



A revolution? How do you know?

SHANE GREENSTEIN
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..... How do we know that electronic commerce is a revolution? While Marx wouldn't recognize the meaning of the word "revolution" in this context, many firms that promote e-commerce often use the word. It's interesting to consider why.

Even *BusinessWeek* and *The Wall Street Journal*, the usual beacons for mainstream commerce in the US, have noticed e-commerce's ubiquity. Although, mainstream publications mostly concentrate on the activities of empires and their builders—Microsoft, AOL, AT&T, Intel, Cisco, IBM, Sun, and their friends—the sea change in focus is unmistakable. Some Internet valuations are too high by standard metrics. There are more IPOs this decade than ever before. Something dramatic must be happening.

Another information source is the publications of the unestablished. As public discussion of e-commerce has grown, a loose coalition of new economy prophets has emerged. They write for such publications as *The Industry Standard*, *Business 2.0*, *Wired*, *Red Herring*, *Fast Company*, and more electronic magazines than anyone can list.

Spend some time reading these magazines and you will notice a worldview containing two principal features. First, the prophets declare a business revolution in all information-intensive activities, such as broadcasting entertainment, retail marketing, supply-chain management, other coordinative activity, and research. Next, and this is related, these same

prophets proclaim that e-commerce technology's novel characteristics dilute standard lessons from the past. That is, because of its many unique features, it's ushering in a new commercial era that operates with new rules.

There is probably a grain of truth to these declarations, and the euphoria is intoxicating. However, as a commentator on economic activity I am obligated to be skeptical, particularly of the second declaration. Euphoria does not, and should not, justify too simplistic a retrospective view of what actually happened, or of what is about to happen.

We are experiencing a revolution, but probably not for the reasons most people think. Why does this market phenomenon look like an actual revolution to a long-time and professionally skeptical observer of computing markets? Because of the three trends that comprise this revolution:

- E-commerce grew rapidly, attracting the interest of tens (and possibly hundreds) of thousands of firms and millions of users, quickly achieving the trappings of mass-market status.
- The infrastructure behind e-commerce, that is, the Internet, has almost become geographically and industrially pervasive, a diffusion pattern rarely found in new infrastructure markets.
- Firms didn't quickly settle on the offered menu of business services, indicating no consensus about the

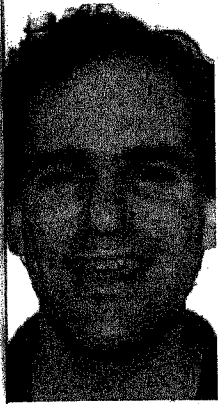
appropriate business model for commercializing Internet services.

These trends don't usually arise together in a new product or service, whether it's high or low technology. For example, the jet engine is nearly pervasive in all economic activity today, but that took several decades to achieve. The Furby market grew rapidly, but that's because there was a pretty clear consensus about how to commercialize a Furby. Nobody knew how to commercialize cellular telephony for two decades after its invention, and it still is not pervasive. Rapid, pervasive, and unsettled conditions don't appear frequently and certainly not together. They are symptomatic of a revolution. Explaining all three traits should provide insight about the wider forces at work and where this revolution might be going.

Pervasive and rapid characteristics

The diffusion of the Internet infrastructure influenced the origin of e-commerce. Originally a government-sponsored project, the Internet backbone initially served only noncommercial purposes. Its commercialization began in 1992 with selling the backbone, rescinding management responsibility for any public data exchange points, and privatizing domain name registration. This let private decision making further develop the contours of network infrastructure.

How did e-commerce's pervasive and rapid traits show up together after



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commercialization? Two contributing factors deserve special mention: the absence of both significant technical and commercial incongruity.

Most technologies developed under government auspices have significant technical incongruity during commercialization. Government users, procurement, and subsidies often result in technological features mismatched to commercial needs. From a technical or engineering viewpoint, technology used exclusively for noncommercial purposes may appear primitive in civilian use and require considerable complementary inventions or entrepreneurial imagination.

Commercial incongruity arises when commercial markets require substantial adaptation of operation and business processes to use technologies. That is, government or research users often tolerate operational processes that don't translate profitably to commercial environments.

The Internet incubated under government auspices for over two decades, but wasn't technically incongruent with private computing use. Why? Because academic modem pools and computing centers tended to use technologies similar to their civilian counterparts, such as bulletin board operators, buying most equipment from commercial suppliers. Therefore, moving this activity into the civilian sector didn't necessitate building a whole new Internet equipment industry. Similarly, computer users had already developed a routine set of applications for the Internet protocol (e-mail, FTP, Telnet, and so on). These immediately transferred into commercial use because many similar applications were already in use in networking environments.

The Internet-access business lent itself to small-scale commercial implementations, as was already occurring in academic computing centers. The marginal costs of providing (and using) dial-up services were low, and the marginal costs of expansion fell quickly. The feasible economic thresholds for commercial dial-up service encouraged small firms and independent ISPs.

Pervasive and unsettled characteristics

Against this backdrop, two key events in 1995 set the stage for pervasiveness and unsettled markets. The first was the Netscape IPO. The other was the marketplace entry of AT&T WorldNet.

The Netscape IPO brought extensive publicity to this technology and, not trivially, caught Microsoft unprepared. The World Wide Web began to diffuse early in the history of Internet commercialization, providing an unexpected and potentially lucrative set of opportunities.

This new technology opportunity provided firms with strong incentives to experiment with new business models. Web technology developed extraordinarily fast, fueled by decentralized adaptation. While not all regional localities—where the Internet was available—experienced the same type of competitive choices, nor did all firms perceive the same opportunities, many companies developed opportunities quickly, seeding lessons for other localities.

Pervasiveness in the form of widespread adoption came about as a by-product. The number of firms maintaining national and regional networks increased and moved into almost every regional market. At the time of the Netscape IPO, for example, most of the national access firms were recognizable. Such established firms as IBM, AT&T, Netcom, AOL, and others entered the ISP business. By 1998 many entrepreneurial firms maintained national networks, and few of these new firms were recognizable to anyone other than user consultants for this service. These two types of firms could bring the Internet to almost anyone almost anywhere in the country.

AT&T's actions mattered for another reason. It developed a nationwide Internet access service, opening with as large a geographic spread as any other contemporary national provider. It also grew quickly, acquiring one million customers after a few months of publicity on the strength of its promise to provide reliable, competitively priced, and easy-to-use service. It was deliberately aimed at households, providing a brand name and a

