Social Networking: Tools

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Abstract
This entry presents the wide variety of tools available to support social software engineering. Three methodologies are available when making a platform decision: 1) off-the-shelf; 2) mashup; and 3) build your own. This entry provides information to start you moving in a direction that is the most suitable for your organization.

Most professionals, when they think of social networking at all, think in terms of Facebook and Twitter. Chief Information Officers (CIOs) see great potential in these sorts of tools. IBM conducted a worldwide study of 2500 CIOs in late 2010. The collective take on collaboration tools is that they must be institutionalized to meet the demands of business. Surprisingly, as we will shortly show, and with some effort, all of these tools can be institutionalized to enhance the productivity of the software engineering discipline. Based on the popularity of these types of tools among consumers, it is no wonder that a variety of such tools are geared to specific business disciplines.

TOOLS THAT PROVIDE NETWORKING CAPABILITIES
Salesforce.com, the enterprise customer relationship management giant, has begun to provide social networking capabilities. Its new Chatter service is available on Salesforce’s real-time collaboration cloud. Users establish profiles and generate status updates that may be questions, bits of information and/or knowledge, or relevant hyperlinks. All of this information is then aggregated and broadcast to coworkers in their personal networks. Essentially, a running feed of comments and updates flow to those in a particular network. Employees can also follow colleagues throughout a company, not just in their own personal networks, enabling cross-organizational knowledge sharing. Toward that end, Chatter also provides a profile database that users can tap into to find needed skills for a particular project. Chatter is accessible via desktop or mobile.

Like Salesforce.com, more than a handful of well-known software companies have developed collaboration tools, all for a fee. Oracle’s Beehive provides a spate of tools such as instant messaging, e-mail, calendaring, and team workspaces. Microsoft’s SharePoint is heavily used within IT departments. Microsoft’s Lync Server product that permits users to communicate from anywhere via voice, video, or document share is also becoming a contender. One of the first companies to dabble in the collaborative market—indeed they created it—was Lotus. Now owned by IBM, Lotus Notes brings together a wide array of tools: instant messaging, team rooms, discussion forums, and even application widgets.

A wide variety of free tools are available, which may be adapted for various purposes. LinkedIn has been widely used to provide networking capabilities for business people. A relevant feature is the LinkedIn group that may be created for any purpose, with permission required to join. Thus, project teams can make use of the already developed facilities LinkedIn provides. For example, the Tata Research Development and Design Centre (TRDDC) was established in 1981 as a division of Tata Consultancy Services Limited, India’s largest information technology (IT) consulting organization. TRDDC is currently one of India’s largest research and development centers for software and process engineering. TRDDC has its own membership-by-request LinkedIn group. It is very easy to create a members-only LinkedIn group for a particular project, which can be limited to specific members, as shown in Fig. 1.

Of all the collaborative tools available, particularly those that are free, wikis are the most commonly used. Zoho.com provides a wide range of tools, including chats, discussions, meetings, and projects, but it is their wiki tool I will focus on. Fig. 2 is a wiki I created to store all the artifacts for a typical project, i.e., project plan, systems requirement specifications, analysis documents, etc. Fig. 3 shows the project plan artifact in wiki form. Note the ability to post comments.

Twitter, a social networking application made famous by celebrities who tweet hourly updates on what they are doing (eating lunch, shopping, etc.), has morphed into an enterprise social networking application called...
Fig. 1 Creating members-only LinkedIn group.

Fig. 2 Project artifact wiki.
Yammer. With the ability to integrate with tools such as SharePoint, Yammer provides a suite of tools including enterprise microblogging, communities, company directories, direct messaging, groups, and knowledge bases. SunGard employees actually started using Yammer on their own to share information about projects they were working on. Now, Yammer has been rolled out to all 20,000+ employees. Much of what Yammer offers is free with its basic service. A gold subscription provides such corporate niceties as security controls, administrative controls, broadcast messages, enhanced support, SharePoint integration, keyword monitoring, and virtual firewall solutions. Yammer can be used by the software development team to interactively discuss any aspect of a project, as shown in Fig. 4.

Project groups have used wikis in some creative ways: writing personal research and making comments on others’ research, asking questions, posting links to resources that may be of interest to others in the group, adding details for upcoming events and meetings, letting each other know about activities, adding comments to other team members’ information and pages, and recording minutes of meetings in real-time. One may expect that use of these sorts of ad hoc discussion tools would degenerate into chaos. In truth, this rarely happens—even in social networks of anonymous users. Anderson\(^\text{[1]}\) talks about the fact that the largest wiki of all, Wikipedia, is fairly resistant to vandalism and ideological battles. He stresses that the reason is “the emergent behavior of a Pro-Am [professional and amateur] swarm of self-appointed curators.” This group of curators has self-organized what Anderson terms the most comprehensive encyclopedia in history—creating order from chaos. Welcome to the world of “peer production.”

**WIKIS IN ACTION**

Intellipedia (https://www.intelink.gov/wiki) is an online system for collaborative data sharing used by the United States intelligence community (IC). It consists of three different wikis with different levels of classification: Top Secret, Secret, and Sensitive But Unclassified. The levels used by individuals with appropriate clearances from the 16 agencies of the IC and other national-security-related organizations, including Combatant Commands and other federal departments. The wikis are not open to the public.

Intellipedia includes information on the regions, people, and issues of interest to the communities using its host networks. Intellipedia uses MediaWiki, the same software used by the Wikipedia free-content encyclopedia project. Officials say that the project will change the culture of the U.S. IC, widely blamed for failing to “connect the dots” before the September 11, 2001 attacks.

The Secret version predominantly serves Department of Defense and Department of State personnel, many of whom do not use the Top Secret network on a day-to-day basis. Users on unclassified networks can access...
Intellipedia from remote terminals outside their workspaces via a virtual private network, in addition to their normal workstations. Open Source Intelligence (OSINT) users share information on the unclassified network.

Intellipedia was created to share information about some of the most difficult subjects facing U. S. intelligence and bring cutting-edge technology into its ever-more-youthful workforce. It also allows information to be assembled and reviewed by a wide variety of sources and agencies, to address concerns that prewar intelligence did not include robust dissenting opinions about Iraq’s alleged weapons programs. Some view Intellipedia as risky because it allows more information to be viewed and shared, but most agree that the result is worth the risk.

The project was greeted initially with a lot of resistance because it runs counter to past practices that limited the pooling of information. Some encouragement has been necessary to spur contributions from the traditional IC. However, the system appeals to the new generation of intelligence analysts because this is how they like to work, and it represents a new way of thinking.

The wiki provides so much flexibility that several offices throughout the community use it to maintain and transfer knowledge about daily operations and events. Anyone with access to read it has permission to create and edit articles. Because Intellipedia is intended as a platform for harmonizing the various views of the agencies and analysts of the IC, Intellipedia does not enforce a neutral point of view policy. Instead, viewpoints are attributed to the agencies, offices, and individuals participating, with the hope that a consensus view will emerge.

During 2006 and 2007, Intellipedia editors awarded shovels to users to reward exemplary wiki “gardening” and encourage others in the community to contribute. A template with a picture of the limited-edition shovel (actually a trowel) was created to place on user pages for Intellipedians to show their gardening status.
handle is imprinted: “I dig Intellipedia! It’s wiki wiki, baby.” The shovels have now been replaced with mugs bearing the tag line “Intellipedia: it’s what we know.” Different agencies have experimented with other ways of encouraging participation. For example, Central Intelligence Agency managers have held contests for best pages and awarded prizes such as free dinners.

Chris Rasmussen, a knowledge management (KM) officer at the Defense Department’s National Geospatial Intelligence Agency (NGA), argues that “gimmicks” like the Intellipedia shovel, posters, and handbills encourage people to use Web 2.0 tools like Intellipedia, and they are effective low-tech solutions, and using them is easy to promote. Also, Rasmussen suggests that social software-based contributions should be written in an employee’s performance plan.

MEANING-BASED COMPUTING

Even before the advent of social networking, the sheer amount of data needed to be processed by a worker was overwhelming. Researchers and writers talked about information overload decades ago. Now data arrives from many more directions, much of it unstructured and unordered (e-mail, IM, video, audio, etc.). Wall Street technologies have a solution for such data overload. They make use of powerful computers to speed-read news reports, editorials, company websites, blogs, posts, and even Twitter messages. Intelligent software then parses all the input and figures out what it means for the markets. If only we could have a smart software like this for our IT-oriented blog, wiki, discussion group, and other types of messages!

Autonomy.com is a leader in the movement toward finding a way to add a sort of autonomy to this disorganized chaos of data. Termed meaning-based computing, the goal is to give computers the ability to understand the concepts and context of unstructured data, enabling users to extract value from the data where none could be found earlier. Meaning-based computing systems understand the relationships between seemingly disparate pieces of data and perform complex analyses of such data, usually in real-time. Key capabilities of meaning-based computing systems are automatic hyperlinking and clustering that enable users to connect to documents, services, and products that are linked contextually to the original text. The ability to collect, analyze, and organize data automatically to achieve this end requires these computer systems to extract meanings. Autonomy’s meaning-based computing platform known as Intelligent Data Operating Layer (IDOL) is capable of processing any type of information from any source. IDOL can aggregate hundreds of file formats including voice, video, document management systems, e-mail servers, web servers, relational database systems, and file systems.

Google’s most recent plans for “augmented humanity” will most certainly give Autonomy.com something to think about. According to Google CEO Eric Schmidt, Google knows pretty much everything about us: “We know roughly who you are, roughly what you care about, roughly who your friends are.” Schmidt sees a future in which people simply don’t forget anything because the computer (read that Google) remembers everything. Some of these abilities are already available if you use Google tasks, contacts, calendar, and documents. Your searches are stored and accessible by Google. If you use Google e-mail and chat, this data lives on Google servers as well. Google’s plan is to be able to suggest what you should do based on what your interests or knowledge requirements are. It intends to use this knowledge to suggest ideas and solutions that you may have found, if you performed your own analysis. Some writers are comparing this eventuality as a clone or “your own virtual you.”[2] Coupled with Google’s new voice synthesizer that can replicate an individual voice, it’s not much of a stretch to find that one day you will go on vacation and your clone will give your team a call to set up a project meeting.

SEMANTIC WEB

Google cloning is actually an extension of technology that exists today. Tim Berners-Lee, the inventor of the World Wide Web and HTML, also came up with the idea of a semantic web as shown in Fig. 5. The semantic web represents a synthesis of all corporate and external data, including results from data mining activities, hypermedia, knowledge systems, etc. It uses a common interface that makes data easily accessible by all (e.g., suppliers, customers, employees).

The semantic web is sometimes called the defined web, and serves as an ultimate repository of all content and knowledge on the web. It uses Extensible Markup Language (XML), a formalized version of HTML, to tag information on intranets, extranets, and the Internet. Tim Berners-Lee explains the semantic web as follows:
At the doctor’s office, Lucy instructed her semantic web agent through her hand-held web browser. The agent promptly retrieved information about mom’s prescribed treatment from the doctor’s agent, looked up several lists of providers, and checked for the ones in-plan for mom’s insurance within a 20-mile radius of her home and with a rating of excellent or very good on trusted rating services. It then began trying to find a match between available appointment times (supplied by the agents of individual providers through their websites) and Pete’s and Lucy’s busy schedules.

Hewlett-Packard’s Semantic Web Research Group frequently circulates items of interests such as news articles, software tools, and links to websites; they are called snippets or information nuggets.[3] Because e-mail is not the ideal medium for this type of content, the group had to find a technique for decentralized, informal KM. They began a research project to create a system capable of aggregating, annotating, indexing, and searching a community’s snippets. The required characteristics of this for this system include:

- Ease of use and capture.
- Decentralized aggregation. Snippets will be in a variety of locations and formats. It will be necessary to integrate them and perform a global search of the results.
- Distributed knowledge. Information consumers should be able to add value by enriching snippets at the point of use by adding ratings, annotations, etc.
- Flexible data model. Snippets are polymorphic. The system should be able to handle e-mail, web pages, documents, text fragments, images, etc.
- Extensible. It should be possible to extend snippet data schema to model the changing world.

Inferencing. It should be possible to infer new metadata from old. For example, a machine should “know” that a snippet about a particular HP Photosmart model is about a digital camera.

Some have suggested that blogs make ideal tools for this type of content and KM. However, today’s blogging tools offer only some of the capabilities mentioned. Traditional blogging has many limitations but the most important one is that metadata is used only for headline syndication in a blog. Metadata is not extensible, not linked to a risk-flexible data model, and incapable of supporting vocabulary mixing and inferencing.

The researchers, therefore, looked to the semantic web for a solution. As discussed previously, the premise of the semantic web is that data can be shared and reused across applications, enterprises, and community boundaries. RSS1.0 (web.resource.org/rss/1.0) is a semantic web vocabulary that provides a way to express and integrate with rich information models. The semantic web standard Resource Description Framework specifies a web-scale information modeling format (http://www.w3.org/RDF). Using these tools, researchers devised a prototype (http://www.semanticblogging.org/blojsom-hp/blog/default/) for creating what they called a semantic blog. The prototype has some interesting searching capabilities. For example, snippets can be searched via their own attributes (“I’m interested in snippets about HP”) or via the attributes of an attached blog entry (“I’m interested in snippets captured by Bob”).

VIRTUAL WORLDS

Perhaps the most interesting of all social-based community software is Linden Labs’ Second Life (http://www.secondlife.com). While Second Life is used primarily for such fun activities as fantasy role-playing (pirates, Goths, science fiction, etc.), the software has a serious side.

In 2008, IBM’s Academy of Technology held a virtual world conference and annual meeting in Second Life, as shown in Fig. 6. The virtual meeting conference space had room for breakout sessions, a library, and areas for community gathering.

IBM estimates that the return on investment for the virtual world conference was about $320,000 and that the annual meeting cost one-fifth that of a real-world event (http://work.secondlife.com/en-US/successstories/case/ibm/). Just think of the possibilities. Project team members near and far can use Second Life to hold virtual but tactile team meetings and even work with end users.
KM TOOLS

KM has been defined as the identification and analysis of available and required knowledge and the subsequent planning and control of actions to develop these into “knowledge assets” that will enable a business to generate profits and/or increase its competitive position. The major focus of KM is to identify and gather content from documents, reports, and other sources and be able to search such content for meaningful relationships. A variety of business intelligence, artificial intelligence, and content management methodologies and tools constitute the framework under which KM operates. While we will discuss the relationship of KM, social networking, and software engineering in more depth later, it is worthwhile to briefly address the best-known KM construct now.

Individual groups who share knowledge about a common work practice over time, while not part of a formally constituted work team, are considered “communities of practice” (CoPs) that generally cut across traditional organizational boundaries. They enable individuals to acquire new knowledge faster. They may also be called communities of interest if the people share an interest in a common task but do not necessarily perform the work on a daily basis. For example, in one government agency, a group of employees who were actively involved in multiparty, multi-issue settlement negotiations began a monthly discussion group during which they explored process issues, discussed lessons learned, and shared tools and techniques. CoPs can be more or less structured, depending on the needs of the membership.

CoPs provide mechanisms for sharing knowledge throughout one organization or across several organizations. They lead to improved networks of organizational contacts, supply opportunities for peer-group recognition, and support continuous learning, all of which reinforce knowledge transfer and contribute to better results. They are valuable for sharing tacit (implicit) knowledge. To be successful, CoPs require support from organization(s). However, if management closely controls their agendas and methods of operation, they are seldom successful. This issue is more applicable to CoPs within organizations.

CoPs can be used virtually anywhere within an organization: within one organizational unit or across organizational boundaries, with small or large groups of people, in a single or multiple geographic locations. They can also be used to bring together people from multiple companies, organized around a profession, shared roles, or common issues. They create value when tacit information, if shared, produces better results for individuals and the organization. CoPs are also valuable in situations where knowledge is constantly gained and shared, which is beneficial to the accomplishment of an organization’s goals.

CoPs serve a number of purposes. Some develop best practices, some create guidelines, and others meet to share common concerns, problems, and solutions. They can connect in different ways: personally, in small or large meetings, or electronically. These virtual CoPs are called VCoPs.

VCoPs (as well as face-to-face CoPs) need a way to capture their collective experiences for online examination. Daimler AG does this via its Engineering Book of Knowledge (EBOK) system that provides best practice information on almost every issue related to the manufacture of cars. Tech CoPs share knowledge related to various car processes by consolidating the information into the EBOK system.

CoPs provide a great amount of what academics called social capital that provides the motivation and commitment required to populate knowledge stores such as EBOK. CoP has historically been used for small team interaction. More recently, some organizations are attempting to use it for large group interventions, although some dispute whether this can be effectively done at all. In experiments, up to 300 people were brought together within a CoP to work through organizational issues. While it would be unusual for a software engineering effort to involve such large populations, it would not be out of the question to have to develop a system in which team members and stakeholders, together, approached this number. A variety of CoP-based designs apply to groups of this size. The World Café is perhaps the best known and most popular example of them all; others are Open Space Technology, Participative Design, and Wisdom Circles.

The World Café ([http://www.theworldcafe.com/](http://www.theworldcafe.com/)) describes its process as an innovative yet simple methodology for hosting conversations. These conversations link and build on each other as people move among groups, cross-pollinate ideas, and discover new insights into the questions and issues raised. As a process, the World Café can evoke and make visible the collective intelligence of any group, thus increasing capacity for effective action in pursuit of a common aim.

In a face-to-face environment, the way to do this is simple. Tables allow seating for a series of conversational rounds lasting from 20 to 45 minutes, each of which intends to tackle a specific question. Participants are encouraged to write, doodle, or draw key ideas and themes on the tablecloths, as shown in Fig. 7. At the end of each round, one person remains at the table as the host and the others travel to new tables. The hosts welcome the newcomers and share the table’s conversation so far. The newcomers share what they discussed from the tables they’ve already visited and so on. After the last round, participants return to their individual tables to integrate all the information. At the end of the
session, everyone shares and explores emerging themes, insights, and learning. The process serves to capture the collective intelligence of the group.[4]

Visiting the World Café’s website demonstrates how the construction was modified to suit the online environment. One output of this type of brainstorming session might be a “tag cloud” or visual depiction of user-generated tags based on discussions. Tags are usually single words, usually listed alphabetically. The importance of a tag is shown by font sizes or colors as shown in Fig. 8.

Tag clouds were popularized by websites such as Flickr and Technorati. They actually serve a very useful purpose for software engineers by providing methods to classify, organize, and prioritize the results of meetings. Because individual tags may be hyperlinks, it is possible to tag clouds to store increasingly granular levels of information. Perhaps the best-known cloud tag generator is Wordle (http://www.wordle.net/create).

MASHUPS

Web developers have long been engaged in what is known as service composition—the practice of creating value-added services by reusing existing service components. Mashups represent an emerging paradigm of Web 2.0 that enables developers and very talented end users to create new web-based applications and services, which address specific needs and interests. Mashup implies fast integration. This is achieved by using open APIs and data sources to produce enriched results that were not necessarily the original reasons for producing the raw source data. Mashup tools generally support visual wiring of GUI widgets, services, and components together.

Some tech leaders have discontinued their mashup tool offerings (Microsoft’s Popfly in 2009 and Google’s Mashup Editor in 2009). However, Yahoo Pipes (http://pipes.yahoo.com/pipes/) is still supported. As Yahoo describes it:

Pipes is a free online service that lets you remix popular feed types and create data mashups using a visual editor. You can use Pipes to run your own web projects, or publish and share your own web services without ever having to write a line of code. You make a Pipe by dragging pre-configured modules onto a canvas and wiring them together in the Pipes Editor. Each Pipe consists of two or more modules, each of which performs a single, specific task. For example, the Fetch module will retrieve a feed URL, while the Sort module will re-order a feed based on criteria you provide (you can find a complete list of available modules in the documentation). You can wire modules together by clicking on one module’s output terminal and dragging the wire to another module’s input terminal. Once the terminals are wired together, the output from the first module will serve as input to the second module. In addition to data feeds, Pipes also lets you add user input fields into your Pipe. These show up at runtime as form fields that users of your Pipe can fill in.

JackBe Corporation is a privately held software provider of enterprise mashup software. JackBe’s flagship product is an enterprise mashup platform called Presto (http://www.jackbe.com/products/), with support for
Microsoft SharePoint. JackBe launched its Enterprise App Store product in July 2010 as a platform for creating internal enterprise application stores. Enterprise App Store is aimed at non-developers, allowing them to create new business applications and share them with other users. JackBe is a founding member of the Open Mashup Alliance (OMA) that promotes enterprise mashup interoperability and portability. JackBe was the original contributor and continues to be a key supporter of OMA’s Enterprise Mashup Markup Language (EMML), an XML markup language for creating enterprise mashups. These software applications consume and “mash” data from variety of sources, often performing logical or mathematical operations, as well as presenting data. Mashed data produced by enterprise mashups is presented in graphical user interfaces as mashlets, widgets, or gadgets. EMML is an open language specification promoted by OMA. EMML is fairly easy to understand and use because it is a derivative of the now-familiar XML. For example, the EMML code below joins Yahoo! News, Financial News, and Reuters feeds.

```xml
<merge inputvariables="$YahooRSS, $FinancialNewsRss, $ReutersRSS"
       outputvariable="$NewsAggregate"/>

EMML provides a common command to invoke any publically accessible web service or website using the <directinvoke> operation. The following code shows how this operation can be used to access the Google Finance web page and retrieve the financial information for the ticker through the web clipping feature provided by EMML. Web Clipping converts the HTML result of any URI into XHTML and gives you a clip of the required content from the web page:[5]

```xml
<foreach variable="value" items="$itemNames/records/record">
  <template expr="http://finance.google.com/finance?q={$ticker}" outputvariable="wholeURL"/>
  <!-- invoke the Google Finance web page that has stock information -->
  <directinvoke outputvariable="clipresult" endpoint="$wholeURL"/>
  <assign fromexpr="$clipresult/xhtml:div[@class = 'g-section sfe-break-bottom-8']" outputvariable="clipresult2"/>
  <assign fromexpr="$clipresult2/xhtml:h3/ string ()" outputvariable="$company"/>
  <assign fromexpr="$clipresult/xhtml:span[@class = 'pr']" outputvariable="clipresult3"/>
  <assign fromexpr="$clipresult3/xhtml:span/string ()" outputvariable="$price"/>
  <assign fromexpr="$clipresult/xhtml:div[@id = 'price-change']" outputvariable="clipresult4"/>
  <assign fromexpr="$clipresult4/xhtml:span[@class = 'chg']/string ()" outputvariable="change"/>
</foreach>
```

Detailed documentation for EMML can be found on the OMA website (http://www.openmashup.org/omadocs/v1.0/index.html).

**CONCLUSION**

As you can see, a wide variety of tools are available to support social software engineering and you can choose from three methodologies when making a platform decision: 1) off-the-shelf; 2) mashup; and 3) build your own. This entry has provided information to start you moving in a direction that is the most suitable for your organization.

**REFERENCES**