The Internet Revolution

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Why a Revolution?

Not very long ago, the only people talking about the Internet were the small number of individuals who were engaged in engineering it, building it, and nurturing its growth. That was during the 1970s. But even during the 1980s, as the Internet expanded its reach and diversified its information resources and services, the Internet's existence went largely unnoticed by the general public and it managed to retain its quiet, remote, and unassuming presence. The only national press coverage the Internet received during the first two decades of its existence was when there was a sudden and sizable failure in one of its component systems or a debilitating network attack, like the Internet worm of 1988. And the only individuals who took an interest in the Internet were computer enthusiasts, and their numbers were still very small. Moreover, in order to have any access to the Internet, you had to work at a major research facility, like AT&T Bell Laboratories, or attend one of the lucky few Internet-connected academic institutions, like MIT or Stanford, or be employed by one of the United States government agencies that controlled it. In other words, for the first twenty or so years of its existence, the Internet remained predominantly hidden from public view and functioned as the private and entirely commerce-free playground of researchers and scientists, students and computer center workers, and some members of the military.

Nowadays, it's difficult to avoid some reference to the Internet, no matter how hard we may try. It comes up in conversations with friends and family and in meetings at work as people complain about the latest email virus or some interminable network slowdown or as they rave about a site they have just discovered for managing their stock portfolio or playing poker. We hear about the Internet on radio and television programs as broadcasters awkwardly spell out their Internet site addresses in an effort to entice us to get more in-depth information on a particular subject, such as a recent news story or the upcoming episodes of a popular show. We see the Internet's effect on commerce everywhere we look, in its role as an entirely new and powerful medium for the distribution of all forms of advertising, as evidenced by the Web site names that confront us on everything and anything that can contain printed text, from billboards to baseball caps, t-shirts to tattoos, the sides of cars, trucks, trains, and planes, the walls of sports stadiums, the cellophane wrappers enclosing heads of lettuce, and even those annoying stickers attached to each and every grapefruit, tomato, and cucumber.

This change didn't happen overnight, but it definitely feels like it did. It took less than ten years after the Internet was privatized and opened up to commercial traffic in the early 1990s for it to become a basic and essential part of our daily lives. It became, quietly and unobtrusively, an integral component of our home life, our jobs, and the world's communication infrastructures, economies, and cultures. This change was so compelling and pervasive that it raises the question: what kind of vacuum or void existed before the Internet's creation and its evolution into such a powerful and ubiquitous presence? In the course of a few, frenetic years, the Internet has grown into an inexorable force that businesses, non-commercial organizations, governments, scientific and academic institutions, and individuals throughout the industrialized world have not only accepted but embraced. Consequently, the Internet's impact can be seen all around us.

The Internet has transformed how business is conducted, and it has provided powerful new ways to locate, learn about, and buy all types of products and services. It has inspired and made possible the creation of entirely new business enterprises, including the much touted and highly speculative business of e-commerce. It has enabled governments to better share information

about and distribute information to their citizens, and better collect information about those citizens. It has facilitated collaboration on research, which, incidentally, fulfilled one of the visions of its original creators. It has dramatically changed the way we communicate and has enabled the creation of new social structures in the form of virtual communities. It has forever altered how we access information and the variety and quantity of information we can access, empowering us to gain knowledge through a richness of resources that was previously only imagined in science fiction. It has allowed us to become publishers of family photos, shared genealogies, journals, diaries, diatribes, musical compositions, short stories, full length novels, and just about anything else that can be stored and distributed in the form of a computer file.

For the purposes of a simple comparison, consider an earlier revolution incited by a different, but just as pronounced, leap in technology. The Industrial Revolution, which began in England in the 18th century and resulted from the invention and refinement of the steam engine, brought us the mechanization of labor. Machines were created that performed the labor of men, women, and farm animals, and they performed this work faster, cheaper, with fewer problems and interruptions, and often with greater precision. For a fortunate minority, the Industrial Revolution meant new-found wealth, provided one understood how to apply the new technology and succeeded in financing and managing a new type of business venture. For the majority of the population, it meant a change in employment and, more often than not, a resulting change — for better or worse — in one's financial situation, as many old, established jobs were eliminated or greatly changed and new, very different jobs were created.

The impact of the Industrial Revolution and the mechanization of labor was immediately evident in changes in the job market, the creation of new businesses and new products, and the quality and quantity of products that could be produced. But its most profound and lasting impact — albeit less immediately apparent — was revealed in how individuals lived their lives and interacted with others. It not only affected what people did for employment, it affected how people performed their jobs. It also affected people's home life and the amenities in their homes, their health and the general comfort and quality of their lives, their opportunities for

education and advancement, and how fast and how far they (and their information) traveled the world.

In some way, shape, or form, the Industrial Revolution eventually affected every region of the world and nearly every member of society. Even the few, isolated areas of the world that, for whatever reason, failed to feel its direct impact, were eventually indirectly affected either through the trade and transportation of goods, the communication of information, the expansion of urban areas into rural communities, or the increased movement and migration of people. Today, more than two centuries later, some segments of society remain distant or disconnected from the Industrial Revolution's mechanization and associated modernization, a few through choice (e.g., the Amish) and others due to lack of financial resources or other limiting economic factors. Even so, whether people rejoiced in its arrival, felt indifferent to it, shunned its existence, or somehow avoided its impact, the Industrial Revolution changed forever the face and form of the world, and, directly or indirectly, these changes had consequences for everyone.

The Internet Revolution, which began in the U.S. in the early 1990s and resulted from the proliferation and internetworking of computers, is reshaping our world right now, whether or not we are a willing and eager participant and whether or not we want to acknowledge it. It has brought about a different sort of mechanization than that brought about by the Industrial Revolution, but one equally broad and far-reaching in its impact: the mechanization of information and communication. Moreover, there is no going back, no undoing of its effects, any more than one could undo the effects of the Industrial Revolution. Also, much as the Industrial Revolution changed the lives of individuals in different ways, the Internet and its revolution in how we communicate, acquire information and educate ourselves, perform our jobs, entertain ourselves, contribute to our communities, and interact with others, means something different to each of us.

If you currently use the Internet, consider for a moment how much time you spend online at home, at work, or elsewhere. Think about the information you routinely access through the Internet or the amount of email you send and receive. Two of the most popular Internet services — email and the Web — are used by millions of people across the globe each and every day. These

services constitute only a small fraction of those the Internet offers. But they alone have changed the way we interact with our friends, family, and others, the variety and volume of information at our disposal, and, more generally, how we conduct our lives.

The Industrial Revolution was not a revolution because the mechanization it brought changed the way products were manufactured. Nor was it a revolution because it enabled the creation of entirely new types of products and services or new sorts of jobs. Although it did all these things and the effects were both permanent and far-reaching, what made it a revolution was how it transformed us. The same is true of the Internet Revolution.

Everywhere we look, we see more and more references to the Internet. That's because it is becoming part and parcel of everything we do. The Internet is changing how we raise and educate our children, how we stay connected with our families and friends, how, when, and where we perform our jobs, how we purchase our goods, how we read the weather forecast or our horoscope or send a birthday card. These changes in our behavior are fundamental and permanent, and they are becoming more pervasive with each passing year. Consequently, the Internet is changing us, our communities, our societies, and, as you will understand after reading this book, the very interconnectedness of our world.

What is the Internet?

The very short definition of the Internet is that it is a network of computer networks. As such, the Internet comprises a communication infrastructure that enables computers to locate and talk to one another and to send and receive information. The Internet's infrastructure consists of a global communication network of copper telephone lines, fiber optic cables, coaxial cables, and satellite systems. Its communication infrastructure for handling the transmission of information can be compared to the roadway infrastructure for handling the transportation of vehicles. Computers use the Internet's global network to move small packets of data quickly and efficiently from place to place (i.e., from computer to computer) and deliver them to their intended destination (i.e., another computer) much as cars and trucks use