Guest Editor's Introduction:
Reengineering Standards

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When standards define an interface—that infinitesimally thin boundary layer across which two disparate worlds can communicate—they facilitate progress by focusing our attention where we can have the most positive impact.

Standards in the best sense are interfaces, not just between networks, or computers, or chips, but between people and organizations and ideas. In my view, the purpose of standards is successful products—not standards per se. But the discipline of standardization must reengineer itself if it is to meet today's challenges.

Bring up standards in polite company and you may see your listener's eyes instantly glaze over, or find yourself in the midst of a debate on how standards obstruct innovation. But ask your listeners about the impact of the VHS standard on consumer electronics, and you may get an entirely different response. Why? Because many people think of standards as only academic and obscure documents full of arcane language produced at glacial speed by near-retirees in century-old organizations.

Today's standards are agreements, not just documents. These agreements are the critical enabling technology, the paradigm shift that will change new industries, like the nascent multimedia information highway, or wireless communications, or personal digital assistants. These agreements can be produced in different ways, including emerging electronic standards development methodologies being explored by organizations such as the IEEE Computer Society, as well as Information Technology (IT) consortia. The ramifications of alternative standards development strategies are complex, with far-reaching consequences.

Standard terminology
An interface is a defined multidimensional surface at which independent systems interact. Think of the interface between humans and automobiles as just the accelerator, brake pedal, and steering wheel. This interface defines how humans interact with the automobile; it does not define how stepping on the brake causes the car to slow. The brake pedal may be connected mechanically to drum brakes or hydraulically to disc brakes, or it may cause a parachute to deploy. They all implement the same interface.

That is the power of interface standards. They encourage multiple, innovative implementations to compete and evolve in the marketplace. By combining a sufficient number of these interface standards, one can define all the elements of a computer—a virtual machine—that can be implemented in many ways, by many companies, and at many levels of cost and performance.

In contrast, a standard based on one particular implementation discourages innovation, and might, for example, have required us to drive cars with mechanically operated nonpower-assisted drum brakes. The final arbiter of the value of a standard should be the marketplace, not a standards developing organization (SDO). So long as the appropriate process is followed, and users and vendors are willing to develop a standard, anything is an appropriate topic for standardization.

We have two major categories of standards, de facto and de jure: Accredited SDOs give us de jure (according to law) standards. The American National Standards Institute sets the rules, or metastandards, for US SDOs, which require openness, consensus, and due process. ANSI is the US member of ISO, the International Standards Organization. For de jure standards in the IT industry, ISO standardization is the optimum goal—a single standard accepted all over the world.

Not surprisingly, there are no agreed rules defining what is a de facto (in fact) standard. Market acceptance is often thought of as a synonym, although that too is an intuitive metric. No rules
of openness, consensus, or due process apply, and a single company controls many of these standards. Of course, de jure standards may evolve into de facto standards, allowing the industry to enjoy the benefits of an open process and the economics of scale created by a volume market. The converse (de facto standards becoming de jure) is also possible and desirable. Some user groups and consortia seek to foster de facto standards in a formal, structured manner. Such organizations have rules that define the process and may seek to involve interested constituencies. But because they answer to no accrediting authority, they do not develop into de jure standards.

One final term I want to introduce is standardization—an engineering and marketing discipline that seeks to foster successful products through the development of de facto and de jure standards. Standardization offers an unusual opportunity to advance a company’s products, and at the same time, benefit the industry and the profession.

**Pragmatics**

Companies participate in standardization because they perceive an economic benefit. Shane Greenstein discusses some of the economic implications of decentralized mechanisms of standardization, with regard to what are called economic networks—all the buyers and sellers economically interested in the features of a system.

Should government become more involved? Linda Garcia discusses the history of public and private sector roles in standards development, and raises the possibility of greater government involvement.

**Choosing a standards strategy.** The critical questions are: Where are we today in standards? Where could we be tomorrow? Where should we be? Do we want an open standard or a proprietary product? Table 1 lists four strategies of standardization (leading, following, monitoring, and ignoring) and their characteristics.

Leading requires a large investment and carries with it a great deal of risk: There may be no followers, or another interface may compete for leadership and win, necessitating a retrenchment. Following involves a lower cost strategy, and several organizations may cooperate as leaders and followers to create a camp, as Chris Halliwell discusses. Monitoring is a passive strategy, and accordingly, the risk is greater because the leader is less constrained from changing direction. Companies that believe they are ignoring standards are really implementing a leading strategy. But by misunderstanding their strategy, they lose the opportunity to use explicit standardization techniques to promote their interfaces.

**Standardization options.** Once chosen, the options involve choosing avenues for developing and promulgating the standard: The basic choice is either open or closed. Either approach can lead to the primary goal of a de facto standard. The de jure route is more difficult, but is often the only way the industry will accept the interface. The IEEE is a major developer of de jure standards, with more than 600 currently active and over 700 in development.

New technology and new products frequently demand new interfaces. Litigation today has become a major consideration in development and adoption of new standards. Gervaise Davis discusses the inherent conflicts between US law, compatibility, and standards.

Two fast-moving and controversial applications of standardization are in the area of Asynchronous Transfer Mode (ATM) and data encryption. Richard Vickers addresses the parallel development of ATM technology and standards. Burt Kaliski provides us with a road map of the variety of encryption algorithms, and the multiple and competing standards definitions that support them.

**SUCCESSFUL STANDARDIZATION REQUIRES** an unusually broad range of disciplines (all with a global perspective): engineering, marketing, economics, group dynamics, law, and finance. Individuals and companies must also understand the history of standards, and the processes, precedents, people, and organizations.

3DOs, consortia, and user groups are reengineering their processes to make them more responsive, comprehensible, and agile. Change must come if the discipline is to survive and achieve its potential. I hope this special issue will help you achieve a broader perspective on the purpose, use, process, and future of standardization. I believe this perspective will help you in achieving the real goal of standards: successful products.

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