
Introduction

The Internet has been the most fundamental change during my lifetime and for hundreds of years. Someone the other day said, "It's the biggest thing since Gutenberg," and then someone else said, "No, it's the biggest thing since the invention of writing."

—Rupert Murdoch (2005)

The Internet Revolution

On February 27, 1995, *Newsweek* magazine published an article written by Clifford Stoll entitled *The Internet? Bah! Hype Alert: Why Cyberspace Isn't, and Will Never Be, Nirvana*. In the article, Stoll, an astronomer and well known author of the book *Silicon Snake Oil—Second Thoughts on the Information Highway* infamously predicted that many of the things made possible by the Internet that we now take for granted would never become a reality.

The article, which has been repeatedly passed around the Internet and mocked incessantly, proclaims that “Internet hucksters,” “computer pundits,” and “visionaries” are devoid of “all common sense.” Stoll goes on to decry their vision of the future, calling it “baloney.” He mocks their claims that the Internet will make possible a world in which, among other things, people telecommute, purchase and read books online, book airline tickets and restaurant reservations, interact in virtual worlds, and engage in online commerce. Stoll decries the hype and lambastes those who claim that the Internet will drastically change the world in which we live:

“Visionaries see a future of telecommuting workers, interactive libraries and multimedia classrooms. They speak of electronic town meetings and virtual communities. Commerce and business will shift from offices and malls to networks and modems . . . Baloney. Do our computer pundits

lack all common sense? The truth is no online database will replace your daily newspaper . . . Nicholas Negroponte, director of the MIT Media Lab, predicts that we'll soon buy books and newspapers straight over the Internet. Uh, sure . . . Then there's cyberbusiness. We're promised instant catalog shopping—just point and click for great deals. We'll order airline tickets over the network, make restaurant reservations and negotiate sales contracts. . . . Even if there were a trustworthy way to send money over the Internet—which there isn't—the network is missing a most essential ingredient of capitalism: salespeople. . . .”

As we now know from our comfortable vantage point sixteen years later, Stoll could not have been more wrong. The vast majority of the predictions that he scoffed at have now come true. In little more than a decade, the Internet has literally transformed our lives, from how we conduct business to the ways in which we interact and connect with family and friends.

The Internet has made it possible for us to shop online for virtually anything we can imagine. Workers telecommute. We use Voice Over Internet Protocol (VOIP) to make free international phone calls and conference calls. We hold online video meetings and attend online classes.

The Internet has become a repository for all types of information. Indeed, for many, the Internet is our primary source of information, from news, current events, encyclopedic knowledge, and scholarly articles. Through the Internet, we connect to our social networks, communicate with our friends and family, and network with business associates. Virtual communities are now a reality as are multimedia classrooms and interactive libraries.

The Internet is entrenched in our day-to-day activities and is an integral part of our lives on so many levels. The bottom line: Stoll was an outspoken—and very mistaken—critic of those who dared to dream of the possibilities of the Internet. He was the original Internet curmudgeon and bastion of old-school ways, just like many lawyers today. Like Stoll, rather than accepting and embracing change, a good portion of the legal profession remains firmly entrenched in the ways of decades past, staunchly resisting the inevitable changes ushered in by technology. Unlike lawyers of the twenty-first century, however, Stoll had an arguable excuse for his lack of vision: the technology had not yet evolved.

The Internet was a clunky beast back then. By today's standards, the dial-up connections were horribly unreliable and were slower than molasses.

Anyone who had access to the Internet at the time no doubt recalls staring at a blank screen for minutes at a time while listening to the familiar, raucous sound of the dial-up modem attempting to connect to the network.

Connection speeds and data transfers via the Internet were painfully slow because today's technological groundwork for the information highway had not yet been laid. For that reason, it was undoubtedly difficult to envision a future in which the pipe dreams of the Internet hopefuls would ever come to fruition. Since that time, Internet-based technologies have drastically changed our world. From 1995 until now, a number of important events occurred that made the Internet as we now know it possible. With these changes came the increased Internet and processing speeds that make cloud-based computing a feasible alternative.

It was not always this way. As Stoll describes in the *Newsweek* article, in the days of dial-up access, the Internet was unbearably slow, and the Internet was a virtual wasteland of inaccessible information. That began to change in 1995, however, in part because the commercial possibilities of the Web became apparent. As with many other phenomena, commercialization was one of the driving forces behind change—in this case, the reorganization of the Internet.

As Nicolas Carr notes in his book *The Big Switch: Rewiring the World from Edison to Google* (© 2008 by Nicholas Carr), the year 1995 was somewhat of a turning point in this regard:

At the end of 1993, less than 5 percent of sites were in the .com domain. . . . [A]s the profit-making potential of the new medium became clear, businesses rushed in and commercial sites quickly came to dominate the network. By the end of 1995, half of all sites bore .com addresses, and by mid-1996 commercial sites represented nearly 70 percent of the total.

The next five years brought forth remarkable changes, due in large part to the forces behind the Dot-com boom. In his ground-breaking book, *The World is Flat: A Brief History of the Twenty-first Century*, Thomas Friedman posits that the tipping point occurred sometime around the year 2000, when ten “flattening” forces converged. According to Friedman, the interaction of these ten forces—the fall of the Berlin Wall, the rise of the PC, Netscape, work flow, outsourcing, offshoring, uploading, insourcing, supply chaining, in-forming (Internet search), and the Steroids (digital, mobile, personal, and virtual)—resulted in a new world order, moving us from Globalization 2.0 to 3.0. Friedman explains this how this transition occurred horizontally, rather than vertically:

Globalization 2.0 was really the era of mainframe computing, which was very vertical—command-and-control oriented, with companies and their individual departments tending to be organized in vertical silos. Globalization 3.0, which is built around the convergence of the ten flatteners, and particularly the combination of the PC, the microprocessor, the Internet, and fiber optics, flipped the playing field from largely top-down to more side to side. And this naturally fostered and demanded new business practices, which were less about command and control and more about connecting and collaborating horizontally.

In other words, it is a whole new ball game now that we have now entered Globalization 3.0. The rapid convergence of the ten flatteners has changed the way that we do business and there is no turning back. The activities that we engage in every day using the Internet—and most importantly for the purposes of this book, cloud computing—were not possible prior to the widespread availability of broadband access.

One of the most important factors behind this change—the speed of broadband access—has increased dramatically in recent years, thus erasing the barriers that prevented us from fully realizing the potential of networked computers and the rapid exchange of data via the Internet. In fact, the Internet has become such an integral part of our lives, Finland recently became the first country to declare that reasonably priced broadband Internet access is a legal right when it enacted amendments to its Communications Market Act.¹ This development is simply further evidence that, now that we have entered the next stage of the Internet, cloud computing is a finally a feasible alternative for businesses.

In his book, *The Big Switch: Rewiring the World from Edison to Google*, Nicholas Carr compares cloud computing to the electrical grid and suggest that, just as businesses that once produced electricity in-house later outsourced electrical production to utility companies, so too will businesses ultimately outsource computing to the cloud. Carr explains this option has only become a possibility in recent years, in large part due to faster Internet connections that are becoming increasingly affordable:

The network barrier has, in just the last few years, begun to collapse. Thanks to all the fiber-optic cable laid by communications companies during the dot.com boom—enough, according to one estimate, to circle the globe more than 11,000 times—Internet bandwidth has become

¹Finland makes broadband a 'legal right,' BBC News (July 1, 2010). (<http://www.bbc.co.uk/news/10461048>)

abundant and abundantly cheap. . . Now that data can stream through the Internet at the speed of light, the full power of computers can finally be delivered to users from afar.

Without this rapid increase in available Internet bandwidth, combined with the ever-increasing processing power and reduced costs for bandwidth and data storage, cloud computing and the advantages it offers businesses would not now be possible.

The opening of the Internet floodgates that we are now seeing is occurring, in large part, due to the operation of Moore's law. Moore's law, an important and pivotal theory, predicts that every two years the price of a unit of computer processing power will be reduced by half. In *Free: The Future of a Radical Price*, Chris Anderson, the editor of *Wired* magazine, describes the effect of Moore's law, in combination with other "flattening" factors, upon Internet-based technologies:

Just as Moore's Law dictates that a unit of computer processing power halves in price every two years, the price of bandwidth and storage is dropping even faster. What the Internet does is combine all three, compounding the price declines with a triple play of technology: processors, bandwidth and storage.

In other words, we are in the midst of a seismic shift. This conclusion is, I think, indisputable. The changes wrought by the Internet are broad and far reaching, affecting every aspect of our lives, from how we conduct business to how we connect and communicate with friends and family, how we obtain information, how we shop, and how we learn. This is an important shift—some might say it is revolutionary. I would argue that this shift is on par with other fairly recent and significant events that fundamentally altered our culture, including the invention of the automobile, the creation of the US highway system, and the wide-scale adoption of air conditioning.

Each of these events radically altered the landscape of our country, our cities, and our lives. At this point, there is no turning back—these changes are here to stay and our lives will never be the same. For that reason, for some readers, it may be useful to examine these other forces of change in an historical context to provide a better sense of how the mass adoption of cloud computing, like these other pivotal events, has the potential to fundamentally change our world. For those interested in this analysis, you can learn more about the transformative nature of the invention of the automobile, the creation of the US highway system, and the wide-scale adoption of air conditioning in Appendix A.

Upending Grove's Law

The Internet has changed the ways in which we work and play. It has drastically altered our reality in just fifteen short years, making activities that were once mere science fiction commonplace—activities like video conferencing, telecommuting, and online commerce. The key to making these possibilities a reality was the realization of Moore's law, which predicted that the price of computing processing power would be reduced by half every two years. As processing power became increasingly affordable, the Internet became an integral part of our lives.

It was the operation of Moore's law combined with the lack of realization of another law, however, that made cloud computing possible. This "law" is referred to as Grove's law, which predicted that telecommunications bandwidth would double just once every century. Grove's law is based on Grove's observation that, historically, computing processing power increased far more quickly than communications bandwidth, where said bandwidth is comprised of high speed, high capacity communications networks connected by computers, cables, satellites and electronic switches. Accordingly, he predicted that the communications network would develop at a snail's pace compared to processing power.

Lawyers and the Internet Collide

For the legal profession, cloud-computing platforms and services present a number of thorny ethical and security issues, as discussed later in the book, but legal cloud-computing providers are proving to be responsive and receptive to the very valid concerns raised by lawyers in that regard. In its current form, cloud computing for lawyers is not perfect, but it is a viable alternative to traditional desktop software for many lawyers, especially solos and small firms. As the technology and products improve, cloud-computing platforms will become a more palatable alternative for large and small firms alike.

I believe that the day of reckoning has come for our profession. The technologies and changes wrought by the Internet are not going away. Technology is here to stay, and cloud computing is a large part of the Internet-based computing landscape that will shape business in the years to come.

If you are not yet convinced, consider the results of findings recently released by Gartner, a technology and research company, widely recog-

nized as a leader in the field. According to Gartner, cloud computing and mobile computing will become more and more common, as borne out by the statistics from their annual report, *Gartner's Top Predictions for IT Organizations and Users, 2010 and Beyond: A New Balance*:

- ◆ Cloud computing was the top technology trend for 2010
- ◆ By 2012, 20 percent of businesses will own no IT assets and will conduct business solely in the cloud
- ◆ By 2013, mobile phones will overtake PCs as the most common Web access device worldwide
- ◆ By 2014, over three billion of the world's adult population will be able to transact electronically via mobile or Internet technology

As you can see, if you intend to do business in the twenty-first century, ignoring cloud computing is no longer an option. Understanding it is a necessity. This book will help you do just that.

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