

# Standards, Innovation, and *Survival*

## The role of market standards in business successes and failures

**W**e're part of a highly innovative industry and the creative folks among us have a love/hate relationship with standards. Managers tend to see the benefits of standards: they reduce learning requirements and improve quality. Engineers tend to be more ambivalent because standards appear to limit their creative choices.

In 1984 I attended a management seminar at which Prof. Jim Utterback of MIT gave a talk on the life cycles of industries. He described the critical role that dominant standards play in those life cycles. He emphasized the similarities in the life cycles of several industries including the automobile, airplane, typewriter, photography, and ice making. It struck me at the time that his analysis applied directly to the Personal Computer business in particular, and to high technology in general.

A typical example of his thesis is illustrated in the curve of Fig. 1, which shows the number of automobile manufacturers in the US over a 60 year period.

### The Automobile Industry circa 1923

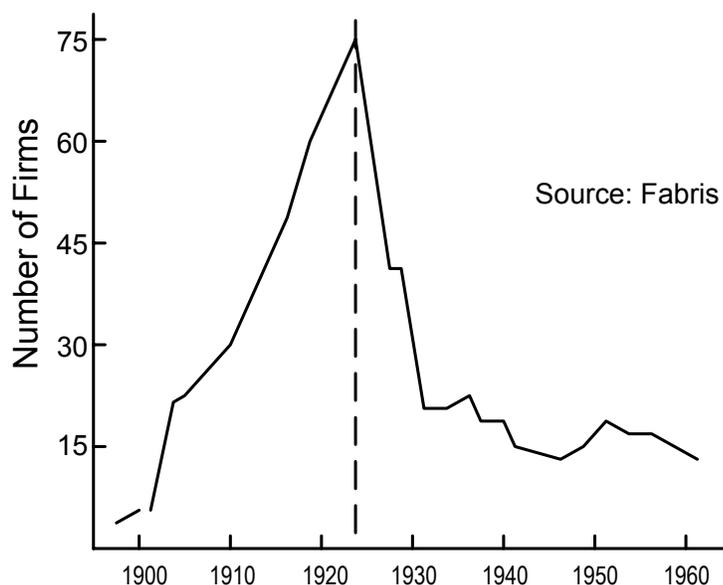
In 1923 there were some 75 manufacturers, and Ford had more than a 40% market share with the Model T, a car that it had produced since 1909! By

1925 the number of manufacturers had shrunk to 38. In 1926 Ford made no cars as it desperately sold off inventories of the Model T and retooled to build the Model A. If Ford had not had \$300 million cash in the banks in 1925, it would not have survived. It took Ford over 50 years to rebuild its market share to a mere 17%!

The event that precipitated the automobile industry's consolidation and the perilous decline in Ford's fortunes was the introduction of the closed-steel-body chassis in 1923 by the Dodge brothers. By 1926, 80% of automobiles sold in the USA had closed-steel-body chassis. (According to Jim Utterback, two other standards, the internal combustion engine and rear-wheel drive, were dragged along with the closed-steel-body chassis.) The customers made this innovation the dominant standard by voting with their wallets. Ford's Model T didn't meet the standard, it had an assembled chassis; high off the ground and far less comfortable. Neither Ford's market share nor its dominant distribution system slowed the stampede to a market standard.

Prior to 1923 the automobile industry was in what Prof. Utterback calls the *product innovative* phase of its life cycle: when a variety of technically changing products are supported by a multitude of

Ford had a 42% market share in 1923 and built no cars in 1926!



**Fig. 1:** A rough plot of the number of automobile manufacturing firms in the USA for the years 1900 to 1960. Those counted were in business at least three years. The peak of 75 firms was reached in 1923.

Product  
innovation  
before  
standards,

Process  
innovation  
after  
standards

suppliers. The suppliers make relatively small numbers of widely varying products. New suppliers enter the market on the basis of technical innovations that create products with unique advantages.

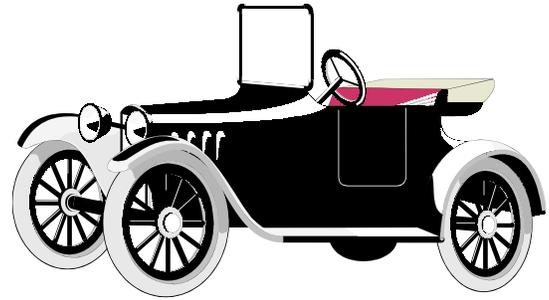
In 1923, dominant standards emerged and the automobile industry moved into what Prof. Utterback calls the *process innovative* phase. In this phase, successful innovation is limited to product improvements that enhance the standards, to manufacturing improvements, and to improvements in marketing and distribution. Products that directly attack the market standard are doomed. (Front wheel drive and the Stanley Steamer died in 1923.)

Once dominant standards emerge, the number of suppliers shrinks and those who survive must effectively produce and sell large quantities of products that embody these standards. Their manufacturing efficiencies and the effectiveness of their distribution channels determine their relative market shares and profits.

#### The Personal Computer Industry circa 1983

The computer business had its 1923 in 1983 when the IBM PC emerged as the dominant standard. Apple, like Ford had a dominant market share in 1983 but lost it because it failed to adapt to the primary dominant standard for personal computers: Open Architecture.

Open Architecture computers are those which have hardware, software, and add-ons supported by a multitude of vigorously competing suppliers! Open Architecture dragged along the IBM PC technical standards (including the PC bus, Intel's 8088 architecture, and MS-DOS) just as the closed -steel-body chassis dragged along the inter-



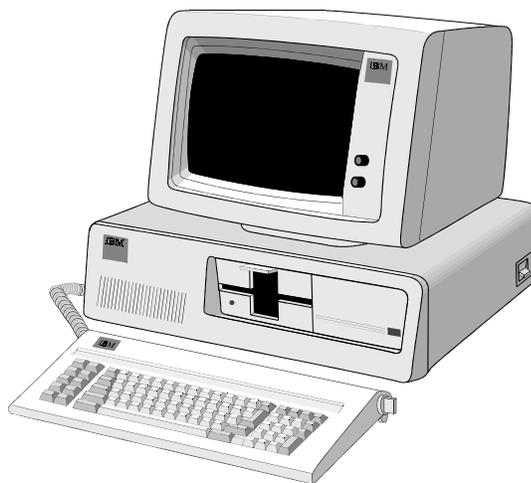
nal combustion engine and rear wheel drive.

Apple has spent the last decade losing market share with its proprietary products. Its sales pitch has been that its products are easier to use. Apple is probably right; but it doesn't matter. Ease of use is less important to the market than Open Architecture. Now, it is also less important than being the overwhelming market standard that generates a revenue stream in excess of \$150 Billion per year. This revenue stream continues to attract and pay for the latest and best innovations in hardware and software.

IBM, like Apple, squandered its opportunity to dominate the very standard it, accidentally, created. It tried to regain **control** of the market with proprietary technology (like Micro-channel, VGA graphics and OS/2) and its (then) dominant distribution system. It even wasted time with *sub-standard* products like PC Junior. (We're probably seeing other companies reprising this error with their proposed \$500 Internet terminals.)

Both Apple and IBM thought they could get the customers to trade *Open Architecture* for *ease of use* or *improved technical performance*. They were wrong. Some day this reality will sink-in on their highly paid executives. Their legions of ex-customers figured it out years ago.

The companies that have succeeded in the PC business have done so by enhancing the market standard without replacing it, and/or by developing superior manufacturing and distribution systems for the market standards. Intel has aggressively enhanced the performance of its market standard CPUs. Microsoft, at an arrogantly leisurely pace, continues to *improve* the performance of its operating systems. Companies like WordPerfect, Intuit, and Lotus succeeded (for a few years) because their products enhanced the standards. Compaq succeeded at first because it enhanced the standards with improved portability. It sustained its success in a commodity market by



improving its own manufacturing and distribution systems.

### **Market standards dominate for decades**

Once a dominant standard emerges, technical improvements to non-standard alternatives are largely irrelevant as far as the market is concerned. This fact has been demonstrated time and again, as the following three examples illustrate.

In the early days of electrical power, there were a variety of voltages and frequencies; each advocated for various technical and/or marketing reasons. Thomas Edison, for example championed DC as the best method based on technical considerations. Once 60 Hz, 115 Volts AC became the power standard in the USA, the technical advantages of DC or of other frequencies and voltages of AC became irrelevant to the US market.

Prior to 1911 every typewriter manufacturer promoted different arrangements of keys on their keyboards. Each manufacturer argued technical advantages, but, in fact, each knew that once a typist learned to use its keyboard, she was unlikely to buy another product because she would have to re-learn to type. The QWERTY typewriter keyboard happened to be on the first typewriter in which the typist could see a character immediately after typing it. That typewriter was introduced in 1911 and became wildly popular because of the visibility of the typing. The QWERTY keyboard was dragged along as a market standard, learned by the vast majority of typists. Other manufacturers were forced to adopt the QWERTY keyboard in order to have a chance at selling to the majority of trained typists.

In the 1930s, a man named Dvorak introduced a technically superior typewriter keyboard. The Dvorak keyboard enables one to type 20% faster, go for hours without fatigue and learn typing in half the time. Today, it is used by less than 0.01% of the market!

The TV picture standards of the United States were established in the late 1940's when technology was limited. Picture quality is marginal. Significant improvements in picture quality have been available for decades. The European standards, which were adopted much later, have significant improvements in picture quality. Those improvements aren't used here because adopting them would require us to abandon technical standards that connect content producers, broadcasters, audiences, and TV manufacturers.

The requirement for backwards compatibility with existing standards seriously limits what can

be done to upgrade or change our TV standards, typewriter standards, power standards, and Personal Computer operating system standards.

Successful companies, like Panasonic when it backed JVC's VHS video recording technology and Netscape with its Internet browser technology, have demonstrated the importance of market standards to their long term success. They made "establish a market standard" a first order of business.

In the battle between VHS and Betamax video recording standards, VHS won. Betamax was technically superior (like Apple's PC) but it didn't matter once the market standard was established.

Netscape, as a start-up with virtually no assets, gained an 84% market share in Internet Browsers by giving away its products. When it had the dominant position, and tons of IPO money in its coffers, it charged for its browsers while it vigorously improved their performance. It doesn't surprise me that Microsoft initially missed the boat on this one. (1998 update: Microsoft is fighting back to unseat Netscape's dominance by using its operating system monopoly, some questionable practices, and a ton of money. In response, Netscape has returned to free browsers. This only demonstrates how strategically important control of a dominant standard is to both Microsoft and Netscape.)

### **What you might do**

Ask yourself: Is my industry in its product innovative phase or have market standards emerged? If there are no market standards, consider likely candidates and then work to establish them. This probably includes working with your competitors. You probably won't control market standards, but if you're worth your salt you'll get a jump on your competition and rapidly improve your products, manufacturing, and distribution to sustain your success in the marketplace.

If standards have already emerged in your markets, adopt them, don't waste time trying to replace them with your "technically superior" proprietary products. If you choose to attack a vibrant market standard with an alternative, you are doomed to failure, or condemned to a relatively trivial niche market. Your company will probably be among the walking dead.

Jim Utterback showed the futility of attacking an established standard. He gave historical examples of the persistent attacks by alternate solutions and successful responses by companies supporting the established standards. By the way, there is a

Once a market standard emerges, non-standard alternatives are largely irrelevant

The  
*PowerPC*  
is  
Motorola's  
fig leaf.

way to replace an existing standard with a new one under certain conditions. However, it is not accomplished by directly attacking the existing standard. If you're interested in finding out what it is, give me a call.

**Miscellaneous thoughts**

1. The Intel CPUs are somewhat proprietary and the Microsoft Software is fully proprietary. However, the consumers and business customers don't see this when they buy computers. They select from a variety of fiercely competitive systems that are IBM PC compatible. The suppliers of these systems are captive OEMs of Intel and Microsoft. They are forced to deal with proprietary products, and they shield the end users from most of this humiliation. As a result, the OEMs do most of the work, take most of the heat from users, and receive of heprofi *or Selling Systems.*)

2. Motorola's 68000 architecture was cleaner and technically superior to Intel's 8080 architecture. Unfortunately, it was used in Apple PCs, not in the dominant standard PCs, so that its technical merits relative to Intel's products became irrelevant.

In 1995, Motorola gave up its race with Intel to develop increasingly more powerful CPUs. It

didn't have the market share, income stream, to continue to fight its uphill battle. Motorola's fig leaf is to make and use the *PowerPC*. This strategy is probably doomed because it's unlikely that the *PowerPC* will ever generate a sufficient income stream to keep up with Intel.

3. For a religious slant on the standards battle, see my companion essay "*The Computer as God?*" That essay deals with the same business issues from a religious viewpoint: we technologists just reenacted the Protestant Reformation. IBM was the Roman Catholic church, and Steve Jobs was Martin Luther. Although this is a humorous look at recent history, it reveals the theology and fervor which drove intelligent people to make sub-optimal business decisions.

4. Jim Utterback is a professor of management and engineering at MIT. I highly recommend him as a speaker. He finally published his book on this subject: James M. Utterback, *Mastering the Dynamics of Innovation*, Harvard Business School Press, 1994

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