

The Web 2.0 Demystified – Six Theses on a Misinterpreted Concept

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Abstract

The Web 2.0 was said to bring real innovation, new concepts, and new applications to the Web. The role of a user is upgraded by changing his passive role of information consumer to the role of somebody producing and consuming information at the same time ("prosumer"). In our paper, we discuss the major aspects of the concept Web 2.0 and draw conclusions from our findings by means of theses. It is argued that technologies used with Web 2.0 do not represent an innovative factor. We discuss technical aspects such as technologies and programming interfaces as well as usability aspects and business aspects of Web 2.0 applications and give an outlook to future developments and new concepts used on the Web. Based on the derived theses it is proposed that the Web 3.0 will bring new concepts and applications to the web rather than the Web 2.0.

Keywords

Web 2.0, Web 3.0, Internet Applications, AJAX

1. Web 2.0 - old wine in new skins?

The past 10-15 years have seen a rapid development and adoption of Internet services. Business managers have been enthused but also alarmed by a rapidly proliferating series of developments to the internet and web based services that alter consumer behaviour and have the potential to transform business models (Cassidy, 2002; Tapscott and Williams, 2007). The increase in number and performance of broadband Internet connections and the decrease of costs of intense use of Web enabled applications that would not have been possible a few years ago due to the required data rates and volumes.

The concept of Web 2.0 represents a paradigm for Web applications and their usage (Nickull, 2008; Vossen, 2007). The term "Web 2.0" was coined by Tim O'Reilly in 2005 during an O'Reilly-internal conference (see (O'Reilly, 2005)). According to O'Reilly, the Web 2.0 has the following properties:

- Using the Web as a Platform,
- Collective Intelligence,
- News Forms of Data Collection and Data Management,

There exist some mash-ups combining, for instance, eBay auctions with the locations of those auctions. Others show the location of real estate or the place of work of contacts within an online community.

Other offers aim to replace traditional desktop services with Internet services. Examples for this are atoolo.com and youos.com, both providing a complete desktop with integrated applications such as a word processor or spreadsheet application via the Internet. For using those services, a user solely requires a computer with a Web browser running on it. Hence the operating systems installed on a local machine or locally installed applications are secondary since all software used and the data is exclusively used via the Internet.

1.2. Collective Intelligence

In contrast to traditional ways of publishing information on the Web where users only took the role of consuming information, the Web 2.0 uses the "collective intelligence" of its user base and some analysts and researchers believe that it marks a profound change in the way information is generated and distributed and how business is conducted (Tapscott and Williams, 2007).

Firstly, there is the grouping and tagging of information by users, i.e. augmenting information with meta information. A photograph of e.g. Stonehenge can be described by tags like "stones", "Stonehenge", "UK". The tagging of information such as videos, photographs or even scientific articles favours their grouping and classification (Stock, 2007). This is –in contrast to a taxonomy– called "folksonomy".

The advantage of this approach is obvious: editorial work is being "outsourced" to the user who does this for free. Many users of information searching the Internet for classified and grouped information can benefit from this approach. Additionally, user interest is increased and therefore a multiplier effect can be achieved. However there are severe limitations and problems such as the tags lack of precision, e.g. when indexing scientific documents (Stock, 2007).

An additional and essential aspect of using "collective intelligence" on the Internet is the community-based development of software, contents, and information (Benkler, 2007). Open Source Software (OSS) is an example for this approach. Virtual teams collectively developed, test, and maintain software whose quality is comparable, if not better, to commercial software. Examples of very successful OSS are the Apache web server, the programming language PHP, and the office software Open Office.

1.3. New Forms of Data Collection and Data Management

The management and collection of data in the Web 2.0 represents a new approach. Through a combination of existing data which can be augmented by users, new data is being created. This user-generated meta data can be of an extremely high commercial value (Musser, 2007). Users at Amazon.com, for example, write reviews on books, DVDs, etc. and provide additional information to potential buyers of those products. Google offers a service "Google Maps" which displays maps on the

Internet and allows users to create own Internet applications by using the Google Maps programming interface (API). A very common usage of Google Maps within Web 2.0 is to create a “mash-up” combining Google Maps with, for instance, craigslist.com or Ebay.com information.

The more information is used the more it is augmented by users and thus represents a greater value to other users. When users map their favourite fitness club or restaurant on Google Maps, implicitly map-based yellow pages is created which is much for intuitive to use than a paper representation and which is much more up-to-date.

1.4. New Software Development Models with User Participation

The development of Web 2.0 is done at a high pace and with utilising scripting languages such as Perl, JavaScript, or Ruby (Nickull, 2008; Vossen, 2007). The dynamic provision of information and services on the Web often requires a continuous change and adaptation of applications.

Requirements change at such a high speed and frequency so that most Web 2.0 offers are marked “Beta” (O’Reilly, 2005). For standard software applications being installed on desktop computers, this would be an intolerable situation. For those types of applications, users get the software after an intensive testing phase and beta phase in which only developers or selected users may test “preview” of “beta” versions. Service providers such as Google or Flickr, for example, have integrated the Beta badge into their logo for years.

Another aspect of Web 2.0 is the participation of users in developing software (Tapscott and Williams, 2007). This does not have to, such as with the development of OSS, mean that users actually are writing code. In connection with Web 2.0 applications rather an interactive and continuous design and collection of user features (requirements) comes to the fore. The state of a perpetual beta version means that user requirements are continuously gathered and implemented.

1.5. Simple, Light-Weight Programming Models

Web 2.0 sites such as Google, Amazon, or Flickr.com provide freely available programming interfaces (APIs) that are simple to use, well-documented, and can even be used by non-professional programmers. The goal herewith is the realisation of loosely-coupled systems being composed of a mix of existing services. Providers target at a high penetration of the market through a multiplier effect: The more often a Web service is combined with other services, the more popular it becomes and attracts more users. Web services provide their interface via an XML-based data stream and can be used by other Web services, Web sites, or applications.

1.6. Applications for multiple Devices

Web applications are usually not developed for a particular type of hardware or hardware platform. There are new mobile devices on the market offering ubiquitous

access to the Internet and thus to Web 2.0 applications, which means user participation anytime and anywhere.

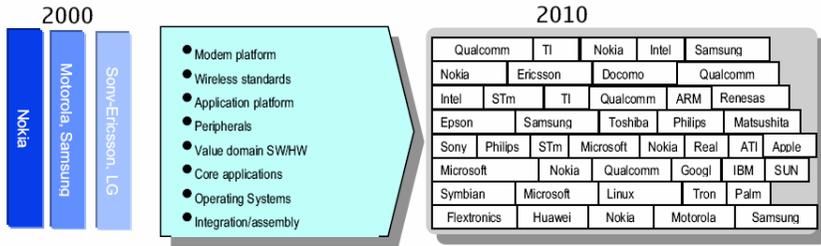


Figure 2: Vertical to horizontal mode shift in Mobile Device Industry (Suoranta, 2006)

A shift from vertical to horizontal mode can be expected in the mobile device industry (Suoranta, 2006; Walker 2006). This process may ultimately lead to a development from current “processor-centric-architectures” towards “content and communication centric architectures” (Suoranta, 2006). The main challenges of these developments from a hardware point of view are energy consumption and performance (e.g., with respect to CPU energy consumption and performance or memory capacity and speed). Furthermore new services require security and trust with respect to the HW and SW platform. A number of industry forums and alliances such as the Open Mobile Terminal Platform (OMTP), Open Mobile Alliance (OMA), Mobile Industry Processor Interface (MIPI) Alliance are currently active with the ultimate goal of providing open and accepted standards for mobile devices (Walker, 2006). Another key player in this area is Google that leads the Open Handset Alliance (OHA). Google developed the Android open source platform for mobile devices that is based on Linux. The main aim is to enable multi-platform mobile devices that support the Android operating system and applications.

1.7. Web Applications or Rich Internet Applications

A new form of applications in the context of Web 2.0 are such only being available via the Internet (or Intranet of a company) which providing a comparable set of features to desktop applications. Those applications are called "rich Internet applications" (RIAs). To use RIAs, a user just has to have a computer running a Web browser and a connection to the Internet. No additional software or runtimes are required. This is why RIAs are platform-independent and can be used anywhere, for example, from a mobile client, an Internet cafe, or from home.

The concept of RIAs is connected to the concept of application service provisioning. Applications are hosted with an application service provider rather than being installed locally. Examples for RIAs is the Internet e-mail client Google Mail (www.gmail.com), the mind mapping tool Mindmeister (www.mindmeister.com), or the word processor Writely (www.writely.com).

1.8. AJAX

The technological basis for the aforementioned RIAs forms AJAX (asynchronous JavaScript and XML). The term AJAX does not stand for a technology but has been created by the owner of an Internet company (Jesse J. Garret) for easier customer communication. Hence AJAX does not represent a new set of technologies, but a combination of existing ones. Figure 3 below shows the structure and components of AJAX.

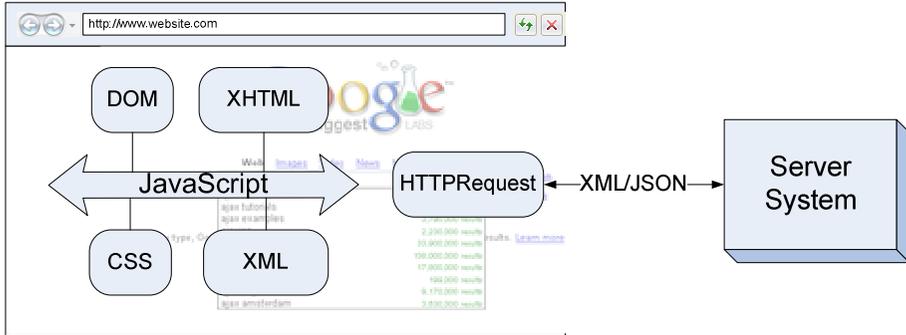


Figure 3: AJAX Structure and Components

XHTML (Extensible HTML) and CSS (Cascading Style Sheets) are used for formatting and displaying XML data. JavaScript implements functionality of the client, including an asynchronous event mechanism. Through its script code, JavaScript "glues" all other AJAX components and functions as a communication backbone on the client. The DOM (Document Object Model) is used to dynamically modify an XHTML page without having to reload the page while the XMLHttpRequest object realises asynchronous communication to a server system. As a protocol for data transmission between the client and the server, XML or JSON (JavaScript Object Notation) are used.

Through an asynchronous communication model, rich graphical user interfaces, and a new look-and-feel, AJAX-based RIAs can provide a similar set of functionality to desktop applications.

1.9. Bloggers, Podcasters and other Self-Promoters

Podcasts are audio and video data being provided over the Internet. The word podcast is composed of the words "iPod" (a popular Apple MP3 and video player) and "broadcasting". In contrast to just downloading audio and video files from a Web page podcasts are provided by RSS ("really simple syndication") feeds. Podcasts form the multimedia equivalent to blogs.

The word blog is composed of the words "Web" and "Log" and stands for frequently updated Web sites that are maintained by one or more users ("bloggers"). Blogs exist on a huge variety of topics, such as diaries, corporate blogs, photography blogs, or blogs discussing just up-to-date news. With a blog, the user becomes a published himself through the role of a moderator or reviewer for a particular blog.

By January 2007, there existed more than 60 million Blogs worldwide (source: technorati) and by July 2006, more than 700 million videos were viewed per day by online users (source: ComScore). It is interesting to note that some companies even encourage their employees to blog (e.g., IBM launched a program to encourage its employees to start blogging or podcasting) (Tapscott and Williams, 2007). This can be seen as an extended and contemporary marketing strategy (e.g. IBM employees will be perceived as experts in the field and will further be able to effectively promote products and services).

The vast majority of bloggers and podcasters do not make any money with what they do on the Internet. A strong impulse of social-networking and self-promotion rather than commercial interests are the key motivations for many bloggers.

1.10. Social Software

The term social software stands for applications supporting the social interaction of people. This is nothing new from Web 2.0 since there already exist newsgroups, e-mail-systems, and online learning platforms long before the term Web 2.0 has been created.

However, the new generation of social software carving the Web 2.0 uses technological innovations and higher transmission bandwidth to enable new forms of social interaction. The following list contains examples for social software in the context of Web 2.0:

- Wikipedia (Internet encyclopaedia, in which each user can create and manipulate content),
- Skype (instant messaging und Voice-over-IP telephony),
- del.icio.us (social bookmarking; users can have bookmarks online, and assign keywords ("tags") to them),
- Flickr.com (publishing and tagging of photos),
- Social networks: Xing.com, MySpace.com, LinkedIn.com, Facebook.com (establishing and maintaining contacts, search for people having the same interests),
- twitter.com (micro blogging),
- digg.com (online reviews, user reviews of products),
- Plazes.com (marketing and tagging of places through users, search for tagged places, and
- YouTube.com (upload, viewing, tagging, and rating of videos).

2. Web 2.0 - Innovation or Buzzword?

The continuing hype around the Web 2.0 and tremendous investments into that area (e.g., Microsoft paid 240 million USD for a 1.6 per cent share of facebook in October 2007) leads to the assumption that Web 2.0 is more than just “old wine in new skins”. Venture capitalists as well as established companies either develop own

Web 2.0 applications and Web sites or acquire promising companies in that area. But what is so innovative about Web 2.0?

2.1. New Technology?

The main concepts of Web 2.0 are focussed on usability and types of applications rather than on technology. One umbrella term which is often associated with the Web 2.0 is AJAX. However, the technologies forming AJAX have been available long before the rise of Web 2.0 (JavaScript – 1996, DOM – 1998, XHTML – 2000, CSS – 1996, XMLHttpRequest – 2000, XML – 1998, JSON – 2000). AJAX is also a good example for existing concepts that are re-applied to software engineering: class frameworks. For AJAX, a vast number of class frameworks exist, ranging from frameworks for simple GUI effects (e.g., script.aculo.us) to server frameworks for asynchronous communication (e.g., SAJAX).

Also by means of communication of Web 2.0 applications no new technology is being used. Even new communication protocols such as SOAP (simple object access protocol) or REST (representational state transfer) use HTTP as a basis.

Web 2.0 applications are developed using standard technologies. The distinctiveness of those applications rather expresses itself through a limitation of technologies used. On the client side, Web 2.0 RIAs focus on XHTML and JavaScript. This means that every client can use those applications with a browser being capable of executing JavaScript and of rendering XHTML.

Web 2.0 applications use technologies that have been available for many years and found widespread use even before this concept was created. This is also stated by Tim Berners-Lee, the creator of the WWW, who further questioned the use of the term "Web 2.0" in a meaningful way as many of the technology components of Web 2.0 have existed since the early days of the WWW (Laningham, 2006).

All users of sites such as YouTube, Facebook, or Flickr are, probably unknowingly, part of the Web 2.0. It can be argued that the widespread adoption of internet tools and the technological trend is translating into a new business trend, and requires new strategies on how to apply "wiki" thinking to existing businesses (Tapscott and Williams, 2007). Again, the idea that the contributions and efforts of many are usually better than the labour of one is not at all brand new but as old as economic theory. It can be taken even further to assume that the contributions and even opinions of crowds are superior to those of groups or individuals (Surowiecki, 2005). Furthermore the fundamental principles of current developments have been outlined many years ago by Kelly who argues that "our manufactured world has become so complex that the only way to create yet more complex things is by using the principles of biology" (Kelly, 1995) or Locke who predicted "the end of business as usual" (Locke, 2001) predating Wikinomics by eight years.

Thesis 1: technologies used in the context of Web 2.0 do not represent an innovative factor.

2.2. New APIs?

One central characteristic of the Web 2.0 are “simple, light-weight programming models”. Making APIs understandable and accessible even to non-experts means that the API has to become easier and smaller. Hence more functions have to be available for achieving the same functionality than with more complex APIs. Thus complexity is rather distributed than eliminated. However Web 2.0 APIs take a different approach as they only support one particular aspect of a use case, i.e., they are very specialised.

It is interesting to note that Web 2.0 APIs can only be used for one particular use case. For example, the YouTube.com API (“Google Data API”) allows the integration of Google Maps with Youtube.com videos or the integration of videos in Web sites. The API of Amiando.de (event management and online invitations) allows developers to set-up events and to invite people.

The characteristic of Web 2.0 APIs thus is a limitation to a small fragment of a particular use case having an elemental functionality. Only this aspect is targeted and supported, which also makes APIs easier to use. This approach, however, is not applicable to complex use cases and services providing a rich set of functionality.

Thesis 2: Web 2.0 APIs do not represent an innovation but rather a limitation of functionality to scale down complexity.

2.3. New Applications?

Web 2.0 applications such as RIAs – word processors (e.g., Writely, Google Mail), social software (e.g., facebook.com, Xing.com) or even entire Desktops on the Web (e.g., www.youos.com, www.eyeos.org) – or Blogs (simple content management systems for web site creation) are just providing functionality that has been available to users for a long time by simple Content Management Systems (CMSs).

Even "micro blogging" applications such as Twitter (www.twitter.com), Yurbo (www.yurbo.com), or Jaiku (www.jaiku.com) can be viewed as a new form of chat room (not to talk about the applicability or deeper sense in using those). To underline this some example statements taken from Jaiku are listed below:

- "Good Old Christmas Card just sent";
- "am offline for most of today, helping a friend. will be working tonight when i get back.";
- "is anyone wanna hangout with sisha? We wait w ya'll at cafe sasha galaxy.barbel in da house".

Phelan estimates that this type of obviously trivial and futile contents will cost economy about \$ 13.5 billion in 2008 only on Twitter, similar services not included (Phelan, 2008).

The phenomenon that many new software packages do not provide new features has already been observed by Niklaus Wirth in 1995 (Wirth, 1995). None of the Web 2.0

application features are really new. What is really new here is that there are millions or even billions of users with only their user data representing a multibillion-pound worth database with potential customers to many industries.

Thesis 3: Web 2.0 applications do not represent a new type of applications with a new set of functionality.

2.4. The Myth of User Participation

Getting volunteer labour for achieving a common goal (Bricklin, 2007; Tapscott and Williams, 2007) is a key phenomenon of open source software development. Web 2.0 lowers the barrier for users to participate as even non-experts and non-programmers can participate. Everybody can, for example, write an article on Wikipedia or publish a blog. Anybody can participate in testing "alpha sites" or submit requirements to new Web 2.0 sites. The hurdle to overcome for users to participate are very low and do not require expert knowledge.

However, there has to be a very strong motivation on the user side not only to make a user start participating but also to keep him or her participating. Taking all existing blogs (the "blogosphere") as an example, one can notice that a huge number of blogs being created every month worldwide (see, e.g., www.blogcensus.de for statistics on blogs in Germany), but there are no statistics available about how many are continued by their creators. Many people create their own blog because its simple and they can tell friends that they have their own blog. Despite some self-promoters or people making a business out of their blog, there is a high risk of people discontinuing their Blog because of a decreased interest in it.

In a clear contrast to the development of open source software, not only experts but anybody can participate as a user in Web 2.0 applications. If it comes to simple tasks such as "tagging of photographs", the task can be successfully completed by non-expert users. However, if more complicated tasks are to be done such as software testing or requirement specification, non-expert users soon reach their limits. This can be seen as a clear contrast to the development of open source software (OSS) such as Linux. Many experts and highly sophisticated developers participate in the development of OSS. With Web 2.0 anybody can participate thereby putting the "power of the masses" over qualification and quality assurance.

Another aspect of user participating is more related towards commercial offers. The question is if a company developing a commercial Web 2.0 web site really has an interest in letting users participate in one or another way. In other words: changing input to technical and/or non-technical activities and requirements over a long period of time hinders established processes or approaches for software development to be successful.

Thesis 4: Web 2.0 user participation is over-rated and mostly used as a marketing argument.

2.5. The Long Tail or How to Earn Money with Web 2.0

A number of different ways to make money on the Internet exist. For example, one can sell products or services via a web page, a web site may only provide access to registered users paying a membership fee or "banners" (graphical advertisements linked to its originator) as a part of an "affiliate program" (partner program for Internet marketing) may be placed on a web site. The very popular German online community Xing has announced in December 2007 to open its platform for advertising "partners". This means practically that an advertisement is displayed when a user views the profile of another user. After huge protests of Xing members (Heise, 2008), Xing plans to let users decide whether they want ads to be displayed with their profile or not. The same paradigm is used by the online video provider YouTube (www.youtube.com) which displays ads before starting to play a video.

A new paradigm for earning money with Web 2.0 is described as the "long trail" (Anderson, 2006). The "long tail" stands for a huge number of "virtual products" such as mp3 or video files that are offered to customers. In contrast to well-known markets in which consolidation takes place by means of suppliers (only few suppliers "survive" competition) and products (mainly major products are sold by major suppliers), niche products and niche markets ("the long tail" of economy) play, according to Anderson, an important role in Web business. He argues that this is due to the fact that additional "virtual products" do not impose proportionally higher costs. This may be the case for products such as mp3 files, video files, or software that can be downloaded from the Web. However, traditional businesses offering their products via a web site ("brick-and-click shops") cannot benefit from the "long tail". A car dealer will not offer all type of cars to customers and a furniture store will not offer thousands of products. The long tail only applies to a very limited number of businesses.

Another way of earning money on the Web is to start a Web 2.0 company, develop a new service, and sell it to a venture capitalist or go for an IPO (initial public offering). We have already mentioned Microsoft buying 1.6 per cent of facebook's shares (for a tremendously high amount of money as some analysts comment). The way the value of a start-up is measured stays intransparent. Some social software is measured by the number of active users, but this is only one possible measure for this. The current situation resembles in some aspects (e.g. extremely unorthodox valuation of businesses) the "dot-com bubble" around the year 2000 where many billion dollars were "burned" by investments in technology companies (Cassidy, 2002). In view of a current valuation of facebook of 15 billion dollars, analogies can easily be drawn.

The problem with many Web 2.0 communities is that they are still not profitable. An example for this is the German student community "StudiVZ" having more than four million users (www.studivz.com). From its start on StudiVZ has not earned any money. It was acquired by the German Holtzbrinck publisher group for 100 million Euros in 2007 and has even continued not to be profitable after its acquisition. A recent, nearly unnoticed change of StudiVZ's general terms and conditions (Fokus, 2007) was to bring the turnaround: user profiles should be used to generate profiles for user-specific advertisements. As users tend to fill-out their profiles in great detail,

this should enable StudiVZ to earn some money the old "Web 1.0-style" mentioned above. However, user participation in Web 2.0 communities in some cases can lead to different results: after a huge number of user protests and many people leaving StudiVZ, the concept has been weakened so that users feel more comfortable with it.

Thesis 5: Web 2.0 is lacking business concepts of how to transform user attraction into profit.

2.6. Web 2.0++ = Web 3.0?

Even if there no common agreement on the term "Web 2.0", there seems to be an agreement on the features of Web 3.0 (Wikipedia, 2007). This is due to the shortcomings of current information representation mechanisms on the Web, which is mainly human-readable, human-understandable, machine-readable, but not machine-understandable. A machine or software application cannot understand the semantics of, for example, a hyperlink on a web page. Does linking another web site express affirmation, refusal, or only linking a friend's web site?

The solution to this dilemma is semantic information making information machine-understandable. With this type of information, "software agents", i.e., human-independently acting applications can interpret semantic information on the Web, gather and compile information. This can, for example, be the search for a particular type of information ("the cheapest notebook at a trustworthy e-shop where many of my friends tend to buy") or a B2B business process in which catalogue information of machine parts is exchanged.

The standards for providing semantic information on the Web still exist, but have not been widely adopted yet. Standards such as the Resource Description Framework (RDF) (W3C, 2004) and its RDF Schema (W3C, 2004a) will provide semantic information allowing a "semantic tagging" of contents, a provision of machine-understandable information, and more powerful search mechanisms on information. The major concept being applied with these approaches is to create taxonomies and to make new terms semantically interpretable by assigning those to an existing grouping of well-known concepts/terms.

A step towards the "semantic Web" or "Web 3.0" is the application of microformats (Microformats, 2007). Microformats allow for the augmentation of web sites by community-standardised meta-tags and meta-data. This approach is very similar to the aforementioned taxonomy approach, however, it is not as powerful. The are microformats, for example, to specify a business card (hCard) or to specify a contact network (XHTML Friends Network, XFN). This means that the "taxonomy" in this case is defined by a standardisation, but new information cannot be integrated.

The augmentation of Web 1.0 and Web 2.0 sites with semantic information will provide a more powerful mechanisms of specifying information and for specifying and grouping information.

Thesis 6: Unlike the Web 2.0, the forthcoming Web 3.0 will bring new concepts and applications to the Web.

3. Conclusion and Outlook

The discussion whether a concept is new or not in some cases can change into a philosophical debate or a matter for patent attorneys. This is why we formulated our conclusions as theses we tried to underline by our findings. There are no "Web 2.0 technologies" as well there are no new forms of APIs or applications. Web 2.0 for those concepts solely forms a new "packaging". In some cases the discussion whether a feature is new or not may not be important. For example, a user may be able to use an AJAX-based word processor and store his documents on a server he does not know – but it is very unlikely that many users will do so.

User participation, a central concept of Web 2.0 sites, seems to be very limited for non-trivial tasks to be done. Turning the user into a publisher via the concept of blogs and having millions of people world-wide writing articles on their blogs does not say anything about the quality of information. The concept of microblogging even seem to form a perversion of the tendency of some people's desire to self-promotion. When looking at the entries of microblogs, it suggest itself that many of those are just as a result of boring work days and that employers should configure the filter rules of their firewalls more accurately. The current state of the Web 2.0 and commercial interest of all types of companies in it seems to resemble the state of the "dot com bubble" at its peak around the year 2000. Everybody wants to jump on the train since competitors have already done, but in many cases it is unclear how a success by means of user attraction can be transferred into a business success.

In our discussion above, we have targeted technical as well as business concepts of Web 2.0 and have found that many aspects or traits of the Web 2.0 and its applications are even overrated or exaggerated.

The Web 3.0 will bring urgently required new features and applications to the Web and will thus create a real added value to users and companies.

These developments further create an urgent need for new institutional forms that reflect 'relational' processes that challenge existing systems of governance and representational structures (Rossiter, 2006). The argument arises from the apparent inadequacy of modern institutions to respond to the impact of socio-technical networks. Emergent forms are radically dissimilar to the ways in which social relations are organized under what has been described as 'moribund technics' of modern institutions (Rossiter, 2006). These older forms are hierarchical and centralizing despite the rhetoric of apparent transparency, democracy and devolution. In contrast, emergent 'organized networks' are horizontal, collaborative and distributed and offer a distinct social dynamic and transformational potential.

It can further be envisaged that new social processes arise directly from the development toward the Web 3.0 and future network cultures that challenge some of the existing paradigms of shared control. Emergent "democratic" activity is somewhat demonstrated in the socio-technical dynamics of blogs or wikis. For instance, peer to peer networks allow for a distinct form of 'peer production' outside of the mainstream market structures and state influence (Benkler 2006; Tapscott and

Williams, 2007). Similarly, ‘peer production’ is non-hierarchical and represents an alternative to forms of production, one based on social networks. Organised networks represent relative institutional autonomy but not in isolation - they also need to operate tactically, engaging horizontal and vertical modes of interaction in recognition of their socio-technical architectures.

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