**Handouts of Lecture 6 Professional Practices (IT)**

**Lecture Title: Networking**

**Spam**

The growth of email has been phenomenal—well over a billion people now have email accounts. Every day about 300 billion email messages are sent. Unfortunately, a significant percentage of this traffic consists of unsolicited bulk email, or **spam**. Why is spam called spam? Brad Templeton, chairman of the board of the Electronic Frontier Foundation, traces the term back to the SPAM sketch from *The Final Rip* *Off* by Monty Python’s Flying Circus, in which a group of Vikings drown out a café conversation by loudly and obnoxiously repeating the word “spam”. In a similar way, legitimate email messages can get “drowned out” by spam.

**The Spam Epidemic**

The rise of spam corresponds with the transformation of the Internet from a noncommercial academic and research enterprise into a commercial global network. Early spam messages provoked Internet users and generated big headlines. For example, in 1994 Phoenix lawyers Laurence Canter and Martha Siegel sent an email advertising their immigration services to more than 9,000 electronic newsgroups. Canter and Siegel received tens of thousands of responses from outraged newsgroup users who did not appreciate seeing an off-topic, commercial message. The *New York Times* reported the incident with the headline, “An Ad (Gasp!) in Cyberspace.” Canter and Siegel were undeterred. Their ad was successful in bringing them new clients. “We will definitely advertise on the Web again," Canter said. “I’m sure other businesses will be advertising on the network in the very near future”.

As recently as 2000, spam accounted for only about 8 percent of all email. It was still viewed as a problem for individuals managing their mailboxes. By 2009 about 90 percent of all emails were spam. Today spam consumes a large percentage of the Internet’s bandwidth and huge amounts of storage space on mail servers and individual computers. The cost to businesses is estimated at billions of dollars per year in wasted productivity. The volume of spam is so large because spam is effective. The principal advantage of spam is its low cost compared to other forms of advertising. For between $500 and $2,000, a company can send an advertisement to a million different email addresses. Sending the same advertisement to a million addresses using the US Postal Service costs at least $40,000 for the mailing list and $190,000 for bulk-rate postage. And that doesn’t include the cost of the brochures! In other words, an email advertisement is more than 100 times cheaper than a traditional flyer sent out in the mail. The cost is so low that a company can make money even if only one in 100,000 recipients of the spam actually buys the product or service.

Where do spammers get email lists with millions of addresses? The Internet provides a variety of sources of email addresses that can be harvested and sold to spammers. For example, email addresses often appear in Web sites, in chat-room conversations, and newsgroups. Some computer viruses gather email addresses stored in the address books of PCs and transmit these addresses to spammers. Another way to garner email addresses is through dictionary attacks (also called directory harvest attacks). Spammers bombard Internet service providers with millions of emails containing made-up addresses, such as AdamA@isprovider.com, AdamB@isprovider.com, AdamC@isprovider.com, and so on. Of course, most of these emails will bounce back, because the addresses are no good. However, if an email doesn’t bounce, the spammer knows there is a user with that email address and adds it to its mailing list. Sometimes people voluntarily reveal their email address. Have you ever entered a contest on the Web? There is a good chance the fine print on the entry form said you agree to receive “occasional offers of products you might find valuable” from the company’s marketing partners; in other words, spam. Sign-ups for email lists often contain this fine print, too.

How can spammers send out so many email messages? About 90 percent of spam is sent out by bot herders: people who are able to take control of huge networks of computers. Bot herders create these networks by launching programs that search the Internet for computers with inadequate security and install software robot programs, called bots, on these vulnerable systems. A computer with the bot program installed on it is called a zombie because it can be directed by a remote computer to perform certain tasks. Bot herders can send out billions of email messages every day by dividing the address lists among hundreds of thousands of zombies they control. To deal with this deluge, ISPs install spam filters to block spam from reaching users’ mailboxes. These filters look for a large number of messages coming from the same email address, messages with suspicious subject lines, or messages with spam like content.

**Need for Social-Technical Solutions**

New technologies sometimes cause new social situations to emerge. The spam epidemic is an example of this phenomenon. The Internet allows people to send email messages for virtually no cost. Because a spammer’s profits increase as the number of sent messages increases, every spammer has an incentive to send as many messages as possible. The spam problem arose because the Internet and email technology developed without taking social expectations into account. The design of the Internet allows sophisticated users to disguise their own email addresses. Spammers take advantage of this loophole to send out millions of messages, knowing that unhappy recipients will not be able to respond. This is contrary to a fundamental social expectation: fairness. In order to be fair, communications should be two-way, not one-way.

**Case Study: Ann the Acme Accountant**

Ann is an accountant at Acme Corporation, a medium-sized firm with 50 employees. All of the employees work in the same building, and Ann knows all of them on a first name basis. In fact, Ann distributes paychecks to Acme’s employees at the end of every month. Ann’s 10-year-old daughter is a Girl Scout. During the annual Girl Scout cookie sale, Ann sent an email to all of the other Acme employees, inviting them to stop by her desk during a break and place orders. (There is no company rule prohibiting the use of the email system for personal emails.) Nine of the recipients were happy to get Ann’s email, and they ordered an average of four boxes of cookies, but the other 40 recipients did not appreciate having to take the time to read and delete an unwanted message; half of them complained to a coworker about Ann’s action. Did Ann do anything wrong?

**KANTIAN ANALYSIS**

According to the second formulation of the Categorical Imperative, we should always respect the autonomy of other people, treating them as ends in themselves and never only as the means to an end. The story provides evidence that Ann was not simply “using” her coworkers as the means to her end of making money for the Girl Scouts. She didn’t misrepresent what she was doing. She didn’t force anyone to buy the cookies or even read the entire email; employees not interested in Girl Scout cookies could simply delete Ann’s message as soon as they read the subject line. Some people who received the email freely chose to buy some cookies. Therefore, what Ann did wasn’t strictly wrong.

On the other hand, if Ann had found a way for those people interested in hearing about the Girl Scout cookie drive to “opt in” to her announcement, those people not interested in purchasing Girl Scout cookies would not have been bothered by her email. An “opt in” approach would have been better because it would have shown more respect for the autonomy of Ann’s coworkers.

**ACT UTILITARIAN ANALYSIS**

We will do our evaluation in terms of dollars and cents, quantifying the benefits and costs of Ann’s action. Let’s begin with the benefits. A box of cookies costs $4 and provides $3 of profit to the Girl Scouts. Someone who buys a box of Girl Scout cookies understands it is a fund-raising activity and is happy with what he receives for $4. Since the cost of $4 is matched with $4 of benefit, they cancel each other out in our analysis, and we do not have to worry about this factor anymore. The average employee who participated in the sale purchased four boxes of cookies. Nine employees participated, which means Ann sold 36 boxes of cookies and provided $108 of benefit to the Girl Scouts. Now let’s look at the harms. The principal harm is going to be the time wasted by Acme’s employees. Ann took orders and made deliveries during coffee or lunch breaks, rather than on company time, so our focus is on the 40 employees who did not appreciate getting Ann’s solicitation. It’s reasonable to assume that they spent an average of 15 seconds reading and deleting the message. That adds up to 10 minutes of lost productivity.

Half of the employees spent 5 minutes complaining about what Ann did with a coworker. You can imagine the typical conversation. “What makes her so special?” “How does she get away with this kind of thing?” “If I did this for my kid, I’d get in trouble." Taking both the employee’s time and the coworker’s time into account, Acme loses 10 minutes of productivity for each conversation. Multiplying 10 minutes by 20 conversations gives us 200 minutes.

The total time wasted equals 210 minutes or 3.5 hours. Assume the average Acme employee makes $20 per hour. The cost of the lost productivity is 3.5 hours times $20 per hour or $70.

The benefit of $108 exceeds the cost of $70, so we may conclude that Ann’s action was good. We should note, however, that all of the benefit went to the Girls Scouts and all of the cost was borne by Acme Corporation. It would be perfectly reasonable if the owners of Acme Corporation concluded that this kind of activity was not in the best interests of the company and created a new policy forbidding the use of company email for cookie drives and other fund-raisers.

**RULE UTILITARIAN ANALYSIS**

What would be the consequences if everyone used the company email system to solicit donations to their favorite causes? All the employees would receive many more messages unrelated to business. There would be plenty of grumbling among employees, lowering morale. Reading and deleting these solicitations would waste people’s time, a definite harm. It’s unlikely that any one cause would do well if everyone was trying to raise money for his or her own charity. There is a good chance the owner would become aware of this problem, and a logical response would be to ban employees from sending out this kind of solicitation. Because the harms are much greater than the benefits, it is wrong to use the company email system to solicit donations to a charity.

**SOCIAL CONTRACT THEORY ANALYSIS**

Acme Corporation does not have a prohibition against using the company’s email system for personal business. You could say that by sending out her email solicitation, Ann was exercising her right to free speech. Of course, she did it in a way that many people might find obnoxious, because even if they did not choose to read her entire message, they had to take the time to scan the subject line and delete it. Unlike spammers, however, Ann did not disguise her identity as the sender, thereby providing unhappy recipients with the opportunity to respond to her email and voice their disapproval of her solicitation. If many of the 40 people who did not appreciate receiving her email sent a reply communicating their displeasure, then Ann got a taste of her own medicine by having to wade through a bunch of unwanted email messages, and she may choose a better method of advertising the Girl Scout cookie drive next year. From a social contract theory point of view, Ann did nothing wrong.

**VIRTUE ETHICS ANALYSIS**

Good coworkers exhibit many virtues, including honesty, dependability, fairness, friendliness, and respect for coworkers. Three that seem particularly important for this case study are honesty, fairness, and respect. Ann demonstrated honesty by being completely straight forward about the Girl Scout cookie drive with her fellow employees. However, it wasn’t fair or respectful for Ann to use the email system to promote her own daughter’s fund-raiser when other employees have not used email for similar solicitations for their children. Ann clearly exercised poor judgment when she sent the email, since half of the company’s employees felt the need to complain about it. Looking at this scenario from a completely different angle, we consider Ann in her role as a parent. Good parents want what is best for their children, and Ann was undoubtedly thinking of her daughter’s welfare when she decided to sell the Girl Scout cookies at her workplace. Perhaps her daughter has a quota to meet, or perhaps nice prizes are given to those who sell enough boxes of cookies. Viewed in this light, Ann’s actions seem consistent with those of a loving parent. However, parents are also supposed to teach their children how to develop into capable and independent adults. Ann could have used the cookie sale as an opportunity to teach her daughter some of those lessons. After all, her daughter is 10 years old, certainly old enough to handle many of the tasks. Instead, Ann ran the entire cookie sale operation herself and simply handed her daughter the proceeds. We conclude Ann demonstrated many, but not all, of the characteristics of a good coworker and a good parent in this episode. If Ann wanted to help her 10-year-old daughter sell cookies, fine, but she should have found a way for her daughter to play a more active role in the cookie sale at Acme Corporation. For example, her daughter could have come in after school one day to deliver the cookies to the people who ordered them and collect their payments. In this way Ann’s daughter could have gained the satisfaction of knowing she had contributed a good portion of the time and effort needed to achieve the desired result. Furthermore, Ann should have found another way to advertise the sale that respected her workplace’s culture of keeping the email system free from solicitations.

**SUMMARY**

Although the analyses of Ann’s action from the perspectives of these five ethical theories reached different conclusions, it is clear she could have taken another course of action that would have been much less controversial. Since Ann has only 49 coworkers, it would not have been too difficult for her to find out who wanted to be notified the next time the Girl Scouts were selling cookies. She could have put a sign-up sheet on her desk or the company bulletin board, for example. By notifying only those people who signed up, Ann’s emails would have been solicited and personal. She could still take advantage of the efficiency of the email system without anyone objecting that she was “using” coworkers or contributing to lost productivity, meaning there would be much less chance of the company instituting a policy forbidding the use of its email system for fund-raising activities. Finally, Ann could have found a way to share the work with her daughter.

**Internet Interactions**

The Internet mediates communications and commerce among more than two billion people. In this section we review just a few of the myriad number of ways people are using the Internet to interact with others and gain access to information.

 **The World Wide Web**

The creation of the World Wide Web stimulated a tremendous growth in the popularity of the Internet. Its creator, Tim Berners-Lee, initially proposed the Web as a documentation system for CERN, the Swiss research center for particle physics, but the creation of easy-to-use Web browsers made the Web accessible to “ordinary” computer users as well. The Web is a hypertext system: a flexible database of information that allows Web pages to be linked to each other in arbitrary fashion. Web browsers such as Chrome, Internet Explorer, Firefox, and Safari allow people to traverse this hypertext system with ease. Two attributes enabled the Web to become a global tool for information exchange. First, it is decentralized. An individual or organization can add new information to the Web without asking for permission from a central authority. Second, every object on the Web has a unique address. Any object can link to any other object by referencing its address. A Web object’s address is called a **URL** (uniform resource locator).

**The Rise of the App**

People are spending more time on smartphones and tablets and less time on laptop or desktop computers. Using Web browsers on mobile devices can be awkward, and for this reason organizations are developing **mobile apps**: software programs that are loaded onto mobile devices. Some mobile apps are standalone programs, but others connect to the Internet, allowing people to download and upload data. Mobile apps are becoming an increasingly popular way to access the Internet because they can be optimized to make best use of a mobile device’s resources (limited screen size, touch interface, etc.).

**How We Use the Internet**

Intuitive Web browsers and mobile apps have made the Internet accessible to people with little or no formal computer training. Today millions of people access the Internet for a wide variety of purposes. Here are just a few examples of how people are using the Internet.

1. *We shop.*

Shopping sites enable us to view and order merchandise from the comfort of our homes. Forrester Research predicts that products purchased online in the United States will grow from 6 percent of all retail sales in 2009 to 8 percent in 2014.

2. *We socialize.*

The Internet has become a popular way for friends to keep in touch with each other. The most popular social network is Facebook, with more than 1.1 billion active users in March 2013. Another well-known social network is LinkedIn, which serves people looking for professional contacts. In 2012 the Dutch airline KLM launched a program that allows ticketed passengers who have uploaded information from their Facebook or LinkedIn profiles to select seatmates based on the profiles provided by other passengers.

3. *We contribute content.*

Popular apps allow people to upload videos, photos, podcasts, or other digital content. Instagram, with more than 100 million subscribers, allows its users to upload photos and videos and share them on social networking services, such as Facebook. A **wiki** is a Web site that allows multiple people to contribute and edit its content. The most famous wiki is *Wikipedia*, an online encyclopedia. Relying on the submissions of hundreds of thousands of volunteers, *Wikipedia* has become by far the largest encyclopedia in the world. More than forty languages are represented by at least 100,000 articles, but by far the most popular language is English, with more than 4.2 million articles written as of 2013. However, critics wonder about the quality of a reference work that allows anyone with a Web browser to contribute.

4. *We blog.*

A **blog** (short for “Web log”) is a personal journal or diary kept on the Web. Used as a verb, the word blog means to maintain such a journal. Blogs may contain plain text, images, audio clips, or video clips. Some commentators use the term **Web 2.0** to refer to a change in the way people use the Web. Social networking services, wikis, Flickr, Reddit, and blogs illustrate that many people are now using the Web not simply to download content but to build communities and upload and share content they have created.

5. *We help each other avoid traffic jams.*

People who load the Waze app onto their smartphones and allow this app to run while they are driving automatically send their car’s GPS coordinates to Waze, which can compute the vehicle speeds and then send information about traffic congestion back to Waze users. Waze’s app to collect information from commuters is an example of **crowdsourcing**: an online method of getting information or ideas from a large group of people.

6. *We learn.*

In 2001 the Massachusetts Institute of Technology launched its Open Course Ware initiative. Since then, the quantity and quality of freely available classes posted online has increased steadily. The potential for **Massive Open Online Courses** **(MOOCs)** provided by edX, Coursera, and Udacity to disrupt traditional university education is being widely debated.

7. *We explore our roots.*

In the past, genealogists interested in accessing American immigration and census records had the choice between mailing in their requests and waiting for them to be processed or visiting the National Archives and examining the documents by hand. Now that the National Archives has put more than 50 million historical records online, the same searches can be performed remotely—and much more quickly— over the Internet.

8. *We enter virtual worlds.*

An **online game** is a game played on a computer network that supports the simultaneous participation of multiple players. A **persistent online game** is an online game in which each player assumes the role of a character in a virtual world and the attributes of the character and the world persist beyond a single gaming session. The most popular persistent online game is World of Warcraft, with more than ten million monthly subscribers worldwide. At times, the number of simultaneous players in China alone has reached one million. Another hub of persistent online gaming is South Korea. Cyber cafes (called **PC bangs** in South Korea) have large-screen monitors enabling spectators to watch the gameplay, which is full of virtual violence and mayhem. Some children spend up to 10 hours a day playing games, hoping to turn professional. Kim Hyun Soo, chairman of the Net Addiction Treatment Center, complains that “young people are losing their ability to relate to each other, except through games”. The phenomenon of global online gaming has created a real economy based on virtual worlds. Some people are making a living playing persistent online games. Chinese “gold farmers” who work 12 hours a day, 7 days a week can earn $3,000 a year killing monsters, harvesting virtual gold coins and artifacts, creating powerful avatars, and selling them over the Internet.

9. *We control the Internet of Things.*

An increasing number of non-IT devices—thermostats, appliances, lights, motion sensors, door locks, garage door openers, and baby monitors, to name just a few examples—are being equipped with wireless connections to the Internet, forming an **Internet of Things**. These devices can be controlled from a Web browser, allowing people to control them even when they are not at home. More significantly, some Internet-connected devices can be programmed to interact with each other without human intervention. Imagine devices at home that can monitor the GPS coordinates of your smartphone. You’re driving home after a long, hot day at work. When your car is 15 minutes away from home, the air conditioning in your home turns on. You turn onto your street, and your porch lights turn on. As you pull into your driveway, the garage door opens automatically.

10. *We pay our taxes.*

About 100 million Americans now file their federal income tax returns online.

11. *We gamble.*

Internet gambling is a $32-billion-a-year global business. Running an Internet based casino is illegal in most states. As a result, many American ´emigr´es are operating gambling sites from the Caribbean or Central America.

12. *We take humanitarian action.*

Kiva is a Web site supporting person-to-person microlending. Kiva works with microfinance institutions to identify entrepreneurs from poor communities, and it posts information about these entrepreneurs on its Web site. People who wish to make an interest-free loan are able to identify the particular person to whom they would like to lend money. Lenders have the ability to communicate with the entrepreneurs and see the impact their loans are having on the recipients, their families, and their communities.

***Referrence:***

***Ethics for the Information Age by Michael J. Quinn***