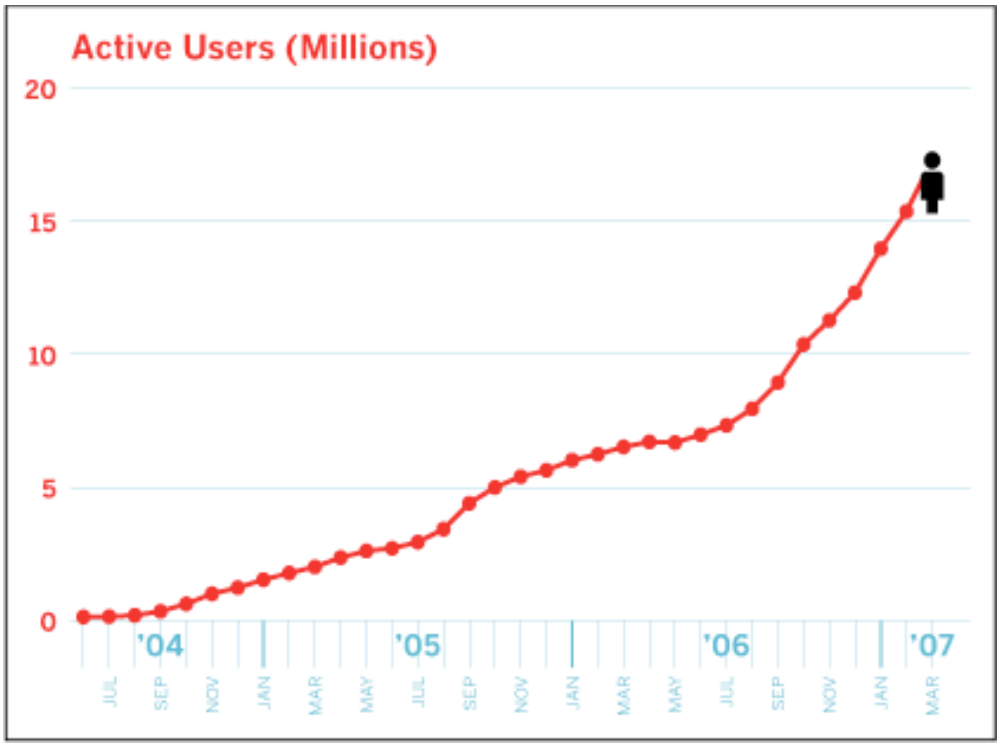


Figure 19: Facebook users in millions from July 2004 to March 2007, from Facebook.com.

This local uptake is greatly influenced by the growing number of South Africans online and increased broadband penetration in South Africa. According to the Economist Intelligence Unit, Internet penetration in South Africa has almost doubled since 2005 (EIU Report).

3.5.2. Facebook - a user's experience



Figure 20: Facebook's home page

Facebook offers a number of social networking services including a rich media enabled profile, visible 'friend' networks, blogging and commenting. Users create profiles that detail biographical information including age, gender, relationship status, hometown, political and religious views, interests, activities and favourite music, TV,

and movies. Each biographical variable can be made either public or private based on a users' preferences.

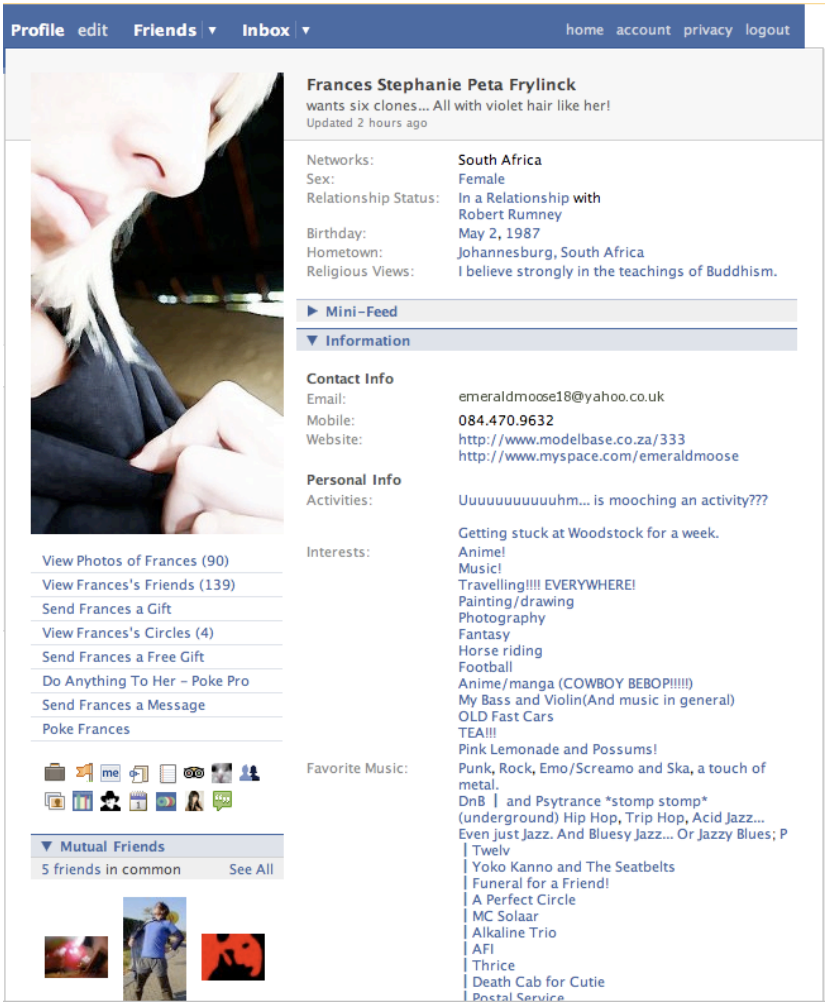


Figure 21: A Facebook profile

The default setting for Facebook profiles is that they are open to everyone in your selected network, which usually relates to geographic location, or an affiliate institution (Boyd and Elisson, 3). However these settings are highly customisable and allow profiles to be viewed by just your circle of 'friends' and even allows you to restrict what part of your profile particular 'friends' can view.

A very important feature of the site is the news feed found on the home page. The News feed displays information in real time on the latest online activities of all of

a user's 'friends' and thus makes visible the 'social graph'[51], the map of interconnections between users of the platform, in a meaningful tangible way (Marwick, 5).



Figure 22: Facebook's News Feed

The mini-news feed displayed on each individual profile, acts in the same way, making visible the previous actions of the user. These features are based a common idea drawn from social networking analysis: that allowing users of a site to codify, map and view the relational ties between themselves and others can have useful and

[51] Social graph was a term made popular by Facebook creator Mark Zuckerburg. The term combines the relationships between users on a site with graphing theory to create a visual mapping of everybody on the site and how they are related to each other (Fitzpatrick, 2).

positive consequences (Marwick, 2). It is in this feature that the Facebook really becomes ‘a place to eavesdrop’, making it a powerful social tool.

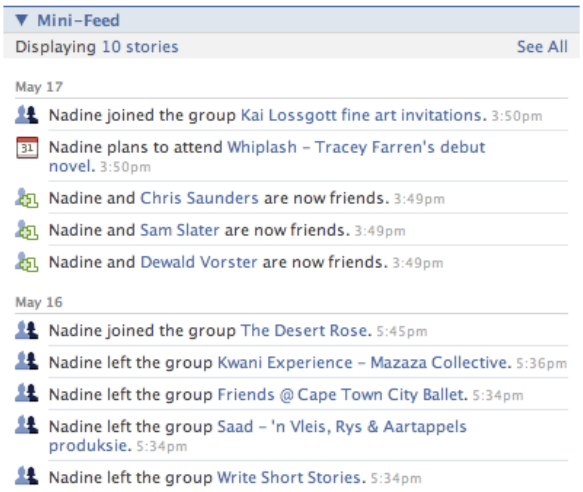


Figure 23: Facebook’s Mini-Feed displayed on individual profiles

The Wall also serves to make connections between users visible, as messages to users are displayed publicly. There is no offline analogy for this individual to individual, yet totally public dialogue. The Wall both shows the relational ties between users and verifies profile authenticity.

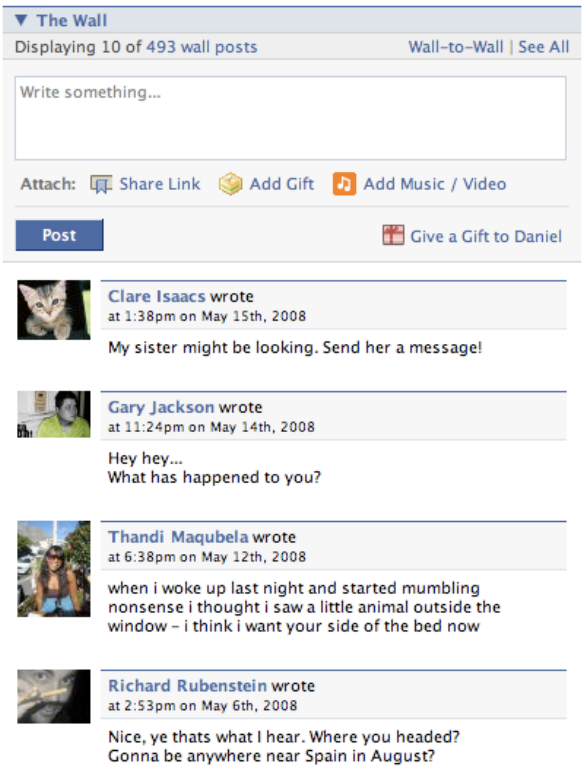


Figure 24: Facebook's Wall

Each profile also has a list of actions underneath the main image that allow users of the site to communicate with each other. As a standard offering these include the ability to add a user as a friend, view photos of them, view their friends, send them a private message or to 'poke' them. 'Poking' is a Facebook specific action that enables users to make tentative contact with each other without any more in depth communication. 'Pokes' appear to a user when they log in, and allow them to see the 'Poke-ees' profile. A number of other communication options like Pro-poke, Send gifts, View circles etc are the result of applications installed by the specific user of that profile.



Figure 25: Communicating with a Facebook user

3.5.3. Facebooks's technological platform

These profiles, news feeds, Wall to Wall communication, Poking and Messaging are the core competencies of the Facebook platform designed by the Facebook developers themselves. All additional features including photo sharing, Group formation, an Events calendar and Fan pages were created by other users of the site. These applications can be created, used and shared by users of the platform. In August 2006 Facebook opened the API, the Application Programming Interface, of the site allowing anyone to create a number of application and widgets that are virally spread within the Facebook community. The Facebook API uses a REST-based interface meaning that calls are made over the Internet by sending HTTP GET or POST requests to Facebook's REST server (Facebook Developers

Documentation). REST, Representation State Transfer, software systems use a style of architecture specifically designed for hypermedia systems like the Web (Facebook Developers Documentation). The API allows access to profile, friend, photo, and event data. Facebook Query Language, or FQL, allows access of the same data through SQL like queries and Facebook Markup, FBML, enables the creation of applications that link into several Facebook integration points, including the Profile, Profile Actions, Canvas, News Feed and the Mini-Feed (Facebook Developers Documentation).

There are currently 25,019 of these applications on Facebook and the most popular ones have been installed by over 2 million users (Facebook: Applications).

3.5.4. Facebook and social participation

Facebook is predominantly used to maintain or solidify pre-existing offline relationships and users spend more time searching for people that they already have relationships with offline than browsing for strangers (Elisson et. al., 3). Its primary use is therefore a virtual space in which to interact with other users of the site when unmediated interaction is not possible.

The online identity created on Facebook is content rich and mimics real world identity more closely than most other online phenomena in the layers of identity that can be constructed. In the real world we often define ourselves and are defined by our age and gender, how we look, what we're interested, what institutions we attend or are affiliated with and who are friends are, and all of these aspects are represented and visible in Facebook profiles. As an individual's 'friends' also construct identity on Facebook, these 'friends' provide a context to users of behavioural norms thus encouraging authenticity (Marwick, 2). This allows for greater trust in the integrity of other users' profiles and may encourage use of the platform by

individuals who previously mistrusted online representations of self. The author believes that this trust in the authenticity of online identity combined with increased Internet penetrations is largely responsible for the mass uptake of the platform. The applications, which are a technological phenomenon, become not only important tools for interaction between individuals, but are also used to construct online identity as one's interests and personality are reflected in the applications visible on an individual's profile. Online identity constructed through Facebook and other social network sites is thus richer and more engaging that identity constructed through the use of blogs and wikis. Communication can also take place across a number of multimedia channels allowing for a degree of expression not inherently possible in text and image based blogs and wikis. These alternative means of communication including virtual gifts, sharing of applications, SMSing and Instant Messaging give users of the site much more control over the type, form and time-scale (eg immediate SMS, or email that can be viewed at any time) of communication.

Users can easily both create and propagate content through the uploading of images or videos, and the use and creation of applications. While the actual creation of applications still requires technological skills not present in the populace at large the architecture of participation and reference material provided by Facebook means that these skills can be learnt by any user of the site with a basic grounding in programming. Much interaction between users of the site occurs through the sharing of these applications, and the sending of virtual gifts, videos or other items through these applications. Applications appear by default on a users' profile page, although they can be removed or minimised. The majority of applications either ask for or require a user to share them with other users, maximising their viral spread through the Facebook community. Interestingly there was resistance to the viral spread of these applications and the Facebook group 'Official Facebook Petition: To ban the

inviting of friends on Applications', with over 800,000 members aimed to ban the requirement of some applications to invite friends to use the application, and allow users the ability to block these applications totally. This highlights the importance of the Facebook community in controlling the functionality of the platform. Thanks to this petition applications that require viral spread can now be reported to Facebook and are removed from the platform, and users of the site are able to totally block these applications. A similar Facebook user driven initiative 'Official Facebook Petition: To remove the is from status messages' resulted in the removal of the 'is' from user status messages. Users of the site are thus really able to control its content and functionality.

While it is not possible to manipulate certain aspects of the platform, the applications are created in an open source context. Users can thus manipulate the functionality of the platform. Participation with and through the platform also occurs at a network level, as the power of Facebook as a online social tool is directly proportion to the number of connected individuals using the platform. Users can also appropriate the platform through the creation of applications to enable interactions from money lending schemes[52] to vampire vs. werewolf battles[53]. In addition the platform can be used for any networking purpose from user defined business connections to sporting communities.

Finally according to the definition of an online community used in this report, Facebook allows for the creation of intrinsically Web 2.0 communities, in which the software provides means of communication and community formation unavailable in real world interactions. This community exists within the rules that bound the

[52] http://www.facebook.com/apps/application.php?id=2360494761&b=&ref=pd

[53] http://www.facebook.com/apps/application.php?id=2526220728&b=&ref=pd

Facebook platform and is self-regulating in that ‘friends’ encourage profile authenticity.

3.6. A comparison of Wikipedia, Boing Boing and Facebook

3.6.1. A comparison of the technologies of Wikipedia, Boing Boing and Facebook

The comparison of the technologies of the three platforms is detailed in the table below:

Technologies	Wikipedia	Boing Boing	Facebook
Age of fundamental technology	1995	1999	2004
Technologies developed specifically for the site	MediaWiki	_	Facebook API, FQL, FMBL
Common Web 2.0 technologies	PHP, MySQL, Apache	RSS, RDF, permalinks	REST system
Is the platform built within an architecture of participation in which user interaction is desired, encouraged and made simple?	Yes	Yes	Yes
Does the technology enable a read-write Web?	Yes	Yes	Yes

Technologies	Wikipedia	Boing Boing	Facebook
Does the technology enable a rich media experience?	No, text and images only	Yes - Boing Boing TV ensures this	Yes - a range of media is available

Table 3: A comparison of the technologies used by Wikipedia, Boing Boing and Facebook.

From this comparison we can see that the age of technologies have no bearing on their classification as Web 2.0, as all these technologies except for the custom built Facebook software pre-date the Dot.com crash.

However, while each platform uses a different set of technologies all these technologies are created within an architecture of participation that encourages and eases user participation.

All three sets of technologies allow users to easily be content producers, but the type of content that users can produce varies greatly between platforms.

While Boing Boing and Facebook offer rich media experiences to users the technological platform of Wikipedia does not. Rich media experiences thus can not be a necessary feature of a Web 2.0 technology.

3.6.2. A comparison of the social aspects of Wikipedia, Boing Boing and Facebook

The table below compares the social aspects of Wikipedia, Boing Boing and Facebook according to this report's working definition of social participation.

Social participation	Wikipedia	Boing Boing	Facebook
1. Does the platform allow for the creation of an online identity?	Yes	Yes	Yes
1.1. Are there standard variables associated with these profiles?	No -these are entirely at the discretion of the user	Yes	Yes - but the user can determine which elements they'd like to display
1.2. Can these profiles be searched independently of other content?	No - associated with articles only	No - associated with comments only	Yes
2. Can users create, manipulate and propagate content?	Yes - can create and edit articles	Yes - can comment and suggest links	Yes - can create groups, share images, create events, applications etc
2.1. Is content creation easy?	Yes	Yes	Yes - but the creation of applications requires some technological background
2.2. How varied is the content that users can create?	Not varied - text and images only	Primary users: Not varied - text and images only Secondary users: Less varied - only text	Very varied - content can be anything supported by the Facebook API

Social participation	Wikipedia	Boing Boing	Facebook
3. Can users participate with, and influence and change, the platform's technology?	Yes	Yes - but only for primary producers	Yes
3.1. Does this participation occur at an open source level?	No	No	Yes
3.2. Is the power of the platform directly proportional to the number of users on it?	Yes - large community for self-regulation and increased content	No - more secondary users have no influence	Yes - large numbers of users are necessary for the success of a social network
3.3. Are there measurable effects of users on the platform?	Yes - in terms of self-regulation of content	No	Yes, eg banning of applications, the removal of the 'is' from status feeds
3.4. Can the platform be appropriated for another use?	No (but Wikis as a technology can)	No (but Blogs as a technology can)	Yes, any networking purpose or any purpose made possible by a custom application
4. Does the platform lead to the formation of a Web 2.0 community formation?	Yes	Primary users: Yes Secondary users: No	Yes
4.1. Is the community self-regulating	Yes - in terms of user and content moderation	Yes - in terms of both content and comments	Yes - in that applications and users can be reported

Social participation	Wikipedia	Boing Boing	Facebook
4.2. Does trust exist between users?	Yes	Yes	Yes
4.3. Does the platform both support and add to the user experience?	Yes	Primary users: Yes Secondary users: No	Yes
4.4. Are the connections between community members made visible?	No	No	Yes - through news feeds and friends lists, and common friends.

Table 4: A comparison of social participation in Wikipedia, Boing Boing and Facebook.

From this comparison we can see that all these platforms allow for the creation of online identity. However, the lack of standard variables across all three platforms, and the fact that users can not be viewed unless associated with other content except on Facebook, shows that a focus on online identity is not a necessity for a Web 2.0 platform. Google, cited by O'Reilly as a Web 2.0 platform (O'Reilly, 2005, 3), has only essential identifiers for online identity and ultimately results in an email address which also acts as the user name for all of Google's services. Since digital identity as an email address pre-dates Web 1.0, the presence and type of identity can not be used to define the Web 2.0. phenomenon.

The comparison shows that users of all three sites can easily create content for the platform, although the possible types of content vary greatly. The single highly simple type of content created by secondary users of the Boing Boing blog does not show any significant advancements from interactions made possible on Web 1.0.

platforms. However, despite this variation in the nature of content, the presence of User Generated Content on all three platforms means that UGC is a key feature of Web 2.0 platforms. Even platforms like Google rely on user generated links between Web pages in order to rank these pages in Google searches (Google: Technology).

Wikipedia and Facebook allow users to participate with, influence and change the technology of the platform in some way. The Boing Boing blog, and indeed all blogs, only allows primary producers to interact in a meaningful way with the technology itself. Only Facebook allows participation at an open source level, while Facebook and Wikipedia are powered by the number of users of the platform, and show the measurable effects of this power source. While only Facebook can be appropriated to another use, wiki and blog software, but not pre-existing wikis and blogs like Wikipedia and Boing Boing, are also intrinsically capable of any number of functions.

All three platforms lead to the creation of a community, although for secondary users of the Boing Boing blog this is not an intrinsically Web 2.0 community. While all these communities are self-regulating, built on trust, and supported by the technological framework of the platform, only in Facebook are these connections made visible. Therefore while Web 2.0 technologies lead to the formation of communities, these connections must not necessarily be made visible to qualify as a Web 2.0. site.

3.6.3. Case studies contributions to a definition of Web 2.0

Web 2.0 technologies include:

- Any type of technology created within an architecture of participation
- Technologies that enable a read-write Web
- Technologies that usually, but not necessarily offer media rich experiences.

Web 2.0 social aspects include:

- Can include digital identity - but not necessarily a focus of the platform
- Users must be able to create content easily, but the type of content can vary greatly
- Some of the users are able to participate with and change with the platform's technology. It is the viewpoint of this report that the larger the percentage of these users, and the more ways in which this interaction can take place, the more intrinsically Web 2.0 the platform.
- Web 2.0 platforms result in Web 2.0 communities.

4. Towards a definition of Web 2.0.

4.1. Looking for meaning in the term Web 2.0

Tim O'Reilly's original attempt to describe the key features of a Web 2.0 platform was economically motivated (Anderson, 1). The O'Reilly Media Corporation aimed to identify a set of new Web companies that were potentially ripe for investment (Anderson, 1). This is why the original description included so much emphasis on the business characteristics of these platforms (Anderson, 1). This focus on economic potential is not appropriate in an academic definition of the term, but does the term's corporate origins mean that it is a marketing buzzword with little substance? No, the fact that the term has been constantly re-interpreted and its meaning morphed is one of the clearest signs of its usefulness and importance (Madden and Fox, 2). So why is the meaning of the term so argued?

Based on research and the comparative analysis the position of this report is that the meaning of this term is widely contested for 5 reasons:

1. There is no clear separation between definitions for a Web 2.0 technology vs. a platform or site that is a holistic example of Web 2.0.
2. Web 2.0 technologies (like blogs and Wikis) had been around for at least ten years before O'Reilly first coined the phrase.
3. A purely social focus for the definition is not sufficient as the original Web, and indeed the Internet, had always been designed with the intention of connecting people, rather than machines.
4. An active vs subjective audience, or a read vs. read-write Web stance is not sufficient as the original Web was designed to be read-write, and content has been created and shared by at least some users since the Internet.

5. Many of the features of these Web 2.0 platforms are due to the direct or indirect effects at both micro and macro level that a billion Web users produce (Anderson, 1). And as this is a social effect that is a direct result of technology penetration, it is thus difficult to define whether Web 2.0 is a technological or social phenomenon.

In order to succinctly define the Web 2.0, one needs to differentiate between Web 2.0 technologies and Web 2.0 platforms. These terms are not interchangeable, and the use of a Web 2.0 technology does not result in a Web 2.0 platform. Similarly a Web 2.0 platform can exist that is not built with Web 2.0 technologies. While blogs are Web 2.0 technologies, a personal journalling blog site like InnerJoeJoe[54] is not a Web 2.0 platform. While the blogging technology does allow for user participation via commenting, this interaction is both highly limited and moderated, and the audience is thus largely a passive one. The site is not powered by users and these users have no control over site content. Sites like these are examples of Web 2.0 technologies used for a very traditional Web 1.0 publishing purpose.

Similarly sites like BitTorrent and USENET are Web 2.0 platforms in that they embrace the ideals of Web 2.0, are built around communities that share User Generated Content and are more powerful the more people use the sites. However, these sites are not built with Web 2.0 or even Web technologies. Separate definitions must therefore exist for Web 2.0 technologies and Web 2.0 platforms.

A definition of a Web 2.0 technology is compounded by the fact that wiki, blogging and other Web 2.0 technologies have been in existence almost 10 years before the phenomenon was first described by O'Reilly. Even social network sites, by the definition used in this report had been around for 4 years, and previous incarnations of this social platform could arguably date back to USENET and WELL

[54] http://innerjoejoe.wordpress.com/

in the 1980s. Without resorting to a list of Web 2.0 technologies the characteristics of a Web 2.0 technology are difficult to define. In addition new, different technologies will continually emerge, and these new technologies may be still be involved in creating Web 2.0 platforms. The position of this report is that the defining characteristic of Web 2.0 technologies is an approach and attitude towards these technologies both in the creation of the platform and in a user centred approach. This report proposes that the attitude towards technology use in the creation of these platforms harnesses the open source ideals of freedom of code, ultimate functionality and sharing of information found in the original Internet without the economic centred focus of Web 1.0. Web 2.0 technologies also embrace the mash-up multi-medium[55] approach that is becoming the norm across all science and art disciplines. Their user centred approach focuses on making Web experiences both easy and rich for users, and harnesses the two-way communication between users and the platform to improve and enrich both the platform and the user experience. This attitude to technologies is summed up in O'Reilly's architecture of participation and perpetual beta approach (O'Reilly, 2004, 4)as well as Eric Shmidt's, CE of Google, viewpoint that these technologies "Don't fight the internet" (O'Reilly, 2006).

The original Web, and indeed the Internet, had always been designed with the intention of connecting people, rather than machines. In addition the Web 1.0 was intended to be a read-write Web and result in active audiences. Either description is therefore not sufficient to explain the differences between Web 1.0 and 2.0. However these factors are still necessary features of any Web 2.0 platform. The people centred approach of Web 2.0 platforms does encourage their use (Marwick, 2). This is shown most typically in a social network platform, but blogs and wikis still closely mimic the way in which people interact and communicate in the real world. This

[55] In this sense the term 'mash-up' refers both to technologies that combine data sources to create a single integrated tool, as well as the combination of multiple types of technology in a single platform.

blurring of the way in which interaction takes place in the real world and digital realms means that first time users can engage with these platforms in a way at once understandable by them. And this interaction provides another layer of support and richness to their real world interactions without necessitating the learning of a new range of communication and interaction skills.

Web 2.0 blurs the boundary between technological advancements, social aspects and social aspects made possible by technological advancements. The graph below shows Internet penetration as a percentage per 100 individuals from 1994 to 2007 globally, in the developed world and in South Africa.

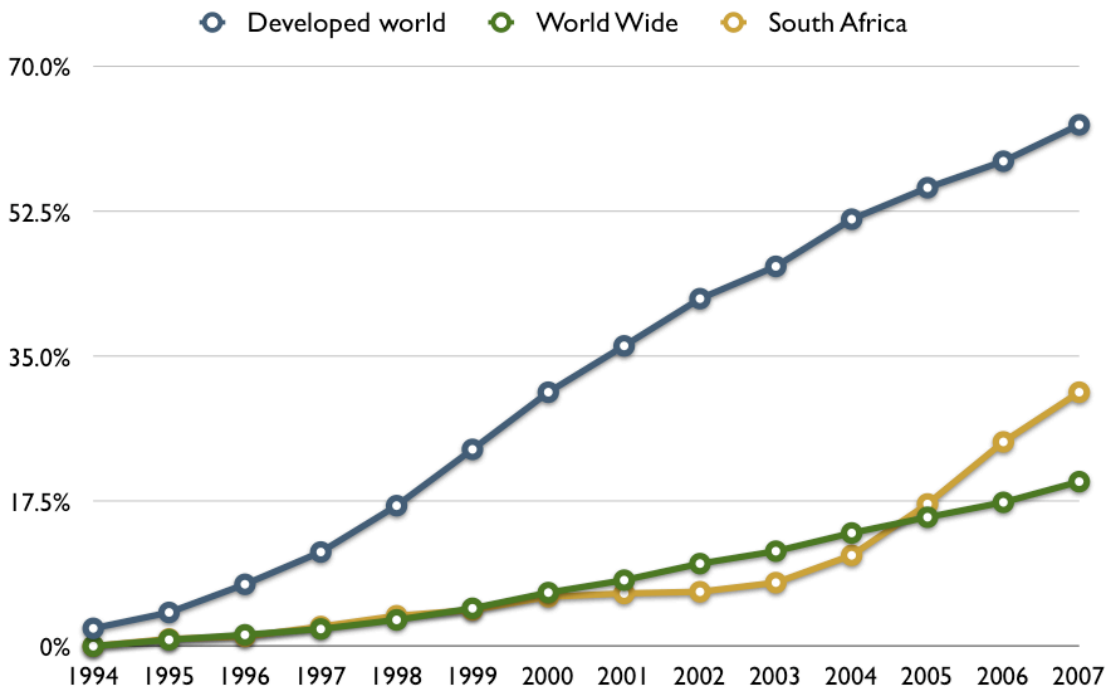


Figure 26: Internet and Web penetration World wide, in the Developed World and in South Africa from 1994 to 2007 – *global data from the International Telecommunications Network, local data from the Economist Intelligence Unit.*

This exponential growth in Web use itself can explain many of the differences between Web 1.0 and 2.0 (Anderson, 1). This increased Internet penetration

combined with globally lower broadband costs, and access to the Internet on smaller cheaper devices like mobile phones has opened up Web communication to a much larger audience that ever before.

These larger audiences themselves make Web 2.0 platforms more powerful. This is the old fax machine argument, a single fax machine is useless, but each fax machine becomes exponentially more useful and powerful with each new fax machine built (Harkins and Hollihan, 41). In this way each new user of the Web increases the potential of the Web as a whole for communication and interaction. Wikipedia would not be the largest encyclopedia in existence without its huge network of content producers. Blogs like Boing Boing moved into the digital realm because they could, for the first time in history, reach a larger audience online than offline. The first social network site lasted three years, because users felt there was little to do, and now the proliferation of Facebook is such that employees feel they must ban it from the office space to ensure productivity. The author believes that this explains the recent uptake in these Web 2.0 phenomenon locally, most notably in the use of Facebook, as for the first time there are enough South Africans online to make a platform that takes advantage of and is powered by social connections work. Simply put, there are finally enough South Africans online, with fast enough Internet connections, so that users of Facebook will have a significant number of their friends on Facebook to make interaction through the platform engaging.

Another social factor brought about by a technological framework is that Web 2.0 technologies are so easy to use that for the first time *anyone* with a computer and Internet connection can become an active audience and produce content for the Web. While the type of Internet connection may restrict certain rich media interactions, Web 2.0 technologies like wikis can be utilised even by users with the slowest dial-up connections.

The affects of users on the Web and Internet are influenced by not just sheer volumes of individual users, but also by their previous experience, and time spent, engaging with the Web platform. Reid (1997) cites four stages of Internet evolution; experimentation, novelty, utility and ubiquity. We are finally at the stage as a global community where enough people have engaged with the Web that they are at the utility and ubiquity phases, meaning that millions of people are now able to use the medium as a tool for social exchange or accept its presence as a necessary and fundamental part of their lives.

Web 2.0 platforms harness the power of these users at a network level and create feedback loops whereby users add value to the technologies used in the platform.

4.2. The Web 2.0. A working definition

A Web 2.0 technology is any technology that aids and encourages simple intuitive user interaction through an architecture of participation. These technologies enable user feedback, and are thus constantly improved and exist within the ethos of a perpetual beta. Web 2.0 technologies embrace re-mix and mash-up philosophies.

Succinctly put a Web 2.0 platform is a read-write Web platform designed to enable and encourage User Generated Content and interaction. These platforms can be built with any set of technologies, and their primary characteristics are social in nature, but the platforms must allow users to interact with the technology at either an open-source, network or appropriation level. These platforms become more powerful and richer the greater the number of people using the platform, and ultimately result in the formation of Web 2.0 communities.

4.3. Concluding thoughts

This report disagrees with Maness that the Web 2.0 comprises equal parts evolution and revolution. Web 2.0 appears to be predominantly the result of the evolution of the technologies and attitudes behind the Internet and Web 1.0 combined with increased global Internet penetration. This incremental progression from the 'Galactic network' to the social network is one of the reasons for the confusion around the term, as no single revolutionary event, technology or attitude separates the two versions of the Web. Because of this progression from Web 1.0 to Web 2.0 even platforms that are defined as Web 2.0 will differ in their possibilities for social interaction. Wikis, blogs and social networks are all Web 2.0 phenomena as defined by this report and by other authors. However the lack of rich media content and standards in the wiki language mean that wikis don't offer content rich experiences or exist universally across a number of devices. Personal journal blogs use a Web 2.0 technology but appropriate it to a Web 1.0 publishing purpose. Even a Web 2.0 blog like Boing Boing only really offers a holistic Web 2.0 experience to its primary editorial users. The author believes that it is in social network sites, like Facebook, where the full potential of the Web 2.0 phenomena is reached. It is in these sites, designed around people, populated by people, and powered by people that the extent of Web 2.0 as a social phenomena is visible. Whether this social interaction does indeed lead to a 'new kind of international understanding...citizen to citizen, person to person' or whether the ideological biases inherent in the Web restrict its potential to unify remains to be seen, but the author is more than 'just a little bit curious.'

5. **Technical Glossary**

CSS: Cascading Style Sheets, is a stylesheet language used to define the presentation of a document written in any markup language (World Wide Web Consortium).

DHTML: dynamic HTML is the name given to a collection of technologies used to create dynamic and interactive Web sites including HTML, JavaScript, CSS and the Document Object Model (World Wide Web Consortium).

Document Object Model: is a standard object model for representing HTML or XML (World Wide Web Consortium).

E-mail (electronic mail): is a means of composing, sending, receiving and storing messages over electronic communication systems (Whittaker, 19).

eCommerce or Electronic Commerce: is defined by the Cambridge online dictionary as the buying and selling of goods and services on the Internet.

Flash: is a set of multimedia technologies developed which are a popular method for adding animation and interactivity to web pages (World Wide Web Consortium).

JavaScript: is a scripting language often used for Web development (World Wide Web Consortium)**.**

XHTML: Extensible Hypertext Markup Language, is more flexible than HTML and conforms to the XML syntax (World Wide Web Consortium).

XML: Extensible Markup Language: is a extensible language in which users can define their own eleemnts and allows them to create custom markup languages (World Wide Web Consortium).

XMLHttpRequest: is an API that cis used by web browser scripting languages to transfer text data between a web page's server and a users machine (World Wide Web Consortium)**.**

XSL: Extensible Stylesheet Language Transformations, an XML-based language to transform XML documents that can be understood by users (World Wide Web Consortium).

6. Bibliography/Works Cited:

Abbate, Janet. Inventing the Internet, Cambridge, Massachusetts: MIT Press. 1999.

Acquisti, Allessandro and Gross, Ralph. Imagined Communities: Awareness, Information Sharing, and Privacy on Facebook. 2006. http://www.springerlink.com/content/gx00n8nh88252822/ accessed <11/26/2007>

Anderson, Paul. "What is Web 2.0? Ideas, technologies and implications for education." 2007. JISC Technology and Standards Watch. http://www.busi.mun.ca/Lwetsch/B6004/includes/Daily%20Preparations/January%2016%20-%20Web%201.0%20-%20Web%203.D/Web%202.0.pdf. accessed <11/26/2007>

Aumueller, David. SHAWN: Structure Helps a Wiki Navigate. 2006. http://dbs.uni-leipzig.de/file/aumueller05shawn.pdf. accessed <10/26/2006>

Berners-Lee, Tim. The World Wide Web: A Short Personal History. 1998. http://www.w3.org/People/Berners-Lee/ShortHistory.html accessed <10/26/2006>

Berners-Lee, Tim. Weaving the Web. Orion Business Books: Britian. 1999

Berners-Lee, Tim, Cailliau, Ari, Nielsen, Hendrik and Secret, Arthur. "The World Wide Web", 1994. The New Media Reader, Ed. Noah Wardrip-fruin and Nick Montfort, Cambridge: Mit Press. 2003. 792-798.

Bijker, Wiebe. “Do not despair: There is life after constructivism”. Science, Technology, & Human Values, 1993. Vol. 18, No. 1 http://links.jstor.org/sici?sici=0162-2439(199324)18%3A1%3C113%3ADNDTIL%3E2.0.CO%3B2-E accessed <07/11/2006>

Blood, Rebecca. WeBlogs: A History and Perspective. 2000. http://www.rebeccablood.net/essays/weBlog_history.html accessed <09/04/2006>

Bolter, Jay David and Grusin, Richard. Remediation Understanding New Media. MIT Press: Cambridge MA. 1999.

Boyd, D. M., and Ellison, N. B. “Social network sites: Definition, history, and scholarship”. Journal of Computer-Mediated Communication, 2007. 13(1) http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html <accessed 02/02/2008>

Burnett, Robert and Marshall, P. David. Web Theory: An Introduction, Routledge: New York. 2003.

Bush, Vannevar. “As We May Think”, 1945. The New Media Reader, Ed. Noah Wardrip-fruin and Nick Montfort, Cambridge: Mit Press. 2003. 37-47.

Cayzer, Steve. “Semantic Blogging: Spreading the Semantic Web Meme”. Proceedings by DeepXLtd. www.RenderX.com/Blogs/Cayzer accessed <09/15/2006>

CMS News, “MySpace: Your Kids in Danger”. 2006. http://www.cbsnews.com/stories/2006/02/06/eveningnews/main1286130.shtml accessed <09/05/2008>

Chandler, Daniel. Technological or Media Determinism. 1995. http://www.aber.ac.uk/media/Documents/tecdet/tecdet.html accessed < 11/29/2007>

Chesney, Thomas. “An empirical examination of Wikipedia’s credibility”. First Monday, http://firstmonday.org/issues/issue11_11/chesney/ accessed < 11/29/2006>

Cross, Jay. Blogs. Learning Circuits ASTD’s Source for e-learning. 2002. http://www.learningcircuits.org/2002/apr2002/ttools.html accessed <09/15/2006>

Cunningham, Ward. Cunningham and Cunningham Inc Wiki, last edited 2008. http://c2.com/ accessed <02/10/2008>

Darkwa, O. and F. Mazibuko. "Creating virtual learning communities in Africa: Challenges and prospects." First Monday 5(5). 2000.

Davis, Ian. “Talis: Web 2.0 and all that”. Internet Alchemy. 2005. http://iandavis.com/Blog/2005/07/talis-web-20-and-all-that?year=2005&monthnum=07&name=talis-web-20-and-all-that accessed <09/15/2006>

Economist Intelligence Unit “South African Telecoms and Technology monthly report, January.” 2008. http://www.eiu.com/ <01/11/2008>

Ellison, N. B., Steinfield, C., & Lampe, C. “The benefits of Facebook ‘friends’: Social capital and college students' use of online social network sites.” Journal of Computer-Mediated Communication, 12(4) 2007. http://jcmc.indiana.edu/vol12/issue4/ellison.html accessed <02/02/2008>

Englebert, Douglas. “Augmenting Human Intellect”, 1962. The New Media Reader, Ed. Noah Wardrip-fruin and Nick Montfort, Cambridge: Mit Press. 2003. 95 -108.

Fensel, Dieter and Musen, Mark. The semantic web: A brain for human kind. 2004. IEEE intelligent systems, http://ieeee.review/2004/fensel accessed <09/02/2006>

Fitzpatrick, Brad. Thoughts on the social graph. 2007. http://bradfitz.com/social-graph-problem/ accessed <09/11/2007>

Garrett, Jesse James. Ajax: A New Approach to Web Applications. 2005. https://www.adaptivepath.com/ideas/essays/archives/000385.php accessed <07/02/2007>

Gross, Ralph and Acquisti, Allessandro. “Information revelation and privacy in online social networks”. Proceedings of the 2005 ACM workshop on Privacy in electronic society. http://portal.acm.org/citation.cfm?id=1102199.1102214 accessed <07/02/2007>

Harkins, Phil and Hollihan, Keith. The Story and Lessons behind RE/MAX. 2004. John Wiley and Sons.

Hargittai, E. “Whose space? Differences among users and non-users of social network sites.” Journal of Computer-Mediated Communication, 13(1). 2007 http://jcmc.indiana.edu/vol13/issue1/hargittai.html accessed <02/02/2008>

Hourihan, Meg. “What We’re doing when We Blog.” O’Reilly Emerging Telephony conference, San Fransisco. 2002. http://www.oreillynet.com/pub/a/javascript/2002/06/13/megnut.html accessed <10/30/2006>

Kahn, Richard and Kellner, Douglas. “New Media and Internet Activism: from the Battle of Seatlle to Blogging” New media and society, Vol 6(1):87–95, London, 2004.

Kleinrock, L. "Information Flow in Large Communication Nets", RLE Quarterly Progress Report, 1961. http://www.lk.cs.ucla.edu/LK/Bib/REPORT/PhD/ accessed <06/12/07>

Lamb, Brian. “Wide Open Spaces, Wikis Ready or Not”. Educare. 2004. http://www.educause.edu/ir/library/pdf/ERM0452.pdf. accessed <06/12/07>

Leiner, B.M., Cerf, V.G., Clark, D.D., Kahn, R.E., Kleinrock, L., Lynch, D.C., Postel, J., Roberts, L.G., and Wolff, S. A Brief History of the Internet, arXiv:cs/9901011v1, http://arxiv.org/html/cs/9901011? 1999. accessed <05/05/2007>

Lessig, Larry. Code and Other Laws of Cyberspace, Basic Books, 2000.

Leyshon, Andrew, Webb, Peter, French, Shaun, Thrift, Nigel and Crewe, Louisa. “On the reproduction of musical economy after the Internet’. Media, Culture and Society, Vol 2, 177 - 209. 2005. http://mcs.sagepub.com/cgi/content/abstract/27/2/177 accessed <05/05/2007>

Licklider, J.C.R and Taylor, Robert, W. “The Computer as a Communication Device” Science and Technology, http://gatekeeper.dec.com/pub/DEC/SRC/publications/taylor/licklider-taylor.pdf, 1968. accessed <05/05/2007>

Lih, A. “Wikipedia as participatory journalism: reliable sources? Metrics for evaluating colloborative media as a news resource,” Proceedings of 5th International Symposium on Online Journalism. Austin, TX. 2004.

Lister, Martin, Dovey, Jon, Giddings, Seth, Grant, Iain, Kelly, Kieran. New Media: A Critical Introduction, Routledge, 2003.

Mackay, Hughie, and Gillespie, Gareth. “Extending the Social Shaping of Technology. Approach: Ideology and Appropriation”, Social Studies of Science, Vol. 22, No. 4, 685-716 (1992)

Mahajan, Vijay, , Srinivasan, Raji, and Wind, Jerry. “The Dot.com Retail Failures of 2000: Were There Any Winners?” 2002. Journal of the Academy of Marketing Science, Vol. 30, No. 4, 474-486. http://jam.sagepub.com/cgi/content/abstract/30/4/474 accessed <09/27/2006>

Maness, Jack. Library 2.0 Theory: Web 2.0 and it's implications for Libraries. Webology 3(2) 2006. http://www.webology.ir/2006/v3n2/a25.html accessed <09/27/2006>

Marwick, Alice. "I'm a Lot More Interesting than a Friendster Profile": Identity Presentation, Authenticity and Power in Social Networking Services". 2005. Proceedings of Paper the Association of Internet Researchers 6.0. http://itp.nyu.edu/blogs/js960/2008/02/27/i%E2%80%99m-a-lot-more-interesting-than-a-friendster-profile/l accessed <09/14/2006>

McLuhan, Marshall. "The Medium is the Message." The New Media Reader, Ed. Noah Wardrip-fruin and Nick Montfort, Cambridge: Mit Press. 2003. 203 -209.

Mee, Cynthia. "To Blog or not to Blog", On Target vol 2(1), 2006. http://www.target.ir/2006/v2/1html accessed <09/14/2006>

Miller, Carolyn and Shepherd, Dawn. "Blogging as Social Action: A Genre Analysis of the WeBlog". Into the Blogosphere [Rhetoric, Communitiy and Culture of WeBlogs]. 2005. http://Blog.lib.umn.edu/Blogosphere/Blogging_as_social_action_a_genre_analysis_of_the_weBlog.html accessed <09/20/2006>

Miller, Paul. "Web 2.0: Building the New Library". Ariadne (45), 2005. http://www.ariadne.ac.uk/issue45/miller/ accessed <09/26/2006>

Moon, Peter. “The future of the Web as seen by its creator” ITWorld. 2007. http://www.itworld.com/Tech/4535/070709future/index.html. accessed <10/11/2007>

Musser, John. Web 2.0 Principles and Best Practices. Executive summary. http://www.oreilly.com/catalog/web2report/chapter/web20_report_excerpt.pdf. accessed <10/11/2007>

Moulthrop, Stuart. “You say you want a revolution? Hypertext and the laws of media. 1994. The New Media Reader, Ed. Noah Wardrip-fruin and Nick Montfort, Cambridge: Mit Press. 2003. 691 - 704.

Mowery, David and Simcoe, Timothy. Is the Internet a U.S. Invention? – An Economic and Technological History of Computer Networking. 2002. http://64.233.183.104/search?q=cache:S_FDkodBjW0J:www.druid.dk/conferences/nw/paper1/movery.pdf+Is+the+Internet+a+U.S.+Invention%3F+%E2%80%93+An+Economic+and+Technological+History+of&hl=en&ct=clnk&cd=2&gl=za&client=firefox accessed <09/13/2006>

Nielsen, Jakob. Multimedia and Hypertext: The Internet and Beyond. Morgan Kaufmann. 1995.

O’Reilly, Tim, Kennedy, Niall, and McClure, Dave. The Facebook Application Platform 2nd edition. 2007. https://members.oreilly.com/ accessed <02/14/2008>

O’ Reilly, Tim. Open Source Paradigm Shift, 2004. http://tim.oreilly.com/articles/paradigmshist_0504.html accessed <09/12/2006>

O' Reilly, Tim. What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software, 2005. http://time.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

O'Reilly, Tim, "Web 2.0: Compact Definition?", O'Reilly Radar blog, 1 October, 2005b http://radar.oreilly.com/archives/2005/10/web_20_compact_definition.html accessed <09/13/2006>

O'Reilly, Tim. Levels of the Game: The Hierachy of Web 2.0 Applications. 17 July, 2006. http://radar.oreilly.com/archives/2006/07/levels-of-the-game-the-hierarc.html <09/13/2006>

Palmer, Sean. The Semantic Web: An Introduction. 2001. http://infomesh.net/2001/swintro/ accessed <02/02/2008>

Phillips, Sarah. "A brief history of Facebook". Guardian.co.uk. 2007 http://www.guardian.co.uk/technology/2007/jul/25/media.newmedia accessed <02/02/2008>

Poulsen, Kevin. MySpace Sex Offenders, Five of Nine Still Online. 2007. http://blog.wired.com/27bstroke6/2007/05/myspace_sex_off.html accessed <02/05/2008>

Postman, Neil. Teaching as a Conserving Activity. New York. Dell. 1979

Preece, J., and Maloney-Krichmar, D. “Online communities: Design, theory, and practice.” Journal of Computer-Mediated Communication, 10(4), 2005. http://jcmc.indiana.edu/vol10/issue4/preece.html accessed <02/02/2008>

Quin, Hua and Scott, Craig. “Anonymity and self-disclosure on weblogs.” Journal of Computer-Mediated Communication, 12(4), 2007. http://jcmc.indiana.edu/vol12/issue4/qian.html accessed <02/25/2008>

Reid, Robert. Architects of the Web. New York, John Wiley and Sons. 1997.

Sarup, Madan. An Introductory Guide to Post-structuralism and Postmodernism. University of Georgia Press. 1993.

Shreve, John. MySpace faces a perp problem. 2006. http://www.wired.com/culture/lifestyle/news/2006/04/70675 accessed <04/28/2008>

Schmidt, J. “ Blogging practices: An analytical framework.” Journal of Computer-Mediated Communication,12(4), 2007. http://jcmc.indiana.edu/vol12/issue4/schmidt.html accessed <02/25/2008>

Smith, Marc.A. and Kollack, Peter “Communities in Cyberpace”.” 1999. Communities in Cyberspace, Ed. Smith, Marc.A. and Kollack. Routledge, 1999.

Stallman, Richard. “The Gnu Manifesto”, 1985. The New Media Reader, Ed. Noah Wardrip-fruin and Nick Montfort, Cambridge: Mit Press. 2003. 543 - 550.

Stern, Hal. The Morning Snowman. 2003. http://Blogs.sun.com/stern/entry/web_2_0_in_three, accessed <09/20/2006>

Sunden, J. Material Virtualities. New York: Peter Lang. 2003.

Surowiecki, James. The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations. New York: Random house, 2004.

Tolksdorf, Robert and Simperl, Elena. Towards Wikis as Semantic Hypermedia. WikiSym. 79-88. 2006. http://meta.Wikimedia.org/Wiki/ accessed <09/12/2006>

Tonkin, Emma. “Making the Case for a Wiki.” Ariadne 42. 2005. http://www.ariadne.ac.uk/issue42/tonkin/ accessed <09/27/2006>

Volkel, Max, Krotzsch, Markus, Vrandecic, Denny, Haller, Heiko and Studer, Rudi. “Semantic Wikipedia”. WWW 585- 594. 2006. 2http://www.mediaWiki.org accessed <09/27/2006>

Voss, Jakob. “Measuring Wikipedia”. Proceedings for the ISSI 2005 Conference. 2005. 1-12. accessed <09/20/2006>

Wakeford, Nina. “New Media, New Methodologies: Studying the Web.” Web.Studies Ed. Gauntlett, David, London: Arnold, 2000.

Whittaker, Jason. The Internet The Basics, USA and Canada: Routledge, 2002.

Wright, Robert. “Overhearing the Internet,” The New Republic. 1993. http://w2.eff.org/Net_culture/overhearing_the_internet.article.txt. accessed <07/22/2007>

Young, Margaret, Muder, Doug, Kay, Dave, Warfel, Kathy and Barrows, Alison. The Complete Reference Internet, Millennium Edition, Berkley, Osborne/McGraw Hill, 1999.

Sources:

BBC News, 19 July 2005. News Corp in $580 Internet Buy. http://news.bbc.co.uk/2/hi/business/4695495.stm accessed <07/05/2008>

Boing Boing

http://www/boingboing.net

Facebook

http://www.facebook.com

Facebook statistics:

http://www.facebook.com/press/info.php?statistics

Facebook Developers Documentation: http://developers.facebook.com/documentation.php accessed <12/12/2007>

Facebook applications:

http://www.facebook.com/apps/

Official Facebook Petition: To ban the inviting of friends on Applications

http://www.facebook.com/group.php?gid=9912127233 accessed <02/02/2008>

Google: Technology

http://www.google.com/technology/

Wikipedia

http://en.Wikipedia.org

Wikipedia:About

http://en.Wikipedia.org/Wiki/Wikipedia:About accessed <09/20/2007>

Wikipdeia: Special statistics

http://en.Wikipedia.org/Wiki/Special:Statistics accessed <09/20/2007>

Wikipdeia: WikiMedia

http://en.Wikipedia.org/Wiki/MediaWiki accessed <09/20/2007>