Chapter 1

Catalysts for Change

1. According to the author, there is good reason to say we are living in the Information

Age because computer and communication technologies have made it easy to collect,

store, manipulate, and distribute vast amounts of information.

2. The Amish demonstrate that people have the ability to evaluate every technology

critically and determine whether its use will improve or degrade their quality of life.

3. Three aids to manual calculating are the tablet, the abacus, and the mathematical

table.

4. Commercial mechanical calculators became practical in the late nineteenth century

because advances in machine tools and mass-production methods made it possible to

manufacture reliable devices at a reasonable price.

5. Rapid industrialization, economic expansion, and a concentration of corporate power

in the late 19th century created a growing market for devices that could speed up

accounting.

6. The Burroughs Adding Machine Company surpassed its competitors by combining an

excellent product with excellent marketing.

7. The widespread adoption of the mechanical calculators led to the lowering of wages

of bookkeepers and the transformation of a male-only occupation to an occupation

employing a large number of women.

8. The invention of the cash register was a response to two needs: the need to prevent

clerks from embezzling money, and the need for better sales accounting.

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9. In the early twentieth century, the U.S. Census Bureau used punched cards to store

census data, Marshall Field's used punched cards to analyze information generated by

cash registers, railroads used punched cards to send out bills more frequently, and the

Pennsylvania Steel Company used punched cards to do cost accounting on manufac-

turing processes.

10. A data-processing system has three principle components. The \_rst component inputs

data, the second performs calculations, and the third outputs data.

11. The development of radar in World War II stimulated three advances in comput-

ing: electrostatic memory (exempli\_ed by the Williams Tube), semiconductor memory

(exempli\_ed by the transistor), and graphical user interfaces (exempli\_ed by Doug

Engelbart's oNLine System).

12. IBM quickly overtook Remington Rand as the leading mainframe computer maker be-

cause it had a larger base of existing customers and a much better sales and marketing

organization, and it made a much greater investment in research and development.

13. The motivation for the creation of higher-level programming languages was a desire to

make programming less tedious and error-prone and improve programmer productiv-

ity. Higher-level programming languages changed computing by enabling programs to

be moved more easily from one manufacturer's computers to another manufacturer's

computers. It also led to a large increase in the number of people writing computer

programs.

14. Time-sharing gave more organizations access to electronic digital computers in the

1960s by allowing them to share the cost of purchasing (or leasing) and operating a

computer system.

15. Between 1962 and 1965, the Minuteman II missile program was the largest single

consumer of integrated circuits in the United States, representing about 20 percent of

total production. In the course of making these chips, manufacturers found ways to

make chips less expensive and more reliable.

16. The principal innovation of the IBM System/360 was the creation of a series of nineteen

binary-compatible computers. All nineteen computers had the same instruction set.

That means customers could upgrade from one IBM System/360 to a bigger, faster

computer in the same product line without having to rewrite their programs.

17. The semaphore telegraph was adopted more rapidly on the continent of Europe than

in the British Isles because the system only works when atmospheric conditions allow

good visibility between stations. Since fog and rain are more common in the British

Isles, the semaphore telegraph is not as practical.

18. Morse's telegraph put the Pony Express out of business. Morse's telegraph made

possible \_re alarm boxes in urban areas.

19. The telephone blurred the traditional boundaries between private life and public life,

between family and business. The telephone eroded traditional social hierarchies. The

telephone enabled the creation of the \_rst \on-line" communities.

20. A circuit-switched network sets up a permanent physical circuit between the machines

that are communicating. The circuit may not be used for other communications while

these two machines are holding the circuit, even when they are not actually exchanging

messages. A packet-switched network divides messages into groups of bits called pack-

ets. Network routers transfer packets from a message sender to a a message receiver.

At one moment a physical wire may be carrying a packet from one message, and at

the next moment it may carry a packet from another message.

21. The Internet has a decentralized structure because ARPA did not want the ARPANET

to collapse if a single computer were lost. It is widely reported that fear of a nuclear

attack led ARPA to this design decision.

22. The National Science Foundation stimulated the creation of commercial, long-distance

data networks in the United States by simultaneously (1) encouraging commercial use

of regional NSFNET networks and (2) banning commercial tra\_c on the NSFNET

Backbone.

23. The codex is more durable than a papyrus scroll, and it makes it much easier for

readers to locate a particular passage in a book.

24. Hypertext is a linked network of nodes containing information.

25. A hypertext link is similar to a citation in a book in the sense that both point to a

source of related information. A hypertext link is superior to a citation in that you

can jump immediately to the related material by clicking on the link.

26. Douglas Engelbart invented the computer mouse in the 1960s.

27. The Apple Lisa was not commercially successful because it was too expensive and its

processor was too slow. The Macintosh was much cheaper and faster.

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28. An Apple HyperCard stack is fundamentally di\_erent from the World Wide Web be-

cause hyperlinks connect pages (cards) all located on the same computer.

29. Constructing the World Wide Web on top of the TCP/IP protocol, rather than one

vendor's proprietary network protocol, helped ensure the success of theWeb, because it

enabled the Web to span computers made by di\_erent manufacturers running di\_erent

operating systems.

30. The \_rst widely used Web browser was Mosaic, developed at the National Center for

Supercomputer Applications at the University of Illinois, Urbana-Champaign. Four

popularWeb browsers in use today are Microsoft's Internet Explorer, Google's Chrome,

Mozilla's Firefox, and Apple's Safari.

31. A search engine is program that accepts a list of keywords from a user, searches a

database of documents, and returns those documents most closely matching the spec-

i\_ed keywords.

Crawler-based search engines automatically create the database of information about

Web pages. Google and AltaVista are crawler-based search engines. The other type of

search engine relies upon databases of Web page information constructed by humans.

OpenDirectory is an example of this kind of search engine.

32. Information technology refers to devices used in the creation, storage, manipulation,

exchange, and dissemination of data, sound, and/or images.

33. Inventions mentioned in this chapter that were created for a military application are

the the ENIAC, radar, and the ARPANET.

34. The need for large amounts of timely information by corporate managers in the late

nineteenth century fueled the growth of the manual calculator market. The need

to store and manipulate large amounts of data prompted the invention of punched-

card tabulation and data-processing systems. A demand for less expensive access

to computers stimulated the development of time sharing. BASIC became popular

because there was a demand for an easy-to-learn programming language. An interest

in accessing and sharing information led to the rapid adoption of the World Wide Web

created by Tim Berners-Lee. (Other examples are possible.)

35. The adoption of the telephone erased traditional boundaries between work and home.

The telephone also make possible the \_rst on-line communities, through party lines.

Manual calculators led to the deskilling and feminization of bookkeeping. Time-sharing

systems gave many more people access to computers, which they used for both edu-

cational and entertainment purposes. Television broadcasts may have inuenced the

outcome of the U.S. Presidential election of 2000. (Other examples are possible.)

Chapter 2

Introduction to Ethics

1. The \ethical point of view" means respecting not only your own goals and aspirations,

but taking into consideration the goals and aspirations of other people as well.

2. Morality refers to guidelines that you can use to determine what you ought to do in

a particular situation. Morality also allows you to \_gure out whether a particular

decision or action is right or wrong. Ethics is the philosophical study of morality.

3. Morality is focused on solving particular problems. Ethics is broader than morality in

that it includes the higher-level activities evaluating moral systems and the creation

of new ways of evaluating moral problems.

4. Relativism is the view that \the good" exists inside the human mind. Our role as

humans is to invent \the good." Since \the good" is invented, its de\_nition is malleable.

Objectivism is the view that \the good" exists outside the human mind. Our role as

humans is to \_nd or discover \the good." Since \the good" exists independently of our

intellectual activity, its de\_nition never changes.

5. By using an ethical theory in which all humans are treated equally and guidelines are

developed through a process of logical reasoning, it is more likely that you can craft

an ethical argument that will be convincing to a diverse audience.

6. Person B has not made a strong ethical argument because she has not brought up any

facts or values that would undermine or contradict the explanation of Person A.

7. When we say an ethical theory is rational, we mean that it relies upon logical reasoning

from facts or commonly held values.

8. The many/any fallacy is to conclude that any option is acceptable after observing that

many options are acceptable. For example, you may observe me take several di\_erent

routes between home and work, and all of them are good in the sense that they allow

me to reach my destination safely and in a reasonable amount of time. That does not

imply that all possible routes between home and work are good.

9. The equivalence fallacy is to confuse similarity with equality. It comes into play in this

chapter in the discussion of the divine command theory. When we say \God is good,"

it is fallacious to argue that God and the good are identical.

Another example of the equivalence fallacy would be to conclude from the statement

\Adolph Hitler was evil incarnate" that everything Hitler said or did was evil.

10. Sometimes I leave home a little late, but I'd still like to get to work on time. I

want to be able to drive through red lights on those days when I am running late.

The proposed moral rule is: I may ignore tra\_c laws when I am pressed for time.

If we universalized this rule, then tra\_c signals would cease to have any meaning.

The streets would be chaotic. There would be gridlock or accidents at every busy

intersection. That contradicts my desire to get to work on time. Hence my proposed

moral rule is logically self-defeating. It is wrong for me to drive through red lights on

those days when I am running late.

11. Plagiarism is the use of someone else's words or ideas without giving that person

credit. Appendix A actually gives \_ve ways of committing plagiarism: copying an-

other's words without putting the words in quotation marks and citing the source;

paraphrasing another's words without citing the source; incorporating someone else's

\_gures or drawings without citing the source; referencing facts that are not common

knowledge without citing the source; and using another person's ideas without giving

that person credit.

12. Plagiarism refers to deliberately concealing the fact that you have used someone else's

words or ideas. If the action is not intentional, it should be called misuse of sources.

13. A consequentialist theory determines whether an action is right or wrong by evaluating

its consequences. Utilitarianism is a consequentialist theory. A non-consequentialist

theory determines whether an action is right or wrong by considering the underlying

rule or principle motivating the action. Kantianism and social contract theory are

non-consequentialist theories.

14. Three situations in which my action would be primarily motivated by a sense of duty

or obligation:

(a) I promised someone if he could get two tickets to a rock concert, I would purchase

a ticket and go with him. He got the tickets and expects me to pay for mine. I

keep my promise, even though I just lost my job and I really can't a\_ord to go.

(b) I pay my income taxes, even though I think the government has some wasteful

programs.

(c) Everybody in my fraternity is going to give blood. I donate blood, too, even

though just thinking about it makes me queasy.

Three situations in which my action is primarily motivated by its expected conse-

quences:

(a) I give money to a particular charity because it has the lowest administrative

overhead of any international relief organization. I \_gure more of my money will

actually reach those who need it.

(b) I work extra hard in a particular class, even though I am not interested in the

material, because I hope the professor will write me a good letter of recommen-

dation.

(c) I slightly exaggerate my experience in order to get a good job as a server in a nice

restaurant.

15. Moral luck is a problem associated with act utilitarianism. According to act utili-

tarianism, the moral worth of an action depends solely on its consequences. If the

consequences are out of the control of the moral agent, an action that should have had

a good e\_ect may end up having a harmful e\_ect. In this case, the action is deemed

to be wrong, even though it was no fault of the person performing the action.

16. Businesses and governments often use utilitarian thinking to determine the proper

course of action because it allows all the consequences of a decision to be boiled down

to dollars and cents (or some other quanti\_able unit of measure).

17. The di\_erence principle states that social and economic inequalities must be justi\_ed,

and the only way to justify a social or economic inequality is to show that its overall

e\_ect is to provide the most bene\_t to the least advantaged. For example, under

capitalism some people are allowed to have much more wealth than others. In order

to justify capitalism, it must be shown that the poorest are better o\_ than under

alternative economic systems.

18. Social contract theory is a non-consequentialist theory. Social contract theory as ar-

ticulated in Rawls's two principles of justice is a non-consequentialist theory.

19. Subjective relativism and ethical egoism are similar in the sense that both theories

allow an individual to put himself or herself \_rst in determining the right action to

take in a particular situation. However, there is a crucial di\_erence between the two

theories. Subjective relativism, like all relativistic theories, holds that each person

decides what is right for himself or herself. Two people in the same circumstances

could choose completely di\_erent actions, and both could be right. Ethical egoism, on

the other hand, is an objective theory. It holds that the right action for a person to take

in a particular situation is the action that will be to the greatest long-term bene\_t of

that person. A rational, objective process is used to determine the greatest long-term

bene\_t, meaning anyone in the same situation should reach the same conclusion.

20. Both divine command theory and Kantianism are objective, holding that right and

wrong can be expressed in rules that are true for all people at all times in history.

Divine command theory identi\_es the good with the will of God, and holds that the

will of God is communicated through holy books. Kantianism, on the other hand,

holds that we can use our reason to determine what is good.

21. Both subjective relativism and act utilitarianism would allow an individual to evaluate

a situation to determine whether a particular action is right or wrong. However,

subjective relativism allows a person to use any means to decide the right thing to

do. According to act utilitarianism, the consequences of the possible actions must

evaluated. The correct action is the one that leads to the greatest increase in total

happiness among the parties e\_ected.

22. Both Kantianism and rule utilitarianism are objective. According to both theories,

right actions are those that are in line with universal moral rules. However, the two

theories derive the rules in di\_erent ways. Kantianism determines whether a proposed

moral rule is acceptable by evaluating it according to the Categorical Imperative.

Utilitarianism determines whether a proposed moral rule is acceptable by considering

the long-term, overall total change in happiness that would result if everyone always

followed the rule.

23. Both act utilitarianism and rule utilitarianism are consequentialist theories. However,

act utilitarianism considers the consequences that would result from an action taken

in one particular situation. Rule utilitarianism considers the consequences that would

result if everyone always took a certain course of action in all similar situations.

24. Both theories focus on the notion of society, but they are quite di\_erent. For one

thing, cultural relativism is an example of relativism, while social contract theory is

an example of objectivism. Cultural relativism says each society must determine for

itself what people ought to do in various situations. Di\_erent societies come up with

di\_erent moral codes. These rules may be based heavily on tradition and not on reason.

Social contract theory says morality consists in those rules that rational people ought

to recognize are in everyone's best bene\_t if they are universally obeyed.

25. Both Kantianism and social contract theory are objective, rule-based theories. In

Kantianism, proposed rules are derived by seeing if they can meet the requirements of

the Categorical Imperative. In social contract theory, proposed rules are derived by

seeing if their universal adoption would be to everyone's mutual bene\_t.

26. Alexis did wrong when she made use of a student's login and password to gain access

to the library's computers and printers. Alexis treated the student as a means to her

end of getting access to the private college's computers.

The anti-spam organization is treating the innocent computer users in the East Asian

country as means to its end of reducing spam. That is wrong.

The analysis depends upon the expectation of privacy people should have. The exis-

tence of the cameras is public knowledge. If nobody is being \used," the action appears

to be morally acceptable.

Releasing the software without informing the potential users of the possible bugs would

be wrong. However, if the hospital sta\_ were fully noti\_ed that the product was in

beta test, a decision to release the product could be justi\_ed.

27. The bene\_ts to Alexis were large. The harms to others were small. Her action was

morally acceptable.

Millions of people are getting much less spam. The bene\_t to each of these persons is

small, but meaningful. Tens of thousands of citizens of the East Asian country cannot

send email to the United States. The harm to each of these persons is signi\_cant.

Concluding whether the action is right or wrong depends upon the weight you give to

each person's bene\_t or harm.

In this case the bene\_ts seem to outweigh the harms. The actions of the East Dakota

State Police are morally acceptable.

To do the analysis, we must examine the various courses of action and weigh, for each

one, the potential bene\_ts and harms to the patients, nurses, hospital, and members

of the start-up company.

28. A rule utilitarian is likely to subscribe to the rule \Gaining access to another person's

private information is wrong," since a great deal of harm can result if people were

unable to protect con\_dential information such as credit card numbers. For this rea-

son, Alexis did wrong when she used someone else's login and password to access the

library's computers and printers.

The challenge with this scenario is to determine whether any moral rules have been

broken. In general, utilitarianism is comfortable with the notion that maximizing the

overall good may mean that the majority gains a bene\_t while the minority su\_ers a

harm.

The East Dakota State Police is using technology to increase the safety of the commu-

nity. Its actions appear to be morally acceptable.

As long as the company fully discloses the status of the product, it appears to be on

safe ground.

29. Alexis violated the property rights of the private college when she used its computers

without permission. Her action was wrong.

The residents of the East Asian country had a reasonable expectation that their email

would be delivered. By blacklisting the country's ISPs, the anti-spam organization

encouraged American ISPs to refuse to forward email. This seems wrong.

How much privacy should a person have while operating a motor vehicle on a freeway?

If a person has given up all privacy, then there seems to be nothing wrong with this

action. If a person has a reasonable expectation of privacy, then the East Dakota

State Police may have done something wrong if it secretly gave the FBI access to the

information.

The purchaser of a product has a right to expect the manufacturer stands behind the

quality of the product. In this case it would be wrong for the company to sell the

product as if it were completely debugged and 100 percent reliable. On the other

hand, the hospital might be willing to beta test the device if it could get a discounted

price or if that would help the company certify its reliability. The company could begin

shipping the device to hospitals that understood the current state of the software.

Chapter 3

Networked Communications

1. The Internet is a network of computer networks that uses two protocols, collectively

known as TCP/IP, to control the exchange of data.

2. The \_rst part of an email address (before the @ sign) identi\_es a particular computer

user. The second part of an email address (after the @ sign) contains a domain name.

3. Unless the email message is short, the mail server divides the message into packets.

The message is sent from mail server through zero or more intermediate routers to

the mail server of the person to whom you are sending the email. The destination

email server reassembles the message from the packets (if necessary) and transmits the

message to the intended recipient.

4. Spam is unsolicited, bulk email.

5. A spam \_lter attempts to keep spam from reaching someone's mailbox by identifying

and discarding (or routing to a special folder) emails that appear to be spam.

6. A URL is a Uniform Resource Locator. Every Web page has a unique URL, enabling

hyperlinks to be set up between arbitrary pages.

7. A wiki is a collaborative Web site that allows multiple people to create and edit the

contents of the site using Web browsers.

8. A blog (Web log) is a personal diary or journal kept on the Web. The journal may

contain text, photos, or videos.

9. A PC bang is a Korean cybercafe in which people play persistent, on-line games.

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10. Here are \_ve among a multitude of other uses of the Web:

(a) We sell stu\_ in on-line auctions (such as eBay).

(b) We seek medical information from on-line special interest groups of people su\_er-

ing from particular diseases.

(c) We learn about the weather.

(d) We \_nd out about current tra\_c conditions before deciding whether to leave work.

(e) We get directions before driving to a place we've never been before.

11. Censorship is when one person or organization prevents another person or organization

from expressing their opinion.

12. There are three forms of direct censorship: government monopolization, pre-publication

review and licensing and registration. Government monopolization means the govern-

ment owns all the media outlets. Pre-publication review means the government must

approve information before it is disseminated. Licensing and registration means a news

organization must get a license from the government before operating. It is used for

media with limited bandwidth, such as radio and television.

13. Broadcasters have the most limited First Amendment rights because they have a per-

vasive presence. Broadcasters beam signals into the privacy of the home. Since people

can turn radios and televisions on and o\_, they may turn a device on in the middle

of a show. That means that warnings at the start of a show are less e\_ective than a

warning at the front of a newspaper or magazine article. Also, broadcasting is acces-

sible to children, even those too young to read. Restricting the access of children to

radio or television is more di\_cult than restricting access to adult magazines or books.

14. Censorship is di\_cult on the Internet because:

(a) The Internet supports many-to-many communication. The Internet has far more

information outlets than television or radio.

(b) The Internet is dynamic. Millions of computers are being added to the Internet

every year.

(c) The Web is huge, containing billions of pages. Nobody can keep track of every-

thing published on the Web.

(d) The Internet is global. Laws passed in one nation may have no e\_ect outside that

nation's borders.

(e) It is hard to distinguish between children and adults on the Internet.

15. A Web \_lter is a piece of software that prevents Web browsers from displaying certain

pages, presumably because they have objectionable content.

16. The term \sexting" refers to sending text messages or emails that are sexually sugges-

tive. Often sexting involves sending nude photos.

17. The leading form of identity theft in the United States is credit card fraud.

18. Phishing is a form of spamming in which the email messages are designed to trick

victims into revealing sensitive \_nancial information.

19. Cyberbullying refers to bullying via the Internet or the phone system.

20. The term \Internet addiction" stretches the traditional concept of addiction because

the traditional de\_nition of addiction focuses on the misuse of a chemical substance or

drug.

21. The Enlightenment view of addiction is that people are responsible for the decisions

they make about what they put into their bodies. Therefore, the responsibility for a

Chapter 4

Intellectual Property

1. The term intellectual property is used to describe a unique creation of the human

mind that has commercial value. Examples of intellectual property include poems,

photographs, songs, plays, books, paintings, sculptures, movies, logos, slogans, designs,

perfumes, recipes, and computer programs.

2. John Locke holds that when people remove something from Nature through their own

labor, they have mixed their labor with it, and therefore they have a property right in

that object.

3. If more than two people create the identical intellectual property, there is only one

instance of that property, not two, meaning both people cannot claim full rights to that

property. Copying an intellectual property is di\_erent from stealing a physical property.

Perfect copies can be made of objects embodying an intellectual property. When this

happens, the original owner has lost exclusive control over use of the property, even

though he or she still has the original article.

4. An individual or \_rm in the United States may protect intellectual property through

trade secrets, trademarks, service marks, patents, and copyrights.

5. A trademark is a word, symbol, picture, sound, color, or smell used to identify a

product. It is good when a company's trademark becomes well known to the public.

Examples of trademarks are Kleenex, McDonald's Golden Arches, and Advil. Your

college or university's logo is most likely trademarked. A trade secret is a piece of

intellectual property that is kept con\_dential. Examples of trade secrets are formulas,

processes, proprietary designs, strategic plans, and customer lists. The information

loses much or all of its value if it becomes public knowledge.

6. The advantage of a trade secret is that it does not expire. The disadvantage of a trade

secret is that a company cannot prevent another company from attempting to reverse

engineer the formula or process. The advantage of a patent is that the government gives

the patent owner the exclusive right to the intellectual property. The disadvantage of

a patent is that this right expires after 20 years.

7. Fair use refers to those circumstances under which it is legal to reproduce a copyrighted

work without permission.

8. As information technology has advanced, companies have begun using digital media

(such as CDs and DVDs) to store copyrighted songs, movies, and computer programs.

The widespread availability of personal computers and CD/DVD burners has made it

much easier for consumers to make copies of CDs and DVDs.

9. The Digital Millennium Copyright Act curtails fair use of copyrighted material by

consumers by making it illegal to make copies of DVDs.

10. Digital rights management refers to any of a variety of actions owners of intellectual

property stored in digital form may take to protect their rights. Examples of digital

rights management include encryption, digital watermarking, and making CDs copy-

proof.

11. A peer-to-peer network is a transient (temporary) network allowing computers running

the same networking program to connect with each other and access \_les stored on each

other's hard drives. Peer-to-peer networks facilitate \_le sharing.

12. Napster relied on a single central server to mediate requests. FastTrack distributes the

index of available \_les among many supernodes. Shutting down Napster simply re-

quires shutting down the single central server. Shutting down FastTrack would require

shutting down all of the supernodes. Hence FastTrack would be more di\_cult for the

judicial system to shut down than Napster.

13. BitTorrent achieves an order-of-magnitude increase in downloading speed, compared

with KaZaA and Grokster, by allowing a user to download di\_erent pieces of a \_le

from many di\_erent sources simultaneously.

14. Sony did not actively encourage its customers to break copyright law. The Supreme

Court ruled that time-shifting was not an infringement of copyright. In contrast,

Grokster and StreamCast actively encouraged the availability of copyrighted \_les on

their networks and helped consumers download these \_les, because these actions in-

creased the popularity of their services and heightened their advertising revenues.

15. Patents are considered an unreliable way of protecting intellectual property rights in

software because the Patent O\_ce has given out many bad software patents than

cannot hold up in court. This has happened because for decades the Patent O\_ce

did not give out patents on software. During this time a lot of \prior art" was being

developed. Now, when a company applies for a software patent, the Patent O\_ce may

not be aware of some of the prior art. It may issue a patent even though the algorithm

is not novel. Such a patent has little value. The existence of bad patents in software

reduces the value of software patents in general.

16. Company A resorts to \clean room" software development. Two independent teams

work on the project. The \_rst team is responsible for determining how Company B's

program works and produces a technical speci\_cation. The second team relies solely

on the technical speci\_cation to develop the software. Because the code developers are

isolated from Company B's product, Company A can ensure no code get copied, even

unconsciously.

17. Open source refers to software in which the source code is distributed along with the

executable program.

18. Linux has a\_ected the market for proprietary software by putting price pressure on

companies selling proprietary versions of Unix. It is providing an alternative to servers

running the Windows operating system. Linux is also putting pressure on Microsoft

and Apple, which sell proprietary operating systems for desktop computers.

19. My band can select a Creative Commons license that allows people to download music

for noncommercial purposes, but still protects the band's copyright to the song.

Chapter 5

Information Privacy

1. Whitepages.com combines information contained in two databases. The \_rst database

ties phone numbers to addresses. The second database ties addresses to locations on

a map. By combining information in these databases, Whitepages.com can show the

map location associated with a phone number.

2. Privacy is a negative right because all I have to do to give you privacy is leave you

alone.

3. The Third Amendment to the U.S. Constitution gives people the right to refuse to let

the government quarter soldiers in their homes in peacetime.

4. When we say privacy is a prudential right, we mean that granting people this right

provides a net bene\_t to society. Hence it is prudent for a society to choose to give its

members some privacy.

5. With the invention of air conditioning and television, people spend more time in their

own apartments than they did 100 years ago. Automobiles and taxicabs give people

more privacy than subway cars. Young adults are more likely to live away from their

parents than they were 100 years ago. Other examples are possible, of course.

6. A public record contains information reported to a government agency for the purpose

of informing the public.

7. Here are a few examples of public records that may exist about a person: legal name,

address, list of real estate owned, property tax records, political party, date of birth,

date of marriage, date of divorce, and date of death.

8. Here are a couple of possible answers. In order to get a job, many people are required

to take a drug test; i.e., submit a urine sample. People routinely submit urine and

blood samples and hand over medical records in order to get a life insurance policy.

9. The Electronic Privacy Information Center \_led a complaint about Facebook Tag Sug-

gestions because Facebook apparently used photos posted on its site to develop its

facial recognition technology, but it never received consent from Facebook users to use

their photos for this purpose.

10. Enhanced 911 service raises new concerns about privacy because in order to implement

this service, cell phone companies must install technology that enables them to track

the positions of all active cell phones.

11. By keeping track of a consumer's purchases using a loyalty card, a company can predict

which other products that consumer may be interested in purchasing and generate

coupons for those products to stimulate a sale.

12. If consumers cannot detach or disable the RFID tags associated with items they have

purchased, then information about their possessions may be collected by other people

with RFID scanners.

13. If every pet has an embedded RFID tag with the address and phone number of the

owner, then authorities who recover a stray pet can use an RFID scanner to read this

information and quickly return the pet to her owner.

14. A two-way communication system allows drivers who need help to contact an OnStar

representative. If the vehicle's airbags deploy, the system automatically communicates

the location of the vehicle to an OnStar center. OnStar can be used to help owners

recover stolen vehicles. OnStar representatives also have the power to disable the gas

pedal on OnStar-equipped vehicles.

15. Consolidating a patient's medical records into a single database can make it easier

for multiple health care professionals to provide quality service to that patient. For

example, having all of a person's prescriptions in a single database makes it easier to

identify potentially dangerous drug interactions. The risk of consolidation is that if

someone should gain access to the database without authorization, that person would

get access to all of that patient's medical information.

16. Digital video recorders provide viewers with less privacy that videotape recorders be-

cause they report information about the viewing history back to the subscription service

providing the DVR.

17. Cookies created by a Web server can a\_ect your privacy because if someone else should

steal the your cookie, that person can impersonate you. (This issue will be discussed

in Chapter 7.)

18. Data mining means searching through multiple databases looking for patterns or rela-

tionships in the records.

19. Secondary use of data is when information captured for one purpose is put to another

purpose.

20. Collaborative \_ltering is a way of helping an individual wade through a large amount

of choices and focus in on the best ones. It uses information about the preferences of

a large number of people to predict those items an individual is more likely to like.

On-line retailers and movie-rental sites use collaborative \_ltering to make recommen-

dations.

21. Some campaigns are using data mining because it enables them to target their direct

mailings and home visits to the people most likely to support their candidates.

22. An opt-in policy requires a consumer to explicitly give permission before an organi-

zation can share information it has collected about the individual. An opt-out policy

allows an organization to share information it has collected about a consumer unless

the individual explicitly forbids it.

23. Facebook's decision to make their Beacon system opt-out infuriated many Facebook

users, who didn't even know Beacon existed until it had revealed information they

thought was private.

24. Cell phone companies are using data mining on social networks to identify \inuencers"

and o\_er them incentives to keep them loyal. Police are using data mining on social

networks to identify where big parties are happening and deploy o\_cers accordingly.

Banks are using data mining to evaluate the riskiness of loans.

Chapter 7

Computer and Network Security

1. In the 1950s the term \hacker" referred to an inquisitive and creative person able to

make systems do new things. When digital computers became available, the use of the

term shifted to include software virtuosos as well as hardware experts. After people

began breaking into government and corporate computer networks in the 1980s, the

everyday meaning of the word shifted. Today, the word \hacker" is most frequently

used to describe someone who gains unauthorized access to computers and computer

networks.

2. Three \low-tech" methods that hackers have used to obtain login names and passwords

are eavesdropping, dumpster diving, and social engineering.

3. The maximum penalty for violating the Computer Fraud and Abuse Act is 20 years in

prison and a $250,000 \_ne.

4. It is dangerous to surf the Web using an open WiFi network because others within

range of the wireless access point can sidejack your Web session by capturing a cookie

being sent to your computer.

5. Here are de\_nitions of common types of malware:

(a) Adware is a type of spyware that displays pop-up advertisements.

(b) A backdoor Trojan is a Trojan horse program that gives an outsider access to the

victim's computer.

(c) A bot is a type of backdoor Trojan that can be controlled by a command-and-

control program on another computer.

(d) A botnet is a network of bot-infected computers controlled by a single person or

organization.

(e) Cross-site scripting is one way that a Web surfer can accidentally run malware.

The victim visits a Web site and reads something posted by someone else (the

attacker). The posting contains a client-side script that is executed by the victim's

Web browser.

(f) A drive-by download is the unintentional downloading of malware caused simply

by visiting a compromised Web site.

(g) A rootkit is a set of programs that are launched every time the victim's computer

is booted. The programs have privileged access to the computer's functions, and

because they start executing before the operating system has launched, they use

their privileges to hide their presence.

(h) Spyware is a program that communicates over a computer's Internet connection

without the knowledge or consent of the user.

(i) A Trojan horse is a program that publicly does something bene\_cial but privately

performs other harmful actions.

(j) A virus is a piece of self-replicating code contained inside another program, called

the host.

(k) A worm is a self-contained program that is capable of automatically propagating

through a computer network by exploiting security holes.

6. It is dangerous for an email program to open attachments automatically, because an

attachment may be an executable program containing a virus.

7. Andy Sudduth's email was of no help for two reasons. First, it didn't have a subject

line. Second, and more importantly, the email was not delivered in a timely manner,

because the mail server handling it was infected with the worm.

8. Here are descriptions of common types of cyber attack:

(a) A denial-of-service attack is an intentional action designed to prevent legitimate

users from gaining access to a networked computer service.

(b) A distributed denial-of-service attack is a type of denial-of-service attack in which

multiple computers attack the computer service. Botnets can be used to launch

distributed denial-of-service attacks.

(c) Phishing is an e\_ort to gain sensitive information from gullible computer users

through the use of a mass emailing.

(d) Spear-phishing is a type of phishing in which the email list is narrowed down to

improve the success rate.

(e) SQL injection is a way to attack a database-driven Web application by injecting

an SQL query into a text string.

9. Some criminal organizations use the Internet to launch phishing attacks. They sell the

credit card numbers and other \_nancial information netted by their phishing schemes.

Other criminal organizations rent botnets to those who wish to send spam, attempt a

phishing scheme, or launch a distributed denial-of-service attack.

10. A cyber attack is an attack from one computer to another that attempts to disable the

target computer or steal information from it.

11. Companies are converting SCADA systems to the Internet Protocol because it saves

them money and allows them to do remote maintenance and monitoring.

12. The Stuxnet worm infected computers in Iran that controlled centrifuges processing

uranium, causing a temporary shutdown of Iran's nuclear program.

13. A vote thief could cast multiple votes in an on-line election by purchasing pass codes

from people willing to sell their right to vote. A thief could fool other voters into

revealing their pass codes and then using this information to cast multiple votes.

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Chapter 10

Work and Wealth

1. Automation reduces the price of goods, increasing the real income of the people who

buy those goods. With a higher real income, people can use the extra money to buy

other things. Hence automation increases the standard of living. However, automation

puts some people out of work. They must go through unemployment, and perhaps

retraining, before getting another job. People who are too old may be unable to \_nd

another job after being displaced by a machine.

2. There is evidence that automation eliminates jobs. More than 43 million manufacturing

jobs disappeared in the United States between 1979 and 1994. Spreadsheets and other

software packages are reducing the need for accountants and bookkeepers. A large

number of white-collar, middle-management jobs were eliminated in 1991{1996. Most

of these people had at least some college education. Only 35 percent of these people

were able to \_nd new jobs that paid as well.

There is also evidence that automation creates more jobs than it destroys. Automation

causes new kinds of jobs to be created. For example, the automation of stock exchanges

has led securities \_rms to hire mathematicians and computer scientists to develop

automated trading systems.

3. The work week hasn't gotten shorter, even though productivity has doubled since

World War II, because the increase in productivity has been used to improve the

average standard of living. Another reason is that people are aware that layo\_s have

happened and can happen again. This knowledge is a strong incentive for people to

work long hours so they won't be part of the next layo\_.

4. Information technology can lead to changes in the structure of an organization by open-

ing up new communication paths. Access to information can lead to a decentralization

of decision-making.

5. Telework can improve the environment by reducing pollution caused by automobiles

driven by commuters.

6. Teleworkers fret about being less visible, because they do not want to be forgotten when

it's time for raises or promotions. In addition, they don't want to be undervalued when

managers are trying to \_gure out who should be laid o\_.

7. Proponents of globalization say it helps workers in developing countries in several ways.

Globalization increases competition and lowers prices, improving the purchasing power

of everyone, and raising the global standard of living. Globalization gives people in

developing countries access to jobs. When they gain employment, their prosperity

increases. Every example in the 20th century of a poor country becoming more pros-

perous has been the result of that country producing goods for the world market,

rather than trying for self-su\_ciency. Prosperity reduces the chance of countries going

to war.

Opponents of globalization say it hurts workers in developing countries by forcing them

to compete with subsidized American agribusinesses. Mexican farmers who cannot

compete with these prices are driven out of business. Most of them cannot \_nd jobs

in Mexico and end up immigrating to the United States.

8. Pippa Norris says the digital divide has two dimensions. The global divide refers to the

disparity in Internet access between more industrialized nations and less industrialized

nations. The social divide refers to the di\_erence in access between the rich and poor

within a particular country.

9. Mark Warschauer says the term \digital divide" promotes the idea that the di\_erence

between the \haves" and the \have nots" is simply a question of access, but it's more

complicated than that. In reality, the underlying social system a\_ects the adoption

of information technology. Another problem with the term \digital divide," according

to Warschauer, is that it implies that people either use information technology or

they do not, when in reality there is a continuum of engagement with information

technology. Third, the term \digital divide" implies that a lack of access will lead to

a less advantaged position in society. But there is no simple causality. Each factor

a\_ects the other.