THE INTERNET: FORTY YEARS LATER

Introduction

Download the mp3 of this Introduction at newsinreview.cbclearning.ca.

Focus
The Internet is so much a part of people's lives it's hard to believe that the technology is only 40 years old. This *News in Review* story examines the birth of the Internet and the challenges that Canadians face as the World Wide Web continues to evolve.

Definition
Net neutrality refers to the desire to allow the Internet to function as a free and open system. Advocates for net neutrality oppose government regulations limiting the Internet.

It started as a project of the U.S. military. It became the bedrock of the information age. The Internet turned 40 recently, and the world was too busy surfing the net to really take notice.

But maybe it's time to pay more attention to where the Internet is heading. Internet innovation is a two-sided coin: One side of the coin represents the on-demand videos of YouTube and social phenomena like Facebook. On the other side of the coin are routine breaches of privacy by webmasters and the throttling of Internet traffic by Internet service providers (ISPs). While the Internet continues to evolve at a staggering rate, the technology used to enhance a person's enjoyment of their Internet experience is also being used to monitor their behaviour.

Concerns about lack of privacy on the Web made headlines recently when Canada's Privacy Commissioner Jennifer Stoddart challenged Facebook to clean up its privacy rules. Members who quit the group discovered that Facebook kept their personal information even after deleting their profile from public viewing. Others discovered that each time they added an application to their page—like a quiz or a game—the third party that created the application was getting access to their entire Facebook profile. This was too much for the privacy commissioner, and she asked Facebook to make some changes. They did. Canada's protests led to a reworking of Facebook's privacy protocol, and 200 million members reaped the benefits. Nonetheless, many began to wonder: if their online profile was being harvested from Facebook, from where else was their personal information being scooped up without their consent?

Internet users also recently discovered that Canada's largest ISPs were deliberately slowing down their connection each time they tried to download a song or video on peer-to-peer (P2P) file-sharing sites. The process is called "throttling," and many critics claimed it was a direct violation of the principal of net neutrality. Nonetheless, the Canadian Radio-Television and Telecommunications Commission (CRTC) ruled that ISPs are free to throttle traffic but should inform their customers when they are doing so.

Another major development that may well affect the Internet is the Anti-Counterfeiting Trade Agreement (ACTA). ACTA was proposed in September 2009 and, if it becomes a reality, governments will be able compel ISPs to cut off customers who download copyrighted material without permission. This could mean a tremendously contentious battle between Internet users on one side and government regulators and ISPs on the other.

And you thought the Internet was all fun and games.

To Consider

1. In your own words, describe the two sides of the Internet innovation coin.

2. What do you think of throttling and ACTA? How might these two things impact your Internet use in the future?

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Video Review

Did you know . . .
An emoticon is a series of typed characters that indicate a writer's mood. For example, the characters :) mean a person is smiling and is happy; while the characters :(mean a person is frowning and is sad. Note: Tilt your head to your left to see these emoticons more clearly.

Focus for Viewing

Working with a partner, answer the following questions:

1. How much time do you spend on the Internet each day? Don't forget to include Web access you gain via your cell phone.

2. How many texts do you send per day?

3. How many minutes do you spend on your cell phone per day?

4. While involved in any of these activities, do you ever worry about your privacy? If so, in what way?

5. Would it bother you if the information you choose to share while using the Internet is being shared with others without your consent? Why?

6 (a) Do you know anyone who has had their identity stolen? If so, what happened?

   (b) Do you ever worry this might happen to you?

7. Do you think it is a big deal that Internet service providers (ISPs) can intentionally slow down your Internet connection? Why?

Viewing Questions

1. (a) What one-word message marked the birth of the Internet?

   (b) How successful was the initial attempt to send this message?

2. Why did John Allen—speaking in the early 1990s—think that the Internet had the potential to change human fellowship? In other words, how does the Internet affect the way we interact, connect, and befriend one another?

3. Name the emoticon that Bill Cameron makes note of in his report.

4. How many Internet users are there around the world?

5. (a) What is a denial-of-service attack?

   (b) Why is it so difficult to track down the hackers that caused the shutdown of Twitter and Facebook in the summer of 2009?

6. How did online scammers con Shodna Nundy out of her money?

7. Why is the RCMP so concerned about fraud perpetrated on social networking sites like MySpace and Facebook?

8. (a) How quickly was Peter Klein able to gather the personal information of Kendra Hart?

   (b) Why wasn't Klein able to get much information off of Hart's Facebook account?

   (c) Were you surprised at how much information Klein was able to find about Kendra Hart? Why?

9. Why was Jeremy Wright fired by his employer?

10. (a) What is Internet throttling?

(b) What did the CRTC have to say about throttling by Canada's largest ISPs?

(c) What unfair practices do some critics fear arise as a result of an ISP throttling a user's Internet speed?

Post-viewing Activity

Revisit the Focus for Viewing questions listed on page 34.

1. Have any of your answers changed as a result of viewing the video? If so, which ones did and why?

2. Did the information in this story make you change your behaviour while online? Explain.

3. Do you believe that ISPs, Web sites, and the Internet in general can be trusted with your personal information? Why or why not?

4. How much is too much information to share?

THE INTERNET: FORTY YEARS LATER
The Revolution Begins — and Continues

Further Research
To watch an interesting and detailed video on the birth of the Internet go to YouTube and search "History of the Internet."

In 1969 the first message was sent between computers at the University of California, Los Angeles (UCLA), and the Stanford Research Institute. UCLA researchers Leonard Kleinrock and Charley Kline established a connection with their colleagues at Stanford and began to type in the word "LOGIN." The system crashed as Kleinrock and Kline typed in the "G" but this mattered little—contact had been made and the Internet was born.

They didn't call it the Internet back in 1969. Instead they called it ARPANET because the Advanced Research Projects Agency (ARPA) was charged with the responsibility of establishing the network by the U.S. government. Between 1969 and 1989, ARPANET grew steadily in military and academic circles. However, 1989 proved to be the true breakout year for the Internet after Tim Berners-Lee created the World Wide Web. The Web knocked ARPANET out of commission and replaced it with a much larger, much faster Internet.

By the mid-1990s the Internet was becoming a commercially viable network, with 15 million users worldwide and Web browsers like Netscape giving people the opportunity to surf the net. E-mail and blogging soon became commonplace and, by the turn of the millennium, the Internet was a multi-billion-dollar fact of life in the developed world.

Since 2000, the Internet has grown exponentially with each passing year. Google has redefined Internet search technology. YouTube has ushered in the video-on-demand era. Social networking sites like Facebook, MySpace, and Twitter have opened new doors to mass social interaction. So what's next for the Internet? When asked this question by CBC News in 2004, ARPANET pioneer Leonard Kleinrock said, "Anyone who tries to predict five years out is a fool" (CBC News In Depth: "The past and the future of the Internet," December 29, 2004). However, Kleinrock did go on to say that we have entered a period of "nomadic computing" where people can access the Web using a variety of devices from almost anywhere they want, anytime they want.

He wonders if the next thing we are going to see is the emergence of "embedded technology" that goes way beyond the computer screen. Imagine walking into a room and having the lights turn on based on your preferences. While watching a television news show you wonder about democracy in Iran and say "tell me about democracy in Iran." A computer that is perpetually connected to the Internet finds the answer and puts it up on your TV screen. In the meantime, Internet innovations continue to surface as the technological infrastructure is built for the next great network. What form that network will take is unknown.

Follow-up

To gain some perspective about the pre-Internet era, go to the CBC Archives and listen to a 1970 radio clip that predicts the impact of computers on the world. Type "Envisioning a global network" in the search box or go to http://archives.cbc.ca/science_technology/computers/clips/11976/.

How accurate were the predictions of the commentator?

THE INTERNET: FORTY YEARS LATER

YV *Internet Terminology*

Did you know . . .
Columbia Law School professor and Toronto native Tim Wu coined the phrase "net neutrality."

Changes in technology also bring about changes in language. The Internet and new social media have ushered in many new terms and phrases that were unheard of even a few years ago. As you review the terms below, write "me" beside any terms you know, and "parent" beside any terms you think your parents would know.

Adware – a software application that forces advertising onto the screen of an Internet user. Anti-virus programs have gotten better at blocking adware that acts as a nuisance when people are trying to surf the net.

Botnet – a series of computers infected by malicious software in the form of worms and viruses that are used to mount a large-scale attack on Web sites and other computer services. Botnets are controlled by a central figure known as a botnet herder who uses the network to shut down Web sites, steal personal information, and send out spam e-mail from infected computers. The term is a combination of the words ro**bot** and **net**work.

Cloud storage – the process of storing information on the Internet. Instead of storing information on your hard drive, you choose to store things like e-mails (via Hotmail), documents (via Google docs), and photos (via Flickr) directly onto a Web site. The Internet is the metaphorical "cloud" where you are storing your information.

Cookie – a small text file delivered to your computer by the Web sites you visit. This allows the site to remember who you are and load its pages more quickly the next time you visit. A cookie also keeps track of what you are doing when you visit a site.

Data mining – the process of examining huge amounts of data to determine patterns and relationships in a computer-user's behaviour. Data mining allows companies to target advertising at consumers based on the entries made on search engines and the sites they visit online.

Deep packet inspection (DPI) – a process that allows Internet service providers (ISPs) to monitor content movement on the Internet. DPI can be used to scan for spam e-mail as well as to monitor activity on peer-to-peer (P2P) file sharing sites.

Denial-of-service attack – when a botnet wages war on a Web site. The botnet herder in effect activates their zombie computers, which flood the site, causing it to crash.

Internet service provider (ISP) – Rogers, Bell, and Telus are examples of Internet service providers in Canada.

Malware – a malicious software application that infects a computer. Malware can slow down your Internet connection, hack into e-mail accounts and send out spam, and/or cause computers to crash.

Net neutrality – the concept of allowing the Internet to function as a free and open system. Advocates for net neutrality oppose ISP throttling and government regulations limiting the Internet.

P2P – peer-to-peer file sharing, a software program that allows people to share files across the Internet. P2P file sharing tends to be one of the most common ways that viruses and malware are installed on computers because many P2P sites allow anyone to join, download their operating software, and share files openly with whoever is part of the group. P2P sites are also controversial because of the volume of copyrighted material shared by members.

Pharming – a program, virus, or worm that monitors your address bar. When you type in an address incorrectly you are redirected to the pharmer's site. For example, let's say you type your bank's Web address in incorrectly. A pharmer would own the fake address, make the site look like the real site, and then have you type your personal information (account number and PIN), which can then be used to steal your money.

Phishing – an e-mail that attempts to trick a person into releasing their personal information. For example, a phisher might pose as a lawyer that is holding the inheritance of a distant relative in trust for you, claiming that your banking information is needed to transfer the money. You send them your banking details and, in turn, they use the information to steal your money.

Spam – unsolicited e-mail. Some experts estimate that over 85 per cent of e-mail traffic is spam. Over 80 per cent of spam is believed to come from just six botnets.

Spyware – a program that alters a computer's privacy settings to allow for the stealing of data, program applications, and private information from a computer user.

Trojan horse – a malicious program that attaches itself to your computer. The Trojan horse will either do what it was designed to do by its creator or will be operated remotely by its creator.

Virus – a program or code that attaches itself to legitimate software on a computer. When the program runs, the virus multiplies and goes in the direction that the virus programmer has instructed it to go.

Worm – a program or set of programs that self-replicates and is able to spread from one computer to another. Worms commonly spread via e-mail attachments and through non-secure Internet connections.

Source: www.michigan.gov/cybersecurity

To Consider

1. Review the terms beside which you wrote "me" or "parent." Are you familiar with more terms than your parent or parents? If so, why is that? Do you think there is a generation gap between adults and teenagers when it comes to knowledge of technology?

2. Pick five terms that represent issues that you feel are cause for concern. In two or three sentences, explain why each term concerns you.

THE INTERNET: FORTY YEARS LATER
The Transformation of the Internet

Did you know . . .
The nickname "Web 2.0" came from a 2004 conference on the future of the Internet staged by O'Reilly Media. It implies that the Internet has upgraded itself.

We've come a long way in a short period of time when it comes to the Internet. What started as a two-letter message sent between two nodes in 1969 has become a vast network that has transformed our lives. And young people are on the leading edge of these transformative technological experiences.

Web 1.0

Generally speaking, the transformative nature of the Internet can be divided into two epochs. The first epoch began with Tim Berners-Lee's creation of the World Wide Web in 1989. Berners-Lee was able to construct a form of communication for the Internet called Hypertext Transfer Protocol (http) as well as the source code used to create Web sites, called Hypertext Markup Language (html). This meant little to people back in 1989. They simply marvelled at the fact that they could view a Web page in Canada that someone posted just seconds before in Australia.

The early Internet was largely software driven: if you wanted a program, you bought the software and installed it on your hard drive through a series of 3.5-inch floppy disks or CDs. While adults often struggled with this process, teenagers didn't. They seemed to understand the logic of software almost by osmosis and were able to easily navigate within the computer environment, eliminating glitches along the way.

Back in 1989, e-mail use by the general public was really in its infancy but grew steadily in the decade to follow. Netscape was the browser of choice for most at this time.

Between 1989 and 2000, the Internet evolved largely because young people were able to move the net forward—creating Web sites for businesses, developing innovative approaches to data processing for personal computer users, and writing a lot of software. They also had a lot of fun along the way as computer games became extremely popular.

More than a few young people got very rich as the so-called dot-com bubble continued to expand. A demonstration of the strength of the Internet came in 2000 when U.S. Internet giant AOL bought Time Warner for a staggering USD$162-billion in the largest-ever corporate merger.

This early wave of the Internet has come to be known as "Web 1.0." But more than anything, the Internet was a fascinating novelty that only Canadians who could afford a computer—and a dial-up connection—had the luxury of playing with.

Web 2.0

In the fall of 2001, the dot-com bubble burst, sending the world's financial markets into turmoil. Some wondered if the Internet had done as much as it could do and was about to fade away. However, innovations pushed the Internet to a whole new level—marking the beginning of the second Internet epoch, nicknamed "Web 2.0."

The following changes had a major impact during the Web 2.0 era:

- Google replaced the software-dependent search engines of the Web 1.0 era with a perpetually updating Web application that revolutionized Web searches by incorporating a sophisticated algorithm to prioritize pages, making searches much more effective.

- Napster became the first reliable peer-to-peer (P2P) file-sharing service; it was used to share music. By 2001, the music industry had Napster shut down for breaching copyright laws. However, P2P file sharing was adopted by an overwhelming number of other sites in the wake of Napster's demise. Meanwhile, the music industry was forced to reduce the cost of their CDs as album sales plummeted.
- Eventually, Apple launched iTunes in an effort to tap into people's thirst for music and video files. iTunes, and other paid services, seemed to alleviate some of the music industry's concerns about copyright infringement and financial compensation for artists' work. However, so-called piracy—where music and videos are shared without regard for the artist—continues to occur on a number of P2P sites.
- Blogging began in 1998 and expanded until it became an Internet staple. Blogging led to podcasting when bloggers began uploading sound files to their blogs.
- Chat rooms were popular from the very beginning of the Internet, but they really gained prominence with the dawn of MSN Messenger. Created in 1999, MSN became the go-to chat site within a few years of its inception.
- Social networking sites like Facebook, MySpace, and Twitter surged in popularity after coming online in 2003. Young people in particular created profiles and made social networking sites the place where people connect online.
- The video-sharing Web site YouTube made streaming video another fixture of the Internet. YouTube users began uploading their own videos, setting off a massive creative surge in amateur video production. In 2006, YouTube was purchased by Google for USD$1.65-billion.

While the Web 2.0 revolution was driven by innovation, it was the users—predominantly young people—who moved the technology forward. If young people hadn't pushed for better search engines, created and utilized file-sharing services, and embraced social networking sites, the second wave of Internet expansion never would have happened. Young people seem to have a taste for technological innovation, and the Internet is their playground. Older people seem to watch younger people exploring technology and then jump on the bandwagon later on.

Analysis

Respond to the following question with a partner or in a small group.

1. In what ways would your life be different if you didn't have access to the Internet and the opportunities it provides? Make a list.

2. Why do you think younger people have a much better grasp of Internet technology than adults? Provide examples where this is the case in your own life.

3. How well has your school adopted and incorporated technology? How would school be different for you if technology was used more extensively (more often) in your classrooms?

THE INTERNET: FORTY YEARS LATER
Ongoing Challenges

Did you know . . .
Canada has 28 million Internet users: 84.3 per cent of the population.

There are several challenges that the Internet faces as it moves into the next phase of its existence. Up to now, the net has been a largely unregulated, borderless frontier of information creation and sharing. However, some wonder if the frontier is about to get boxed in by governments and Internet service providers looking for greater control.

Net Neutrality

One of the greatest challenges facing the Internet these days relates to something called net neutrality. Since the creation of the World Wide Web, the Internet has been a completely open book—a veritable repository of every idea, both good and bad, that Internet users have come up with. It has been remarkable to note that the Internet has been free to develop with very little government interference. However, some observers fear this is all about to change.

This became abundantly clear in Canada in 2009 as the Canadian Radio-Television and Telecommunications Commission (CRTC) ruled on a complaint filed against Bell—one of Canada's largest ISPs. Here's what happened: Bell subscribers discovered that network managers were intentionally slowing traffic for customers downloading and uploading on peer-to-peer (P2P) file-sharing sites. The process of slowing traffic around certain sites is called "throttling" by critics and "traffic shaping" by ISPs. Bell subscribers claimed that throttling violated net neutrality and constituted a breach of Bell's contract with their customers. After all, people weren't paying monthly Internet fees just to have Bell turn around and slow down their connection.

Soon it was discovered that Rogers was also throttling P2P traffic, making the CRTC ruling all the more important. Eventually, the CRTC ruled that ISPs had a right to control traffic on their networks because of the overwhelming amount of bandwidth being used by P2P sites but recommended that Bell and Rogers notify their customers when they are throttling Internet traffic. Just to keep the ISPs honest, Google created a throttling detection tool called M-Lab (www.measurementlab.net) so Internet users can determine when traffic is being throttled. Meanwhile, the debate over throttling will continue, with advocates of net neutrality continuing to criticize ISPs for the practice.

Privacy

Most people assume that using their personal computer is a confidential affair where privacy is respected and valued. However this is often not the case. Canada's Privacy Commissioner, Jennifer Stoddart, took Facebook to task after learning that the social networking giant was permanently storing member profiles even after members quit the group. Facebook was also allowing personal information to be compiled by third parties without the consent of members.

Here's what was happening: Facebook members would add an application like a game to their profile. The game was made by a third party, not by Facebook. Once the game was added to the member's Facebook page, the third party had access to that person's profile information to do with as they pleased. Stoddart believed that both practices were a violation of the privacy rights of Canadians using Facebook and asked the

Web site to do something about it.

To its credit, Facebook listened to Stoddart, and in the fall of 2009, they followed the privacy commissioner's recommendations and rewrote their privacy rules. This included requiring the permanent removal of deleted Facebook accounts within a reasonable period of time and exercising greater control over the sharing of information with third parties. These changes led to greater privacy for Facebook's 200 million members.

The Facebook story caused many to wonder how often their personal information is being accessed when they are on the Internet. Google already has the ability to target advertising to the individual user based on the Web searches they engage in. Some companies do the same thing through a process called data mining where they analyze huge amounts of data to build consumer profiles in order to deliver advertizing to certain people with specific preferences.

Meanwhile, ISPs use a process called deep packet inspection (DPI) to find out where people are going when they are on the Internet. This is how they found out that P2Ps were generating a massive amount of traffic, eventually leading to the decision to throttle traffic heading in and out of file sharing sites. Overall, the Internet is not a place where privacy is embraced, and it is important for people to guard their personal information. While ISPs using DPI aren't looking at specific information about individual people, someday someone might develop a nefarious technology that will cater to the Internet criminal element. These techniques could be used to make something like identity theft even easier to accomplish than it seems to be today.

Analysis

1. No one likes slow bandwidth when they want to surf the Internet. So why do some people think it is a bad idea for ISPs to throttle traffic around certain sites that tie up a lot of bandwidth? What do you think about this practice?

2. (a) Do you use Facebook? Would you care if Facebook or another site shared your personal information with a third party? Why or why not?

   (b) Would you care if your school shared your personal information with a third party? Why or why not?

   (c) Should the same privacy laws apply to both schools and Web sites? Explain.

THE INTERNET: FORTY YEARS LATER
The Anti-Counterfeiting Trade Agreement

Did you know . . .
If you don't turn off the "sharing feature" when you join a P2P site, every time you go online songs and movies can be copied from your hard drive onto the hard drive of other members of the group.

Further Research
Visit Michael Geist's Web site and learn more about ACTA at www.michaelgeist.ca.

Many Canadians download copyrighted material every day without the permission of the creator. This casual approach to music, movie, and print downloads has intellectual property owners very concerned. Take the music industry as an example. On any given day thousands of Canadians navigate to peer-to-peer (P2P) file-sharing sites and download songs onto their computers. Once a person joins a P2P site they have access to a vast library of music, video, and print. The problem isn't the sharing, it's the fact that most of the file transfers dodge Canadian and international copyright laws, and the people who wrote the songs and produced the movies are not being compensated or credited for the product they produced.

The music, movie, and publishing industry see unauthorized sharing as stealing. For years they have been trying to stop what they call "piracy" and "counterfeiting," but the unregulated Internet just comes up with new ways to share data. For this reason the U.S. has spearheaded an initiative to deal more comprehensively with the problem.

In the fall of 2009, delegations from a number of nations held secret meetings in Seoul, South Korea. They created a draft proposal called the Anti-Counterfeiting Trade Agreement (ACTA), which would form the international standard for how nations deal with piracy. Professor Michael Geist, Canada Research Chair of Internet and E-commerce Law at the University of Ottawa, gained access to some of the ACTA resolutions dealing with the Internet and was alarmed by what he read. Apparently, if approved, ACTA would hold ISPs responsible for the conduct of their subscribers.

For example, if an ISP receives a complaint from a copyright owner that one of their subscribers has downloaded a song, movie, or book from a P2P without the owner's permission, the ISP will have to issue a warning to the customer that they have violated copyright laws. The copyright owner does not have to prove that the customer illegally obtained their product, they just have to file a formal complaint to the ISP. After three warnings, the ISP will be compelled by the terms of the treaty to cut off Internet service to that subscriber's household for a year. The ISP will then share the fact that the subscriber has been cut off with all of the country's other ISPs to ensure that the person, and everyone who lives at their address, is not allowed back online for a year.

There are plenty of problems with this scenario. First, why should everyone in a household be punished if one person is responsible for downloading something illegally? Second, the Internet is a vital component of people's lives. Cutting them off essentially cuts them out of many educational and social activities. Third, what if someone steals a household's ground or WiFi signal? The treaty doesn't care if a signal was stolen; all it cares about is shutting down the IP address from which the violations originated.

To Consider

1. How might ACTA affect your life if it becomes law?
2. (a) Does Canada have a responsibility to protect artists and producers? Why?

   (b) Is ACTA the best way to do this?

THE INTERNET: FORTY YEARS LATER

YV *Activity: Youth Speak*

Now it's your turn to speak up. Consider the following two issues and take a stand. Use the information found in this *News in Review* story to create an informed opinion on these issues.

Issue #1: Throttling

ISPs call it traffic shaping, and advocates for net neutrality call it throttling. Canada's largest ISPs routinely slow down traffic going in and out of peer-to-peer (P2P) file-sharing sites because of the huge amount of bandwidth these sites use. ISPs claim if they don't slow down P2Ps, everyone else on the network will get slowed down because there is only so much bandwidth to go around. P2P sites encourage the sharing of songs, videos, and print, often with a disregard for international copyright laws. Nonetheless, P2Ps are incredibly popular, and many Canadians are downloading massive amounts of music and video in particular.

Issue #2: Piracy

Copyright infringement has been a concern for people in the music, film, and publishing industry for years. Now it appears to be out of control as P2P sites give people easy access to whatever data they want. In an effort to stem the tide of copyright infringement, the Canadian government has taken part in negotiating the Anti-Counterfeiting Trade Agreement (ACTA). If ratified, ACTA will impose a three-strikes rule: three copyright complaints filed against an Internet user and their Internet connection gets cut off for a year. The cut-off affects everyone living at the home of the person identified in the complaints.

For each of these issues, create in your notebook a "Pro and Con" chart like the one below and then conclude by taking a stand on each of the issues. Be prepared to share your position in class.

Canada should sign ACTA	Canada should not sign ACTA
Take a stand! Which side do you support? Why?	