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Upgrading, catching up, and shooting for par

My father is not starry-eyed about technology. He does not have time for it. He would prefer to run his business or play golf. He buys computers when they are cheap, simple to use, and obviously better than something he already owns. His golfing partners seem to be about the same.

My father and his golf partners are not odd people. They are like most business executives. They are much less enthusiastic about PCs than you, me, or anyone else who builds and sells computers.

In general, it is not odd for buyer and seller to have different perspectives. Indeed, ever since PCs migrated from the hobbyist community into the business community, such a difference has existed in the PC market: Most PC engineers, who spend the bulk of their time designing best-practice technology, have few friends like my father's golfing buddies. This is not an editorial on the social circles of PC engineers. Instead, it is something simple and somewhat obvious to most observers of this market: Buyers and sellers are not playing on the same course.

Why does this matter? Because most PC engineers I know do not talk to their biggest customers—business managers. As a result, most PC engineers do not understand how their biggest customers think—on the most basic level.

Most PC engineers do not have my father's computer problems (nor do they want them). These problems illustrate a more general economic phenomenon that goes to the heart of how computer technology spreads in the US economy.

Upgrading grudgingly

Several months ago, my father and I began discussing the computers at his office, where he is the managing partner. My father wanted to know whether the firm should adopt Windows.

My father did not really care which version. He just wanted to know if he should junk all his DOS programs once and for all, retrain his staff, and purchase new software and hardware to run it. Was it worth his trouble to change now, or should he wait?

My father was very clear-headed in his reasoning. Change was inevitable, but not essential at the moment. His customers are not worried about whether he uses DOS or Windows, as long as the office delivers the services. Moreover, the firm is not a technical backwater, so there was no technical constraint on upgrading. A few years ago, for example, the introduction of laptops revolutionized the firm's field work, allowing employees to do much more at customers' premises. The office also uses a moderately sophisticated LAN. None of this requires Windows, but would be enhanced by it.

If one spends enough time with the average business manager, this type of story comes up repeatedly. The underlying economic issue is not unique to our time, to this product, or to my father. This year it was Windows, last year it was notebooks, next year it will be something else.

The underlying problem is always about the timing of upgrades.

Just below the surface is a puzzle that engineers often overlook because they spend so much time with best-practice technology. If most executives are not enthusiastic about technology, and most PC customers are executives, how does new technology ever find its way into America's offices?

Think about it. When something new comes along in the PC industry (about every five minutes), business managers are caught between two impulses. On the one hand, a manager's day is busy, filled with appointments, deadlines, and tee times. Who wants to take the time to

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change a computer system if it is not required?

At the same time, most office managers hate to fall behind. They feel compelled to catch up to the vanguard. It does not really matter why: Perhaps the marketplace is very competitive, and new technology is necessary for survival. Perhaps customers demand new services associated with new technology. Perhaps it is a payoff to employees who like the latest fancy toys.

Eventually the impulse to catch up overwhelms the reluctance to invest—not all at once, but piecemeal. Today it's an operating system, tomorrow it's printers, the next day it's something else. This process putters along, bringing steady, relentless, and technically uneven improvement.

Best versus average practice

Students of technology use the terms "best practice" and "average practice" to describe a whole market going through this process. Best practice refers to the best available technology for the lowest price at some point in time. Average practice refers to the typical technology in use by the average user. The first focuses on what is technically possible; the second on what is typically in use.

Average practice is not as exciting as best practice, and it is not as technically adventurous. Not surprisingly, most computer engineers would rather spend their day thinking about best practice. It is their job, after all.

Yet, most executives spend their day worrying about average practice. Today's purchases are only a small part of that whole stock of equipment.

Consider average practice in the PC market. While it is not hard to believe that most users keep up with new technology to some degree, it is hard to answer the question, what is the typical user's experience? Only a small percentage of all users own only new equipment. New users buy new stuff almost by definition, but most old users upgrade at different rates. The least one can say is that everyone

eventually upgrades and throws away old equipment. For example, virtually every experienced user I know has a closet full of old parts, obsolete systems, or useless old software.

The more precise question to ask (and the harder one to answer) is, how far does average practice fall below best practice for most users? If users replace their systems often, average practice is not far below best practice. If users are basically satisfied with very old designs, they won't buy new ones quickly. In that case, only very few users, if any, will put best practice into general use.

Does anyone have any idea how big the gap is today? With millions of PCs, workstations, and software programs, it is hard to measure or observe average practice across the United States. Occasionally small surveys hint at the gap between best and average practice, but it is hard to pin down such a complex moving target.

My bet is that average practice is only a few years behind best practice and has generally stayed very close in the last decade. This is based on one unscientific hunch and one scientific observation.

Here's the hunch: My father's story is not too unusual, and at worse, he is not far behind the average. Most of the offices I visit in my field work look technically similar to his, give or take a couple years of technology.

Now here's the scientific observation: It is possible to compare PCs to a similar technology in an earlier age. Several years ago I documented average- and best-practice computing in the US during the mainframe era, roughly 1968 to 1983. (See National Bureau of Economic Research, Working Paper number 4647). While use varied somewhat, the typical mainframe computer was between five and seven years older than best practice. While we could argue about the main causes, this much was true: Most users tended to own old equipment for only a few years. Some stayed very close to and others stayed far away from best practice. On average, however, they were never far behind.

Narrowing the gap . . . a little

Why does this tell us something

about the modern era? Because PCs are a lot easier to replace than mainframes (and a lot cheaper). Probably most PC users have narrowed that five- to seven-year gap; possibly they are no more than two to three years behind best practice.

There is a fundamental observation here about how technology spreads. Technology diffuses to business whenever a product appeals to the majority of customers—executives—who are not starry-eyed about technology. Many good products missed their mark because the designers forgot that their users did not want the best practice, but merely something better than what they had.

Put simply, the products that fill the gap between best- and average-practice technology bring the biggest advances to the mass of users. These are the applications that businesses decide to buy and adapt to their existing systems. Many well-intentioned (but misguided) engineers have encouraged their companies to design new, technically sophisticated products without worrying about who would use them or how.

By the way, my father's office decided to switch to Windows sometime this spring. However, nobody wanted all the (anticipated) difficulties to interfere with the firm's ability to meet spring deadlines, so the switch was put off for a few months. It will probably have taken place by the time this column is published. From what I can tell, this seems like a sound and rational business decision.

This is not an advertisement for my father's business; it is just an example of how business decisions lead to changes in average practice in computing today. Progress is cautious, incremental, but inevitable.

That's about par for the course.

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