Businesses must evolve to meet the needs of their customers and an ever-changing, competitive marketplace. Likewise, professional societies must adapt to meet the needs of their members in a dynamic environment.

The IEEE Computer Society (IEEE-CS) has served its membership well over the past 65 years by providing high-quality publications, conferences, standards, technical committees, educational products, and support for local chapters. But these well-defined services have led to a stovepiped structure characterized by rigid control and boundaries in which formal processes and procedures have proliferated and crystallized to the point where it’s difficult to respond quickly to the rapidly changing needs of both members and the competitive market.

Clearly, a more flexible structure is needed for the IEEE-CS to meet its members’ needs. Special Technical Communities (STCs) represent a new way for members to develop communities focusing on selected technical areas, integrating with contemporary technology in a way that breaks down silos and fosters organic growth. These communities will be able to scale up, scale down, or even shut down when they no longer serve the community’s needs. As a result of this new structure, we foresee more synergy across publications, conferences, and standards activities—leading to increased intellectual property creation and enhanced financial sustainability for the IEEE-CS.

Creating Communities

Professional associations are all about creating communities. In the mid-1600s, scientists began creating associations to exchange ideas and practices, and engineers began forming similar groups in the mid-1800s. Today, professional associations are still an important medium of exchange for technologists, researchers, educators, students, and other stakeholders. Within these professional societies, focused communities of interest have evolved and are sustained through meetings, publications, lectures, short courses, standards development, and other activities.

Traditionally, professional associations build communities through letters, printed journals, and face-to-face interaction. Modern communications, however, have changed this process, initially through audio and video conferencing, followed by the use of simple Internet-based services such as e-mail and websites. Soon after e-mail became commonplace, mailing lists, bulletin boards, and basic archives became important media for interaction.

More recently, Web 2.0 and social networking technologies have enhanced remote interaction. Although face-to-face contact is still valued, professionals, especially younger ones, have become used to interacting virtually. Some even question whether face-to-face meetings are necessary if technology can support rich interaction (P. Wiesner et al., “Virtual Communities for the Technical Professional,” Proc. ASEE Ann. Conf., 2003; www.asee.org).

With the growth of the IEEE-CS and its stovepiped organizational structure, the formation of new publications, conferences, and other traditional products has become more difficult. For example, even when someone could make a business case to start a new magazine, the process could take several years; discontinuing a publication has always required considerable political willpower. It sometimes requires more than a year to thoroughly review and publish an article. While IEEE-CS is less willing to invest resources when certain areas of interest may only be relatively fleeting, members are less tolerant of delays in creating new publishing outlets and in publishing articles than they once were.
The IEEE-CS has been exploring the use of technology to address these problems for several years. For example, in 2007, Sorel Reisman, the current IEEE-CS president, proposed reducing the organization’s stovepiped structure and focusing activities around common technical interests (S. Reisman, “Fast-Tracking Content: The Dramatic Evolution of Intellectual Property,” *IT Professional*, Sept/Oct 2007, pp. 58-60). In 2010, the IEEE-CS president introduced instant communities, a self-service-based on Liferay technology.

STCs derive from and build on this and other past experience in the IEEE-CS and IEEE. As an example, the software engineering community comprises professionals, educators, researchers, students, and business enterprises. We need to focus this community of interest—including both IEEE-CS members and nonmembers—around relevant technology. As Figure 1 shows, publications, conferences, standards, and so on will result from the collaboration of this community of interest rather than vice versa.

The power of social networking combined with crowdsourcing and technology support, such as self-served mailing lists, wikis, multimedia interaction, digital newsletters, and magazines, could create intellectual property in new ways, reduce peer review time, and improve reviewing quality.

**SPECIAL TECHNICAL COMMUNITIES**

STCs are intended to reach beyond traditional membership and activities, introducing new revenue-generating opportunities, offering new products and services, and enriching professional activities such as sharing best practices. These activities should also benefit the IEEE-CS by improving both its reputation and financial position. STCs will also strengthen governance by allowing members to feel more involved in decision-making processes through the dynamic organizational structure.

The principles behind the STC concept include the following:

- **Elasticity.** STCs will be easy to create, and will grow, contract, and retire as member needs warrant. They will be inclusive of IEEE-CS and IEEE members as well as nonmembers with shared interests, offering different levels of engagement such as newsfeeds, blogs, information exchanges, reviews, newsletters, and virtual conferences.

- **Self-service.** STCs will require little or no staff support; use up-to-date technology; integrate with social networking tools such as blogs, wikis, alerts, and portals; and allow for personalization and presence on social networking sites such as Facebook, LinkedIn, and Twitter.

- **Customization.** STCs will integrate into existing IEEE-CS
STCs will enable IEEE-CS members to keep pace with the world by providing a more dynamic way of creating communities based on new technologies without regard to geographic boundaries. Moreover, because STCs aren’t based on a single publication, conference, or standard, their creation will eliminate structural silos. By establishing a Web presence and complementing existing social networking sites, STCs will expose the world to IEEE-CS products, services, and membership benefits, offering members and nonmembers new ways to collaborate.

**ORGANIZING AND MANAGING STCS**

From 2002 to 2003, the IEEE piloted the use of virtual communities through the Agora project. Several valuable lessons were learned from this experience, as described in the “Characteristics of Virtual Communities” sidebar. Taking into account these lessons and experience from the IEEE-CS’s pilot virtual communities, we envision the evolution of STCs from small groups offering lightweight features to much larger communities offering richer feature sets. STCs are more focused communities, some of which will be large, whereas others will be smaller.

The key elasticity concept, enabling flexible growth and scaling down of communities, must be matched by the dynamic management and organization of STCs, avoiding the creation of administrative obstacles. Figure 2 illustrates the envisioned evolution of a new STC. Suppose a small group of IEEE-CS or IEEE members and a few nonmembers gather around an area of interest, for example, open hardware architectures. Numerous existing projects focus on this topic, for example, the Arduino project (www.arduino.cc), which has a well-orga-
nized community. But suppose this group of IEEE-CS members wishes to establish a more formalized community for the purposes of IP capture and broader exposure. A core group of 5 to 20 individuals could create a new STC site based on a simple Web portal service mechanism. For a group of this size, the IEEE-CS might offer some services such as membership discounts, a given number of free downloads from the Computer Society Digital Library (CSDL), or even discounted library subscriptions.

Over time, if the STC grows, so will the scope of its member benefits. The combinations of potential benefits are limitless as the size of a community evolves. For example, if the community grows into hundreds of members, it might be able to support a newsletter. If it grows even more, offering hosted conferences (virtual or face-to-face), electronic magazines, or e-books would be possible. If the community continues to grow, other benefits and offerings could include courses, webinars, books, and discounts on IP bundles. Discounts or even free access could be given to magazines, conferences, standards, EssentialSets and ReadyNotes (annotated collections of papers), and professional certification testing.

All content for the community would be semantically tagged and cross-linked to existing IP in the CSDL, resulting in substantial customization for each STC. The ability to combine peer reviewing with community feedback will be essential to maintain high scientific and technical standards.

At the same time, communities can downsize as interests and technologies change.

The exact levels of offerings for each phase of STC evolution has yet to be finalized. We're developing the mechanisms and guidelines for the creation, growth, and retirement of STCs. In the meantime, Table 1 lists seven STCs currently in a pilot phase.

**BUSINESS MODEL**

For long-term sustainability, STCs must follow a sound business model. On the revenue side, it's possible that STCs will provide sufficient indirect benefits, such as increased numbers of new and retained members to cover the operational costs. In addition to membership fees, other income streams are possible by providing subscription products and services to an STC's members. It may also be possible to form financial relationships with e-learning site developers, portal operators, vocational training institutes, certification vendors, publishers, universities, technology providers, and technology integrators who could provide services to members and share revenue with the STC and the IEEE-CS.

The Agora team found that it takes about three months to set up a community. During that period, about 25 hours a week of staff time were required. But once a community is set up, only about one hour per week of staff support would be required to maintain and monitor the community as long as the elements necessary for success are in place. Expenditures might include software platform costs and support as well as the costs associated with staff and institutional overhead. Many, but not all of these costs, can be reduced through the use of volunteers.

Once the guidelines for the creation and maintenance of STCs receive approval from IEEE-CS governance bodies, we expect rapid growth both in the number of STCs and in total membership. By the end of 2011, we plan to grow today's seven active STCs with approximately 50 members to 12 STCs with 300 members. By the end of 2012, we anticipate growth to 100 STCs with 1,000 members, and by the end of 2013, we foresee 200 STCs with 10,000 members. This is reasonable and conservative growth based on IEEE Technical Committees membership.

We believe that STCs are the future of the IEEE-CS. However, we recognize that there are challenges ahead, as the Agora team foreshadowed by concluding that “during the ‘pioneer phase,’ there certainly must be a degree of advocacy to ‘sell’ the concept of virtual communities.” In time, users will respond and adapt to technological opportunities if they receive sufficient benefits, and similarly, STCs will adapt to meet the

<table>
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<th>Community</th>
<th>Site</th>
<th>Contact</th>
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<tr>
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<td>Paul Croll</td>
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needs of IEEE-CS members. Perhaps research related to needs might expedite matters. Like any other initiative, virtual communities must compete for relevance.

To meet this challenge, we vigorously advocate the participation of members and nonmembers in the STCs. If you wish to participate in an existing STC, please contact the leads noted in Table 1. If you wish to start a new STC, please contact the authors.

Acknowledgments
We acknowledge John Walz, Sorel Reisman, and Jim Isaac for contributing many of the ideas presented here and for their encouragement and support for the development of IEEE-CS STCs. We also collectively thank the many other volunteers and IEEE-CS staff who also have been involved in this initiative.

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