Research 2.0: A Framework for Qualitative and Quantitative Research in Web 2.0 Environments

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Abstract
The paper explores the potential of the Web 2.0 environment for conducting both qualitative and quantitative research. The paper analyzes the emerging Research 2.0 domain using the theoretical framework of Web 2.0 core principles (e.g., web as a platform, harnessing collective intelligence, etc.). These principles, first proposed by Tim O’Reilly, provide a useful lens through which researchers can examine the potential for Web 2.0 technologies in shaping the next generation of research methodologies. To this end, the paper examines how these principles would apply to the research domain, how traditional methodologies used in qualitative and quantitative research can be applied within a Web 2.0 environment, and the challenges and issues that researchers may face in a Research 2.0 domain. The paper identifies key research issues that need to be explored to fully realize the potential of Web 2.0 technologies in conducting qualitative and quantitative research.

1. Introduction
Web 2.0 technologies (including social networking sites and other interactive, user-driven tools) have created a new environment of participation and collaboration for users and scholars. Users in the Web 2.0 environment are creating new content, tools and technologies in collaboration with other individuals, world-wide. A large number of studies have been conducted to understand how online communities (including social networks) form and evolve, how members communicate in computer-mediated environments, the benefits of community membership, and other related topics. However, few studies examine the potential of Web 2.0 technologies and virtual worlds for advancing theory, method and methodology in the design and implementation of qualitative and quantitative research. Studies of research practice, including ethical and legal implications of conducting research in virtual environments, are needed to facilitate innovative and appropriate use of these new technologies for social research.

The Web 2.0 environment offers many new opportunities for researchers undertaking both qualitative and quantitative research. Researchers can use Web 2.0 tools to enhance their approaches to data collection, engage users in their research process (e.g., research work done by [1], [2], [3], [4] and [5]), facilitate research collaboration between project team members to analyze data and write papers, etc. Indeed, many companies are now making use of Web 2.0 technologies to engage with consumers. For example, there is increased potential for collecting data from online communities; in the UK, car rental company Avis has started using blogs to collect qualitative-type data by asking site users to “to share your experiences, tips for other travellers, feedback and questions.” The company uses consumers’ data to understand their needs and to improve customer service.

This paper explores how the theoretical framework of Web 2.0 core principles (proposed by Tim O’Reilly) can be applied in the research domain. The paper also explores how traditional tools and techniques used in qualitative and quantitative research can fit a Web 2.0 framework, as well as the pitfalls that researchers may encounter when engaging in this work. In the next section, the paper discusses literature on the key concepts of Web 2.0 and Research 2.0, by way of introduction to these topics.

2. Web 2.0: A Review of the Literature
There are many definitions of Web 2.0; however, the common elements in most of these are that it takes place on the internet, it is not limited to a single software product, it is open and shared, and users provide content and add value [6]. Tim O’Reilly (2005) first defined Web 2.0, in what remains the most cited definition: “Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications
...through an ‘architecture of participation’... deliver rich user experiences”” [8].

Web 2.0 is about social publishing and not just developing Web pages. It has lowered the barrier for many users to contribute to web content and created an environment for collaboration, openness and a direct flow of information among users [7]. In the literature a large number of Web 2.0 tools and technologies such as blogs, wikis, social bookmarking, social networking, podcasting, image and video sharing, RSS (Really Simple Syndication or Rich Site Summary) feeds, Internet virtual worlds (e.g., Second life), and content aggregators (e.g., Mashup) have been identified [6][8]. The use of these tools has redefined the original Web into what is now referred to as ‘Web 2.0’ due to their ability to promote and support user participation in content development, rarely seen in earlier versions of the Web and online discourse. Originally, web content was created by web designers, programmers, administrators and other knowledge ‘gatekeepers,’ whose goal was to bring information to the public through internet technologies. Typically, this content was very text-heavy, presented on brochure-style webpages [8]. User feedback and input (where allowed, at all), was through email exchange, web forms, or other asynchronous mechanisms. With the development of Web 2.0 technologies, users can take the lead in content development. Users can tag and share favourite resources, or create an avatar that can chat online in a virtual environment with other individuals, around the world. These technologies have not only changed how individuals engage online for leisure activities (e.g., through World of Warcraft and other, interactive online games), for education (e.g., university classes in Second Life), but also hold great promise for the ways researchers engage with participants. Although researchers have used online technologies for many years (e.g., using SurveyMonkey to implement online questionnaires, or conducting email interviews) [1][9], the possibility of Web 2.0 to reshape the research landscape is an important, emergent area of investigation. The next section provides background on the development of online research practices.

3. Research on the Web: An Overview

There is a huge body of literature on computer mediated communication (CMC) (e.g., [10][11]) and its use in undertaking both qualitative and quantitative research. The primary focus of these projects was to understand the use of different communication media (both synchronous and asynchronous techniques), such as email, listservs, instant messaging and Internet relay chat (IRC) chat in undertaking research. Online synchronous and asynchronous interviews and virtual focus groups are three primary categories of Internet-based qualitative research methods identified in one study on using email for qualitative research; here, key steps and issues were noted, such as sending invitations, writing subject lines, self-disclosures, interview processes, ethics and informed consent, deadlines and sending reminders – all things to be taken into account in the design of the project [12].

A literature review completed by another author [13] presented interesting insight into the work of a number of key researchers who have engaged in online research; the work of Hewson (2003), Mann and Stewart (2000), Best et al., (2001), Coomber (1997), Dillman (2000), Solomon (2001), Beck (2005), Liiampputong and Ezzy (2005) and others were highlighted for their contributions in advancing theories for conducting research in cyberspace and the use of CMC in research. This author [13] argued that the Web provides exciting and new opportunities for conducting research but that the possibilities and issues in “are relatively unexplored”. Quantitative researchers have used the Internet extensively but qualitative researchers have been slower in making use of web technologies, in part due to limitations in the human-to-human connection points offered by many Web 1.0 technologies. Today, however, there is huge potential to exploit this medium, given advances in Web 2.0 technologies; for example, “blogs offer substantial benefits for social scientific research providing similar, but far more extensive opportunities than their ‘offline’ parallel of qualitative diary research” [13]. Recently, a large number of agencies undertaking qualitative studies are working to exploit the potential of online forums in unison with traditional focus groups [14].

Some of the current literature focuses on Web 2.0 as a research environment, including what separates this emerging domain from CMC and other traditional approaches to qualitative and quantitative research in cyberspace; this distinction is known as the “architecture of participation” [8]. In this new domain there is an inclusive approach of encouraging users to be creators of data [15], tools and techniques, and co-researchers for data analysis, writing, etc.

Some authors (e.g., [9] and [16]) have identified trends relevant to online research, such as the growth of the open source movement, the emergence of collaborative tools and social media, the explosion of online social networks, and the importance of data gathering from multiple sources, all of which have a bearing on the practice of conducting qualitative and quantitative research online. Similarly, advances in Internet-based communication caused paper-based surveys (i.e., often called offline surveys) to move to the online environment; services such as
SurveyMonkey and Zoomerang have been instrumental in the rise of online questionnaires [9]. This evolution was considered the first phase of online research, which was “all about representation and the growth of the online panels.” [9]. Now, Web 2.0 is leading us into the second phase of online research and creating a new age for market research where traditional rules for conducting research are expected to be challenged [9]; i.e., “the old models of doing research from a top-down authoritarian approach are beginning to be challenged” [17]. This author also argued that the use of “online research communities are now becoming an established research method” [17] and presented a users’ guide by identifying the stages for developing successful online research communities. However, one of the surprising results from this study was that participant recruitment ‘take-up’ rates were lower than expected (i.e., the research team received a third of the normal survey response rate). This is important as the response rate could be lower still in cases where the moderator is specifically looking for particular personality or demographic traits.

Different data collection tools in Web 2.0 have also been identified and categorized into a framework based on the traditional research model of primary and secondary data sources [18]. Primary research tools in Web 2.0 are those “platforms which are purposefully set up for specific research objective” and secondary tools are those “online platforms that are not explicitly meant for research but can provide access to information or research participant” [18]. The operationalization of these constructs is drawn primarily from traditional definitions of primary and secondary sources of data. In addition the authors also identified a few interesting primary research tools which they call plug-ins (e.g., visual user tagging, after survey comment tools, etc.).

A number of authors [9], [12], [13], [14], [16], [17], [18] and [19] have identified a few advantages of conducting research in an online environment, including the Web 2.0 domain; these include: low-cost data collection; instantaneous, large amounts of publicly available data; efficient time for data collection; and, lowered geographical barriers, which involve more participants from a range of geographical contexts. However, there are a few disadvantages that have been identified in terms of engagement in the online environment; these include: lack of facial expressions and paralinguistic cues; extended time frame of user engagement in data collection; and, interruptions, such as work place interruptions [20].

Currently, the concept of ‘Research 2.0’ is a focus for scholars as they attempt to demystify this domain; often, this literature addresses the mechanics of techniques and strategies for conducting research in Web 2.0 environments. This is evident from the fact that there was a special issue on Web 2.0 in the International Journal of Market Research, for example. However, there is limited discussion in the literature that focuses on analyzing this new research context or exploring the theoretical frameworks that might help researchers to develop scholarly practices for these environments. Connecting the principles of Web 2.0 to Research 2.0 is an important first step in that process, which is the focus of the sections that follow. It is vital to examine how the framework and principles of Web 2.0 affect research designs, including how Web 2.0 is changing traditional modes of research. These changes include the use of different tools for analysis of the collected data, as well as different approaches to research ethics. The Web 2.0 framework proposed by Tim O’Reilly [8], (to be discussed in later sections of this paper) will help in decoding the Web 2.0 environment for its applicability to the research domain.

4. Research 2.0 in Web 2.0 Framework

Different professional domains, such as organizations in Business and Library and Information Studies are making efforts to develop their own 2.0 frameworks. For example, one author [6] proposed the concept of ‘Library 2.0’ using the Web 2.0 framework and identified ways of increasing patrons’ participation and the integration of Web 2.0 tools and technologies (such as blogs, tagging, wikis, etc.) in the traditional online library domain. Another author [21] discussed the use of major Web 2.0 tools and technologies in an online retail domain.

In this paper we define and develop the concept of Research 2.0 by drawing parallel links with Web 2.0 definitions by applying the Web 2.0 principles put forward by O’Reilly [8]. Certainly, it might be revisited in future after extensive discourse and critical evaluation by members of the research community; however, this approach will give scholars (across disciplines) a lens through which to view their approaches to research, particularly to ask key questions in the development of qualitative and quantitative research practices. In the next section, the analysis of different principles of Web 2.0 and their applicability in the Research 2.0 domain is presented.

4.1. The Web as a Research Platform

O’Reilly [8] proposed that software in the Web 2.0 environment would be delivered over the web and run in a web browser; in this way, it would not be required to run on individual computers, changing the standard
platform used by individuals world-wide to a purely web-based platform. Rather than buying a word processing software (e.g., Microsoft Word), individuals would use software hosted on the web and save their work in this virtual environment.

In drawing a parallel for the Research 2.0 environment, this concept might be called The Web as a Research Platform. Here, data can be gathered, stored, analyzed and disseminated purely in an online environment. Indeed, all phases of the research (e.g., participant recruitment; research team meetings; etc.) could happen in the web environment. The researcher would not need to purchase or use separate programs or tools that might need to run on different computers to conduct the study. For example, at present, many qualitative analysis software packages (e.g., NVivo) are designed for single-use, stand-alone computing; however, the Web 2.0 environment offers new tools, such as University of Pittsburgh’s ‘Coding Analysis Toolkit’ (available at http://cat.ucsur.pitt.edu/), which can be used online by multiple users in multiple locations. Using traditional tools, projects involving many researchers and research assistants must purchase equipment and software (and find space for these systems), so that data can be accessed by all. This can be problematic, in particular, for research conducted across institutions, as only some members of the team may have access to the data files for analysis and writing. Similarly, in using a focus group method (for example), the moderator of the session and the participants of the research would be able to interact in a Web 2.0 environment in very different and enriching ways than is currently possible; by using tools such as Wikis to engage with participants, researchers can extend product reviews, website analyses, and open discussions to include more interactive approaches to the method. Indeed, these same tools can also be used by the research team, to foster dialogue between researchers and assistants and to bridge any geographical gaps that may, typically, complicate the research design process.

In the Research 2.0 world, then, all research stages would be executed within the web in a participatory environment. Web tools such as wikis, blogs, forums, multimedia applications and RSS feeds would help the team to conduct the study in the Web. For example, [5] used blogs with cancer related content to identify users and to invite them to participate in an online survey on using blogs among cancer blog users. The data collected from the study would be stored in a ‘data cloud’ and cloud computing would be used to process the data [22][3] (i.e., the tools and software provided by services such as Amazon Web Services (AWS) could be used for data analysis). Tools to manipulate and analyze qualitative and quantitative data would be part of the web environment. For example, a product like the gapminder software (www.gapminders.com), which provides visualization tools could be used to enrich data analysis. Similarly, tools provided by a company like Google (e.g., Google Analytics) could be used to analyze website data and generate custom reports, including the segmentation of web page visits by dimensions such as location, time of visit and referral sites.

Certainly, this vision of a web-based research environment raises a number of key concerns and questions. Stability of data archived on a remote server (as opposed to a researcher’s local computer or network) may be one issue. Similarly, involving a corporate client as the host of the data gathered in publicly-funded studies (especially given the cost of such services), may put this type of research out of reach of many scholars, particularly those in developing countries. These issues can also be problematic given the different laws and regulations governing access to information across international borders (e.g., the U.S. Patriot Act), which may also have implications for one’s local research ethics processes. These are just a few of the issues that researchers must consider in choosing to house their data online, particularly in other jurisdictions.

4.2. Harnessing Collective Participation – the Promise of Crowdsourcing

O’Reilly [8] has also argued that “the network effects from user contributions are the key to market dominance in the Web 2.0 era”. The key element of Web 2.0 is “turning the Web into a kind of global brain” where product developers can harness collective intelligence. In this context, the Zipfian distribution of the long tail [23] can apply to the Web 2.0 environment (i.e., where a small number of users are contributing to a large amount of new data); however, given the global reach of these technologies, the scale of the end result can be impressive. Wikipedia, for example, has become a notable phenomenon, despite the relatively small number of contributors [6]. Similarly, the Open Source Software (OSS) movement has been at the forefront of developing tools using a “bazaar” (or crowdsourcing) model [24], where users are co-developers in the project. One of the key characteristics of the bazaar-style model is that it has a decentralized and strong peer review system in place. Some authors [16] have identified this as one of the key trends in the Web 2.0 environment and argued that it can lead to new tool development.

In drawing a parallel for the Research 2.0 environment, researchers should consider ‘crowdsourcing’ as a mechanism for user involvement
in research projects. Crowdsourcing, was defined as “the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call” [25]. Its use in business contexts is notable, in particular, as a way to encourage consumers to comment on a product and share their views with friends, family or strangers.

Research 2.0 projects can harness collective participation by using crowdsourcing not only for data generation but also for data analysis and writing. For example, researchers could use crowd opinions for different steps of the research process like [3], who adopted a crowdsourcing strategy in their research work to make relevance judgments for each query-result pair by using online users drawn from a large community. Consumers, for example, are tagging their own content in Hewlett Packard’s ‘Community Wiki Discussion Forum.’ In qualitative research projects these techniques could be used for participant member checking or for inter-coder reliability checks; in quantitative projects, researchers could use these techniques to pilot a questionnaire prior to distribution or to beta test an experimental web interface.

Web 2.0 technologies can allow researchers to situate individuals at the core of new research approaches; in this way, “this new world is defined by the concept of engagement” and this new environment can create opportunities for researchers “to engage with the population and begin to co-create the data” for better insight [15][26].

In addition to creating research projects that use Web 2.0 technologies to engage participants in new and different ways, researchers can also make use of other user-created web content as sources of data. Some authors [27] have argued that Web tools such as blogs allow large numbers of users to add content on the web that can be used by different stakeholders; it is important for researchers to recognize that they have a place within this framework, as well. The ease of generating content using blogs has also brought a change in discourse among participants. Earlier tools and technologies, such as email and instant messaging, had the limitation of “dialogue by invitation,” where researchers invited individuals to complete a questionnaire or participate in an email interview. With Web 2.0 technologies, users need not wait for researchers to engage them in conversation; individuals can create their own blogs or choose to invite researchers into their realms, to discuss issues of interest to them. One author [27] noted that “a significant use of blogs is as a publicly exposed, online diary describing both real-world and web based experiences. Bloggers frequently read each other’s postings, and the phenomenon of listing and commenting on information found through a user’s online exploration is common”. Researchers need to consider these new, emergent conversations and communities in designing and implementing projects; by tapping into users’ online spaces and engaging with them in new ways, researchers can move their projects to the next level of interactivity in the research context.

In order to be effective in implementing a Research 2.0 project, researchers must consider their roles as moderators in managing user involvement in the research tasks. The quality of the crowdsourcing experience (for everyone involved), depends on the process and technologies used to encourage engagement. The research plan itself, including shaping the research questions, conducting a pilot study, evaluating a methodological design, identifying the target market for the project, and implementing the research, would be supported by the active involvement of users. For example, traditionally, market researchers conducted online polls to identify the ‘best product’ from a suite of products; in Web 2.0, users are designing their own polls to identify the best product on websites like kaboodle.com and zebo.com. Researchers could make use of these types of techniques to obtain participants’ feedback.

Wikis would be an interesting tool to use in the design phase, to foster appropriate engagement between researchers and participants. Wikis could be used to create a research document, for example, a frequently answered questions (FAQ) about the research plan and methodology. The document can be started by the researcher-moderator, but community members (i.e., researchers and participants) can edit and add new content. This would not only bring transparency to “who did the editing, when it was done, and why it what was done, along with any comments” [19], but also allow for the temporal aspect of the changes to be stored (or restored to an older version).

Of course, the use of crowdsourcing in a Research 2.0 environment is not without its limitations. Individuals participating in these projects may fall into certain (typically high) socio-economic and educational demographics. Projects targeting participants who are not as ‘wired’ or ‘web savvy’ as Web 2.0 technologies require will be excluded from these projects. Although this may be appropriate for some projects (e.g., qualitative research using purposive sampling of the types of individuals engaged in Web 2.0), without adversely affecting data credibility and confirmability, those projects that require random samples (e.g., quantitative or experimental designs) must adjust the Research 2.0 project plan to ensure data validity and reliability.

Another issue relates to research ethics, particularly in the areas of informed consent, confidentiality, and
privacy. As individuals may post images of themselves or reveal personal details in a blog (for example), researchers must take great care with the ethics review process, to ensure that appropriate steps are taken to inform participants of their rights. Where interview transcripts and diaries were typically closed (private) documents, between researcher and participant, in traditional research projects, Web 2.0 tools can be very public. Participants must understand the implications of engaging in online research in public forums, prior to answering a researcher’s (or another participant’s) call for commentary. Even where forums are closed to researchers and participants, only, there may be the potential for participant-to-participant breaches of privacy and confidentiality. Researchers must create and maintain a safe environment for everyone.

Finally, another consideration involves ownership of data and authorship of findings. Researchers must determine (and discuss with participants, in advance) restrictions on the output and dissemination of these types of projects. For example, will participants be co-authors of final research reports, book or articles (or is that even possible, with dozens of crowdsourced participants)? What data will be made public and what will remain private, particularly given concerns over intellectual property rights and copyright of material? These are just a few of the questions researchers must ask in designing Research 2.0 projects.

4.3. Data 2.0 in the Web Cloud

O’Reilly [8] argued that “every significant internet application to date has been backed by a specialized database: Google’s web crawl, Amazon’s database of products among others, all demonstrate that database Management is a core competency of Web 2.0 companies”. These companies provide valuable services to users of Web 2.0 technologies using these databases; for example, Amazon.com uses user-generated data (such as book reviews and product reviews) to provide insight into the product quality and to enhance user experiences with their retail website. Some sites also track user preferences over time, so an individual returning to a site is guided to new products or asked to purchase items they had viewed previously.

In a Research 2.0 environment, this concept might best be referred to as ‘Data 2.0,’ where a specialized database that stores Web 2.0 data (e.g., blog data, temporal data of wikis, social tagging data, etc.) would be primary data sources [18], created especially for research purposes, only in a web environment. This data could be used by researchers at anytime; and, the data would continually regenerate as the website, itself, is used by individuals coming to the site. For example, [1] used discussion threads, audio, video and images of musicians and bands available on MySpace and Facebook social networking sites to analyze the South Asian music scene and [4] analyzed blogs “using semantic network analysis and content analysis methods to ascertain what bloggers were communicating about their travel experiences”.

The availability of data in a web ‘cloud’ highlights one significant issue in the process of data collection in online environments. In research projects, particularly those conducted by university scholars, in hospitals, and in other environments with established ethics review processes, researchers must undertake ethics approval prior to conducting research. However, the public nature of the web, and the mix of private vs. public online forums, has made it complex (in some circumstances) to identify which data are in the public domain (and therefore not needing ethics review) and which are private. For example, a researcher may conduct a study that examines public blog postings without needing ethics review (i.e., akin to studying letters written to the editor of a newspaper). However, data collection of postings to a private chat room, where participants must register for membership, are considered private materials, which would require ethics reviews. Even in a public space, if a researcher engages actively with other content creators, this would require ethics review. Whether researchers need the consent of content creators to include those comments in a dataset will depend on the context of the particular study (see [11], [28], and [29], for discussions of this complex issue).

In Research 2.0, one of the most powerful, emerging trends is the end of spatial and temporal barriers to conducting research. Researchers are now able to involve participants who are not only geographically dispersed but also socially separated from the researchers (Hessler et al., 2003; Mann and Stewart, 2000 as presented by [13]). Although some researchers travel great distances in traditional projects, to conduct research in other countries or to gather data from multiple jurisdictions, the Web 2.0 environment can facilitate a broader international reach at much less cost. The time, money and other potential savings may radically alter researchers’ approaches to their work [14]. Another aspect of the removal of spatial and temporal barriers is that this will benefit longitudinal studies, as the archiving systems of Web 2.0 tools can store data organized by date in the cloud, for future use. Indeed, archived data from sources such as blogs and YouTube could support the examination and analysis of the emergence of new social practices and cultures over time. For example, [2] used YouTube videos to analyze the emergence of cultures related to pregnancy and birth. Thus the “qualities of practicality and capacity to shed light on social processes across
space and time, together with their insight into everyday life, combine to make blogs a valid addition to the qualitative researcher’s toolkit” [13].

4.4. Perpetual Beta = Perpetual Data

O’Reilly [8] also noted that in this new era, the creation of products is always in ‘Perpetual Beta’ (i.e., there is no final product release; instead, there is a continuous update of the software and release of newer versions). As users evaluate each new version and give feedback on its features, changes and additions are made to the product and the next version is released.

In Research 2.0, this parallels what we would call **Perpetual Data**, or the notion of a never-ending stream of data gathered throughout the research cycle. Data collection is a central step in research; and, typically, this phase in the project is quite discrete in nature, beginning and ending with the posting of a questionnaire or recruitment of interview participants. However, in a Research 2.0 environment, where individuals are involved in the design and execution of the project, data gathering is continuous in nature (i.e., data collection continues, in perpetuity). Although this may be a new way of working for many quantitative and qualitative researchers, this practice does mirror some qualitative approaches (e.g., ethnography), where the researcher lives in a community for many weeks to many years, gathering data in a very continuous way. Similarly, some randomized control trials (e.g., studies of new medications) may involve ongoing monitoring of patients involved in a new drug regime.

However, for researchers who typically engage in more contained, discrete projects (such as paper questionnaires or in-person focus groups), the ongoing nature of data collection in the Web 2.0 environment may be quite a shift from traditional data gathering practices. Where users may only engage with the researcher at the point of completing the survey or sitting in an interview room in traditional projects, users in the Web 2.0 environment may continue the dialogue long past traditional timeframes (e.g. posting to a research blog weeks after the first call for participation). Similarly, where participants in traditional studies may have had no or little contact with one another, Web 2.0 technologies allow for threads of discussion to be followed and commented on by many subsequent participants – with the original participants having the chance to add to their first contributions.

For example, it is estimated that every minute, ten hours of video clips are uploaded on YouTube (www.youtube.com/t/fact_sheet). This site, alone, would be a valuable resource for data gathering and analysis of video data; however, it also highlights the challenge, for researchers, in containing the scale of Web 2.0 projects. This type of continuous, iterative, and non-linear data collection can enrich the data collection process (and enrich participants’ experiences of the research itself), but also reshapes the ways that researchers engage with data sources. In Research 2.0, researchers will experience the ‘problem of plenty’ and the ‘problem of perpetuity’ and will need to make judgments about when adequate data are collected and when further user contributions will not be considered. However, the positive side here is that the research can be an ongoing process and analyses can be done both incrementally (i.e., on periodic data) and in-totality (i.e., on a whole data set).

The additional benefit that the problem of perpetuity presents is the “real-time feedback” [19] that researchers can gain from participants. This is in contrast to traditional methods where there may be some lag time in participant-researcher contact; similarly, data collection in traditional approaches is often not as concurrent (or real time) as in Research 2.0. RSS tools could also be widely used to monitor the real-time updates of the content added by users; this would reduce the burden on researchers to check for new updates or comments posted by participants.

4.5. Research Mashup Model

O’Reilly [8] suggested that there should be simple standards for Web 2.0 so that systems could be combined into a new creation. The aim is to syndicate and not coordinate (i.e., allow others to use the data without worrying about what will happen at the other users’ end). This approach makes it easy for other users to mix the codes and content to create new results, which are often referred to as Mashups [6].

In Research 2.0, this concept might be termed a **Research Mashup Model**. The data collected from blogs, wikis or forums can be mixed with other content to conduct research. In qualitative research, this would be similar to the concept of triangulation, where data from various sources (often using different methods) are combined to provide holistic perspectives on phenomena. For example, in a Research 2.0 project, a researcher might ‘mash’ the following types of data: a) using participants’ location information with Google maps and analyzing their posted comments to look for the emergence of any regional phenomena; b) using mobile location-based data and mixing with a map application programming interface to analyze participants’ buying location and behavior; c) using RSS feeds to extract data from different sources (e.g., blogs of different social shopping websites) and mixing the contents (using, say, discourse analysis) to provide in-depth understanding of consumers’ mindset and
their behavior on social shopping websites. One author has [15] presented other interesting examples: “how consumers ‘tag’ their photos on Flickr.com; what videos they post on YouTube.com; their favourite websites on del.icio.us; what content they choose to post and rate on digg.com, or how they describe themselves and their favourite things in their MySpace profile. This new type of data allows us to go beyond the traditional models created using group discussions and cluster analysis, and look at the ways that the population is building its own world and how it is referencing it via the ‘folksonomy’ that it is using, rather than through our labels”. This would provide more insight about the consumers than data from just one source; similarly, participants would engage with researchers using their own language and in their own ways of presenting data.

4.6. Research Beyond a Single Device

O’Reilly [8] proposed that in Web 2.0, software applications would not be limited to a single device; so, the software gap between computers and other devices needs to be bridged. O’Reilly cited Dave Stutz (ex-Microsoft Developer), who noted that “useful software written above the level of the single device will command high margin for a long time to come”.

In a Research 2.0 environment, this concept would be expressed as Research Beyond a Single Device. Traditionally, although researchers have used different devices in their projects (such as voice recorders, video recorders and cameras in qualitative research), these tools are often used separately. Data are gathered, transcribed and analyzed from each source, independently; and, the use of these specific tools is driven by the objective of the project, with choices about modes of working driven by financial and other constraints. Although data analysis may involve the exploration of themes across data types, there are few opportunities to layer the results of each data source. In quantitative studies, too, projects may involve a single data gathering tool (e.g., SurveyMonkey) that gathers data into a single analysis package (e.g., SPSS), with little opportunity to export results to different packages for different types of analyses (e.g., to map the data in a Geographic Information System).

In a Web 2.0 environment, different data types are more integrated and available for collection at the same place and time. For example, in a blog the researcher will not only encounter text data but will also find videos, photos and audio alongside the textual data. All the different formats are well integrated in the new environment because browsers are able to support different applications for data types in the same environment. Although these various types of data can enrich the data set, the presence of these different data types (e.g., diary entries, YouTube videos, podcasts and Flickr photos in a single blog posting), can also present challenges to the researcher because all of the data may need to be taken into account when analyzing a participant’s opinions or experiences. For example, in analyzing a blog posting, a researcher may need to also review a video clip that is referred to in the blog; or analyze photos that the participant mentions. Thus different data types are interlinked to one observation. Hence to conduct Research 2.0 data collection and processing devices (post-collection) would now have to be linked by a single device; in effect, the device should be able to handle multimedia applications irrespective of platform. In Research 2.0, the data could then be interlinked with different data formats. Researchers should be able to connect seamlessly to the database on the Internet with any type of device and be able to view different data formats in a single device. For example, Apple’s iTouch is a device that supports not only the ability to handle different data formats within the same device, but can also support Internet applications such as YouTube.

Of course, for this type of integration to be possible, researchers must have access to server space, computer equipment, and backup provisions; and, they must also be skilled in and have support for the latest technologies. These technological innovations may require additional grant funding, not just to support the technological infrastructure but to hire research assistants to download, store and analyze the data. At the same time, many analysis tools are designed for traditional sources (e.g., questionnaire data or interview transcripts), lacking the ability to support multimedia data. Transana, Atlas.ti, and other packages are available for this type of research, particularly for the results of qualitative projects. However, additional innovations must follow in data analysis techniques to support this new data landscape.

It is also worth noting that while new online journals are embracing multimedia dissemination and encouraging authors to submit audio and video data files to appear alongside traditional (text-only) journal articles (e.g., The International Journal of Qualitative Methods), many journals are still very print-based. The dissemination landscape will also need to evolve to support innovations in data collection and analysis.

4.7. The Participatory Research Experience

O’Reilly [8] also argued that “companies that succeed will create applications that learn from their users, using an architecture of participation to build a commanding advantage not just in the software interface, but in the richness of the shared data”.

In Research 2.0, this might best be termed the **Participatory Research Experience**; in this environment, research projects would be enhanced by participants’ direct experience in different phases of the research. Research projects of this type would be required to adopt a participatory approach (similar to participatory design approaches used in developing software applications); as one author noted, to “engage participants fully, research communities have to rely on an integrative set of research tools, such as multimedia uploads, drawing boards, polls, chats, blogs or online group sessions” [18] to integrate and enhance participants’ role in the research project.

Although participatory design approaches have been used for many decades in qualitative research projects (e.g., in participatory action research projects), quantitative projects are typically (and purposively) designed to distance researchers from their research subjects; this distancing is intended to enhance the objectivity (and validity) of the research data, by eliminating bias that may be caused (for example) by observer effect. In many traditional research projects (including some web approaches, such as online questionnaires) the interaction between the participant and the researcher is generally limited to the data collection phase; in Research 2.0, participants could be involved in many (if not all) phases of the work, from design of the project, through analysis and dissemination. Thus, successful research projects would continue collaboration with participants after the close of data collection, and would strive to integrate these individuals as members in the research by sharing results, involving them in subsequent product development and unequivocally encouraging participants to “socialise, learn, entertain themselves, interact with each other” [18]. Researchers working in Web 2.0 environments need to create innovative ways to allow interaction and bonding among participants (and the research team) over extended periods of time.

As qualitative researchers have used participatory approaches to enhance the credibility and trustworthiness of data in research projects, by involving participants in all phases of the work, these projects can offer modes of working that can enhance other qualitative (and quantitative) practices in Web 2.0. For example, member checking of data analysis is one mechanism for ensuring the credibility of qualitative data [30]. Qualitative approaches to participant engagement, as well as the steps taken in these studies to ensure rigor, may serve as an excellent model for the development of participatory research practices in an online, Web 2.0 environment. Indeed, The Sage Encyclopedia of Qualitative Research Methods [31] includes a number of entries on the “Internet in Qualitative Research,” conducting “Virtual Research,” “Community-based Research,” and on specific methods that have been used in an online environment, such as “Virtual Interview.” Although these entries do not focus, exclusively, on Web 2.0 environments, many of the practices, methodological issues and ethics implications detailed in this volume can provide guidance to researchers engaging in Research 2.0 projects.

As in other Research 2.0 projects, the participatory nature of Web 2.0 applications (and the implications for research design), will alter researchers’ approaches to and considerations of research ethics. Maintaining confidentiality through guarantees of anonymity (for example), was relatively straightforward in approaches that distanced participants from one another; in approaches that involve participant-to-participant engagement, researchers need to alter consent approaches. For example, anonymity may not be appropriate in these types of circumstances, so individuals selected to participate may need to be made aware of (and agree to) the possibility that they may be identified in the course of the study. Not only is this provision already possible in ethics policies at present (see [32] for example), despite the ubiquity of anonymity guarantees, it may also be in the participants’ best interest to be identified, especially if they will be co-authors of papers and/or co-creators of data. Indeed, not acknowledging participants’ contributions in Web 2.0 projects may, in fact, be unethical in these circumstances; and yet, this will require researchers (and ethics boards) to reconsider their own past practices in reshaping consent forms, confidentiality, etc. to suit this new environment.

5. Conclusion

The proposed concept of the Research 2.0 model fits very well in the Web 2.0 framework (as proposed by Tim O’Reilly). The new framework presents new opportunities, such as crowdsourcing data collection and analyses, increasing interaction and collaboration with (and/or among) participants in each stage of the research, data management by storing and processing the data in the cloud, among others. It also presents a few challenges, such as privacy, confidentiality and other ethics issues to researchers. Research 2.0, as discussed here, is a framework for undertaking qualitative and quantitative research in the Web 2.0 environment; while this will not replace established research techniques this is a valuable addition to the researcher’s repertoire, in the digital age. The new framework also requires that researchers meet a few pre-conditions [24], such as enhancing their online project management skills, ensuring good communication skills with participants and team
members, and increasing their understanding of various cultures, so that sensitivities could be handled appropriately.

Future projects in this area could explore: the impact of the digital divide on undertaking research in this new environment; how crowdsourcing can eliminate issues such as question reformulation (an issue identified in email-based survey [33]); and, implications of sampling techniques on participant selection in the Web 2.0 environment [34]. In the coming years, it will be interesting, as well, to see if Web 2.0 research projects comply with the seven principles outlined here (e.g., the drive for participatory engagement), or whether the Web 2.0 principles will need to evolve, further, to suit the demands of the online research environment.

6. References