

Technology and Globalization

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Technology and Globalization

Introduction

In nearly every corner of the world, from Mumbai to Madrid, one cannot enter a café or walk down the street without seeing someone talking, texting, or surfing the Internet on their cell phones, laptops or tablet PC. Information Technology (IT) has become ubiquitous and is changing every aspect of how people live their lives.

Recent advances in our ability to communicate and process information in digital form— a series of developments sometimes described as an "IT revolution"— are reshaping the economies and societies of many countries around the world.



Picture Source: <http://www.flickr.com/photos/sydneya/130164091/>

Information Technology

IT is a driving factor in the process of globalization. Improvements in the early 1990s in computer hardware, software, and telecommunications greatly increased people's ability to access information and economic potential. While advancements in Internet-based tools, such as social networking websites, twitter, and other Web2.0 applications are changing the way people use and share information for personal, political, and commercial purposes. These developments have facilitated efficiency gains in all sectors of the economy. IT drives the innovative use of resources to promote new products and ideas across nations and cultures, regardless of geographic location. Creating efficient and effective channels to exchange information, IT has been the catalyst for global integration.

Products based upon, or enhanced by, information technology are used in nearly every aspect of life in contemporary industrial societies. The spread of IT and its applications has been extraordinarily rapid. Just 30 years ago, for example, the use of desktop personal computers was still limited to a fairly small number of technologically advanced people. The overwhelming majority of people still produced documents with typewriters, which permitted no manipulation of text and offered no storage. Twenty years ago, large and bulky mobile telephones were carried only by a small number of users in just a few U.S. cities. According to the Cellular Telecommunications Industry Association, 302.9 million Americans were subscribers to cell phone plan in 2010,¹ and in some developing countries, mobile phones are used by more people than the fixed line telephone network.

But perhaps most dramatically, just fifteen years ago, only scientists were using (or had even heard about) the Internet; the World Wide Web was not up and running, and the browsers that help users navigate the Web had not even been invented yet. Today, of course, the Internet and the Web have transformed commerce, creating entirely new ways for retailers and their customers to make transactions, for businesses to manage the flow of production inputs and market products, and for job seekers and job recruiters to find one another.

The news industry has also been dramatically transformed by the emergence of numerous Internet-enabled news-gathering and dissemination outlets. Websites, blogs, instant messaging systems, e-mail, social networking websites, and

¹ <http://www.ctia.org/advocacy/research/index.cfm/aid/10323>

other Internet-based communication systems have made it much easier for people with common interests to connect, exchange information, and collaborate with each other. Education at all levels is continually transforming thanks to innovations in communication, education, and presentation software. Websites now serve as a primary source of information and analysis for the masses.

Advances in Information Technology

The IT revolution has been driven by the extraordinarily rapid decline in the cost and rapid increase in the processing power of digital technologies. The digital device whose technological advance has perhaps been most crucial to the IT revolution is the microprocessor, the collections of millions of tiny circuits that serve as the "brains" of personal computers and that are embedded in an ever-expanding number of products, from video games, to cars, to refrigerators. Over the past two decades, the processing power of microprocessors has doubled roughly every six months.

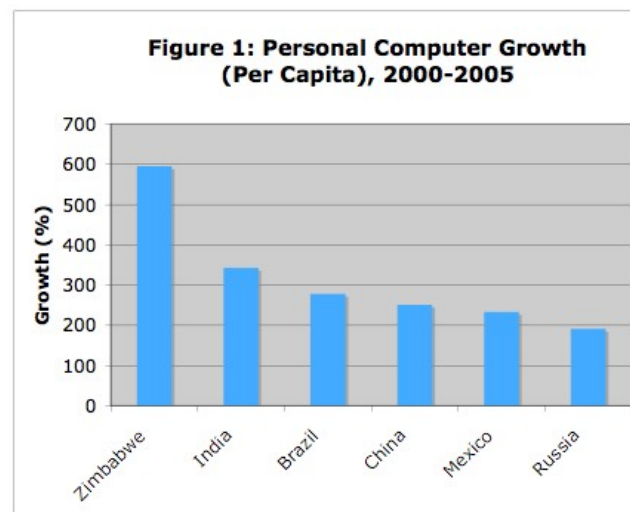
Rapid advancements in fiber optic technologies have also been critical to the IT revolution. Fiber optics technology enables data, including voices captured in digital form, to be converted into tiny pulses of light and then transmitted at high speeds through glass fibers wrapped into large capacity telecommunication cables. Hundreds of thousands of miles of these cables were installed over the past ten years, boosting the speed and capacity of telecommunications networks.

YouTube video on fiber optics: http://www.youtube.com/watch?v=lll8Mf_faVo.

Advances in microprocessors, fiber optics, and a number of other complementary technologies, such as telecommunications switching devices and memory chips, have dramatically increased the speed, processing capacity, and storage space of computers and of telecommunications networks themselves.

Driving Down the Cost of Information Transactions

A key reason why these advances in IT have spread so quickly is that they have progressively reduced the unit cost of computing power or the transmission of a message. For less than \$400, Americans without any advanced technical training can purchase and use a desktop computer whose data processing power far exceeds the room-sized computers that powered the spacecraft that carried astronauts to the moon and back in the late 1960s and early 1970s. Companies such as Microsoft have even sold \$100 computers to consumers in emerging countries as a way of helping developing countries use more advanced technological resources.



	Environment	Development	
Trade		Media	Women
	Technology	Migration	
Investment		Culture	Human Rights
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Source: World Development Indicators Database

The decline in computing prices is a factor in spurring the growth of computers in the developing world (see Figure 1). Countries such as Zimbabwe, India, Brazil and China experienced tremendous growth in the number of personal computers. From 2000 to 2005, the growth rate of personal computers per capita exceeded 200 percent for most of these nations, with developing countries like Zimbabwe increasing almost 600 percent. By the end of 2008, there were reportedly more than one billion PCs in use, and by 2015, two billion are expected to be in use.²

The spread of digital technologies has also been spurred by several unique attributes of information, which serves as the principal input and product of many IT industries. In contrast to more tangible products, like consumer goods, one person's "consumption" of a piece of information does not necessarily reduce or eliminate the possibility that another person might benefit from the same piece of information.

Furthermore, networks built upon the exchange of information, like the Internet, tend to become more valuable to existing participants as new participants link up with them. Finally, the cost of using digital technologies, such as Internet service providers, decreases as the number of users increases. All of these factors have worked together to promote rapid growth in the demand for, and supply of, IT products and services. During the second half of the 1990s, as more people bought computers and went online, the average cost of the equipment and services necessary to access the Internet declined. Today, individuals go beyond the conventional desktop computer to stay connected: laptops, smart phones and tablet PCs utilize Wi-Fi networks to make the Internet an integral—and necessary—part of everyday life.

² <http://www.forrester.com/Research/Document/Excerpt/0,7211,42496,00.html>

The Impact of Information Technology

The next three sections of this Technology and Globalization Issue Brief will examine the impact of the IT revolution in several critical areas:

- Industrial structure and jobs
- Workforce
- Financial markets

In each of these areas, we will identify ways in which the application of new information technologies promotes prosperity and enhances lives. But developments in IT are also causing some problems and raising some concerns in both areas, and the sections that follow will also look at some of those problems and concerns.

Industrial Structure and Jobs

Developments in computing and telecommunications technology are changing America's industrial landscape and its workforce. The application of new digital technologies to management, manufacturing, distribution, and services has produced significant and lasting increases in productivity. The new technologies have also created new industries (e.g., Internet access providers) and entirely new kinds of work (e.g., website designers) and boosted other industries. But the new technologies have also shrunk or even eliminated other industries and the jobs associated with them (e.g., electric typewriters).

IT is fundamentally restructuring business practices. IT innovations have increased the efficiency of business operations. New IT-based inventory systems allow businesses to cut costs by delivering or receiving parts for "just-in-time" assembly. By reducing delivery times and inventories, "just-in-time" assembly allows businesses to meet consumer demand more quickly and cheaply.

IT and the use of the Internet have also dramatically transformed exchanges between buyers and sellers. Some Web-based businesses, such as Amazon.com, are using the Internet to sell and arrange for the delivery of large quantities of goods without buyers themselves having to access a network of wholesalers and retail stores. "Business-to-business" ("B2B") commerce over the Internet helps many companies streamline their sourcing of production inputs and allows them to sell products or services to other companies. Similarly, companies are using the Internet to find other businesses that might want to buy their products or services or sell them products or services. The value of B2B e-commerce exceeds the value of e-commerce between Internet retailers and individual consumers.

Over the past decade, there has also been a proliferation of online employment marketplaces, which offer new tools for buyers and sellers of labor to link up with each other. Internet-based recruitment services, such as Monster.com, enable employers to post job announcements on the Internet and prospective employees to search job listings or post their resumes.

Global e-commerce is growing steadily; past growth shows a gradual upward trend. (See Figure 2).³ While the absolute numbers declined in 2009 as a result of the recession, they have bounced back in 2010. The U.S. online retail sales are expected to grow from \$152.1 billion in 2010 to \$223.9 billion in 2014.⁴ Because of the growth of e-commerce, other

³ <http://www.comscore.com/2010/09/u-s-retail-e-commerce-spending-by-year-2/>

⁴ Plunkett Research

<http://www.plunkettresearch.com/Industries/ECommerceInternet/ECommerceInternetStatistics/tabid/167/Default.aspx>

sectors of the job market have shrunk and will continue to do so. For example, employment for stock clerks and order fillers are expected to drop by 171,000 from 2006 to 2016.⁵ On the same note, retail sales at physical stores are expected to grow at an annual rate of 2.6 percent from 2007 to 2012, but online sales are expected to grow 14 percent annually for the same time period.⁶

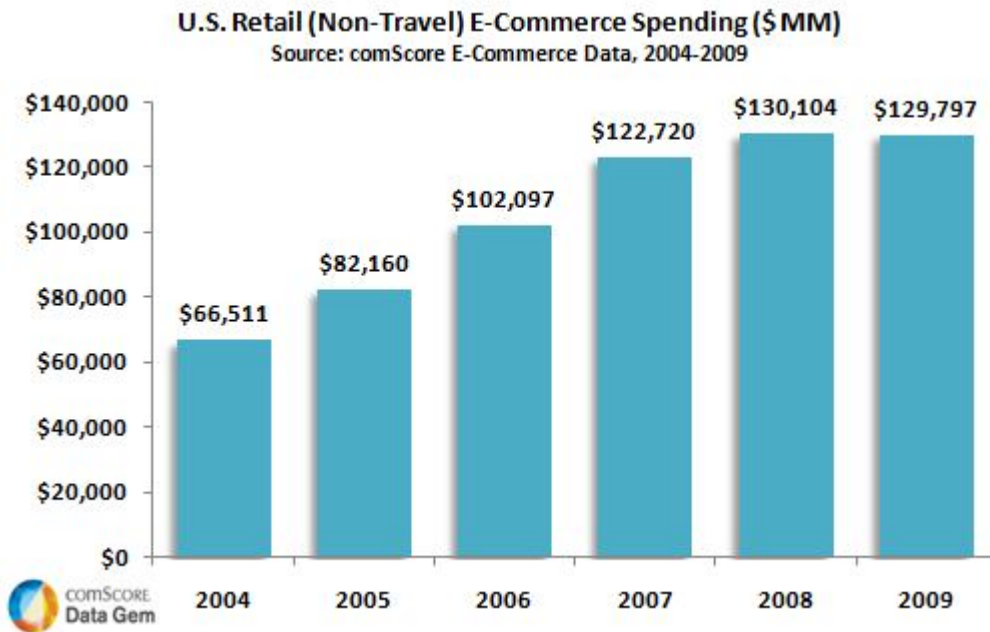


Figure 2:

Applications of new IT have boosted U.S. labor productivity. From 1974 to 1990, labor productivity grew by 1.4 percent per year. Between 1991 and 1995, annual productivity growth increased slightly, to 1.5 percent per year.

From 1996 to 2005, however, as companies invested heavily in IT equipment, software, and services, annual productivity growth, measured by non-farm output per hour, soared from 1.0 percent in 2000 to 5.5 percent in 2008. Most recently, U.S. productivity in the non-farm businesses declined slightly by .9 percent in the second quarter of 2010 as a result of the recession; this decline though followed five quarters of strong productivity growth. Labor productivity overall rebounded and is now growing; it grew 1.3 percent in the manufacturing sector from 1st quarter 2010 to 1st quarter 2011.⁷

Most economists attribute the increase in annual productivity growth to the pairing of labor with new kinds of IT across a broad swath of the U.S. economy. Many economists believe the recent productivity gains will endure for the foreseeable future.

⁵ U.S. Bureau of Labor Statistics, <http://www.bls.gov/news.release/ecopro.t08.htm>

⁶ <http://www.computerworld.com/action/article.do?command=viewArticleBasic&articleId=9061108>

⁷ U.S. Bureau of Labor Statistics, <http://www.bls.gov/news.release/prod2.nr0.htm>

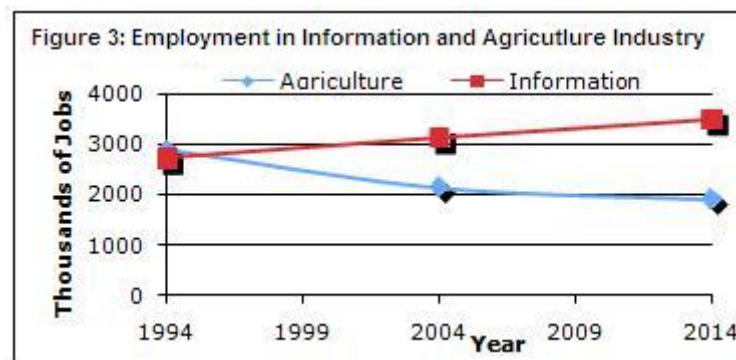
Extraordinary labor productivity growth, coupled with a rapid increase in Internet usage by businesses and individual, has prompted some economists and other analysts to argue that the United States now has a "new economy." According to this view, permanently higher productivity, more versatile and flexible corporations, and a likely reduction in the periodic ups and downs of economic activity, known as the business cycle, characterize the new economy.

One significant implication of the new economy theory, if it is correct, is that the United States will be able to grow at a faster rate than has been the historical norm, without generating price inflation. Among other things, higher, non-inflationary growth would enable further reductions in our unemployment rate.

Workforce

These information technology-induced changes in the structure and performance of the U.S. economy have had significant consequences for the American workforce. The incorporation of new digital technologies into all sectors of the U.S. economy has created substantial new demand for expertise in software development, the management of computer and information systems, technical support services, and the manufacturing of high-tech gear.

Information Technology (IT) is the fastest growing sector in the economy, with a 68 percent increase in output growth rate projected between 2002 and 2012.⁸ Figure 3 depicts the changes in IT-employment from 1994 through 2014 (projected) for the information and agriculture sectors. Comparing the two industries side-by-side, it is clearly visible the demand for information jobs will steadily gain momentum, while agricultural employment will continue to dwindle, with a projected one million jobs lost by 2014.



Source: "Industry output and employment projections to 2014" by Jay M. Berman, Bureau of Labor Statistics

Growing demand for workers in the information-technology sectors has pushed up their wages relative to workers in other industries. According to the Bureau of Labor Statistics, the average hourly earnings of non-supervisory information workers increased from \$17.14/hour in 1997 to \$26.37 in March 2011; during the same period average hourly earnings from the private sector increased from \$12.51 in 1997 to \$19.32 in March 2011.⁹

Over 60 percent of workers in the U.S. economy are now considered knowledge workers. Knowledge workers are also called "symbolic workers," as they use very little physical or mechanical labor. Unlike their industrial counterparts, knowledge workers spend their time at work manipulating information rather than machines. An increase in knowledge workers has led to a decline in other sectors of the economy, such as service and labor-intensive jobs.

⁸ Source: U.S. Bureau of Labor Statistics: http://63.88.32.17/brg/Indprof/IT_profile.cfm

⁹ Ibis, <ftp://ftp.bls.gov/pub/suppl/empsit.ceseeb2.txt>

	Environment		Development	
Trade		Media		Women
	Technology		Migration	
Investment		Culture		Human Rights
	Energy		Health	
IMF+World Bank		Education		International Law

The flip side of increased demand for high-tech workers is the decreased demand for workers in industries where computers and other high-tech devices have replaced tasks that used to be performed by people. Workers have also lost jobs in industries or firms that have been unable to adopt new information technologies as effectively as industries or other firms that offer comparable products or services.

For example, the U.S. manufacturing sector lost three million jobs between 2000 and 2006.¹⁰ According to the U.S. Bureau of Labor Statistics, from May 2007 to May 2008, the number of unemployed individuals within the manufacturing sector increased from 651,000 to 879,000.

Many of those workers who lose jobs in declining firms or industries lack the education or training to take up jobs in the high-tech sector. A person who spent 30 years in a steel plant that is shutting down may not be equipped to work for many of the industries that are adding jobs as our economy transforms itself. State governments and the federal government offer programs designed to help workers acquire the training and education needed to make the transition from declining to growing sectors of our economy, but the record of these programs has been mixed.

Unfortunately, many firms in the industries that are succeeding also have a bias in their hiring practices toward younger workers. They may believe that younger workers are more flexible and more easily trained than older workers, and they may undervalue the importance of experience and maturity.

The IT-driven cycle of job creation and job destruction can be seen in almost every sector of the new, knowledge-based economy. The automation of assembly lines has reduced jobs in manufacturing, for example, but it has created new jobs in robotics technology and computer engineering. The introduction of computers has reduced the need for many kinds of clerical work in offices, but it has also created a new demand for computer designers, software writers, computer system managers, service personnel, and data entry workers.

Financial Markets

A second area in which the impact of information technology has been profound is in financial markets. Financial markets encompass a wide variety of institutions and practices through which lenders and borrowers are able to interact. Lenders include banks and other financial institutions that make loans to individuals (e.g., for house or car purchases) and to institutions (e.g., for expansion or acquisitions).

These lenders are typically compensated through interest payments or, in some cases, an ownership stake in an enterprise. Individual investors who buy corporate stocks and bonds or government bonds are also lenders, and the companies and governments that sell the investors the stock or bonds are borrowers.

The borrowers hope to use the money raised through these transactions for new equipment, new lines of business, or other productive purposes. The investor-lenders receive compensation for their investments through interest earnings, dividends, or an increase in the value of their stock or bond holdings.

Stock markets are perhaps the most familiar institutions in the financial marketplace, but a wide variety of other institutions and investment vehicles, or "instruments" are available to those hoping to earn or raise money. These include bond markets, foreign exchange markets and futures markets, among others. Each of these markets for financial markets has been impacted by the efficiency improvements from IT.

¹⁰ Christian Science Monitor, <http://www.csmonitor.com/Business/2008/0215/p01s04-usec.html>

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A combination of policy reforms and IT innovations has transformed financial markets over the past two decades. Governments around the world have modified, or eliminated, regulations that limited innovation and competition in their financial markets. They have also reduced barriers to foreign participation in their markets.



New IT developments have spurred innovation and international expansion in financial markets in three ways:

1. By permitting complex domestic and international transactions to be conducted rapidly and securely.
2. By enhancing data storage, analysis, and other data—dependent tasks associated with the management of financial institutions.
3. By giving market actors of all sizes access to a wide array of information on investment and borrowing opportunities, the performance of companies and financial institutions, economic trends, and policy developments.

Building upon policy reforms and technological developments, private financial firms have over the past two decades created numerous new vehicles, or "instruments," through which people and institutions can lend, invest, or raise money. Reforms and technology have also helped multiply cross-border linkages among national financial markets.

As recently as the 1970s, individual investors, firms, and governments were generally able to invest or raise capital only within their own self-contained, national financial systems. Access to foreign bank loans, stocks, and other financial instruments was available only to the most sophisticated investors.

Closed markets like these are hard to imagine today. Cross-border financial arrangements have become commonplace. A global financial market has emerged, and the volume and value of the transactions it supports is staggering. The total daily value of foreign exchange transactions (exchanges of one national currency for another) has increased from \$18.3 billion in 1977 to \$4.0 trillion in April 2010.¹¹¹²

Benefits

The global financial market offers an extraordinary range of opportunities to invest and borrow money, benefiting investors, firms, and economies. On the borrowing side, if a U.S. entrepreneur is not satisfied with her American options for raising funds for a new business, she can seek funds in Europe or Japan. The wider range of options available to borrowers has increased competition among lenders, helping to keep the cost of borrowing down. This has made it easier for firms to finance business expansion plans and acquisitions, generating jobs and economic growth.

¹¹ An Overview of the Foreign Exchange Marke, http://www.saf.ethz.ch/publicat/pb_63rr.pdf

¹² Triennial Central Bank Survey, <http://www.bis.org/publ/rpfx10t.pdf>

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Likewise, on the investing side, a European stock investor hoping to earn a higher return than he can earn in his home stock market can now explore alternative investments in the United States. Access to a wider range of international opportunities has helped successful investors increase their earnings and minimize risk through diversification of their investment portfolios.

The global financial market has increased the growth potential of individual countries. By opening up their financial sectors to international flows of capital, countries have been able to acquire the funds they need to support all sorts of private and public sector development initiatives. These funds have the potential to spur higher levels of growth.

Short-Term Capital Concerns

The same technologies that have helped create a nearly seamlessly international financial market also increased both the probability and the potential cost of market volatility. The chief problem is that the openness of national financial systems and the technologies that facilitate transactions not only make it easier for investors to find places around the world to put their money—they also make it possible for investors to pull their money out of particular investments or countries very quickly. The quick withdrawal of investments can potentially have devastating consequences for the countries concerned.

The funds that investors are able to withdraw on short notice from foreign markets are often called short-term capital. International flows of short-term capital have increased at an astonishing rate over the past decade, thanks largely to new communication and IT. The buying and selling of currencies has generated perhaps the largest and fastest-growing flows of short-term capital in recent years, \$1.5 trillion daily in the foreign exchange market.

When an American visiting the United Kingdom changes some of her dollars for pounds, the British currency, she "buys" pounds and "sells" dollars, and the person or institution with which she makes the exchange "buys" dollars and "sells" pounds. The amount of dollars she will need to buy one pound is the exchange rate of the pound in terms of dollars.

Professional money traders do the same thing as an American tourist in London, though on a much larger scale and for very different purposes. Money traders who work for companies or financial institutions often buy and sell currencies to support international trade and investment transactions. Using sophisticated trading technologies, money traders are able to move large sums of currency around the world every day.

A U.S. company that needs to buy production inputs from an Italian firm, for example, needs to use some of its dollars to buy the Italian currency, or euro, that the Italian firm wants to receive in payment for its product. Other money traders, called speculators, buy and sell currencies in an effort to make money. Speculators make money by anticipating changes in the value of one currency relative to another, or by taking advantage of small differences in the values of a currency being traded at the same time in different countries.

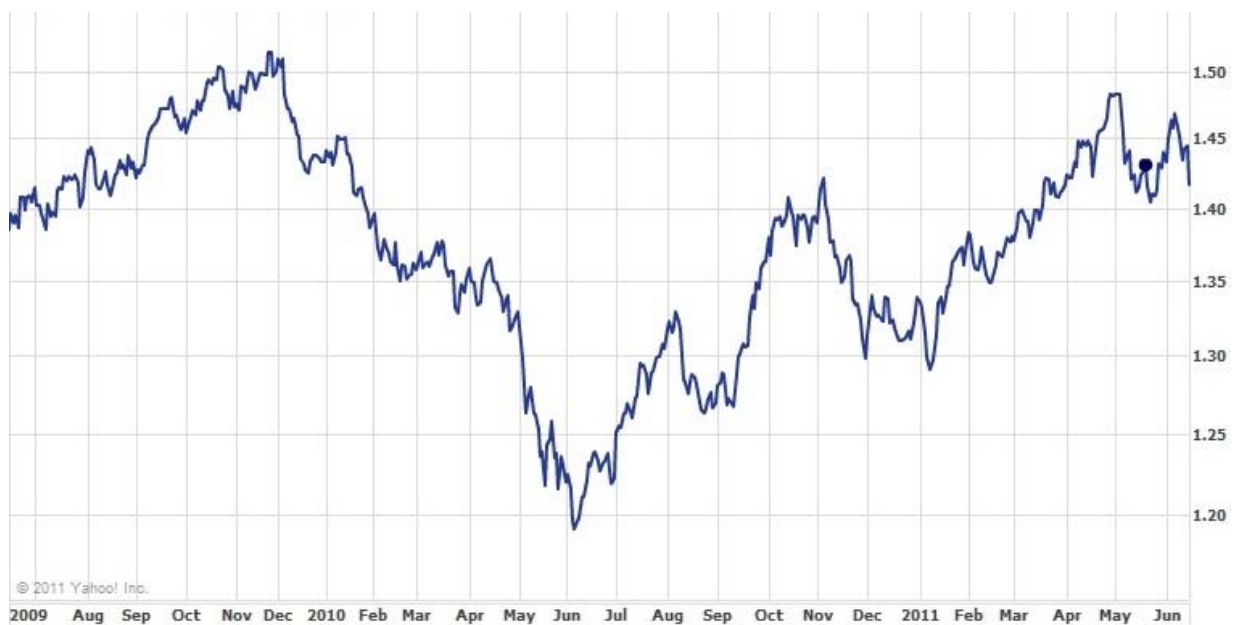
Currency speculation can cause rapid swings in the value of a country's currency. These currency swings can make it difficult for a country's businesses or its trading partners to make trade and investment plans. Large volumes of short-term capital also flow around the world in response to changing assessments of the health of national economies. If an investor fears that the exchange value of the currency of an ailing economy is likely to drop by a significant amount, he may decide he wants to get rid of stocks or bonds he owns in that country. His hope is that he can sell those foreign stocks or bonds before the relevant currency drops too much, after which the amount of other dollars or other currencies he will be able to receive in exchange for the sale of the foreign investments will be much lower.

But if many investors share the same concern about the country's economy and decide to sell investments there at about the same time, the exchange rate of the currency will, indeed, depreciate by a large amount, and perhaps even collapse. When the value of a country's currency collapses, the currency loses its purchasing power relative to foreign currencies. What this means is that imported products become much more expensive. As imports rise in price, the prices for other

domestic goods also typically rise. Basic necessities can end up beyond the reach of average citizens. To prevent crushing price inflation and reverse a currency's decline, countries typically must cut government spending and increase interest rates, which can cause more pain in the short run.

Figure 4 shows the U.S. Dollar to Euro exchange rate over the course of two years. The weak dollar, due primarily to rising defaults on mortgages for U.S. homeowners with poor credit, has the government trading lightly.

Figure 4: The Euro Versus The Dollar Exchange Rate, 2009-2011



This is precisely what happened during the financial crisis that started in East Asia in 1997 and spread to Russia and Latin America in 1998. The 1997-98 crisis highlighted the risks and volatility that are associated with today's massive international flows of capital.

The United States is currently suffering from a weak dollar, partially due to the unprecedented [subprime mortgage crisis](#). High housing prices during the early-to-mid 2000s drove many mortgage companies to offer loans to "subprime" borrowers, high-risk individuals who had lesser credit and lower incomes than "prime" borrowers. However, it was a dangerous maneuver because companies were banking on the fact that the subprime lenders could repay them through future refinancing of their homes.

When the housing bubble burst, subprime borrowers had difficulty refinancing and were unable to pay back their loans. During 2007, nearly 1.3 million properties were subject to foreclosure, up 79 percent from 2006.¹³ The debt impacted mortgage lenders initially, but eventually hit banks, security firms and even foreign stock markets. The subprime fiasco yet again highlights the risk and dire consequences of economic wagers and how global these outcomes can be. Recently,

¹³ Source: RealtyTrac, "U.S. Foreclosure Activity Increases 75 Percent In 2007," <http://www.realtytrac.com/ContentManagement/pressrelease.aspx?ChannelID=9&ItemID=3988&acct=64847>

the collapse of the housing market, in conjunction with a stupendous drop in the stock market, left several nations crippled.

A former U.S. Treasury Secretary recently compared the emergence of the modern international financial system to the development of jet aircraft. Jet planes are significantly more powerful and efficient means of transportation than the ships and propeller-driven planes they replaced. Analogously, the modern international financial system can generate much more wealth and support much more business than the system that preceded it. But just as the power and speed of jet planes can make for spectacularly destructive crashes when something goes wrong, the massive volume of transactions and rapid pace of modern financial markets can produce extraordinarily costly crises.

In an effort to minimize those costs, governments have tried to find new ways to reduce financial volatility and avert financial crises before they start. A couple of developing countries have experimented with restrictions on the outflow of capital. Most countries have been reluctant to impose new regulations on wealth—generating capital flows. They have tried instead to use new data disclosure and monitoring tools to identify signs of financial or economic weaknesses before they are able to touch off a crisis. Not surprisingly, some of these new tools rely heavily upon IT. Moreover, nations with stronger economies are now searching for new ways to further regulate their markets and economic activity, in order to protect against the devastating effects of global recessions.

Improving Sectors of Society: Health, Education, Journalism, and Government

The information revolution is creating opportunities in many other sectors of society, including health care, education, journalism, and government. Over the past decade, new applications of information and communication technology have improved services, transparency, and public access in each of these areas.

By improving access to health care, education, and government services to these sectors, new IT has the potential to help people around the world overcome geographic or income barriers which currently degraded the quality of their lives. By dramatically increasing access information, the advances can enhance knowledge, break down barriers to participation, and improve the accountability of public and private institutions to its people. These developments will prove especially beneficial to individuals in poor and underserved communities around the world.

In this section we look at some of the ways that IT is enhancing knowledge in health care, education, journalism, and government. In the next section we look at gaps in access to IT, sometimes known as the "digital divide."

Health Care

IT is dramatically improving health care in the following ways:

- prevention and control of emerging infectious diseases,
- patient to health care provider interaction,
- rapid dissemination of information,
- improved responses to outbreak situations.

Efforts to contain outbreaks of dangerous infectious diseases require the rapid collection and transmission of detailed patient data to medical labs or public health centers. Health professionals need tools to communicate important scientific or epidemiological findings to other parts of the health care community. IT is enhancing capacity in each of these areas.



Source: <http://www.flickr.com/photos/23065375@N05/2234741663/>

Many health problems in developing countries are being addressed using IT. Digital records and images utilizing digital cameras have made it possible for doctors around the world to share information or offer advice on treatments for complicated ailments. For example, using Internet connections, doctors working in remote regions of northern Uganda during an outbreak of the deadly Ebola virus would be able rapidly to transmit their findings to experts at the World Health Organization in Geneva and the U.S. Centers for Disease Control in Atlanta.

Before the arrival of the Internet, transferring detailed patient information of this kind could take as long as two weeks. In conditions like these, when the rapid dissemination of information is vital to treating infected persons and containing an outbreak, IT can provide tools for an efficient outbreak response.

Public health officials are also using new technologies to study the impact of health interventions and to target disease prevention programs. For example, health agencies have used satellite-based global positioning systems (GPS) to monitor the spread of West Nile Virus in the United States. Data collection and monitoring technologies like these increase the information available to public health officials when they make important health policy decisions.

Information Technology Applications in Health and Medicine

- Patients will have access to their medical records from any location via secured Internet sites. Readily available medical records will help ensure that individuals receive appropriate care when traveling or changing medical institutions.
- New devices are able to determine the chemical content of blood when placed on top of the skin.
- A simple digital watch can be incorporated into a pill bottle-cap to record the time and date when the bottle was opened. This will allow medical personnel to monitor the use of medication by patients.

Education

IT improves educational opportunities by enabling educators and students to overcome barriers of distance and by enhancing the content of instructional materials.

The use of IT to deliver lessons or training from instructors in one location to students in another is frequently called "distance learning." Distance learning has been around for a long time. For many years people have listened to recordings of classroom lectures or other educational presentations, and millions of people have watched educational programming on public television channels.

In a 2006 study, it was observed that more than 96 percent of the largest educational institutions (>15,000 total enrollments) have some online course offerings. Community colleges, for example, increased their distance enrollment by eight percent in 2007.¹⁴

Figure 5 further highlights the popularity of online courses among college students, showing that more than 75 percent of those taking online courses do so as a part of the undergraduate experience.

LEVEL OF STUDY OF ONLINE STUDENTS - FALL 2007



Source: Making the Grade: Online Education in the United States 2008, Sloan Consortium¹⁵

Both the emergence of the Internet and new developments in educational software have vastly enhanced distance education over the past decade. The geographic reach of distance education has been extended. There has been a substantial increase in the quantity and diversity of educational material available over the Internet or through the use of satellite video and audio linkups.

¹⁴ "Distance Ed Continues Rapid Growth at Community Colleges," insidehighered.com

¹⁵ http://www.sloan-c.org/publications/survey/pdf/staying_the_course.pdf

Over the past decade, computers and Internet connections have been widely deployed in classrooms, from pre-K through the university level. Lessons delivered through computers can be interactive, which gives students real-time feedback on their work and enables them to work at their own pace. Kids often enjoy working with computers, so when they are intelligently integrated into classrooms, computers can create excitement about learning among students.

The Internet provides an extraordinary opportunity for students to extend the reach of their learning. Before the Internet, the resources available to students were largely those that could be found in their classrooms, in their outdated textbooks or in public libraries. The Internet enables students to reach well beyond the physical confines of their classrooms and gain access to virtually unlimited quantities of information on the topics or events they are discussing in their classrooms. The use of the Internet for school assignments also encourages students to give free rein to their curiosity and strengthens their research and investigative skills.

IT offers especially valuable educational opportunities for poor people in developing countries. Students and other residents of poor countries are increasingly using the Internet—often in community Internet centers—to gain access to information and communicate via e-mail. Doctors, scientists, and other professionals, for example, can achieve cheap or free access to journals and other professional publications that are too expensive to afford in hard-copy versions.

Government aid agencies, foundations, and private firms sponsor numerous distance education programs designed to teach skills to a wide variety of developing country professionals, government officials, engineers, scientists, and businesspeople. Internet or satellite connections enable students from developing countries to take courses offered in foreign institutions. In these and other ways, technology-enabled educational programs can help strengthen the people who will be called upon to provide leadership in developing countries in a wide variety of social welfare, economic, and political fields.

Improved technology and the accessibility of open source projects have improved the field of education, as well. On average, traditional textbooks are updated once every several years, making a lot of the information within fields such as science outdated by the time it hits school bookshelves. Editors and publishers are weary of constantly putting out new editions of books because the cost of reprinting is cumbersome. For students, the price of purchasing textbooks adds to their financial burdens and can often lead to people dropping out of school because book costs exceed tuition at some community colleges.

Indeed, open source helps to fill in the gaps and fix the flaws of textbooks by providing free material that can be accessed anytime via the Internet. The “Open Education” revolution offers “print-on-demand” articles and the possibility of using legal material and incorporating new changes, and hopefully even tailored material for individual students.¹⁶ Colleges such as Harvard University and Massachusetts Institute of Technology have even started the option of taking “Open Courses” that are open to the public. All class material is uploaded online, along with video feed or audio files of lectures. Although the course selection is still relatively limited, it is beginning to take shape on other campuses around the United States. Open courses will hopefully help break down barriers of socioeconomic factors and the hierarchy of schooling to provide everyone the opportunity to learn from top institutions.

To learn more, please visit our Education brief: http://www.globalization101.org/issue_main/Global_Education.

Journalism and Media

The technological revolutions of the Internet have ushered in a new age of journalism that cannot be confined to one medium or one platform of exchange. It has made publishing and accessing news easier and cheaper than ever before with more sources and varied voices. The Internet offers unlimited space to whoever chooses to partake, unlike television

¹⁶ <http://www.project-syndicate.org/commentary/wales1>

programs and news articles that are confined by word count limitations and air time restrictions. The relative ease with which information spreads creates an interactive playground for users that will only grow with time.

The Shift to the Digital

In the late 1980s, Cable News Network (CNN) began offering 24-hour news coverage that affected political discourse and public opinion, producing what is now known as the "CNN Effect." Around-the-clock reporting took news to the next level beyond the daily newspapers and weekly or monthly magazines. Yet, the CNN effect seems limited compared to the possibilities of the Internet: Not only is national and international news available within minutes of the events happening, but there are also more news sources to choose from than just CNN. The perspective of both American and international reporters, of journalists and citizens, are open to the public.

Wider and Broader News Conglomeration

Greater dependence on the web has sparked various trends relating to the collection of news stories. First, newspapers are turning more readily to news agencies for efficient news coverage. This can be seen with the growth of news agencies such as The Associated Press (AP), which creates and distributes content to registered members and subscribers in 121 countries. With 1,700 newspapers and 5,000 television and radio broadcasters reprinting their stories and images daily, it is no surprise that more than half of the world's population sees AP news on any given day, according to their website.

The second trend is the emergence of news conglomeration websites that bring together stories from a variety of sources including AP and other nationally-based papers. For example, the British Broadcasting Corporation (BBC) News, the world's largest newsgathering organization, amasses its stories from over 4,000 sites.^{17 18} Even larger news-gatherers are online search engines themselves, such as Google and Yahoo! Search. Not only do the searches include news stories, keywords also pull out the most searched-for commentaries, surveys, and blogs.

Where People Get Their News

Many studies have shown that the Internet is becoming increasingly popular as a news source. According to Pew Research Center, 54 percent of voting age Americans used the Internet to get political news and information and to email others to discuss the Presidential race during the 2010 midterm elections.¹⁹ During the 2008 presidential elections, the range and use of the internet reached unprecedented levels. The Obama campaign, utilized the internet as a communication, information and outreach platform in an unparalleled fashion.

The Pew study also found that people were no longer as dependent upon television and local news for information. For example, within a "high-powered" group of Internet users, defined as those who use broadband four or more times a day, 71 percent go online for news on an average day, while 59 percent get news from local TV, about half from national TV and radio, and 40 percent from local newspapers.²⁰

The generational gaps also show differences in where people turn to for news. In research conducted by the Associated Press, it was found that younger consumers get news from a variety of sources such as stories passed along by e-mail, social networking sites, and text



Source: <http://www.flickr.com/photos/kalleboo/2214841137/>

¹⁷ <http://news.bbc.co.uk/2/hi/help/3676692.stm>

¹⁸ http://news.bbc.co.uk/newswatch/ukfs/hi/newsid_3970000/newsid_3975900/3975913.stm

¹⁹ <http://www.pewinternet.org/Press-Releases/2011/The-Internet-and-Campaign-2010.aspx>

²⁰ http://www.usatoday.com/life/columnist/mediamix/2006-03-22-media-mix_x.htm

messaging.²¹ Figure 6 reflects the divergences among the age demographics in regards to how they are informed of national and international news. The Internet is the most popular source for the 18-29 crowd; while the 30-up age group prefers local television and cable news.

Figure 6: Generations Divide in Sources of National and International News²²

	Age 18-29	30-49	50-64	65+	Age Gap
<i>Regularly learn from...</i>	%	%	%	%	
Internet	65	48	34	14	51
Television	52	63	71	79	-17
Newspaper	21	22	38	47	-26
Radio	15	19	15	13	-2
<i>Internet in 2004</i>	20	16	7		13

Multimedia and Interactive Dialogue

Words alone do not account for how individuals comprehend and share news—photos and videos are fervently uploaded to add perspective and visual aids. Forums and blogs (discussed below) allow for continual exchange of the multimedia dialogue, and the Web is able to combine both print and television for a comprehensive media package.

Americans are adapting to these high-tech advances and speaking out on various topics. Video-sharing websites such as YouTube have even been incorporated into the political process. During the 2007 U.S. Presidential Debates, CNN teamed up with the video-sharing hub and asked citizens to upload videos questions for the candidates. The debate forum was deemed by CNN's DC bureau chief David Bohman as "the most democratic of all possible structures" because anyone could voice his or her opinion, despite the usual barriers associated with politics.²³

New forms of Media

Information is dispersed in many different forms because of the overlapping of technology, print, and film. We highlight three significant applications of the Web revolution to journalism and discuss how each is changing the way media is conceived and perceived by public.

Blogs

Blogs, or web logs, gained popularity right before the new millennium with the releases of LiveJournal, OpenDiary and Blogger in 1999. As of 2010, there were an estimated 152 million blogs.²⁴ The purpose of a blog ranges from personal use, functioning like an online diary, to political commentary and trend analyses. Web blogs are increasing in popularity due to the ease with which one can be publish material online. One of the main features of blogging is the integration of folksonomy (tagging). Users are able to tag blog posts to make the content available through keyword searches. By

²¹ <http://www.womma.org/blog/2008/05/young-people-prefer-to-get-their-news-via-online-social-connections/>

²² <http://people-press.org/2011/01/04/internet-gains-on-television-as-publics-main-news-source/1/>

²³ http://www.wired.com/threatlevel/2007/06/youtube_and_cnn/

²⁴ <http://royal.pingdom.com/2011/01/12/internet-2010-in-numbers/>

grouping similar content, searching for and indexing the information is an easier task, making an age of “information overload” more convenient and adaptive.

A survey conducted by Universal McCann found that up to 45 percent of people worldwide have started a blog. Asian countries like China, Taiwan, and South Korea show a larger portion of Internet users—around 70 percent—engaging in blogging, while 26 percent of U.S. users participate in blogs. Approximately 73 percent of those surveyed reported reading blogs regularly.²⁵

Though the majority of blogs is used for personal use (close to 63 percent), a handful are becoming a legitimate form of news.²⁶ The Daily Kos, the largest progressive community blog in the United States, receives two million unique visitors per month and notable figures such as President Jimmy Carter, Senate Majority Leader Harry Reid, and Speaker of the House Nancy Pelosi have posted entries on the political website.²⁷ Newspapers such as *The New York Times* and *The Washington Post* have both incorporated online blogging as a form of news that is more interactive and less formal.

Besides the traditional forms of text blogging, video, audio, and photo blogs are taking form within the online community. Many of the users on YouTube, a website featuring user-generated videos, are bloggers of a wide range of interests, from comedy to commentary. Flickr, an image and video-hosting website, serves as a photo repository for bloggers and also utilizes folksonomy (or tagging) to categorize content.

Podcasts and Web Syndication

Podcasts, dubbed by Apple Inc. as a literal combination of the “iPod” and “broadcast,” are expanding their reach beyond iTunes and iPod users. Podcasts update the age-old medium of radio broadcasting to compete with online content. The broadcasts usual occur in a series of digital-media files which are distributed over the Internet using *web syndicated feeds* to notify listeners of updates. Listeners can subscribe for free to the audio-content through RSS feed that automatically update anytime new podcast shows are added.

In a 2008 survey conducted by the American Media Services, the Radio Index showed that 33 percent of participants said they have listened to a radio station on the Internet compared with only 12 percent who said they have listened to anything broadcast on HD radio.²⁸ Though the figures do not compare to the 61 percent of American adults that listen to the radio every day, organizations are turning their syndication into podcasts. National Public Radio (NPR), one of America’s largest public radio networks, has turned popular programs such as *All Things Considered* and *This American Life* into downloadable podcasts that can be streams anywhere. Furthermore, they offer podcast-only material to reach out to younger audiences.

The market for podcasts is expanding, with a listener base of an estimated six million. Feedburner, a web feed management service that helps measure and put ads in RSS feeds for publishers, currently administers approximately 250,000 podcasts.²⁹ By 2011 Forrester research predicts 12 million people will be listening to podcasts, and the listener market will grow to \$60 million domestically.³⁰

Issues and Controversy

Although access to up-to-date information is more widespread and accessible, the public availability of data is a double-edge sword. Because content is permanently available over the World Wide Web, accusations against inappropriate facts

²⁵ <http://arstechnica.com/news.ars/post/20080429-report-like-it-or-not-number-of-bloggers-growing-rapidly.html>

²⁶ *ibid*

²⁷ <http://www.dailykos.com/special/about2>

²⁸ http://findarticles.com/p/articles/mi_m0EIN/is_2008_April_8/ai_n25152189

²⁹ <http://www.feedburner.com/fb/a/podcasts>

³⁰ http://economictimes.indiatimes.com/LiveITUP/Podcasting_The_new_tool_of_communication/articleshow/3170058.cms

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posted can result in unseen consequences. For example, Lewis S. Mills High School senior Avery Doninger lost her position as class secretary after using the term “douche bag” to describe a school official. Although she stood behind the First Amendment for protection of free speech, the court finally sided with the school, stating “we are not authorized to intervene absent ‘violations of specific constitutional guarantees.’”³¹

On an even more serious level, some governments are tightening Internet restrictions further as blogging becomes more and more popular. For example, users who mention topics such as corruption, prostitution, or apostasy can possibly face a death sentence in countries such as Iran. Iran was also amongst the first countries to ban YouTube from the Iranian Internet providers.³²

<http://www.youtube.com/watch?v=kYRu9CGJJal>

For more on the role of the media and the Iranian elections, please read our news analysis: [Two Historic Middle East Elections, with Two Radically Different Results](#).

The media revolution is consequently hurting print media, such as newspapers and magazines. Newspapers and magazine rely heavily on ad revenue to fund their companies, but competition with online mediums is hurting sales. According to the Newspaper Association of America, in the past five years, newspaper ad revenue has fallen 51.9 percent from the 2005 peak of \$49.4 billion to \$25.8 billion in 2010. However, less consumption of print also equates to less environmental damage. The Pulp and Paper Products Council (PPPC) found newspaper companies consumed 13.5 percent less paper from May 2007 to May 2008—that is equivalent to 800 million pounds of paper not used.³³

The recent economic recession further hampered the newspaper industry. According to an April 27th, 2009 New York Times article, “At 395 daily newspapers, weekday circulation declined 7.1 percent for the six months that ended March 31, compared with the previous year. Sunday circulation for 557 daily newspapers was down 5.37 percent.”³⁴ Not surprisingly, “In the first quarter of 2009, newspaper Web sites attracted more than 73 million unique visitors each month, on average, according to an analysis by Nielsen Online for the Newspaper Association of America. That is a 10.5 percent increase from the first quarter of 2008.”³⁵

Print media has tried to adapt by integrating new content on websites to draw readers to both the web and paper, but with the expansion of web syndication and the popularity of interactive user forums, the future of media remains unclear.

Government

IT can enhance interactions between citizens and their governments in several ways. The use of IT in government, sometimes called “e-government,” can enhance the efficiency and effectiveness of government services. E-government can also help achieve other important goals of good governance, such as accountability and transparency.

In democratic societies, information on government activities should be readily available for review by the public. Prior to the emergence of computer databases, the Internet, and other IT innovations, large quantities of government documents were not easily accessible to most citizens. Using these technologies, governments today can provide citizens with fast and free access to a wide variety of documents and records.

³¹ <http://arstechnica.com/news.ars/post/20080601-douchebag-blog-post-costs-senior-her-student-council-seat.html>

³² <http://arstechnica.com/news.ars/post/20080707-iran-considering-banning-filthy-bloggers-from-meatspace.html>

³³ <http://newsosaur.blogspot.com/2011/03/newspaper-ad-sales-hit-25-year-low-in.html>

³⁴ <http://www.nytimes.com/2009/04/28/business/media/28paper.html>

³⁵ Ibid.

Access to official information is critical to ensuring that governments are accountable to citizens—that they are responsive to citizens and that they are doing what they are obligated to do under law. The capacity to track government budget expenditures, for example, enables taxpayers to ensure that governments are trustworthy stewards of the funds entrusted to them.

IT can also provide mechanisms through which governments can interact with citizens. Government websites can provide quick access to information on building regulations, motor vehicle licenses, or immunizations, for example. Information technology can also improve the performance and efficiency of government bureaucracies, and enhance interagency cooperation. In these ways, technology can strengthen the delivery of government services. For example, in India, an [e-governance initiative](#) is being implemented to improve citizen access to public services and increase the transparency of government transactions.

<http://www.youtube.com/watch?v=vBKa1TihqXU>

Technology in Warfare

Up until now we have discussed the uses and advancement of technology in the financial markets, media, and workforce. This section will begin to cover how technology has altered the face of war, and how developments in such technology have changed the means by which wars are waged over the course of the 20th and 21st centuries.

There have been numerous advancements that were seen on the battlefield in the form of arms, transportation, and air power. In this section we will trace the origins of technological inventions that have direct impacts not only on the battlefield, but for those who may be operating on a remote computer thousands of miles away from a combat arena. These technologies are increasingly impersonal, as countries are waging war via proxies and remote controlled weaponry.

This section will help bring to light the technological advancements made during eras of heightened global conflict such as the timeframe spanning the two World Wars (1900-1950), as well as modern warfare crises (1960-Present). The strategic and technical uses of these inventions will be examined concurrently with the moral and ethical hazards that are faced in the ever changing field of warfare technology.

WWI & WWII

Technological innovations during the first half of the 20th century were numerous, helping to shape the methods by which the two largest wars in history were waged. We began to see brilliance in the creations of highly sophisticated technology such as radars and jammers, as well as experimentation with nuclear energy that offered myriad of possibilities for positive use in the civilian world. In addition, these advancements coincided with applications in the world of warfare that could be used for great harm and casualties. We will ascertain the importance of these technologies below.

Communications & Intelligence Gathering Technology

Observation Balloons- The observation balloon was initially used during the French Revolutionary War, and rose to mainstream military prominence with continual use throughout World War I. The use of this technological advancement was varied, however, the balloons were primarily employed for intelligence gathering, artillery spotting, and locating enemy submarines.

This technology was composed of rather simplistically, filling up fabric envelopes with hydrogen gas, which were then tied to steel cables before being sent up for observation. Observation balloons were often targeted by enemies, and the operators often had to parachute to safety to avoid the potentially lethal consequences of the highly flammable hydrogen gas.³⁶



As one of the first major technological breakthroughs in 20th century warfare, the observation balloon was a major element for change in combat operations. The ability to fly a balloon overhead and view the advancement of the opposition's forces brought about a new method in which global warfare strategies are enacted, and the observation balloon is still used in present day military operations in both Iraq and Afghanistan.³⁷

³⁶ <http://www.century-of-flight.net/Aviation%20history/airplane%20at%20war/upload2/Observation%20Balloons.htm>

³⁷ <http://www.washingtonpost.com/wp-dyn/content/article/2009/08/19/AR2009081903712.html>

Radar- Early experiments with electromagnetic waves can be dated back to the late 1800's to German physicist Heinrich Hertz, who helped to discover the fact that radio waves could be reflected by solid objects. In 1917, Croatian Engineer Nikola Tesla outlined the premise for a modern radar unit, declaring that from any standing location, electromagnetic waves should be able to locate the location of any standing or moving object.



The use of radar technology did not reach prominence until the 1930's when nations began to realize that they needed the ability to remotely locate enemy crafts and ships. The term RADAR was initially created by the United States Navy in the year 1940, as an acronym for **Radio Detection and Ranging**.

Radar equipments' use in warfare was immense, allowing for the jamming of enemy signals to deny communications, as well as intercepting intelligence transmissions of the opposition forces.³⁸ Such functions described are often referred to as "electronic warfare".

Electronic warfare has significantly impacted combat since war is no longer being waged with just guns, rockets, and tanks. The use of such technology would now allow devices such as 'radar jammers' to detect, combat, and change the strategy of their opposition, drastically changing the methods by which wars are waged, and enemies interact with one another.

Weapons of Mass Destruction

Atomic Bomb- Commonly referred to as *weapons of mass destruction* (WMDs), nuclear weapons have been at the forefront of international relations policy debates for many decades, with many questioning the morality of using such technology to cause indiscriminate harm.

Only two nuclear weapons have been used throughout the history of warfare, both by the United States near the end of World War II. In 1942, the United States began the 'Manhattan Project', to create the first atomic bomb. With the help of theoretical physicist J. Robert Oppenheimer, known as the 'father of the atomic bomb', the United States crafted two bombs, "Little Boy" and "Fat Man", which would be used to decimate the Japanese cities of Hiroshima and Nagasaki in August 1945.

- **"Little Boy"**- Dropped on Hiroshima on August 6, 1945, this weapon obtains its explosive power through the nuclear fission of uranium-235. Designed as a 'gun type' fission weapon, when the 'bullet' hit the target an immense amount of energy and heat radiation is released, decimating its immediate surroundings. The temperature of the center of the fireball at the moment of detonation is more than one million degrees Celsius. It is estimated that approximately 140,000 people died by the end of December 1945, due to the use of this weapon.³⁹
- **"Fat Man"**- Dropped on Nagasaki August 9, 1945, this weapon functioned as an 'implosion-type' weapon, with plutonium-239 as its base core. Thirty-two detonators were placed inside of a hollow sphere

³⁸ <http://www.militarynuts.com/ar/t1252.htm>

³⁹ http://www.pcf.city.hiroshima.jp/kids/KPSH_E/frame/hirotop11.html

of explosives to cause a powerful inward pressure, resulting in initiation. It is estimated that approximately 80,000 people died by the end of December 1945, due to the use of this weapon.⁴⁰

On August 15, 1945, less than one week after the bombing of Nagasaki, the Emperor Hirohito of Japan issued a radio address to the nation, declaring the surrender of Japan. There is often much debate as to whether the use of such weapons of destruction was truly necessary to compel the Japanese to surrender. The moral dilemma of using a weapon of such indiscriminate brutality is thought to have weighed heavily on then President Harry S. Truman's mind, however, when he reflected upon later in life still came to the same decision, stating "I knew what I was doing when I stopped the war ... I have no regrets and, under the same circumstances, I would do it again".⁴¹

With these instances being the only times nuclear weapons have ever been used in the history of warfare, it is categorically necessary to include them in the section depicting warfare technology of World War II, however, the threat of use of nuclear weapons still remains today, and is a continual discussion in the realm of International politics.

Nuclear non-proliferation remains a pillar within the global community to this day, with no country wanting to see such gratuitous violence ever rear its head on the face of this earth again. There are currently 189 signatory member states to the UN's "Nuclear Non Proliferation Treaty", which aims to halt the spread of nuclear weapons to non-nuclear states, disarm and liquidate nuclear weapons, and maintain a peaceful use for nuclear power in today's world.

President Harry Truman's use of the Atomic Bomb on Japanese soil remains highly debated to this day. Do you think it was necessary for such technology to be used in order to garner surrender on the battlefield? With the development of weapons of mass destruction, how has the global atmosphere changed in terms of unilateral cooperation, deterrence, and ability to trust those who possess weapons of such destructive power?

To learn more about the UN's non-proliferation treaty, you can visit the UN webpage [here](http://www.un.org/en/conf/npt/2005/npttreaty.html).⁴²

Modern Warfare

After the conclusion of World War II, the military industrial complex truly began to produce some simply amazing technological breakthroughs. As countries around the globe were engaged in a competition to produce the best technologies the fastest we began to see the inventions of man-portable missiles, spy satellites, and a plethora of other gadgets that are still used in today's combat operations.

⁴⁰ <http://www.aasc.ucla.edu/cab/200708230009.html>

⁴¹ Letter from Harry S. Truman to Chicago columnist Irving Kupcinec (unsent), (August 5, 1963), from The Papers of Harry S. Truman: Post-Presidential Papers, Harry S. Truman Library (digitized and online at [National Archives Archival Research Catalog](http://www.nationalarchives.gov/arc/online/tpst/), ARC Identifier 201504

⁴² <http://www.un.org/en/conf/npt/2005/npttreaty.html>

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IMF+World Bank		Education		International Law

Critically examining the inventions and uses of these technologies helps to gauge the level of technological advancement in modern warfare. These often impersonal devices can bring about changed feelings towards war on the global stage. The issues of sovereignty and civilian casualties are at the forefront of such discussions, and should be considered when examining the following technologies.

Rocket Propelled Grenade (RPG)- Coming to prominence shortly after World War II, the RPG is a shoulder-fired anti-tank weapon, firing rockets equipped with an explosive warhead. While the accuracy will only remain intact within a few hundred feet of firing, it is easily portable while still maintaining the same explosive force as a stick of dynamite upon impact.⁴³

The RPG is largely popular in asymmetrical guerilla warfare spanning many countries, from Ireland to Chechnya. It is still a weapon of choice for many combatants in the 21st century. While industrialized countries such as the United States continue to wage war with cutting edge 21st century technology, the RPG remains highly useful for small contingencies of opposition forces. Ease of access coupled with simplicity of usage makes this weapon a preferred item to have in ones weapons cache on the battlefield.



Improvised Explosive Devices (IEDs)- The terminology of this weapon was first used the 1970's, when British forces were dealing with the Irish Republic Army insurgency, and their use of fertilizer and semtex to create improvised yet highly effective surprise traps for their foes. The use of IED's in modern warfare shows the truly indiscriminate nature of battlefield technology in the 21st century. These devices can and do harm not only to military personnel, but to innocent civilians who make the fatal flaw of walking or driving over such devices.

There has been an indisputable growth of anonymity added to modern warfare due to technological advancements in the preceding decades. Does the use of UAVs promote a feeling of being 'removed from the battlefield' that allows an individual to consider 'pulling the trigger' without wholly considering the consequences? Does this mainstreaming of remote controls and 'video game-like' technology create any hazards in modern warfare, or is it a positive step forward that helps save lives that could otherwise be lost when engaging in traditional forms of combat?

⁴³ <http://science.howstuffworks.com/rpg1.htm>

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	Energy	Health	
IMF+World Bank		Education	International Law

Man-Portable air-defense systems (MANPADs)-

Development of the original surface-to-air-missiles (SAMs) began in the 1940's. Rapid advancement began though roughly two decades later in the 1960's. Modern usage of such technology can be seen with devices known as 'stingers', which are infrared-homing SAMs, developed by the United States. Stingers were used combat in the early 1980's during the Cold War combat operations between the Soviet Union and Afghanistan. With the ability to hit an aircraft from nearly 16,000 feet, this weapon once again introduced a level of long-distance warfare where the enemy was simply seen as a target to strike from a distance, rather than a human being that was being destroyed by the hands of another human being.⁴⁴



Reconnaissance Satellite- With early development dating back to the 1950's, the United States and Russia initially began trying to garner this technology in their great 'space race'. This technological competition was exemplified the quest for global hegemony.

In modern warfare, this technology provides never before access to high resolution photographs (IMINT), communications eavesdropping (SIGINT), as well as the ability to detect the launch of any missiles. This technology is popularly referred to as "spy satellites."⁴⁵

The topic of civil rights and the usefulness of SIGINT remains an issue of high contention around the globe, with ardent proponents citing the need to eavesdrop on others to prevent potential terrorist plots, as well as those who believe this is a flagrant violation of individual rights that has taken "the desire to protect" a step too far.

To learn more about the role of electronic warfare in 21st century "War on Terror", you can visit this *New York Times* [article](#).⁴⁶

To learn more about 21st century warfare technology, communications, and intelligence systems, you may watch this [video](#).

⁴⁴ <http://usmilitary.about.com/od/armyweapons/a/stinger.htm>

⁴⁵ <http://www.satellite.com/Spy.aspx>

⁴⁶ <http://www.nytimes.com/2006/01/23/politics/23cnd-wiretap.html>

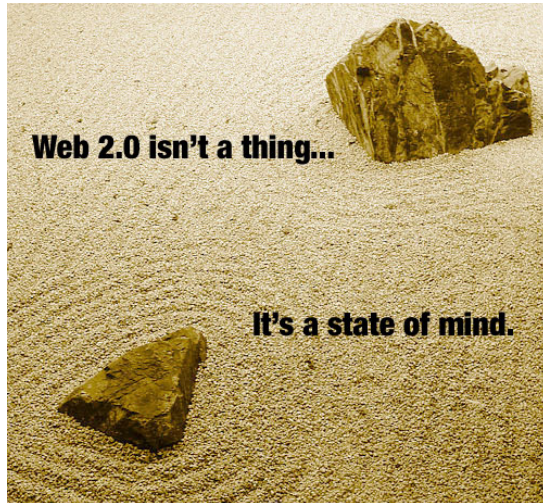
Unmanned Aerial Vehicles (UAVs)- Functioned by a remote controlled navigator often far away from the battle field, UAV's saw their official indoctrination to the United states military in the early 1970's. Highly useful in a hazardous territory, a UAV can be used by its controllers to conduct reconnaissance, to provide logistical support, to target enemies, and much more. While many UAV's are simply used as an "eye in the sky", there are other uses as well used specifically for combat, detailed below:

- **Armed Drones**- Coming to prominence only within the past two decades are missile-laden UAV's with such ominous names as "Reaper" and "Predator" drones, used to target and kill enemy targets of high value.⁴⁷ Largely used by the United States in modern warfare scenarios, these armed drones can be used to attack targets that are deemed too dangerous or inhospitable for soldiers to enter, taking 21st century combat to a new level of anonymity in the battlefield.

To watch "Robot Wars: Worrying New World Technology for 21st Century Modern Warfare", a documentary on the increasingly complex technologies used in modern warfare and its implications for the "changing face of war", visit this link.

⁴⁷ http://www.vectorsite.net/twuav_13.html#m4

Web 2.0



Source: <http://www.flickr.com/photos/pigatto/332193181/>

One thing seems to hold true for modern Internet enterprises: nothing stays constant forever. The number of users is growing, page views are exponential rising, and online content is frequently updated, from every couple days to every five minutes. Many experts believe Web 2.0, a term made popular by O'Reilly Media in 2004, is the cause of the boom. According to President and founder Tim O'Reilly, the advanced Internet has become "the business revolution in the computer industry caused by the move to the Internet as platform."

As a platform, the Web evolution comes with integrative enhancements thanks to cheaper production of technological infrastructure. A core aspect of Web 2.0 is harnessing collective intelligence through open source project, mass collaboration, user engagement on social networks, and rethinking the traditional business model.

In the next section, we will discuss Web 2.0 and its social, economical, and ethical implications. This issue brief will provide background into popular trends brought about by Web 2.0 and why they hold significance in the global age.

Social Networking Sites

Social networking sites (SNS) have gained much momentum since the dot-com boom at the start of the new millennium. According to the Forrester Research, 50 percent of Americans visit social networking sites monthly.⁴⁸ What was once an uncommon activity, SNSs include millions upon millions of users, most of which whom engage in networking for a variety of reasons.

Characteristics of Social Networking Sites

Networking websites embody many characteristics of Web 2.0, including an interactive, user-based platform built around the notion of a personalized profile page that reflects how you want to be perceived. Along with a profile, another important aspect of social networking is being able to link to the circle of friends that your acquaintances have built, creating a world that is truly connected by a few clicks of a mouse.

⁴⁸ <http://www.marketingpilgrim.com/2009/08/over-80-of-americans-use-social-media-monthly.html>

	Environment	Development	
Trade		Media	Women
	Technology	Migration	
Investment		Culture	Human Rights
	Energy	Health	
IMF+World Bank		Education	International Law

SNSs not only allow for users to stay connected more frequently, but they also provide a more personal user experience in a generation founded upon technology. Like other web-based services, there is a mass conglomeration of social networking websites springing up on the Internet. Wikipedia, a free online-encyclopedia utilizing open-source, users have compiled a list of over 120-active, “well-known” SNSs on the World Wide Web.⁴⁹ Of these popular sites, three are among the top 20 most-trafficked sites globally on a daily basis according to Alexa.⁵⁰ Facebook, the fastest-growing social networking site, boasts more than 500 million active users.⁵¹

Various Uses of SNSs

Although it would be easy to categorize SNSs as a tool used to keep individuals connected, that would be an oversimplification. Different sites serve diverse roles that fit into the various niches to improve Internet accessibility. Below, we highlight three important uses of social networking sites that are shaping the way people are engaging themselves within the Internet:

Personal networking: For example, Facebook and Twitter have been categorized as “lifestyle” social networking tools, where users actively upload photos, update their interests, and comment on other user’s activities. Similarly, sites such as LinkedIn aim toward working professionals and make searching for jobs and networking with colleagues more convenient.

Corporate and Market Research: Because social networks have such a large pool of users, they have also become a new form of market outreach. Although the largest demographic among SNS users is the college population, companies and other individuals are beginning to submerge themselves in this platform to target. More than 30 percent of the current users on Facebook are 35 years or old or older, and everyone from musical artists, clothing lines, and televisions shows have accounts.⁵²

Companies are eager to expand their reach turn to SNSs to gather demographic information and improve marketing tactics. One way that corporations reach out to users is through ad sales. According to eMarketer, overall advertising spending in the U.S. on Facebook as a proportion of total online ad spending is expected to total 7.7 percent in 2011.⁵³ Ads seen on sites such as Facebook and Twitter, the two sites that dominate more than 70 percent of SNS ad sales, are customized to user preferences.

For examples, if a person has stated liking a particular musical artist on their page, ads that appear in the banners will be related to that artist or other musicians similar to the group. We are heading away from a mass-marketing approach to a niche strategy that utilizes the advances technologies of the Web.

Besides boosting ad sales, SNSs are becoming a platform for business-exchange. Recently, Visa was the first company to launch an *application* directed towards small businesses on Facebook. The credit card company has teamed up with Google, *The Wall Street Journal*, *Entrepreneur*, Forbes.com, and Microsoft to provide tools, such as expert and Q&As with business professionals, within this network so emerging companies can better target their consumers.

Activism at home and abroad

Social networking sites also facilitate the mobilization of grass-root movements, especially among the younger generation. One such example is the Darfur cause. The Genocide Intervention Network (GI-Net), a non-profit aiming to promote awareness, advocacy and fundraising for civilians, started out as an on-campus organization that now includes over 300 colleges and 200 high schools in less than two years. GI-Net utilizes platforms such as MySpace, LiveJournal and

⁴⁹ http://en.wikipedia.org/wiki/List_of_social_networking_websites#

⁵⁰ http://www.alexa.com/site/ds/top_sites?ts_mode=global&lang=none

⁵¹ <http://www.facebook.com/press/info.php?statistics/>

⁵² <http://www.digitalbuzzblog.com/facebook-statistics-stats-facts-2011/>

⁵³ http://www.emarketer.com/Report.aspx?code=emarketer_2000757

Facebook to spread information about the organization. In many cases, students themselves were “self-organizing” within these sites, rallying friends on the site to learn more about the cause.

On a more serious level, social networking activity in the Middle East is stirring great controversy within political infrastructure. Nir Boms, Vice President of the Center for Freedom in the Middle East, states *“the internet has provided Arab activist groups with a new medium of expression: it quickly has become the preferred domain for many opposition groups that have little or no access to traditional forms of media.”*⁵⁴

For example, SNSs played a significant role in the spread of the Arab Spring and revolts of early 2011. In Algeria, Tunisia and Egypt, civil unrest was spread through social media sites and protestors were given a place to organize. Due to restrictions placed on conventional media, the Internet provided a perfect platform for dissenters to voice their opinions and spread their ideals.⁵⁵

In the most recent Iranian Presidential Election, the SNS Twitter, played an vital role in the organization and information dissemination efforts of the Mousavi supporters. The reformist camps used Twitter to circumvent strict governmental political oversight and rally support.

<http://www.youtube.com/watch?v=2SPuxiHYXmc>.

Support Groups

In contrast to general SNSs like Facebook, niche-specific sites have been growing in popularity because people are searching for a more private, community-based network that larger sites can no longer provide. It is an “inevitable reaction” to “leave for a smaller, more personal experience,” says senior analyst Deborah Williamson of eMarketer.⁵⁶ Of these sites, online support groups are highly sought after.

For example, Patients Like Me is a recently emerging SNS that acts as an online therapy group in which people can search for others with similar experiences or share their own stories to help others cope. Individuals who suffer from HIV/AIDS, depression, and Parkinson’s disease now have a common space to seek advice and learn about new treatment without distance barriers. SoberCircle is another example of an online support group, specifically for those overcoming addictions.

Global Reach of Networking

Looking at Figure 7, we see that social networking sites have a global reach. For instance, Orkut is most popular in Brazil, while Facebook is heavily concentrated in North America, Europe and Africa. The growth of Facebook throughout the world has begun to foster the global connections that these sites sought out to develop.

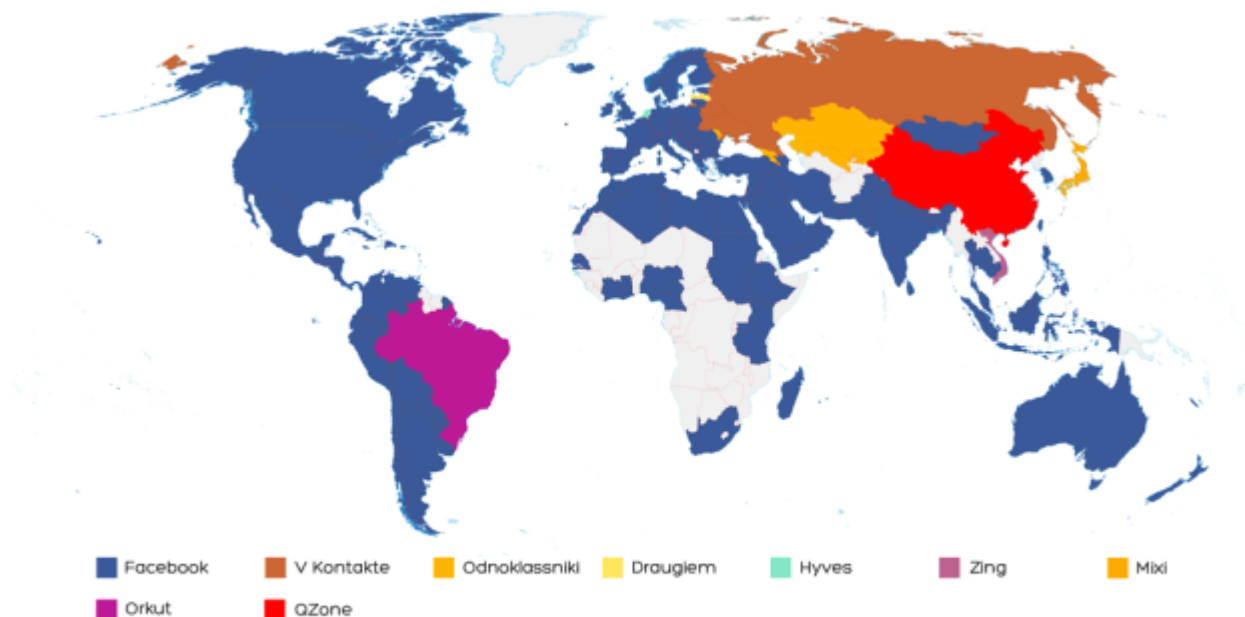
Figure 7

⁵⁴ *The Australian*, <http://www.theaustralian.news.com.au/story/0,,23928381-7583,00.html>

⁵⁵ <http://gulfnews.com/news/gulf/uae/social-media-played-role-in-facilitating-arab-spring-1.809266>

⁵⁶ http://www.businessweek.com/technology/content/mar2007/tc20070314_884996.htm

June 2011



credits: Vincenzo Cosenza www.vincos.it

license: CC-BY-NC

sources: Google Trends for Websites/Alexa

Source: <http://techcrunch.com/2011/06/13/its-a-facebook-world-other-social-networks-just-live-in-it/>

Because social network sites span across nations and cultures, many networks are beginning to adapt to these changes. One example is XIHA, a Finland-based start up, which bridges language barriers by offering the first multilingual SNS. According to Jani Penttinen, the Co-Founder and CTO at XIHA, the website was created out of the necessity to provide an online community that wasn't based around one language. "Users can simultaneously select as many languages as they know or want to learn. Our technology platform recognizes and filters the languages, so that the user generated content is displayed based on the language preferences."⁵⁷ As time continues on, the website hopes to provide over 100 languages for users to choose from. XIHA is changing the way people perceive communication across borders.

⁵⁷ PR Newswire, <http://www.reuters.com/article/pressRelease/idUS124432+23-Apr-2008+PRN20080423>

Peer Production: A Mighty Fortress of Collective Creativity

Peer production (PP) has gone from a technical term only used within the software industry to becoming a landmark revolution that is transforming how business is conducted within firms and across borders. Also referred to as mass collaboration, peer production is any coordinated, (chiefly) Internet-based effort whereby volunteers contribute project components, and there exists some process to unify them to produce an integrated intellectual work. PP covers many different types of intellectual output, from software to libraries of quantitative data to human-readable documents (manuals, books, encyclopedias, reviews, blogs, periodicals, and more).

Peer production has its roots within the technology sector, but large corporations, including Procter & Gamble, Google, and Amazon, are beginning to utilize its powerful potential. Capitalizing on an infinite amount of collective energy facilitated through the Internet, projects ranging from user reviewed databases to constantly-edited open source (OS) software projects are tapping into a new market that relies on the knowledge of the common people.⁵⁸

Changing Firms and Markets

Peer production is changing the way people perceive production, especially within the business sector. One of the key elements of peer production is the widespread availability of information. Projects are open to anyone who feels the desire to contribute. Open resource initiatives are counterintuitive to the fundamental notion of for-profit firms, which safe-guard company-owned research to produce revenue.

Ronald Coase wrote in 1937 that firms exist within markets because they greatly lower contract costs by specializing in a specific area and dealing with co-operations all in one place. Firms exist as long as their production levels are less expensive than the market price of producing the same result. For example, Microsoft, a multinational technology corporation, excels in their specific industry by contracting and hiring workers to design, research, and develop new software for them. Having the resources “in house,” Microsoft is able to put out products into the market more inexpensively than had the individuals desired to design, develop, and market the software themselves.

Procter & Gamble (P&G), a \$78 billion enterprise, recently strayed from the typical research and development (R&D) model to a “connect and develop (C&D) structure of production. C&D turns to “external sources for innovation” to help sustain “high levels of top-line growth.” Currently, more than 35 percent of PG’s new products in market have elements that originated from outside PG, and innovation success rate has more than doubled, while the cost of innovation has diminished.

However, the emergence of peer production eliminates transaction costs all together because the existing hierarchy of upper, middle, and lower managements is no longer in place—the fluidity and organic formulations of PP renders this modeling system for firms obsolete.

To highlight an example of this phenomenon, we can take one of the most successful open source projects: Firefox. It is a web browser managed by Mozilla whose aim is to “promote openness, innovation and opportunity on the web”.⁵⁹ Firefox’s newest web browser, version 5.0, boasts over 15,000 improvements since its first launch, and all adjustments have been made by interested contributors that were not contracted or paid. There is no hierarchy that dictates the method of production; ordinary Internet users are encouraged to give feedback and partake in the venture. Currently, 26 percent of Internet clients use Firefox, making it the second most popular web browser.⁶⁰ The eight million downloads for Firefox 3.0 on its first day of launching in June 2008 made a Guinness World Record for most downloaded software in a

⁵⁸ Business Week, http://www.businessweek.com/magazine/content/05_25/b3938601.htm

⁵⁹ <http://www.mozilla.com/en-US/about/>

⁶⁰ <http://www.getclicky.com/marketshare/global/web-browsers/>

24-hour period.⁶¹ The popularity of its user-friendly interface and constantly updated features reflects the success of how this “organic” project functions.

In addition to firms’ diminishing value in the face of peer production, the open market also has to compete with peer-production. Yochai Benkler, the Harvard Law Professor who coined the term peer production, believes that PP projects are helping to form the ideal market that is shifting away from the rigid, asymmetrical pyramid of the privileged few dictating the actions of managers and workers.

“What we are seeing now is the emergence of more effective collective action practices that are decentralized but do not rely on either the price system or a managerial structure for coordination.”

Decentralization allows for more efficient platforms of information exchange that depend on strong interdependence and networking. More people can harness their knowledge to create better products in a shorter amount of time. Yochai believes that people who partake in peer production do so not because of monetary gains, but rather *“for a wide range of intrinsic and self-interested reasons [...] people who participate in peer production communities love it. They feel passionate about their particular area of expertise and revel in creating something new or better.”* This outlook may hold true for contributors of projects such as Wikipedia, the free online encyclopedia that is written, managed, and edited by the masses. Yet, because open source is becoming a viable approach to tackling the diverse market competition, companies are eager to incorporate this model into their strategic infrastructure remodeling.

Open Source

Open source software projects reach the market much quicker than traditional software programs. Because open-sourced products are constantly being improved and updated, there is little reason to purchase software that only comes out once a year. For instance, OpenOffice, an OS software aiming to compete with Microsoft Office, is updated as often as every two months. On the other hand, Microsoft Office software comes out once a year. Not to mention, OS projects are free-to-use and free-to-update. The 2010 Microsoft Office products range from \$150 to \$500.⁶²

Open Source and Global Betterment

Open source software saves organizations millions of dollars in information technology. In 2004, large companies with annual revenue of over \$1 billion saved an average of \$3.3 million dollars thanks to open source software.⁶³ Open source projects are not limited to IT, though. SHPEGS, an Open Renewable Energy Project of the Buckminster Fuller Institute, utilizes the same methodology as OS software projects, which is usually referred to as open design, but aims to create sustainable energy through solar collection that will be *“economical, environmentally friendly, scalable, reliable, efficient and location independent manner using common construction materials.”*⁶⁴

Figure 8

61 <http://arstechnica.com/news.ars/post/20080702-mozilla-sets-guinness-world-record-with-firefox-3-launch.html>

62 <http://office.microsoft.com/en-us/products/FX101754511033.aspx>

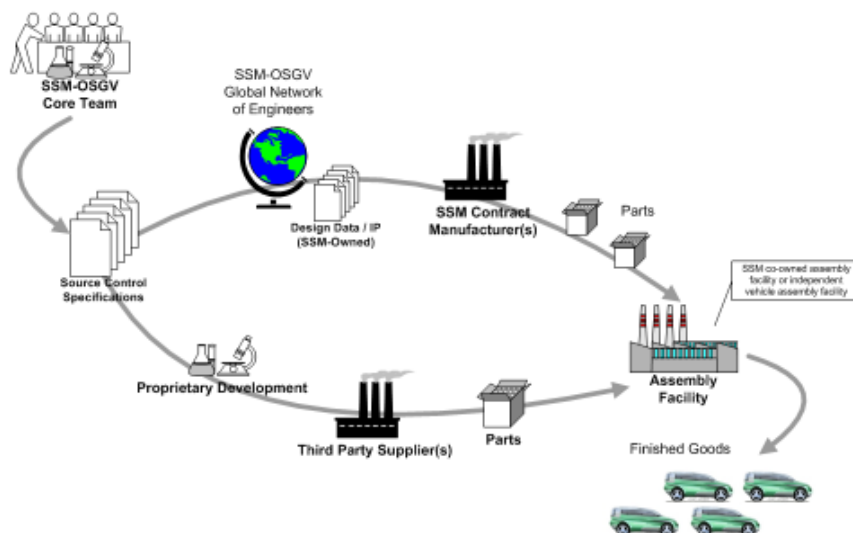
63 Walli, S., Gynn, D., Rotz, B. V. “The Growth of Open Source Software in Organizations: A Report.”

http://www.novell.com/news/press/pressroom/wp_optaros_oss_usage_in_organizations.pdf

64 http://p2pfoundation.net/SHPEGS_Open_Energy_Project

Trade	Environment	Media	Development	Women
Investment	Technology	Culture	Migration	Human Rights
IMF+World Bank	Energy	Education	Health	International Law

Society for Sustainable Mobility Engineering Development and Production Plan Illustration



Source: Society for Sustainable Mobility

Similarly, the Society for Sustainable Mobility (SSM) of the International Humanities Center is a nonprofit automotive engineering group working on an open design project to create next-generations electric cars.⁶⁵ Figure 8 shows the open design model for the creation of the car from planning to execution.

Another noteworthy open design project is the Hexayurt, a hexagon-shaped house made of simple materials such as cardboard and plastic. The collaborative product resulted in a cheap, \$200 shelter that can be set up in less than 20 minutes. The Hexayurt has been featured in *The New York Times* and *BusinessWeek*, and it was also recently presented at the Red Cross Innovative Shelter Convention as possible emergency homes for disaster-stricken areas.⁶⁶



Picture Source: <http://www.hexayurt.com/>

⁶⁵ <http://www.osgv.org/frequently-asked-questions/>

⁶⁶ <http://www.hexayurt.com/>

Government Sponsorship

Governments are starting to look into the benefits of open source codes and are trying to find ways that federal agencies can implement similar programs. In a 2007 report from the Federal Open Source Alliance, 55 percent of all U.S. federal respondents have been or are involved with open source implementations. Additionally, 71 percent of the respondents feel their agency could benefit from open source.⁶⁷ In 2004, the U.S. formed the Government Open Code Collaborative (GOCC), a partnership amongst public sector and non-profit institutions to encourage the free sharing of computer code developed for and by government entities.⁶⁸ However, no new material has been added since 2006, signifying only a partial embrace of this new open source culture by the US government.

⁶⁷ <http://www.federalopensourcealliance.com/Press-Release-102607.pdf>

Concerns of the Technological Age

The preceding sections have highlighted ways in which new information technologies are improving the quality of people's lives. This section will look at two of the leading sets of concerns that have been raised with respect to the growth of IT.

IT is rapidly creating a knowledge economy, in which productivity and prosperity will increasingly come to depend on access to information and on the ability to make productive use of it. But the great promise of these technologies to improve the quality of lives carries with it an implicit risk: gaps in technological access will reinforce and perhaps even widen existing disparities in living standards. Access to new IT—and therefore to knowledge—varies widely within countries and between countries. The promises that information technology provides require access to and knowledge of the new technology itself—without one or the other, the IT will not be used to its maximum potential.

The broad variations in IT accessibility could lead to the exclusion of large numbers of people from the benefits of the knowledge economy. As knowledge critical to enhancing social welfare and economic opportunity increasingly comes to depend on IT, these gaps in access to technology, frequently called "digital divides," will reinforce national and international gaps in living standards.

Digital Divide in the United States

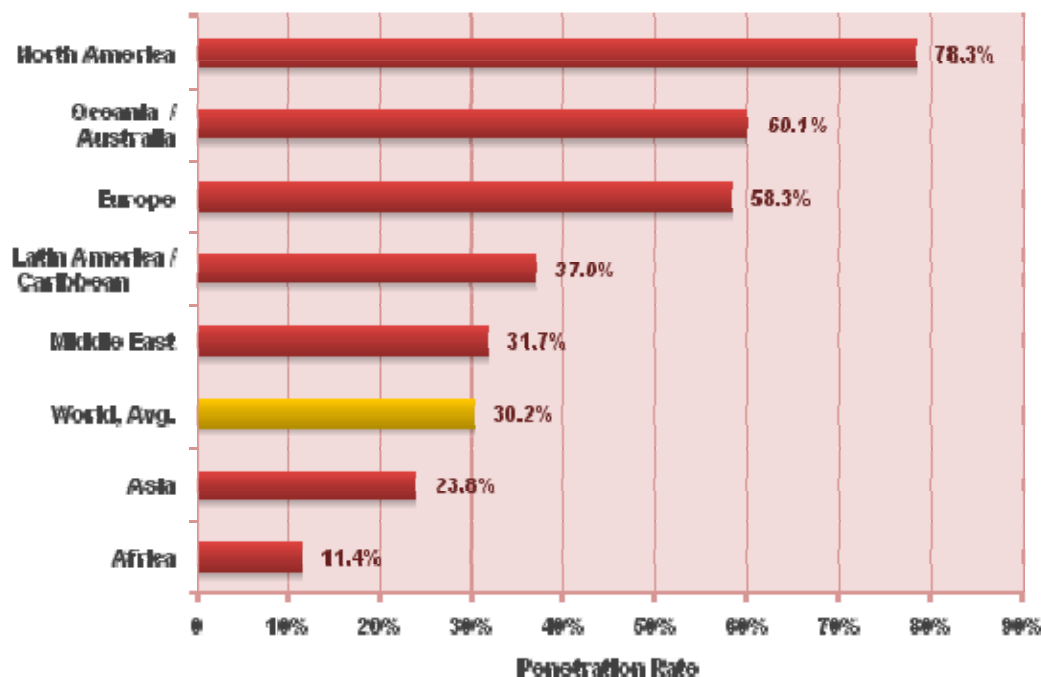
The digital divide in the US has made improvements in recent years; however, certain indicators such as race and income levels still show large disparities in access to IT.

According to the 2005 Pew Digital Divisions report, 57 percent of African Americans go online vs. 70 percent of Caucasian Americans. As of 2009, the percentage of African Americans that use the internet increased to 64 percent.⁶⁹ A Pew English language survey found that 70 percent English-speaking Hispanics and non-Hispanic whites both use the Internet. However, US Census data, collected in Spanish and English, reveal that 37 percent of Hispanics (3 years and older) have Internet access vs. 65 percent of non-Hispanic whites (3 years old and older).

Figure 9:

⁶⁹ <http://www.emarketer.com/Article.aspx?R=1006871>

World Internet Penetration Rates by Geographic Regions - 2011



Source: Internet World Stats - www.internetworldstats.com/stats.htm
Penetration Rates are based on a world population of 6,900,055,154
and 2,095,000,000 estimated Internet users on March 31, 2011.
Copyright © 2011, Minniewatts Marketing Group

Broadband access is the latest digital divider amongst income groups and urban/rural communities in the U.S. A 2010 report by the Social Science Resource Council found that: “Broadband access is increasingly a requirement of socio-economic inclusion” and that “Price is only one factor shaping the fragile equilibrium of home broadband adoption, and price pressures go beyond the obvious challenge of high monthly fees. Hardware costs, hidden fees, billing transparency, quality of service, and availability are major issues for low-income communities.”⁷⁰ Rural households with broadband still lag behind both urban and suburban households with broadband by 21 percent and 18 percent, respectively.

Despite the inequities in Internet access described above, the United States has made impressive progress in closing its digital divides over the past few years. From 2000 to 2008, the share of all U.S. adults with Internet access increased 135.2 percent.⁷¹ Internet usage in rural areas also trails the national average: 60 percent of rural adults use the Internet from any location, compared with the national average of 71 percent.⁷²

The use of IT has increased among all American population groups, regardless of income, education, race or ethnicity, geographic location, age, or gender. Groups that have traditionally fallen behind as new information and communication technologies have spread (rural populations, African Americans, women, and Hispanics) have been making dramatic

⁷⁰ http://webarchive.ssrc.org/pdfs/Broadband_Adoption_v1.1.pdf

⁷¹ <http://www.internetworldstats.com/stats.htm>

⁷² Pew Internet and American Life Project, Home Broadband Adoption 2007

gains in narrowing the digital gap. Women have closed the Internet usage gap with men, and the disparity between these two groups is now negligible.

According to the 2009 Pew Study, when asked why they don't use the internet:

- 33 percent of non-users say they are not interested.
- 12 percent say they don't have access.
- 9 percent say it is too difficult or frustrating.
- 7 percent say it is too expensive.
- 7 percent say it is a waste of time. ⁷³

Some Quick Facts About Internet Use by Americans

- E-mail is the most popular Internet application: 91 percent of all Internet users reporting using e-mail services.
- The fastest growing Internet applications are social networking applications.
- Lower-income Internet users reported looking for jobs most frequently on the Internet, signaling growing Internet usage in that income group.
- Large numbers of Americans access the Internet through public access points in schools, libraries, community centers, and for-profit ventures.

⁷³ <http://www.pewinternet.org/Reports/2008/Home-Broadband-2008.aspx?r=1>

The International Digital Divide

Access to IT is not equitably distributed around the globe. There are an estimated two billion people online globally, yet there are 6.9 billion people in the world. Thus only approximately 30 percent of the world's population is online. As Figure 10 indicates, access to and usage of the Internet is extremely unequal around the world.

Figure 10: WORLD INTERNET USAGE AND POPULATION STATISTICS						
World Regions	Population (2011 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000-2011	Users % of Table
Africa	1,037,524,058	4,514,400	118,609,620	11.4 %	2,527.4%	5.7 %
Asia	3,879,740,877	114,304,000	922,329,554	23.8 %	706.9 %	44.0 %
Europe	816,426,346	105,096,093	476,213,935	58.3 %	353.1 %	22.7 %
Middle East	216,258,843	3,284,800	68,553,666	31.7 %	1,987 %	3.3 %
North America	347,394,870	108,096,800	272,066,000	78.3 %	151.7 %	13.0 %
Latin America/Caribbean	597,283,165	18,068,919	215,939,400	36.2 %	1,037.4 %	10.3 %
Oceania / Australia	35,426,995	7,620,480	21,293,830	60.1 %	179.4 %	1.0 %
WORLD TOTAL	6,930,055,154	360,985,492	2,095,006,005	30.2 %	480.4%	100.0 %

Source: World Internet Usage Stats.

The Internet access gap is partially explained by income levels. In most developing countries, the cost of Internet access, broadband as the new standard for connectivity, constitutes a much larger proportion of income than in the developed world, as Figure 11 indicates.

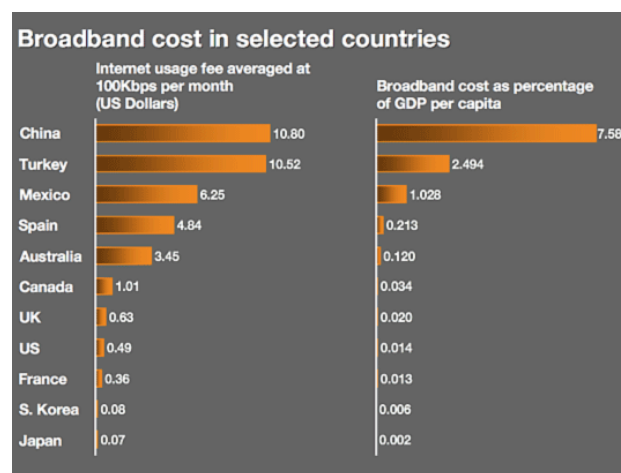


Figure 11

Source: The World Bank; International Monetary Fund

	Environment		Development	
Trade		Media		Women
	Technology		Migration	
Investment		Culture		Human Rights
	Energy		Health	
IMF+World Bank		Education		International Law

For China and Turkey, monthly broadband costs are more than \$10, which is much higher than the \$0.50 average that Americans pay. Furthermore, since broadband adoption is nearly eight percent of China's and Turkey's GDPs—it is no surprise that many developing countries have been lagging in adopting the cyberspace. The cost of paying for a couple hours of Internet usage could amount to a day's worth of work. Keep in mind that Figure 11 only depicts broadband internet costs—most families in developing countries do not own their own computers, which makes the Internet practically obsolete.

The implications of this gap for developing countries are significant. As one expert points out, "*Continuing disconnectedness leaves developing countries less competitive in the newly wired global market place, and less participatory in the now electronically networked global knowledge systems than their more connected OECD [Organization for Economic Cooperation and Development] neighbors.*" Wealth and economic resources truly seems to be at the heart of the issue. Cliff Missen, Director of the Iowa-based eGranary Digital Library, said at a recent UN conference in May 2008, "*There is no digital divide – it is an economic divide pure and simple. To improve access and connectivity we have to improve the economy.*"

Although developing countries are at a great disadvantage, modern technology does help to close the digital divide more quickly. For instance, the infrastructure needed to deliver telephone lines could be eliminated in many developing countries by simply using mobile communication technologies. Eliminating this stage of the development process offers an opportunity to "catch up" to the countries of the developed world and is often cited as an example of the "leapfrog effect."

Privacy and Security Concerns

The stunning growth of Internet usage in some countries is also raising concerns about privacy. The qualities that make computer networks such powerful tools for improving efficiency and living standards also give them extraordinary power to collect, store, or distribute medical data, financial data, and other personal or biographical information. Many individuals and consumer groups are calling for new privacy safeguards for the Internet and other computer networks.

Personal information that may be of interest to businesses or people with malevolent aims is generated whenever people surf the Internet. Companies, for example, are able to learn a great deal about web surfers who visit their websites. Using tracking devices known as "cookies," companies are able to track purchases and gather personal data. They can use this information to target their marketing efforts at individual consumers or groups of consumers.

While some may welcome increased attention to their consumer needs, others may consider it an invasion of their privacy. There is also growing concern about what online and conventional stores do with the purchasing or personal data they collect during transactions. Under pressure from consumers, some stores have recently begun to develop privacy policies, but consumer groups say many of these policies fall short.

Finally, patients and consumer advocates want to set rules for the sharing of personal medical data. In each of these areas, it will be difficult to strike a balance between protecting privacy and ensuring a flow of information and data that can enhance quality of life.

The same Internet-based tools that can improve education, health, and governance can also cause considerable damage when used for purposes of theft or fraud. Companies and individual computer users are being increasingly affected by computer viruses and schemes to steal data or computer identities. Companies are spending enormous amounts of time and money to protect their networks and their data. Recent polls suggest that two thirds of American companies have experienced some form of "cyber-disruption."

Resources that could be directed toward improving Internet capacity are being used to thwart cyber criminals. According to an article published in the [Financial Times](http://www.financialtimes.com), the average annual cost per company of these disruptions exceeds \$2 million. The Federal Bureau of Investigation (FBI) has estimated annual losses to industry in the \$10-15 billion range. U.S. spending on information security services was almost \$5 billion in 1998, and was expected to grow to \$23.5 billion by 2007. Internet or computer service disruptions have become a major problem not only for companies, but for governments, associations, international institutions, and private citizens around the world.

Conclusion

Advances in technology are producing many changes in our society at speeds that are hard to measure and quantify. The shifts within the job market, the rise of open source material, and the rethinking of firms will bring about new trends in business. More efficient ways to handle health care and education material will provide more access, flexibility, and coverage to all parties. Web 2.0 and the Internet Revolution will continue to lead the way so social networking, peer production projects and comprehensive news coverage will be streamlined to become an integral part of the expansion of communication across cultures.

However, the rapid expansion of information and computer technology also bears certain costs. Workers in sectors such as agriculture and manufacturing are losing their jobs as innovations in IT create a greater demand for high-tech workers and introduce efficiencies that make manual labor obsolete. Furthermore, governmental programs do not provide the assistance needed to help these workers transition to the technological age, further wedging the gap between rural and urban America. This disparity is also magnified within the stratification of international systems: The digital divide that exists among developed and developing countries is obvious and the high cost of bringing broadband and technology to third-world countries is an issue that needs to be solved.

As individuals become more engaged with the possibilities that Web 2.0 brings, censorship and the imprisonment of journalists in autocratic nations will become a larger and larger issue that should be addressed by the international community. Although information technology and increased knowledge can empower everyone on an individual level, the limitations of the existing structures within the job market, socioeconomics, and governmental sovereignty are hard to cast away; an underlying irony has yet to be eliminated.

If the new technologies are to fulfill their promise, it is necessary to direct attention towards the costs and concerns that come with the globalization of technology. Experience with previous technologies suggests that prudent policies can help us effectively manage the risks associated with new technologies without harm to their benefits. History also advises that the measures taken must be developed through close consultation between governments, private sector experts, and stakeholders and citizens. We can partake in the ongoing debate by staying informed on current events, and technology facilitates the process in a vital way.

Ellie Walton and Sunju Ahmadu, young filmmakers

Ellie Walton and Sunju Ahmadu are young filmmakers seeking to tell the story of how radio helps get youth involved in peace-building in war-torn Sierra Leone. Sunju, who grew up in Sierra Leone, describes her home and goals for the project: *"My country of origin is Sierra Leone. It is a beautiful country with a vibrant population, situated on the coast of West Africa . However, in 1992 we were plague by what became a decade long civil war where Sierra Leonean rebels committed some of the most brutal atrocities against innocent civilians. Judging from the reaction of people when I tell them I am originally from Sierra Leone, I believe the international media coverage of the war has led to a widespread view that we are a violent, corrupt people from a hopeless land. I am thus dedicated to presenting stories of those who survived the war and are making positive contributions to promote social change within the country. The development of community radios in particular has played a significant role in promoting peace and reconciliation by encouraging Sierra Leoneans, young and old, to voice their concerns and to come up with resolutions."*

Ellie notes that the film will *"focus on stories of a former child soldier who is now hosting her own show about children's rights, as well as a group of young people who are just learning radio skills. Through the documentary they hope to illustrate how Sierra Leoneans are actively working for change, through the brilliance of educational music and soap operas played on the radio. The film seeks to rejuvenate a sense of pride and hope in the country, while also seeking to dispel the image of Africa portrayed in the main stream media as a barren, dangerous and hungry land."*

One particular community radio station gained their interest and will be featured in the film. Sunju describes the station: *"Radio Tombo is situated in a small fishing community separated from Freetown (the capital of Sierra Leone) by the peninsular mountains. Originally one of the reasons it was set up was to with the geographical distance; the community felt that it was important for them to be connected to the rest of the country and to get the latest national news on the peace process. Radio Tombo received sponsorship from World Vision and Talking Drum Studio, a US-AID sponsored NGO that offers technical training to FM stations. It started out as a project that was managed by Tombo youth; however it has now been adopted by the larger community and has the support of community leaders. The station concentrates on catering to community needs discussing on air themes which include health, HIV/Aids prevention, proper waist disposal and literacy, in addition to programs geared toward women and youth. Ellie and I had the opportunity to interview several young people involved in radio from Tombo who discussed with us their desire to have access to more equipment and to expand their practical skills in radio journalism. She and I discussed with them the possibility of providing such equipment and training in exchange for their contribution to our film."*

Both Sunju and Ellie have been involved in social activism for many years. Ellie describes her first experience using the radio as a tool to change public opinion. *"When I was ten years old I vividly remember watching a documentary about the destruction of the rainforest in and feeling completely overwhelmed and frightened by its apocalyptic prediction. Nonetheless, I went to my local community radio station and spoke out against deforestation. Although the rainforest may not have been saved by that broadcast, it was an empowering experience. This made me realize that through globalization, images like burning trees can be spread around the world instantaneously, which can sometimes lead to powerlessness and frustration."*

During college, Ellie continued her activism. *"During college, I discovered on the internet that a community radio station in Guatemala was looking for volunteers. I jumped at the opportunity to work in a radio station which was set up to promote peace building. For 3 months I helped train young people in radio skills and supported the production of a radio soap opera which encouraged women to vote in the upcoming elections. However, the former dictator Rios Mont, accused of acts of genocide during the 36 year civil war, was also running for president, and many feared political suppression. Upon return to Washington DC, I created a link between the community radio station in Guatemala to my own neighborhood station. On election day, the radio reports from the streets of were broadcast to Washington DC , extending the support network to guard against suppression. Not only did Rios Mont lose in the first round, but record numbers of Guatemalans went to the polls, including the largest percentage of women ever."*

Currently Sunju and Ellie are in film school together in London. They hope to return to Sierra Leone soon to make the documentary.

Hoping to change the world, both offered strong advice to young people everywhere. Sunju recommends: *"Travel far and wide. The media i.e. print, television, radio, film and the internet, are only some of the ways to inform you about the world which we live in. They are not the only means of obtaining knowledge and are certainly not always the most reliable sources of information. If given the opportunity, try to meet and get to know people from all walks of life. Always try to keep an open mind and question that which you think you know about a people or a place, especially if you have never been."*

Ellie's message: *"My message for young people is thus always seek out new things, as life is about learning, and learning is about exploring different perspectives, opening your mind to new conversations. Globalization has enabled this exchange. Although it is to easy to be overwhelmed by the injustices of the world, to be swept away by the divisions made between north and south, east and west, it is crucial to participate and cross over those boundaries. Travel, and share stories: it makes you realize that a midst all these differences, there is everything to share. This exchange, I believe strongly can foster positive change, starting at the personal/local level."*

Glossary Of Terms

Blog: The abridged term for “web log,” it is maintained by an individual or group with regular entries of commentary or description of topic of interest with added graphics or videos. Can also be used as a verb to describe the action of adding content to blogs.

E-commerce: Electronic commerce is the ability to reach a global market, access real-time market information, improve internal efficiencies, reduce costs, and complete business transactions electronically. E-commerce benefits economic growth in the developing world by providing a further channel to export goods and services. This is particularly true for business-to-business trading.

E-government: Online provision of public services and information to the citizen, as well as the participation of civil society in governance through IT. E-government initiatives focus on bringing government services online and strategically set out to demonstrate the economic advantages and beneficial use of IT. These include the internal information efficiencies assisting policy decision-makers; improving delivery of government services; and the empowering civil society to access, and respond to, government information.

Firms: A business organization that owns or operates one or more establishments.

Foreign bonds: Bonds denominated in domestic currency, but are issued and sold by a foreign company. An example of a foreign bond would be a French firm selling bonds in the United States. Some foreign bonds are nicknamed: foreign bonds sold in the UK are often called "Bulldogs," while foreign bonds sold in Japan are called 'Samurai.'

Foreign exchange market: The market in which foreign exchange is traded, foreign exchange management is implemented and foreign exchange rates are set.

Futures markets: The market where contracts are traded to buy or sell an amount of a commodity for a specific price at a specific point in the future.

Health care and IT: The application of technology to health-care is a key to improving quality of life. Health programs draw on the benefits of access, used to capture and disseminate information, for example in the monitoring of diseases and their treatment, and the dissemination of disease prevention information. IT in health-care brings medical knowledge to remote and poor areas.

International bond market: a source of medium and long-term funds for borrowers, which include corporations (multinational and domestic), sovereign governments, intergovernmental organizations and financial institutions. International Bond Market consists of Eurobonds and Foreign Bonds.

International market for Equity is a market that consists of shares in foreign equity.

Just-in-time inventory: A management philosophy that strives to eliminate sources of manufacturing waste by producing the right part in the right place at the right time. Just-in-time inventory is the minimum inventory necessary to keep a system running. Technology plays an important role in helping facilitate Just in Time Inventory by facilitating the transfer of information.

New economy: Extraordinary gains in performance, including rapid productivity growth, rising incomes, low unemployment, and moderate inflation that have resulted from a combination of mutually reinforcing advances in technologies, business practices, and economic policies.

	Environment	Development	
Trade		Media	Women
	Technology	Migration	
Investment		Culture	Human Rights
	Energy	Health	
IMF+World Bank		Education	International Law

Open design: The application of open source to methods of creating physical materials.

Open source (OS): A development methodology offering practical accessibility to a product's source of goods and knowledge. The concept is generally applied to the development of source code for software that is made available for public collaboration, and it is later released as open-source software free to the public.

Options: A call option is a contract in which a seller gives a buyer the right, but not the obligation, to buy the optioned shares of a company at a set price (the strike price) for a certain period of time. If the stock fails to exceed the strike price before the expiration date, the option expires worthless. A put option is a contract that gives the buyer the right, but not the obligation, to sell the stock underlying the contract at a predetermined price (the strike price). The seller (or writer) of the put option is obligated to buy the stock at the strike price.

Peer Production (PP): Any coordinated, (chiefly) internet-based effort whereby volunteers contribute project components, and there exists some process to combine them to produce a unified intellectual work. PP covers many different types of intellectual output, from software to libraries of quantitative data to human-readable documents (manuals, books, encyclopedias, reviews, blogs, periodicals, and more)

Protectionism: A series of economic regulatory measures by which the government attempts to protect domestic industry from foreign competition. One of the most common methods used to measure the degree of protectionism in the economy is to look at the country's average tariff rate. Tariffs act as barriers and serve to reduce imports of foreign products thereby protecting domestic industry that would otherwise have to compete with imported goods. Tariffs used to be the most common trade policy tool, but with the expansion of liberalization (which implies the lowering of tariff barriers); many countries began to use non-tariffs barriers.

Research & Development (R&D): Creative work undertaken on a systematic basis in order to increase the stock of knowledge to devise new applications.

RSS: Stands for "Really Simple Syndication" and allows for users to subscribe to a news feed and receive automatic e-mail updates or notifications on content aggregators such as Google reader and Netvibes.

Stock market: Markets where ownerships of shares in corporations are bought and sold. Each share of stock is a proportional stake in the corporation's assets and profits, and purchasing a stock should be thought of as owning a proportional share of the successes and failures of that business.

Tag: keyword or term associated with a piece of information (i.e. blogs, websites, news articles). They serve as "internet bookmarks" and multiple articles under the same tag are grouped together by the keyword. The verb referring to the act of attaching tags is "tagging."

Web syndication feed: Commonly known as "web feeds" or "RSS feeds," Internet feeds are a data format used for providing users with frequently updated content. Websites syndicate content, users subscribe to websites (or feeds) that they are interested in, and the updates are collected on a web aggregate (such as Google reader, Blogline, Netvibes)

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