Technology for communities

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This essay is the first published work from a larger effort leading to a report on technologies for communities of practice. For progress on this report see our website at http://technologyforcommunities.com/

This chapter summarizes the findings of a larger study of communities of practice and the technologies they use to create a sense of togetherness over time and across distances. It discusses the contribution that technologies can make to communities of practice. It analyzes the evolution of the market and its structure and describes some examples of new tools available to communities. It outlines some of the challenges involved in selecting technologies and offers some techniques for making a community aware of technology without over-emphasizing it.

Section 1: Introduction

In 2000, the US Federal Government's Council of CIOs commissioned Etienne Wenger to do a study of the technologies designed to support communities of practice. His report described Internet tools that were explicitly designed for communities of practice, as well as tools that were designed for other purposes such as instruction, collaboration, document storage, and conversation, but that communities of practice had adopted. It described and compared the functionality of many different tools and proposed some fundamental dimensions that helped make sense of the market at that time. The report was refined and distributed widely on the Internet the following year (see http://www.ewenger.com/tech/). Many people found it to be useful in thinking about the market for technologies and the technology needs of communities of practice.

Since the publication of the first report, the technologies available to communities of practice have proliferated. This prompted us to produce a new report (see http://www.technologyforcommunities.com/). The new version reflects our practice and experience with these technologies and the experience of communities who have used them over extended periods of time as well as the evolution of the market. Many of the products described in the first report no longer exist or have been incorporated into other products. More technologies have been incorporated into the regular life of communities, alone and in combination with each other. Their use has become more varied and inventive. This has stimulated our thinking about how communities of practice and technologies shape each other.

This chapter summarizes our principal findings. It should interest community leaders and their sponsors because technology plays an increasingly important role in the life of many communities. With the technologies discussed here, communities reach out across much greater distances than ever before. Participation is richer and can be more meaningful despite limited "face time." The technologies discussed in this report are regularly used not only by distributed communities but also by communities that mostly meet face-to-face, whether to share documents, stay in touch between meetings, or send out announcements. Just as we find interesting variance in the way members of any given community use available technologies, we find a great deal of variance between communities, with a lot of room for community growth and development as new tools are added to a community's mix.

The way communities of practice use technologies should be of interest to technologists, whether they are directly supporting communities or not. The close, voluntary collaboration in communities enables their members to invent and share new uses for all of the technologies at their disposal—they are a vector for the dissemination of technology. The social lens needed to understand the way communities of practice use technology can be helpful in understanding many of the issues faced in other distributed group interactions, from virtual teams, to collaborative projects, to informal networks.

As communities of practice around the globe appropriate technology in new ways to serve their purposes, the technologies becoming available to them are also evolving. So is our understanding of the affordances and community uses of those technologies. Our research is a contribution to a broader conversation about these developments—with participants in that conversation often using the very technologies we are describing. This chapter, therefore, is a snapshot of an ongoing evolution and, we hope, a stimulus to the conversation as well.

Section 2: A community perspective on the role of technology

Inherent in the experience of community are some fundamental tensions that require inventiveness. Two of them are particularly relevant for understanding how technology intersects with communities.

First, a community implies an experience of togetherness that extends through time and space. The continuity of togetherness is what creates the community but it is experienced by members in a rhythm of specific activities located in time and space. Separation in time and space then creates a dilemma for communities. How can we experience togetherness even though we cannot be together face-to-face? How can the togetherness of a few members (a meeting, a conversation) be made part of the experience of the whole community? One critical role of technology then is to provide new resources for making togetherness more continuous in spite of separation in time and space.

A second tension involves the relationship between communities and individuals. Togetherness is a property of communities, but it is something that is generated and experienced by individual members. These members are not only members of one community. They are participate in a number of communities, teams, and networks—active in some, less so in others. Communities cannot expect to have the full attention of their members nor can they assume that all their members have the same levels of commitment and therefore the same needs. Conversely, members have to deal with the increasing volume and complexity of this multimembership. They have to find meaningful participation in all these relationships while preserving a sense of their own identity.

This complex character of the personal experience of community is all the more relevant when one talks about technology-mediated togetherness. Technology can heighten the individual character of the experience of community, because the experience of community becomes something that participants project into their experience of the technology. A subtle entailment of this projection is the danger of confusing the community with the technology: it is a community you belong to, not an e-mail list. Furthermore, the mediation of a screen or a phone line increases the possibility of diverging interpretations and broadens the range of levels of participation and commitment. All this calls for new breeds of interfaces and devices that bring the experience of community to the individual. Community technology is designed for communities, but it is experienced by individual members when they use the technology to connect with the community.

The act of community is therefore a very creative act by which communities and their members invent ways of dealing with these tensions. To this end, they use all the resources available to them. What technology has done over time is increase the array of resources available to communities and their members to deal with these tensions. They have not made the tensions disappear. They have not resolved them. In some cases, they have made them worse: today an individual can easily be overwhelmed by the amount of material produced in a community and made available online. Nevertheless, to understand the evolution of the field of community technology, one has to understand how new technologies do or do not provide new resources for addressing these tensions inventively.

Communities experience these tensions in many activities that are often mediated, supported, or enhanced by technology. These include:

- **Interacting**: To discuss issues, agree and disagree, brainstorm, work on tasks, ask and answer questions, etc., members need to connect, in and across time and space.

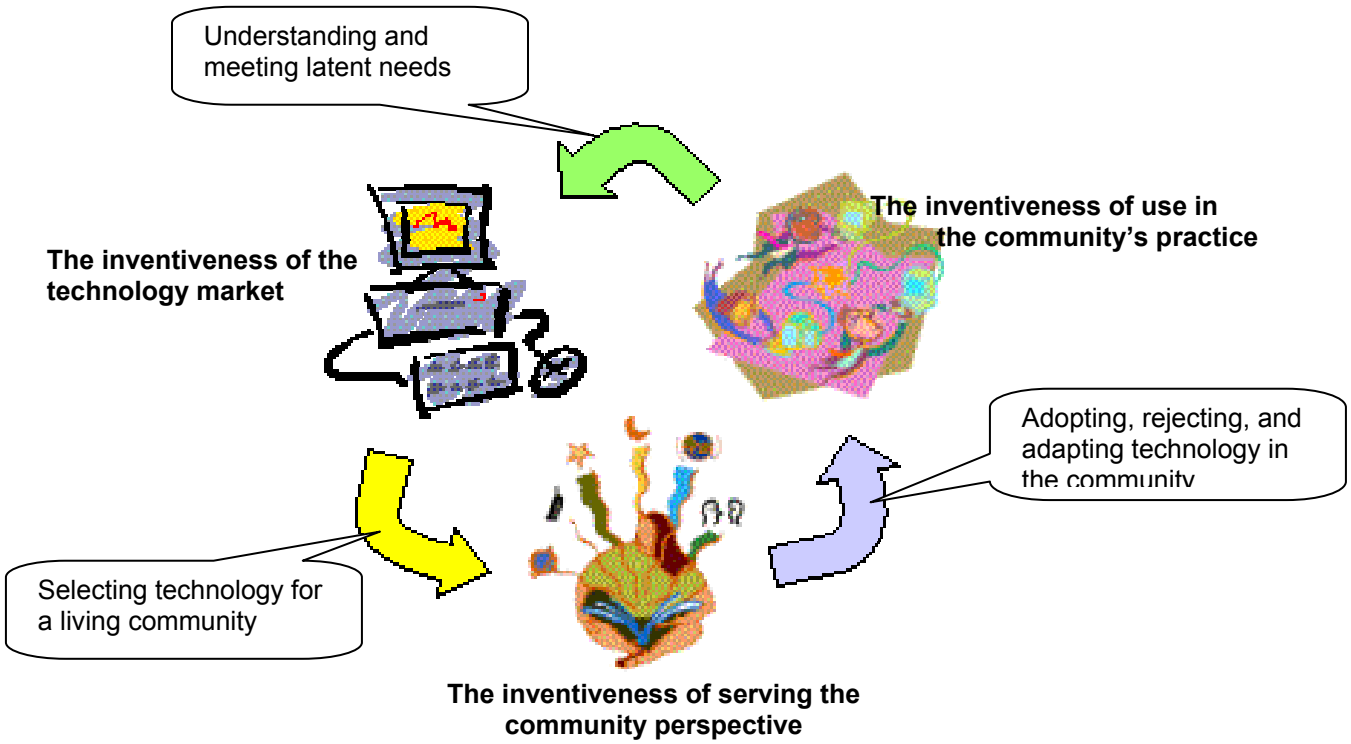

Figure 1 – The cycle of inventiveness by which technology and communities influence each other.

- **Publishing**: To produce, share, and collect artifacts that are relevant to their practice, members need to organize communal repositories as well as individual access to them.
- **Tending**: To nurture their togetherness, members need to find ways to participate personally as well as cultivate their community. This requires being able to see the community as community: understanding its pulse, its forms of participation, its evolving structure, its emerging roles, and its changing interests and needs.

All members contribute to the togetherness of the community by participating more or less actively, but the role of cultivating the community is often taken on by a person or a small group, though this stewardship usually becomes more distributed in mature communities. In a community that depends on technologies for being together, tending to the technology becomes an important role. In the following discussion we use the label "technology steward" to refer to this "tending to the technology" role as if it referred to one person even though in many cases it's a role that involves several people. This tending role, whoever contributes to it, includes configuring an array of technological support that enables the community to function. The technology steward role entails three moments of inventiveness by which a community comes to find the technology it needs:

- **The inventiveness of the technology market**: understanding the evolving, exploding market of relevant technologies as it provides new resources for communities
- **The inventiveness of serving the community perspective:** seeing this market from the perspective of a living community in order to select and provide technologies that fit its specific activities and experience of the tensions
- **The inventiveness of use:** supporting the way the community does and does not use its technological resources, attending especially to the ongoing inventiveness of members in their use of technology and the discovery of unmet needs

Figure 1 places these three contributing factors in a cycle by which community and technology influence each other. Because the point is to provide resources for the community's inventiveness rather than resolving the tensions, there is no "perfect" technology configuration. It is a moving target, different from community to community and over time.

The next three sections each address one of these moments in the cycle of Figure 1. We start with the need to understand the technology market, then move on to the process of selecting technology for a community, and end with the importance of supporting technology in use.

Section 3: Understanding the evolving technology market

The market of products potentially useful to communities has changed significantly in recent years. Not only are there more tools, but there are also more niche configurations aimed at different segments of the distributed interaction market. Which of these can be useful to communities, regardless of their niche of origin? And in what ways can they be useful? Just as the increasing use of technology to support communities has forced us to look carefully at the underlying dynamics of communities, encouraging a combination of technical and social invention, so has the community perspective forced us to look at available tools on the market in a new and deeper way.

Early taxonomies focused on a fairly limited set of technologies that were experienced in a fairly consistent manner. Some classified tools into four quadrants: same time/same place, same time/different place, same place/different time and different place/different time as illustrated in Figure 2. This perspective revealed how technology could expand the possibilities for interaction over time and space.

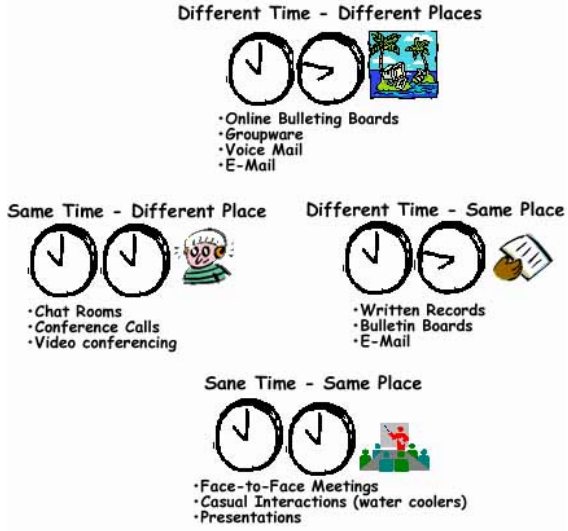

Figure 2: the classic time/place taxonomy

Other taxonomies expressed functional classifications around what could be done with a tool: tools for discussion. For document management, for file sharing, etc. This suggested that a tool could prompt a community to explore a new potential activity. For example, the introduction of a new file-sharing program might have prompted a group to ask if file sharing was something they wanted to do.

These taxonomies represented significant advances for the field. New tools suggested new possibilities for distributed groups at a time when experience and imagination around distributed activity was just emerging and beginning to drive adoption patterns. But early taxonomies generally assumed a single function per tool. In practice, people had to bridge between these modes and tools.

Experience and application of these technologies over time along with the introduction of new technologies reveal a more complex picture. Things no longer "fit" very well when one considers the full range of activities and needs of actual communities and their members. A number of questions seem to go unanswered: How to support sociability, identity, and togetherness over time? What classification embraces functions that are not driven by a single tool and but still need the support of tools, such as the emergence of a community perspective or the role of community leaders? How should we think about "technology platforms" when communities improvise their way out of gaps in their assigned "toolset": they

just reach outside of pre-configured “platforms” and invent new ways of doing things? How should we classify uses or tools when individuals and communities don’t necessarily use technologies in consistent or intended manners?

One way to start addressing these questions is to inventory the market of tools available for communities in a single diagram. Figure 3 attempts to capture in one glance how the current inventory of tools fit in the range of activities and tensions we find in communities. The diagram has five regions. On the outer band are three general types of activities: synchronous interactions, asynchronous interactions, and publishing. In the middle are community-building activities, showing individual participation on the left and cultivation from the perspective of tending for the community’s togetherness on the right. We have attempted to place each tool in a location that gives some insights as to its intended use, and when possible, its relation to other tools. Such a synoptic two-dimensional representation inevitably involves compromises that highlight some aspects and miss others, but it does place tools in a broader landscape that reflects their overall relation to community life.

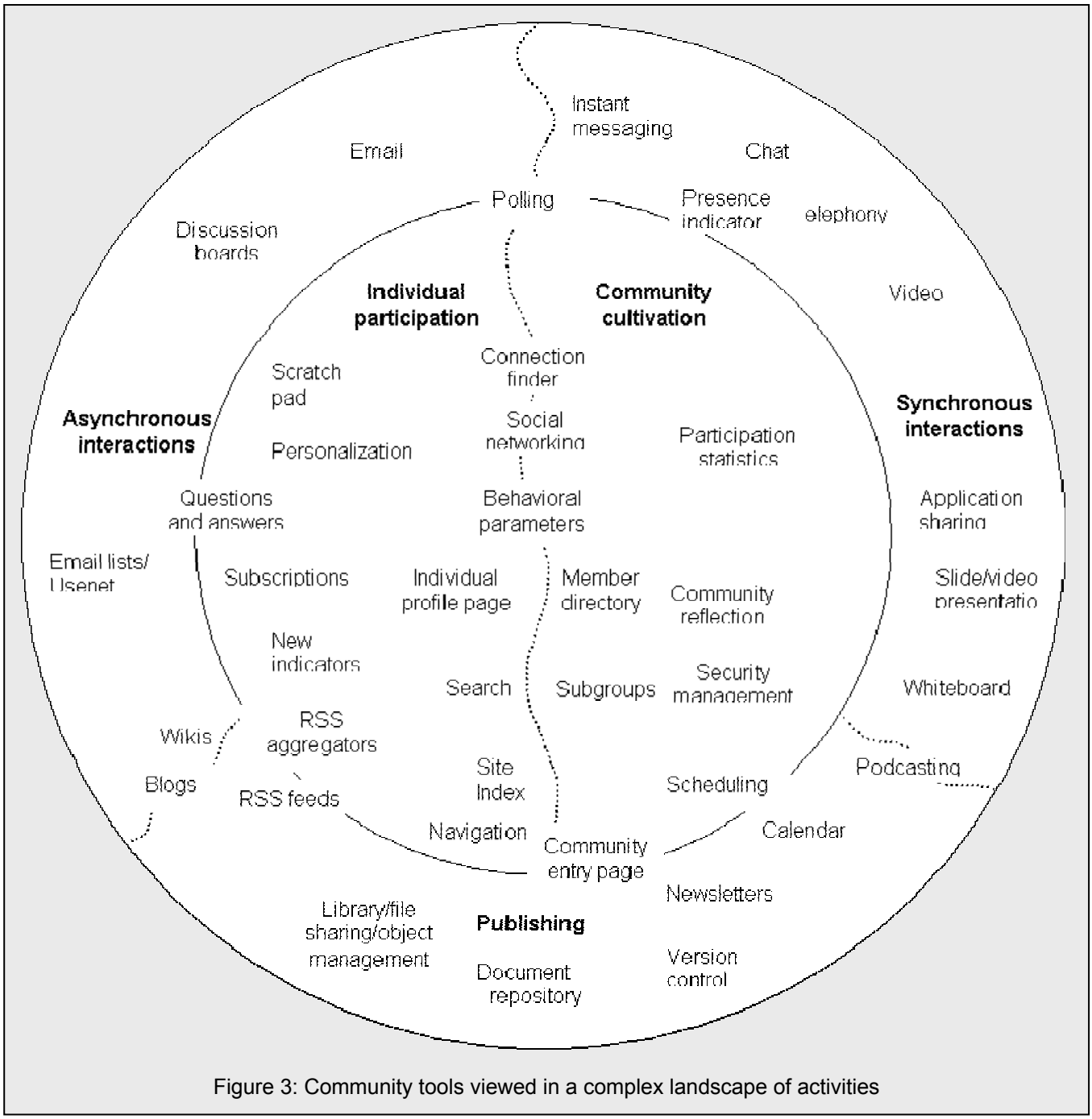

Figure 3: Community tools viewed in a complex landscape of activities

Two observations about the diagram reveal somewhat diverging trends in the market today.

First, in the last few years, there has been a notable change in how tools appear on the market. Many of the tools in the diagram were free-standing products just a few years ago: discussion boards, IM applications, and document repositories. Today, most products available on the market are “platforms” that combine tools from across the diagram. Even previously simple applications like instant messaging have turned into platforms that include applications sharing, VOIP telephony, individual profile pages, personalization, directories, and search.

The emergence of bridging tools: the story of blogs and RSS

Five years ago, a community might have static web page to describe its activities and publish static content, a discussion tool where static content was discussed or developed, and if you were lucky, an email newsletter to alert members when new material was posted on the static site. The static pages represented community and individual publishing and were usually managed by the one or few members who had sufficient skill with HTML. The discussion tools were places for meaning-making and social interaction. Alerts helped focus the community's attention and often relied on an individual to create and send them. If you followed more than one community web site or discussion, you had to keep track of each set separately. Publishing, commenting and discussion and subscriptions were three distinct buckets.

Then there was a shift in technology. The desire for "easy web page publishing" led to the birth of web-logs or blogs. Blogs made publishing easy, but also made it personal, adding individual voice to the conversations in cyberspace. When comments were added (readers could post their thoughts attached to specific blog posts), blogs became more conversational, like discussion boards, with time stamps. Blogs bridged across the previously distinct "buckets" of web publishing and discussions, but also moved from a centralized to distributed publishing model.

Because blogs made publication easy, they resulted in a huge increase in published content. Individual and community voices could now spring up easily and effortlessly. This in turn created a new tension: how to make sense of all these voices? RSS, or "really simple syndication" emerged, allowing an individual to subscribe to a group of blogs. RSS readers allowed subscribers to combine and recombine published postings in ways that made individual sense, and receive updates from those sites.

Recognizing how RSS feeds focused attention on blogs, other web page publishers began adding feeds to their sites, compounding the type and volume of content a reader could subscribe to and configure, creating new tensions and opportunities for knowledge flow and interaction.

Once individuals had a way to track emergent content and ideas, they could respond to someone else's post on their own blog (referencing a posting on another blog), or they could add a comment on another person's blog. With tools such as trackbacks, they could be alerted to posts referencing their posts, enabling rapid replies and leading to new comments and new content. New patterns and connections emerged as a result, bridging the individual voices of blog authors into wider networks and communities linked by common domains and personal relationships. As a result conversational boundaries were much looser, shaped by attention rather than the platform boundaries of a discussion board or email list. Communities emerged around (or flocked to) these conversations.

Easy-to-use publishing (blogs, comments) and subscription tools (RSS and trackbacks) resolved and at the same time reinvented the tensions between interaction and publication and between the individual and the community. Individuals no longer had to stay within one tool set or platform, but could now move more easily across tools and communities, within one set of protocols. It would not surprise us to soon find new practices and tools that support the community-tending aspect of these new, much looser communities that gather in the blogosphere.

This emerging class of flexible, boundary-spanning tools has been called social software by its proponents. The label points to the user's ownership of their software-mediated experience and to the ways that the software bridges between the individual and the group. Easy publication and easy group formation, driven by individuals, are key phrases in this new frame for online collaborative technologies.

technology resources that fit their changing understanding of their changing needs. The need to manage multimembership also places some limits on the consolidating logic. Individuals belong to multiple communities that may be on different platforms. For them integration calls for a bridging logic. From a bridging perspective, it may be more productive to have light modules that are made compatible through standards like XML, API, and RSS syndication. These modules may be single tools or small clusters of neighboring tools that can be “plugged” into each other or “talk” to each other.

There are paradoxical forces that drive both trends at once. On the one hand communities need to focus on their work rather than have to deal with technology (just give me the platform); on the other, they need to rely on their inventiveness when necessary. On the one hand, vendors and IT departments try to offer "full" solutions under their control; on the other hand, increasingly sophisticated users and independent developers have access to technology on their own. The important point here is that technologists and community leaders need to embrace the somewhat paradoxical complexity of this community perspective as they endeavor to serve the needs of living communities.

Based on these observations we propose a framework for analysis of community technology with four levels that extend the dual logic of the tool-platform combination in two directions:

- The **configuration of technologies** that a community and its members use (e.g., at a specific point in time a community might depend mostly on Lotus Notes, phone, e-mail, and Yahoo messenger)
- The **platforms** into which vendors and developers package technology (e.g., CommunityZero, which consists of a series of integrated tools)
- The **tools** that support specific activities (e.g., a discussion board), or bridge between types of activities (e.g., podcasting makes a phone conversation available to those who were not there)
- The **features** of tools and platforms that make them usable or differentiate one offering from another (a discussion board may have "preview own postings," "new" flags, consistent interface, easy navigation)

The evolution of the market and day-to-day experience of communities suggest that this scheme of separating levels is not without ambiguity. What's a tool or a feature, or even a platform, may vary over time or depending on a community's choices and experience. However, the combination of these levels provide a useful context for thinking about each.

At the top level, the notion of configuration moves the focus from a platform and its tools to the life of the community. It calls attention to the real story of technology in use from the perspective of the community and its members. Because of space limitations, we have not included such full stories in this chapter, although the stories of actual communities are the basis for our report. The full report describes a number of communities we studied, selected because of the way they had configured their technology over time, and accumulated in-depth experience with major platforms or cluster of tools.

At the bottom level, it is still important to analyze the usefulness of any tool for its intended purpose on the basis on the features it includes. The key to usefulness is often in the details. But by placing the details of technology decision in the broader context of all four levels, technology stewards can avoid a simple feature-by-feature comparison of products, a kind of "feature shoot out" until one vendor falls short in comparison to the other. This "bells and whistles" syndrome has too often resulted in technology for technology's sake. We expand on the need for an analysis at all four levels in the next section when we talk about the task of selecting technology.

The evolution of technology use by communities calls for a corresponding evolution in perspective. Table 1 briefly summarizes this shift in perspective as it applies to understanding the technology market as well as to the topic of the next two sections, selecting and using technology.

Perspective	From	To
Technology market	▪ A simple market with few options ▪ Single-point "solutions"	▪ Complex choices ▪ Ability to both integrate and bridge across tools ▪ Vendors are users in their own communities
Configuring technology for a community	▪ Selection by "feature shoot out" and comparisons	▪ Mix and match technology to community activities and to multimembership
Technology in use	▪ Select the "right" solution and expect uniform adoption	▪ Members configure, adopt, reject, and invent

Table 1: An evolving perspective on community technology issues

Section 4: Providing technology to actual communities

This much we have learned about technology and communities of practice: Good technology in itself will not a community make, but bad technology can sure make community life difficult enough to ruin it.

So the process of providing technology to actual communities has to be undertaken with both utmost humility and utmost diligence. The key to success is to keep the focus on the community: its circumstances, its aspirations, its members, and its activities. Not that a community necessarily knows what it needs. Technologists can open the doors of imagination and start new kinds of conversations; they have a key role to play. But it is the community that will have to live with the results.

A variety of circumstances

Communities live in very different institutional and technological environments that influence everything, including the process of adopting technology. This ranges from the latitude (taken, or expressly given) to choose unique technology solutions all the way to larger social considerations, technical resources, funds, expertise, performance, and organizational constraints. Comprehensive, fully featured solutions, which require extensive integration, customization or development, are appropriate for well-funded, sophisticated groups comfortable with advanced technologies. But many communities have to be content, and indeed can do very well, with much simpler ware. Communities have existed, lest we forget, long before technology was a key concern. Just as communities are diverse, so is the range of implementation options, from simple to highly complex, from mix and match to integrated platforms, from borrowing, to buying, to building. It is therefore important to adapt the design process to the specific circumstances of the target communities:

- Community members often have different levels of access to technology. For instance, some communities include members in very low-bandwidth areas. Some include both PC and Mac users, as well as users of different versions of operating systems. The technology needs to work for everyone if the sense of community is to be sustained.
- Some communities have low budgets and have to use tools that are cheaply or publicly available, such as e-mail groups. Open-source software is increasingly a low-cost option for more customized applications, but it often requires internal technology expertise for successful deployment.
- Communities with enough funds but no access to a large technology infrastructure or IT support may want to consider using a hosted application from an Application Service Provider – ASP. The simplicity of hosted applications often outweighs the lesser degree of control over the application.
- Some communities live inside organizations where they need to worry about security of information, firewalls, compatibility with existing enterprise software, and sharing technology with other communities. There is usually an IT department with resources and formalized processes for

technology deployment. Organizations present a mix of resources and constraints that play a large role in shaping how communities use technology.

Good technology design from a community perspective

Regardless of environment, providing technology for communities is not fundamentally different from providing technology for other purposes. Therefore good principles of technology design and deployment do apply and we do not need to rehearse the whole list here. But the particular nature of communities does give an additional twist to a few general design principles, which are worth revisiting explicitly.

Design for ease of use and learning. Because communities are rarely their members' highest priority, the general principle of simplicity is doubly important. A team that will spend extensive time working together may be ready to invest in learning a complex system, but community members rarely have such luxury. Difficulties in learning to use the technology will quickly discourage participation. A community-centric approach to implementation of new technologies implies that the technology steward looks for existing tools in the environment available for community adoption "as is" or with minor modifications. Adoption of familiar tools is faster and less painful than tools that seem too new or too different. At the same time, sustained interaction with other community members can lead to high levels of sophistication, so community members can come to tolerate and exploit a great deal of complexity. Learning in, around, and about technology for communities of practice happens not only at the individual level, but at the level of the group.

Design for evolution. It is always a good idea to design technology that can evolve, but with communities, the need to design for evolution is paramount. The community's needs at the beginning of its life will evolve over time—a challenge for technology providers. Unlike the trajectory of a team, which can often be fairly well planned from the start, the life of a community is a voyage of discovery. Communities change. They often start rather tentatively, with only an initial sense of why they should come together. They reinvent themselves continuously. Their understanding of their domain expands. New members join. Their practice evolves. The technologies need to support the intertwined evolution of domain, community, and practice without overbuilding. Leading with too much or over-designed technology will burden community members if the environment gets too difficult to use, or introduces too much change. The community leaders represent the community in facing these challenges.

Design for "closeness at hand". Community members often do not work together on a day-to-day basis, but what they interact about is often related to their main occupations. Solutions that are "one click away" from the tools that members use day-to-day are preferable to those that seem "farther away" from their working environment and require effort to switch context. Providing "close at hand" access to a community of practice can be complicated by the fact that members may want to participate from home, office, or on the road. This is one reason e-mail is still a very successful community tool in spite of all the recent developments: it integrates community interactions in the tool where people spend a large portion of their working and social lives.

Design from a user's perspective. Like most users of technology, communities come together for a purpose, which is rarely a fascination with technology for its own sake. As in any technology design, the user perspective has to be the focus. However, because community technology is designed for communities but experienced by individuals, the process has to balance community and individual perspectives. Individual participation is shaped by many forces, including different needs and preferences, personal learning goals in the community context, as well as familiarity with the technology. What will it take to achieve community togetherness and at what cost to individual preferences? Can communal and individual technology configurations integrate? Communities are notable in this regard because participation is usually voluntary, varies in intensity, and is usually spread across multiple communities and projects.

Configuring technology

Defining a technology configuration for a community is not a linear process that can be prescribed in a step-by-step fashion. It has many loops, intricacies, and iterations that depend on the circumstances and

constraints under which it takes place. But our four-level model suggests four general categories of factors to pay attention to. Here are some examples of considerations associated with each level.

Configuration-level considerations. The technology configuration has to reflect the constitution of the community, its stage of development, and its diversity.

- Where are the members located? Over what time-zone spread? How much face-to-face access does the community have?
- What kind of internet access do they have? What are the baseline technologies they already use?
- What are the skill levels? How comfortable are they with technology? What is the range?
- What are the needs of various constituencies, such as more or less engaged members or members with different degrees of familiarity with and access to technology? What resources are available for developing technology skills?
- What is the linguistic and cultural diversity of the group?
- What is the likelihood that members will form sub-communities and other types of subgroups? Does this suggest a "space of spaces"?

Tool-level considerations. Communities tend to engage in a complex set of activities to support the various ways members learn with and from each other. What is the range of activities the community needs to engage in?

- What types of ongoing interactions? What types of events and meetings? How much need to bridge between synchronous and asynchronous interactions? Will interactions be more focused on group processes or on individual contributions?
- What artifacts will they share? How will these be organized and archived?
- Who will tend to the perspective of the community? What information will they need about the health of the community? What actions will they need to take?
- How will members manage their participation? Find their way around? Connect with others?

Mapping activities to tools is not necessarily a one-to-one mapping. Some activities may require multiple tools; a meeting, for example, may require a calendar, a phone bridge, a web-based presentation, and chat. Conversely some tools may support multiple types of activities, such as polling, which can be used to make decisions, schedule meetings, or reflect on the community's health. Still, given the breadth of potentially useful tools shown in Figure 3, it is important to conduct an analysis of existing or desirable activities to delineate the set of tools to include.

Feature-level considerations. Not all tools for the same activity are created equal. They have features that define their usability. Addressing this level of detail is important because usability is key.

- What do the features of a tool try to accomplish? How are they implemented? Can the tool be used in different ways?
- Does the implementation of the feature set support the specific way a community conducts an activity?
- To what extent is the tool adaptable? Can it be tweaked and configured by the user, by the technology steward, or by a skilled technologist?
- Can some features be turned off so as to make the technology more accessible in the beginning?

These considerations require an understanding not only of the range of activities but also of how a community conducts these activities. Again the point is not to go for the maximum number of features, but to understand how certain features meet the needs of a community or how the lack of a feature constitutes a specific problem because of the way the community operates. These feature-oriented considerations have to balance functionality and flexibility with simplicity and learnability.

Platform-level considerations. Comparing candidates for inclusion in the technology configuration also requires some analysis of the platform as a product to be acquired, deployed, and used.

- How compatible is the platform with other tools the community or its members use?

- Who are other users and do they form a community?
- What is the relationship with the vendor or developer? Are they willing to adapt the tool, or allow others to do so, as the community evolves?
- Can tools be turned on and off to reflect the community's evolution?
- What is the total price of the platform, including support?
- What is the pricing model? How will it affect community participation? For instance, if the price is per-community, what about small communities, still tentative about their longevity? But if the price is per-member, what about peripheral members who might be discouraged from participating? What do other communities say about the total cost?

Table 2 illustrates the multi-level analysis process outlined here with a small snippet of a large table we have put together for the full report. This table describes each of the tools in Figure 3 in terms of purpose, usefulness to communities, and typical feature sets with purpose and comments about the potential relevance of each feature to a community. The excerpt uses the example of discussion boards and a few features that support the posting process. In addition to specific tools, the full table also includes consideration of platform-wide features, such as quality of interface and security.

Identifying what a community needs and how to deliver it is a complex task. It requires collaboration between community insiders and technology providers. Over the long term, the involvement of technology stewards from the membership helps ensure that the technology configuration meets both the initial and the evolutionary needs of the community.

Section 5: Technology use in the practice of communities

The role of community technical stewards is not finished when the initial configuration is deployed. The technology market keeps changing, bringing new offerings and choices. The needs of the community are likely to evolve. And the community itself will be inventive in its use of the technology it has, in its resistance to the technology it does not care for, and in its attempts to fill in perceived gaps and to bridge across tools. As a community evolves by reinventing itself, evolving new uses of technology is part of the process. This suggests a subtle change in perspective, which we are advocating for technology stewards: shifting from encouraging compliance or struggling to "fully implement" a platform to focusing instead on the potential for inventiveness inherent in a community's use of technology. Improvisation does not become invention until it produces new practices or artifacts through cumulative learning. Stewards can help translate a community's improvisational capacity into actual inventiveness with transformative effects.

Technology stewards are finding that paying closer attention to how their communities actually use technology reveals surprising and innovative uses. As a community matures, it's likely to be a significant resource in building its own capacity to use technology. For example, in one community that crossed organizational boundaries, a group was frustrated because some group members were excluded from a chat by their corporate firewall. They found that they could meet on a discussion board that wasn't blocked by the firewall, in real time, by refreshing the view continually. This created a kind of "threaded chat," which in that instance met their needs better than a conventional synchronous chat tool with its single stream. Another community found that their meetings on a phone bridge were productive, but that note-taking was a chore. They developed a practice of taking notes together using chat or instant messenger sessions during their phone calls; chat or IM transcripts were good enough for collaborative note-taking so that, when distributed, absent members felt they were in touch with the rest of the community.

Asynchronous interactions		
▪ E-mail ▪ E-mail lists ▪ Discussion boards ▪ Question & answers ▪ Polling ▪ Wikis ▪ Blogs	These types of tools enable communities to interact across geography, hours of the day and time zones.	Especially useful for distributed communities across locations and time zones, but used more generally by all types of communities to keep in touch, interact, and do things without meeting.
⋮		
Discussion boards	**Tool description**	**Tool usefulness**
Issues addressed by the feature set include: 1. message posting 2. message display and viewing options 3. enabling participation 4. administrative functions	Enables written discussions in asynchronous mode. Members participate whenever they can from wherever they are. They can post successive messages, with date stamp and author name, onto an environment where they can view the entire discussion. Today most discussion boards are web-based because the Web has become such an accessible interface for many people. Sometimes also called online forums or discussion databases.	This is a classic tool, used by many communities to sustain conversations without meeting physically. Especially useful when time zones are a problem, but expect turn-taking to be slower the more time zones are covered. May require some getting used to, but we have seen communities accomplish a lot in this medium in terms of asking for help, discussing issues in depth, socializing, and reflecting. Compared with e-mail lists, discussion boards do usually require participants to learn an additional interface. But they are better for discussing many topics in parallel. And they also enable adding and viewing postings in the context of an entire thread, which gives more of a "community feel" to the conversation. The price is that it is not as easy to follow one person's evolving thinking as it is in blogs.
Features	**Feature description**	**When relevant**
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1.5 Upload attachments with messages	One or more document or multi-media files can be uploaded with a posting	Increasingly indispensable as people want to include documents, pictures, and other files in their conversations. Especially important for communities that want to use this medium for in-depth conversations.
1.6 Preview own postings	See a posting as it will appear in the discussion before committing to posting it.	Very useful when people are not confident with written text, with the community's main language, or with the process of posting.
1.7 Save response as draft	If one is interrupted in the middle of writing a post, what has been written so far can be saved in a draft that one can be reviewed and finished later.	Community participation is rarely one's main occupation. Interruptions are frequent. This feature can also be used for saving a list of postings to come back to.
1.8 Message labels	Classifies responses (e.g., as "statement," "question," "agreement," "disagreement," etc.)	Helps participants see the shape of the discussion at a glance. Also allows reflection on the community and its conversations in terms of these types (e.g., "there is a lot of disagreement in this community")
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Table 2: Small excerpt from the tool-feature table of the full report

This excerpt shows a few features for discussion boards. Note how the tools and their features are always discussed with respect to specific community activities and needs.

The community's creation of its own practice is not always aligned with the aspirations of technology providers. The kind of solidarity that characterizes many communities of practice can be a powerful force for resisting technology just as much as it can push for innovation. When communities are widely dispersed and informal, the suggestion that technology will "bring everyone closer" may be regarded with suspicion. The effort to adopt a new tool can be significant. Communities can be quite skillful in resisting the introduction of new tools, and for good reason. New technologies can shift the power structure, can bring in new and unknown members, and can seem like a distraction from the basic business of a community. Community resistance to technology is itself a statement. There may be much to learn from it.

Another factor that changes the role of technology stewards today is that community members are increasingly likely to be sophisticated users of technology themselves. In their jobs, they may have extensive experience working with colleagues online. They are likely to have computers at home and to have developed their own opinions about technology, from their own use and from other groups they belong to. Today so many tools can easily be bought, downloaded, shared, and installed by individuals that the use of technology increasingly involves personal decisions. Members may both bring in new tools to the community and resist those it offers. The mutual engagement of members makes a community a ripe context for leveraging creatively the members' likely variance in exposure to the technologies discussed in this chapter.

Some practices that can keep technology use in the community's awareness without letting it take over or swamp other, more important, discussions include:

- Pay attention to the experience of new members (their learning curve can reveal flaws or opportunities that are invisible to long-standing members)
- Ask community members about their experience and use of technology in other settings (use multi-membership as a stimulus)
- Occasionally give some attention to new tools that are on the horizon, encouraging reflection on how the tensions around separation or membership are experienced
- Encourage community members to observe each other using the community's basic tools (even watching each other use a common program like MS-Word can stimulate important learning)
- Check on how existing tools are combined and work together (as a briefly noted, occasional subject in community meetings, for example)

So, the next time you hear about how some community members are experimenting with some new toy or have used the community's current technologies in some odd new way, consider what kind of an opportunity that might be. It could be a tangent. On the other hand, it might be the beginning of spreading a new technology or a new use of technology in your community. That in turn might bring in new members to the community, or it might open up new kinds of connections between members, or it could give community members a new kind of access to each others' work and thinking. It could be the next step.

Conclusion

It is remarkable how much has changed in the five years since the original research on technologies for communities of practice took place. The tools themselves have evolved, along with the way they support community togetherness. The skills that they require of their users have changed, and, of course, our thinking about them has evolved. Looking at the changes in technology from a community perspective as we are doing in this study, instead of adopting the view of an individual user, or the perspective of a technologist (let alone that of a vendor or "a market"), turns out to be productive. The insights it yields enrich our view of the market, deepen our understanding of technology-related roles, and focus attention on the decisions that communities themselves face.

The changes in the nature of the tools that are available implies that in several ways the process for augmenting a community's technology infrastructure is evolving. Software developers need to listen to community needs very carefully, communities themselves must have significant involvement in the process, and community technology stewards play a crucial role. Finally, communities that depend on

technology need to pay attention to the tools that enable their togetherness without being distracted from the interests that brought them together in the beginning.

The complete report that is summarized in this chapter is intended to help technology stewards with the challenges they face and offer a productive perspective to vendors and community sponsors as well. Our full study spans several levels of detail, from the overview of the market in Figure 3 to the features that make an individual tool useful to a community, illustrated in Table 2. Hopefully this chapter gives a flavor of the full report and stimulates discussions within the audience of this book. For information about the full report, go to http://www.technologyforcommunities.com.

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