Business and Engineering

- Engineers are more involved in business management than ever.
  - Startup companies.
  - Integrated product development cycles.
  - Biotech and e-commerce raise new ethical issues.

- Engineers are increasingly exposed to issues of business ethics.
Today’s Topics

- Professional Ethics
- Quality and Safety
- Intellectual Property
- International Business Ethics
Professional Ethics

• Professionals:
  – are experts;
  – use expertise responsibility;
  – belong to a professional order.

• Why professions?
  – Easier to identify competence.
  – Can identify incompetence before it is too late.
  – Engineering clearly needs professionalism.
Professional Ethics

- Professional obligations are narrower than ethical duties in general.
  - The whole point of a profession is to establish a reputation (and live up to it).
  - Professional conduct is what the reputation leads people to expect.
  - Determining professional obligation is more a matter of sociology than ethics.
“Professional” duties of business managers and directors have been narrowly construed.

- Strictly a *fiduciary* duty to owners (investors, stockholders).
- Fiduciary duty is strictly *financial* - make lots of money. Not allowed to think about ethics if it impedes profit.
- This protects fiduciaries from frivolous lawsuits.
Duties of Managers

• Abuses of 1980’s created a backlash.
  – Rampant plant closings to relocate offshore.
  – Downsizing out of control.

• “Stakeholder” theory developed.
  – A business has duties to employees, customers, community as well as owners.
  – But how are these duties reconciled?
Duties of Managers

• A broader conception of fiduciary duty.
  – Managers and directors represent owners with respect to their ethical duty as well as their financial interests.
  – Some states (e.g., Pennsylvania) recognize a corporate charter that allows directors to consider ethical issues.
Quality and Safety

- How to balance quality and safety against cost?
- How safe is safe?
- What to do when managers want to cut corners?
The new competitive environment

- Lack of trade barriers stiffen global competition.
- Lean manufacturing now a necessity.
- Small lot sizes, setup times, inventory levels.
- Rapid product development cycles.
The Business View

• If the firm can’t compete, managers will get the blame.
• Quality and safety raise the price of the product.
  – Ideally, the consumer decides how to balance quality and safety against cost.
  – But quality and safety often cannot be evaluated until long after the purchase.
The Business View

• So there is market failure. The government and engineering profession must step in.
  – Trademarks.
  – Safety regulations.
  – Product liability suits.
  – Professional codes and standards.

• Engineers help shape the environment in which the manager must compete.
What are a company’s legal duties to customers?

Three theories of product liability:
- Contractual theory.
- Due care theory (primarily Europe).
- Strict liability (USA).

Larger projects are governed by tort law.
Product Liability

• Contractual theory.
  – A product must be fit for the purpose for which it is sold (otherwise, failure of consideration).
    • Uniform Commercial Code develops this into concept of implied warranty.
    • Usually not overridden by express warranty, unless sold “as is.”
  – An unsafe product is unfit for its purpose.
Product Liability

– Seller is liable only for contractual damages, and not any other harm the buyer may suffer.
– There may be further penalties if fraud is involved.
Product Liability

• Due Care Theory (Europe)
  – Product manufacture must meet standards set by statute.
  – Seller is liable for harm caused by defects only if standards were not met.
  – Origin of ISO standards.
Product Liability

– Justification: purely contractual damages don’t provide manufacturer enough incentive to be diligent.

– Justification: contractual theory assumes that parties are well informed, impossible for complex products.
Product Liability

• Strict liability (USA)
  – Manufacturer is liable for any damages caused by product defects.
  – This applies no matter how careful the manufacturer is.
  – Evolved out of U.S. case law, not statute.
  – Justification: regulations cannot keep up with innovative, high-tech industry.
Projects

• Quality of work governed by contract law.
  – Contract usually lists specifications.
  – It states that project will be completed in “workmanlike manner,” which is defined by professional practice and codes, public expectations.
  – Firms that ask engineers for substandard work can be sued for breach of contract.
Projects

- Safety governed by tort law.
  - A firm that builds an unsafe bridge or heart valve can be held liable for damages if it is negligent.
  - Negligence is lack of due care, as defined by professional codes and practices, and public expectations.
  - Negligence can be criminal if it involves reckless disregard for safety.
The Engineer’s Duty

- An engineer’s professional obligation is defined by the profession’s reputation.
  - This is reflected in legal standards, professional codes and public expectations.
  - Varies across cultures (Volvo vs. Ferrari).
  - Example: 1999 earthquake in Turkey.
The Engineer’s Duty

- Engineers are also bound by obligations that apply to human beings in general.
  - Should one practice engineering at all?
  - It is adequate merely to meet public expectations?
  - What happens when there are no clear standards or expectations (e.g., Challenger case)?
Whistle Blowing

• What is the engineer’s duty when the firm behaves unethically?
• Options:
  – Blow the whistle, internally or publicly.
  – Resign.
  – Keep quiet and do what the company wants.
Whistle Blowing

• Some considerations:
  – Whistle-blowing (especially external) is typically traumatic for the employee and often ineffective.
  – Resignation may violate mutual obligations of employer and employee.
    • Look at the converse: should firm fire an unethical employee or try to correct him/her?
    • Perhaps an unethical firm has already violated its duties to employees.
Intellectual Property
Intellectual Property

• As designers, engineers do little but create intellectual property.
• Biotech and computing have complicated the issues.
Legally, intellectual property is:
- A patented invention.
- A trade secret.
- Copyrighted material.
Patents

• A patent grants the owner exclusive rights for 17 years in exchange for public disclosure of the invention.
  – One cannot patent a pure idea, such as a mathematical theorem.
  – One can patent a method, product, apparatus, composition of matter, design for article of commerce, certain kinds of plant.
  – An algorithm or computer code is a “method.”
– One cannot patent anything that occurs in nature.
– One cannot patent a “way of doing business.”
– The disclosure must be specific enough to allow a person skilled in the art to re-create and use the invention.
The invention must be:

- Useful
- Novel
  - Not known or used in the USA prior to patent application.
  - Not patented or published outside the USA more than one year prior to application.
- Unobvious
  - The idea was not obvious to one skilled in the art at the time of invention.
• A trade secret is a secret formula, pattern or device that is used in a business and provides a commercial advantage.
  – A trade secret lasts forever (not just 17 years) or until the secret gets out.
    • Coca-Cola formula.
  – While the law prohibits others from using a patented invention (without permission), it only prohibits others from stealing a trade secret.
Trade Secrets

- Stealing a trade secret is misappropriation of intellectual property, a crime.
- It is OK to create a trade secret independently and use it.
- Reverse engineering is not theft of a trade secret.
A copyright limits the number of copies one can make of a document or work of art without permission.

- Copyrights held by individuals last 50 years beyond owner’s lifetime.
- Ideas cannot be copyrighted.
- Only particular expressions of ideas are subject to copyright.
Intellectual Property Ownership

• A patent is registered in the name of the inventor, but another person or corporation can own it.

• A person working “for hire” must turn over ownership to the employer.
  – “For hire” = the person hired is not being paid for a specific product but for any job-related output.
Intellectual Property Ownership

– A full-time employee works for hire.
  • Company has rights to any job-related ideas, even if developed at home in the garage.
  • 3-M employee who invented post-it notes for his church choir had to turn over rights to the company.

– Consultants may or may not work for hire.
  • Depends on specifics of contract.
Intellectual Property Ownership

– A Ph.D. student who is “hired” to write a particular algorithm does not work for hire.
  • The student has rights to the algorithm, unless there is an agreement to the contrary.

– A professor’s output under a government grant is governed by the conditions of the award.

– By tradition, a professor retains rights to scholarly books and articles.
  • But universities can and sometimes do modify these rights in the employment contract.
Intellectual Property Rights

• What can an inventor do about lack of rights? Not much.
  – Make sure patent is registered in inventor’s name.
  – Mention patents in articles and grant proposals.
  – Negotiate an employment contract that rewards invention.
  – Buy the company.
Software

- Software ownership went through several stages that involved both patent and copyright law.
  - The key issue was whether an algorithm is a pure idea.
Software

• It is now recognized that an algorithm or software design can be patented as a method or process.
  – Machine code or source code can be copyrighted.
  – Software that implements a procedure once done by hand may not be patentable if it automates a “way of doing business.”
Software

• One cannot patent or copyright the “look and feel” of a user interface.
  – This allows for standardization across vendors.
  – Microsoft/Apple, Lotus/Borland.
Patenting Life

• One cannot patent an organism that occurs in nature.

• However, one can patent a genetically altered organism.
  – U.S. Supreme Court, Diamond v Chakrabarty, 1980.
  – One gets credit for the entire organism after tinkering with its DNA.
Patenting Life

Disclosure requirement limits generality of patent.

- Philip Leder patented genetically engineered mouse that contains cancer-causing genes, and any similar mouse.

- “Similar mouse” must be engineered according to the technique disclosed in Leder’s patent application (Jeremy Rifkin notwithstanding).
Neemix Case Study

• W. R. Grace patented neemix, derived from seeds of neem tree, which grows naturally in India.

• Patent was challenged on two general grounds:
  – Neem seeds are natural and belong to everyone.
  – Neem extracts and their effects are traditional knowledge in Indian culture.
Can Grace patent a substance that occurs in neem seeds?

- No. They cannot patent anything that occurs in nature.
- Grace patented a more stable form of neem seed extract.
Neemix Case Study

- Can Grace patent a neem extract that is traditional knowledge in India?
  - Not in India. They didn’t try.
  - They got a U.S. patent because
    - the extract had not been known or used in the USA prior to the patent application
    - The extract had not been patented, nor the idea published, in India a year or more prior to the patent application.
Suppose patents extended across international boundaries.

- Neither U.S. nor Indian companies would be able to patent traditional Indian knowledge.
- But U.S. companies would be entitled to video royalties in India.
- First-world intellectual property would have the advantage.
Ownership of Genetic Material

Is it right to view genetic material as intellectual property?

- Traditional property systems recognize several types of property and limit exchange.
- We do this in a limited way now: laws against prostitution; food stamps, frequent flyer benefits.
Ownership of Genetic Material

– Historically, economic systems have moved in a direction of total exchangeability.
  • Abolition of chattel slavery was a notable exception.
– Economists argue that restrictions on exchange simply lead to black markets.
  • For example, food stamps.
– However, electronic verification can limit exchangeability.
  • For example, frequent flyer miles.
Ownership of Genetic Material

- Michael Walzer argues that limits on exchangeability promote justice.

- Perhaps it is again time to scale back property rights, as was done with slavery?
  - There is no problem of a black market.
  - But this removes part of the incentive to invest in genetic engineering.
Ownership of Genetic Material

• A compromise:
  – If genetic or other engineering creates a product with *new effects*, allow patent protection.
  – Otherwise allow commercialization without patent protection.
  – Thus Neemix would not receive patent protection.
  – In the meantime, work toward a more just system of property ownership.
International Business Ethics

- Engineering projects are frequently international.
  - Engineers find themselves working and doing business with people of different cultural backgrounds.
International Business Ethics

• While Westerners believe that everyone is or should be basically the same, cultures differ fundamentally.
  – The key to working in a multicultural setting is to acknowledge the possibility and legitimacy of radically different approaches to life.
International Business Ethics

- Will focus here on:
  - “Corruption”-- kickbacks, cronyism, nepotism, bribes.
    - These are corrupting in the West; may or may not be corrupting elsewhere.
    - Other systems can be corrupted, but in different ways.
  - Women in business.
    - Westerners notice the difference, because it is a high-profile issue back home.
• Kickbacks
  – A purchasing agent may receive payments from a supplier in exchange for a contract.
  – This is corrupt in the West because it implies conflict of interest.
  • The purchaser is supposed to consider the company’s interest, not his/her own.
  • Decisions are based on transparency: the bids, information about the bidders, etc.
– In another system, one does business with a person, not a company.
  • Business is based on a long-term relationship that builds trust.
  • When there are problems, it is no use to call a lawyer. One must rely on the relationship.
  • It is therefore in the company’s interest for the agent to build these relationships. There is no conflict of interest.
Corruption

• The kickback makes it clear that the seller is serious about the relationship. If he has invested in the relationship, he is unlikely to disappear when there are problems.

– In some parts of the world, kickbacks are written into the contract.

• A curious result of imposing the foreign idea of a written contract.

• A contract presupposes a universal framework of rules and justice, in which most cultures do not believe.
Corruption

• Cronyism
  – In most of the world, one lets contracts to one’s friends.
    • Guanxi in China.
    • Bonds of affection and friendship in Latin America.
    • Old-boy networks in Japan and Korea.
  – It is anything but transparent.
    • It may be insulting to ask a business partner for accounting data, because it implies lack of trust.
Corruption

- In much of the world, cronyism provides the social glue that makes business possible.
  - Great civilizations thrived on this system for millennia.
  - The Asian financial crisis resulted largely from lack of cronyism, not the reverse. (China and Taiwan were largely unscathed.)
  - Cronyism reflects ethical sensibilities that are less developed in the West -- honor, loyalty to friends, sensitivity to needs of associates.
Corruption

• Nepotism
  – Your associates may ask you to employ their relatives.
    • This is often unethical in the West due to conflict of interest.
    • It is standard practice in much of the world.
Corruption

In many cultures nepotism has advantages.

- The boss is intimately aware of abilities and can assign duties accordingly.
- Duties are determined more by direct supervision than written job descriptions.
- The authority of an elder family member can induce relatives to produce more than others with greater talent.

The main reason for nepotism is the primacy of the family.
Corruption

• Bribes
  – Definition varies.
    • Many view a kickback as a “commission,” not a bribe.
    • A thank-you gift may be viewed as gratitude rather than bribery, even if there is some quid-pro-quo.
  – Consequences vary.
    • In China, bribery can be punished with death by firing squad.
    • In Turkey, the police ask you to pay them a bribe.
Corruption

– Frequency varies.
  • In Singapore, no one dares.
  • In China, it is ubiquitous.

– Bribery may or may not be corrupting.
  • In South Korea, executives give white envelopes full of cash to government officials as a normal part of doing business.
    – The bribe assures the government official that the executive will abide by regulations to avoid losing a relationship in which he has invested.
    – Not necessarily corrupting, although exposure brings loss of face.
Corruption

- In Japan, bribery is corrupting because it undermines group loyalty.
- In China, it is corrupting because it shortcuts *guanxi* and weakens government power.
- In Malaysia and Indonesia, unclear.
- In Russia and eastern Europe, an unmitigated evil.
- In Africa, bribes so inflate the cost of doing business that the economy is crippled.
- In India, government officials could not subsist without side payments.
Corruption

– U.S. Foreign Corrupt Practices Act forbids bribery of government officials in other countries.
  • Does not forbid payments to business people.
  • Does not forbid paying extortion money or facilitating payments.
  • Forbids what is already illegal in most of the world.
  • Is only occasionally enforced.

– In any event, bribery is risky.
Women in Business

• The case study “Foreign Assignment” describes a female bank manager in the USA who requests a transfer to Mexico City.
  – She encounters patronizing attitudes from coworkers and lack of respect from clients.
  – She decides to resist rather than acquiesce.
  – She receives lukewarm evaluations, and her career becomes bogged down.
Women in Business

• To reject or try to change cultural traits implies a judgment.
  – Westerners are notorious for passing judgment, due to a strong tendency to universalize their own point of view.
  – It is best to understand behavior in its larger context first.
Women in Business

• In this case, *machismo* is at issue.
  – It emphasizes manly honor and has historical roots in Moorish Spain.
  – It is a stress control mechanism that gives men a sense of control over their fate.
    • Historically Latin American men faced a life of violence and danger.
    • By using any means to take charge, violence if necessary, men regained a sense of control over their lives.
Women in Business

• This made a virtue of necessity. One could face danger with courage and honor, like a man, rather than give in to fear.

  – The flip side is Marianisma.

  • Patronizing attitude toward women does not imply that they are inferior; only that they have a different role.

  • They are morally superior and deserve protection.

  • What U.S. women regard as demeaning, traditional Latina women accept as a sign of respect.
Women in Business

• In recent times, *machismo* in upper classes has become devotion to family.
  – A Mexican businessman puts his family first.
  – Mexicans judge a good family man as a man of honor and therefore trustworthy in business.
  – This contrasts with U.S. business, which often demands total commitment, as though families did not exist.
  – U.S. business people might envy this aspect of *machismo*. 
The Western habit of viewing cultures as simply more or less advanced is inadequate.

- Different cultures solve life’s problems in different ways and make different tradeoffs.
- A culture develops some aspects of human potential while suppressing others.
- One benefit of working in another culture is the opportunity to bring out a side of one’s character that would be inappropriate at home.

Women in Business