

Do Web Sites Dream of Electric Sheep?

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Abstract

The Web became a name used to describe a common information space in which people used to communicate and share information in the form of web pages. The pages can contain links that point to private, local, or global web pages that may or may not be finished or even exist at all. The end user uses a web browser to view the document and click on hyperlinks that lead to other documents on the Web. Its definition represents a moment in history that will indefinitely effect how we live our lives.

The Web has become an organism manufactured by humans that not only carries out work which is too boring, dangerous, or distasteful for humans, but also allows for rich communication and collaboration between its participants. As the sum total of all web sites in existence and the technologies used on them "come alive", we can imagine them becoming more and more like people, and in fact in many ways replacing them.

This paper peeks at a futuristic Web and examines the changing nature of personal and human identity from the context of man vs. machine.

A Digital History

The first successful run of a stored program on a computer occurred in 1948 on a small-scale experimental machine (SSEM) known as the "Baby". The program was written by Tom Kilburn, who designed and built the machine along with F.C. Williams. It had a 32-bit word length, serial binary arithmetic using 2's complement integers, a single-address format order code, a random-access main store of 32 words extendable up to 8,192 words, and a computing speed of around 1.2 milliseconds per instruction.

Over 20 years later, Ed Mosher, Ray Lorie, and Charles Goldfarb invented Generalized Mark-up Language (GML) at IBM. In 1974, Goldfarb invented the Standard Generalized Mark-up Language (SGML). The idea was to create a mark-up language that would allow information too complex for one person to understand, such as the documentation for nuclear plants, aircraft, and government laws and regulation, which had life-or-death significance.

The Internet was designed in 1973, published in 1974, and rolled out in 1983. It used TCP/IP as its key protocols for host-to-host communication. David Clarke of the MIT Laboratory for Computer Science was considered the father of the Transmission Control Protocol (TCP), which allowed for reliable connections between computers. Vint Cerf and Bob Kahn defined the Internet Protocol (IP), which routed packets of information sent from one computer to another.

Together, the Internet and SGML led to the invention of the World Wide Web (WWW, or the "Web") by Tim Berners-Lee in 1990. It was the ultimate killer app – you never knew how much you needed it until you saw it. It used the Hypertext Transport Protocol (HTTP) to communicate Hypertext Mark-up Language (HTML) documents, also known as "web pages", from a web server to a web client using a standard naming scheme called the Uniform Resource Locator (URL).

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A global and rapidly increasing inertia facilitated the piecemeal evolution of the Web as a tool to connect people, computers, and devices together. It allowed them to communicate and collaborate in ways never imagined before. The global integration of rich content, social fabric, and electronic commerce has led to what is often called the *connected economy*. But it had one major issue – it wasn't well suited for non-graphical applications, such as data interchange between integrated businesses.

This led to the invention of the Extensible Mark-up Language (XML) in 1996 by a group of SGML experts, which acted as an extremely simple dialect of SGML. Its main purpose was to allow generic SGML documents to be served, received, and processed on the Web in a way that was as simple widespread as HTML.

While the evolution of SGML, the Internet, the Web, HTML, and now XML has dramatically helped businesses communicate with their customers and partners, it only represents the first major step in the evolution toward a totally connected digital economy.

The Humans

Why weren't humans satisfied enough with life in caves? Since the beginning of time, both natural and unnatural creation has facilitated biological and sociological evolution, and experiencing life has become both easier and more advanced. Newer inventions tend to be created from existing ones. As society became more and more advanced, the notion of value for some things became a commodity, and we began to trade value with others, often hoping to gain a competitive advantage. More than two millennia ago, a major economic paradigm shift occurred: trading value got organized.

As far back as 1800 BC, the Mesopotamians created institutionalized trading exchanges. In 1400 AD, guilds were created to provide a context for self-regulation and cartel-like trading. And two years after the first American stock exchange was created in Philadelphia, 24 traders got together under a buttonwood tree at 68 Wall Street in New York City. They agreed to give each other preferential treatment in deals, creating what is known as the New York Stock Exchange. Eventually, technology facilitated a more efficient exchange, and the Internet has taken it to a whole new level.

Ticker machines were used to communicate price information to stockbrokers. The invention of the telephone facilitated richer communication between brokers and their customers. Exchanges themselves became more efficient when computers were used to perform analysis, and financial institutions all around them took on a whole new level of efficiency by using computers for their own analysis, processing, and to communicate with other institutions.

As the Web started to become mainstream, online discount trading firms emerged that allowed their customers to receive quotes and research, execute trades, and view trade history through the Web. They became popular so rapidly, that trade execution has traditional brokerages such as Merrill Lynch squandering for an online presence with competitive advantage. Within a few years, a deep majority of all retail equities trading was executed online.

Today, products such as wholesale and retail energy are being traded online. Traditional financial institutions are beginning to announce clearing services for these products. And consortiums of financial institutions are creating scalable, reliable, organic financial networks that will allow participants and service providers to interact in ways that will totally redefine the global financial marketplace.

This – in conjunction with a global movement by all industry segments to buy and sell raw materials, parts, MRO, and other goods and services online through exchanges, auctions, and aggregation platforms – creates a global environment that will eventually blur the lines between traditional and non-traditional financial products and currencies. A global ecosystem of dynamic trading communities will eventually emerge that naturally follow liquidity and price elasticity in a frictionless, organic manner.

And the Servers that Serve Them

Even further back than trading exchanges – relatively near to the creation of humankind – people started using tools to make it easier to do things. What seems to have motivated this is the ability to perform activities like hunting, building shelter, and agriculture more efficiently.

As societies became more and more organized, newer tools and techniques were developed that allowed people to establish a craft and perform services in exchange for value. This value could consist of things like food, animals, and eventually derivatives such as currency. Currency, which served as a proxy for value, was an important component in the evolution of our economy.

It allowed for third parties such as exchanges and banks to emerge that provided a trusted, neutral platform for this value exchange.

Dramatic increases in population led to a demand for goods and services that could not be met by the creation of handcrafted goods. Resources such as tools and workers, who had established crafts qualifying them to perform specific tasks, were utilized and structured into manufacturing organizations that performed mass production. Manufacturing companies were able to produce goods much quicker, at a lesser cost, and in greater quantities. Then, these manufacturers would distribute them through a supply chain to retailers who would sell them directly to customers.

Mass production burgeoned and created the industrial era. Workers who manned assembly lines at manufacturing plants were definitely valuable in the production process. But machines were a key factor that facilitated mass production. They allowed companies to continue to innovate in ways that increased efficiency or made it easier for assemblers to be more productive.

As the industrial era gained critical mass, companies used capital to acquire physical assets that would allow them to increase efficiency and capacity. This led to the creation of capital markets such as the New York Stock Exchange that allowed companies to receive capital in exchange for sharing partial ownership. Since the industrial era was booming, capital markets attracted speculators that bought and sold shares in trading exchanges.

Exchanges gained so much momentum, that price elasticity made it even more attractive to analyze and speculate on the future of these companies and the market overall. Machines such as stock tickers were used to make it easier for exchanges to transmit price information to traders and brokers at remote locations. Eventually, machines were used to make a wide variety of things easier: transportation, mass production, trading on capital markets, national defense, etc.

In 1948, a key breakthrough occurred: machines became smart. The first successful run of a stored program on a computer was the beginning of a whole new era. It would not only facilitate dramatic increases in industrial efficiency in the mass production of goods and services, but it allowed capital markets to become much more sophisticated in how stock market behavior was analyzed and forecasted. Many innovations in all other industry segments have led to increased efficiency and other benefits.

Today, people and businesses use private and public networks to disseminate real-time market data all over the world almost instantaneously. Most retail trading is done online through the Internet. People use automatic teller machines to withdraw money any time of the day or night. Commercial aircraft like the Boeing 757 are capable of taking off and landing without human assistance. Neural networks and other processing strategies are utilized in financial institutions that make it easier for traders to make informed decisions that would be virtually impossible most humans to do alone.

The explosion of computing machines in the 1950s made it easier to process large amounts of data. But the explosion of the Internet into the consumer and business space in the 1990s set the landscape for a new era that would yet again change the way humans live life. The Web and the Internet have turned computers into connected devices that allow them to collaborate, communicate, and coordinate activities with other people regardless of their location on planet Earth.

While the mass adoption of telephones in the early 1900s allowed a person to communicate with others at specific locations, the mass adoption of cellular phones in the late 1900s allow a person to communicate with others regardless of their location. The notion of smart appliances emerged as well. And recent innovations in technology are indicating that we are not far off from having households full of wireless connected appliances and devices which constantly communicate, collaborate, and coordinate to make our lives easier.

Since the beginning of mankind, people have striven to make doing things and living life easier and more efficient. Suddenly, a world containing billions upon billions of connected devices – tracking people’s location and every action they perform in order to make their lives easier – has become a reality. A pervasively connected future consisting of this kind of distributed, complex system of objects suggests that our perception of reality, identity, relationships, and privacy will experience a dramatic, perhaps frightening change.

The (Dark?) Future

Oil and electricity powered the Industrial Age, and bandwidth will power the Digital Age. Billions of objects around the world will come into life and discover, connect, and interact with other objects, then become eliminated. Digital behavior in this massively distributed system will occur through a totally pervasive, part-wired and part-wireless, infrastructure. The platform will be comprised of ubiquitous devices, such as cars, refrigerators, televisions, computers, cellular telephones, and vending machines.

Eventually—and to a large extent, it’s happening now—there will be a transparent but global electronic blizzard of light waves, radio waves, electric current, and who knows what else. As bandwidth, storage, and processing requirements increase exponentially, other mediums will be used to transmit signals and store memory. Even today, research groups at major corporations are investigating quantum systems, biological processing, molecular computing, and other crazy means of data crunching. All driven by our insatiable desire to make life easier.

At the time this essay was written, computers and networks have already made working and living tremendously easier. As a consequence, some major side effects have emerged. Every time people use the Internet or create a new account, their identity and behavior is tracked, analyzed, and sold to mass marketers. Privacy has become a major issue. Corporations all around the world are attempting to utilize technology to automate, integrate, and dominate. This digital renaissance has changed the market climate in dramatic ways that have both hurt and helped.

Billions of dollars were spent to remediate machines that were suspected to be not Y2K compliant. An MCI meltdown caused the Chicago Board of Options Trade to halt trading of derivatives for half a day. Viruses virtually paralyzed e-mail communication in entire corporations for days. The dot com gold rush has turned Internet savvy kids into overnight millionaires. And quiz shows like *Who Wants to be a Millionaire?* received sky high ratings through an intensified sense of greed in those who have missed out.

Already today, application service providers allow companies to provide a link on their consumer-oriented web sites that allow them to click and initiate a real-time chat session. But who says humans need to exist on the other end? As artificial intelligence is applied to collaborative filtering, and as more and more data about a company’s customers is gathered, it will become more and more possible to predict what the customer will do next.

The art of cross-selling and up-selling will be computerized. Intelligent agents won’t be human unless a customer’s problem is too complicated for it to solve, and the transition from machine to human will be seamless. Everything will be relationship-centric, and technology will increasingly serve as a value enabler. As technology becomes more and more effective, and as bandwidth and storage capacity and processing power become greater, more and more of the customer-facing side of a business will be replaced. Customer service becomes commoditized.

Perception of reality and identity will change. Cops will use intelligent agents that act like 13-year-old girls in order to find pedophiles. Dynamically personalization of a consumer’s context with automated, value-added services will occur through mutual discovery of mobile devices such as cars and cellular telephones via short-range radio. Everywhere a consumer goes, devices,

agents and services will be struggling for a piece like of the action, like meat sharks capitalizing on your existence.

Humans will eventually live in such a deep sea of illusion, that the concept of reality's beginning and end, the authenticity of life experience, and the notion of digital sociology replacing our ability to largely discern the difference between human and machine will change us. In fact, our predisposition for waxing nostalgia and reliving memories and keeping part of life private could become blurred into non-existence.

Baby Boomers will feel powerless through ignorance but attracted to how technology allows them to connect with others. Generation X will both fear and loathe this trend as its velocity increases. Generation Why will have a natural advantage in adapting to its digital evolution. But Generation Z may not even have the ability to understand how it could be different.

Conclusion

As the sum total of all ubiquity and the infrastructure technologies that connect them "come alive", they will become more and more like people, and in fact in many ways replace them. In twenty years, the Industrial Age will seem like the Medieval Age. Fear will walk hand in hand with the benefits that the Digital Age will bring to our lives.

Will the struggle between machines and humans ultimately become The Immortal Game of the Digital Age? Too bad we won't live to know. But then again, who does?

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