

Chapter 8.

Social Informatics and Economics

In this chapter we examine some of the ways that information is used and controlled in our society. Modern society balances many components such as political and economics and Information management is essential for the development of complex social, organizational, and economic systems. Interlocking systems of government, political systems, and economics. Public policy, governmental accountability, marketing, intellectual property, and modern warfare all are information intensive for better or worse. These are highly complex systems (Fig. 8.1). They seek equilibria in many subsections. Indeed with many dimensions of change, even those partial equilibria are changing. Part of the goal of creating social order is to try to create stability and predictability in some areas that allow other areas to flourish. We start with some policy issues which develop tradeoffs and balance.

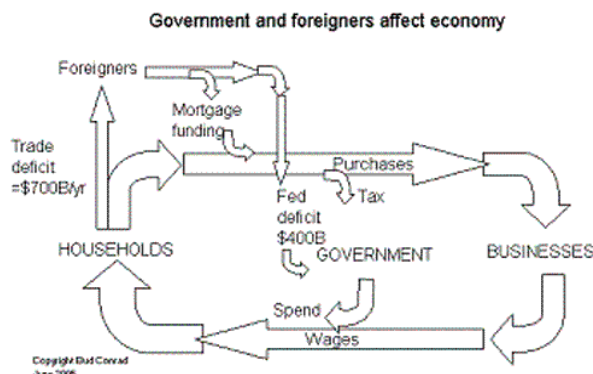


Figure 8.1: Society can be viewed as a complex adaptive system. Indeed, it is particularly complex because the laws and norms are fluid and individuals have many different (sometimes contradictory) agendas. (redraw)

8.1. Social Policy: Freedom and Control of Information

Freedom of expression is a cornerstone of democracy. Along with transparency in organizational and governmental processes, freedom of expression is one of the foundations of an Information Society. Freedom of information is essential for critical thinking. Social complexity^[75].

The free exchange of ideas helps to resolve social issues. However, in some cases information can damage the very systems and institutions it has helped to create. This has led to a variety of traditions, laws, policies, and procedures for dealing with information. These seek to balance the sometimes competing forces of individual rights, the power of knowledge and information, and the good of society.

There can be legitimate reasons to limit the distribution of information — it may be personally confidential or it may be under copyright, for example. Some information is also potentially very harmful, such as instructions for making bombs or a hate group's literature, and there may be very legitimate reasons for preventing it from being freely exchanged.

8.1.1. Freedom of Speech and of the Press in the U.S.

Freedom of information allows all sides of issues to be discussed and analyzed. It is fundamental to democracy and a market-based economy. Among other advantages, the press provides a watchdog role on government and business activities. The First Amendment of the U.S. Bill of Rights guarantees the freedom of speech, of assembly, and of the press. While the First Amendment is broad, not all speech is protected. It only covers only government regulation of speech and not speech that is regulated by organizations with which a person is associated. Moreover, some types of speech such as libel, blackmail, fraud, and child pornography are considered so antisocial that they are not protected. Yelling "Fire!" in a crowded public place, such as a theater, when there was no fire would similarly not be protected

by the First Amendment because it is fraudulent and because of the potential for injury among the panic-stricken theater goers. However, the definition of pornography is based simply on “community standards”; what constitutes pornography, what constitutes a community, and which community is setting the standards are all questions that need to be determined.

Objecting to what people do rather than to what they think.

Down-side of freedom of the press is patently false information.

Commercial speech which is speech employed in the conduct of business, can be regulated more than other types of expression. For instance, a business can’t make fraudulent advertising claims. The U.S. courts upheld a ban on cigarette advertisements on television, but they would be unlikely to ban any sort of political speech (such as a campaign advertisement) in the same way. Moreover, there are some cases when speech is compelled such as requiring the ingredients to be listed on food products.

Freedom of speech protects a person from censorship by the government but it doesn’t protect a person from retaliation by an employer.

Civic data. Data about local government and community.

In the U.S., information generated by the government is owned by the public. There are, of course, cases where it is necessary to keep information from being widely disseminated. Disseminating individual census records would violate individual privacy. Some military secrets may need to be protected as a matter of national security. As a means of allowing the public access to governmental records, the Freedom of Information Act (FOIA) was created in 1966. This law allows the public to petition the government for access to governmental records. However, the law does allow for exceptions to the release of information for reasons such as individual privacy and national security. Freedom of information for releasing records in governments around the world^[5].

Claims for access are reviewed by a government office and ultimately by an independent judge. When documents are released under FOIA, some sections may be hidden as redactions (8.2.4). Records and archived material (7.4.1, 7.5.1) may contain sensitive information. When a record or document must be made public, such as in response to a Freedom of Information Act (FOIA) request (8.1.1), parts of it may still have to be held back, or “redacted”. This is generally related to the legal requirements of the records system. For some other types of material there are too many copies of any published material so it is impossible to retract it. Classified material. Open government data. Limitations of FOIA - slow response. Identity of author of a message and responsibility for its content.

Unrestricted freedom of expression. Slander. Defamation. Libel. These must be adjudicated. Shield laws for the protection of journalist’s sources.

Examples.

8.1.2. Freedom of Speech and of the Press outside the U.S.

In Britain the libel laws are much stricter than the U.S.

Hate speech.

8.1.3. Censorship

Censorship is intentionally blocking access to information resources by information consumers. That is, it distorts one part of the information creation and dissemination stream.

Several types of censorship can be identified: Political, moral, and security. Political censorship is particularly harmful to an informed public in a democracy.

One example of censorship which is accepted is giving parents control over what information resources are available to their children.

There are a variety of approaches to implementing censorship sBook burning. Banned books (Fig. 8.2). As is the case with a lot of computer-based language processing, much of the nuance is difficult to automate consistently Thus, some automated filters remove references to a breast of chicken or breast cancer.

When censorship is implemented as a social policy, its purposes and limits should be clearly delineated. Need for freedom of information may be be balanced with community control of appropriate content.

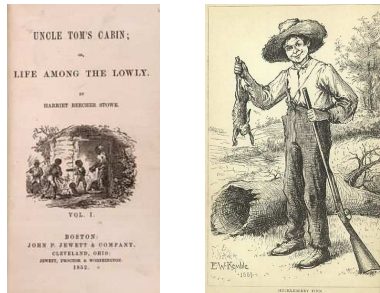


Figure 8.2: Some banned books: *Uncle Tom's Cabin* (left) and *The Adventures of Huckleberry Finn* (right).

Potentially, content filtering can be censorship.

Information monitoring. Technology can both circumvent and facilitate censorship. Great Firewall.

Fig. 8.3. In other cases, only certain types of material are selected for collection. State secrets doctrine. Versus FOIA (8.1.1).



Figure 8.3: Nazi book burning.

8.2. Social Policy: Intellectual Property

8.2.1. The Logic of Intellectual Property

We are accustomed to the idea of ownership of physical objects such as clothes, cars, and houses, but less so to the idea of ownership of intellectual property. Knowledge and ideas can be of great value to society and to their creator. The output of creative intellectual activity may yield a type of property. The idea of ownership of ideas is found in the discussion of plagiarism (5.12.3)but it is also the basis of a legal construct. As a legal construct, intellectual property differs from real property ((sec:realproperty)). There are five major types of legally protected intellectual property: copyrights, patents, trademarks, and design patents. Trade secrets, such as formulas for soft drinks, are also intellectual property, but they are not protected by contracts with employees.

Not all creative activity is protected. In the fashion industry, it has proven difficult to protect creations. In some other cases, intellectual property is enforced primarily by social norms. For instance, top comedians apply social pressure that discourages stealing each others' jokes. Intellectual property,



Figure 8.4: Mozart had no intellectual property protection and died a pauper despite producing great music.

unlike other types of property, can be quickly and duplicated and someone's hard work and creativity can be usurped by another. Laws for protecting intellectual property attempt to balance the rights of the creator with the needs of society and the practicality of enforcing the rules. Ideally, copyright facilitates a healthy publishing industry that is independent of government control.

Intellectual property laws are not always clear, and the emergence of new forms of technology constantly pushes for new legislation. We now see additional complications of music copyrights (8.13.3).^[55]

Intellectual property right for digital materials and methods is fuzzy.

The Congress shall have Power ... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries

Figure 8.5: Article 1.8.8 of the U.S. Constitution on the need to protect intellectual property.

8.2.2. Intellectual Property Law in the U.S.

Copyright

Copyright and patents are specifically authorized by the U.S. Constitution and are administered by the Library of Congress (Fig. 8.5). As stated in the U.S. Constitution, the main justification for protecting intellectual property in the U.S. is that it serves as an incentive to others to create new works. There are major challenges to copyright from digital works.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

Figure 8.6: The First Amendment of the U.S. Bill of Rights which guarantees the free exchange of information in many public settings.

Copyright Law In the United States, the United States Code (USC 17)^[20] defines copyright law. A copyright can be granted to “an original expression fixed in a tangible medium”. A “tangible medium” may include text, music, film, painting, and even sculpture. Copyright law in the U.S. is slightly different from that in other parts of the world, and even within the U.S., some of the details have changed frequently, often owing to other innovations and technological advancements. In essence, however, copyright law extends legal protections to a creator's ability to obtain benefits from their work (usually monetary) and their ability to control how their work is used. Opt-in versus opt-out.

What Can be Copyrighted Copyright not only protects specific wordings and other types of materials such as books or music, but also creations such as type fonts and sculptures. There are limits, however; copyright protects the expression of an idea and not the idea behind it. A newspaper journalist does not have an exclusive right to use the facts behind a news story; rather, the copyright would simply protect the way that journalist describe the events. Similarly, in the 1992 court decision about whether the “look-and-feel” of the Macintosh desktop interface could be copyrighted, the judge determined that only the specific design used for the desktop could be copyrighted and not the idea of the desktop.

A complex multimedia production may have separate copyrights on different components of the production; there may be music rights and narrative rights, for instance. The selection and order of works in an anthology can be copyrighted, even if each work is copyrighted separately, as there is intellectual effort in the selection process. “Works for hire” (i.e., those you are paid to complete), however, are owned by the person who hired you unless otherwise stated. In addition, works for the U.S. federal government are owned by the public.

Re-mix. (Fig 8.7).



Figure 8.7: Mashups as fair use? Girl Talk.

Rights Granted by Copyright Copyright protects original expressions by granting the five rights listed in Fig. 8.8. The basic right is that of the creator to control the making of copies of the work. There are rights related to this first one that may not involve the actual making of physical copies, such as in the case of theater. Here, these rights are known as “performance rights”. Further, performances themselves can be copyrighted separately from the copyright on the work performed. Thus, a specific singing of a song or reading of a poem can be copyrighted and it will be a separate copyright from the copyright on the poem or song itself. This is sometimes described with the claim that copyright can apply to both matter (the work) and energy (a performance). Works are sometimes adapted or expanded into more complex works; those derivative works can be copyrighted as well, but the copyright also depends on permission to copy the original source.

Right to copy
Right to distribute copies
Right to make derivative works
Right to perform
Right to display

Figure 8.8: The five rights granted by the current U.S. copyright law.

Under current law, the creator of an original work automatically holds the copyright on it from the time it is made public, and extend for the author’s lifetime plus 70 years thereafter. In previous versions of the law, the creator had to register and deposit a copy of the work at the Copyright Office, which is part of the Library of Congress. Once copyright is established, it can be transmitted to others by a contract or license. Normally this agreement gives the publisher the right to market, distribute, and sell copies of a work and gives the creator a royalty in return.

Copyright infringement is the illegal use of copyrighted material. Copyright infringement for commercial gain is called “piracy”. Generally, before an infringement is determined, the owner of the copyright must send a “cease-and-desist” letter to the person who is using the work. If the person does not stop using the copyrighted material, they may get sued. Indeed, in the current version of the law, any content can be captured and posted under the “safe harbor” unless the owner opts out.

Exceptions to Copyright In the U.S., several exceptions to copyright are recognized (Fig. 8.9). One of the most widely discussed exceptions is “fair use,” which allows limited use of a copyrighted work for certain purposes. However, the limits of fair use are difficult to define — Fig. 8.10 lists the factors considered. Fair use allows a reviewer to quote material in book review; in general, the use of quotations from a copyrighted work for the purpose of explicating criticism or comment is allowed. Photocopying a

work for personal use is acceptable, and a limited number of copies may also be justified for educational purposes. Fair use has also been interpreted to allow parodies of works. Parody uses a work to make a comic point (Fig. 8.11). It is obvious that without the fair use exceptions for parody and criticism, no copyright holder would allow the use of their work for those purposes. Digital rights and fair use.

Exception	Description
Fair Use	A limited amount of public use of copyrighted works is allowed as “fair use”.
First Sale	A copyright holder can collect royalties only the first time a work is sold. If a used book is sold by a used book store, the copyright does not apply.
Library Exception	A library may make copies of works that are out of print for the purpose of inter-library loan.

Figure 8.9: Major exceptions allowed by U.S. copyright law.

Factor	Example
Purpose	Is it for personal use or for sale? Is it for education? Is it a parody?
Amount	Is it just a brief quotation or a full chapter?
Nature of work	Is it primarily factual (e.g., biography or history)?
Effect on value	Are the most unique parts selected?

Figure 8.10: Factors typically considered in determining fair use of copyrighted material.

Material that was never copyrighted or for which the copyright has expired is said to belong to the “public domain”. Such material may be freely used by anyone; no permission is required and no fee is charged. Many materials prepared for the U.S. federal government are automatically public domain because they are created with public funds, but works for state and local governments often are not. There may be ambiguities about the facts and even about interpretations about fair use. Risk analysis.

<p>?Twas the night before implementation and all through the house, not a program was working, not even a browse. The programmers hung by their tubes in despair, with hopes that a miracle soon would be there. The users were nestled all snug in their beds, while visions of inquiries danced in their heads. When out in the machine room there arose such a clatter, I sprang from my desk to see what was the matter. And what to my wondering eyes should appear, but a super programmer (with a six-pack of beer). His resume glowed with experience so rare, he turned out great code with a bit-pusher’s flair. More rapid than eagles, his programs they came, and he cursed and muttered and called them by name. On Update! On Add! On Inquiry! On Delete! On Batch Jobs! On Closings! On Functions Complete!</p>	<p>His eyes were glassed over, fingers nimble and lean, from weekends and nights in front of a screen. A wink of his eye and a twitch of his head, soon gave me to know I had nothing to dread. He spoke not a word, but went straight to his work, turning specs into code; then turned with a jerk. And laying his finger upon the “ENTER” key, the system came up and worked perfectly. The updates updated; the deletes, they deleted, the inquiries inquired, the closings completed. He tested each whistle, and tested each bell, with nary a bomb, and all had gone well. The system was finished, the tests were concluded, the users’ last changes were even included. And the user exclaimed with snarl and a taunt, “It’s just what I asked for, but not what I want!” Anonymous</p>
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Figure 8.11: A parody of “The Night Before Christmas”. Parodies, especially, those with political intent are generally, protected from copyright restrictions relative to their source.

Digital Works and Copyright Reform Digital systems have greatly changed the nature of the copyright. Because copying digital objects is easier than copying traditional documents, modern technologies challenge many of the traditional assumptions on which copyright is based. Ultimately, there must be a balance between the creator’s need for protection and the client’s need for reasonable use, but it is unclear exactly where that balance point will be found. Should the rules that allow libraries to

distribute books for short periods of time apply to digital libraries that are available via the Internet? Similarly, the “first sale” principle allows the owner to sell a used book, but can you sell a used digital file?

Technical protection measures. Most importantly, with digital systems it is easier to make copies than it was with traditional media. The Digital Millennium Copyright Act (DMCA), the most recent update of U.S. copyright, has many controversial sections. It does not permit attempts to decrypt content and does not allow the publication of certain encryption and de-encryption algorithms. This makes the mere distribution of software that enables copyright infringement an illegal act. Anti-circumvention.

Duration of copyright.

There are many challenges in copyright law. Works for which the copyright holder cannot be located are known as orphan works. But, because the copyright holder cannot be located those works can never be republished. Fig. 8.12 shows some variations of copyright licenses that have been proposed by the Creative Commons project^[57] seeks to grant flexible copyright licenses that both protect the rights of the creator as well as promote open-source use.

Right	Description
Attribution	Whenever the work is used, always give the creator’s name
Non-commercial	This work can be copied but is not allowed to be sold.
No derivative works	This work cannot be incorporated into other works.
Share alike	This work can be distributed by others under a license identical to the original license.

Figure 8.12: A copyright holder may care about retaining some rights but not others. Some of the rights formalized by the Creative Commons^[57].

```
<cc:License rdf:about="http://creativecommons.org/licenses/example2" >
  <cc:permits rdf:resource="http://web.resource.org/cc/Reproduction" />
  <cc:permits rdf:resource="http://web.resource.org/cc/Distributio" />
  <cc:requires rdf:resource="http://web.resource.org/cc/Copyleft" />
</cc:License>
```

Figure 8.13: A fragment of the RDF code for a Creative Commons Attribution license^[56]. (check permission)

Trademarks

Trademarks uniquely identify a product or service. Trademarks prevent confusion with other similar products or services they are therefore, are essential to establishing a brand name. For the customer, the trademark provides evidence of a level of quality. Indeed, trademarks and the products they represent are often so tightly bound that it is difficult to think of one without the other. Phrases or graphics are the most common forms of trademarks, but it is also possible to trademark a musical jingle or even an animated character. A trademark must be distinctive and its unauthorized use must be controlled by the owner. In addition, trademarks are usually registered, which simply solidifies their ownership force both within and outside the product’s common market. One recent trademark controversy concerned whether or not the statement “You’ve got mail” could be trademarked by AOL. However, the line was judged not to qualify as a trademark because it is a common phrase in everyday use.

Trade Secrets

Trade secrets, such as the formula for Coca-Cola, are also intellectual property. They are not protected by federal laws but they may be protected in two other ways. First, individual state law often protects such information. Second, companies interested in protecting their trade secrets generally include a “non-disclosure requirement” in employee contracts. Any violation of that clause can be prosecuted and damages can be sought. There are exceptions to non-disclosure agreements in cases where an employee believes that their company is concealing information that may be damaging to the public health or interests. Such people can often apply for federal whistle-blower status, in which case they become

exempt from prosecution under their original employee contract. Branding (5.2.2). Industrial espionage (7.11.0).

Patents

Patents provide protection from the use of specific processes. Thus, they generally promote technological development while copyright often promotes artistic development. In return for the public disclosure of technical information about a device or process in the patent application, inventors are given a period of proprietary use for their creation. Fig. 8.14 illustrates the content of a patent. Under current U.S. law, patent coverage lasts for twenty years from the date of issue. Patents of a process may be granted for a “non-obvious extension” of a technology. Patent searches. Originally, an invention or process had to be “reduced to practice,” meaning it had to be a completely novel process. Historically, patents have been applied to protecting machines which complete processes. In many cases this leads to patent protection for the products of such processes such as complex pharmaceutical drug. However, that principle is difficult to apply to software and processes have been accepted in the U.S.; these are called “method patents”.

A successful patent can be very valuable; and some businesses are based primarily on intellectual property (8.13.3). In general, patents have proven to be a driver for a knowledge economy (8.13.2). In some ways, the intellectual property system has evolved in a way that actually inhibits innovation which was one of the main justifications for the legal framework in the first place. Patent trolls.



Figure 8.14: A close-up of Velcro which was awarded U.S. patent #2717437. (different picture)

Other U.S. Laws and Rights Relevant to Intellectual Property

Personality rights. In the U.S., some rights are typically granted by state rather than federal law. People have the right to control the right of personal information such as their name and photographs. However, most public figures, such as politicians, who exist in the public eye lose some expectation of being able to control their image or the use of their name in all but the most libelous of settings. On the other hand, in California — where Hollywood is located — restricts the use of images even after they died. Physical objects, even though they be “informational” in a sense, are considered ordinary property, and their owner can control their use. The Mona Lisa is owned by the Louvre Museum in Paris, and the museum is allowed to control copying its likeness (the Louvre does not allow photographs to be taken on its premises). Increasingly, intellectual property is coming to be regarded more like an ordinary property and is governed by contracts rather than by intellectual property laws. Patent searches in order to confirm that an idea is novel.

8.2.3. Non-U.S. Intellectual Property Laws

Intellectual property (IP) laws are usually associated with mature economies. Europe has IP laws which are similar to the US although they tend to include more compulsory licensing. Less common is a notion of fair use. In some countries, especially in Europe, intellectual property rights for creative works allow additional “moral rights” which go beyond the economic rights. These give the creator rights such as the right of attribution and permanent rights to control some aspects of the use of the work. For instance, a sculptor would be able to veto certain locations for the display of his/her work ^[11], or prevent it from being shown in certain contexts. Moral rights makes that case that intellectual property is an extension of the personality of its creator, and that as such, their right to their work supersedes that of copyright law. Some elements of moral rights are included in the Berne Convention

treaty, but only in the context that each signatory country is required to enact in their domestic laws the extent and specifics of an author's moral right to their own work. This leads each country to have specific rules regarding the moral rights of intellectual property. Joint ownership of IP. Tribal IP laws. Piracy.

8.2.4. Rights Management

Rights are an integral aspect of information resources. There are frameworks for describing and applying rights. Contract-like documents, such as "terms and conditions of use," are often attached to information resources as a disclaimer. These explain the proper and allowable uses of the product. Any contract, however, is only as good as the ability to enforce it. Mechanisms for ensuring that the stipulations of a user agreement are upheld are integral to managing the economics of information goods (8.13.3). Passive versus active DRM. Copyright crawler. Rights metadata and contracts. Rights management organizations: BRR, ASCAP, BMI.

Digital Rights Management Technologies

Many options are possible. In the case of music, you might buy the rights to play a given song 100 times, or alternatively you could buy the rights to play it for one year. Solutions such as this, however, have not proven to be effective. As a general solution, a formalism can help specify rights; indeed, there could be rights expression languages. Repositories (7.8.0).

Digital rights management systems have been designed and proposed to more effectively accomplish this task. These systems encode or encrypt particular functional allowances into the file that is to be managed. These affordances prevent the user's equipment (hardware and software) from executing certain tasks, such as copying or distributing the controlled file. The particular affordances that are encoded are intended to be selected by the copyright owner and any other involved parties (such as the creator's employer).

Rights Definition Language (RDL). DRM metadata needs to be associated with implementation details. It may be possible to create a system in which one copy is loaned from one machine to another. The file would simply be deactivated from the first machine and placed on the second machine, and when the loan is completed, the file would be deleted from the second machine and reactivated on the first.

Usage rights can also specify what parts of the content can be used and under what circumstances. Fig. 8.15 shows some categories defined by a DRM language and Fig. ?? gives an example of the DRM language. These technical languages allow the user to define the components to be managed and then to set terms and conditions for their use.

Rights	Example
Transfer of rights from one user to another	Product movement from one repository to another
Rights to reproduction	Print and display of content
Rights to derived products	Using the product for creation of new products
Rights to file management	Creation and restoration of reserved copies
Rights to system configuration	Software installation in repository

Figure 8.15: Categories of digital rights as defined by XrML^[73].

Not all creators are protective of their creations as others are. While copyright gives an author several distinct rights, the author may not care to claim all of them. A contract can define "acceptable use" policies. These policies detail for what, and to what extent, a copyrighted material may be used. A copyright holder might sell part of a document for a single use or for a specified time period.

Other Terms and Conditions for Use

Contractual requirements rather than societal policy. The owner of the rights to a work sets the terms and conditions for others' use of that work. These stipulations may be based on copyright licenses (8.2.2) or other property rights, or they may be based on organizational policies concerning security and privacy. Acceptable use policies are one example. These are the conditions under which a user

can legitimately use another person’s intellectual creation. They may include such things as privacy of archives or personal papers, source citation, and the use of watermarks. Digital objects and rights metadata (8.2.4). Right clearance center.

Redactions block the presentation of certain material for privacy or security reasons in a document. Redactions have been applied to paper documents with magic marker (Fig. 8.16), but they can also be controlled electronically with XML-based tags. This could be a part of a repository management system.

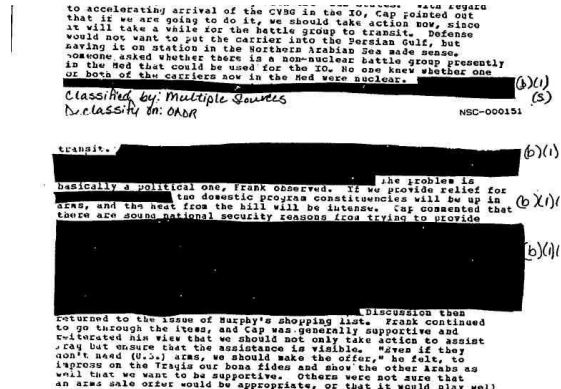


Figure 8.16: A paper document with redactions¹⁷. For electronic documents, redactions would be processed with XML and a Digital Rights Management system. (check permission)

8.2.5. Technologies for Rights Management

Secure Containers

Digital rights management systems require an environment in which the content is able to be controlled. Many DRMs require that a trusted system be implemented by requiring the use of specialized, common software and hardware. This would allow these trusted systems to restrict the use of a protected file only to systems where its proper and authorized use can be enforced, in effect creating a lock and key scenario in which a copyrighted file is transferred to a user in an encrypted (locked) state that requires a key to decrypt, and which simultaneously prevents unauthorized uses of the file.

Copy Identification: Digital Watermarks and Fingerprints

Digital watermarks and fingerprints encode a digital object in a way that identifies its source (Fig. 8.17). This can be helpful for copyright protection. “Watermarks” are indicators on a display that are apparent to an observer. The term watermark comes from the process of stamping paper with a unique symbol that is often used to certify its authenticity.



Figure 8.17: Picture with a digital watermark (from Mira.com, check permission). Note the “C” with a circle around it which appears to be stamped on the image indicating copy protection.

“Fingerprints” are hidden in digital representations. There are many ways to hide identifying information in an image. Codes may be hidden in the brightness or color signals. Fingerprints can be created

by spreading code throughout an image. In a typeset document image, the spaces between letters and lines may be used^[35] (Fig. 8.18). Fingerprints can even be hidden in wire-frame models used for computer-generated graphics (Fig. 8.19). Both watermarking and fingerprints can often be defeated by converting material across formats. For instance, the postscript file in Fig. 8.18 might be OCR'd and then reconstructed. Multimedia fingerprints.

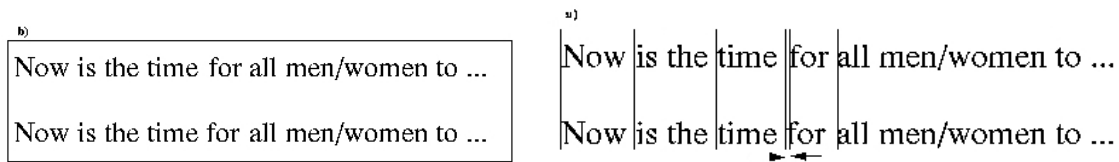


Figure 8.18: Using the spacing between letters to create a digital fingerprint. The word “for” has been intentionally shifted a small distance from its default position to mark this document^[35]. (check permission)



Figure 8.19: Watermarks can be hidden in shapes of polygons in a wire mesh for a 3-D synthetic object^[21]. (check permission)

Duplicate and Plagiarism Detection

It is easy to make copies of digital resources. In some cases, this is highly desirable, but the copies may also be unauthorized and it would be helpful to be able to automatically detect them. Detection of copies can go beyond exact word matching but also semantic similarity. This can be an indication of plagiarism (5.12.3). This could be useful for detection of copyright violations, for detection of plagiarism, or for reducing duplicates in search-engine returns^[39]. Near duplicates and imperfect matches are more difficult to determine. One strategy is to look for matches to distinctive fragments or authorship characteristics. Some strategies for approximate match are related to text retrieval. Multimedia duplicates. Fades into similarity matching by search engines (10.7.0).

8.3. Social Policy: Privacy, Anonymity, and Surveillance

8.3.1. Privacy

Modern technology and security concerns pose challenges to an individual’s right to privacy. A certain degree of privacy is something that most of us expect in our day-to-day lives. This expectation extends to some of the information about us. We often want to control access to that information, and prevent other people, companies, or governments from viewing it. Indeed, while it is not explicitly stated, some parts of the U.S. Constitution are interpreted as implying a right to privacy. The 4th Amendment of the U.S. Constitution protects against unreasonable search and seizure (Fig. 8.20). This amendment has been interpreted as granting a general protection of privacy.

But what exactly is privacy? People differ greatly in their conceptions of what constitutes privacy. Some people do not want even their address given out while others don’t seem to care. Therefore, an invasion of privacy may best be defined as any “unwanted intrusion”^[23] into a person’s life. This definition is filled with difficulties, however, and in the end, what constitutes privacy (or a breach of it) may be determined piecemeal, as instances arise.

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Figure 8.20: There is no right of privacy specified explicitly by the U.S. Constitution. The Fourth Amendment of The Bill of Rights of the U.S. Constitution, which places limits on search and seizure, has been interpreted as implying a “right of privacy”.

In some cases, privacy has more to do with an individual’s ability to control social impressions rather with access to specific data. Privacy norms rather than privacy laws.

Information Privacy

Privacy about the information resources one accesses. Electronic media introduces many challenges to privacy. There is privacy from commercial interests.

However, there needs to be a balance between citizen’s right to privacy, security, and the need for the free exchange of information. The government has the right to wiretap suspected criminals. This is a necessary and logical right, but it is regulated by requiring a court order to prevent abuse. Other such circumstances may include accessing private medical information in an emergency (9.9.3).

EU privacy rules.

Too much surveillance raises the possibility of totalitarianism. Big Brother.

Issue of privacy for information brokers who collect large amounts of personal data from web browsing and credit card transactions. Data brokers (9.6.0).

Privacy and willingness to disclose personal information. Privacy capitalism.

Location privacy.

Special protection for (a) personally identifiable information, (b) children and students, and (c) health information. On the other hand, there are times when in depth background checks are desirable.

Invasive technologies such as dragonflies (sec:infosecurity) and sensor networks. Balance with the need to beware of possible terrorist attacks. Privacy depends in part on information security (7.10.3).

It has been proposed that individuals could control their own personal information as a type of intellectual property. Types of harm due to violation of privacy. Costs of keeping privacy. Search warrants.

Many kinds of data. Modeling what a person will be doing. Location data. Behavioral extrapolation. Recommendation systems.

User expectations about privacy versus privacy itself. Privacy standards are changing. Perhaps because of the highly social nature of Internet interaction. Expectations about privacy differ greatly across cultures and even across individuals. In some social settings, there is little expectation of privacy. It is often said that in a small town, everybody knows everybody else’s business. Different standards across cultures and generations.

Corporations sharing information about individuals.

A corollary of freedom of information is that a person’s privacy is protected about what information a person accesses. In libraries, this is known as reading privacy. Records on the circulation at libraries and purchases at bookstores are, generally, protected. However, people are required to release a certain amount of information, for instance, when making applications to both the government and to compa-

nies. Privacy of reading habits. Library circulation records have traditionally been considered private. However, many social media applications record details of user behavior.

Data Mining and Personal Information

Massive amounts of information are collected about individuals. The data come from online behavior but also from activity in specific environments such as supermarkets or amusement parks (4.11.0).

Pattern-based surveillance.

Policies for Collection Availability of Personal Data

In contrast to physical privacy, informational privacy is harder to ensure. Information systems make the collection and distribution of information (particularly information stored in databases) faster and easier. Information technology facilitates the storage of and remote access to data. There can be many benefits of sharing data across databases. Data such as drivers' records, which used to be difficult to obtain, are often available online. Moreover, these data can easily be merged with other data, which can save time and money. Also, it allows security agencies to be more effective at monitoring suspicious people, including terrorists. This increase in monitoring ability creates challenges for privacy.

Personal information security. One of the dangers of the spread of personal information in information systems is "identity theft," which happens when one person poses as another person to spend their money or obtain lines of credit using their social security number. Fraud of this variety is rampant, and the costs to society are enormous. Privacy breach. Many records are corrupted. While privacy controls may not have changed, it will soon become necessary for them to be altered to reflect the new realities of the digital age. Fig. 8.21 lists several factors to be considered in data privacy. The principle of "individual participation" asserts that individuals should be able to view a profile of any personal information that is kept about that. The networking of information resources dramatically change the available of personal information. It is easy to find detailed information about an individual. Moreover, there can be a longevity of personal data that appear online. privacy and data aggregation. Credit score. Opt-in versus opt-out. Who controls dissemination of personal information. For instance, in the accuracy of personal information

Principle	Description
Collection Limitation	Data should be collected only by legal and fair means.
Data Quality	Data should be collected only for specific purposes
Purpose Specific	The purpose for which the data are collection should be clearly stated.
Use Limitation	Data should be used only for the purposes for which it was collected.
Security Safeguards	Once collected, personal data should be protected.
Openness	The existence and nature of a personal data set should be described openly.
Individual Participation	Individuals should be allowed to validate and challenge data that is held about them.
Accountability	Any organization controlling data should abide by these principles.

Figure 8.21: Data privacy rights for personal information in the OECD (adapted from^[66]).

Privacy laws. Conflict of privacy laws across national boundaries.

An active digital footprint is personal information that individuals release, wittingly or unwittingly, about themselves. Part of the threat to privacy is that data about an individual from many sources can be coordinated. While any one piece of data may not be problematic, the combination of many pieces can be very revealing [?].

Loss of privacy through data aggregation (9.6.0). Having vast amounts of personal information readily available online seems qualitatively different from public records which had been kept in different records centers.

Social media sites and privacy. Balance of privacy and social media. Exchange of private information in social media can be an act of trust. Difficulty of forgetting. Right to oblivion in archival materials

((sec:oblivion)). Social forgetfulness can be a good thing^[42].

Privacy and system security are closely interrelated. Cyber-crime may attempt to systematically attack personal records (5.3.4). Spyware is a term used to describe covert computer programs that install themselves on a user's computer without their explicit knowledge, and are designed to collect and report information about the user's computer habits. These programs can also gather personal information, ranging from names and addresses to credit card numbers.

Putting the User in Charge

Some internet initiatives are seeking to encourage companies to create fair and extensive privacy policies. Simply labeling a site with a clear, identifying mark indicating the site owner complies with privacy standards can help users identify trustworthy sites. “Seal programs,” such as those from the Better Business Bureau (BBB), provide non-governmental certification of sites that follow approved privacy practices.

Data vault.

Economics of privacy.

Beyond Information Privacy

Multimedia and data processing technologies are presenting additional challenges to privacy. Face recognition and privacy (anonymity). Cellphone cameras and privacy.

Privacy and personal identification tags.

Drones.

There are even new types of threats to privacy. The results of DNA test may suggest that a person has a predisposition to certain diseases (9.8.1). That person may want to keep this information confidential. They may want to ensure their genetic privacy (8.3.1).

Management of private information by a separate organization.

8.3.2. Anonymity

In its strict sense anonymity is the total concealment of an identity, without the possibility of discovery. The more common form of anonymity, can be defined as practical obscurity, which can be thought of as being lost in the crowd. This holds true for much of our personal information as well. Effectively, anonymity is one way to achieve a level of privacy. Anonymity is a double-edged sword, however. Although it helps to maintain the privacy of individuals, it can also prevent the identification of people committing illegal acts. Generally, actors in society need to be responsible for their actions.

“Anonymity is dead.” Generally, there is loss of anonymity.

In some cases, anonymity can lead to avoiding responsibility.

Balance between anonymity and free speech. Versus taking responsibility for ones claims. Pros and cons for anonymity of actions on the web. Anonymizer. Networking (-A.15.0). Onion routing (Fig. 8.22.)

Online anonymity and tracking IP addresses. Cyber-hate. Personal VPN tunnel.

8.3.3. Surveillance

Surveillance is intentional observation. It can be done with cameras, by tapping telephones, or monitoring Internet traffic. Furthermore, it is enhanced with technologies such as face recognition. Surveillance, like anonymity, has both benefits and disadvantages. Focused surveillance can certainly be helpful — for example, patients in a hospital can benefit from being monitored (Fig. ??) parents can watch a nanny minding their child, and surveillance in public places helps to both prevent and solve crimes. However, most people become uncomfortable when they know they are being watched. Indeed, surveillance undermines trust (5.2.3) and the internalization of personal responsibility.

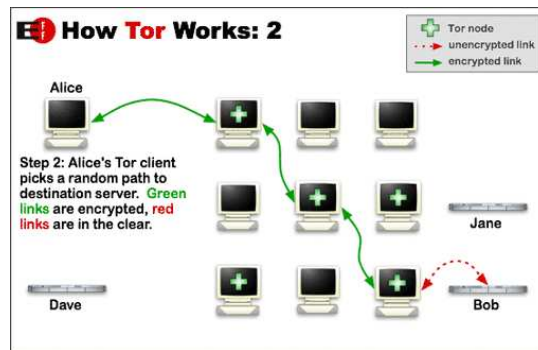


Figure 8.22: Onion routing^[76]. (check permission) (redraw)

The widespread use of surveillance is sometimes compared to the pan-opticon model of a prison (Fig. 8.23). Algorithmic surveillance for instance with automated face recognition. Surveillance of Web activity through tracking cookies. The Constitutional limits of surveillance are unclear. Implications of long-term focused surveillance versus transient surveillance.

Increasingly, information systems are being used to monitor the activities of people on the internet. While this has benefits, such as apprehending criminals, many people are worried that the increased ability of information systems to monitor the actions of ordinary citizens and to gather together personal information about them constitutes an effective loss of anonymity. Parental surveillance of children.

Algorithmic surveillance. Pattern and fraud detection. Data mining for surveillance.

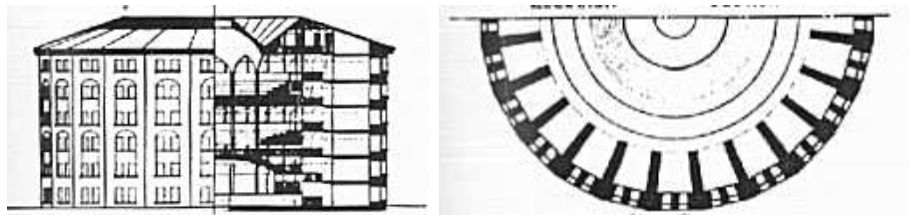


Figure 8.23: Bentham's 1791 drawing for a "pan-opticon"^[34]. This is a prison with a circular design that would allow for optimal surveillance of prisoners with a minimal number of guards. Some people believe that information systems may lead to an invasion of personal privacy that will make society like a pan-opticon in which the activities of large numbers of people are monitored by a small number of observers. (check permission)

Some applications on the Web allow for identification and detailed tracking of individuals. IP addresses can be tracked and characteristic usage patterns can be monitored. Cookies carry identifying information about the users. Many companies use this information to develop marketing schemes that either directly target users via advertisements, or entire demographics via products and services. Massive amounts of click data and cookies. Data-driven marketing (8.12.5). Re-targeting. Predictions and profiles of individuals. Patterns of behavior. Descriptions of how to present ads. Taxonomies for ads. Auction of personal information.

Green Wall. Co-opting social media by the government.

There are many benefits to knowing where a person or object is located. It helps applications from cellphone call routing to supply chain management (8.12.1). Surveillance can help to protect society from terrorists. Monitoring patients in a hospital. Parents checking on children's activities online. However, detailed tracking of location for instance location-based services also threaten anonymity. Unique types of targeted advertising with location tracking. These issues are amplified by social location services Such as those which identify when you are in proximity to your friends. Video and surveillance (11.6.1). Location-based question answering. Problem of 3-D location. For instance, where a person is located in an office building. Anonymity can facilitate illegal and terrorist activities. Anonymity and personal

histories. Right to oblivion (8.3.1).



Figure 8.24: Non-specific video surveillance.



Figure 8.25: Surveillance of hospital patients with sensors and monitors for their own safety. (check permission)

8.3.4. Personal Identification

To flip anonymity around, there are times when we need to positively identify a person. How does a person or society do that? What credentials uniquely identify an individual as the person they are claiming to be? For obvious reasons, it is necessary that this identification process be done with a high degree of accuracy and confidence.

Establishing identity with biometrics (8.3.4). Each of these has different identification effectiveness — hair color is not as an unique identifier than is a fingerprint, for example. Photo identification is a type of biometrics. A second type of identification consists of knowledge that only a single individual may possess. This form of ID is commonly used for automated verification processes, and includes PIN numbers and passwords. A third form of identification is items uniquely associated with an individual. In the United States, the most common form of this type of ID is a social security card/number. It is the mere possession of an item that confers identity. Social security cards and numbers are easily lost or stolen, and when used for verification purposes, need to be confirmed by another means. However, this is often not the case. Identity cards based on biometrics can be useful when there other forms of identification are not feasible. This is being done a large scale in India.

Face recognition can be applied in public spaces. Surveillance linked to face recognition (8.3.4). But, this has substantial implications for privacy. This can be both useful and intrusive even if the individual is not identified specifically.

An individual's privacy can be adversely affected by many identification processes. Because so many services require a person's social security number, for example, that identifier is easily obtained by others. Once it is obtained, it can then be used to access very sensitive information and authorize many different transactions. Beyond the technological details, there is an ongoing debate about the social implications of using biometric identity cards. The related concepts of authentication and authorization are discussed in terms of information security and assurance (7.10.3).

8.4. Government and Social Decisions

8.4.1. Government

Government is an institution for making and implementing social decisions. Government may be thought of as a social contract between citizens to implement policies which are in the common good.

It is a set of institutions that has been set up to provide a framework for social interaction. The government encompasses an enormous range of activities, and it is information intensive. Government provides a framework for dispute resolution. Government archives and records (7.4.1).

Open government and asking for suggestions from the public. Making government data sets available to the public. Government as a publisher of information. Maintaining the confidence of the public in the quality of government information. But it is rare that the details of are fully presented such as full disclosure of government contracts and grants.

There are many ideas about the role of government. This is the basis of political science. ^[30] There are different perspectives on the role of government. In one view, government as an umpire in a sports match. An alternative view government promoting fairness and justice. Beyond the theory of government, there are practicalities in everyday governance and crises such as natural disasters, economic dislocation, and foreign threats. Social contract. Government and governance.

We have already encountered organizational bureaucracies (7.3.4). Government bureaucracy.

Government setting economic and industrial policy.

8.4.2. Government Information and Services

The government provides many different information services. From town councils through the federal government, citizens rely upon their government to provide services and information. Each one of these services, from driving licensing to economic statistics and monetary policy, involve the collection and management of vast amounts of information. The government's role in collecting and managing information. Open data for government (9.6.4). Public information. Government archives (7.5.1). The record-keeping tasks alone, such as birth, marriage, and death records, constitute an enormous amount of information that must be managed. Weather service. Improving the operations of government with eGovernment.

Disclosure and public information. Open government. Community information services. Civic data (8.1.1).

IT Governance. Government and information policy. Privacy. Risk Management. Compliance. Regulation.

Public Administration

There are a lot of databases in the public sector. Government data collection and storage. This includes datasets (9.6.0) such as census data, labor statistics, tax records, environmental data sets, and scientific data sets. These have many challenges ranging from political issues confounding their management to special problems of procurement of infrastructure because of budgeting for government information systems^[53]. Transparency and FOIA. A totally transparent government would publish detailed budgets and contracts. Social information institutions that minimize corruption.

8.4.3. Social Decision Making

All the many aspects about how society works are social decisions. Social groups need procedures for reaching decisions. Sometimes these decisions are made by dictators, sometimes by representatives, and sometimes by democracy. Decisions made by small groups. Simulation could be used as a tool to support these decision aids much as it is used in DSS systems. However, simulations involving social policies are notoriously unreliable. Are organizations and governments rational? Public choice theory ^[40] asserts that governments and organizations often serve the personal goals of their leaders^[26].

There are many strategies and procedures for decision making. Decision making in small groups (5.6.0). A social decision process must have at least implicit consent of the group for whom the decisions are being made. Often, there are too many voices to be heard in regard to issues that are too complex for simple discussion to be effective.

Information and Democracy

Democracy places the political, and hence, social, decisions in the hands of individual citizens. Democracy is most often associated with voting but it actually requires a balance of among many social factors such as freedom of expression (8.1.1) and stable social institutions. Because of this, each citizen needs to have rich information and the ability to analyze it. The possession of information is, of course, only part of the battle — citizens must also be educated to think critically about the information they have. Social media and coordinated social action. Personal democracy. One of the values of democracy is that it gets citizens to participate in the government.

Democracy also has many challenges. For instance, the votes of a simple majority and not protecting minority rights. A republic or representative democracy (in which the power of the citizenry is delegated to elected representatives), can be seen as a way to avoid the “rule of the mob”; the seasoned and informed temperaments of politicians can put the brakes on the wild swings of public zeal. Because citizens are not fully informed on many issues, and because some issues are extremely complicated (tax laws, trade negotiations and tariffs, etc.), direct citizen voting may not produce wise results in many instances. People can be swayed by short-term emotional reactions. This can be aggravated by the time-honored technique for introducing confusion among decision makers by providing misinformation. There can also be a “tyranny of the majority” in which the right of small, but none-the-less significant groups are entirely dominated by the majority.

Public discussions about complex issues often lose the subtleties. Some participants gloss the issues to score points. This requires knowledge and information, mainly about whether the views and opinions of the proposed representative are similar to those of the person voting for them. An uninformed, or misinformed, citizenry is, thus, less able to select representatives who reflect their intentions^[60]. Pundits and prediction accuracy.

What do people accept as factual? How do they judge reliable sources.

News versus advocacy (8.13.7).

Social media and democracy movements.

Civil Debate in Adversarial Discourse To provide considered discussion of positions, discussions should be carefully considered. Such discussions are characterized by focus on the issue and collegial, non-threatening discussions.

Avoid direct personal attacks on opponents in a discussion, that is ad hominem comments and insults. These introduce emotional responses which may cloud the reactions of the participants and the audience.

Protest and dissent.

Public Discourse and Civic Media

Newspapers and other mass media can facilitate the free flow of ideas (8.13.7). Though, they may also do this while expressing strong political opinions. This is even more true of interactive media such as talk radio and blogs (10.11.2). Blogs and citizen journalism (8.13.7). Discourse (6.3.2). Effective democracy depends an educated, thoughtful, and informed citizenry. Deliberative democracy. Social decisions occur most effectively with transparency, and informed, open debate^[7]. Political activism (5.1.4).

Ideally, political discourse would be respectful and restrained. This is often different from rowdy political conventions and gamesmanship of blogs. Freedom of expression and speech (8.1.0) are essential for an informed citizenry. Such a variety of channels of information encourages individuals to form their own opinions and make their own decisions. Freedom of information also helps expose political corruption and create a more solid government. For this reason, it is necessary in a democracy to have a large amount of government and institutional transparency. That is clarity of processed, public access to relevant information, and recording decisions.

Managing public opinion. Attitude change (4.5.2). Buzz analytics (10.11.2). By framing a public the debate the categories and issues are outlined. Biasing social discourse by creating a narrative and focusing on only one aspect. Indeed, there may be intentional obfuscation and sewing confusion.

Ideally, citizens would be critical thinkers and immune to attempts to bias their opinions. Collaborative analysis tools can help support deliberative democracy. Discussion of policy issues^[49]. Argumentation systems (6.3.5). Social Decision Support Systems^[77] (Fig. 8.26). Debate graphs. Blogging as social debate. Blogging as catharsis.

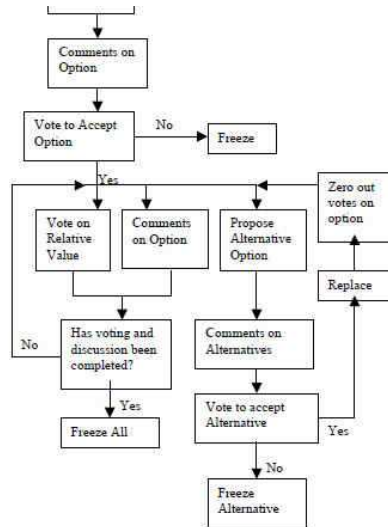


Figure 8.26: Social Decision Support System^[77] can be systematic and similar to legislative deliberation. Potentially, these incorporate argumentation systems with decision support systems. (redraw) (check permission)

Confidential discussions in running government or any organization versus the need for transparency.

Claiming the legitimacy of scientific research for a political agenda.

Political Protests

Political protests.

Social media and political change. Political danger of synchronized groups.

Polling

Assessing public opinion for polling and surveys. Polling as a type of data analysis and analytics. Attitudes and opinions (4.5.2). Tracking public opinion with sentiment analysis (10.11.2). However, polls, can be greatly affected by the way questions are asked.

Big data analytics.

Public Opinion

Awareness and issues. Journalism (8.13.7) and blogs. Buzz analysis (10.11.2). Personal opinions (4.5.2). Seeking logical arguments with which you disagree And then developing a basis for the differences of opinion.

In a prediction market, people can buy options for predictions about future events. Prediction market (Fig. 8.28). but these can, sometimes be manipulated. Prediction market as a matter of public opinion.

There is a considerable incentive for politicians to manipulating public opinion and there are many ways in which this is done (5.3.3). Framing the debate. Creating an impression of crisis. Flooding media



Figure 8.27: Incorrect polling in the 1948 U.S. presidential election predicted that Dewey would beat Truman. This belief was so strong that one newspaper printed the incorrect result. (check permission)



Figure 8.28: In a prediction market people can buy options predicting future events.

channels (e.g., search engines) so that contrarian opinions can't get through. Demagoguery Distorting information. Spin. Providing alternative explanations. Focus on only one aspect of a complex system

Making Social Decisions

Many social decisions are complex specialized. Representative government has the effect of slowing down the processes of government and legislation with debate and placing decision-making power in the hands of people with experience in the process. The use of a representative form of democracy is believed to be a buffer against the emotions of the people and the rule of the mob.

Distributed decision making. Transparency and how those decisions are made and in the responses to them. Of course, there are many forces opposed to transparency. Corruption and the distortion of public opinion. Transparency for institutional decisions consists of citizens being aware of the processes by which decisions are made and also be having the deliberations about specific decisions be open. News provides information about government policies and events and it can be a watchdog examining the actions of government and public figures for hypocrisy, corruption, and wrongdoing. The Internet engages citizens in ways that traditional media cannot, by allowing them to actually participate in Web discussions on civic issues, for example. This grassroots power can lead to an emergent groundswell of public opinion through online communities (5.8.2) and popular websites. However, that same grassroots power can also be overrun. There can be a value in reputation of news organizations for a balanced presentation of the news though even that is increasingly rare.

Political campaigns. Part information, part persuasion.

Voting

Voting is a formal mechanism for reaching social decisions. The most obvious, and important, form of civic participation is voting. Direct democracy could maximize voter confidence in elections and issues, which as we have noted, often serves to increase citizen participation and interest in the political issues. We discuss more about voting in (A.9.5); for instance, the problems of using a plurality rule when there are more than two candidates. Secret ballots help to minimize the possibility of retaliation for voters. Collecting electronic votes is related to electronic records management. Secret ballot related to privacy.

As noted above, information is vital to effective social decisions. An informed electorate.

Transparency in the election process.

Electronic voting systems have been proposed. These have many advantages but they may have many possible problems. The anonymity of voters must be maintained while also preventing voting fraud adding votes. Information systems, with their support for rapid communication could allow for a more direct democracy, which allows citizens to vote directly on issues. Security (7.10.3) and trustworthy results. Open source software for electronic voting machines can be reviewed to ensure that there is a very small possibility for fraud.

Multi-Party Democracy

Voters tend to align into political parties. Computation and argumentative nature of the proceedings.

In combination with freedom of speech, adversarial political opinions tend to illuminate aspects of social issues. Potentially, these can highlight issues.

Political parties usually provide a relatively stable coalition which form around clusters of significant issues.

Downside of multi-party democracy.

Political parties are often non-deliberative and often rely on brash advertising. Persuasive mechanisms of all sorts. Social media use for informing, persuading the voters.

This carries over into the mechanism of checks-and-balances in government. Effects of Internet fund raising in political campaigns. Micro-targeting of political messages like other targeted advertisements.

8.4.4. Polling, Campaign Marketing, and Voting Analytics

Big data for democracy.

Modeling the electorate.

Computational political science.

8.5. Policy, Law, and Regulation

We have seen the norms and rules are fundamental to social interaction. One of the main functions of government is to develop rules for society to function. Law is the result of implementation. Policies are statements of principle; laws are rules created to implement policies, and regulations execute the laws (Fig. 8.29). Law has is enforced with consequences. All of these pieces need to work together.

Policy analysis and development. Developing a model of how different components affect the topics to which the policy applies.

Level	Example(s)
Policy	Copyright should be established in order encourage people to be creative.
Law	Give an author copyright for a certain number of years.
Regulation	Details of forms which need to be completed. Develop appeal procedures.

Figure 8.29: Policy sets broad principles, law establishes rules, and regulations describe implementation procedures.

Network continuity.

Ethics and policy.

8.5.1. From Policy to Law

Policy

A policy is a statement of principle it emphasizes a desired condition. Policy is built on values and goals. We have also considered organizational policy (8.11.1). Some social policy is implements in laws. It outlines the strategy or tact that a government or organization is going to take about a particular

matter. A good policy has several basic elements: it should be specific, it should be unambiguous, and it should be technology-neutral (because technology is normally an implementation detail). Also, policies should be well conceived; that is, they should have their intended impact [?], and not negative effects that careful analysis could have foreseen. Few policies are so carefully conceived and many idealistic policies are impractical to implement.

Think tanks. Epistemic communities. Multi-disciplinary perspectives which often deal with policy issues.

Legal Frameworks

In constitutional systems, such as the U.S., the constitution sets out the basic framework of society. Parliamentary system such as in the Commonwealth, do not have such a strict framework. A Constitution sets out the rules for the allocation of political power. It describes the structure of the government and provides checks and balances among the parts to keep any one power source from dominating the others. It is a sort of meta-law. Within that framework, laws and regulations are formal rules for creating a structure for creating a civil society. They are the tools by which policy is implemented. Parliamentary systems generally have a similar interpretation of constitutional conflicts. However, the Parliament is the final authority. Either way the meta-legal system must support the basic needs of a complex society. For instance, the rights of minorities should be protected.

A law, on the other hand, is a statement created and ratified by elected officials or legislators, and which outlines a code of conduct or a prohibited behavior. Laws should encourage a stable social consensus for how society could be run. It is possible to make a lot of rules to handle many different situations. Good laws should be easy to understand, easy to follow, and difficult to circumvent. Reasonable person test.

While laws are abstract and often imperfect there's a great social value in having people follow laws. People must be willing to follow laws and people who want to follow laws facilitates a stable environment. Laws and norms provide a structure for society. Transparency of laws often comes from simplicity. Ideally, laws should be clear and effective. That is, they should be clear, easy to follow, not overly broad, and minimize side effects. There is a cost to laws and regulations. Formalization of norms (5.3.1).

Common Law and Case Law

In the U.S. and English systems, there is a distinction between case law, or common law, and civil law. Statutes are the laws as passed by the legislature. Some other laws are so integral to the working of society that they are accepted as "common law". Common law is generally based on precedent which is the accumulation of effective action from court decisions. Laws do not exist in isolation. Rather, it's helpful to think about the entire legal framework. Consider the combination and interaction of many laws. Case law reasons from previous cases by analogy. Case law citations form a network which is similar to Networks of scholarly citations (??)(Fig. 8.31). Similarly, this would be true of interconnected patents.

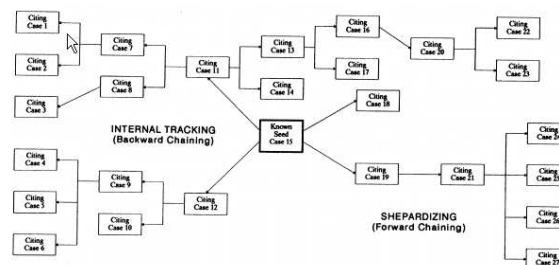


Figure 8.30: Case law precedents as a citation network (from [?]). Legal informatics. (redraw)

Statutes leave out many details. These details are then often specified in regulations. Though sometimes the laws themselves also implements regulations. The details of the procedures for applying for copyright

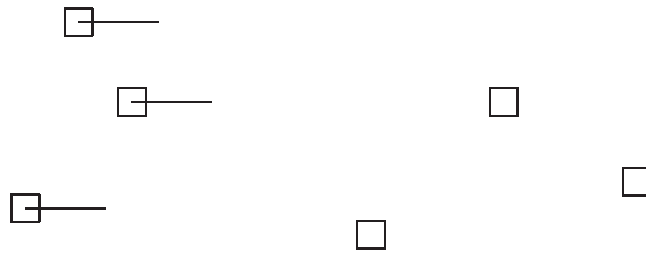


Figure 8.31: Case law precedents as a citation network (from [?]). (redraw)

in the U.S. are specified by regulations from the Copyright Office.

Food labeling. Banks have extensive regulations.

Some regulations promote transparency and disclosure of information are often desirable but even those need to be well crafted. On one hand, regulations can provide orderly management of activities, but they may also be overly restrictive. Regulations require compliance by the entity being regulated. Regulation as very precise rules but these sometimes have unanticipated consequences. Regulations do not carry the full weight of the law, and may be a clarification of the law, or guidelines for a law's application.

Build closed, controlled systems. However, people often go outside the law. Laws should discourage people from doing that.

8.5.2. Developing Effective Policy, Laws, and Regulations

There are a number of hazards for policies, laws, and regulations. Laws and regulations are often aimed at one problem but have unintended consequences affecting an entirely different area. Thus, a law should be based on an analysis of a wide variety of scenarios where it may have an impact. A law or regulation may be unenforceable simply because it is too broadly drawn. Or, it may be ambiguous and lead to misunderstanding. Jurisprudence is the theory of the law; there are two main threads natural and normative principles. We saw this distinction earlier with respect to copyright (8.2.2). Laws as behavioral requirements. Law as instructions.

Laws often reflect cultural and social norms but they may also be the result of political and economic pressures. Laws often, but don't always, reflect policy. Law should be internally consistent.

Laws must change as society changes; of course, this is the role of legislature. Electronic distribution allows more people to view government documents, and provide them with more information with which to make informed decisions. A record of the legislation before Congress, for example, would allow citizens to hold their representatives to account and petition them to reflect the will of their constituency^[58] (Fig. 8.32). The legislative history is the record of the debates about the law in the legislature. That may be helpful to understand the intent of the legislature in creating the law. Hansard.



Figure 8.32: The Thomas system is a repository of legislation pending in the U.S. Congress.

Creating policy and laws requires reasoning about intended effects, enforceability, and likely judicial opinions. Information systems can provide greater transparency and public access to the records

(7.4.1) and the rationales that are being used in policy creation, and help to provide more detailed analysis. Version management tools (-A.5.8) applied to laws. However, the existing approach is not amenable to that.

Effective regulations, while aimed at eliminating some undesirable behavior, need to be able to be followed. That is, the regulations cannot be so restrictive as to inhibit growth and innovation within an industry. This is particularly apparent for information sciences. Regulation needs to preserve individual rights and privacy, but cannot throttle the development and marketing of new technology. Policy, laws, and regulations need to be easy to understand and to be enforced. Too many laws or regulations may make people ignore them and may be difficult to enforce. Furthermore, almost from the time they are created, policies, laws, and regulations are likely to be co-opted, modified, and challenged.

8.5.3. Compliance and Enforcement of Laws and Regulations

Enforcing laws with penalties such as social sanctions such as fines and jail. Furthermore, the enforcement of laws and regulations is necessarily done by human beings, that is by the police and regulatory agencies. Thus, there are limitations to what we can expect from them. Expanded regulation can dampen industry, and wind up destroying the thing that the laws were created to protect.

Punishment and sanctions. The wording of a law is not important if it is not enforced. Compliance and enforcement are the main factors that contribute to a policy's efficacy, particularly for regulations aimed at information and information systems. The much-lauded benefit of modern information systems is that they open up the world to anyone with a computer. This, however, has the corollary effect of decentralizing and depersonalizing illegal activity, which makes enforcement of any legislation difficult. Developments in information technology will be needed to establish a balance between necessary control and desired freedom. A law or rule is only as good as its compliance — it does little good to create a policy with which people cannot comply, or which cannot be enforced. Moral agency.

8.5.4. Legal System and Informatics

Ecology of legal concepts. We would hope that the law is clear, and logical. Indeed, the law is a formal system, perhaps in some cases, it can be modeled with exact definitions. However, there is enough ambiguity that it is difficult to do that. Purely, legal constructs such as ownership. While this is an ideal, it can be difficult to model constructs such as the “reasonable person” test (i.e., what would a “reasonable person”) do in a given situation. Ambiguity of laws (example). From legal informatics to law enforcement. Preservation of court records and trial transcripts.

Example

Figure 8.33: Ambiguity of law.

Trials and Hearings

Most trials are about establishing the facts of a case – what really happened; however, a few require interpretation of the law. Court hearings and other proceedings should maximize the chance the truth in a case will be found. This can be accomplished, in part, by following standard procedures. That is by due process. The proceedings of a trial need to be orderly. This can be threatened by too much public speculation. In some cases, a judge may prevent public disclosure with gag orders. This includes a fair judge and suitable treatment of evidence. Independent judiciary.

Due process means that previously specified procedures are followed.

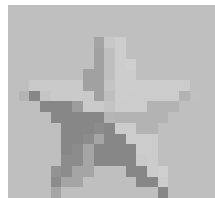


Figure 8.34: Trial.

Legal Evidence

We have encountered the notion of evidence several times. There are specific rules for what constitutes appropriate evidence in a trial. Physical evidence in hearings needs to follow a chain of custody so that it can be certified not to have been tampered with, much like the precautions we have discussed for electronic records. “Rules of evidence” Circumstantial evidence. Testimony. Hearsay evidence is not allowed. Criminal forensics. Records and evidence (7.4.2). Wiretaps.

A trial begins with discovery which is the sharing evidence between both parties. In very large cases, this may amount to several million documents and document management systems are required. Sometimes internal organizational information is well organized but in many other cases it poorly organized. ((sec:internalorginfo)). For electronic materials, this becomes electronic discovery or eDiscovery. This is a type of text data mining. This is a challenge because a great deal of content must be reconstructed. Digital forensics (7.5.5).

Legal Argumentation and Searching

Many aspects of legal proceedings which are information intensive. First, the law needs to be specified. Second, in case law, the law depends heavily on context, and related cases must be identified. Understand the implications of previous cases. Many laws are abstract. That is, they apply general principles rather than cover specific cases. However, they have to be applied to specific cases. Difficulty of searching legal digests. Often, it is not clear what the law requires. Furthermore, it is important for lawyers to identify as many of the relevant cases as possible. High-recall search. Fact similarity. Legal searching^{[29][37]}. Adapting the legal system to managing large amounts of information. Legal argument can involve classification.

Define the law. Apply the law. Legal reasoning such as determining whether a given case is covered by a given statute. Laws are generally categorical, but many arguments are quantitative. This often leads to the slippery slope. Laws are highly structured. An argumentation system (Fig. 8.36) (6.3.5). can also be used for students to understand how legal arguments are constructed. Legal argumentation^[65] (Fig. 8.35).

Whoever ...

- 2) intentionally accesses a computer without authorization or exceeds authorized access, and thereby obtains
 - A. information contained in a financial record of a financial institution, or of a card issuer as defined in section 1602 (n) of title 15, or contained in a file of a consumer reporting agency on a consumer, as such terms are defined in the Fair Credit Reporting Act (15 U.S.C. 1681 et seq.);
 - B. information from any department or agency of the United States; or
 - C. information from any protected computer if the conduct involved an interstate or foreign communication;

Figure 8.35: Fragment of TITLE 18, PART I, CHAPTER 47, US Code. Fraud and related activity in connection with computers.

Styles of written argument versus oral argument. Dynamic argument (e.g., analogy) versus absolute standards.

Attorney-client privilege.

8.6. Government Structure and Services

Previous section described government as rules. This section described government as workflow and services.

8.6.1. Civic Data

Many data sets for civic functions. Collectively, these are termed civic data. These include polling and voting, economic data, land use, census data. Community infrastructure is a complex maze. Some of these are managed by the government while others such as utilities may be managed by utilities.

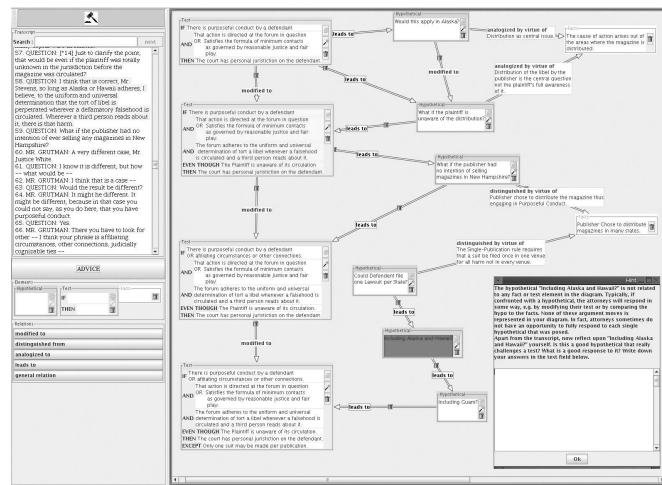


Figure 8.36: Argumentation graphing tool for students to analyze the discourse elements for Supreme Court arguments^[28]. (check permission)

Just as interoperability of business records has proven important (7.4.4), interoperability of data sets is increasingly important.

Smart cities. Sensors (-A.19.0). Active environments (11.9.5).

8.6.2. Disaster Planning, Crisis Management, and Emergency Response

Information is particularly important in a crisis such as occurs after earthquakes, hurricanes, and terrorist attacks. Using information under pressure with high stakes.

Highly adversarial situations (7.11.0). Crisis management (8.6.4). The ability to quickly collect and analyze information can be particularly helpful for reacting in a crisis. Moreover, that information often needs to be rapidly disseminated to the public. Increasingly, that it one of the roles of social media.

8.6.3. Disaster Planning and Preparedness

Risk management. Vital records. Communication. Disaster planning.

8.6.4. Crisis Management and Emergency Response

Information systems that are integrated across agencies could allow for a coordinated response to an emergency that would far surpass in speed and efficiency the procedures that are currently in place. Emergency personnel could be dispatched to the most appropriate areas, available resources could be tabulated and dispersed, and evacuation plans could be coordinated between agencies much more fluidly using information systems. These types of disaster relief and crisis management information systems could provide clear information using simplified interfaces and syntax to emergency personnel to compensate for the distraction of the crisis itself as it reduces a responder's ability to retrieve information due to an increased cognitive load (4.3.3). Emergency preparedness and response. Adversarial situations (7.11.0). Difficulty of communication in a crisis can be difficult due to network congestion.

Evacuation. Hurricanes, floods, subways, stadia, and fires. What evacuation routes will people pick in a crisis. Figure 8.37. Application of social modeling (9.5.1)with agents simulations. Crowd dynamics (5.4.3).

Social media for individuals to communicate with each other and get local updates. Collaboration in crisis management. Collaboration in crisis situations such triage. Collaboration during emergencies on space station. Team schema.



Figure 8.37: Agent-based models for evacuation of Venice (from [?]).



Figure 8.38: Crisis management and emergency response; especially in real time. (check permission)

8.6.5. Citizen Information in a Crisis

Keeping Citizens Informed

Ad hoc communities of those affected.

Informing citizens what's going on.

Disaster health information. Dissemination of information from government and officials.

Citizen Information Behavior during a Crisis

Tweets during a crisis [?]. Re-tweets as information diffusion.

Crisis information needs.

“Situational Small-World” [?]. Traditional community boundaries shift. Ad hoc online communities spring up.

Person finder following earthquake.



Figure 8.39: Google people finder site following the 2011 Japanese earthquake and tsunami. (check permission)

8.7. Economics

We have look at social structure, now let us consider economic activity. Economics deals with the production, exchange, and allocation of resources among members of that society. The economy results from aggregate decisions made by millions of individuals. The production and exchange of goods is a fundamental human activity. The number of resources is limited.

Information is essential for economic activities because it helps people value what they are buying. Economics and minimizing uncertainty.

Ongoing interaction of politics with economics. Laws related to economics to structure the economy. At the societal level, we are developing a “knowledge economy”. In such a framework, services apply knowledge to provide a benefit.

8.7.1. Economic Systems

There are many possible economic systems. Relative separation of political system and economic system. Most modern societies are based on some combination of economic constructs such as property, markets, and capital. Yet, modern society also interacts with other types of exchange between people and groups and those interactions need to be better understood.

Wealth. Cumulative wealth.

Economics is not gambling, but analysis of risks and opportunities which people find useful. An effective economy can improve living standards for its citizens. Ideally they should facilitate the efficient distribution of scarce resources. That is, in terms of game theory (3.4.1) it can produce win-win solutions. One of the goals of economic policies can be to find such win-win scenarios. For instance, incentives can be structured to get people to efficiently provide good and services which other people find useful.

Economic systems can be largely self-organizing but they are also complex systems and can easily be perturbed. Economic activity can be explained based on psychological principles. We have already discussed cognition and choice (4.3.4). decision making processes (3.4.1). While people will pick an alternative that provides the cost-benefit tradeoff. Ideally, transactions would be win-win interactions for both side and the cumulation of many such transactions would benefit all participants in a market.

8.7.2. Exchange Systems and Markets

Markets

The study of economics examines the effects of different ways of organizing economic activity. One of the key concepts is that of a market. People and companies often produce goods and services beyond what they need for their own use. They can then exchange those to other people for other necessary goods. A market brings buyers and sellers together to enable the exchange of goods and services. It should facilitate matching of supply and demand while using resources efficiently. By comparison, economics within a family. How companies fill market niches – industrial organization.

A market is efficient to the extent that it allows both the buyer and seller to optimize goals as much as possible. Market-based economies may be distinguished from “command economies,” in which the allocation of goods and resources is at the direction of the government.

An efficient markets generally make goods available at lower costs. Markets provide ways to optimize the distribution of resources. They are based on people being able to project their resources (supply) and needs (demand). Thus, information is essential for efficient markets.

Procedures which maintain the integrity of the markets. Market makers. Orderly market. Regulations can facilitate an orderly market but some types of regulations can impede it. Competition (anti-trust laws)laws attempt to establish a fair market. For instance, they block collusion by participants in the market.

Industrial policy of governments.

Prices, Supply, and Demand

In economic theory, price is equilibrium point of supply and demand. Price is the metric around which the economic system organizes itself. On average, prices will tend to be determined by supply and demand. In the autumn when a big crop of apples is harvested, the price of apples normally drops. If small fluctuations in a good's price produce relatively large fluctuations in the demand for that good, the demand for that good is said to be "elastic"; if changes in price do not affect demand, a good is said to be inelastic. Similarly, the supply of a good can also be categorized as elastic or inelastic, depending on the market's ability to increase the supply of a good within a fixed period of time. Elastic supplies can be increased to meet increased demand (such as might be the case with auto assembly), while inelastic supplies cannot. Managing risk of price changes with futures contracts.

Fig. 8.40 shows supply and demand curves. As suggested by these curves, when the price is high, the supply will tend to increase over time. As the price drops, demand increases. The price should be the point at which the two curves cross. However, prices are actually determined by expectations of future supply and demand. Because the future is always difficult to predict, the prices may not match the actual supply and demand. That can lead to distortions and bubbles.

Because some goods are not consumed immediately after purchase, the price for them is set by the expectation of future value. If we expect that prices will be rising we might purchase early. If we expect that prices will be falling, we might delay a purchase. Either way, information and prediction models are helpful.

The law of supply and demand is not absolute. For instance, sellers may take advantage of unwary buyers. But in the long run, the prices will tend to match the supply. Information systems can set prices adaptively. Moreover, eCommerce sites may use user history to set prices for each individual. Furthermore, prices may be adjusted based on knowledge of characteristics of the individual buyer. Dynamic pricing.

Competition keeps prices down by allowing consumers to directly compare prices and products. This also forces supplies to be efficient and to develop new features. Transparent information about prices allows consumers to make better comparisons and price comparison web sites coupled with social media reviews highlight comparisons.

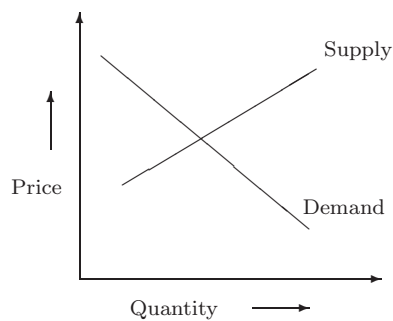


Figure 8.40: In an efficient market, the price will be the point where the supply matches the demand. (redraw)

Increasingly prices are personalized.

Economic Factors Beyond the Market

Goods may have benefits or costs beyond those directly reflected in the price. These often have implications for the broader society and are called externalities. Externalities are factors outside of the market which may affect it. One type of externality which is relevant to networking is the number of people connected by that network. If there were just two telephones in the world, or two computers on a network, each of these machines would be virtually useless. The greater the number of participants in a network, the greater the value of that network (Fig. 8.43). This has come to be known as Metcalfe's

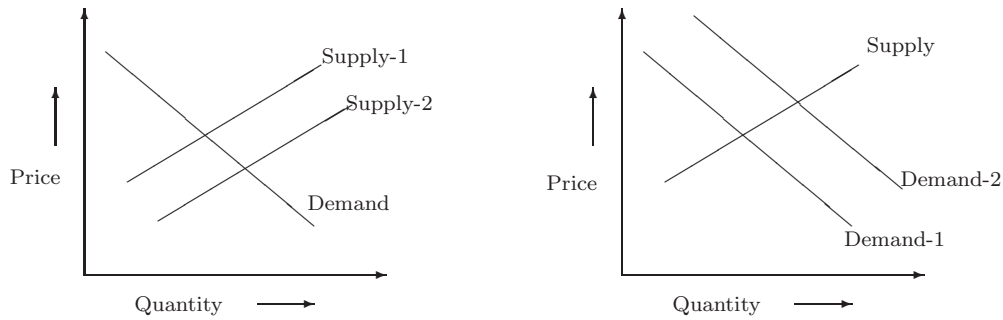


Figure 8.41: If there is a fundamental change in the supply (e.g., a new process is invented to make it easier to produce more of the product), the whole supply curve will shift (left). Similarly, a change in the demand, say as the result of marketing, will shift the price up (right). (smaller font)

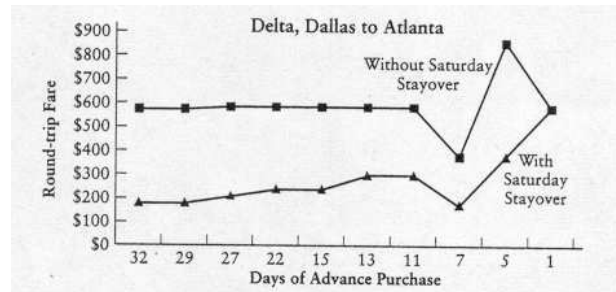


Figure 8.42: Pricing data for airline seats on a flight from Dallas to Atlanta from the 1990s^[50]. More recent techniques are even more adaptive. (check permission)

Law. This is an example of a “network effect,” or a network “positive externality.” This is a kind of positive feedback (-A.10.2) but external to the product itself but it leads users to focus increasingly on one brand (Fig. 8.44).

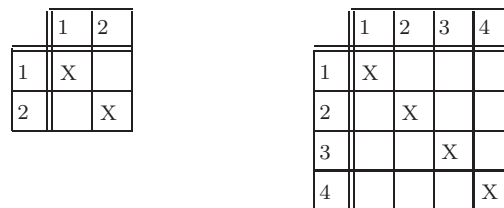


Figure 8.43: The number of two-way connections in a communications network is $(N^2 - N)/2$ of the number of participant (N). When there are two people in the network (left) then there are one possible connection. When there are four people in the network (right) there are 6 possible connections.

Attributes of Goods and Services

Economic goods come in several varieties and these differences affect the way they can be used and, thus, their value. These attributes help to define how the supply is determined. The value of “perishable goods” decrease with the passage of time. Seats on an airplane cannot be sold once the airplane takes off (Fig. 8.42). Likewise, information goods such as news are perishable. There are two general categories of goods: public goods and private goods. Private goods have the following characteristics: “excludability,” meaning that they can be denied to anyone not willing to pay for them; “rivalry,” meaning that an individual’s use reduces the overall supply; and “rejectability,” meaning that an individual can reject the good, if they please. Public goods, on the other hand, are “non-excludable” and “non-rival,” meaning that people cannot be prevented from using the goods despite not paying for

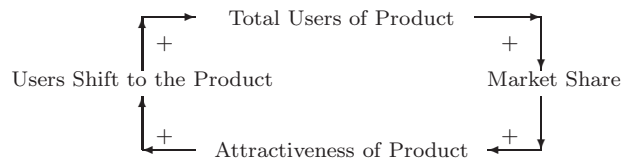


Figure 8.44: A simple causal loop diagram shows positive network effects such that the more people who use a service, the more valuable it becomes for all of them. Then even more people want to adopt that service. (redraw)

them, and that individual usage does not meaningfully reduce the overall supply of the good (Fig. 8.45). Information goods (8.13.3). Goods often incorporate a great deal of specialized knowledge.

	Excludable	Non-excludable
Rival	car, Walkman	unmanaged fishing rights
Non-Rival	movie in a movie theater, concert in a large hall	lighthouses, national defense, mosquito control

Figure 8.45: Rival and excludable goods: Two dimensions for characterizing how goods may be used^[16].

Services produce value without producing physical goods. For instance, education is a service rather than a good.

Virtual Economies Virtual worlds (11.10.2). Digital assets. Fig. 8.46. Interaction of virtual world and the physical world. The value of virtual assets in the “real” economy. Virtual justice.

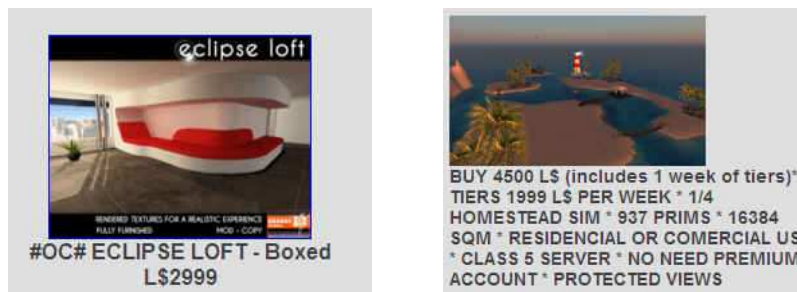


Figure 8.46: Virtual economies: Land sales from Second Life. (check permission)

Market Design and Computer-Mediated Exchanges

Markets are frameworks for the exchange of goods. They facilitate coordination but require infrastructure. They must provide a predictable structure — participants must fulfill their agreements. This can be designed this requires fostering trust.

An ideal market maximizes the transparency of trades and minimizes the “friction” (i.e., costs and inefficiencies) of transactions. ^[33]. A frictionless market would allow the prices more closely reflect the ideal illustrated in the Figure above. However, the notion of a truly frictionless market is an impossible idealization. Indeed, in practice, there may be major distortions. Potentially, electronic markets reduced transaction costs. Some sort of legal framework is needed. Some regulation seems to be needed but that needs to be balanced. Natural monopolies. Duoplogy. Market.

Auctions Auctions are one way to determine (how high bidder is willing to go). They are similar to but more more formal mechanism than haggling. Auctions can also have an emotional component. As shown in the table below, there are several types of auctions. The most commonly portrayed type of auction is a “cry-out” English auction. Offers are typically shouted out and accepted by a fast-speaking auctioneer, and the prices are raised until there is only one bidder remaining. This form of auctioning reveals information about bidders — what they look like, what was the highest amount they were

willing to pay, or sometimes even whether they were bidding more out of a sense of competition with other bidders than out of a real desire for the auctioned item. In these circumstances, the winner of an auction sometimes has trouble knowing whether they bid too much; this is known as the “winner’s curse”. Some auctions do not reveal buyer information and the bidding is done silently.

Type	Description or Example
English - Cry Out	Buyers call out bids above previous bids. Examples are art auctions and cattle auctions.
Sealed bid	Bids are placed in envelopes. When the envelopes are opened, the highest bid wins.
Dutch	When multiple goods are available, bids specify both a price and quantity. Bids are filled in descending order until the supply is exhausted.
Reverse	Seller drops prices until a buyer agrees to it.
Double	Both sellers and buyers adjust prices (e.g., the stock market)

Reverse auctions and name-your-own-price. affective components of cry-out auctions.

Online auction sites introduce a number of challenges. They may include gamesmanship such as bad mouthing and ballot stuffing. These may reveal fraud. Automatic detection in fraud may be applied to auction sites (5.3.4). The pattern of purchases and endorsements may show unusual patterns.

Matching market. Internet archives.

Market signaling is a type of information transmission. One clever application of this was the introduction of a limited number of roses by the dating web site cupid.com. Each client is given a limited number of roses so sending a rose signals particular interest.

A free rider is somebody who gets advantage from a public good without having contributed to it.

Problems with Markets

While there is a social value in production and competition among businesses. There are, of course, problems of markets. The competition keeps prices low. However, uncontrolled competition sometimes leads to the end of competition and to corruption of the market. This can rapidly lead to social damage. Thus, the right incentives must be created to produce social benefits. This includes, managing the stability of the system. Transparency in business finances. Exceptions and not following transparent procedures, in other words corruption, hurts the overall economy. Avoiding insider trading.

Costs need to be aligned with the activities which generate them. Costs should be presented transparently to consumers in order for the consumer to know how what to prioritize.

Competition policy. Market manipulation. Perverse incentives. Corruption.

Markets may degenerate into collusion and private deals which can be minimized by efficient market regulation. Markets require a stable legal and social environment. Markets thrive from the free flow of information. Market efficiency is generally optimized by allowing direct comparison between a number of alternative goods; this is an efficient means of setting prices. A farmer with vegetables to sell will go to the local market and set price according to the quality of the produce, the season, the popularity of what is being sold, and competitor’s prices for similar vegetables — this is, in effect, allowing the market (supply of vegetables, demand, production costs, and competition) to determine the price of goods. Sometimes, instead of allowing the market to determine the price of a good, vendors and buyers rely on bargain and negotiation. In many ways, haggling mimics market forces (competition, value, need), but invests them directly in the buyer and seller. Collusion. Markets.

Financial Markets

Capital and stocks. Electronic markets. Trading based on news analysis (8.13.7).

Agents, Brokers, and Intermediaries

Information systems facilitate the flow of information in markets and, thus, increase efficiency. Traditionally, many supply chains have “middlemen” who coordinate the exchange of goods and payment between the producer and the consumer. These include services such as travel agents, real estate agents, and stock brokers. Disintermediation. This extra level of communication provides an extra layer of market efficiency. Travel agents traditionally matched a customer’s travel interests with the available plane, train, and bus schedules. Much of that is now being done by the consumers themselves over the internet. Because it does not include any middlemen, this effect of information systems is known as “disintermediation”.

Making electronic markets. Cyber-intermediaries. Remote retail (8.12.5). Auction sites. GLG. Selling apps. Customer aggregators.

The Internet allows application of human effort to tasks that are otherwise difficult. Human mediated internet tasks (Fig. 8.47). Another example of social computing and crowd-sourcing. Mechanical Turk for question answering by billing. Geographically distributed problems like the Red Balloon challenge. Recursive motivation mediated through social media. Coordinate individuals to contribute.

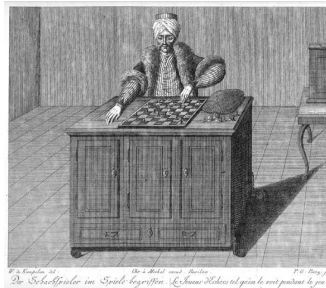


Figure 8.47: The Mechanical Turk was actually manipulated by a human being hidden in the case. There is an analogous service which support a human-mediated Internet task completion. (check permission)

Clickworker. Brokers and agents.

8.7.3. Money

Originally, people exchanged goods by bartering — one farmer might exchange a pig for another farmer’s corn. Eventually, people began to exchange “money” rather than goods. Money is generalized representation of work and resources. Originally, money had a tangible value: A gold coin was worth a certain amount based on the amount of gold that it contained. An intermediary step in the evolution of money came about when the money itself no longer possessed any intrinsic value, but was worth a fixed amount if exchanged; U.S. paper dollars used to be exchangeable for a dollar’s worth of gold or silver, and the U.S. Treasury was theoretically unable to print more money than was backed up by gold in its coffers. Now, however, money is not valuable in itself, it is merely a representation. People accept money because they have confidence in being able to exchange it for goods or services. Money is more flexible barter, and thus is better for facilitating exchange. Today, money has become electronic. As it becomes more virtual, it increasingly — though still imperfectly — represents work in society that others are willing to pay for. Prices set in a common currency establishes an equivalence of value for many types of goods and ultimately, the money must be backed by goods and services. In short, money is a representation system.

Converting recognition and other resources into money is termed monetization.

Electronic Money

The management of electronic money provides a distinct set of tradeoffs for information system design compared to other types of content. Any electronic system for managing money must maintain strict control over the security of that money. Just as banks used safes and steel bars to protect cash, so too must electronic financial and information systems use security measures to protect “digital money”.

People’s trust in electronic money services is important because the adoption of information systems by the financial industry has driven down their costs considerably. Social conventions associated with money. Security (7.10.3) and attacks on the finance system.

Increasingly, even cash transactions are being implemented with digital implementations such as Digi-Cash (Fig. 8.48).

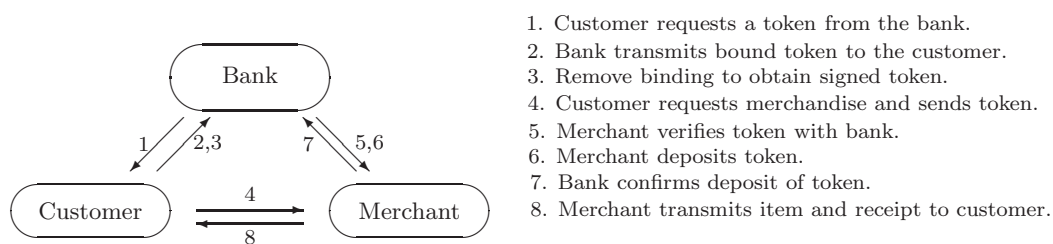
Alternative Currency and Virtual Currency Bitcoin.

Moreover, we increasingly have alternates to cash such as frequent flier miles, as competition for government-issued currency.

Addressable Money Addressable money.

Micro-banking and Micro-payments Micro-banking.

Micro-payments could be an alternative to advertising or subscriptions for funding low-cost internet services. Moving funds from a checking account. Mobile payments.



1. Customer requests a token from the bank.
2. Bank transmits bound token to the customer.
3. Remove binding to obtain signed token.
4. Customer requests merchandise and sends token.
5. Merchant verifies token with bank.
6. Merchant deposits token.
7. Bank confirms deposit of token.
8. Merchant transmits item and receipt to customer.

Figure 8.48: A collaboration diagram for the DigiCash model. A token, which has been approved for a fixed value, is obtained by the customer from a bank. It is then passed to the merchant who can “deposit” it back to the bank [41]. (check permission)

How PayPal works.

Bitcoin Credit Card Transactions

Accounting, Financial Records, and Financial Institutions

Detailed records for capital. Double-entry book-keeping. Cost accounting. Return on investment (ROI). Financial records (5.3.4). Accounting practices as a social activity. Transaction processing.

The monetary system allows the ebb and flow of money across the economy. Financial institutions.

8.7.4. Macroeconomics

It is common to distinguish between microeconomics and macroeconomics. Macroeconomics concerns the behavior of the entire economy while microeconomics (8.8.3) considers the way individuals make economic decisions. The economy is intertwined with other parts of society. This is an example of a highly non-linear complex system. Some complex non-linear systems are stable within a range of conditions but most such systems, such as the economy, become unstable as conditions change. These systems often become unstable and chaotic (-A.10.2).

While many factors need to be balanced, many factors affect the essentials of a healthy economy such as the rate of savings and investment in new business.

Interplay of large financial institutions such as banks and large companies.

The economy undergoes fluctuations, periods of growth followed by periods of stagnation and recession which are collectively referred to as the business cycle (Fig. 8.50). Complex systems often develop

increases, then productivity should rise. If we give workers across the workforce improved tools, then more goods can be produced for people to use and the entire economy is more efficient. Information can also improve productivity by making workers more efficient. Corporate productivity. The relationship between IT and productivity is complex. It seems that IT increases output but not ROI. Increasing productivity can also have an effect on unemployment.

8.8.2. Technology and Economics

The laws of supply and demand are pervasive in a market-driven society, extending to and driving technological innovation (9.4.4, 9.4.0). Moore’s Law, which states that the data density of a computer chip doubles every 18 months (1.5.2), demonstrates how public demand for ever more computing power effectively drives innovators to come up with ways to supply it. This innovation has maintained an increasing supply of computing power (keeping supply elastic), thereby allowing its costs to drop (keeping its price elastic), but there may be limits to this trend if physical constraints prevent the creation of computer chips with greater data density. Disruptive technologies.

An organization needs both social and technical components. The relationship between society and technology within an organization is like that same relationship within society as a whole. These systems which include contributions of both social and technical aspects are known as “socio-technical”.^[19] (8.8.2).

Productivity and Technology

In itself technology-based productivity seems like a good thing. The result is that there are more goods to go around. Eq. 8.1 shows the standard method for calculating productivity across the entire economy; it is the ratio of the Gross Domestic Product (GDP) divided by the number of hours worked. This is generally reasonable, but there are several difficulties with this definition. Many service activities, such as teaching and housework, are not well reflected as contributing to productivity. Indeed, much knowledge work is difficult to measure and may not be reflected very well. Personal productivity.

$$Productivity = \frac{Gross\ Domestic\ Product\ (GDP)}{Total\ Hours\ Worked} \quad (8.1)$$

Technology allows workers to produce more for the same amount of labor. Industrialization and technological advancement had a profound effect on productivity throughout the 19th and 20th centuries. This enriches society since there is more overall wealth. Facilitating production and technological development. How much of the surge of productivity was due to the Web?

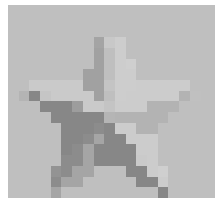


Figure 8.51: Productivity rates in the U.S economy from 1870 to the present.

Productivity and Employment

Mixed results.

Education level of workforce.

Effects of robotics on employment.

Technology and white collar employment.

8.8.3. Microeconomics, Incentives, and Behavioral Economics

Microeconomics concerns how individuals make economic decisions. Much of this is based on the economic decisions of individuals. We have already discussed many aspects of microeconomics such as processes for choice (4.3.4) and general principles of human cognition (4.3.0). Organizational behavior and supply-demand curves. Determining value and utility. Ultimately, some values are based on fundamental biological needs such as health, food, and family (4.6.3). Incentives. Incentives need to be matched to objectives.

Behavioral economics. Economic decisions in everyday life.

A further dimension of tasks is the incentive. We do some things to directly satisfy biological needs. Some other things people do seem to accomplish these goals indirectly. Managing incentives effectively. Incentive-centered design can include the efficient use of information. Dissonance and large incentives. Economic mechanism design theory extends game theory analysis.

Economics and everyday decisions. To a surprising extent, understanding the true contingencies in a situation seems to affect the many everyday decisions people make. Thus, these decisions reflect economic choices^[4]. Everyday information seeking. Designing incentives.

The economics of drug dealing, includes the surprisingly low earnings and abject working conditions of crack cocaine dealers.

Figure 8.52: Even illegal activity seems to follow economic principles^[4]. (validate quote)

The Notion of Economic Rationality

If it's cold outside, we would think it is rational to wear a sweater or jacket. If you had an abnormal medical test, you would say it is rational to get a follow up check-up. Or, if someone hasn't eaten all day, it would be rational for them to look for food. Suppose you could earn either \$10 or \$20 for the same task. Presumably, you would take the \$20. Indeed, we would say that's the rational thing to do. Similarly, we all tend to prefer choices which take less physical or cognitive effort and which give greater rewards.

In economics, a rational decision is one which meets your needs. However, this definition depends on a person's understanding of what their needs are. While people mostly focus on meeting their own needs, some actions are clearly altruistic. Moreover, a person may not clearly understand what is in his/her self interest. Sometimes emotion may cloud choices, but the model would suggest that rational choices are made without affect.

Thus, economics does not claim that people are always rational. Rather, it attempts to describe the nature of interaction when they do behave rationally.

Indeed, a person might think hard about how to accomplish a goal with less work. That is, they might be able to provide you with reasons for their actions to accomplish their goal. This is not to say that every decision is optimal or fully rational^[70]. Rather, the economics would claim that decisions will tend to be rational.

People can't know everything about the implications of choices they make, that is their rationality is bounded by their knowledge^[71]. The wide availability of information broadens the information on which decisions can be made. Another possible explanation for seemingly irrational behavior is that a person may not have sufficient cognitive resources to determine the optimal response (4.3.3). Psychological processes and rationality (4.3.4).

There are examples of altruism and there is an evolutionary advantage for altruism (-A.12.2). That is people may sometimes forego narrow self-interest for the social good, but this is fairly unusual. Similarly, people act seemingly irrationally. They show emotion or simply do not know all the relevant information about a given problem. Nonetheless, people tend to be risk averse. Expected utility.

Prospect Theory^[15] addresses the problem that people are not able to make good estimates of payoff and utility.

Law of unintended consequences.

Rationalization. To provide reasons for an action which would explain why it is rational. In some cases, these explanations can become causal stories and may or many actually be rational.

Rational choice theory. vs. “Practice” (Bourdieu) [?].

8.8.4. Economics and Information Policy

Intellectual property (8.2.0). Effects of Telecommunications Act of 1934 [?]. Open access publications. Net neutrality. Businesses and IP (8.13.3). Most social policy questions have an economic component: patents, copyright, information management.

8.8.5. Controlling and Managing Complex Systems

Infrastructure studies. Information infrastructure (1.5.3). Social infrastructure. Government.

Supply chain (8.12.1). Operations research. Epidemiology. Climate.

Instabilities and Disruptions

Many interesting phenomena are complex adaptive systems. Complex systems are susceptible to discontinuities (1.3.2). Effects of trying to manipulate the economy. Changing one thing excessively often has broader consequences. Financial crash.

8.9. Information, Globalization, and Development

Freedom of information. Political reform. Arab Spring. Alternatives to low information environments. While many parts of the world are now highly interconnected by communications, many others are not.

8.9.1. Information and Communication Technology for Development (ICTD)

There are many applications ranging from health and agriculture. For instance, farmers in remote areas can find more about prices in regional market centers. Using GIS data for development. Collaborative support for low resource environments. Often simple solutions work well.

Wireless Hypothesis. Priority in communication infrastructure. How important is technology compared to other human needs. (Fig. 8.53.) One-laptop per child.



Figure 8.53: The Wireless hypothesis proposes that development can be spurred by simply jumping to wireless systems. (ICTD) Here a set of rural health clinics in a developing country are connected by a wireless network because the landlines are unreliable. Here is a clinic in which some of the medical diagnosis is done remotely. (check permission)

Ultimately, the greatest gain may be in harnessing technology for efficient production.

8.9.2. A Flat World?

Information systems and changes in transportation are creating a “flat” world for interaction between nations. The role of the nation state in a globalized world is minimized. As communication technology becomes improves, companies are seeking to maximize their profit by locating various elements of their business in different locations around the world, which may offer lower wage standards, fewer corporate taxes, and looser environmental regulations. This trend is commonly referred to as outsourcing.

The flat world also has many implications: English as a common language and globalization of World music. The expansion of the market-state to increased terrorist organizations^[38] ((sec:netwar))and the globalization of criminal activity.

As noted earlier, information technology has created outsourcing^[14]. In the global economy, this has become offshoring. Outsourcing can have positive effects for both in the country from where the jobs were shipped, and in the receiving country. Lower company operating costs generally translate into lower consumer costs for the people who buy the company’s products, which means that people have more money to spend in other economic sectors, leading to increased growth, and an increase in the number of jobs. Also, if a company is able to lower their production costs and their product prices and thereby increase their sales, they will experience growth that will necessitate the creation of more (and often better jobs), which are often staffed in the original country. The country that receives these jobs will often find that the wages offered are higher than those of local industry, creating demand for more jobs of this type. This, in turn, often encourages political stability, leading to more higher paying jobs being located there, and raising the standard of living. Near-shoring. While there are certainly economic advantages to outsourcing — no companies would be doing it, otherwise — there are sometimes coordination difficulties and hidden costs. These can range from the mundane (different countries use different units of measure) to the extreme (some countries are not politically stable,. and a company can find itself in a country with a collapsed government).

Innovation (8.14.0).

8.10. Managing Infrastructure

Cities.

8.11. Management and Business Procedures

8.11.1. Management

Management is optimizing the optimal use of resources. How should the organization be run to accomplish its goals. Management should makes the effective allocation of resources to goals. Management keeps an organization aligned with its goals. There are many factors to juggle. Both people and processes. Facilitating processes with management. Task and project directed.

Managers make decisions regarding strategy and direction, strive to implement an organization’s core philosophies, and organize and focus workers. Management is different than administration; administration simply carries out an organization’s regulations, while management determines them. Within a large and complex organization, many elements at different levels need managing (Fig. 8.54). Routine management and flexibility. Learning and adaptation. Management and bureaucracy. Managers deal with scheduling, planning, and broken plans. Effective management can mean the difference between a growing company and a failing one. Ideally, management would be clear, direct, and informed. In this regard, information systems are integral to all areas of management, from strategic planning to day-to-day oversight. Organizational leaders should work to spread a common or shared understanding among members of the organization, and work to build a consensus on the decisions to be made. Dealing with policy and planning.

Management as coordination. Managers are intensive users of information. Management information systems (MIS) (7.3.2). Management can try to affect outputs, behavior, and culture. Scenario development as part of management. Management teams and building consensus. Coordination (3.5.3).

Strategic Management Planning	Aligning activities with long-range plans and policies. Determining long-range directions.
Front-line Management Administration	Aligning daily activities with specific plans. A particular issue is project management. Implementing routine procedures.

Figure 8.54: Some types of management activities.

Businesses, organizations, and the technologies that are used to manage them have changed considerably over the past decade. Niche oriented knowledge-intensive industries have enlarged their presence in the market. Not surprisingly, there has been a proliferation of small firms to conduct business. Information systems have facilitated this shift because they allow people to work more efficiently. Members of an organization or business can come together on a particular task and work more efficiently by pooling or allocating resources and knowledge. Information systems that facilitate interaction among different components of an organization allow the formation of project-specific dynamic work groups within organizations. However, these ad hoc alliances are flexible enough to allow resources and responsibilities to be allocated to individuals very quickly. This adaptability and organizational learning helps organizations to operate in dynamic environments (7.3.4). This can be facilitated by Web Services which allow organizations to obtain just the information services they need.

Managing People

Management Style

The management style an organization adopts should be appropriate to the task(s) it needs to accomplish. The classical hierarchical structure (5.7.0) is still the most common management style. It is stable, is quite suited to many industries, and it allows for clear and direct control. Some industries or tasks, however, are dynamic and changing, their requirements do not fit neatly into a department, and are time sensitive. Organizational structure (5.7.1). These types of tasks could benefit from another management approach known as “matrix management” (Fig. 8.55). There are, effectively, two lines of management. This allows people to move in and out of a project according to stage and demand, and encourages the sharing of information across typical task boundaries. This style is most effective when there are several different types, categories, or stages of decisions to be made or tasks to be accomplished. In most cases, setting a positive and constructive tone is most effective but in a few cases intimidation many work.

		Location				
		Asia	N.America	Africa	Europe	S.America
Function	Design					
	Marketing					
	Engineering					
	Production					

Figure 8.55: Matrix management controls organizational activities from two dimensions. In this case, management is by function and location.

Management is not just a set of individual decisions, but should support a consistent set of strategies. The strategies themselves are often determined by “upper management” to maximize the opportunities of an organization. Management, overall, attempts to build an organizational structure. This structure should represent the activities of the organization as a community of practice. That is, the organization is composed of individuals who are practiced at accomplishing particular types of tasks using particular tools, knowledge, and techniques that are inherent to this community. Management structures and techniques should seek to utilize this latent knowledge to the organization’s benefit, and not subvert the knowledge of its members. Knowledge such as this is generally hidden in the minds of the members of a professional community, but can be made visible by involving them in all stages of task completion. This is particularly true when utilizing decision support systems (3.4.2), which are more useful with more

pertinent information.

Business Rules and Procedures

Business rules are policies and procedures for running a business or organization. They can be found in operational information systems as formalized rule configurations. Fig. 8.56 shows some examples; they can determine, for instance, how data is entered into a database which helps to ensure the integrity of the database (3.9.2). Rules for the allocation of business travel allowances are an example of business policies. These are the also types of procedures which should be captured by records management systems (7.4.1). Financial records. Business process engineering (8.11.2).

Each ordered item line corresponds to one inventory type, and each inventory type can be referenced by one or many order item lines.

An item may be placed into use upon its arrival or it may be stored. An item may not be stored at all. Some items such as printer cartridges, are part of a generic grouping and may be stored in more than one location. Therefore, some items may be stored in zero, one, or more locations. Each location may store zero, one, or many items.

Figure 8.56: Business rules may define policies for inclusion of entries in a database. (check permission)

Business activities.

8.11.2. Organizational Structure and Processes

Information and organizations are intertwined. Even organizations not typically considered to be information-based are, in fact, heavily dependent on it; for instance, the expertise necessary to run a steel mill and the data to tune efficient production are as integral to the mill and the materials used. Why do we form organizations? Theory of the firm. Process and resource based models of the firm. Industrial organization in relation to markets. Object-oriented design (3.9.3). Preservation of workflows (8.11.2, 7.4.1).

Information systems may have a profound effect on organizational structure. Traditional business is also feeling the pressure to evolve, and many businesses and even individual positions may have to “re-engineer” themselves to stay competitive^[51].

The economic consequences of the development and improvement of information systems is hard to ignore. These systems have allowed organizations to streamline production processes, cull knowledge and information from various sources faster and with almost no overhead, and reduced almost to zero many of the costs that were long thought to be unavoidable, such as office rent. Indeed, many organizations have become virtual, with no centralized business headquarters and employees who have minimal, if any, physical interaction with each other. Organizational structure determines not just information flow, but also decision making and control. There may be formal structure or informal structures.

Arranging incentives within a business.

Enterprise content management (7.3.6). Organizing business information^[80].

Information ecology and communication genres for business communication.

Business are information intensive.

Operations: sales forecast

Control: Budget control

Planning: shop-floor scheduling.

Structuring a business around a database and data that can be collected.

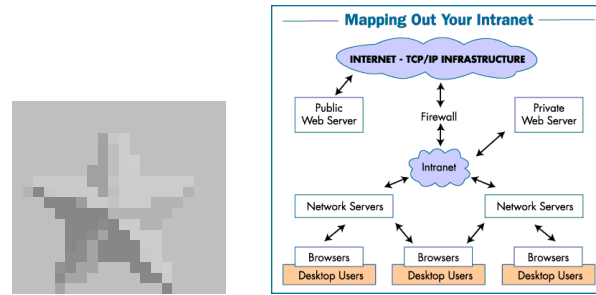


Figure 8.57: Corporate communication and intranets.

Core Competencies of a Business

To re-engineer organizations, there has been an increase in functional specialization in companies, with one result being the tendency of organizations to focus on “core competencies”. “Core competencies” are the primary, or fundamental services that the organization exists to provide. This often means the elimination of superfluous operating elements; many non-primary or supporting functions are outsourced to independent companies that specialize in providing particular services. Fig. 8.58 shows how the basic structure of an organization might be divided into competencies. If the organization is restructured, it can then focus on its “core” competencies. Because information systems allow organizations to be decentralized, these virtual organizations can have a minimal structure. The detailed structure may be determined with object-oriented design (3.9.3). But, there is also more external information. These are socio-technical systems because they depend on both technology and social information.

Management of virtual organizations. This often means management of project teams. Use of online resources and use of open source products to avoid lock-in with specific vendors. Flexibility in the face of disruptive technologies.

Resource maximization

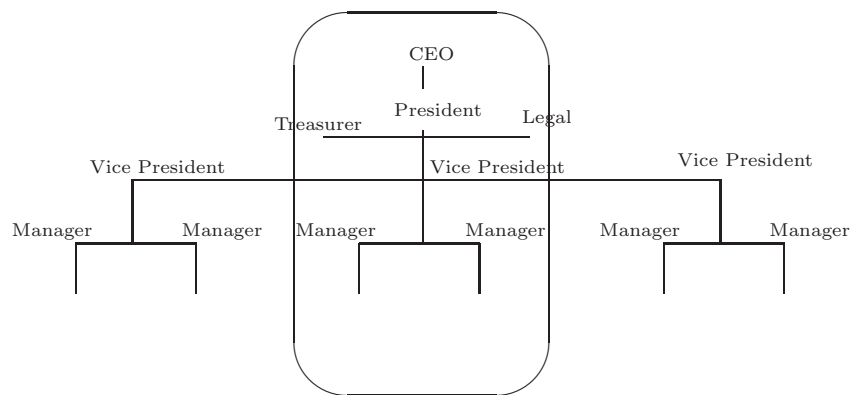


Figure 8.58: Information systems contribute to the fragmentation of monolithic organizations. The core business activities (inside the box) might be kept and the remainder outsourced.

When two organizations need to work together these issues and considerations can be difficult. The introduction of technology is not solely a technological endeavor; it is groups of people who will be using it, and every group is unique in the way that it will approach and adopt technological change. This phenomenon is best explained by “adaptive structuration theory,” which is an extension of basic structuration theory and illustrates the idea that technology and the groups that utilize it are constantly and systematically changing due to their reciprocal interactions^[45]. There are often coordination difficulties between the established processes of the individual organizations. Through adversity, however, innovation is often born; a merger can be seen as an opportunity to re-engineer two organizations at once, and introduce a new information system technology on a relatively blank slate. These factors are

summarized with the Technology Acceptance Model (7.9.6).

Organizational Process Engineering and Re-Engineering

Rather than focusing on organizational structure, it's often helpful to emphasize processes. For instance, this can be helpful in developing and re-designing organizations. This may include the following steps: (a) Analyzing existing processes. (b) Determining what could be improved and (c) propose and implement how to do that. Requirements specification (7.9.1). Requirements models which include goals. Object-oriented design (3.9.3). Dependency graph (Fig 8.59). Optimize quality by managing processes.

From re-engineering processes to re-engineering the corporation.

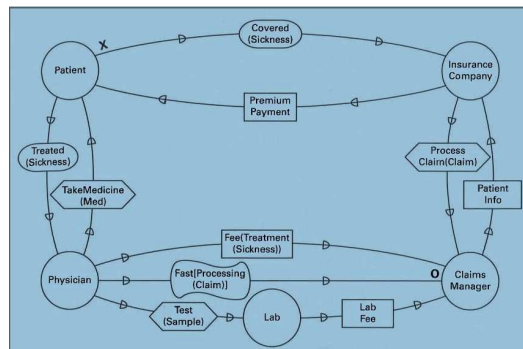


Figure 8.59: Dependency graph (from^[46]). Diagramming the flows can facilitate organizational engineering. (redraw) (check permission)

Introducing an updated information system into an existing organization may require re-engineer processes to optimize workflow. This is often associated with the introduction of information systems. They may benefit from system analysis (8.11.0) and specification of activities. At the “front end” of this re-design, information can be targeted to the individuals who are responsible for it without having to be assigned down the line through management. As the traditional management control structures become unwieldy, knowledge management systems become more influential in aiding decisions such as these (7.3.1). Technology, such as knowledge management systems, can also help with the documentation and enforcement of business policies. Capturing tacit organizational knowledge (7.3.4). Group thinking by managers in determining business process engineering can facilitate acceptance of those models.

Each company must find the way to operate within the various structures that are made possible by information systems. An organization's particular business strategy must be considered when attempting to integrate an information system. Introducing a complex automated phone tree does not make sense if a company's strategy is to maximize its relationships with customers. Workflow. Coordination Theory (3.5.3). There are often inconsistencies of organizational processes. Business environments change rapidly. Business process mapping. This may use UML activity diagrams (3.10.2).

Management for Quality

Poor quality products can be very costly. It is generally better to prevent bugs and failures than to fix them later. These factors are acknowledged to result in more efficient and capable workflows. Capability Maturity Model Integration (CMMI), rates organizations on their ability to manage and complete large software development projects. The rating system utilizes a scale of one-to-five, indicating the level of an organization's procedural development. The CMMI indicates that the ideal organization is adaptable to unique and varying situations and requirements. As such, certain production and quality control approaches, such as TQM (Total Quality Management), can be overly rigid. Information system utilization and management of post-production information can greatly enhance an organization's ability to not only anticipate and adapt to new situations, but also to do so in a way that ensures a high level of product quality.

8.11.3. Projects, Project Teams, and Project Management

Management of specific activities towards a specific goal. Coordination theory (3.5.3). Flexible organizations are often structured around projects. Beyond simple meetings there is a spectrum of increasingly structured coordinated group activity^[8]. In the extreme, the organization can be refocused around projects. Projects are time limited and goal oriented and often cross organizational boundaries. Having a set of people dedicated to seeing the project through from start to finish ensures that they do not become mired between groups or departments. Projects are difficult to manage because each project is relatively unique, although many of the same skills are utilized. Project management can be facilitated by object-oriented design (3.9.3) because the expected tasks are clearly specified. Organizing workloads into projects allows an organization to be adaptive, and to plan, schedule, and control organizational activities to reach a goal. Quickly and accurately assess a situation as well as the risks and opportunities it presents. Fitting constraints and a budget. That said, a project plan should often be flexible and adaptive. Project management as managing dependencies. Coordination (3.5.3) in management. Project libraries.

Composing the team with individuals of different skills. Every individual on the team has roles, responsibilities, and tasks that need to be accomplished for the team as a whole to succeed. There may be more than one team and project going on at the same time; coordination and communication across projects and project teams can ensure that all available knowledge is being utilized, and no efforts are wasted.

Centralized control of all projects happening at one time can be useful when there are a lot of complex activities that need to be coordinated. Multiple project managers, each responsible for their own team, will all report to one project leader. This is often the case for large, complex projects, where multiple teams may work on small portions of a large project whose stages need to be completed at the same time. Coordinated information is essential to the efficiency of these tasks, and information systems play a large role in the management of these types of projects. Indeed, information systems themselves are generally developed in this way.

Centralized decision making and centralized information processing depends reaching one correct response. Different perspectives and approaches may allow alternate solutions.

Judging the risk of various alternatives. These evaluations benefit from good information and there is a substantial risk the result of not having accurate information.

Project managers are responsible for maintaining continuous parallel streams of activity at all times to ensure maximum efficiency. A project manager may have to manage multiple, often conflicting schedules, balance and determine costs, and set and push for the completion of goals^[12]. Even modeling these activities can be difficult. Processes and methods for doing this do exist, however, and should be in place before a project begins. Process documentation.

Collaboration in large-scale projects (Fig. 8.60). Collaborative project management tools.



Figure 8.60: Large scale project management is needed in complex projects such as the construction of the Oresund bridge [?].

For managing specific activities that need to be accomplished. Another method involves Pert charts, which are a common tool for task scheduling (Fig. 8.61). Pert charts are useful for modeling processes that have a definite order of operations, such as when one stage cannot be started until previous stages have been completed.

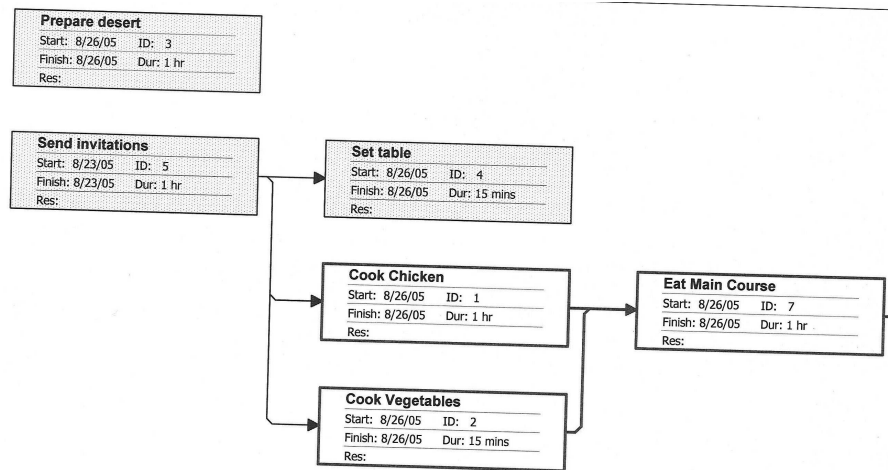


Figure 8.61: PERT chart for cooking dinner. These are they same tasks as shown in the Gantt chart above.

Individuals often have discretion about their work environments and develop strategies for organizing their work. Learning about the organization or work through apprenticeships.

From task models to workflow^[78]. Workflow shows tasks to be completed. The Gantt chart (Fig. 8.62), shows parallel timelines or processes. This actually implements a simple workflow system ((sec:workflow1)).

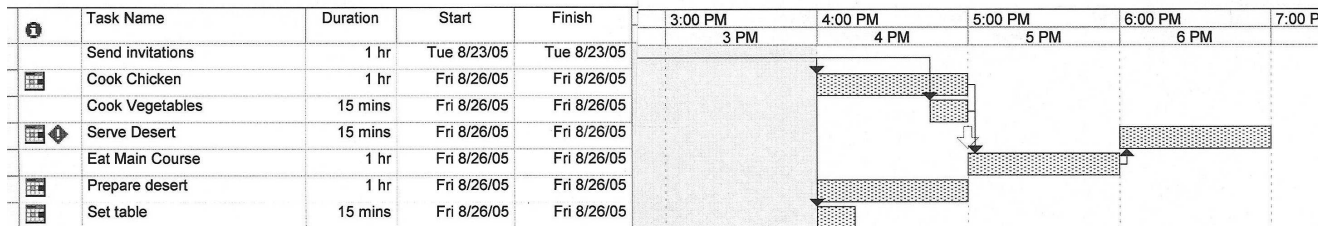


Figure 8.62: Gantt chart with a simplified set of steps required to cook dinner.

Operations research supporting logistics (8.12.1).

The critical path^[2] is path through the tasks that will take the longest time. Thus it is particularly important for the project manager to keep those activities on schedule. For each stage of the critical path, a completion-time range for each task and sub-task can be determined. Given at least some probable dates within a project's schedule, the "slack" (Eq. 8.2) can be used to extrapolate the remaining times. The schedule can be further enhanced by considering the probability of completing each stage according to the schedule. Given that information, the schedule can be modified to consider the costs of different scheduling options.

$$\text{slack} = (\text{earliest start time}) - (\text{latest start time}) \quad (8.2)$$

When scheduling a project, plans should be as adaptive and flexible as possible. It may rain, the mail could be lost, the boss could get sick; despite detailed planning the unexpected will occur, and schedules need to be revised. Chance and the unexpected are the perpetual thorns in the side of strategic planning^[63]. Contingency procedures and plans should be developed and put in place. Obviously, not

all circumstances can be foreseen, but with pre-developed fall-back plans, knowledge redundancy, and adaptive management systems, procedures and schedules adapt to almost any situation. Assessment of risks (7.10.3) for the completion of a project and management of those risks is a critical skill for the project manager. Workflows and management.

Standards

Standards set uniform practice. Standards allow coordination between companies and organizations. Information systems are full of standards ranging from formats such as HTML, to protocols such as TCP/IP, to hardware such as standard plugs.

These standards are so pervasive that they are barely noticed but they do have pros and cons. They allow complex activities to be completed efficiently and safely and they support interoperability.

Standards are often set by the organizations which are likely to employ them. In many cases, this works well. However, it is also possible they may be developed to limit competition from members outside the group.

Accreditation. Model curricula.

8.11.4. Business Models

Efficiency of production. Businesses are commercial organizations which emphasize production. Earlier, we focused on information in organizations. Here, we consider management, production, and commerce, and how information interacts with them. Each of them has distinct needs for information management. One of the major difficulties is simultaneously handling complexity efficiently and being adaptive to new conditions. Produce things which people want. Free as a business model.

Any organization needs to determine its strategy for managing its resources. This strategy is known as a “business model”. A business model should not be confused with an organization’s micro-strategies relating to specific products or services — a business model is a grand plan, outlining broad concepts and methods. There is no “one size fits all” business model; various models are appropriate for different products, markets, regulations, and economic climates. Every sound strategy takes into consideration the nature of the entity at hand, its strengths and weaknesses, and the competition that faces it (and their strengths and weaknesses). The business model includes the way in which the proceeds from the company can sustain the process.

Type	Description
Advertising	Draw attention and deliver messages about other products.
Brokerage	Facilitate transactions for a fee.
Infomediary	Collect and organize information of value to others.
Manufacturer (Direct)	Make products.
Merchant	Provide products in a convenient environment for the consumer.
Subscription	Pay for regularly delivered materials.
Utility	Provide services at a fixed cost.

Figure 8.63: Some broad categories of business models^[3]. (check permission)

Companies are a specific type of legal entity. Generally, they are organized with by-laws.

Business models help in determining an organization’s growth and revenue potentials. These two factors are related, and changes in one will have an effect on the other. Growth potentials indicate how large a company can expect to grow given its product or service and the market in which it operates. Growth potentials can change, however, and the initial projection can be influenced by factors such as economic or technological developments and the fluctuating cost of the product itself. Revenue is the gross amount of money that an organization takes in, without considering operating costs. Revenue potential is the projected amount of money that an organization will take in, based on its growth potential, the cost of its products or services, and other factors. An organization’s actual growth and

revenue can be much different than its projected growth and revenue — changes in management, the economy, and technology can all affect the numbers. It is typically the actual growth and revenue that investors look at when deciding whether or not an organization is sound (Fig. 8.64).

		Revenues	
		Low	High
Growth	High	Question Marks	Star
	Low	Dog	Cash Cow

Figure 8.64: Given revenue and growth prospects a company will usually prefer a business with high revenue and high growth^[31].

Mission statement to articulate the goals of the organization.

Senior management team. CIO, CTO, COO, CEO.

Handling crises.

The business model is implemented by the allocation of corporate resources. Thus, there needs to be a financial model. Financial models help to predict the future. IT investment in businesses.

8.11.5. Social Infrastructure of Businesses

Effective business depends on a stable monetary system, legal system, education system, and trained professionals. Economics (8.7.0). Trained workforce. Stability. System of record keeping.

Legal System: Enforceable Contracts

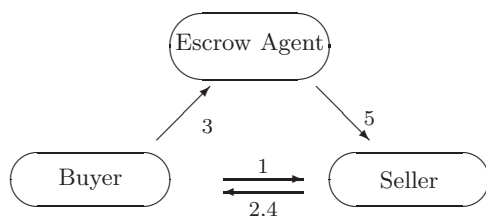
A contract is a binding commitment to action based on offer and acceptance between two or more parties. Contracts require a mutual exchange. Simple example of a contract. Such as “If you bring me a sandwich for lunch for a month, I will pay you \$100.”

Software agents may be designed to enter into contracts.

Promises. Deontic logic. Ontological design for commitments.

Disputes may arise when one party honor the details of the contract before the other party must honor theirs; after the first party receives what they want, what prevents them from renegeing on their portion of the deal? In situations such as this, when a transaction requires the exchange of funds but the parties do not trust each other, a third party may be required to transfer the funds i.e., in “escrow” (Fig. 8.65). While escrow accounts have existed for a long time in traditional business models, there was no system capable of handling these types of demands over the internet. It was necessary for the growth of ecommerce and the continued viability of the Web to develop a system whereby individuals could securely enter into un-trusting transactions. Contracts and commitment. Contractual drafting. Contract should specify explicit actions required of both sides. it should focus on those actions.

Legal aspects of corporations.



1. Buyer requests information about products.
2. Seller provides information.
3. Buyer deposits funds with a third part (escrow agent).
4. Seller transfers product to buyer.
5. Third party moves funds to seller.

Figure 8.65: Escrow facilitates trust in online transactions where either the buyer or seller may not have enough of a reputation to be trusted.

8.12. Functional Units of Businesses and their Use of Information

Knowledge management (7.3.1). Structuring organizations and roles. Danger of silos (7.3.6). Although there are many types and structures of businesses, they can be decomposed into functional units such as manufacturing, retail, and engineering. Administration. Financial records. Personnel.

Business activities. Business services. Capturing those. Records management (7.4.1). Organizations use information in coordinating the interaction of all these components. Traditional components of business: Finance, Technology, Marketing.

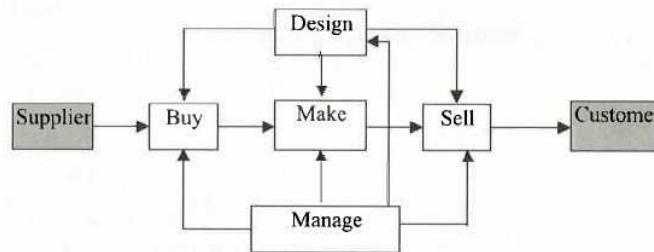


Figure 8.66: Business activity model^[61]. (check permission) (redraw)

Structuring businesses to take advantage of information. Redesigning the business to take advantage of record keeping capabilities, customer interaction, automated inventory and fulfillment, and metrics for performance.

Business Classification Systems

Systems of taxonomies, such as the North American Industry Classification System (NAICS).

8.12.1. Manufacturing, Production, and Services

Compare to business based on services. There are several possible configurations for production activities. Manufacturing vs knowledge organizations. Henry Ford developed sequential production in 1913. This manufacturing design process uses sequential steps to rapidly construct a product, and for 75 years it has been the industry standard. However, due to changes in the marketplace, consumer demands, and production times, a successful company can typically no longer support sequential production techniques. Recently, there has been a push to develop more efficient and flexible processes. Integrated production, or concurrent engineering, has emerged as that efficient model. The model can be a unified vision incorporating concept, design, production, marketing, sales and maintenance, among others. Manufacturing learning curves reduce costs along with economies of scale. Business models for knowledge and information based organizations (8.13.8). PLM: product lifecycle management.

Efficiencies in factors from information systems. Automated manufacturing with robotics.

New models of manufacturing with distributed printers. Distributed manufacturing. This can be based on personalized designs for mass individualization such as with 3-D printers (8.12.1).

Managing the Flow of Material: The Supply Chain

In manufacturing, the parts needed have to arrive at the same time. A supply chain is the path from source to destination that goods, materials, and products follow (Fig. 8.68). In its entirety, a supply chain describe from where, and how, an organization gets the materials that it needs to create its products, and how those materials are utilized. Optimization of a supply chain improves productivity, and lowers costs (8.8.1). Delivery and shipping time is increasingly important. The more general problem of managing inventory and supplies in many locations. This may include warehouses and transportation time. This is a type of coordination or articulation. Plan, source, supply, deliver.

Information is crucial to managing a supply chain. Keeping track of inventory such as who owns it and



Figure 8.67: Consider all the items that must be stocked and available at a moment's notice in a hospital emergency room. (check permission)

who has it. Management of physical products can be tracked and facilitated by location technologies. Moreover, supply chains can be integrated with inventory, shipping, and retail management. A tightly optimized supply chain, just-in-time manufacturing, could almost entirely eliminate inventory. When conditions are stable, it is fairly easy to manage the flow. But, uncertainty and changing conditions can create uneven flow. To maintain maximum efficiency, it is important to prevent any interruption of output, which means preventing any interruption to the input of necessary materials. Because supply chains are so integrated, and changes in one environment can have unforeseen changes in another environment, the supply and demand of materials and products is dynamic, and it is often necessary to alter the parameters of a supply chain fairly quickly. Articulation work (5.6.2). Modeling supply chains with Petri Nets.

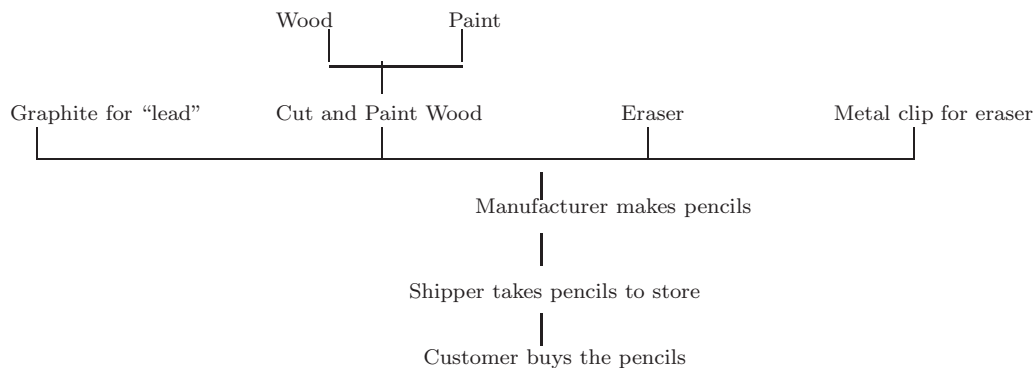


Figure 8.68: Schematic of a supply chain for producing wooden pencils. Without any one of these pieces, the pencil would not be complete. The delivery system will be much more complex if there are cross-links.

Timely information and accurate forecasting (3.4.2) such as these systems provide make a business much more efficient. When the demand for a product or service is constant, predictions are relatively simple — the average historical demand adjusted for demographic changes is an effective model. Moreover, inventory ties up resources and, indeed, often requires considerable handling and space. Many production environments, however, are dynamic, with sometimes unpredictable demands. Production systems must be designed to be much more flexible, and forecasting programs must be able to predict demand using incomplete information. Programs utilizing system dynamics modeling techniques often used in the design of production systems, many are already formalized (-A.10.2).

Related to B2B. Demand-pull economies.

One of the variables used by forecasting systems are current orders. These are the defining element of current demand. By utilizing systems that automatically upload electronic orders into forecasting software, on-the-spot calculations can be made. However, purchase order and invoice automation systems are essential^[43] in and of themselves. Very long supply chains may minimize perceived responsibility.

Highly predictable environments are required for long supply chains to be effective. In the extreme, the issues become related to managing outsourcing (8.9.2).

Manufacturing

Because they operate in real-time, when linked with other advanced productions techniques they allow “mass customization” of products. Blue jeans can be produced to perfectly fit a customer’s measurements.

Information systems are also useful for maintaining logistical and transportation models. Whereas the supply chain illustrates what materials come from where and where they go, logistics describe exactly how they get where they are going. In most production settings, this involves transportation schedules, supplier operating times, load values, costs, and shipping times. Information systems can help to coordinate and plan schedules using all of this disparate information. This allows more precise analysis of material arrival times, and hence, eventual production time. Using all of this information along with values, such as organization operating hours and average production quantities, and average daily production amounts can be calculated.

In a factory, custom jobs must be scheduled. Operations research. Scheduling algorithms ((sec:schedulingalgor)).

Managing activities so similar processes are completed together.



Figure 8.69: Factory floor scheduling optimizes the use of resources (including worker’s time) in manufacturing. (check permission)

After facilitating the flow of pre-production information systems can facilitate process control. Different models of production have been designed over the years, often reflecting the requirements and constraints of the environment in which they were developed. That basic process was improved and made more efficient with Just-in-Time manufacturing, which used more advanced information and planning systems. When a customer places an order, the necessary supplies for that specific order are requested and injected into the production line almost immediately. Logistics – production schedules and times, and replacement supply orders are re-calculated — and the supply lines in and out of the organization are never broken, but no excess product is produced. Obviously, highly integrated information and control systems are required to coordinated these variables with any accuracy. This process has been combined with mass customization to maximize efficiency on the supply side while ensuring end-user satisfaction on the demand side. However, even preservation of the design for the product not be enough. For complex systems the entire manufacturing sequence is designed.

Object metadata. Design rationale (3.8.7). CAD and design representation.

Semantics of processes. Basic machines (levers, incline plane, etc.) Controlled vocabularies and describing processes. Filter and flow^[13].

Records of manufacturing processes.

Mass customization.

Desktop Prototypes and Manufacturing CAD. Design libraries. 3D printers. Direct manufacturing. One-offs and low-volume reproduction. Rapid prototyping for R&D. Fig. 8.70. Personal fabrication.



Figure 8.70: Desktop manufacturing can be personalized and just-in-time. Rapid prototyping. For instance, a prosthetic leg can be produced in different styles. (check permission)

8.12.2. Distribution

Logistics. The flip side of supply-chain (8.12.2).

8.12.3. Research and Development (R&D)

Research

Innovation of novel products and processes. A research environment needs to encourage innovation. However, managing a research organization is a challenge because effective research is not easily planned or structured. Research and Development (R&D) have inherently non-routine activities. (8.12.3) often have special challenges moving ideas into operations and production^[25]. Physical proximity and research productivity. Role of information resources in research and innovation. Universities (8.13.2).

This “technology transfer” is a particular challenge for organizational culture. It is also one component of organizational knowledge creation. Indeed, research in some organizations is not attempted and the organization evolves by acquisition (8.14.2). Innovation (8.14.0).

In many cases, a learning organization (7.3.4) simply shifts its emphasis to take advantage of opportunities. But, in other situations the organization evolves to disruptive environments. Indeed, some organizations attempt to institutionalize the development of new products. Organizational R&D is a cornerstone of those organizations which are oriented to change. The products and processes need to adapt to those changes^[25]. R&D beyond the organization encouraging staff to participate in professional societies ((sec:professions)). However, there may be deep conflicts between a research organization and other parts of an organization^[6]. Also, coordination with universities. Societal support of technology and research (9.4.0).

Product Design and Development

Design (3.8.0). Production. Project management (8.11.3) and engineering informatics. Design automation.

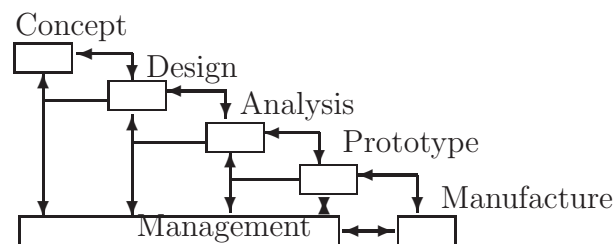


Figure 8.71: Product design development flow in a traditional engineering organization. Note that very little physical product moves across the organization; rather, only product descriptions move. (redraw) (check permission)

Reusable designs. A library of fabricated shapes^[68]. There are several aspects of objects that need to

be defined (Fig. 3.50)^[74]. Issues for describing behavior: very context dependent. This is useful for identifying replacement parts. It is analogous to describing the behavior of software objects. Interactive Computer-Aided Design (CAD) is often part of very large engineering projects. Ways to describe shapes. Index of shapes. Searching shape properties. Shape similarity^[36] (Fig. 8.72). Shape repository^[18]. Representation of shapes: Functions versus data sets. Preservation for engineering records. Legal need for archives of airline engineering drawings.

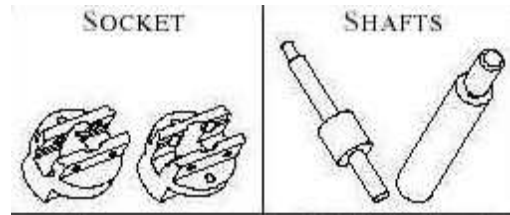


Figure 8.72: Samples for determining the similarity of machine parts^[36]. (different picture) (check permission)

Coordination among design teams. Exchanging artifacts such as CAD across design teams. As different experts participate in different projects, libraries of CAD objects, situations, and designs can be built. All of this expertise can be harnessed to produce interactive representations and simulations that can be used to try out different designs or styles to see how they react to the environment for which they are intended. This represents the fusion of analysis and design, which significantly contributes to an increase in the speed and quality of design, and a decrease to its cost. After that, there needs to be product lifecycle management.

8.12.4. Business-to-Business (B2B) Services

Ecologies of business. Business have a “mutually symbiotic” relationship; each prefers the other to be doing well economically, as this means more business. Similarly, it is in the interest of all businesses to develop ways to allow them to interact with the most efficiency and least cost. Business-to-business (B2B) services allow businesses to interact. they all reduce marketing costs and allow buyers and sellers to easily view what the other has to offer. This not only increases sales, but also helps to optimize supply chains. The Internet greatly facilitates B2B interaction. Frameworks for online markets, such as auctions (8.7.2), have further optimized the benefits that businesses can have for one another. However, despite almost every organization and business having at least some web presence, there is a need for both a standard language for describing content and even more clearly defined marketing frameworks.

This mainly involves two areas: classification and record keeping. Record keeping is important in this regard because it allows other companies to clearly see not only what it is that another organization does, but also how they do it. Business records can illumine an organization’s capabilities and history (7.4.3). Records, however, are only useful if a searcher can find what they are looking for. Business Acceptable Communications (BAC) seeks to permanently link certain business records and transactions with metadata that describe those transactions^[32]. This makes record searching possible. B2B in the media industry may include supplying content to distributors.

Perhaps more importantly, facilitating business interaction is the development of a common interaction language. This allows organizations to communicate with one another, to describe their products, for example, in a consistent fashion. The most obvious method would be to develop web-services (7.8.1). One such system has been termed the business reporting language, or XBRL. This is an XML-based language developed to facilitate financial reporting between organizations. It is a web-based financial record exchange service, and can be used by organizations to distribute financial information about themselves to clients, competitors, or market regulators. Another useful language is ebXML (electronic business XML).

8.12.5. Commerce and Retail

Information Systems for Commerce and Retail

Commerce is the exchange of goods and services. Information systems affects many aspects of commerce including catalogs, funds transfers, accounting, and even the transfer of the goods themselves in the case of digital content. Wal-Mart uses a sophisticated inventory tracking system that automatically synchronizes a global inventory database. When a Wal-Mart customer in Columbus, Ohio buys a toaster, that purchase order is logged into a central database that not only monitors how well all toasters are selling in Ohio and how well that brand of toaster is selling across the country, but also automatically orders a new toaster from the nearest distribution center, and a new toaster is ordered from the manufacturer. It maintains virtually no inventory and each of its computers are built to order. Reliable measurement (9.3.0) for selling goods.

Accumulated data about the purchases of an individual can be used in many ways.

Trusted eCommerce sites.

Retail records. Managing retail inventory. Bar codes environmental tags. Weights and measures. Loyalty cards and personalization. Managing large data sets or customer records (9.6.3).

Order fulfillment. Warehouse distribution.

Market basket analysis.



Figure 8.73: Loyalty cards give discounts to customers but they also collect data about the customer's preferences.

In ecommerce, Internet sales with search engines allow greater awareness and easier access of low-frequency items. Lots of used books are now available. This is also known as the "long tail" [27] (Fig. -A.87). The Internet makes a more efficient market therefore not as much of the tail is truncated.



Figure 8.74: Demand for products generally follows a power law. The most popular product a very popular but there is a "long tail" of demand for a great many products. Traditional (bricks-and-mortar) businesses are limited in the physical inventory they can stock (dark area) but the Internet allows a virtual inventory. (redraw) (check permission)

Sponsored search (10.8.0). SEO (8.12.5). Log files (-A.14.2). Data management (9.6.3). Predicting preferences based on personal information. Privacy preserving data mining (9.6.5).

Point of sale system.

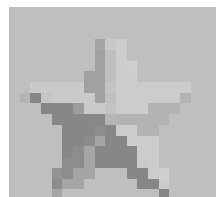


Figure 8.75: eCommerce distribution network.

Marketing

Marketing is presenting a product to a market. Although marketing is sometimes thought to consist only advertising, there are many aspects to presentation, such as pricing, demographics, positioning, and advertising. Indeed, marketing is information intensive and may even include developing models of the markets. Marketing intelligence is the information required to make effective marketing decisions. Marketing can also be seen as a social networking activity.

Segmentation of the market is a basic strategy, for optimizing interest. That is, to find users with different needs and tailor versions of the product to them. Business are constantly seeking to better specify and differentiate their products. Information systems help in this process by dividing customers into groups and differentiating prices. Airlines have found they can divide the business traveler (upper line in Fig. 8.42) from the recreational traveler (lower line) by requiring a Saturday night layover. Without information technology, this was not possible.

A well-marketed product creates a brand, which comes to be an inseparable identifier of that product. That brand must then be managed, always preserving its image while repositioning it to capture more users (5.2.2). Ad buys on traditional media but, increasingly, social viral marketing by word of mouth from person-to-person association in a social network (5.1.0). Social media (5.1.4). Online product reviews and recommendations.

Furthermore, the social media platform will likely return data to the advertiser about the users. Tie into data analytics. Persuadability.

Customers

Customer relationship management (CRM) Customer relationships are often one of the most expensive parts of retail. It can, however, be partially automated and supported with information systems. Service management theory: identification, commitment, bonding, customer relationships, retention. Customer relationship management (CRM) software and programs are used by businesses to help maintain a sense of connection between customer and business while increasing efficiency as much as possible. These systems may perform services ranging from auto-completing a returning customer's order form to making recommendations about what movies they would like. Furthermore, customer service can be facilitated with several information system technologies such as voice interaction and searching. Call centers. Product community. Managing collections of customer complaints (tickets) to give satisfying interaction.

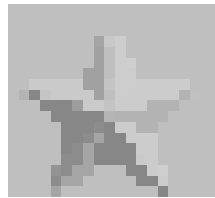


Figure 8.76: Mining discussion groups for customer reactions about a product.

Daily deal sites and correlated activity with other information services. Deals services.

Customer relationship often one of the most expensive parts of retail. It can, however, be partially automated and supported with information systems. Service management theory: identification, commitment, bonding, customer relationships, retention. Customer relationship management (CRM) software and programs are used by businesses to help maintain a sense of connection between customer and business while increasing efficiency as much as possible. These systems may perform services ranging from auto-completing a returning customer's order form to making recommendations about what movies they would like. Furthermore, customer service can be facilitated with several information

system technologies such as voice interaction and searching. Call centers. Product community. CRM and social media. Managing collections of customer complaints (tickets) to give satisfying interaction.



Figure 8.77: Mining discussion groups for customer reactions about a product.

Online Retail

Augmented reality viewing of products to minimize returns.

Product Information and Product Reviews

A business has to provide information about its products to the consumer. This can be done in many ways: websites, customer service representatives, conventions, and advertising. Many consumers do research — often using the internet — before making major purchases, and if they do not, or cannot, find information about a product they may skip buying from that company. This trend acts as an incentive for businesses to not only advertise their products, but also to provide information about them. The most detailed information will often be found on the company’s website, as this is the most cost-effective way of presenting it. Further information can generally be obtained by calling a customer service representative.

Some systems publish subscriber reviews of products or services. In addition, quality ratings of the reviewers themselves are also published, which are based on comments from other subscribers regarding the typical usefulness or accuracy of the published product review. If several “highly reviewed” people seem to think another person’s reviews are generally sound, the odds are that they are a good source of information. The more links or associations to your virtual identity there are, the better or worse your ranking, and the more trustworthy you appear to be. Example shown in the discussion of opinion mining (10.5.3).

Advertising

Advertising typically serves two purposes; it disseminates business or product information, and it seeks to convince. Advertising for ecommerce businesses is different from traditional advertising, particularly because of the way that it can be targeted to small groups of people, and in a sense, even to individuals (4.10.2). An agency advertising a particular product on television must predict, broadly, what type of people are going to be most interested in their product, and on what station at what time those types of people will most likely be watching TV. Although advertisers have become quite adept at doing this, internet advertising can be much more specific. Commercial search engines may match particular advertisements to particular search queries, guaranteeing that the individual conducting the search is at least mildly interested in what the ad is selling. Ecommerce user profiles allow for more personalized shopping, including personalized pricing, which can limit advertised products to a finite price range. This user profiling allows businesses to target individuals for advertising. Many agencies specializing in online advertising guarantee a minimum number of transactions or views (click-throughs) by placing their ads in areas of high traffic, or coordinating their advertising with multiple targeted ad services (8.12.5).

Advertising and attention (4.2.2). Tracking eye movements of people viewing a screen.

Advertising rhetorics. Social media and advertising. For instance, by building online communities. The effects of advertising can be monitored with searches. Searches reflect people’s awareness of topics. Indeed, searches on specific products rise following even non-Internet based advertising campaigns. Search engine marketing (SEM). Advertising campaign. Impressions and presentations of advertisements on

search return pages. Cost per impression (CPI). Click-throughs. Auctions for position.

Search engine optimization. Because many users are led to Web pages by search engines, some Web site designers who want their sites ranked by those search engines add spurious text to Web pages that will be picked up in Web indexing processes. This is known as “keyword spamming”. A variety of techniques have been developed. Such as link farms and content farms. Adversarial IR.

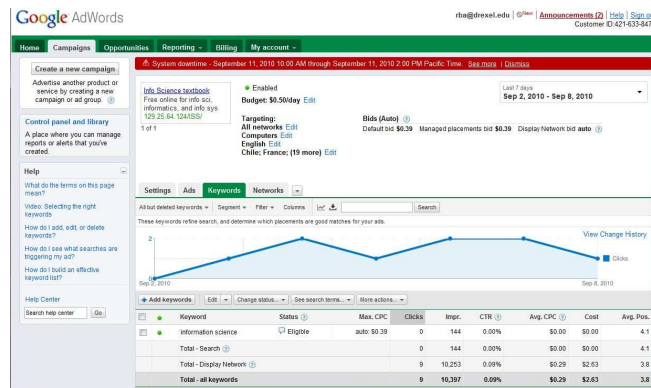


Figure 8.78: Google Adwords interface for managing a targeted advertising campaign.

Micro-targeting advertising.

Keyword auction for setting prices.

Commercial data brokers.

Data profile even without facts. Working with probabilities.

Search engines have rapidly moved from research to a major commercial force. The search is generally supported by advertising. Business models (8.11.4). Search engine business model (10.8.0). Presenting advertisements associated with searches. Personalized advertising (4.10.3). Auctioning advertising space on the search engine results page (8.7.2). Click-throughs. Click fraud, Separating ads from content. To maintain the confidence of users, the search engine company needs to be neutral in selecting sites to be returned by the search. Second price auction.

Giving people what they want in search results versus giving them an overview of the available literature.

Measuring the Quality of a Web Page or Web Site

Quality score.

Business Strategies for B2C

In general, many of the same business strategies that have been used for decades in traditional business environments can be applied to ecommerce businesses. Many businesses employ a hybrid strategy, which include physical locations as well as virtual businesses (i.e., “clicks-and-mortar”). This business model does not alienate any group of potential customers. Even physical purchases are affected by customer research online. In a well-integrated system, the online system can extend the physical displays by making unusual, low volume products available.

Shopping and Consumer Transactions

Process of shopping. Finding and evaluating products. Pay-as-you go, subscriptions, shareware.

Commerce and the transactions that constitute it are processes. They may be more or less complicated, depending on the specific type of transaction. While there are many facets to a commercial transaction, most can be broken down into stages or templates, which are useful in modeling automated forms of those transactions. low-chart of the various transactions that make up a particular activity. Haggling.

Decision to Purchase

Consumers make decisions when purchasing a product. Product information as interpreted by the individual's awareness of the product and analysis of its benefits. The decision to buy, or not, may depend on how the purchasing transactions are managed^[22]. If the process is complicated and there are many different steps, people may be disinclined to make a purchase. Or, perhaps, a particular wording may increase or decrease a customer's desire to buy. Product and service reputation (5.2.2).

Businesses attempt to highlight all those factors that have a positive impact on purchasing probability, and eliminate those that have a negative impact. To understand and analyze what effects the purchasing process has on customers, dynamic data models are gathered from a customer's interaction with a Web site. Fig. 8.79 shows a click data analysis from an online store that registers four million accesses per day. The various levels represent differing degrees, or specificities of information; this is reflected by the increase in the amount of data. An analysis such as this can be used to determine, for example, at what point in the transaction process the majority of people decided not to purchase a product. By analyzing the "click level," a business can determine what most of their potential customers are interested in and what particular information they are seeking. This is related to data warehousing (7.4.4) and data curation (9.6.5).

Level	Description
Customer Level	General information about customers.
Session Level	What purchases were made in the session.
Click Level	Details of all user clicks.
Presentation Level	What is presented on each screen for each customer.

Figure 8.79: Levels of data about user behavior in a large online retailer. The amount of data increases by about an order of magnitude at each step. (check permission)

Habit analysis. Predicting consumer behavior.

8.13. Information Economics, Information Goods, and Knowledge Markets

We have already considered basic economic principles (8.7.0). Economic decisions are greatly affected by information. We have already discussed the effects of information on economic decisions (3.4.1); in this section, we consider the economic aspects of information and information resources themselves. This definition of information as the reduction of uncertainty is particularly applicable for economics. Legal and social frameworks for information distribution: publisher, broadcaster, distributor, common carrier.

8.13.1. Value of Information

Value of information in use versus value of information in exchange. There is a direct value for some information. Information has value either in itself (such as music or software) or because of its value for facilitating predictions. It can also have an exchange value.

Systematically determine valuation by: Accuracy, completeness, availability.

Organizations which manage personal information.

Three ways to value information: Market value, Income value. Replacement value

Measuring the value with "valuation". Each of these components can be extended. Management of personal private information.

Management of the asset of information.

Difficulty of extracting information from people. This is the problem of tacit knowledge that we have considered earlier (7.3.4).

8.13.2. Knowledge Institutions

Media, publishing, and now search engines (8.12.5), are part of the knowledge economy. Manufacturing is less of a factor for the post-industrial society. There is a shift from manufacturing to a service and knowledge economy. Creating values for encouraging innovation such as encouraging research and higher education^[79]. Universities and libraries overlap with and often function as cultural institutions (5.9.3). Intellectual property plays a key role in a knowledge economy. Creating virtual organizations (5.7.3). Entrepreneurship versus detachment in scholarship. Economic impact of universities and other knowledge institutions^[44]. The use of knowledge in society^[52]. Subverting information institutions. Academic integrity and reputation.

Knowledge businesses and profits.



Figure 8.80: Andrew Carnegie donated library buildings to towns across the world. Here is a Carnegie library building which is part of the New York Public Library system. (check permission)

Earlier, we considered memory institutions and cultural institutions such as museums (5.9.3). Here we consider institutions which facilitate knowledge creation and dissemination such as universities, museums, and libraries.

Information policies for knowledge institutions. Determining the value of libraries (7.2.1). Research universities.

Universities

Information creation and transmission. Scholarship (9.0.0). Scholarly communities (9.1.1).

Supporting systematic and neutral discourse. Universities are known as highly political environments, some organizational structures may reduce the politics and encourage scholarship and teaching.

Universities generally realize that scholars need to be able to explore ideas that may be unpopular so they allow latitude to explore ideas under the heading of academic freedom. Debates about the appropriate scope of academic freedom.

Scholarship should be grounded in the world but also separate from the pressures of political agendas. Political issues inside and outside the university.

While scholarship is considered integral with teaching at high level, some universities focus especially on research. Universities as research and development centers. It is often felt that university-level teaching should be coupled with research. In some cases, universities have become primarily research institutions which include some teaching. Traditionally universities are institutions which promote and protect scholarly values (9.0.0).

Quality control and policies which lead to strong universities. Avoiding inbreeding by avoiding hiring their own graduates.



Figure 8.81: The University of Bologna was one of the world's first universities. (check permission)

Academic Libraries

As centers of information use and creation information management is central to universities. Traditionally, that role in the university has been carried by the university library. Typically, these provide specialized information resources. Management of scholarly literature. Liaison librarian.

While information management is still essential for universities, the role of libraries is changing.

Academic libraries and institutional repositories.

The institutional policies might define requirements for data storage.

Academic Disciplines

Universities are typically organized around disciplines. Such discipline a particular viewpoint of perspective literally a discipline for analyzing the complexity of the world. Disciplines maybe based on differences of models (e.g., chemistry versus physics) or differences of methods (sociology versus social psychology). This way of organizing academic knowledge is also related to the organization of the Dewey Decimal Classification system. It is generally, believed to be based on emergent concepts though it is also possible to argue that the categories are arbitrary. Some other disciplines such as computer science are based on evolving technologies and business which serves a particular constituency. Professions (5.8.2). Disciplines and levels of emergent properties (1.3.2).

Practitioners of a discipline form a discourse community (5.8.2). They are slow to change and have developed an institutional momentum. Multidisciplinary and interdisciplinary work. Emergence of new disciplines. Universities provide a home to representatives of different scholarly communities (9.1.1).

8.13.3. Businesses Based on Intellectual Property

One of the justifications for intellectual property rights is that they encourage innovators. Here we consider two examples. Balance of factors.

The distribution music has dramatically changed from CDs to downloads over the past few years. Despite the copyright laws, it was too easy to copy music files from the CD. Now, most music sales are from downloads of individual songs which are low cost and relatively easy to manipulate.

Cloud music.

Sentiment analysis. Fan metrics by blog analysis (10.11.2).

A patent protects the commercial use of an idea for a limited time (8.2.2) in return for making that public. This is an example of science policy (9.4.0). It is possible to build an entire business around one or a few key patents. Typically, businesses that are formed around patents have a high investment in research and development, but relatively low production costs. Pharmaceuticals may cost several hundreds of millions of dollars to develop and test, but once they are approved they can be produced relatively cheaply (Fig. 8.82). Although it might seem logical for a patent holder to implement their idea, The patents are not always used directly. Sometimes they can simply be used to block competitors

from developing along the same lines.



Figure 8.82: Simplified path for approval of a new drug. Even with a very careful research effort, each step is costly and has a high rejection rate.

By comparison to the pharmaceutical industry, information technology and information systems companies often have interlocking patents portfolios.

Information resources are powering much of the world’s economy. This trend is likely to continue. Traditional business models must evolve to incorporate the new technological realities that they face. Failure to do so will most likely mean they will become outmoded and be replaced. The management and review of patents can be complex; indeed, specific information systems have been developed for managing patent portfolios. Moreover, because of the value of patents, there has become a great deal of gamesmanship in their processing. Reverse engineering. Patent trolls.

Information goods have supply, demand, and production costs. Not only do information systems, which manage this commodity, affect traditional businesses, the information industry itself is growing rapidly. Typically, these are non-rival goods (8.7.2) and in many cases, they are perishable goods.

The value of information, like other goods, is dependent on the demand. An algorithm that can predict stock market changes would have a huge demand, and hence, would be extremely valuable. The same can be said for a hit song. Typically, however, information goods have a high cost of development and a low cost of duplication. This alters their value, in the economic sense. Information goods are different from many physical goods, such as a food or an automobile, in that they can be replicated. It is difficult to sell a good if that same good can be had for free — duplication limits the amount of money that can be made from information goods. In terms of information systems, In terms of the dimensions of goods we discussed earlier; information goods can be “excludable”(8.7.2). It is often possible, though in many cases difficult, to control access to them.

Information goods can be exchanged in “knowledge markets”. That is, knowledge can be traded between people. Given the fact that anyone seeking out an information resource for a particular subject is not going to be an expert in that field (else, why seek it out) or have the time to become one, a certain amount of trust is required. Information providers such as newspapers, universities, and Web sites may try to create a reputation for quality information (5.2.2). Scholarly publishing and the exchange of information (9.1.1).

Markets work best when when both sides have full information about the products and services. A buyer of a used car rarely knows as much about it as the seller. That is they have asymmetric information. One result of this is that the price of used cars may be less that their true value because the buyers are cautious. It’s also the case that buyers are sometimes fooled and buy a car with many problems.

When only one organization controls information, there is an information monopoly, it can be provoked by an individual or an organization within a knowledge market. If it is more profitable to retain

information than it is to share it — for example, in the case of asymmetric information for negotiation (3.4.1) — then the information may remain hidden^[9]. Knowledge markets are also accompanied by knowledge gamesmanship which may, of course, include deception (5.3.3). Signaling provides an indication of confidence for contracts, such as an indication of educational credentials Limited use content such as music and book downloads. Fits with genres. Linked to production of information resources ((sec:informationproduction)).

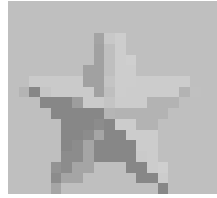


Figure 8.83: Ecosystem of information resources.

Value of general knowledge versus factual knowledge. There are often several ways of learning something so some of the advantage is convenience. Related question of the value of an education.

8.13.4. Publishing and Distributing Information Goods

Content is valuable. There are several ways an information good may be disseminated but the most typical traditional business is through publication. For many media types. Media industry. Book industry.

Publishing is literally making a work public — in the information world, to share is to publish. There are many models for the profitable publication of information, and more are devised every day. We will discuss several of them. Publishing is a social institution that goes beyond simple distribution. It also implies quality because the publisher puts its reputation behind it. Some publishers will publish anything for which they are paid. Because individual of use this type of publisher when their material doesn't reach the quality standards of other publishers, these are called vanity presses.

Publishing is changing, dramatically. The cost of distributing digital information is small compared to traditional methods of distribution. As a result, the distinction between formal and informal publications is breaking down. It is now, in a sense, possible for everybody to be a publisher — the threshold, economically at least, is much lower. The role of traditional publishers is declining; however, traditional information resources can also reap the rewards of lower costs. Digital convergence encourages multi-channel distribution of content the combining of traditional text publishing and new media. The information industry has spurred the growth of large media companies, such as cable TV and newspaper businesses, that can take advantage of this digital convergence. There are many business models that can be utilized to offer high-quality publications that are researched, created, reviewed, and designed by professionals, all for a competitive price. Managing intellectual property. Production asset management. Digital supply chain services. Magazines. Constraints and implications of media business models.

Publishing Platforms

Beyond libraries, data linking has been proposed across the broader Web. Open data (9.6.4). Wikipedia and related projects such as Wikimedia and Wikidata.

Semantic Publishing Semantic descriptions of content can be useful for organizing the material in web publications.

One of the keys is the description of distinct entities. URI FOAF can be used for a personal URI.

Micro-formats. RDFa.

Structuring layouts.

Example vCard and hCard formats. Rich snippets. Advertising.

Web-based publishing platforms. Workflows for web publishing.

Reusing content works better than re-use of code.

Standards for annotations across platforms.

Applicable to scholarly communication ((sec:scholarlycommunication)).

8.13.5. Business Models for Publishing

Dissemination of information, but also a business.

One common method of securing payment for an information resource is the subscription-based publication model. Simply put, a person orders a subscription and issues start to be delivered after the bill is paid. There is a finite term length involved in the subscription-based model; by paying a predetermined fee, a customer is entitled to utilize the service for a predetermined amount of time. This method can be applied to digital content as well by providing the user with a password that is licensed for a specified period. Paywall.

Another method that publishers of all sorts are using capitalizes on the fact that authors and creators want their materials to be seen by the public. In this model, the author and publisher share many of the costs of publication. An author may pay page charges for things such as color, excessive complexity, or open-access. An author may also pay for the entire publication process in exchange for access to the publisher's already established marketing infrastructure and experience. The author would then be reimbursed on a per-view basis, with the publisher receiving a portion of the profit. This requires the formulation of a "cost per access" rate for the publication in question. The demand for publications, however, is often elastic; that is, setting the per-view cost too high will discourage people from accessing it (8.7.2)^[64].

The recording industry has also been coping with similar changes in distribution. It is easy to make perfect copies of digital objects such as MP3 songs and videos on DVDs. Consumers are being confronted with the choice of paying money for material that they can obtain for free by file swapping. This is transforming the music industry much like electronic publishing is transforming the publishing business.

One response has been to try to strengthen digital rights management (8.2.4) and prosecute those who violate the established law. Other responses include limited licenses, or the voluntary relinquishing of certain rights normally associated with copyright. This allows artists to choose the level of copyright that they deem desirable. The copyright to some material is owned by larger organizations such as movie studios or record labels. It remains to be seen in what direction these entities will move to adjust to the development of new technologies. In general, there appear to be two general options available to these industries: the first is to attempt to enforce the existing interpretation of copyright law, and to monitor and control the development of new technologies. The second way is to revise the copyright law and artist contracts to reflect new business models.

Sometimes free distribution of content can stimulate interest by heightening awareness. Bands such as the Grateful Dead and Phish typically did not focus on protecting the intellectual property of their songs, instead allowing free copying and distribution of their material in order to widely disperse their music and build a loyal base of fans. Most of the revenue for these bands came from concert ticket sales and other merchandising endeavors. Music linked to advertising.

Other information resources revolve around information brokering, or the collection (not the creation) of existing information and its distribution. Aggregators are information distributors that collect information from many different sources and provide access to it through a single portal. Search engines are information brokers. Others might develop a "shopping model," which makes a direct connection

between the producer of the product and the consumer. Because so many of these services are offered for free, it is difficult to charge for their use. Most information resources of this type obtain money in two ways: sponsorship and advertising. Some free services may be offered, or partially sponsored, through a larger organization. This gives the larger organization publicity, and associates their name with a commonly used service. The other way that services is through advertising. Companies will pay the service to run advertisements on their website. These may be based on a flat rate or counted per-click. Copyright is inter-twined with traditional publishing but, perhaps, fundamental changes are needed.

Focused advertising.

Scholarly publishing (9.1.1). Open content initiative. Open access is one part of that. Value to research from availability of open-access materials.

8.13.6. Books, Printing, and Print Culture

Printing

Medium of information presentation. Earlier revolution in information transmission infrastructure. Bibliometrics (9.1.3).



Figure 8.84: Scroll to codex to eReader. (check permission)

Many coordination widgets (2.5.5) have been developed to support access to the contents of books. Page numbers, tables of contents, indexes. Using table of contents and indices.

Communication and diffusion among printers and intellectuals through letters and books. This is a type of social network.

These changes are somewhat analogous to the extend of changes we are experiencing today with the introduction of digital technologies. The changes in printing technology also had a number of less obvious impacts such as changes is the significance of authorship.

Generations of print technology. Publishing (8.13.4). (Fig. 8.85).

2400 BC	Earliest surviving papyrus scrolls.
295	Alexandria Library founded.
c. 370	Rome estimated to have 28 libraries.
1041-48	Movable type from an amalgam of clay and glue developed in China.
1373	Bibliothèque Nationale founded in Lyons.
1456	Gutenberg prints Bible with metal type.
1702	First daily English newspaper, Daily Courant. Survives 30 years.
1709	Copyright Act limits terms of copyright protection in England.
1812	Koenig perfects first steam-powered, flat-bed-and cylinder press.
1959	Xerox markets first xerographic copier.
1975	IBM introduces first laser printer.

Figure 8.85: Timeline of some significant events in printing and publishing. (check permission)

Printing changed culture. Originally, printing was primarily used for the Bible, to novels, to paperbacks. Reading aids added to books.^[1] Books and the rise of science. Laws surrounding the distribution of books and newspapers also changed.

Non-fiction. Recording and sharing ideas^[47]

Indeed, there was an extended series of changes. Page turning in books.

eReaders and Structured Formats. Combine content and systems. Social reading and reading on mobile devices. Architecture of the WWW. Links, Anchors, Mappings. Difficulty of adding annotations to an eReader. Coordination widgets (2.5.5).

E-book standards. EPUB. Content licenses and library business models. Interacting with eBooks. Coordination widgets.

Print Culture

Fan bases for other types of media such as games (11.7.3). Culture associated with the printed word. Although rare books appear almost entirely in library, their preservation is related to archives.

Document communities (5.8.2) such as bookclubs. Social implications of printing. Media conservation. Book clubs. Film groups. Comicon.

Reading experience records. Bibliophiles are people who love books. Typically, this includes not only the content but also the craftsmanship of the book. Type face. Preservation of books and of Web pages (7.5.5). Online reading communities.

8.13.7. News



Figure 8.86: Generations of news media: A) Town crier, B) Newspaper, C) Television, and D) Twitter. (check permission)

News gives people a view of what goes on in the rest of the world. It helps individual relate to their world. Publishing news is a special publishing business. Dissemination of news via the particular advertising model. online newspapers and news searching (10.11.2) and news publishing. In a complex society, there is a need to disseminate current events. News functionality versus news distribution. Text processing of news (10.11.2). News as entertainment. News as empathy (5.5.3). News and newspapers.

Ecosystem of systematic information production.

Word-of-mouth from friends. Perhaps from social media.

Structure and organization of news. Broadcast news versus interactive news. Diversity of opinions.

News focuses the public's attention on issues. However, this focus can also create a bias.

News versus newspapers. Newspapers are rich reflections of their community.

News frames and the impact of news on public discourse (8.4.3).

Novelty scores for news. Personalization and recommender systems. What new over what you did not know before.

Policies for Journalism

Principles: Journalistic style. Citing sources.

News reporting. Investigative journalism.

Neutrality versus advocacy.

Silencing journalists for political advantage. News collection and dissemination has changed dramatically.

Greater emphasis on taking a political stand in contemporary. There is a suggestion that this may be due to newspapers shifting place in the news ecosystem. By line and opinion pieces.

Yellow journalism emphasizes sensationalism.

Social structure which supports the news.

News organizations and responsible behavior. Presumably, the details need to be specified better.

Role of the editor.

Journalistic Practices Covering a range of perspectives.

Anonymous sources.

Difficulty of providing object reporting (1.6.2).

Credibility is important for most publishers. Reputation (5.2.2). Reputation for providing unbiased information. Trusting the credibility of a publisher.

An honest broker has no stake either way in the outcome of a transaction. Honest broker of information.

Some of this is due to professionalism of the journalist. Reports should have multiple independent sources of news for confirmation. There is a need for independent observations. For instance, this helps to uncover corruption and abuse by government and organizational officials. Less investigative journalism because it is expensive and traditional news is being challenged by Internet publishing.

Nonetheless, news is subjective and news media have a great deal of influence over public discourse (8.4.3). Newspapers also serve a community information role beyond news reporting.

Policies and practices are helpful for effective freedom of the press [?]. Shield laws protect journalists from having to reveal their sources.

Journalistic ethics. Report conflict of interest.

Reporters may be told about an event but they generally can't be confident without additional evidence. Usually two sources are required. As an additional step in quality control, even simple assertions are double checked before an article goes to press.



Figure 8.87: There is some feedback about the accuracy of political commentary such as these indicators from politifact.com. Such fact checking itself is subjective. (check permission)

“Errata” also serve to establish good practices by showing allegiance to accuracy rather than image, and a desire to acknowledge mistakes in an effort to avoid them in the future.

Errata example.

Authority of sources. Reporters notes.

Political operatives posing as journalists.

Citizen Journalism

Citizens rather than professional journalists. Citizen journalism. Levels of integration of citizen journalism with traditional newspapers. Investigative crowd-sourcing. Hyper-local news blogs. Function of news. Providing information to citizens in society in a cheap way.

Blogs are commentary. Social media journalists.

Hyper-local news blog. Networks of local news blogs. Revenue sharing of blogs.

Bottom-up news stories. News and other content, generated by search.

People often turn to micro-blogs for updates about fast-breaking news stories.

Processing and Searching News Text

News is distinct from other types of content. Characteristics of a news search engine. News search (10.11.2). The content to be searched may change rapidly. Indeed, the reader's expectations about what should be returned by a search may be changing as the story develops. Very different from

Personalization of newspapers.

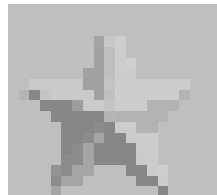


Figure 8.88: Media-space map for news. (check permission)

Production and Distribution of News Newsroom workflow.

Effect of information technology on news. Twenty-four hour news cycle. The allows for a different type of access by viewers. Rather than accessing a newspaper once a day, the users can sample the news stream when they can.

News business models. News, many other mass information services has been supported by advertising. However, Internet distribution of news has changed the parameters of that model.

Broadcast news often does not handle complex issues very well. Video news release.

Writing stories to be highly ranked by news search engines.

Paper production versus electronic distribution. News provides information that can be of both personal and community interest. News services usually deliver data as soon as possible after the events they report occur; some content, such as daily cartoon strips, is of lower priority. News also has a social context. We depend on news outlets to maintain at least some objectivity in their reporting, based on the standards of journalism that have been established (1.4.3).

News agencies.

Streaming and morphing into content.

News as an example of dynamic content. Importance of news media that is independent from the government.

Preservation of news.

Business models for news. Paywall. Aggregators and search engines. Many-to-many distribution model.

8.13.8. Software Publishing and Distribution

Software is similar in many ways to other information resources. Like other information goods, it generally has a high fixed cost of development, low incremental costs (updates), and is easy to duplicate.

Apps as software distribution.

Software Licensing and Contracts

Software is a type of intellectual property and commercial software generally licensed. Beyond sales, software vendors have developed a strategy of selling a base system that needs customization. Thus, they get ongoing income from that customization and from are likely to improve lifecycle management.

Software may be protected by copyright and this is often used as the basis of software licensing agreements. Software companies use patents to protect their intellectual property (8.2.2).

Most commercial software is also protected by contracts when it is sold. A contract may allow one user at a time to access the software, or it may be a site license, which permits use by an entire facility. Digital rights management (DRM) (8.2.4). A variety of new mechanisms for accessing software are being developed. In a networked environment, software may be downloaded from the network as needed and may even be charged for on a per-use basis. This is determined with an End user licensing agreement (EULA).

Software development is techniques are described in (6.5.2). Locked down development platforms versus open development environments.

Open-Source Software

Open-source software goes beyond freeware in providing access to the source code. This makes it easily customizable. Because the software was distributed free in the first place, its creators (and all those who have modified it) wish to prohibit any one person from making a profit from it, To guarantee it remains open source, most open-source software has a license (Fig. 8.89) and this is similar to other types of commons movements (8.2.2, 10.3.2). Libre software and the four freedoms Fig. 8.90.

You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program. You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.



Figure 8.89: The first part of the GNU open-source software license and Gnu project open-source project logo. (check permission)

Free and open source software (FOSS). Open source software can be less vulnerable to bugs or embedded malicious software because each component of it can be inspected and discussed but it may have a slow and unpredictable development of new features. Non-monetary incentives. While this is an appealing

1.	The freedom to run the program for any purpose.
2.	The freedom to study how the program works, and change it to make it do what you wish.
3.	The freedom to redistribute copies so you can help your neighbor.
4.	The freedom to improve the program, and release your improvements (and modified versions in general) to the public, so that the whole community benefits.

Figure 8.90: Four senses in which software may be free [?].

model in many ways, it is impractical for complex large scale or time-critical projects. Some companies contribute their employees time to develop open source software. There is often some mix of open and closed software is projects. Ultimately open source may drive out closed-source software for some applications.

Indexing Software

Difficulty of finding code in a repository. Software libraries (7.9.3). Indexing software^[54]. Reuse.

Software preservation (7.5.5).

8.14. Innovation

8.14.1. How Startups Work

8.14.2. Innovation Networks and Ecosystems

Innovation ecosystem. Silicon Valley as a culture of entrepreneurship. Silicon Valley. Based on entrepreneurship.

Entrepreneurial commons. Sharing ideas and resources in innovation. It has several aspects that make it unique. Accumulated know-how, infrastructure, and resources. This is also related to a industrial commons which is based on manufacturing. Concentration of parts in in a supply chain region.

Research and development (8.12.3).

Innovation is often motivated by competition. User-centered innovation groups. Role of a stable legal framework such as intellectual property. Business to develop ideas. Incubators and knowledge sharing.

Effects of factors such education and government support on innovation.

Role of information for encouraging innovation.

Synergies, specialization, and patents. Role of information resources. Bibliometrics on patents for telling us about innovations.

Open innovation. Management of innovation. Organized research laboratories. Supporting hunches.

Cities as Innovation Hubs

The world is not entirely flat (8.9.2)in terms of innovation. Some areas still have a distinct advantage. Specialization provides distinctive expertise and that allows for productive collaborations. People tend to be more collaborative in cities. The social networks are tighter. Can networked collaboration substitute for proximity. Critical mass.

Science parks, Communities of practice (5.8.2).

Innovation in emerging markets.

Entrepreneurship: Building a Business

Many businesses are built primarily with an idea which identifies a market niche and then hard work. Growing businesses, or businesses with grander ambitions often start with a business plan. Many

information-based businesses are supported with venture capital. Building a business is a different challenge from running an ongoing business. Collecting resources. Return on Investment (ROI) Analysis of costs and return.

Fast fail.

Competitive advantage. Information systems have allowed the development of many new businesses. Being the first to develop a new product can give a “first mover advantage”. For instance, there can be brand-specific training. However, being a first-mover is not always a great advantage because it often expends a lot of resources. Economy of scale. Protection of intellectual property (8.13.3). Introducing new products. Installed base.

Small business. Evolution of the business. Agency theory. Stewardship and succession.

Information entrepreneurs.

8.14.3. Creativity

People in innovation environments.

Serendipity (3.2.3).

8.15. Media

We have encountered aspects of media throughout this text. Like many other terms we have encountered, the term “media” is ambiguous. We will explore the transmission of information by different media in later chapters but here we consider general principles which apply across media. Information resources and entertainment. This is certainly not intended as an exhaustive overview of the topic. Media policy.

Media disseminates culture (5.8.2). Media spreads cohesion. We have already encountered many aspects of media such as the discussion of media and violence, (5.9.4) and media and imitation^[67], and media business models. Media in this sense often refers to commercial media. Analyze the media industry (8.13.4).

Media focuses attention and amplifies individual messages. Persuasive power of the media. In part, this simply by the physical properties of the delivery medium. The relationship between the “medium and the message”^[62]. Hot media. Surfing. Global village.

Media systems and the relationship between news media and the political systems in which they exist [?].

Why are people entertained by media. Infotainment. Media entertainment theory^[10]. Coordinating and controlling publicity. The role of media in shaping public discourse (8.4.3).

Demassification of Media. The development of new information technology, particularly that of the World Wide Web, has increased citizen participation in media. It is now possible for a single individual, through their webpage or Blog, to reach an audience of literally millions of people every day. Conversely, it is also possible for a single person to access virtually any type of information source, from any location in the world. The “mass media,” as it is commonly known, is a reference to the big media outlets. Traditionally, these organizations have competed with one another to be the main source of information for the country. This competition led to a particular type of demographic targeting — that of the “average” person.

The competition offered by the internet’s ability to access a virtually infinite number of disparate news sources has led some to speculate about the decline of the mass media. While this decline may well have begun the mass media is still the primary source of news and information for most people. This is an aspect of “mass personalization”. There are many ways of communicating to an audience, rather audience members can interact. Customization.

8.15.1. Media in People's Lives

Information Storm. Obsession with apparently trivial news items.

Television. Synergy of Internet and television Time shifted TV. Interactive TV services.

Syndication of TV shows.

Engagement with content.

8.15.2. Creativity and Content Ownership

Music. South Park.

Direct internet delivery.

Exercises

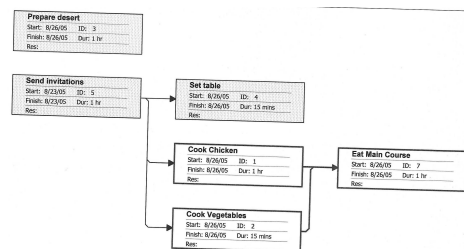
Short Definitions:

1 st Amendment, U.S. Constitution	Disintermediation	Open-Source Software
4 th Amendment, U.S. Constitution	Due process	Orphan works
Academic freedom	Economies of scale	Parody
Administration	Elastic price	Piracy
Affordance	EULA	Privacy
Aggregators	Externalities	Productivity
Auction	Fair use	Public domain
Business cycle	First sale	Public good
Business model	FOIA	Public-key encryption
Business-to-business (B2B)	Fraud	Public sector information systems
Case law	Freeware	Rationality
Cease and desist	Intellectual property	Regulatory creep
Censorship	Information disaster	Return on Investment
Clicks-and-mortar (retail)	Infringement (copyright)	Reverse engineering
Collusion (business)	Just-in-time manufacturing	Royalty (copyright)
Common carrier	Knowledge economy	Slander
Contract	Knowledge market	Social protocol
Core competency	Libel	Steganography
Copy identification	Logistics	Supply chain
Critical path	Macroeconomics	Transaction cost
Customer relationship management	Market	Watermark
Derivative work	Matrix management	Work-breakdown structure
Digital Encryption Standard(DES)	Micro-payment	
Digital rights management	Moral right	
	Network effect	

Review Questions:

1. Do current U.S. intellectual property laws allow people to own facts? Explain. (8.2.0)
2. What are the four legally protected types of intellectual property in the U.S.? (8.2.0)
3. If you invented a new type of computer hardware, what type of intellectual property protection would be most appropriate for protecting it? (8.2.0)
4. What parts of a movie based on a traditional fairy tale can be copyrighted? (8.2.0)
5. Distinguish between plagiarism and copyright violation. Is every case of plagiarism a copyright violation? (5.12.3, 8.2.2)
6. How are intellectual property rights related to “terms and conditions” of use. (8.2.4)
7. Distinguish between “privacy” and “anonymity”. (8.3.1)
8. Distinguish between “identification” and “authentication”. (8.3.4, -A.13.1)
9. Describe some of the potential problems in electronic voting systems. (8.4.3)
10. What are some of the pros and cons of direct democracy? (8.4.3)
11. Describe your school’s policy on the Internet access for students. (8.5.1)
12. Explain how “policy” is different from “law”. (8.5.1)

13. What are some of the ways that information affects economics? (8.7.0)
14. How many combinations or pair-wise communication links are possible for a set of 10 people? (8.7.2)
15. Give additional examples for each of the cells of Table 8.45. (8.7.2)
16. Explain what we mean by different “types of money”. What would happen if you couldn’t trust any banks? (8.7.3)
17. (a) How do Web-based map and route finding services help to increase productivity. (b) Can you estimate how much they improved productivity? (8.8.1)
18. What is the productivity of a country for which the GDP is \$10B and 100M hours are worked per year? (8.8.1)
19. What are some ways information systems might improve productivity? What are some of the obstacles to getting potential productivity benefits from information systems? (8.8.1)
20. Are emotional responses rational? (4.6.0, 8.8.3)
21. Is everything a person does rational? After all, anything that person does can be taken to show subjective utility? (8.8.3)
22. Is rationality an ideal to be achieved or a description of what people actually do? (8.8.3)
23. Read a standards statement and discuss those pros and cons. (8.11.3)
24. What management strategies (8.11.1) might you adopt when
 - a) you are developing a piece of software.
 - b) merging two companies with different organizational cultures.
25. Would it make sense to run an automobile manufacturing plant with project management techniques? (8.11.3)
26. Calculate the slack time for the project shown in the following PERT chart: (8.11.3)



27. Distinguish between “management” and “administration”, and “governance”. (7.10.0, 8.11.4)
28. Describe some of the ways that information systems can streamline business processes. (8.12.5)
29. How is “marketing” different from “advertising”? (8.12.5)
30. Why is it important for a newspaper to clearly distinguish between news and paid advertisements? (8.13.7)

Short-Essays and Hand-Worked Problems:

1. Some countries seem to believe that economic development can occur without democracy. What do you think? (8.1.0)
2. To what extent would the following be protected by freedom of speech in the First Amendment? (8.1.0):
 - a) Disrupting a speech by shouting down the speaker.
 - b) Handing out leaflets inside a shopping mall without approval of the owner of the shopping mall.
3. Give an example of harm done from too tight control of information. Give an example of harm done from too lax control of information. (8.1.0)
4. Can a new dress design be protected by our current intellectual property laws? (8.2.0)
5. How are notions of intellectual property similar to or different from our notion of physical property? (8.2.0).
6. Describe what might happen if ideas, rather than the expression of those ideas, were allowed to be copyrighted.(8.2.2)
7. Take a position pro or con on the following statement: The duration of U.S. copyright protection should be extended from 100 years to 150 years. (8.2.2)
8. What are the difficulties in using copyright to protect novel computer chip designs? (8.2.2)
9. Find an example of an apparent copyright violation and judge it by the criterion of “fair use”. (8.2.2)
10. In a recent case, a trademark was claimed for the phrase “fair and balanced” with respect to a news program. The claim was withdrawn. Why might that have happened? (8.2.2).
11. What are the pros and cons of compulsory licenses for copyrighted materials? (8.2.2).
12. How do privacy policies affect the information management in your organization? (7.3.1, 8.3.1)
13. What are the policies of your university or company regarding the privacy of your electronic communications and Web site access? (8.3.1)
14. List as many different databases as you can find in which your name included. (8.3.1)
15. Contrast the definition of privacy as “any unwanted intrusion” with the legal protection given by the Fourth Amendment to the U.S. Constitution. (8.3.1)

16. What are some of the privacy concerns in the protection of medical records? Specifically, what privacy requirements would you want for patient data on a doctor's PDA? (8.3.1)
17. If you worked for a large company where you ran a server and you had no ethical or legal concerns, what data would you want to collect about a person's Internet usage to help you sell products to them? If you did have ethical concerns, what data would you collect? (8.3.1)
18. Because it is so easy to collect electronic information, it has been proposed that all information should be made public. Do you agree? (8.3.1)
19. How will you conduct a security audit of an electronic voting system? (7.10.3, 8.4.3)
20. What are some steps that you might take to enhance the chance for the acceptance of a policy? (8.5.1)
21. Describe how you would go about developing a policy managing the following information resource (8.5.1):
Confidential plans for a new product to be developed by your company.
22. List four reasons in support and four reasons opposed to the following policy statements (8.5.1):
 - a) There will always be inequality among people so the digital divide is inevitable.
 - b) Information systems are a foundation for a modern society, therefore it should be a priority to introduce them in developing societies.
23. Are the following effective policy statements? Why or why not? (8.5.1):
 - a) Automobiles should pay per mile for highway use. This should be accomplished with GIS-based location technologies.
 - b)
24. Describe a Web page (or Web site) which would provide legal information for ordinary consumers. (8.5.4)
25. Is demand artificially distorted by advertising? (4.3.4, 8.7.2)
26. What are some of the ways freedom of information facilitates the elimination of political and economic corruption? (8.1.0, 8.4.1, 8.7.2)
27. Give an example of how supply and demand affect the value of information. (8.7.2)
28. Compare credit cards payments with micro-payments. (8.7.3)
29. If you were the manager of a corporation, what procedure would you adopt to determine the optimal level of spending on information systems? (8.8.1)
30. What are the difficulties of analysis of system as the sum of its components rather than as whole? (8.11.0)
31. How is "leadership" different from "management"? (8.11.0)
32. What are some of the advantages and limitations of matrix management? (8.11.1)
33. What documentation would be most useful for project management? (8.11.3)
34. What kind of organizational structure would be most appropriate for the following projects (5.7.1, 8.11.3):
 - a) Research and Development.
 - b) Manufacturing.
35. What types of information are conveyed by product branding? (5.2.2, 8.11.4)
36. What techniques would you employ to protect and develop a brand name? (5.2.2, 8.11.4)
37. What is the business model for a private university versus a public university? (8.11.4)
38. Why can supply chain management be difficult to implement effectively? (8.12.1)
39. Develop supply chain diagrams for (a) a light bulb and (b) a newspaper. (8.12.1)
40. Analyze B2B XML tools as socio-technical artifacts. (8.8.2, 8.12.4)
41. A project management effort requires a project team. If you worked for a bank, who would be logical members of a team to develop a lessons-learned database about problems with customer service requests? (8.11.3, 8.12.5)
42. Describe the considerations for a customer relationship management tool. What are some of the tradeoffs required? (8.12.5).
43. Suppose your job was to provide information resources for your workgroup. Investigate and report the licensing costs and conditions (8.13.3) for: (a) an online encyclopedia, (b) financial data that would be useful for competitive intelligence, (c) a digital library.
44. Public libraries in the U.S. are traditionally paid for by taxes. How could you measure whether there is a fair return on the taxes? What other strategies might there be for funding libraries? (7.9.0, 8.13.5)
45. A library fine for a traditional lending library serves to discourage patrons from keeping books out too long but too high a fine can eventually discourage a patron from returning the book at all. What would you argue is the level for a library fine in your town public library? (8.13.5)
46. Compare the way three different newspapers report a news story. What accounts for the difference? (8.13.7)
47. Why is metadata even more useful for software libraries than for text libraries? (2.4.0, 7.9.3, 8.13.8)
48. Why are "networking effects" important in software publishing. Give an example. (8.7.2, 8.13.8)
49. What policies are needed for a software company to manage different releases of its software. (8.13.8)

Practicum:

1. Establish business plan.
2. Describe the information flows and services in your own organization.
3. Pick a standards document. (a) Describe the standard it proposes. (b) Describe the possible pros and cons of the standard.

Going Beyond:

1. How would you measure the level of “freedom of information” in a society? (8.1.0)
2. Compare two countries in how they control information. (8.1.0)
3. Does freedom of information in markets necessarily lead to freedom of information in political systems? (8.1.0)
4. Although it allows some anti-social statements to be made, freedom of speech seems to lead to a stable society. Why is that? (8.1.0)
5. Should the concept of “first sale” apply to digital copies such as downloads of songs? (8.2.2)
6. What is optimal duration for copyright? (8.2.2).
7. How does the notion of copyright serving as an incentive to creativity fit with the number of years granted for that copyright? (8.2.2).
8. The concept of “fair use” is complicated when applied to electronic materials. Separate publications could apply fair use for distinct parts of the original work. These could then be re-synthesized back to the original document. Should the fair use provision be modified? (8.2.2)
9. Is a dress designer protected by intellectual property laws if somebody else makes a “knock-off” of a dress design?(8.2.2)
10. What would the implications be for consumers in the uncontrolled use of trademarks? (8.2.2)
11. It has been proposed that the principle of first sale should be abandon because it is so easy to make copies that the owners are likely to copy and resell a resource – effectively short-changing the creator of the resource. Do you agree this problem needs to be fixed? (8.2.2)
12. Explain how fair use could be managed by a digital rights management server. (8.2.2, 8.2.4)
13. Conduct a patent search. (8.2.2, 8.13.3)
14. Describe a digital watermark scheme. Implement it. Describe what sort of attacks it would prevent. (8.2.5)
15. Give an example of the need to balance between privacy and security concerns. (8.3.1)
16. How would society adapt if “privacy is dead”? (8.3.1).
17. How are principles of privacy affected by cultural traditions? (8.3.1)
18. In the United States, private companies can intercept the email of the employees but cannot tap the employee’s telephone. What do you think the right balance should be? (8.3.1)
19. Given a budget of \$50, determine how much personal information about yourself you could find on the Internet. (8.3.1)
20. Are video surveillance cameras effective at deterring crime? (8.3.3)
21. What is social justice? What is economic justice? (Give a definition, not an example.) (8.4.1)
22. Until about 1985, the U.S. Government tried to control encryption technologies. Why did it do that? Why did it stop? (8.4.1, -A.13.1)
23. In electronic voting the identity of the person who casts a ballot needs to be hidden. How can the be reconciled with the need to track and audit the system’s performance? (8.4.3)
24. Write a statement for the use of the Web by your children. (8.5.1)
25. How can the regulatory process be corrupted? How can that corruption be minimized? (8.5.1).
26. Compare the efficiency in distributed computation and distributed control in economic systems? (7.7.1, 8.7.0)
27. How is speculation different from investment? (8.7.0)
28. Is economics a science? Do you agree with the economic principle that people act primarily in their self interest? (8.7.0, 9.2.1)
29. Relate the discussion of information system management to the application of externalities. (1.5.2, 8.7.2)
30. Does the stock market accurately reflect the value of companies list on it? (8.7.2)
31. Do markets encourage honesty in companies to encourage the trust of investors? (8.7.2)
32. If markets are facilitated by freedom of information, what are the economic consequences of authoritarian governments which control information. (8.7.2)
33. The government is generally not as efficient as commercial businesses. Why is that? (8.7.2)
34. Should all tickets for entertainment events be sold by auction (8.7.2)
35. What has the effect of the Web been for travel agents? Has there been a similar impact on real-estate agents? Why is there a difference? (8.7.2)
36. Should money reflect social value? How could it be made better at doing this? (8.7.3)
37. Identify and explain a digital payment system *not* described in this book. (8.7.3)
38. How important in a stable economic system for individuals? What factors make the system stable? (8.7.4)

39. Find the productivity rates for three other countries than the U.S. Propose why you think there are differences. (8.8.1)
40. Is it rational to be altruistic? (8.8.3)
41. How is the management of for profit businesses different from the management of not-for-profit organizations? (8.11.0)
42. Explain how procedures for managing complexity apply to organization design and re-engineering. (7.7.1, 8.11.2)
43. Compare the procedures and strategies of BPM and TQM. (8.11.2)
44. Develop a business model for an information service or Website. (8.13.5)
45. Print, read, and comment on an end-user software license. (8.13.8)
46. A popular business model for software companies around 1990 was to stimulate demand by giving away one component (e.g., a web browser) and then charge for the server. Compare the success of Adobe and its distribution of Acrobat and Netscape with its Web browser. (8.13.8)
47. What are the pros and cons of the open-source software model? (8.13.8)
48. Open source software appears to violate profit-oriented business practices. Why is that? (8.13.8)
49. If the knowledge economy is robust? How concerned should we be about to decline of manufacturing jobs? (8.13.8)
50. Should universities ever block content on the Web from students and staff? (8.1.3, 8.13.2)

Teaching Notes

Objectives and Skills: The chapter introduces social and policy issues that relate to information systems. These include a discussion of business models and intellectual property.

Instructor Strategies: This long chapter could be split into two sections: social policy and issues (Sections 8.1 to 8.4) and economics (Sections 8.5 to 8.9)

Related Books

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- CHANDLER, A.D. AND CORDATA, J.W. EDS. *A Nation Transformed by Information: How Information Has Shaped the United States from Colonial Times to the Present*. Oxford University Press, New York, 2000.
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- NEUMANN, P.G. *Computer-Related Risks*. Addison-Wesley, Boston, 1995.
- PEREZ, C. *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. Edward Elgar Press, Cheltenham UK, 2003.
- RAZGAITIS, R. *Valuation and Pricing of Technology-based Intellectual Property*. Wiley, New York, 2003.
- SCHON, D.A., SANYD, B., AND MITCHELL, W.J. *High-Technology and Low Income*. MIT Press, Cambridge MA, 1999.
- STEIGLITZ, K. *Snipers, Shills, and Sharks: eBay and Human Behavior*. Princeton University Press, Princeton NJ, 2007
- SULLIVAN N.P. *You Can Hear Me Now: How Microloans and Cell Phones are Connecting the World's Poor to the Global Economy*. Jossey Bass, Indianapolis IN, 2007.