What Price Standards?

Sometimes, Standards Stand in the Way of Innovation

There are two kinds of "standards." One is created when a company announces a technology it expects other companies to use. In reality, these are merely specifications. The other kind—a true standard—is created when a particular specification dominates its niche. This dominance is most common when the specification is developed cooperatively by the major players in that market segment. Standards are generally felt to be good for vendors and users alike, but this is not always true. Sometimes they stand in the way of progress.

Microsoft's Direct3D application programming interface (API), for example, is a specification, not a standard. There are significant alternatives to Direct3D that offer similar features. Also, Microsoft does not support Direct3D on non-Microsoft operating systems. As long as this remains true, Direct3D will never become a true standard for 3D programming.

OpenGL, a 3D API that started life at Silicon Graphics, is a standard. OpenGL provides most of the same features found in Direct3D, but it is managed by an independent architecture review board rather than any single company. Compatible but independent implementations are available from multiple sources for every major operating system.

Though the OpenGL standard is valuable to the industry, Direct3D—despite its many flaws—is more innovative. Each year, Microsoft updates Direct3D with new features and improved performance. Some of these updates obsolete existing code, forcing developers to rewrite entire applications to gain access to the latest 3D technology. OpenGL evolves much more slowly, preserving software investments but delaying support for new features.

Though Microsoft has often been criticized for developing a proprietary 3D API instead of supporting the OpenGL standard, I believe the standard approach would have hindered the development of PC 3D.

The RGB color-space standard offers another example. Almost every application that uses an additive color system uses the RGB color space, including televisions, computer monitors, and digital cameras. RGB is so widely assumed to be ideal that 24-bit color (eight bits each for red, green, and blue) is often called "true color."

This designation simply isn't true. The eye can see many colors that cannot be represented by a mixture of red, green, and blue light. Prove it to yourself—compare the best computer-generated rainbow to a real rainbow. That violet color you see in the real rainbow has no counterpart on the screen of your PC.

Modern commercial printing systems such as Pantone Hexachrome, and simpler "photo-quality" inkjet printers for PCs, are capable of reproducing a much wider range (or gamut) of colors than computer monitors. Without a way to generate or view the extra colors, these printing systems are not fully available to computer-based artists.

Despite this handicap, there is no viable alternative to RGB color on personal computers. To be sure, it would be difficult to offer one. Any new color system would require a great deal of work from operating-system and application software developers as well as hardware vendors. It seems unlikely that this work will get done anytime soon.

Similarly, the success of the Internet networking protocol TCP/IP has blocked the development of asynchronous transfer-mode (ATM) networking technology. ATM was designed to solve many of the problems that plague the Internet today, but TCP/IP, despite its many flaws, is ubiquitous. ATM has been relegated to a few niche applications; the PC industry, in particular, seems unaware of its potential.

It is often said that end users value standardization—or at least compatibility—but this isn't the whole story. End users also value distinction, in the form of better performance and more features. This desire fuels the endless upgrade cycle for processors, graphics chips, and other components.

The easiest thing to sell to a PC buyer is a system that matches the capabilities of the competition and adds just one thing the user wants but can't get anywhere else. This is true even when that thing is something trivial, like the color and shape of the system's enclosure.

There are endless opportunities for innovation in the PC industry. There are enough ideas in graphics alone to fuel decades of product development. Given the chance, users will pay premium prices for good 3D user interfaces, virtual-memory-managed hardware-windowing support, and other features that make them more productive.

What really determines success in this industry is how smart you are. Both business savvy and technical acumen matter, but not equally. There's a limit to how smart anyone can be about manufacturing efficiency, but no limit to the profits waiting for those who can innovate intelligently. ■