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Social Software (and Web 2.0)

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INTRODUCTION

Social software is a class of information systems supporting the establishment and management of online communities for people in performing certain tasks. One of the first application types were bulletin boards. Social software may provide different services for community members such as finding members with similar interests, finding information on interesting subjects, discussing common problems, or simply the storing of private or publicly-accessible documents. Another similar term, *collaborative software*, applies to cooperative work systems, and is applied to software that supports working functions often restricted to private networks. *Web 2.0* is a term coined only recently, and with this concept promoters try to focus on the change of use of the Internet. While Web 1.0 was a medium where few users published information in Web sites and many users read and surfed through these publications, in Web 2.0 many users also publish their opinions, information, and documents somewhere in the Internet. By motivating large communities for submissions and by structuring the content, the body of the aggregated information achieves considerable worth. A good example for such a community project is Wikipedia, where thousands of contributors deliver millions of articles, forming an encyclopaedia that is worth millions of dollars.

MOTIVATIONS

The term *social software* was created only recently; however, applications that follow this paradigm are much older. Due to different reasons, there is some hype about these applications now. Thus, new start-up companies offering such information systems achieve a very high financial rating through their large number of users and the large body of information. However, this is only one group of social software that achieves very high volumes of users. Social software is also used to build smaller communities with a restricted

access. Thus, a company may invite its customers into such a community for online support on products and services of the company. Social software is also used to support knowledge exchange between employees of companies (Wenger, 2004).

Technical Issues

The increasing number of social software applications is partly motivated by the progress of computer hardware, broadband communication, and the number of Internet users. Especially, progress in Internet standards, standard software, and new Internet browser technologies helped to attract a larger audience.

Web 2.0 subsumes a number of new technologies making Web browser user interfaces more user-friendly and, at the same time, reducing traffic load in the Internet. The basic HTTP-protocol that is used to fetch HTML pages from servers to clients is stateless (i.e., the client cannot store a state such as some user preferences). This means, if a user enters anything in a Web page and sends this data to the server, and the server sends in response a new page to the client, then the client software has no knowledge about what the user has entered. In recent years, different technologies were developed to hold either a state at the client by means of cookies or by managing the state at the server side. The problem with both kinds of technologies is that, after each user action, the server has to resend a new page.

New technologies of Web 2.0 support richer clients in the Internet. Thus, more control logic can be executed at the client. JavaScript was one the first solutions to control a Web client's logic. It may be used, for example, to check for correct input syntax of online forms. XML and the processing of DOM structures (the tree structure of well-formed XML or HTML documents), where the structure of XML as well as HTML documents can be changed on-the-fly, enable a more sophisticated control. *AJAX* (Asynchronous JavaScript and XML) is an approach to develop rich clients using recent HTML browsers and the XMLHttpRequest Api (Raymond,

2007). This means that some requirements (XML, JavaScript and DOM support, Cookies and CSS) have to be met by the client to use the rich HTML client interface. The AJAX approach avoids loading the complete HTML page for every action. Layout information is loaded just once, and only the data required due to the user's action is transferred from the server to the client. This transfer may also happen during the time when the user is already reading the new page. *Web services* are a further technology applied to enable an easy integration of software components to build larger applications. One prominent example is Google Earth that can be used to translate addresses into coordinates (i.e., geo-coding) and to construct maps around a certain coordinate on-the-fly. The latest service is that a user can create his/her own maps where existing maps are enriched by user data. Geographical information systems and its components are very illustrative examples for the construction of social software systems from existing reusable components (Scharl & Tochtermann, 2007). Systems constructed from such building blocks are called *mash-ups*.

Social Issues

Communities are built around common interests. Often, it is, however, unclear what the common interests are and whether all community members share the same interests. For example, Wikipedia has only a small group of writers and a very large number of readers. For the success of Wikipedia, there are enough writers, but this may not always be the case in new community systems.

This problem is also investigated in *knowledge management* theory. A company should be interested that information is shared between its employees. Knowledge management systems have to be designed in such a way that individual members of the staff are motivated to share relevant knowledge through these systems. Davenport and Prusak (1998) describe three motivations that lead to successful knowledge sharing: reciprocity (if I submit something, then other community members are also obliged to share information), reputation (if I submit much information, I will be accepted as an expert), and altruism (I want to support this highly-relevant community without any immediate benefits). These motivations are also valid for social software applications. A fourth motivation for participating in social software systems is the pro-

vision of special services such as data storage, e-mail management, and others.

For user acceptance of such systems, the ease of use is also very important. Technological improvements as described above address this issue. Thus, these technologies allow Web browser applications to behave in the same way as standard personal computer software systems.

On the other side, providers of such information systems must also get some revenue to provide these services. The number of users is most important for financial evaluation of such companies. Google, for example, is the company having one of the largest user groups at the moment. Thus, a provider is motivated to attract as many users as possible with good services. One of the most important services on the Internet seems to be the provision of relevant information. And the easiest way to provide such information is to let the users create the content. Google uses, on the one side, Web pages created by its users and, on the other side, the behaviour of Internet users to decide which content is most relevant. The users are, in this case, not aware of what services they deliver to Google. Someone who writes a submission for Wikipedia is aware of the value of his service to the community and will provide this service only in the case that some of the mentioned motivations are present and services are designed accordingly.

A further issue is the behaviour of community members. *Netiquette* (Internet etiquette) is a term for the conventions of politeness and respect in such virtual communities. These conventions address the relationship between personal behaviour and community interests, and outline a dynamic set of guidelines. Examples of these guidelines are not posting spam mails, avoiding commercial advertising outside business groups, and many more (Hambridge, 1995). Using emoticons (emotional icons) are a result of such virtual communities to show, with limited character sets, a kind of emotion in text-based communication.

Trust and Privacy

An important aspect of social systems in general is the *trust* that members of a community have in participation of other members. This is an issue discussed especially for Wikipedia and similar projects. An encyclopaedia has the expectation that descriptions of things of the world are objective and not subjective presentations

that try to favour certain technologies or concepts in contrast to others. For example, people may present themselves as very important researchers in the Wikipedia, or a company may describe its products as superior to others.

On the one side, it is argued that the large community is an adjustment factor that corrects, in a very short reaction time, any subjective malpractice. On the other side, Wikipedia has introduced a new group of users that has greater privileges than conventional users. Moreover, new projects arise that try to focus on a more expert-based encyclopaedia. Nevertheless, there are also strong arguments for open communities. For example, recognized experts might use a different (more formal) language or a jargon that simple users do not understand.

Trust in the provider of such community systems becomes sensible if certain private documents such as e-mail or pictures are stored on a server. Access control with passwords avoids certain misuses; however, a misuse by the provider cannot be assured. Therefore, really critical documents will never be stored unless some kind of encryption is supported in these systems.

CLASSIFICATION OF SOCIAL SOFTWARE APPLICATIONS

In the following section, some specialized groups of social software applications are outlined to show the manifold of concepts. The names used in the following classification describe a kind of information system, but often also some kind of software, which can be used to create such an information system. Differences in the systems are:

- the type of the objects exchanged in the community (text, structured documents, audio, pictures, etc.);
- push or pull service (who starts the communication);
- the rules for access (open or closed communities); and
- whether senders know recipients.

Newsgroups

First approaches of such online communities were *newsgroups*. Usenet was established before the World

Wide Web was introduced and the general public had access to the Internet. Besides mail and file transfers, it offered announcements through the news software. Submissions that users post are organized into newsgroups, which are organized into hierarchies of subjects. For example, comp.ai (artificial intelligence) and comp.lang (computer languages) are within the comp hierarchy, for computers. A user may subscribe to one or more newsgroups, and the news client software keeps track of which articles this user has read. Newsgroups are organized in threads, a submission with a number of responses to the original posting.

The importance of newsgroups has diminished in respect to other community tools. The current format and transmission of news articles is very similar to that of e-mail messages. However, news articles are posted for general consumption, and a user has access to all newsgroups, in contrast to e-mail, which requires a list of known recipients. Newsgroups have the advantage that they require no personal registration and that archives are always available. Due to the problem of spam mail, however, newsgroups are often moderated so that only fitting submissions are accepted.

Internet Forum

An *Internet forum* is a system supporting discussions and posting of user-generated content. A forum provides a similar function as newsgroups and is usually also structured in threads. A spirit of virtual community often develops around forums that have regular users such as forums on computer games, cooking, healthcare, or politics. Internet forums support the specification of different privileges for user groups.

Internet forums are also commonly referred to as Web forums, message boards, discussion boards, (electronic) discussion groups, discussion forums, or bulletin boards.

Wiki

A *Wiki* is a Web site that allows the visitors to easily add, remove, and otherwise edit and change available content in a similar way as a blackboard at school. Wiki software usually supports the differentiation between registered and unregistered users. For a wiki page, different access rules may be specified. Wikis have their own language for specifying links and certain layouts. This ease of interaction and operation makes a wiki

an effective tool for mass collaborative authoring and knowledge management. Since the problem of vandalism may be an issue, wikis support a function to protocol and archive each change, which can be restored.

Web Syndication

Web syndication integrates different sources of structured Internet resources. RSS (Really Simple Syndication) is a specification of formats used to publish frequently-updated digital content, such as Weblogs, news feeds, or Podcasts. A client program is used to subscribe to one or more feeds. This client then checks if any of those feeds have new content since the last time it checked. RSS formats are specified in XML. RSS software delivers its information as an XML file called “RSS feed” or “RSS channel.”

Weblog

A *Weblog* (or blog) is a user-generated Web site where entries are made in journal style and displayed in a reverse chronological order (Powers, Doctorow, Johnson, Trott, Trott, & Dornfest, 2002). They often provide commentary information or news on a particular subject, such as politics or local news. Weblogs are often used as personal online diaries. A typical Weblog combines text, images, and links to other Weblogs, Web pages, and other media related to a topic. Readers may leave comments in an interactive format in a Weblog.

Podcast

A *Podcast* is an audio file that is distributed by subscription over the Internet using syndication feeds for playback on mobile devices and personal computers. The author of a podcast is often called a podcaster. The term “podcast” is derived from Apple’s portable music player, the iPod. A podcast can be downloaded automatically, using software capable of reading feed formats such as RSS.

Instant Messaging

Instant messaging (IM) is a form of real-time communication between two or more people based on typed text (chatting). The text is transmitted over the Internet. Instant messaging requires the use of a client program that subscribes to an instant messaging service and dif-

fers from e-mail in that conversations are then able to happen synchronously. Most services offer a feature, indicating whether people on a user’s contact list are currently online and available for chat. A user may also set a status message indicating further states.

Social Tagging and Bookmarking

Social bookmarking systems store, classify, share, and search links in the Internet or Intranet. Besides Web page bookmarks, services specialized to a specific kind of object or format such as syndication feeds, books, videos, and more can be found. In a social bookmarking system, users store lists with links to Internet resources that they find useful. These lists are either accessible to the public or a specific network. Other community members with similar interests can view the links by category. Some allow for privacy restrictions.

Social bookmarking systems categorize their resources by the use of informally-assigned, user-defined keywords or *tags*. This aggregation of keywords is also called *folksonomy* in contrast to an ontology that would be created by one or more experts in a certain area. Most social bookmarking services allow users to search for bookmarks which are associated with given “tags” and rank the resources by the number of users that have bookmarked them. Many social bookmarking services cluster particular keywords by analysing relations between them. Further services supplied are rating of contents, commenting, the ability to import and export, add notes, reviews, e-mail links, automatic notification, and create groups.

Prediction Markets

Prediction markets are virtual markets where users buy virtual goods or vote for certain decisions in order to predict which goods are successful. Assets are created whose final value is tied to a parameter (e.g., total sales of product in the next year) or to a particular event (e.g., who will win the next election). The current market prices can then be interpreted as predictions of the probability of the event or the expected value of the parameter.

Members buying low and selling high are rewarded for improving the market prediction, while those who buy high and sell low are punished. Prediction markets seem to be at least as accurate as other institutions predicting the same events with a similar pool of par-

ticipants (Surowiecki, 2004). Prediction markets are rapidly becoming useful decision support tools for companies. Also online role *games* are sometimes classified as social software systems. For example, Second Life, where people can invent a second virtual life for themselves, is such an online community system. In this virtual world, users can buy almost the same things as in the real world. Well-known companies are using this online world to evaluate whether customers will accept certain new products. At the moment, there is a great hype in using these systems; however, the future is uncertain because the users of the system represent only a small group of consumers and, moreover, it is not clear whether certain investments in development in Second Life will be secure since there is no guarantee how long this virtual world will remain.

FUTURE TRENDS

Web 2.0 is a relatively new buzz word, but the successor is already in development. Web 3.0 embraces different ideas from the Semantic Web approach (Berners-Lee, Hendler, & Lassila, 2001). By using semantics (e.g., ontologies), the classification and retrieval of Internet resources can be improved. Moreover, certain processes such as configuration of complex objects (processes, products, and services) may be automated. Ontologies may also support social communities. Folksonomies as used in actual systems may be replaced by ontologies. However, this is also a question of ease of use and user acceptance. In principle, an ontology developed by experts may be more accurate, but users may have different backgrounds which let them communicate with different terms than those of the experts.

Another future trend will be the integration of further media. Thus, we will see the integration of digital television, voice communication, and also communication media for handicapped persons, such as Braille, into such systems. Many existing systems already incorporate mobile clients (e.g., for finding other people in the streets); however, this may be extended further in the future (Eagle & Pentland, 2005).

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KEY TERMS

Folksonomy: A collection of tags (terms) to describe objects of a domain; these are created by a community and not as taxonomies, which are created by experts of a domain.

Mash-up: A social software application that uses components of other applications to offer new aggregated services to its members.

Social Bookmarking: A kind of collaborative indexing of Web pages where users share their Web bookmarks with other members of a community.

Social Software: Software for a certain class of information systems that support the creation of virtual communities.

Social Tagging: Collaboratively defining tags as a meta-information on shared Internet resources.

Syndication: An activity to monitor and feed an application from a number of structured Internet sources.

Web 2.0: A number of recent Internet technologies used to improve the interactivity of Web browsers and the user-friendliness of current Web information systems.

Web Service: A software component or procedure in the Internet that can be called by other software programs; the component and its usage conditions may be announced in a registry. Input and output arguments, as well as service level agreements, are described with XML.

Wiki: An Internet blackboard system where users collectively create a number of interlinked Web pages.