

Design Scenarios for Web-Based Management of Online Information

Daryl H. Hepting and Timothy Maciag

Abstract The internet enables access to more information, from a greater variety of perspectives and with greater immediacy, than ever before. A person may be interested in information to become more informed or to coordinate his or her local activities and place them into a larger, more global, context. The challenge, as has been noted by many, is to sift through all the information to find what is relevant without becoming overwhelmed. Furthermore, the selected information must be put into an actionable form. The diversity of the web has important consequences for the variety of ideas that are now available. Whereas people once relied on newspaper editors to shape their view of the world, today's technology creates room for a more democratic approach. Today it is easy to pull news feeds from a variety of sources and aggregate them. It is less easy to push that information to a variety of channels. At a higher level, we might have the goal of collecting all the available information about a certain topic, on a daily basis. There are many new technologies available under the umbrella of Web 2.0, but it can be difficult to use them together for the management of online information. Web-based support for online communication management is the most appropriate choice to address the deficiencies apparent with current technologies. We consider the requirements and potential designs for such information management supports, by following an example related to local food.

Daryl H. Hepting

University of Regina, Department of Computer Science, 3737 Wascana Parkway, Regina, Saskatchewan, Canada, e-mail: dhh@cs.uregina.ca

Timothy Maciag

University of Regina, Department of Computer Science, 3737 Wascana Parkway, Regina, Saskatchewan, Canada

1 Introduction

Over the last several years there has been a shift in the way we communicate, as we have adopted and accepted the web as a preferred communication medium and information source [1, 3, 25]. Online modes of communication are quite diverse [9, 17], ranging from simple email lists, where communication is conducted via personal email clients; to online content management systems (CMSs), where communication is conducted through forums, blogs, newsgroups, wikis, and calendars; to social networking sites (e.g. Facebook (<http://www.facebook.com>) and MySpace (<http://www.myspace.com>)) where communication is conducted using available networking tools (status updates, events, private messages, public comments, and notifications of others' activities). Keeping track with what is going on within our communities has never been more difficult. Often we are required to shift our communication preferences and adapt to unfamiliar, potentially unsatisfactory modes of communication. New tools, and variations on tools, emerge with surprising rapidity, but many are still searching for problems to solve. From a human-computer interaction perspective, this approach is far from ideal [25]. Rather, as Norman [23] suggests, the focus should be on designing for activities and harmonizing that design to incorporate the inherent strengths of technology and end-users.

Many of us, either by preference or necessity, have become accustomed to specific modes of communication. These modes of communication, which include email, instant messaging (IM), and short message service (SMS), each have strengths and weaknesses which mean that it is ultimately preferable, if not required, for the user to be fluent in more than one mode. To be truly informed, we are often required to track several sources, with different modes of interaction or with different membership requirements. As such, *Death by Blogging* [26] can be seen as a real cause for concern. As well, the potential to increase the likelihood of information overload [14, 29] is increased as each source requires its user to access and then filter its content, some of which is duplicate and some of which may be considered spam [27]. Many barriers [13] can remain between these modes, including lack of standards and data portability. Some progress has been made with respect to system infrastructure standards, as seen in the vocabularies such as SIOC [5] (Semantically-Interlinked Online Communities) and FOAF [21] (Friend of a Friend) with which it is possible to annotate our webpages.

Managing our expanding online presences is becoming more of an issue since good end-user support is not readily available. Although there presently exist web-based support technologies that provide support in varying degrees, none of these technologies provide complete end-user support and satisfaction. Consider the FriendFeed (<http://friendfeed.com/>) plugin for Facebook, Twitter (<http://twitter.com/>), and iGoogle (<http://www.igoogle.ca>) that provides end-users with the capability to share updates to the content that they create across multiple platforms. Content authors may have difficulty in configuring the service for their own situation, because it requires the following process: register for the friendfeed service and list which content should be shared; install the application on the particular platform where the content is to be shared; configure the

platform application. Also, friendfeed only allows content to be pushed to (and not pulled from) facebook, for example. Even within these individual platforms, end-users must still adapt to the interfaces provided by the platform applications which have not yet been standardized in any meaningful way. Given the lack of complete and satisfying support solutions, more focus on the end-users and understanding their needs and preferences is required. For this goal, we describe the foundation of a Web-Based Support System (WSS) that would enable such user support.

The general aim of WSS is to assist end-users in conducting activities on the web [30]. In its most general sense, WSS could include support for many types of web-based activities, including those common in web-based business applications (e.g. advertising, online form submission), web-based information dissemination and retrieval (e.g. searching, blogging, browsing), web-based consumer decision-making support (e.g. purchasing, selling, browsing), web-based communication (e.g. IM, social networking), among others [30, 31]. For this chapter, we focus on WSS for web-based communication. Specifically, the vision that guides our research is the development of a WSS that would allow people to effectively manage their incoming and outgoing online communication in a satisfying way that is not overwhelming.

For this goal we describe a framework for WSS that is designed to support end-users by enabling them to use their preferred mode of communication for all of their web-based communicative activities. For example, a recommender system such as News@Hand [6] is a WSS that recommends news items based on user preferences. This system helps users gather information that they may wish to share with others. Yet, this sharing requires a lot of work, including manual editing and posting to other platforms. By allowing end-users the freedom to choose their preferred mode of communication through this WSS, they would improve their level of satisfaction.

This chapter will discuss a scenario-based design process, and results thereof, used to examine how online communication management might be supported by a web-based system. The rest of this chapter is organized as follows. Scenario-Based Design is introduced in Section 2. Section 3 applies scenario-based methods to examine design opportunities within the users' current workflows. Section 4 describes different current communications technologies and how they may help to address the identified opportunities. Section 5 describes designs through which information management support might be achieved. Finally, Section 6 provides a discussion of future directions for this work.

2 Scenario-Based Development

In 1994, Poltrock and Grudin [24] observed obstacles to interface design. Most designers reported that they gave some consideration to users, but few involved users directly. Poltrock and Grudin found that the principles of interactive system design, as proposed by Gould and Lewis [12], were found to be both obvious to and largely unheeded by system developers. Their four principles are:

1. early focus on users
2. early - and continual - user testing
3. iterative design
4. integrated design

Rosson and Carroll [28] popularized the idea of Scenario-Based Design (SBD) as one approach to support better design of interactive systems. SBD is a user-centered process that involves the creation of stories, called scenarios, to illustrate and communicate about issues with current or future software. These stories relate experiences of different stakeholders. Understanding and respecting those different perspectives is important to designing satisfying experiences. Each stakeholder group is embodied by an actor, which is an abstraction between a real user, or an amalgamation of several real users, and the audience discussing the system. It is important to understand the background, expectations, and preferences of the stakeholder groups and communicate it. We need to create real, common, situations for actors in order to test the software system and explore any problems, or opportunities for design. Likewise, an actor must be believable performing his or her given tasks. There are more formal methods, such as the Rational Unified Process (RUP) [18], but the advantage of SBD is that it communicates information in plain language that is therefore accessible to users.

Consider the following example: six blind men encounter an elephant. Each of them touches a different part of the elephant and expresses what the elephant is. Although they are touching the same elephant, each man's description is completely different from that of the others [11]. Here, each man's description presents a different scenario, all of which must be integrated to understand the elephant.

The SBD process begins by conducting a requirements analysis, which comprises a root concept, detailing the project vision, rationale, assumptions, and stakeholders, field studies to gather end-user data, summaries that detail stakeholders' backgrounds, expectations, and preferences, and finally, problem scenarios which describe the end-user's experiences. Each phase in the SBD process includes claims analysis, which highlight the positives and negatives about different features brought out in the scenarios. A useful lens for this analysis of scenario features is provided by Raskin's [25] two laws of interface design:

- the computer shall do no harm to the user's work nor, through inaction, allow harm to come to the user's work.
- the user shall do no more work than is absolutely necessary.

The need for a strong focus on usability is reinforced in a recent study of the technology acceptance model (TAM), which relates perceived usefulness and perceived ease of use to the intention to adopt the technology. Chan and Teo [7] found empirical evidence that usability helps with acceptance, in many cases.

Based on the analysis of the existing practice, new designs and innovations are described through the writing of activity scenarios that describe aspects of system functionality, to information and interaction scenarios that describe the detailed interactions between the technology and end-user. Low and high-fidelity prototype

designs are developed based on results founded which are then evaluated with end-users. Based on user feedback, further insights are gained and areas requiring re-design are identified. In this chapter, we are focused on the analysis and design phases of the SBD process.

3 Understanding Design Opportunities

Table 1 Problem scenario that Introduces Joe, the actor who represents activist users and central connectors in their social networks.

Joe is an active local citizen who is technologically literate. He is committed to the cause of local food because of what he sees are its economic, environmental, health, and societal benefits. He is willing to stand up to be counted and take a leadership role on this issue, interest in which has been growing rapidly over the past few years. To promote his interest, Joe created an e-mail list of people interested in local food. To offer more features to his local food community, he decided to start a website devoted to local food. The website was more difficult to configure than he imagined, not all of his readers were comfortable moving away from e-mail, and he also got several comments about the site being boring and difficult to use. It was always his intention to fix the website, but since it seemed to require a lot of work, little progress has been made. In the meantime, as facebook became more popular, he decided to create and maintain a group there. To keep information flowing to all these channels requires a lot of effort on his part, sometimes too much effort. Recently, he accepted an invitation to join a ning (<http://www.ning.com>) network for a different topic. He liked the features that he found there, but decided that it would be too much effort, with likely too much attrition within his group, to move all of his own network to such a service.

Situation Feature	Possible Pros (+) & Cons(-)
e-mail list	<ul style="list-style-type: none"> + easy to set up and maintain - may be restricted to plain text - may be difficult to advertise web site
web site	<ul style="list-style-type: none"> + provides the opportunity for more features - provides more targets for criticism + more easily discoverable, from a web search - difficult to set up and maintain - unfamiliar technology for some users to adopt
facebook	<ul style="list-style-type: none"> + easy to set up and maintain - separate interface that requires more effort
information on several outlets	<ul style="list-style-type: none"> + more chance for people to see it - much more work to keep everything current

As presented in Section 1, the vision for this research is to develop a web-based support system that will allow people to effectively manage their incoming and outgoing online communication. We begin the design process for the new web-based support system by seeking to understand how online communication is managed presently. Local food (or, more broadly SOLE: Sustainable Organic Local Ethical food) is the subject area that grounds our discussion. It is an increasingly popular

area of concern for many and the New Oxford American Dictionary made the term *locavore* (defined as someone who seeks to eat only foods grown locally) its word of the year in 2007.

The current context is explored through the use of problem scenarios, that describe real tasks done by real people. Those real people are represented by actors, who are representative of real stakeholders in the issue of online communication management.

- activist users who are proactive in seeking out, creating, and disseminating content: represented by the actor Joe (introduced in Table 1)
- largely passive consumers of information and content: represented by the actor Emily (introduced in Table 2)

For purposes of illustration, we consider the two stakeholder groups described below. Beyond this chapter, it may be appropriate to consider other stakeholder groups which would be handled in the same way as those we discuss here.

Given the different stakeholder groups which they represent, it is not surprising that Joe and Emily have different roles in their various social networks. Emily can connect the local food communities in the two towns in which she lives, but she is not an active participant in either. Joe, however, is at the center of his local food community and is responsible for keeping it active and informed. Because Joe is recognized, he has been invited to join some lists and he has joined others to keep

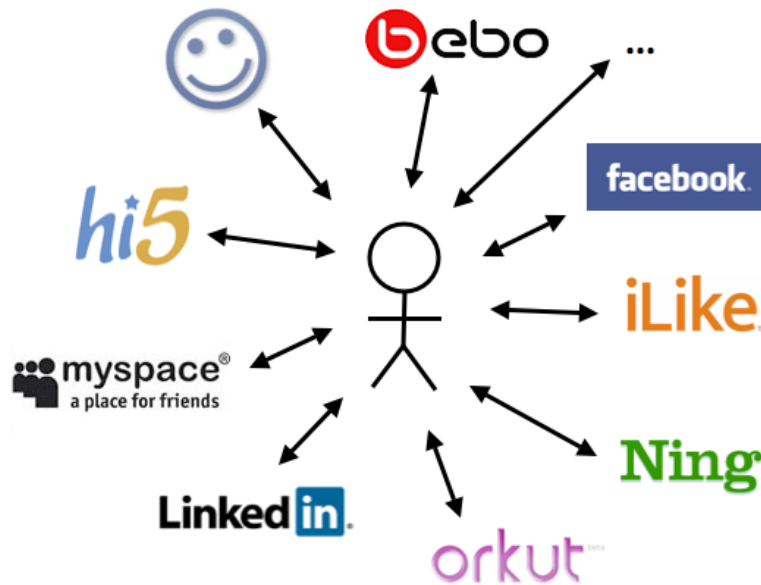


Fig. 1 An illustration of the problem scenarios (Tables 1- 5): the user must interact separately with each information provider or service.

Table 2 Problem scenario that introduces Emily, the actor who represents passive consumers of content and receivers (and possibly carriers) in their social networks.

Emily is an undergraduate student of environmental sciences. She attends college in another part of the country but for the summer months she returns home, which is also the town where Joe lives. She has known of Joe for a while because she was an early subscriber to Joe's local food mailing list. One of her class projects involved local food and so she was able make connections within her university town and she continues to be a subscriber to a few mailing lists there which are dedicated to local food. She likes getting information to keep herself informed about big issues and local events, both in her hometown and her university town. She is a very busy student so she prefers to remain on the periphery of these various groups, at least for now. Her e-mail client is configured to place her local food messages in a separate folder, so they do not clutter her inbox. She reads the messages when she has free time, or needs a change of pace. She is not concerned about any other, more advanced, communication options to get news about local food. In fact, she wonders whether the e-mail is too much. Her local food folder often fills up faster than she can read it and she gets bothered when she gets the same announcement from a few different sources. She wonders if she should drop her subscriptions to all but one of her lists, even though she realizes that she'd be missing out on some things.

Situation Feature	Possible Pros (+) & Cons(-)
e-mail subscriber	+ comfortable with e-mail technology - may be uncomfortable with other modes
prefers periphery	+ stays informed - hard to get her involved in activities
e-mail client configuration	+ able to manage messages, not overwhelmed - easy to locate messages - rules can sometimes be complex and work in unintended ways
same items from different sources	- hard to manage multiple subscriptions + extra reminders about important items - may tune-out very important items - she may be encouraged to unsubscribe

himself better informed. In terms of social network analysis, Emily is a receiver who has the potential to act as a carrier or boundary-spanner and Joe is a transmitter or central connector [20].

Social networks have become an important tool when considering personal knowledge networks, for example, so the relative position of our actors in their networks is important information. Information overload is a common complaint today, but part of this overload is caused by the need to filter duplicate information and to separate the "wheat from the chaff." Spam filters are now quite capable of removing junk mail from consideration, but there is another class of communication that is more difficult to manage, something that is now called bacn - not spam, but still something you don't want to see right now. This word was a runner-up to locavore for word of the year in 2007. These communications also raise ethical issues [27].

Armed with this background knowledge, we construct a number of problem scenarios involving our actors. These are found, along with corresponding claims analyses, in Tables 1 to 5.

To summarize the results from our problem scenario analyses, we see while email is good as far as it goes, there may be much better communication technology avail-

Table 3 Problem scenario and claims analysis: Joe sending information about an upcoming event.. Joe learns of an event happening this weekend and he wants to publicize it to all of his contacts. He sends a plain text e-mail to his mailing list, and then to all the other mailing lists to which he belongs. Then he goes onto facebook and creates an event with all the particulars. His group isn't sponsoring it but he attaches it there anyway. Inviting people directly is troublesome for him (he is never sure if he has done it correctly). He then goes to the related groups about which he knows and posts the event there. Then he goes to his own website which requires a different format of information to create the event. He looks at the clock when he is done and can't believe that it has taken so long.

Situation Feature	Possible Pros (+) & Cons(−)
publicize to all of his contacts	<ul style="list-style-type: none"> + Content is sent to all communities & networks − May be considered spam − Leads to information overload in unintended ways.
plain text e-mail sent	<ul style="list-style-type: none"> + Easy to read + Easy to send and it is likely to reach its destination without problem − Not easy to transfer plain text into calendar format, without retyping − she may be encouraged to unsubscribe
creating event on facebook	<ul style="list-style-type: none"> + facebook users have content in their preferred form − must learn to use facebook interfaces, which don't always match his own model
sending invitations	<ul style="list-style-type: none"> + explicit notification may be appreciated − may be considered as spam
posting to other websites	<ul style="list-style-type: none"> + increases visibility of event − time-consuming − must learn to use other websites' interfaces which don't always match his own model

able now. As Joe moves to embrace the best available technology for him to create to and share content, he must be aware that some members of his network will not want to leave their email. He would like to welcome anyone to his network, regardless of technology, but the reality is that adding more communication modes adds a great deal of work. Emily is able to do what she needs with her email client, yet the work is becoming more burdensome. From both their perspectives, there is an understandable tendency to consolidate information in as few places as possible. Yet, this may not always be feasible, as illustrated in the United Kingdom after their recent food crises [8].

It was extremely difficult to get producer groups to form any consensus that allowed a common message to be delivered to consumers. Rather, each found it in their best interests to protect their niche market at the expense of others promoting similar products. This phenomenon can also be seen in facebook with its proliferation of groups devoted to niche interests. It can be very difficult to find a common message to unite these groups because those who administer the groups seem to cherish the autonomy of their own group and the platform which it provides. Rather

Table 4 Problem scenario and claims analysis: Joe sending new content out to his social network. Joe is always interested in finding new, relevant information for his network. However, he doesn't always have time to search the internet for new items and news sources pertaining to local food. He decides to create a google news query for "local food." Instead of setting up an alert, he sees that he can read the RSS feed for this page. He has always preferred email but he's embraced RSS because he is now able to read those within his email client. He sees that a lot of interesting results have been returned and he wishes that he had more time to read them. He picks an interesting looking story and it seems applicable so he sends along the URL along with some text from the story to his network.

Situation Feature	Possible Pros (+) & Cons(-)
using google news	+ aggregates a great deal of relevant content - must place some trust in google regarding results
reading RSS feed from email client	+ brings web information to him inside his favoured email client - RSS feed may still miss important results [?]
sends content to network	+ network benefits from content filtered by Joe - network may rely too much on Joe for new content - extra messages may cause some to unsubscribe - time consuming to reformat content before sending

Table 5 Problem scenario and claims analysis; Emily tunes her email client rules.

Because Emily spends summers at home and is away at school from fall to spring, she wants to be less involved in her other town while she is away from it. Unless it comes from Robert or Joe, the organizer of the local food networks in her university and home town, respectively. She would still like e-mail and other notifications, but not so intrusively. She does this with some more involved rules for her email client - which must be changed every fall and spring as she changes towns. She'd really like to have a way to have better control over the local food e-mail she gets, but resigns herself to her current setup for some time.

Situation Feature	Possible Pros (+) & Cons(-)
desires complex filtering	+ may lead to "perfect" environment for her - knowledge, and overhead, to maintain - if unrealized, may unsubscribe completely

than trying to reduce the number of sources of information, no matter how noisy they may be, it may be a better approach to support the end user in managing this information. Fischer [10] considered this type of situation when describing the utility of weak input filters with strong output filters.

The two actors have some real issues with the technology that they use, which need to be addressed in future designs. The next section examines technological solutions that are presently available, in the context of our actors' needs.

4 Current Technologies

In the larger context of Web 2.0, there are many interesting trends. Aggregators of different types are becoming more popular. There are increasing efforts towards interoperability and data portability. Each of the communication media types in use has different strengths and weaknesses. And within each type, there are a variety of options. Audiences are fragmented by delivery channels and also by perspective of the authors. The expectation, or the hope, that people will use only a single social networking site, for example, is becoming dated.

The capabilities of our online communication technologies continue to grow. For example, e-mail clients now readily support retrieval of e-mail from a variety of different addresses and service providers. Apple Mail version 3.5, for example, also incorporates RSS (rich site summary, or really simple syndication, or RDF site summary) feed reading. Many of the technologies fulfill some part of our requirements. Here, we consider them broadly according to the following general headings:

4.1 *Input*

What are the new items that should be presented to the network? User generated content has become an important source of information. As Fischer describes, web 2.0 has moved us from the expert editor to the crowd-sourced information. Visiting [digg.com](http://www.digg.com) (<http://www.digg.com>), for example, one gets an idea of what others deem important as the crowd exercises editorial control. In blogs, the authors exercise their own editorial control. If readers agree, they give those bloggers more authority in a variety of ways, including linking to the original posts. Blogs have infiltrated all areas of society: the New York Times operates several blogs, including [dot earth](http://www.dotearth.blogs.nytimes.com) (<http://www.dotearth.blogs.nytimes.com>). All these blogs contribute their own voices to the discussion, which allows for more democratic participation. With the increased participation, there is a growing need for filters [10], however they are applied. No matter what is done, even searching the web with google, for example, represents a choice of filter and what we see is shaped by those filters [22].

The wiki, a tool which allows the editing of web pages on the web, has become an important part of the online culture. One of the first major applications was the wikipedia (<http://www.wikipedia.org>), but it has been plagued by questions about the expertise of its possibly anonymous contributors. Citizendium (<http://www.citizendium.org>) is a response to wikipedia which requires all of its contributors to be known. In both wikipedia and citizendium, there is but one official version of an entry. Google's knol (<http://knol.google.com>), currently under development, is said to have a model that allows for multiple versions, or perspectives, on the same topic. Squidoo (<http://www.squidoo.com>) is a website that offers this basic model in a relaxed way. Users can create lenses about their favourite topics and the website provides different tools to allow inclu-

sion of various interactive elements, like polls. Klein [16] has proposed a moderated wiki, as part of MIT's climate change collaboratorium. In that model, the last post does not have special favour. Groups work with moderators to define the structure of arguments so that once a point is located, it can be elaborated. Removal of the temporal component helps to balance the discussion. Yet all of these things are static. Rollyo (<http://rollyo.com>) might represent a better chance at a dynamic quality, since it is more of a live search. The others collect and or represent the work you might do to research a particular topic. Citizendium clearly has experts involved, either they have credentials or they pro-am [19] (expert amateur). With Rollyo, it is possible to list up to 25 URLs to search for a particular topic. However, when searching, the user receives a list with many duplicates. Therefore, while the concept is very nice, much effort would be expended to identify the unique results in such a list. Furthermore, repeating such a search daily would not always come up with new results within the top results. Bernstein and Zobel [2] do, however, describe a method for filtering duplicates. Tagging, and the creation of folksonomies [15], is a different way to handle this issue.

4.2 Output

There is a lack of integration between different media. It is easy to pull with RSS and the friendfeed (<http://friendfeed.com>) site is one example of this approach. At present, it is not easy to push content to a variety of sites, but SIOC may enable the easy repurposing of content, as described by Bojars et al. [4]. However, not all the web sites may have this annotation. Furthermore, allowing transmission of complete content archives may adversely impact business models that enable current services to be offered in their current forms.

4.3 Portability

With respect to calendar events, the Internet Engineering Task Force (IETF) has created the iCalendar standard (published first as Request For Comment (RFC) 2445 – <http://tools.ietf.org/html/rfc2445>) to allow for the interchange of event information. Exactly how this will be realized in practice does not yet seem clear. Microformats (<http://microformats.org/>) may fill this need, but at present there are tools to output the format and none that accept it as input. There is an event container in the SIOC vocabulary, but few details about its use. The socializr site (<http://www.socializr.com>) is well-regarded, and it provides the means to share or promote an event to some social network sites. The sharing is limited, for example with facebook one can only post to one's profile and not to groups. Sharing with a blog requires copying and pasting. There are pieces of interesting of technology that can improve interoperability. For example, blog-

mailr (<http://www.blogmailr.com>) provides a general interface to enable blog postings via e-mail. However, because it is a web service, the asynchronous advantages of e-mail are lost to a degree: we cannot compose a blog post offline in an e-mail message to be sent when an internet connection becomes available.

As web-based communities evolve, the need to more adequately support the diversity of end-users is becoming more apparent. Modes of communication technology are plentiful, but they are not always satisfactory. With new tools emerging at a rapid rate, to be on the cutting edge within ones community, we must be flexible in adapting to new technology that places more strain on our cognitive abilities to communicate. Ideally, we should have more freedom of choice based on our individual needs. Web-based support structures could assist in such regards, enabling greater accessibility and higher portability of information sources.

5 Towards New Designs

The actors discussed in this examination are not people who seek detachment from the world around them, just better tools to help their interactions be as effective as possible. Some of the technologies described could enable an automatic solution to the problems we identified earlier, but this is too much. Augmentation of peoples' abilities and interests is what we seek.

In the process of transforming our problem scenarios into design scenarios, we have begun to examine the issues in terms of how to innovate system functionality, how to more effectively organize the information displayed to end-users, and how to better develop the physical interactions between the end-users and the technology. In this abbreviated SBD process, we examine potential design approaches at a macro level in order to keep a wide focus on the issues.

We envision a website where people log in to manage their online communications, which allows information to be both gathered and distributed. Based on the variety of problem scenarios created, here we present two design scenarios (one for each actor), in Tables 6 and 7. Figure 2 provides a conceptual view of the image of this web-based support structure.

6 Discussion

Scenario-Based Design is an effective process for determining design directions based on a thorough understanding of the end-user. Such an understanding comes not only through the hard work of the designers but because end-users are involved in the entire process, and the plain language of the scenarios constructed in Sections 3 and 5 give them full access.

The semantic web, or the gigantic global graph as Berners-Lee described it in a recent blog post (<http://dig.csail.mit.edu/breadcrumbs/node/215>),

Table 6 Design Scenario and Claims Analysis for Joe.

Joe logs into the topic manager web service to see what has been going on in the world with respect to local food. He is greeted by a summary page that tells him about the activity on this topic. First he clicks on the link for his own subscriptions, where he can see what has arrived from his e-mail and from his RSS feeds. He likes the idea that all of that traffic is directed here instead of his e-mail client on his laptop, which seems to be getting overwhelmed by all the e-mail he receives. When he signed up for this service, he was given a new email address which he then subscribed to his e-mail lists in place of his personal address. The content filtering on the site has found several duplicates in the days messages and has put them aside, while recording the multiple sources for each document. He finds a notification of a blog posting that looks interesting and visits the blog to read more. He decides that he would like to share this with his community so he clicks on the "Share" button in interface. He is then given some tools to compose an e-mail message that will go out to his community. Joe is able to select which destinations will receive the message, and he is also shown from which of these he has received the message. Sometimes he would like to post a comment on a blog posting, and this allows him to tailor the message for each destination. He also finds an event that he wants to share with his community. Rather than go to each site and create a specially formatted event for the various calendars within his community, he adds the event to his own local food calendar on this site and then sends a message out with the details, and a link to the feed for his calendar. In addition to the calendar feed, Joe likes that he has a number of options to publish what he has shared in an RSS feed. People who like Joe's treatment of the local food topic can also sign up for other notifications from the topic manager, depending on their needs. He likes the fact that people have found his local food community by first finding his feed on the topic manager site. Another link on his homepage is for new content found on the web. He has configured the search engine on the site to look through a number of other sites for stories about local food. He checks digg.com, del.icio.us, and many others. The results from here are filtered for duplicates and also checked against the content from his subscriptions. When he finds a new site with interesting content, he adds it to his subscriptions. When interesting one-off stories appear from this search, he is able to share them with his network just like any other item. Joe is happy that he can handle everything to do with local food from one place. He logs off from the site, glad that he has one less thing to worry about.

Situation Feature	Possible Pros (+) & Cons(-)
email lists going to web service	<ul style="list-style-type: none"> + reduces traffic on e-mail client on his laptop - must trust service to handle email correctly duplicate messages removed + able to concentrate more fully on remaining items - must trust that important details not removed topic-related content on web + less clutter in his e-mail client - does not allow for offline work as accustomed
calendar feed	<ul style="list-style-type: none"> + reduces complexity of event maintenance - some people in network may balk at new process
subscribers can follow topical RSS directly	<ul style="list-style-type: none"> + lower barrier to entry for new people - without contact, people may become disengaged
search engine	<ul style="list-style-type: none"> + configuration gives user more control - may give user too many options - duplicate removal potentially very valuable

Table 7 Design Scenario and Claims Analysis for Emily.

Emily has heard about the topic manager web service and so she decides to give it a try. Once she signs up and defines the local food topic that she would like to manage, she is given an e-mail address along with instructions about how to subscribe that address to all of her current mailing lists. While doing that, she also unsubscribes her personal address from those lists. She can feel her inbox get lighter almost immediately. She is then asked if there are any RSS feeds she would like to track and she enters a few that she has heard about. She is also asked about her presence on a few social networking sites, and any groups she may have joined there. Then she is asked if she would like to add any topic streams from the topic manager service. Because she has identified local food as her topic, she is presented with a list of topic streams that she might like to follow. She is not surprised to find a stream set up by Joe, but she also finds a local food topic stream run by Robert, who has Joe's role in her university town. She subscribes to both of their streams. This will let her stay informed without having to wade through any duplicates she thinks, and smiles to herself. She realizes that she also has some storage associated with her account and she can keep some messages here without having to read through everything about her home town when she is at university and vice versa. She's also read that this service uses SIOC, but she doesn't want to deal with that now.

Situation Feature	Possible Pros (+) & Cons(−)
configuration	+ user has a lot of control − user may not understand all the technical issues
storage of messages on server	+ reduced burden for her e-mail client − stronger dependence on active internet connection
support for semantic web	+ permits more features + does not impose requirements on incoming sources − user may not understand technological implications

will likely bring great benefits to the citizens of the web. However, at what point will those benefits be of sufficient perceived usefulness and perceived ease of use to encourage widespread adoption [7].

At the moment, this brave new world is the domain of the fearless early adopters. Even when the semantic web has been widely adopted, it is interesting to consider whether everyone will be interested in partaking of these schemes to make their information more public. Interactions with privacy legislation in various jurisdictions must also be considered.

Acknowledgements The authors would like to acknowledge the support of the Natural Sciences and Engineering Research Council (NSERC) of Canada. Emma Findlater made several helpful suggestions to improve the chapter. Daryl Hepting acknowledges the inspiration gained from his visit to Gerhard Fischer's Center for Lifelong Learning and Design (L3D) at the University of Colorado Boulder.

References

1. Backstrom, L., Kumar, R., Marlow, C., Novak, J., Tomkins, A.: Preferential behavior in online groups. In Proc. Web Search and Web Data Mining pp. 117–128 (2008)

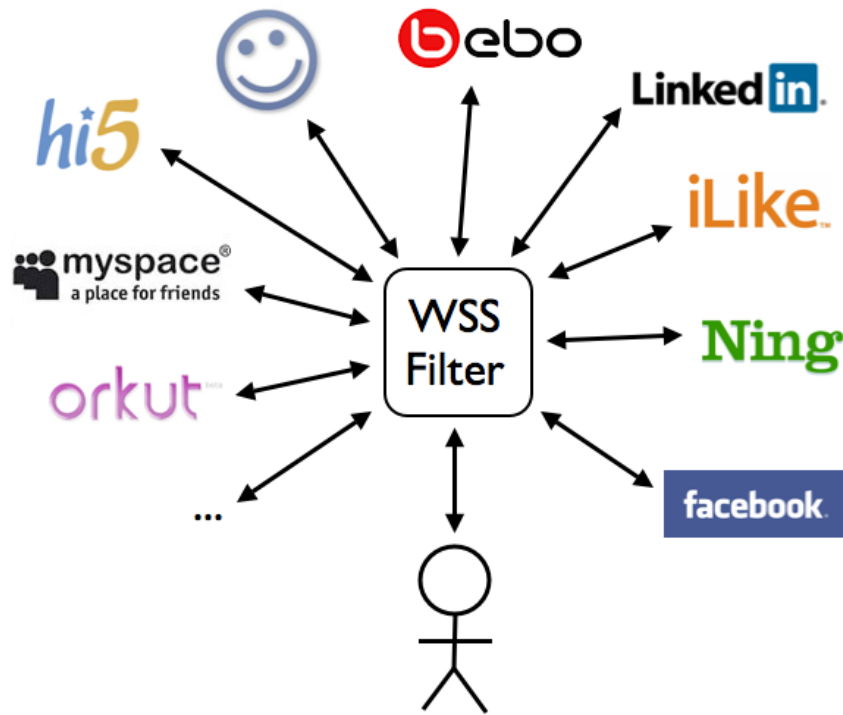


Fig. 2 The web-based support system envisioned in Tables 6 and 7.

2. Bernstein, Y., Zobel, J.: Redundant documents and search effectiveness. Proceedings of the 14th ACM international conference on information and knowledge management pp. 736–743 (2005)
3. Bishop, J.: Increasing participation in online communities: A framework for human–computer interaction. *Computers in Human Behavior* **23**(4), 1881–1893 (2007)
4. Bojars, U., Passant, A., Breslin, J., Decker, S.: Social network and data portability using semantic web technologies. *Science Foundation Ireland* pp. 5–19 (2007)
5. Breslin, J., Harth, A., Bojars, U., Decker, S.: Towards semantically-interlinked online communities. In *Proc. European Semantic Web Conference* pp. 500–514 (2005)
6. Cantador, I., Bellogín, A., Castells, P.: News@hand: A semantic web approach to recommending news. In: *Proceedings of the 5th international conference on Adaptive Hypermedia*, pp. 279–283. Springer (2008)
7. Chan, H., Teo, H.H.: Evaluating the boundary conditions of the technology acceptance model: An exploratory investigation. *Transactions on Computer-Human Interaction (TOCHI)* **14**(2) (2007)
8. Duffy, R., Fearne, A., Healing, V.: Reconnection in the UK food chain. *British Food Journal* **107**(1), 17–33 (2005)
9. Dwyer, C., Hiltz, S., Widmeyer, G.: Understanding development and usage of social networking sites: The social software performance model. In *Proc. Hawaii International Conference on System Sciences* (2008)
10. Fischer, G.: Distances and diversity: Sources for social creativity. *Proceedings of the 5th conference on Creativity & cognition* pp. 128–136 (2005)

11. Go, K., Carroll, J.: The blind men and the elephant: views of scenario-based system design. *interactions* **11**(6), 44–53 (2004)
12. Gould, J., Lewis, C.: Designing for usability: key principles and what designers think. *Communications of the ACM* **28**(3) (1985)
13. Heyman, K.: The move to make social data portable. *Industry Trends* pp. 13–15 (2008)
14. Himma, K.E.: The concept of information overload: A preliminary step in understanding the nature of a harmful information-related condition. *Ethics and Information Technology* **9**(4), 259–272 (2007)
15. Hunter, J., Khan, I., Gerber, A.: Harvana: harvesting community tags to enrich collection meta-data. *JCDL '08: Proceedings of the 8th ACM/IEEE-CS joint conference on Digital libraries* pp. 147–156 (2008)
16. Klein, M., Malone, T., Sterman, J., Quadir, I.: The climate collaboratorium: Harnessing collective intelligence to address climate change issues pp. 1–23 (2006)
17. Kolbitsch, J., Maurer, H.: The transformation of the web: How emerging communities shape the information we consume. *Journal of Universal Computer Science* **12**(2), 187–213 (2006)
18. Kruchten, P.: *The Rational Unified Process: An Introduction*, 3rd edn. Addison Wesley (2003)
19. Leadbeater, C., Miller, P.: *The Pro-Am revolution: how enthusiasts are changing our economy and society*. Demos, London (2004)
20. Liebowitz, J.: *Social Networking: the Essence of Innovation*. Scarecrow Press (2007)
21. Mika, P.: Flink: Semantic web technology for the extraction and analysis of social networks. *Web Semantics: Science, Services, and Agents on the World Wide Web* **3**(2-3), 211–223 (2005)
22. Mowshowitz, A., Kawaguchi, A.: Bias on the web. *Communications of the ACM* **45**(9), 56–60 (2002)
23. Norman, D.: *The design of future things*. Basic Books (2007)
24. Poltrock, S., Grudin, J.: Organizational obstacles to interface design and development: two participant-observer studies. *Transactions on Computer-Human Interaction (TOCHI)* **1**(1) (1994)
25. Raskin, J.: *The Humane Interface: New Directions for Designing Interactive Systems*. Addison Wesley (2000)
26. Richtel, M.: In web world of 24/7 stress, writers blog till they drop. *New York Times* (2008)
27. Rooksby, E.: The ethical status of non-commercial spam. *Ethics and Information Technology* **9**(2), 141–152 (2007)
28. Rosson, M., Carroll, J.: *Usability engineering: Scenario-based development of human-computer interaction*. Morgan Kaufmann (2002)
29. Suzuki, D.: Selective information overload. URL: [http://www.davidsuzuki.org/about_us/Dr_David_Suzuki/Article_Archives/weekly03210801.asp] (Accessed May 2008) (2008)
30. Yao, J.: Design of Web-Based Support Systems. In *Proc. International Conference on Computer Science and Informatics* pp. 349–352 (2005)
31. Yao, J.: An Introduction to Web-Based Support Systems. *Journal of Intelligent Information Systems* **17**(1-3), 267–281 (2008)