

# web 2.0 and the future of research: new tools for research networks

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This paper will discuss the use of social networks and of applications belonging to the so-called web 2.0 as tools for academic research. The paper is divided in two main sections: 1) what is web 2.0, and 2) which activities and tools might be considered as the most relevant in this context from the point of view of academic research. In this second and last section, my attention will be devoted, as the title of the paper suggests, mainly to social networks and to social network applications, and to the idea of research-oriented social networks.

## 1. What is web 2.0

The term 'web 2.0' has no single and definite meaning: It has rather a broad and somehow vague connotation. I dealt elsewhere with its history and scope<sup>1</sup>, and here I will just summarize the main features that, in my opinion, are at its core<sup>2</sup>. I will do that by proposing a rather dull list of eight key concepts, each of which followed by a short explanation. I do hope that at least some of them will acquire more substance in the second part of my paper, when I will deal with specific web applications.

1. **User Generated Content (UGC)**. In the early years of the web, content publishing was limited to people and institutions with access to a web server and with the skills required to build a HTML page and upload it. Content Management Systems (CMS), and most specifically blog-oriented, server-based CMS allowing users to easily write and publish their posts, were but the first step toward a new era: an era of easy content production and sharing. Tools and platforms for image sharing (such as Flickr or Picasa), video sharing (such as YouTube), audio sharing (such as podcasts) were further steps in the same direction. The new web is not just a tool for accessing

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<sup>1</sup> Roncaglia (2007).

<sup>2</sup> This discussion partially overlaps with the one included in Roncaglia (2009).

information produced by institutional entities and by power users: it is an environment in which every single user can publish and share self-produced content. UGC is the core of web 2.0, and most of its tools try to address the obvious problems of sheer volume, organization, classification, evaluation, selection, retrieval, social use and preservation of such a huge amount of information. In the field of academic research, UGC implies a shift in the direction of a strictly interconnected research community, oriented not only toward the individual production of research content, but also toward its active and collaborative dissemination and evaluation.

2. **Semantics.** The new web is so huge and complex that old-style directories or even plain text-search engines won't allow us to manage, search and retrieve information in an effective way. We need semantics in order to organize, classify and retrieve information. In adding semantics (i.e. metadata) to the new web, we are confronted with two quite different approaches: Formal, XML-based, well-structured ontologies are required in dealing with uniform, authoritative collections of information (archives, libraries, structured texts and corpora...), while informal, bottom-up social tagging might help in dealing with most of the user generated content. Tools allowing for an effective implementation and – whenever possible – integration of those two strategies will be an essential component of the new web, both in general and in the specific context of scientific research.
3. **Collaborative filtering.** In the new web, users have both the role of producing information and of using it. And their behaviors in selecting, sharing and using content are also information, that can be – and actually is – scrutinized and used. This raises obvious privacy concerns, but at the same time can be of invaluable help in the process of selecting information: by analyzing the behaviors of users 'similar' to us (and of course our own behavior), a web platform can suggest us books, music, films, news... Any user of Amazon knows how refined and effective those suggestions might get, if we allow the platform to gather enough information about us (profiling). But the use of collaborative filtering is of the utmost relevance also for academic research, where it implies new forms (and tools) of collaborative evaluation of research content, and offers an interesting alternative – or rather a useful supplement – to the traditional peer-review process.
4. **RSS Feeds.** The name is technical, but the idea is simple. The books I read – or rather the metadata describing them –, the music I listen to, the images I publish on Flickr or Picasa, the posts I publish on my blog, the short descriptions of what I am doing that I write on social networks such as Twitter or Facebook – in a word, any kind of reasonably uniform content being released over time – can be organized in structured feeds of information, that can freely flow and move from an application to another, from a web page to another. It is difficult to underestimate the importance of RSS feed for the new web. The very idea of gathering in a feed all kinds of different activities of a single user, and of sharing this feed with the user's friends, is at the core of social networks. Within Open Archives or within research-oriented social networks, RSS feed allows users to monitor the scientific production of individual researcher, but also to monitor new contributions to specific research fields, to easily

follow a discussion within a forum, or to automatically update lists of references or quotations.

5. **Embedding, syndication, reuse, mash-up.** RSS feed allows for an easy syndication (in its most common translation, RSS stands for Really Simple Syndication) and reuse of flows of information. However, even single pieces of information (an image, a video, an audio file) can be easily reused in different web pages. In web 1.0 we did this through links (only in the case of images it was easy – if not always legal – to incorporate in a page images taken from different pages on different web servers). In the new web, we have tools allowing for the direct embedding of all kinds of web content. This means that a web 2.0 page is not just a static, self-enclosed entity: it can be the result of collecting and aggregating content drawn from different web platforms, and ready to be ‘taken away’ and reused elsewhere, by ourselves or by other users. While web 1.0 was a restaurant based on fixed, pre-arranged menus, web 2.0 is a take away. And not just any take-away: one in which we might want to mix Chinese noodles with Indian Chicken Masala, Italian ice cream and French wine. The new web platforms must thus be able not just to talk to each other, but to actively exchange content, gathering and aggregating it (mash-up).
6. **Social networks** are the killing application of the new web. In generating content and sharing it, in exchanging messages and information, users establish relations among themselves and with the very information they produce and gather. Such relations – as well as real-life relations seeking a virtual counterpart in the new virtual environments – are in turn information, valuable information that we want to use and profit from (collaborative filtering being but one example of this process). Social networks are the tools of choice to collect, share and put to work that peculiar kind of information constituted by both user-to-user relations and user-to-content relations. This, of course, might be a rather abstract explanation of social networks – a more concrete one would describe them in terms of a collection of users’ profiles, each of which includes references to the network of ‘friends’ of that user, and might embed content (audio, video, news) that the user has either produced or selected. We will further discuss social networks in the third section of this paper, but I am quite confident that most of you are familiar enough with social networks such as Facebook to make sense even of this rather sketchy and abstract description, and to understand the special role that user-to-content (and even content-to-content) relations might have in the case of research content.
7. **Apps, WebApps, page interaction, Ajax.** The web was born as a tool for publishing content produced elsewhere, and not as a tool for actively interacting with and for producing and manipulating content. Accordingly, web browsers were simply clients used to request and receive information from a web server, not a sort of operating system capable of ‘running’ web based applications. However, we soon discovered that gathering and presenting information was not enough: we need interaction. The idea of web-based applications, embedded in web pages and ready to be used through our browser and inside its window, is another of the key element of the new web. And platform-based, web-aware applications (such as those offered – mostly for mobile devices – by the Apple or the Android markets) might well supplement purely web-

based applications, and/or effectively interact with them. Ajax is the new tool of choice in the field of web applications (and a remarkable improvement over the simple use of JavaScript, VBscript, ASP); this is not the place to discuss it, but it is useful to remember that – when asked about web 2.0 – a web programmer would probably mention Ajax as its main tool.

8. **Web design.** For most users, the expression ‘web 2.0’ has also a very visual connotation, made of large and colorful icons and of a simple design oriented to mainly visual rather than only verbal communication. We will not deal here with this aspect of the new web, but again it might be useful to mention it: web design is after all a central feature of any web page or site, and an effective communication with our users requires good, sound and usable web design.

### Social networks and research

There is no lack of statistics on the amazing penetration of social networks. According to Nielsen’s report “Global Faces and Networked Places” 2009,

Social Networking has been the global consumer phenomenon of 2008. Two-thirds of the world’s Internet population visit a social network or blogging site and the sector now accounts for almost 10% of all Internet time. ‘Member Communities’ has overtaken personal Email to become the world’s fourth most popular online sector after search, portals and PC software applications.

The story is consistent across the world, ‘Member Communities’ has taken a foothold in every major market from 50% of the online population in Switzerland and Germany to 80% in Brazil. Facebook has become the largest player on the global stage, dominant in many countries, yet localized offerings have won the day in many others.

However, the growth in popularity of social networks – and the resultant broadening audience – is only half the story. The staggering increase in the amount of time people are spending on these sites is changing the way people spend their time online and has ramifications for how people behave, share and interact within their normal daily lives.<sup>3</sup>

There is probably no need to say that such statistics are still more impressive when the focus is on the so-called ‘Generation Y’: as early as 2007, an astounding 96% of all American on-line population aged 9-17 was using social network tools<sup>4</sup>. Time spent on social networks is growing three times faster than the overall Internet rate, and the data concerning the most important social network<sup>5</sup>, Facebook, are still higher.

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<sup>3</sup> Nielsen Company (2009).

<sup>4</sup> Grunwald Associates National study; cf. <http://www.trendspotting.com/blog/?p=165>. The research does include e-mail among social network tools, but the impact of this should not be overestimated: Generation Y and Z consider e-mail as a tool of the past, and in 2009 Boston College stopped distributing e-mail addresses to incoming freshmen (<http://socialnomics.net/2009/08/11/statistics-show-social-media-is-bigger-than-you-think/>).

<sup>5</sup> While it is safe to consider Facebook as the biggest and most important social network on a global scale, it is not without competition: China’s QZone declares over 350 million users, with almost 200 million updating their account at least once a month. As of August 2009, Facebook declared more than 250 million active users, with more than 120 million logging on at least once each day, but in July 2010, just while I was revising this paper

Social networks, however, are not usually associated with research. I do think that such an association could and should be explored, and this from (at least) two different points of view: 1. as tools which can be used for web-based informal learning, and therefore as tools useful in the dissemination of the results of research activity, and 2. as tools which can offer us insights and models on how research-oriented social networks could be built (and of the kind of problems that should better be avoided). Both tasks, I think, can profit from three invaluable tools: RSS feeds, content embedding and social network applications.

But let's start from the very idea of social networks. In the early days of web 2.0, it was quite common to distinguish between relation-oriented social networks (such as MySpace), where the main aim is to build upon personal contacts and relations between users and to foster them, and content-oriented social networks (such as YouTube or Flickr), mainly devoted to host and share user generated content.

Facebook successfully challenged this idea. Born as a relation-oriented social network, it owes much of its success to the very tidy and effective implementation of a simple idea: the stuff of which personal relations are made of is information; therefore, implementing tools for sharing information and user generated content is a key element of the mission of a relation-oriented social network. The two models – relation oriented and content oriented social network – should (and did) collapse into a single one.

Embedding, feeds and WebApps are the tools used to reach this goal. Content embedding and RSS feeds have been dealt with in the first section of this paper: as we already know, they are both used to 'move' content (text, images, audio, video) from one site to another, allowing for content mash-up. From the point of view of a social network, this makes it possible to aggregate and embed in the page of a given user the streams of posts from the user's blog, her or his images from an image sharing platform such as Flickr or Picasa, her or his videos from a video sharing platform such as YouTube, and so on.

Let us try immediately to picture this process of aggregation from the point of view of a research oriented social network. In this exercise, we will start from a somehow simpler (and might be less interesting) task: the research-oriented *use* of existing social networks. I will use Facebook as social network of choice, because of its being both the most widely used and the most powerful in allowing content aggregation, but the same principles would apply to other social networks. A number of research projects already have a Facebook page. Unfortunately, most of them use their page just as a sort of place-holder: apparently, the message they intend to convey is just that of 'being there'.

This means that the Facebook page is not fulfilling its primary goal: aggregating and embedding information (both by means of web feed and by means of direct upload), and allowing for its reuse. The project might have a blog, or a web site powered by a RSS enabled content management system, or a content sharing platform that generates RSS feeds... why not using the page as an aggregator for such information?

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for publication, the company announced that the number of Facebook users worldwide had broken the 500 million mark, one out every 14 persons in the world.

Content selection and syndication, by the use of embedding and feeds, might thus be a first step in making the social network page of a research project a useful tool and not just a placeholder. And WebApps might be the second.

Most social networks – Facebook being again probably both the best known and the most useful example – allow for the free development and use of WebApps: small, interactive web applications that can be easily embedded in the user’s page. For sure, most WebApps could be considered, from our point of view, totally useless if not deplorably frivolous: virtual birthday gifts, vampire bites, and the like. However, a 10-minutes search within the thousands of available Facebook applications should be enough to discover way more interesting and useful tools.

Let us just browse through some interesting examples. My first pick – and this might surprise you – would be social reading applications. Before considering them, and trying to explain why they could be relevant for research-oriented social networks, let us briefly introduce the concept of web-based social reading and of social reading platforms. The idea is to allow users to build a personal bookshelf, in which it is possible to include (and differentiate) books that the user just owns, books she or he did actually read, books she or he is reading, and finally books that the user doesn’t own but would like to read. A book is represented by its cover image, allowing for very ‘visual’ bookshelves, and every book may be reviewed and rated by the user. Collaborative filtering is then applied to the data collected by the platform, thus generating both suggestions for new books to read (“among the users with bookshelves ‘close’ to yours in titles and ratings, such and such books, that are not in your bookshelf, are often included and highly rated. Therefore, you might like them too”), and suggestions of new users to connect with (those having bookshelves ‘close’ to yours). Forums to discuss books, feed RSS for each user’s bookshelf and links from every single book to on-line bookstores are usually included among the tools offered by social reading platforms.

At the moment, there are 6 or 7 players in the field of social reading platforms: the best known are Anobii, quite popular in Europe, Shelfari, bought by Amazon in August 2008, GoodReads, possibly the most features-packed<sup>6</sup>, LibraryThing, Living Social Books (aka Visual Bookshelf) and weRead (formerly iRead). All of them offer small Facebook applications, that allow the user to display the most recent readings or acquisitions in her or his Facebook page, and automatically add information on all the bookshelf-related activities to the user’s Facebook feed.

Visual Bookshelf (more than 900.000 monthly active users) and WeRead (almost 400.000 monthly active users) seem to be the applications of choice among Facebook members, GoodReads being the only other social reading Facebook application with more than 100.000 monthly active users.

My purpose here is not to review existing social reading applications or to compare their features, but rather to suggest that such applications could be of great interest from the point

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<sup>6</sup> Cf. <http://www.kenwohlrob.com/2009/02/goodbye-shelfari-library-thing-and.html>

of view of research-oriented social networks. For sure, most existing social reading platforms and applications are somehow 'bookseller-oriented': they promote discussions about books, in a context where the natural place to get the books that are discussed are on-line bookstores such as Amazon.com. There is little doubt on the fact that links to on-line bookstores are the main source of revenues for this kind of platforms.

But there is no reason at all why this kind of applications should be limited to typical 'bookseller's books': the idea could easily be applied to books within libraries and digital collections and to scientific papers on journals or proceedings. And scholarly books and articles are the stuff research is made of. A powerful, collaborative platform for social reading, discussing and annotating scholarly books and papers would be an invaluable help for the research community, and the inclusion of social reading tools within research-oriented repositories – such as most Open Archives – would be a first step in this direction.

How should such a platform be organized? My idea is something similar to existing social reading applications, but focused on academic books and papers, with the added ability to interoperate with open archives, offering Zotero-like tools for in-browser documents and citations management, strong annotation tools, and sort of Google-wave tools for discussion within small-size and medium-size research communities. And it should be possible to use such tools from within research-oriented social networks such as ResearchGATE or Academia.edu, but also from within 'general-purpose' social networks such as Facebook.

Do we have something similar? Well, not yet, but there are four tools that – I think – can give us hints in the right direction. Or rather: each of them hints to something that could or should be developed and integrated within research-oriented social network tools. The four tools I am thinking about are a Facebook application named Digital Text 2.0<sup>7</sup>, a Browser application such as Zotero, a research-oriented social network such as Academia.edu (but also other research-oriented social networks, such as ResearchGATE, could and should be taken into account; for a discussion of different research-oriented social networks and web applications cf. Codina 2009) and a history-oriented social network such as Footnote. I will not discuss here Zotero – I assume that most of you are familiar with it – nor will I discuss Footnote, a platform that, as far as I know, has raised many criticisms within professional historians, but which from my point of view has many interesting features, first of all easy and effective tools for sharing and annotating documents. And has tools for integration with Facebook: a Facebook application called iRemember<sup>8</sup>, which allows users to search and share from within Facebook historical documents and documents related to their family history. But, again, I assume that most of you know about this. Probably most of you know about Academia.edu or about ResearchGATE as well: they are both research-oriented social network with capabilities of document management somehow similar to an Open Archive (unfortunately – as far as I know – still without support for OAI-PMH), but with a stronger emphasis on the social and collaborative aspect of research, allowing for exchange of news and information,

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<sup>7</sup> <http://dtext2.org/main/welcome>; cf. also Rodgers, J., Sinclair S. (2008).

<sup>8</sup> <http://www.facebook.com/apps/application.php?id=58547631756&ref=search>

comments and discussions. The Academia.edu project has been started by dr. Richard Price of Oxford University, who describes the platform in the following terms:

It shows academics around the world structured in a 'tree' format, displayed according to their departmental and institutional affiliations, ... [and] enables academics to see news on the latest research in their area – the latest people, papers and talks.<sup>9</sup>

Digital Texts 2.0 is probably less well known: it is a Facebook application that “helps you to organize and share your digital texts. You can group your texts into collections, associate them with authors, assign tags and other useful metadata, and add your notes and comments. You can also join groups, see what your friends are reading, and share your texts and annotations.”<sup>10</sup>

I do not know how or when we will be able to actually boost our research by using in a widespread and standardized way a new generation of research-oriented social networks and social network tools, but of one thing I am pretty sure: they are not too far away. While waiting for them, and whenever possible collaborating in their development, I think that the research and scholarly community should not fear or avoid 'general purpose' social networks. On the contrary, I think that we should be active and full-fledged agents in this field.

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<sup>9</sup> Quotation from <http://inthelibrarywiththeleadpipe.org/2008/social-networking-with-a-brain-a-critical-review-of-academic-sites/>. The same page, from Kim Leeder, discusses some further research oriented social networks or tools such as Pronetos, Labmeeting, Epernicus, BibApp, which are less interesting from our point of view here.

<sup>10</sup> From the home page of the application, at <http://dtext2.org/main/welcome>