

Modules Linking to Computing Cases

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C O N N E X I O N S

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Chapter 1

Case Study Modules

1.1 Toysmart Case Exercises - Student Module¹

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Figure 1.1: This is an example of an embedded link. (Go to "Files" tab to delete this file and replace it with your own files.)

1.1.1 Introduction

In this module you will study a real world ethical problem, the Toysmart case, and employ frameworks based on the software development cycle to (1) specify ethical and technical problems, (2) generate solutions that integrate ethical value, (3) test these solutions, and (4) implement them over situation-based constraints. This module will provide you with an opportunity to practice integrating ethical considerations into real

¹This content is available online at <<http://cnx.org/content/m14789/1.9/>>.

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world decision-making and problem-solving in business and computing. This whole approach is based on an analogy between ethics and design (Whitbeck).

Large real world cases like Toysmart pivot around crucial decision points. You will take on the role of one of the participants in the Toysmart case and problem-solve in teams from one of three decision points. Problem-solving in the real world requires perseverance, moral creativity, moral imagination, and reasonableness; one appropriates these skills through practice in different contexts. Designing and implementing solutions requires identifying conflicting values and interests, balancing them in creative and dynamic solutions, overcoming technical limits, and responding creatively to real world constraints.

Each decision point requires that you take up the position of a participant in the case and work through decision-making frameworks from his or her perspective. You may be tempted to back out and adopt an evaluative posture from which to judge the participants. Resist this temptation. This module is specifically designed to give you practice in making real world decisions. These skills emerge when you role play from one of the standpoints within the case. You will learn that decision-making requires taking stock of one's situation from within a clearly defined standpoint and then accepting responsibility for what arises from within that standpoint.

Cases such as Toysmart are challenging because of the large amount of information gathering and sorting they require. Moral imagination responds to this challenge by providing different framings that help to filter out irrelevant data and structure what remains. Framing plays a central role in problem specification. For example, Toysmart could be framed as the need to develop more effective software to help negotiate the exchange of information online. In this case, a software programming expert would be brought in to improve P3P programs. Or it could be framed as a legal problem that requires amending the Bankruptcy Code. What is important at this stage is that you and your group experiment with multiple framings of the case around your decision point. This makes it possible to open up avenues of solution that would not be possible under one framing.

Tackling large cases in small teams also helps develop the communication and collaboration skills that are required for group work. Take time to develop strategies for dividing the work load among your team members. The trick is to distribute equally but, at the same time, to assign tasks according to the different abilities of your team members. Some individuals are better at research while others excel in interviewing or writing. Also, make sure to set aside time when you finish for integrating your work with that of your teammates. Start by quickly reviewing the information available on the case. This is called "scoping the case." Then formulate specific questions to focus further research on information relevant to your problem solving efforts. This includes information pertinent to constructing a socio-technical analysis, identifying key "embedded" ethical issues, and uncovering existing best and worst practices.

A case narrative, STS (socio-technical system) description, and two ethical reflections have been published at <http://computingcases.org>. This module also links to websites on bankruptcy and privacy law, the Model Business Corporation Act, consumer privacy information, and the TRUSTe website.

1.1.1.1 Toysmart Narrative

Toysmart was a Disney-supported company that sold educational toys online from December 1998 to May 2000. After disappointing Christmas sales in 1999, Disney withdrew its financial support. The greatly weakened dot-com company lasted less than a year after this. On May 22, 2000, Toysmart announced that it was closing down and brought in a consulting firm, The Recovery Group, to evaluate its assets, including a customer data base of 260,000 profiles, each worth up to \$500.

Fierce opposition emerged when Toysmart placed ads in the **Wall Street Journal** and the **Boston Globe** to sell this data base. Customer interest groups pointed out that Toysmart had promised not to share customer information with third parties. Toysmart also prominently displayed the TRUSTe seal which testified further to the company's obligations to respect customer privacy and security. Selling this data to third parties would break Toysmart promises, violate TRUSTe policies, and undermine consumer confidence in the security and privacy of online transactions. Toysmart's obligations to its customers came into direct conflict with its financial obligations to its investors and creditors.

TRUSTe reported Toysmart's intention to sell its data base to the FTC (Federal Trade Commission) who on July 10, 2000 filed a complaint "seeking injunctive and declaratory relief to prevent the sale of confidential, personal customer information" (FTC article) Toysmart's promise never to share customer PII with third parties provided the legal foundation for this complaint. According to the FTC, Toysmart "violated Section 5 of the FTC Act by misrepresenting to customers that personal information would **never** be shared with third parties, then disclosing, selling, or offering that information for sale." Finally, because it collected data from children under 13 who entered various contests offered on its website, Toysmart was also cited for violating the Children's Online Privacy Protection Act or COPPA.

The FTC reached a settlement with Toysmart. The bankrupt dot-com must "file an order in the bankruptcy court prohibiting the sale of its customer data as a 'stand-alone asset'. In other words, the rights bundled in the liquidation and sale of Toysmart did not include the liberty of buyers to dispose of the asset in whatever way they saw fit. According to the negotiated settlement, buyers were bound by the commitments and promises of the original owners. Toysmart creditors "can sell electronic assets only if the purchasing company abided by the same privacy policy." In essence, the FTC asked Toysmart creditors to honor the spirit, if not the letter, of Toysmart's original promise to its customers not to sell their PII to third parties. Creditors now had to guarantee that (1) the buyer had the same basic values as Toysmart (for example, a commitment to selling quality, educational toys), (2) the buyer use the data in the same way that Toysmart had promised to use it when collecting it, and (3) the buyer would not transfer the information to third parties without customer consent. In this way, the settlement proposed to protect Toysmart customer privacy interests while allowing creditors to recover their losses through the sale of the bankrupt company's "crown jewel", its customer data base.

On August 17, 2000, the Federal Bankruptcy Court declined to accept the Toysmart-FTC settlement. Instead, they argued that Toysmart and the FTC should wait to see if any parties willing to buy the data base would come forward. The Bankruptcy Court felt that potential buyers would be scared off by the FTC suit and the pre-existing obligations created by Toysmart promises and TRUSTe standards. Should a buyer come forth, then they would evaluate the buyer's offer in terms of the FTC-Toysmart settlement designed to honor the privacy and security commitments made to Toysmart customers.

A final settlement was reached on January 10, 2001. When a buyer did not come forward, Buena Vista Toy Company, a Disney Internet subsidiary who was also a major Toysmart creditor, agreed to buy the data base for \$50,000 with the understanding that it would be immediately destroyed. The data base was then deleted and affidavits were provided to this effect.

1.1.1.2 Toysmart Chronology

Time Line

1997	David Lord, former college football player, come to work for Holt Education Outlet in Waltham, Mass.
December 1998	Lord and Stan Fung (Zero Stage Capital) buy Holt Education Outlet and rename it "Toysmart." (Lorek) Toysmart focuses on providing customers with access to 75,000 toys through online catalogue. (Nashelsky).
<i>continued on next page</i>	

August 1999	Toysmart turns down a 25 million offer from an investment firm. Accepts Disney offer of 20 million in cash and 25 million in advertising,
September 1999	Toysmart post privacy policy which promises not to release information collected on customers to third parties. At about this time, Toysmart receives permission from TRUSTe to display its seal certifying that Toysmart has adopted TRUSTe procedures for protecting privacy and maintaining information security.
Christmas 1999	After disappointing Christmas toy sales, Disney withdraws its support from Toysmart.
April 2000	COPPA goes into effect. (Childhood Online Privacy Protection Act) Prohibits soliciting information from children under 13 without parental consent.
June 2000 (approximately)	Toysmart erases 1500 to 2000 customer profiles from data base to comply with COPPA (information collected after law went into effect)
May 22, 2000	Toysmart announces that it is closing its operations and selling its assets. Its initial intention is to reorganize and start over.
June 9, 2000	Toysmart creditors file an involuntary bankruptcy petition rejecting Toysmart proposal to reorganize. They petition the U.S. Trustee to form a Creditors Committee to oversee the liquidation of Toysmart assets.
June 23, 2000	Toysmart consents to involuntary bankruptcy petition. Files Chapter 11 bankruptcy. It rejects reorganization and works with lawyers and the Recovery Group to liquidate its assets.
June 2000	Recovery Group analyzes Toysmart assets and identifies its customer information data base as one of its most valuable assets (a "crown jewel")
June 9, 2000	Disney subsidiary, acting as Toysmart creditor, places ads in Wall Street Journal and Boston Globe offer Toysmart customer data base for sale.
<i>continued on next page</i>	

After June 9, 2000	TRUSTe discovers Toysmart ad. Informs FTC (Federal Trade Commission) that selling of customer data base to third parties violates TRUSTe guidelines and violates Toysmart's promises to customers(13,2)
July 10, 2000	FTC files complaint against Toysmart "seeking injunctive and declaratory relief to prevent the sale of confidential, personal customer information." District attorneys of 41 states also participate in complaint against Toysmart.
July 27, 2000	Hearing by U.S. Bankruptcy Court on Toysmart case. Includes Toysmart proposal to sell customer data base.
Late July 2000	FTC and Toysmart reach settlement. Toysmart can only sell customer information to a third party who shares Toysmart values and agrees to carry out same privacy policy as Toysmart.
Late July 2000	Federal bankruptcy court rejects FTC and Toysmart settlement. Suggests waiting to see if a buyer comes forth.
January 10, 2001	Walt Disney Internet subsidiary (Buena Vista Toy Company?) pays Toysmart \$50,000 for its data base. Toysmart then destroys the data base and provides confirming affidavit.(18,2)

Table 1.1: Chronology of Toysmart Case

Insert paragraph text here.

1.1.1.3 Supporting Documents and Tables

Toysmart Creditors

Creditor	Description	Debt	Impact
Zero Stage Capital	Venture Capital Firm	4 million	
Citibank		4 million	
Arnold Communications		2.5 million	
Children's Television Workshop		1.3 million	
<i>continued on next page</i>			

Data Connections	Set up high speed cable and fiber optics for Toysmart	85,000	Data Connections took out loan to keep solvent
Integrated Handling Concepts	Set up packaging and handling system for Toysmart	40,000	Requires dot-coms to pay up front after Toysmart experience
Blackstone	Software business	45,000	"It puts us in jeopardy as well"
PAN Communications	"Public relations agency specializing in e-business"	171,390	Turns down deals with dot-com companies and requires up-front payments

Table 1.2: Source Lorek

Insert paragraph text here.

1.1.1.4 Intermediate Moral Concept: Informed Consent

Concept and Definition

- **Informed Consent:** The risk bearer consents to taking on the risk on the basis of a complete understanding of its nature and breadth.
- **Belmont Report:** "subjects, to the degree that they are capable, be given the opportunity to choose what shall or shall not happen to them."
- "This opportunity is provided when adequate standards for informed consent are satisfied."
- Quotes take from Belmont Report

Arguments for Free and Informed Consent as a Moral Right

- Free and informed consent is **essential** for the exercise of moral autonomy. Absence implies force, fraud, or manipulation all of which block the exercise of moral autonomy.
- The **standard threat** occurs when crucial risk information is not communicated to risk taker. This could be because the risk taker cannot appreciate the risk, because the mode of communication is inadequate, or because the information has been covered up. Given this standard threat, free and informed consent is **vulnerable**; it must be protected.
- Informed consent must be shaped around its feasibility, that is, the ability of the duty holder to recognize and respect this right in others. If private individuals exercise their right as a veto, then they can block socially beneficial projects. There are also serious problems concerning children, mentally challenged adults, and future generations. Finally, it may not be possible or feasible to know all risks in advance.

Conditions for Recognizing and Respecting Right

- From **Belmont Report**
- **Information:** research procedure, their purposes, risks and anticipated benefits, alternative procedures (where therapy is involved), and a statement offering the subject the opportunity to ask questions and to withdraw at any time from the research.
- **Comprehension:** manner and context in which information is conveyed is as important as the information itself.
- **Voluntariness:** an agreement to participate in research constitutes a valid consent only if voluntarily given. This element of informed consent requires conditions free of coercion and undue influence.

Other Legal and Moral Frameworks

- Institutional Research Boards or IRBs now require documentation of informed consent on research projects carried out under the university's auspices. This is in response to requirements by granting agencies such as the National Institute for Health and the National Science Foundation.
- **Consenting to the transfer of PII (personal identifying information) online:**opt-in and opt-out.
- **Opt-in:** Information is transferred only upon obtaining express consent. Default is not transferring information.
- **Opt-in:** Information transfer is halted only when person to whom information applies does something positive, i.e., refuses to consent to transfer. Default is on transferring the information.
- **Liability Rules and Property Rules:** These also have to do with consent. Sagoff makes this distinction with reference to activities that have an impact on the environment. an injunction referring to liability rules stops the activity to protect the individual who proves impact. Property rules require only that the producer of the environmental impact compensate the one who suffers the impact.

Cases Employing Informed Consent

- **Therac-25:** Patients receiving radiation therapy should be made aware of the risks involved with treatment by the machine. Free and informed consent is involved when shutting down the machines to investigate accident reports or continuing operating the machines while investigating accident reports. In both cases, it is necessary, under this right, to let patients know what is going on and their risks.
- **Toysmart Case:** Toysmart creditors are about to violate Toysmart's promise not to transfer customer information profiles to third parties. This transfer can occur, morally, but only with the express consent of the customers who have provided the information. The devil is in the details. Do opt-in or opt-out procedures best recognize and respect free and informed consent in this case?
- **Hughes Case:** Hughes customers want their chips right away and are pressuring Saia and crowd to deliver them. Would they consent to renegotiating the conditions under which environmental tests can be skipped?

1.1.2 Privacy and Property Summaries

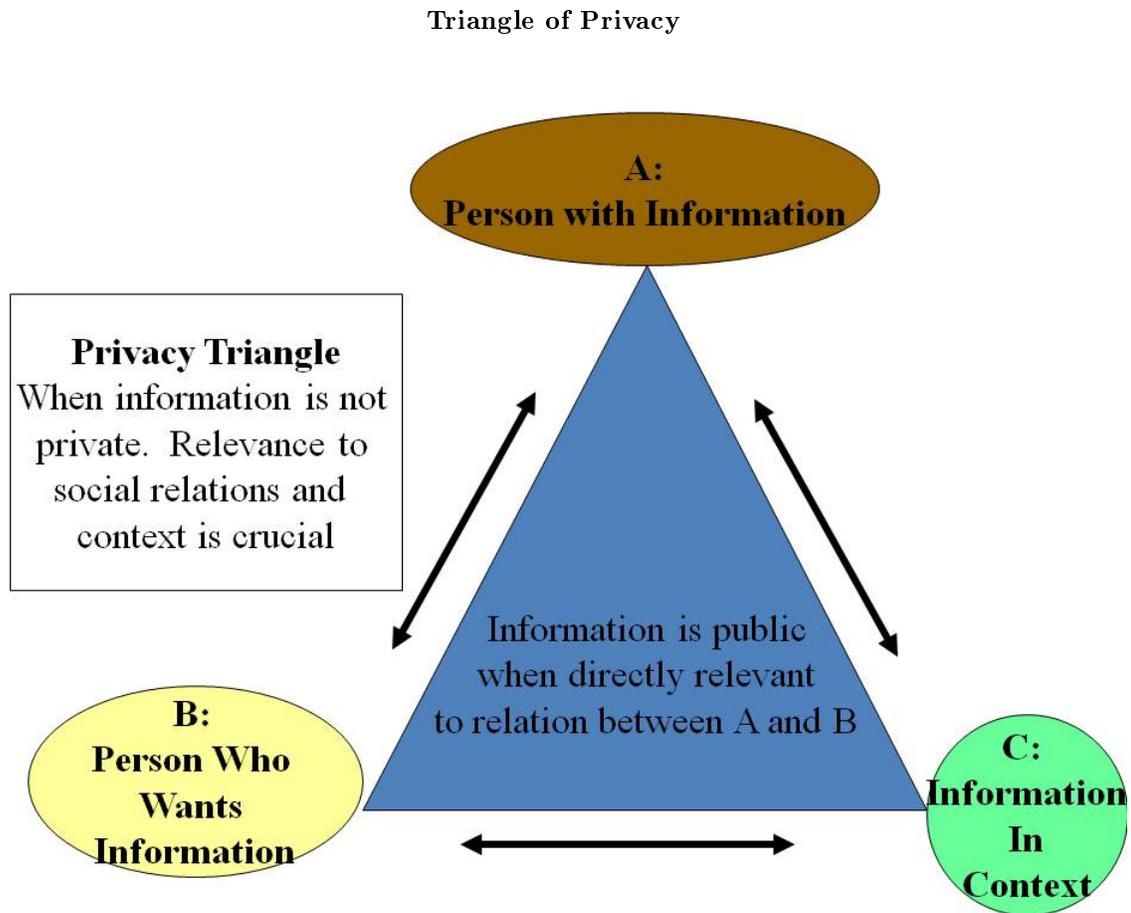


Figure 1.2: Seeing privacy in its STS Context.

Intellectual Property

- I own that with which I mix my labor
- The US constitution attempts to balance two contradictory policies of property
 - Giving innovators and inventors control to encourage more innovation
 - Limiting this control to ensure dissemination of good ideas throughout society
- One way to do this: bundle different liberties under property
 - possess, control, use, benefit from, dispose of, and exclude others
- Another way to do this is to create and balance two things
 - Intellectual commons: shared repository of ideas
 - Legal devices to restrict dissemination and use of property: patents, copyright, trade secrets
 - Control/ Adjustment: extending-contracting terms limits
- Intellectual property is different from physical property
 - Ideas are non-rivalrous (like one candle lighting another)
 - Ideas are non-excludable (like the air which cannot be contained in one restricted area)
 - These two characteristics make ideas “ideal” for forming an “intellectual commons”

Figure 1.3: Summary of issues on Intellectual Property

Bibliographical Note

The triangle of privacy is widely disseminated in the literature of business ethics. The author first became aware of it from George G Brenkert (1981) "Privacy, Polygraphs and Work," **Business and Professional Ethics** 1, Fall 1981" 19-34. Information on intellectual property comes from Lawrence Lessig (2006) **Code.2**, Basic Books: Chapter 10.

1.1.3 What you need to know . . .

1.1.3.1 What you need to know about socio-technical systems

1. **STS have seven broad components: hardware, software, physical surroundings, people/groups/roles, procedures, laws, and data/data structures.**

2. **Socio-technical systems embody values**

- These include moral values like safety, privacy, property, free speech, equity and access, and security. Non-moral values can also be realized in and through Socio Technical Systems such as efficiency, cost-effectiveness, control, sustainability, reliability, and stability.

- Moral values present in Socio Technical Systems can conflict with other embedded moral values; for example, privacy often conflicts with free speech. Non-moral values can conflict with moral values; developing a safe system requires time and money. And, non-moral values can conflict; reliability undermines efficiency and cost effectiveness. This leads to three problems that come from different value conflicts within Socio Technical Systems and between these systems and the technologies that are being integrated into them.
- Mismatches often arise between the values embedded in technologies and the Socio Technical Systems into which they are being integrated. As UNIX was integrated into the University of California Academic Computing STS (see Machado case at Computing Cases), the values of openness and transparency designed into UNIX clashed with the needs of students in the Academic Computing STS at UCI for privacy.
- Technologies being integrated into Socio Technical Systems can magnify, exaggerate, or exacerbate existing value mismatches in the STS. The use of P2P software combined with the ease of digital copying has magnified existing conflicts concerning music and picture copyrights.
- Integrating technologies into STSs produces both immediate and remote consequences and impacts.

3. Socio-technical systems change

- These changes are brought about, in part, by the value mismatches described above. At other times, they result from competing needs and interests brought forth by different stakeholders. For example, bicycle designs, the configuration of typewriter keys, and the design and uses of cellular phones have changed as different users have adapted these technologies to their special requirements.
- These changes also exhibit what sociologists call a “trajectory”, that is, a path of development. Trajectories themselves are subject to normative analysis. For example, some STSs and the technologies integrated into them display a line of development where the STS and the integrated technology are changed and redesigned to support certain social interests. The informing capacities of computing systems, for example, provide information which can be used to improve a manufacturing processes can or to monitor workers for enhancing management power. (See Shoshanna Zuboff, **The Age of the Smart Machine**)
- Trajectories, thus, outline the development of STSs and technologies as these are influenced by internal and external social forces.

In this section, you will learn about this module’s exercises. The required links above provide information on the frameworks used in each section. For example, the Socio-Technical System module provides background information on socio-technical analysis. The "Three Frameworks" module provides a further description of the ethics tests, their pitfalls, and the feasibility test. These exercises will provide step by step instructions on how to work through the decision points presented above.

For more information see Huff and Jawer below.

Decision Point One:

You are David Lord, a former employee of Holt Educational Outlet, a manufacturer of educational toys located in Waltham, Mass. Recently, you have joined with Stan Fung of Zero Stage Capital, a venture capital firm to buy out Holt Educational Outline. After changing its name to Toysmart, you and Fung plan to transform this brick and mortar manufacturer of educational toys into an online firm that will link customers to a vast catalogue of educational, high quality toys. Designing a website to draw in toy customers, linking to information on available toys, setting up a toy distribution and shipping system, and implementing features that allow for safe and secure online toy purchases will require considerable financing. But, riding the crest of the dot-com boom, you have two promising options. First, a venture capital firm has offered you \$20,000,000 for website development, publicity, and other services. Second, Disney has offered the same amount for financing, but has added to it an additional \$25,000,000 in advertising support. Disney has a formidable reputation in this market, a reputation which you can use to trampoline Toysmart into prominence in the growing market in educational toys. However, Disney also has a reputation of micro-managing its partners. Develop a plan for financing your new dot-com.

Things to consider in your decision-making:

1. What are Toysmart values? What are Disney values? Would Disney respect Toysmart's values?
2. What synergies could result from working with Disney? For example, could you share information on customers? You could feed your customer profiles to Disney in exchange for their customer profiles. What kind of data managing technology would be required for this? What ethical problems could arise from transferring customer identifying information to third parties?
3. What kind of commitment would you be willing to make to Disney in terms of product and sales? How should Disney reciprocate? For example, how long should they stick with you through sales that fall short of projections?

Decision Point Two:

You work for Blackstone, "an 18-person software business." You have been asked by Toysmart to provide software the following functions: (1) designing a webpage that would attract customers and communicate Toysmart Values, (2) advise Toysmart on its privacy and data security policy including whether to register with an online trust, security measures to protect customer data during online transactions, and measures to prevent unauthorized access to customer data while stored, and (3) a comprehensive online catalogue that would provide customers with access to educational toys from a variety of small business manufacturers. An example of small toy manufacturers to which Toysmart should be linked is Brio Corporation which manufactures wooden toys such as blocks, trains, and trucks. Develop general recommendations for Toysmart around these three areas.

Information for this scenario comes from Laura Lorek, "When Toysmart Broke," <http://www.zdnet.com/eweek/stories/general/0,1101,2612962,00.html>. Accessed July 16, 2001.

Things to consider in your decision-making

- Toysmart is a fairly new dot-com. While it is supported by Disney, it is still a risky venture. Should you ask them for advance payment for whatever services you render? What kind of policies does your company have for identifying and assessing financial risk?
- What kind of privacy and data security policy should you recommend to Toysmart? What kind of values come into conflict when a company like Toysmart develops and implements privacy and data security measures? (Use your STS description to answer this question.)
- Should Toysmart become bankrupt, their data base would turn into a valuable asset. What recommendations should you make to help Toysmart plan around this possibility? What values come into conflict when planning to dispose of assets during bankruptcy proceedings? What kind of obligations does a company take on during its operation that continue even after it has become bankrupt?
- Using the link provided with this module, visit the TRUSTe website and find its white paper on developing a privacy policy. Evaluate this privacy policy for Toysmart. What benefits can a strong privacy policy bring to a dot-com? Should Toysmart work to qualify to display the TRUSTe seal on its website? Examine TRUSTe procedures for transferring confidential customer PII to third parties? What obligations will this create? Would this over-constrain Toysmart?

Decision Point Three:

You work for PAN Communications and have been providing advertising services for Toysmart. Now you find out that Toysmart has filed a Chapter 11 bankruptcy, and it has an outstanding debt to your company for \$171,390. As a part of this filing procedure, Toysmart has reported its assets at \$10,500,000 with debts of \$29,000,000. Toysmart creditors, including PAN Communications, have petitioned the Office of the United States Trustee for a "Creditors' Committee Solicitation Form." This will allow for the formation of a committee composed of Toysmart creditors who decide on how the assets of the bankrupt firm will be distributed. You, because of your knowledge of bankruptcy and accounting procedures, have been asked to represent your company on this committee. This bleak situation is somewhat remedied by the customer data base that Toysmart compiled during its operation. It contains profiles of the PII (personal identifying information) of 260,000 individuals. Because selling educational toys is profitable, there is a good chance that this data base could be sold for up to \$500 a profile to a third party. Should you recommend selling this data base? Should Toysmart customers be notified of the pending transfer of their PII and, if so, how should they be notified?

Here are some constraints that outline your decision

- As a member of the Creditors' Committee, you have a fiduciary duty to Toysmart creditors in working to distribute fairly the remaining Toysmart assets. This would, all things being equal, lead to recommending selling the Toysmart customer data base
- There are some provisions in the bankruptcy code that may require or allow overriding fiduciary duties given prior legal commitments made by Toysmart. These commitments, in the form of strong privacy guarantees made to customers by Toysmart on its webpage, may constitute an "executory contract." See the Legal Trail table in the Toysmart case narrative and also Larren M. Nashelsky, "On-Line Privacy Collides With Bankruptcy Creditors," New York Law Journal, New York Law Publishing Company, August 28, 2000.
- Finally, Nashelsky makes an interesting argument. While deontological considerations would require setting aside creditor interests and honoring Toysmart privacy promises, a justice-based argument would recommend a compromise. Bankruptcy proceedings start from the fact that harm (financial) has been done. Consequently, the important justice consideration is to distribute fairly the harms involved among the harmed parties. Harm distributions are correlated with benefit distributions. Because Toysmart customers benefited from Toysmart offerings, they should also bear a share of the harms produced when the company goes bankrupt. This requires that they allow the distribution of their PII under certain conditions.

Things to consider in your decision-making

- How do you balance your obligations to PAN with those to other Toysmart creditors as a member of the Creditors' Committee?
- How should you approach the conflict between honoring Toysmart promises and carrying out Creditor Committee fiduciary duties? Do you agree with Nashelsky's argument characterized above?
- Should the Bankruptcy Code be changed to reflect issues such as these? Should privacy promises be considered an "executory contract" that overrides the duty to fairly and exhaustively distribute a company's assets?
- Finally, what do you think about the FTC's recommendation? The Bankruptcy Court's response? The final accommodation between Toysmart and Buena Vista Toy Company?

1.1.4 What you will do ...

In this section, you will learn about this module's exercises. The required links above provide information on the frameworks used in each section. For example, the Socio-Technical System module provides background information on socio-technical analysis. The "Three Frameworks" module provides a further description of the ethics tests, their pitfalls, and the feasibility test. These exercises will provide step by step instructions on how to work through the decision points presented above.

1.1.5 Exercise One: Problem Specification

In this exercise, you will specify the problem using socio-technical analysis. The STS section of the Toysmart Case narrative (found at Computing Cases) provides a good starting point. In the first table, enter the information from the Toysmart case materials pertinent to the general components of a STS, its hardware, software, physical surroundings, people/groups/roles, procedures, laws, data. Some examples taken from the STS description at Computing Cases are provided to get you started. Then, using the second table, identify the values that are embedded in the different components of the STS. For example, PICS (platforms for internet content selection) embody the values of security and privacy. Finally, using the data from your socio-technical analysis, formulate a concise problem statement.

Exercise 1a:

Read the socio-technical system analysis of the Toysmart case at <http://computingcases.org>. Fill in the table below with elements from this analysis that pertain to your decision point.

Socio-Technical System Table

Hardware	Software	Physical Surroundings	People/Groups	Procedures	Laws, Codes, Regulations	Data and Data Structures
Holt Education Outlet	Platforms for Internet Content Selection	Cyber Space	Toysmart the corporation	Buying Toys Online	COPPA	Toysmart Customer Data Base

Table 1.3

Instructions for Table 1:

1. Go to <http://computingcases.org> and review the STS description provided for the Toysmart case.
2. Pull out the elements of the STS description that are relevant to your decision point. List them under the appropriate STS component in the above table.
3. Think about possible ways in which these components of the Toysmart STS interact. For example, what kinds of legal restrictions govern the way data is collected, stored, and disseminated?
4. Develop your STS table with an eye to documenting possible ethical conflicts that can arise and are relevant to your decision point.

Values Embedded by Relevant Software

Software / Value Embedded	PICS (Platforms for Internet Content Selection)	(Platforms for Privacy Preferences)	SSLs (Secured Socket Layers) that encrypt pages asking for SS numbers
Security	Embodies privacy and security by filtering objectionable data. Security selected over free speech.	Integrates property with security and privacy by converting information into property.	Realizes / supports security by sealing off domains of information.
Privacy	Embodies privacy and security by filtering objectionable data. Security selected over free speech.	Integrates property and security by filtering objectionable data. Security selected over free speech.	Realizes and supports privacy by sealing off domains of information.
Property		Integrates property with security and privacy by converting information into property	Realizes and supports property by restricting access (intellectual property protected by excluding non-authorized access.
<i>continued on next page</i>			

Free Speech	Interferes with free speech by filtering content. Content can be filtered with recipient's awareness.	Facilitates by permitting information exchange on model of property exchange. But this limits exchange by assigning it a price.	Restricts access.
Justice (Equity and Access)	Could be used to restrict access to ideas by filtering ideas. Thus it could cut off flow of information into the intellectual commons.	Facilitates by permitting information exchange on model of property exchange. But this limits exchange by assigning it a price.	Because it restricts access to a domain, it can be used to reduce or cut off flow of information into the intellectual commons.

Table 1.4: Values embedded in key software components in the Toysmart case. Emphasis on machine/software negotiation for privacy preferences in Internet transactions.

Exercise 1b

Examine the values embedded in the STS surrounding this decision point. Locate your values under the appropriate component in the Toysmart STS. For example, according to the STS description for Toysmart found at Computing Cases, the software programs prominent in this case embody certain values; SSLs embody security and privacy, P3P property, and PICS privacy. Next, look for areas where key values can come into conflict.

Value Table

Hardware	Software	Physical Surroundings	People/Groups/Institutions	Procedures	Laws/Codes/Regulations	Data Structures
Security						
Privacy						
Property						
Justice (Equity/Access)						
Free Speecy						

Table 1.5

Instructions for Table 2:

1. This module links to another Connexions module, Socio-Technical Systems in Professional Decision-Making. There you will find short profiles of the values listed in the above table: security, privacy, property, justice, and free speech. These profiles will help you to characterize the values listed in the above table.
2. The second ethical reflection in the Toysmart case narrative (at Computing Cases) also contains a discussion of how property comes into conflict with privacy.
3. Identify those components of the Toysmart STS that embody or embed value. For example, list the values realized and frustrated by the software components discussed in the Toysmart case in the STS description.
4. Look for ways in which different elements of the STS that embed value can interact and produce value conflicts. These conflicts are likely sources for problems that you should discuss in your problem statement and address in your solution.

Exercise 1c:

Write out the requirements (ethical and practical) for a good solution. Identify the parts of the STS that need changing. Then, develop a concise summary statement of the central problem your decision point raises. As you design solutions to this problem, you may want to revise this problem statement. Be sure to experiment with different ways of framing this problem.

Harris, Pritchard, and Rabins provide a useful approach to problem specification. See references below.

1.1.6 Exercise Two: Solution Generation

Generate solutions to the problem(s) you have specified in Exercise 1. This requires that...

- each member of your group develop a list of solutions,
- the group combines these individual lists into a group list, and...
- the group reduces this preliminary list to a manageable number of refined and clarified solutions for testing in the next stage.

Helpful Hints for Solution Generation**1. Solution generation requires proficiency in the skills of moral imagination and moral creativity.**

Moral imagination is the ability to open up avenues of solution by framing a problem in different ways. Toysmart could be framed as a technical problem requiring problem-solving skills that integrate ethical considerations into innovative designs. Moral creativity is the ability to formulate non-obvious solutions that integrate ethical considerations over various situational constraints.

2. Problems can be formulated as interest conflicts. In this case different solution options are available.

- **Gather Information.** Many disagreements can be resolved by gathering more information. Because this is the easiest and least painful way of reaching consensus, it is almost always best to start here. Gathering information may not be possible because of different constraints: there may not be enough time, the facts may be too expensive to gather, or the information required goes beyond scientific or technical knowledge. Sometimes gathering more information does not solve the problem but allows for a new, more fruitful formulation of the problem. Harris, Pritchard, and Rabins in *Engineering Ethics: Concepts and Cases* show how solving a factual disagreement allows a more profound conceptual disagreement to emerge.
- **Nolo Contendere.** Nolo Contendere is latin for not opposing or contending. Your interests may conflict with your supervisor but he or she may be too powerful to reason with or oppose. So your only choice here is to give in to his or her interests. The problem with nolo contendere is that non-opposition is often taken as agreement. You may need to document (e.g., through memos) that you disagree with a course of action and that your choosing not to oppose does not indicate agreement.
- **Negotiate.** Good communication and diplomatic skills may make it possible to negotiate a solution that respects the different interests. Value integrative solutions are designed to integrate conflicting values. Compromises allow for partial realization of the conflicting interests. (See the module, **The Ethics of Team Work**, for compromise strategies such as logrolling or bridging.) Sometimes it may be necessary to set aside one's interests for the present with the understanding that these will be taken care of at a later time. This requires trust.
- **Oppose.** If nolo contendere and negotiation are not possible, then opposition may be necessary. Opposition requires marshalling evidence to document one's position persuasively and impartially. It makes use of strategies such as leading an "organizational charge" or "blowing the whistle." For more on whistle-blowing consult the discussion of whistle blowing in the Hughes case that can be found at computing cases.

- **Exit.** Opposition may not be possible if one lacks organizational power or documented evidence. *Nolo contendere* will not suffice if non-opposition implicates one in wrongdoing. Negotiation will not succeed without a necessary basis of trust or a serious value integrative solution. **As a last resort**, one may have to exit from the situation by asking for reassignment or resigning.

3. Solutions can be generated by readjusting different components of the STS.

- **Technical Puzzle.** If the problem is framed as a technical puzzle, then solutions would revolve around developing designs that optimize both ethical and technical specifications, that is, resolve the technical issues and realize ethical value. In this instance, the problem-solver must concentrate on the hardware and software components of the STS.
- **Social Problem.** If the problem is framed as a social problem, then solutions would revolve around changing laws or bringing about systemic reform through political action. This would lead one to focus on the people/groups/roles component (working to social practices) or the legal component.
- **Stakeholder Conflict.** If the problem is framed as a conflict between different stakeholder interests, then the solution would concentrate on getting stakeholders (both individuals and groups) to agree on integrative or interest compromising solutions. This requires concentrating on the people/group/role component of the STS. (Note: A stakeholder is any group or individual with a vital interest at play in the situation.)
- **Management Problem.** Finally, if the problem is framed as a management problem, then the solution would revolve around changing an organization's procedures. Along these lines, it would address the (1) fundamental goals, (2) decision recognition procedures, (3) organizational roles, or (4) decision-making hierarchy of the organization. These are the four components of the CID (corporate internal decision) structure described in the "Ethical Reflections" section of the Toysmart case.
- **Nota Bene:** Financial issues are covered by the feasibility test in the solution implementation stage. As such, they pose side issues or constraints that do not enter into the solution generation phase but the solution implementation phase.

4. Brainstorming. Moral creativity, which involves designing non-obvious solutions, forms an essential part of solution generation. Here are some guidelines to get you started.

- Individually make out a list of solutions before the group meeting. Work quickly to realize a pre-established quota of five to ten solutions. After composing a quick first draft, revise the list for clarity only; make no substantial changes.
- Start the group brainstorming process by having the group review and assemble all the individual solutions. Do this quickly and without criticism. Beginning criticism at this stage will kill the creativity necessary for brainstorming and shut down the more timid (but creative) members of the group.
- Review the list and identify solutions that are identical or overlap. Begin the refining process by combining these solutions.
- Having reviewed all the brainstormed solutions, it is now time to bring in criticism. Begin by eliminating solutions with major ethical problems such as those that violate rights, produce injustices, or cause extensive harm.
- Identify but do not eliminate solutions that are ethical but raise serious practical problems. Do not initially eliminate an ethical solution because there are obstacles standing in the way of its implementation. Be descriptive. Identify and impartially describe the obstacles. Later, in the solution implementation stage, you may be able to design creative responses to these obstacles.
- Identify solutions that do not "fit" your problem statement. These require a decision. You can throw out the solution because it does not solve the problem or you can change the problem. If a solution does not fit the problem but, intuitively, seems good, this is a sign that you need to take another look at your problem statement.
- Don't automatically reject partial solutions. For example, sending memos through email rather than printing them out and wasting paper may not solve the entire recycling problem for your company.

But it represents a good, partial solution that can be combined with other partial solutions to address the bigger problem.

- Through these different measures, you will gradually integrate criticism into your brainstorming process. This will facilitate working toward a manageable, refined list of solutions for testing in the next stage.

Exercise 3: Develop a Solution List

- Have each member of your team prepare a solution list and bring it to the next group meeting. Set a quota for this individual list, say, 5 to 10 solutions.
- Prepare a group list out of the lists of the individual members. Work to combine similar solutions. Be sure to set aside criticism until the preliminary group list is complete.
- Make use of the following table.
- Refine the group list into a manageable number of solutions for testing in the next stage. Combine overlapping solutions. Eliminate solutions that do not respond to the requirements and the problem statement that you prepared in the previous exercise. Eliminate solutions that violate important ethical considerations, i.e., solutions that violate rights, produce harms, etc.
- Check your refined solution list with your problem statement. If they do not match, eliminate the solution or redefine the problem

Refined Brainstorm List

Solution Ranking	Description of Solution	Justification (fits requirements, fits problem)
Best Solution		
Second Best Solution		
Third Best Solution		
Fourth Best Solution		
Fifth Best Solution		

Table 1.6

Anthony Weston provides an illuminating and useful discussion of creative problem solving in the reference provided below.

1.1.7 Exercise Three: Solution Testing

In this section, you will test the solutions on the refined list your group produced in the previous exercise. Three ethics tests, described below, will help you to integrate ethical considerations in the problem-solving process. A global feasibility test will help to identify solutions with serious practical problems. Finally, a Solution Evaluation Matrix summarizes the results for class debriefings.

Setting up for the test.

- Identify the agent perspective from which the decision will be made
- Describe the action as concisely and clearly as possible.
- Identify the stakeholders surrounding the decision, i.e., those who will suffer strong impacts (positively or negatively) from the implementation of your decision. Stakeholders have a vital or essential interest (right, good, money, etc) in play with this decision.
- In the harm/beneficence test, identify the likely results of the action and sort these into harms and benefits.
- For the reversibility test, identify the stakeholders with whom you will reverse positions.

- For the public identification test, identify the values, virtues, or vices your action embodies. Associate these with the character of the agent.

Harm/Beneficence Test

1. **What are the harms your solution is likely to produce? What are its benefits? Does this solution produce the least harms and the most benefits when compared to the available alternatives?**
2. **Pitfall—Too much.** In this "Paralysis of Analysis" one factor in too many consequences. To avoid the fallacy restrict the analysis to the most likely consequences with the greatest magnitude (Magnitude indicates the range and severity of impact).
3. **Pitfall—Too Little.** A biased or incomplete analysis results when significant impacts are overlooked. Take time to uncover all the significant impacts, both in terms of likelihood and in terms of magnitude.
4. **Pitfall—Distribution of Impacts.** Consider, not only the overall balance of harms and benefits but also how harms and benefits are distributed among the stakeholders. If they are equally or fairly distributed, then this counts in the solution's favor. If they are unequally or unfairly distributed, then this counts against the solution. Be ready to redesign the solution to distribute better (=more equitably or fairly) the harmful and beneficial results.

Reversibility Test

1. **Would this solution alternative be acceptable to those who stand to be most affected by it? To answer this question, change places with those who are targeted by the action and ask if from this new perspective whether the action is still acceptable?**
2. **Pitfall—Too much.** When reversing with Hitler, a moral action appears immoral and an immoral action appears moral. The problem here is that the agent who projects into the immoral standpoint loses his or her moral bearings. The reversibility test requires viewing the action from the standpoint of its different targets. But understanding the action from different stakeholder views does not require that one abandon himself or herself to these views.
3. **Pitfall—Too little.** In this pitfall, moral imagination falls short, and the agent fails to view the action from another stakeholder standpoint. The key in the reversibility test is to find the middle ground between too much immersion in the viewpoint of another and too little.
4. **Pitfall—Reducing Reversibility to Harm/Beneficence.** The reversibility test requires that one assess the impacts of the action under consideration on others. But it is more than a simple listing of the consequences of the action. These are viewed from the standpoint of different stakeholders. The reversibility test also goes beyond considering impacts to considering whether the action treats different stakeholders respectfully. This especially holds when the agent disagrees with a stakeholder. In these disagreements, it is important to work out what it means to disagree with another respectfully.
5. **Pitfall—Incomplete survey of stakeholders.** Leaving out significant stakeholder perspectives skews the results of the reversibility test. Building an excellent death chamber works when one considers the action from the standpoint of Hitler; after all, it's what he wants. But treating an individual with respect does not require capitulating to his or her desires, especially when these are immoral. And considering the action from the standpoint of other stakeholders (say the possible victims of newer, more efficient gas chambers) brings out new and radically different information.
6. **Pitfall—Not Weighing and Balancing Stakeholder Positions.** This pitfall is continuous with the previous one. Different stakeholders have different interests and view events from unique perspectives. The reversibility test requires reviewing these interests and perspectives, weighing them against one another, and balancing out their differences and conflicts in an overall, global assessment.

Publicity (or Public Identification) Test

1. **Would you want to be publicly associated or identified with this action? In other words, assume that you will be judged as a person by others in terms of the moral values**

expressed in the action under consideration. Does this accord with how you would want to or aspire to be judged?

2. **Pitfall—Failure to association action with character of agent.** In the publicity test, the spotlight of analysis moves from the action to the agent. Successfully carrying out this test requires identifying the agent, describing the action, and associating the agent with the action. The moral qualities exhibited in the action are seen as expressing the moral character of the agent. The publicity test, thus, rests on the idea that an agent’s responsible actions arise from and express his or her character.
3. **Pitfall—Failure to appreciate the moral color of the action.** The publicity test assumes that actions are colored by the ends or goods they pursue. This means that actions are morally colored. They can express responsibility or irresponsibility, courage or cowardice, reasonableness or unreasonableness, honesty or dishonesty, integrity or corruption, loyalty or betrayal, and so forth. An analysis can go astray by failing to bring out the moral quality (or qualities) that an action expresses.
4. **Pitfall—Reducing Publicity to Harm/Beneficence Test.** Instead of asking what the action says about the agent, many reduce this test to considering the consequences of publicizing the action. So one might argue that an action is wrong because it damages the reputation of the agent or some other stakeholder. But this doesn’t go deep enough. The publicity test requires, not that one calculate the consequences of wide-spread knowledge of the action under consideration, but that one draws from the action the information it reveals about the character of the agent. The consequences of bad publicity are covered by the harm/beneficence test and do not need to be repeated in the public identification test. The publicity test provides new information by turning from the action to the agent. It focuses on what the action (its moral qualities and the goods it seeks) says about the agent.

Comparing the Test Results: Meta-Tests

1. The ethics tests will not always converge on the same solution because each test (and the ethical theories it encapsulates) covers a different dimension of the action: (1) harm/beneficence looks at the outcomes or consequences of the action, (2) reversibility focuses on the formal characteristics of the action, and (3) publicity zeros in on the moral character of the agent.
2. The meta-tests turn this surface disagreement into an advantage. The convergence or divergence between the ethics tests become indicators of solution strength and weakness.
3. **Convergence.** When the ethics tests converge on a given solution, this indicates solution strength and robustness.
4. **Divergence.** When tests diverge on a solution—a solution does well under one test but poorly under another—this signifies that it needs further development and revision. Test divergence is not a sign that one test is relevant while the others are not. Divergence indicates solution weakness and is a call to modify the solution to make it stronger.

Exercise 3: Summarize your results in a Solution Evaluation Matrix

1. Place test results in the appropriate cell.
2. Add a verbal explanation to the SEM table.
3. Conclude with a global feasibility test that asks, simply, whether or not there exist significant obstacles to the implementation of the solution in the real world.
4. Finish by looking at how the tests converge on a given solution. Convergence indicates solution strength; divergence signals solution weakness.

Solution Evaluation Matrix

Solution/Test	Harm/Beneficence	Reversibility	Publicity (public identification)	Feasibility
First Solution				
Second Solution				
Third Solution				
Fourth Solution				
Fifth Solution				

Table 1.7

The ethics tests are discussed in Cruz and Davis. See references below. Wike and Brincat also discuss value based approaches in the two references below.

1.1.8 Exercise Four: Solution Implementation

In this section, you will trouble-shoot the solution implementation process by uncovering and defusing potential obstacles. These can be identified by looking at the constraints that border the action. Although constraints specify limits to what can be realized in a given situation, they are more flexible than generally thought. Promptly identifying these constraints allows for proactive planning that can push back obstacles to solution implementation and allow for realization of at least some of the value embodied in the solution.

A **Feasibility Test** focuses on these situational constraints and poses useful questions early on in the implementation process. What conditions could arise that would hinder the implementation of a solution? Should the solution be modified to ease implementation under these constraints? Can the constraints be removed or modified through activities such as negotiation, compromise, or education? Can solution implementation be facilitated by modifying both the solution and the constraints?

Feasibility Constraints

Category	Sub-Category		
Resource	Money/Cost	Time/Deadlines	Materials
Interest	Organizational(Supervisor)	Legal (laws, regulations)	Political/Social
Technical	Technology does not exist	Technology patented	Technology needs modification

Table 1.8

Resource Constraints:

- **Does the situation pose limits on resources that could limit the realization of the solution under consideration?**
- **Time.** Is there a deadline within which the solution has to be enacted? Is this deadline fixed or negotiable?
- **Financial.** Are there cost constraints on implementing the ethical solution? Can these be extended by raising more funds? Can they be extended by cutting existing costs? Can agents negotiate for more money for implementation?

- **Resource.** Are necessary resources available? Is it necessary to plan ahead to identify and procure resources? If key resources are not available, is it possible to substitute other, more available resources? Would any significant moral or non-moral value be lost in this substitution?

Interest Constraints

- **Does the solution threaten stakeholder interests? Could it be perceived as so threatening to a stakeholder's interests that the stakeholder would oppose its implementation?**
- **Individual Interests.** Does the solution threaten the interests of supervisors? Would they take measures to block its realization? For example, a supervisor might perceive the solution as undermining his or her authority. Or, conflicting sub-group interests could generate opposition to the implementation of the solution even though it would promote broader organizational objectives.
- **Organizational Interests.** Does the solution go against an organization's SOPs (standard operating procedures), formal objectives, or informal objectives? Could acting on this solution disrupt organization power structures? (Perhaps it is necessary to enlist the support of an individual higher up in the organizational hierarchy in order to realize a solution that threatens a supervisor or a powerful sub-group.)
- **Legal Interests.** Are there laws, statutes, regulations, or common law traditions that oppose the implementation of the solution? Is it necessary to write an impact statement, develop a legal compliance plan, or receive regulatory approval in order to implement the solution?
- **Political/Social/Historical Constraints.** Would the solution threaten or appear to threaten the status of a political party? Could it generate social opposition by threatening or appearing to threaten the interests of a public action group such as an environmental group? Are there historical traditions that conflict with the values embedded in the solution?

Technical Constraints

- **Technology does not yet exist.** Would the implementation of the solution require breaking new technological ground?
- **Technology Protected by Patent.** The technology exists but is inaccessible because it is still under a patent held by a competitor.
- **Technology Requires Modification.** The technology required to implement solution exists but needs to be modified to fit the context of the solution. Important considerations to factor in would be the extent of the modification, its cost, and how long it would take to bring about the modification.

1.1.9 Exercise Five: Ethical Perspective Pieces

Getting Consent to Information Transfer

Customer Consent If you have followed the case so far, you see that while the money Toysmart owes to Citibank may just be a drop in the bucket, the welfare and even survival of other Toysmart creditors depends on how much money can be retrieved through the bankruptcy process. The following Ethical Perspective argues that the right of creditors for their money cannot be traded off with the right to privacy of Toysmart customers profiled in their now valuable data base. These two stakeholders and their stakes—in this case rights—need to be integrated as fully as possible. The key lies in the execution of the consumer right to be informed and to freely consent to the transfer of their data to third parties This right's execution must address three important aspects.

- Customer consent must be obtained by having them opt-in rather than opt-out of the transfer of PII. Opt-in represents a more active, opt-out a more passive mode of consent. By opting into the data transfer, Toysmart customers consent explicitly, knowingly, and freely to the transfer of their information. Opt-out is passive because unless customers expressly forbid it, the transfer of their PII to a third party will occur. The chances are that many customers will consent only if compensated.

And the mechanics of obtaining positive opt-in consent are complicated. Is this done by email or snail mail? How can Toysmart customers be fully informed? What kind of timeline is necessary for their full consent? Implimentation of opt-in consent is more adequate morally speaking but much more difficult, time-consuming, and costly in its implementation.

- Any exchange of information must be in accord with TRUSTe standards which Toysmart agreed to when they solicited the right to use the TRUSTe seal. TRUSTe has its own standards (they can be found through the link above) which reinforce the above discussion of informed consent but also bring in other matters. Important here is the utilitarian concern of building and maintaining consumer trust to encourage their using the Internet for e-business. Web site certification agencies like TRUSTe exist to validate that a web site is trustworthy; but to maintain this validation, customers must know that TRUSTe will enforce its standards when websites become reluctant to follow them. TRUSTe must be aggressive and strict here in order to maintain the high level of trust they have generated with e-business customers.
- An important part of TRUSTe standards on the transfer of PII to third parties is their insistence that these third parties share the values of those who have been given the information. Toysmart cultivated a reputation as a trustworthy company devoted to producing safe, high quality, educational toys. The customer data base should be transferred only to concerns that share these goals and the accompanying values. (What are these?) Did Toysmart compromise on these goals and values when they agreed to accept Disney financing and advertising support? What are Toysmart values? What are Disney values?

In conclusion, this perspective piece is designed to get you to think about the right of informed consent, whether it can be reconciled with financial interests and rights of Toysmart creditors, and how this right can be implemented in the concrete details of this case. It has argued that customer PII can be transferred but only with the consent of the customers themselves. It has defined this consent in terms of express opting-into the transfer on the part of the customers. It has also argued that the third part must share the values and goals of Toysmart, especially those values accompanying Toysmart promises to customers.

1.1.10 Group Exercise

Identify the role played and the values held by each of the following participants:

1. David Lord (CEO of Toysmart)
2. Disney (as venture capitalist)
3. TRUSTe (as non-profit)
4. Toysmart Creditors (Pan Communications)
5. FTC (government regulatory agency)
6. Toysmart Customers

Toysmart's customer data base

1. Should Toysmart creditors be allowed to sell the customer data base to third parties? Respond to arguments pro and con given by participants in the case.
2. Assume Toysmart should be allowed to sell the data base to their third party. What kind of values should this third party have?
3. Assume Toysmart has to get customer consent before selling the data base. How should customer consent be obtained? (What counts as customer consent?)

1.1.11 What did you learn?

This section provides closure to the module for students. It may consist of a formal conclusion that summarizes the module and outlines its learning objectives. It could provide questions to help students debrief

and reflect on what they have learned. Assessment forms (e.g., the “Muddiest Point” Form) could be used to evaluate the quality of the learning experience. In short, this section specifies the strategy for bringing the module to a close.

In this module, you have...

- studied a real world case that raised serious problems with intellectual property, privacy, security, and free speech. Working with these problems has helped you to develop a better “working” understanding of these key concepts,
- studied and practiced using four decision-making frameworks: (1) using socio-technical analysis to specify the problem in a complex, real world case, (2) practiced brainstorming techniques to develop and refine solutions that respond to your problem, (3) employed three ethics tests to integrate ethical considerations into your solutions and to test these solutions in terms of their ethics, and (4) applied a feasibility analysis to your solutions to identify and trouble-shoot obstacles to the implementation of your ethical solution,
- explored the analogy between solving ethical and design problems,
- practiced the skills of moral imagination, moral creativity, reasonableness, and perseverance, and...
- experienced, through key participant perspectives, the challenges of ethics advocacy “under the gun.”

Debrief on your group work before the rest of the class

1. Provide a concise statement and justification of the problem your group specified
2. Present the refined solution generation list your group developed in exercise 2.
3. Present and provide a quick summary explanation of the results of your group’s solution evaluation matrix.
4. Show your group’s feasibility matrix and summarize your assessment of the feasibility of implementing the solution alternatives you tested in exercise three.

Group Debriefing

1. Were there any problem you group had working together to carry out this case analysis? What were the problems and how did you go about solving them?
2. What problems did you have with understanding and practicing the four frameworks for solving problems? How did you go about solving these problems? Does your group have any outstanding questions or doubts?
3. Now that you have heard the other groups present their results, what differences emerged between your group’s analysis and those of the other groups? Have you modified your analysis in light of the analyses of the other groups? If so how? Do the other groups need to take into account any aspects of your group’s debriefing?

1.1.12 Toysmart Presentations

[MEDIA OBJECT]²

[MEDIA OBJECT]³

Updated concept presentation for Spring 2011

[MEDIA OBJECT]⁴

²This media object is a downloadable file. Please view or download it at <Toysmart_2.pptx>

³This media object is a downloadable file. Please view or download it at <Toysmart_3.pptx>

⁴This media object is a downloadable file. Please view or download it at <Review on Privacy and Property.pptx>

Privacy, Intellectual Property, Free and Informed Consent

[MEDIA OBJECT]⁵

[MEDIA OBJECT]⁶

1.1.13 Appendix

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This optional section contains additional or supplementary information related to this module. It could include: assessment, background such as supporting ethical theories and frameworks, technical information, discipline specific information, and references or links.

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⁵This media object is a downloadable file. Please view or download it at [<Review on Privacy Property Consent.pptx>](#)

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9. Carolyn Whitbeck (1998) **Ethics in Engineering Practice and Research**. U.K. Cambridge University Press: 55-72 and 176-181.
10. Wike, Victoria S. (2001) "Professional Engineering Ethics Behavior: A Values-based Approach," **Proceedings of the 2001 American Society for Engineering Education Annual Conference and Exposition, Session 2461**.

1.1.14 EAC ToolKit Project

1.1.14.1 This module is a WORK-IN-PROGRESS; the author(s) may update the content as needed. Others are welcome to use this module or create a new derived module. You can COLLABORATE to improve this module by providing suggestions and/or feedback on your experiences with this module.

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1.1.14.2 Funded by the National Science Foundation: "Collaborative Development of Ethics Across the Curriculum Resources and Sharing of Best Practices," NSF-SES-0551779

1.2 Case Analysis Module: Hughes Aircraft⁸

Computer Ethics

Case Module Template

By William J. Frey

Module Introduction:

The Hughes case is what Huff and Frey call a thick, historical, evaluative, big news and bad news case. One particularly noteworthy fact about it is the way in which it combines technical issues (the manufacture and testing of integrated circuits) with ethical issues (when is it morally appropriate to blow the whistle and how does one carry this out). Sifting through the case details, documents, and conflicting participant perspectives will both challenge you and hone your skills in moral imagination. Below are frameworks to help you structure the case's ethical and social problems. You will also be provided with decision points that will force you to enter the case as a participant and practice decision-making in the real world. While the timeline presented below changes the names of the key participants, the conclusion of the legal proceedings surrounding this case make it possible for you to learn the real identities of participants in class. This module contains materials to introduce the case. For a complete analysis, you will need to consult www.computingcases.org. These materials were all developed through NSF projects DUE-9972280 and DUE 9980768.

The module presents the case abstract and timeline. It then refers you to computingcases.org where you can find the case narrative, history, and supporting documents that provide background information

⁷<http://creativecommons.org/licenses/by/2.0/>

⁸This content is available online at <http://cnx.org/content/m13766/1.1/>.

necessary for analysis. The case abstract and timeline introduce the basic outlines of the case. The accompanying decision point taken from the case provides you with the necessary focus to carry out an in-depth analysis from the standpoint of one of the case's participants. Your job is to respond to the decision-point by working through the four stages: problem specification, solution generation, solution testing, and solution implementation.

Module Activities:

1. Instructor introduces the case based on the abstract and timeline found at www.computingcases.org⁹
2. Students read case abstract, timeline, case decision point, and case analysis exercises.
3. Students do further research into the case by consulting ComputingCases materials which include narratives, histories, supporting documents, and ethical analyses.
4. Students carry out the activities outlined in the accompanying case exercises by (a) specifying the problem raised in the decision point, (b) generating solutions, (c) testing solutions using ethics tests, and (d) developing plans for implementing the solution over situational constraints.
5. Students prepare their case analyses working in small groups.
6. These groups present their completed analysis to the class in a case-debriefing session.
7. The instructor concludes by discussing the problem-solving issues and intermediate moral concepts raised by the case.

Hughes Microelectronics: Whistleblowing in the Manufacture of Computer Chips for the Military

Case Abstract:

When computer chips are embedded in expensive weapons systems, the chips need to be tested to make sure they can withstand years of exposure to the extreme environmental hazards they might face (rapid changes in temperature, severe shock, changes in atmospheric pressure, etc.). These chips are sealed in metal containers to protect them from the environmental stress. The seals and the chips need to be tested to make sure they can withstand the stress. Unfortunately, the need to manufacture and deliver these chips on time can compete with the desire to test them thoroughly.

In the mid 1980s, Hughes Microelectronics was manufacturing what were called hybrid microchips for use in guidance systems and other military programs. A series of environmental tests were specified by the government contract. But pressure to ship chips out on time to customers got in the way of complete testing. "Hot" chips, those needed right away for shipment were given preferential treatment by some in charge of the testing process and shipped without the proper tests being performed.

This case is about what happened when employees of Hughes Microelectronics noticed that these tests were being skipped. The decisions they made to report this make this one of the classic cases in the history of whistleblowing

Timeline

1. 1979 Nancy Baker (Baker) begins working for American Aircraft company's Microelectronic Circuit Division (American MCD) in Newport Beach, CA
2. 1981 Claire Paul (Paul) begins working for American MCD as a supervisor for assembly on the hybrid production floor and as a supervisor in the hybrid engineering lab
3. 1984 Baker becomes supervisor for hybrid quality assurance
4. 1985 Paul asks Baker to look at errors in paperwork, Baker brings errors to the attention of her supervisors and was told to keep quiet, beginning of time period when Paul/Baker became aware of problems in hybrid chip testing and paperwork
5. 1986 Paul becomes supervisor for seals processing in the environmental testing area, False Claims Act (31 U.S.C. §§3729-3733) becomes False Claims Reform Act of 1986 making it stronger and easier to apply
6. Oct. 1986 Paul/Baker report problems to American management, and, after the problems were not fixed, Paul/Baker reported the allegations of faulty testing to the United States Department of Defense

⁹<http://www.computingcases.org/>

7. Jan. 9, 1987 Earliest date that American may have stopped neglecting environmental screening tests
American Timeline
- I. Criminal Suit
- a. 1998 Baker leaves American feeling that her job had been stripped of all real responsibility
 - b. Mar. 1989 Paul is laid off from American
1995 Paul and her husband are divorced
- II. Civil Suit: United States of America v. American Aircraft Co., and Tim Clark
- a. Dec. 13, 1991 after a lengthy investigation, the U.S. Department of Defense charges American and Tim A. Clark (Clark) with a 51-count indictment accusing it of falsifying tests of microelectronic circuits (criminal suit)
 - b. Jun 15, 1992 American found guilty of conspiring to defraud the U.S. Government in criminal case, co-defendant Clark acquitted following 4-week trial, Paul/Baker called as witnesses in trial, American appeals
 - c. Oct. 29, 1992 American fined \$3.5 million in criminal trial decision
 - d. Dec. 2, 1993 Appellate court upholds 1992 criminal conviction and sentence, American appeal fails

Scenario 1:

Frank Saia has worked at Hughes Aircraft for a long time. Now he is faced with the most difficult decisions of his career. He has been having problems in the environmental testing phase of his microchip manufacturing plant; the detailed nature of these tests has caused Hughes to be consistently late in delivering the chips to customers.

Because of the time pressure to deliver chips, Saia has been working to make the production of chips more efficient without losing the quality of the product. Chips are manufactured and then tested, and this provides two places where the process can bottle up. Even though you might have a perfectly fine chip on the floor of the plant, it cannot be shipped without testing. And, since there are several thousand other chips waiting to be tested, it can sit in line for a long time. Saia has devised a method that allows testers to put the important chips, the “hot parts,” ahead of the others without disrupting the flow and without losing the chips in the shuffle. He has also added a “gross leak” test that quickly tells if a chip in a sealed container is actually sealed or not. Adding this test early in the testing sequence allows environmental testing to avoid wasting time by quickly eliminating chips that would fail a more fine-grained leak test later in the sequence.

Because environmental testing is still falling behind, Saia’s supervisors and Hughes customers are getting angry and have begun to apply pressure. Karl Reismueller, the director of the Division of Microelectronics at Hughes, has given Saia’s telephone number to several customers, whose own production lines were shut down awaiting the parts that Saia has had trouble delivering. His customers are now calling him directly to say “we’re dying out here” for need of parts.

Frank Saia has discovered that an employee under his supervision, Donald LaRue, has been skipping tests on the computer chips. Since LaRue began this practice, they have certainly been more on time in their shipments. Besides, both LaRue and Saia know that many of the “hot” parts are actually for systems in the testing phase, rather than for ones that will be put into active use. So testing the chips for long-term durability that go into these systems seems unnecessary. Still, LaRue was caught by Quality Control skipping a test, and now Saia needs to make a decision. Upper management has provided no guidance; they simply told him to “handle it” and to keep the parts on time.

He can’t let LaRue continue skipping tests, or at least he shouldn’t let this skipping go unsupervised. LaRue is a good employee, but he doesn’t have the science background to know which tests would do the least damage if they were skipped. He could work with LaRue and help him figure out the best tests to skip so the least harm is done. But getting directly involved in skipping the tests would mean violating company policy and federal law.

Scenario 2:

Margaret Gooderal works in a supervisory position in the environmental testing group at Hughes Aircraft. Her supervisor, Donald LaRue, is also the current supervisor for environmental testing. The group that LaRue and Gooderal together oversee test the chips that Hughes makes in order to determine that they would survive under the drastic environmental conditions they will likely face.

Rigorous testing of the chips is the ideal, but some chips (the hot chips) get in line ahead of others. Gooderal has found out that over the last several months, many of these tests are being skipped. The reason: Hughes has fallen behind in the production schedule and Hughes upper management and Hughes customers have been applying pressure to get chip production and testing back on schedule. Moreover, LaRue and others feel that skipping certain tests doesn't matter, since many of these chips are being used in systems that are in the testing phase, rather than ones that will be put into active use.

A few months after Margaret Gooderal started her new position, she was presented with a difficult problem. One of the "girls" (the women and men in Environmental Testing at Hughes), Lisa Lightner, came to her desk crying. She was in tears and trembling because Donald LaRue had forcefully insisted that she pass a chip that she was sure had failed the test she was running.

Lightner ran the hermeticity test on the chips. The chips are enclosed in a metal container, and one of the questions is whether the seal to that container leaks. From her test, she is sure that the chip is a "leaker"—the seal is not airtight so that water and corrosion will seep in over time and damage the chip. She has come to Gooderal for advice. Should she do what LaRue wants and pass a chip she knows is a leaker?

Case Analysis Exercises:

1. Identify key components of the STS

Part/Level of Analysis	Hardware	Software	Physical Surroundings	People, Groups, & Roles	Procedures	Laws & Regulations	Data & Data Structures

Table 1.9

2. Specify the problem:

2a. Is the problem a disagreement on facts? What are the facts? What are cost and time constraints on uncovering and communicating these facts?

2b. Is the problem a disagreement on a critical concept? What is the concept? Can agreement be reached by consulting legal or regulatory information on the concept? (For example, if the concept in question is safety, can disputants consult engineering codes, legal precedents, or ethical literature that helps provide consensus? Can disputants agree on positive and negative paradigm cases so the concept disagreement can be resolved through line-drawing methods?)

2c. Use the table to identify and locate value conflicts within the STS. Can the problem be specified as a mismatch between a technology and the existing STS, a mismatch within the STS exacerbated by the introduction of the technology, or by overlooked results?

STS/Value	Safety (freedom from harm)	Justice (Equity & Access)	Privacy	Property	Free Speech
<i>continued on next page</i>					

Hardware/software					
Physical Surroundings					
People, Groups, & Roles					
Procedures					
Laws					
Data & Data Structures					

Table 1.10

3. Develop a general solution strategy and then brainstorm specific solutions:

Problem / Solution Strategy	Disagreement		Value Conflict		Situational Constraints
	Factual	Conceptual	Integrate?	Tradeoff?	Resource? Technical? Interest

Table 1.11

- 3a. Is problem one of integrating values, resolving disagreements, or responding to situational constraints?
- 3b. If the conflict comes from a value mismatch, then can it be solved by modifying one or more of the components of the STS? Which one?
- 4. Test solutions:

Alternative / Test	Reversibility	Value: Justice	Value: Responsibility	Value: Respect	Harm	Code
A #1						
A #2						
A #3						

Table 1.12

5. Implement solution over feasibility constraints

Alternative Constraint	Resource	Interest	Technical
<i>continued on next page</i>			

	Time	Cost	Individual	Organization	Legal/ Social	Available Technology	Manufacturability
#1							
#2							
#3							

Table 1.13

1.3 Case Analysis Module: Therac-25¹⁰

Computer Ethics

Case Module Template

By William J. Frey

Module Introduction:

The Therac-25 case is what Huff and Frey call a thick, historical, evaluative, big news and bad news case. Tackling cases of this complexity requires both careful thought and considerable skill. Especially important is the ability to sift through the case details, documents, and conflicting narratives. The purpose of this module is to provide students with a structure to tackle big, long, and complicated cases. Students will receive frameworks to help them structure the case's ethical and social problems. They will also be provided with decision points that will help them to enter into the case and take up the standpoint of a participant. The module presented below can be linked to materials that can be found at www.computingcases.org. Nancy Leveson, in *Safeware: System Safety and Computer* (515-553), also provides an excellent and comprehensive account. Excellent advice on how to teach the case, updated information, and clear explanations of the programming errors are provided by Chuck Huff and Richard Brown in "Integrating Ethics into a Computing Curriculum: A Case Study of the Therac-25." The materials posted at Computing Cases were all developed through NSF projects DUE-9972280 and DUE 9980768.)

The module presents the case abstract and timeline. It then refers students to [computingcases.org](http://www.computingcases.org) where they will find the case narrative, history, and supporting documents that provide background information necessary for analysis. The case abstract and timeline introduce students to the basic outlines of the case. The accompanying decision point taken from the case provides students with the necessary focus to carry out an in-depth analysis. Students respond to the decision-point by working through the four stages: problem specification, solution generation, solution testing, and solution implementation.

Module Activities:

1. Instructor introduces the case based on the abstract and timeline found at www.computingcases.org¹¹
2. Students read case abstract, timeline, case decision point, and case analysis exercises.
3. Students do further research into the case by consulting ComputingCases materials which include narratives, histories, supporting documents, and ethical analyses.
4. Students carry out the activities outlined in the accompanying case exercises by (a) specifying the problem raised in the decision point, (b) generating solutions, (c) testing solutions using ethics tests, and (d) developing plans for implementing the solution over situational constraints.
5. Students prepare their case analyses working in small groups.
6. These groups present their completed analysis to the class in a case-debriefing session.
7. The instructor concludes by discussing the problem-solving issues and intermediate moral concepts raised by the case.

¹⁰This content is available online at <http://cnx.org/content/m13765/1.8/>.

¹¹<http://www.computingcases.org/>

1.3.1 Therac-25 Abstract

Therac-25¹² was a new generation medical linear accelerator¹³ for treating cancer. It incorporated the most recent computer control equipment. Therac-25's computerization made the laborious process of machine setup much easier for operators, and thus allowed them to spend minimal time in setting up the equipment. In addition to making setup easier, the computer also monitored the machine for safety. With the advent of computer control, hardware based safety mechanisms were transferred to the software. Hospitals were told that the Therac-25 medical linear accelerator had "so many safety mechanisms" that it was "virtually impossible" to overdose a patient. Normally, when a patient is scheduled to have radiation therapy for cancer, he or she is scheduled for several sessions over a few weeks and told to expect some minor skin discomfort from the treatment. The discomfort is described as being like a mild sunburn over the treated area. But in this case on safety critical software, you will find that some patients received much more radiation than prescribed

Therac - 25 Timeline

This time line is largely adopted from the Computing Cases website. The website developer, Charles Huff, has provided this module's author with a more detailed unpublished version (that provides the real names of the patients left out in Computing Cases) that the author has adopted here. Readers should note that this time line also overlaps with that provided by Leveson and Turner. (See below for two references where the Turner and Leveson time line can be found.)

¹²http://www.computingcases.org/case_materials/therac/teaching/therac/supporting_docs/Therac%20Glossary.html#tr25

¹³http://www.computingcases.org/case_materials/therac/teaching/therac/supporting_docs/Therac%20Glossary.html#tr13

Therac-25 Chronology

Early 1970's	AECL and a French Company (CGR) collaborate to build Medical Linear Accelerators (linacs). They develop Therac-6, and Therac-20. (AECL and CGR end their working relationship in 1981.)
1976	AECL develops the revolutionary "double pass" accelerator which leads to the development of Therac-25.
March, 1983	AECL performs a safety analysis of Therac-25 which apparently excludes an analysis of software.
July 29, 1983	In a PR Newswire the Canadian Consulate General announces the introduction of the new "Therac 25" Machine manufactured by AECL Medical, a division of Atomic Energy of Canada Limited.
ca. Dec. 1984	Marietta Georgia, Kennestone Regional Oncology Center implements the new Therac-25 machine.
June 3, 1985	Marietta Georgia, Kennestone Regional Oncology Center Katherine (Katy) Yarbrough, a 61-year-old woman is overdosed during a follow-up radiation treatment after removal of a malignant breast tumor. Tim Still, Kennestone Physicist calls AECL asking if overdose is possible; three days later he is informed it is not.
July 26, 1985	Hamilton, Ontario, Canada. Frances Hill, a 40-year-old patient is overdosed during treatment for cervical carcinoma. AECL is informed of the injury and sends a service engineer to investigate.
November 3, 1985	Hamilton Ontario patient dies of cancer, but it is noted on her autopsy that had she not died, a full hip replacement would have been necessary as a result of the radiation overdose.
November 8, 1985	Letter from CRPB to AECL requesting additional hardware interlocks and changes in software. Letter also requested treatment terminated in the event of a malfunction with no option to proceed with single key-stroke. (under Canada's Radiation Emitting Devices Act.)
November 18, 1985	Katy Yarbrough files suit against AECL and Kennestone Regional Oncology Center. AECL informed officially of Lawsuit.
December 1985	Yakima Valley Memorial Hospital, Yakima Washington. A woman being treated with Therac-25 develops erythema on her hip after one of the treatments.
January 31, 1986	Staff at Yakima sends letter to AECL and speak on the phone with AECL technical support supervisor. Available for free at Connexions < http://www.physnet.edu/AECL/ >
February 24, 1986	AECL technical support supervisor sends a written response to Yakima claiming that Therac-25 could not have been responsible for the injuries to the female patient.

Table 1.14: Chronology closely paraphrases chronology in Computing Cases. The major difference is that it replaces fictional names with real names of participants since these were eventually publicized. Most of these events were originally uncovered by Leveson. (See citations below)

Scenario: You are an engineer working for AECL sent to investigate an alleged overdosing incident at the Ontario Cancer Foundation in Hamilton, Ontario. The following is the description provided to you of what happened:

On July 26, 1985, a forty-year old patient came to the clinic for her twenty-fourth Therac-25 treatment for carcinoma of the cervix. The operator activated the machine, but the Therac shut down after five seconds with an HTILT error message. The Therac-25's console display read NO DOSE and indicated a TREATMENT PAUSE

Since the machine did not suspend and the control display indicated no dose was delivered to the patient, the operator went ahead with a second attempt at a treatment by pressing the Proceed Command Key, expecting the machine to deliver the proper dose this time. This was standard operating procedure, and Therac-25 operators had become accustomed to frequent malfunctions that had no untoward [bad] consequences for the patient. Again the machine shut down in the same manner. The operator repeated this process four times after the original attempt—the display showing NO DOSE delivered to the patient each time. After the fifth pause, the machine went into treatment suspend, and a hospital service technician was called. The technician found nothing wrong with the machine. According to a Therac-25 operator, this scenario also was not unusual.

After treatment, the patient complained of a burning sensation, described as an “electric tingling shock” to the treatment area in her hip...She came back for further treatment on July 29 and complained of burning, hip pain, and excessive swelling in the region of treatment. The patient was hospitalized for the condition on July 30, and the machine was taken out of service. (Description taken from Nancy Leveson, *Safeware*, pp 523-4)

You give the unit a thorough examination and are able to find nothing wrong. Working with the operator, you try to duplicate the treatment procedure of July 26. Nothing out of the ordinary happens. Your responsibility is to make a recommendation to AECL and to the Ontario Cancer Foundation. What will it be?

1. Identify key components of the STS

Part/Level of Analysis	Hardware	Software	Physical Surroundings	People, Groups, & Roles	Procedures	Laws & Regulations	Data & Data Structures

Table 1.15

2. Specify the problem:

2a. Is the problem a disagreement on facts? What are the facts? What are cost and time constraints on uncovering and communicating these facts?

2b. Is the problem a disagreement on a critical concept? What is the concept? Can agreement be reached by consulting legal or regulatory information on the concept? (For example, if the concept in question is safety, can disputants consult engineering codes, legal precedents, or ethical literature that helps provide consensus? Can disputants agree on positive and negative paradigm cases so the concept disagreement can be resolved through line-drawing methods?)

2c. Use the table to identify and locate value conflicts within the STS. Can the problem be specified as a mismatch between a technology and the existing STS, a mismatch within the STS exacerbated by the introduction of the technology, or by overlooked results?

STS/Value	Safety (freedom from harm)	Justice (Equity & Access)	Privacy	Property	Free Speech
Hardware/software					
Physical Surroundings					
People, Groups, & Roles					
Procedures					
Laws					
Data & Data Structures					

Table 1.16

3. Develop a general solution strategy and then brainstorm specific solutions:

Problem / Solution Strategy	Disagreement		Value Conflict		Situational Constraints
	Factual	Conceptual	Integrate?	Tradeoff?	Resource? Technical? Interest

Table 1.17

3a. Is problem one of integrating values, resolving disagreements, or responding to situational constraints?

3b. If the conflict comes from a value mismatch, then can it be solved by modifying one or more of the components of the STS? Which one?

4. Test solutions:

Alternative / Test	Reversibility	Value: Justice	Value: Responsibility	Value: Respect	Harm	Code
A #1						
A #2						
A #3						

Table 1.18

5. Implement solution over feasibility constraints

Alternative Con- straint	Resource		Interest			Technical	
	Time	Cost	Individual	Organization	Legal/ So- cial	Available Techno- logy	Manufacturability
#1							
#2							
#3							

Table 1.19

1.3.2 Appendix

Therac Decision Point Presentation

[MEDIA OBJECT]¹⁴

[MEDIA OBJECT]¹⁵

Therac-25 Decision Point

[MEDIA OBJECT]¹⁶

Therac-25 Case Summary

[MEDIA OBJECT]¹⁷

Free and Informed Consent, Safety, and Dimensions of Risk

[MEDIA OBJECT]¹⁸

1.3.3 References

- Nancy G. Leveson. **Safeware: System Safety and Computers**. New York: Addison-Wesley Publishing Company, 515-553.
- Nancy G. Leveson and Clark S. Turner. An Investigation of the Therac-25 Accidents. **Computers, Ethics, and Social Values**, Johnson, D.G. and Nissenbaum, H., eds.: 478.
- Nancy G. Leveson and Clark S. Turner. An Investigation of the Therac-25 Accidents. **IEEE Computer**. 26(7): 18-41, July 1993.
- Computing Cases website. See above link. Materials on case including interviews and supporting documents.
- Sara Baase. **A Gift of Fire: Social, Legal, and Ethical Issues in Computing**. Upper Saddle River, NJ: Prentice-Hall, 125-129.
- Chuck Huff. **Good Computing: A Virtue Approach to Computer Ethics**. Draft for course CS-263. June 2005.
- Chuck Huff and Richard Brown. Integrating Ethics into a Computing Curriculum: A Case Study of the Therac-25. Available at Computing Cases website. See above link.
- For time line see: http://computingcases.org/case_materials/therac/supporting_docs/therac_resources/Timeline.htm

¹⁴This media object is a downloadable file. Please view or download it at <Therac-25 Case_V3.pptx>

¹⁵This media object is a downloadable file. Please view or download it at <Therac-25 Case_V4.pptx>

¹⁶This media object is a downloadable file. Please view or download it at <Therac-25_DP.pptx>

¹⁷This media object is a downloadable file. Please view or download it at <Therac-25 Case_V6.pptx>

¹⁸This media object is a downloadable file. Please view or download it at <Therac-25 Case_V7.pptx>

- Leveson in Safeware provides an excellent summary of the literature on system safety. For two further excellent resources consult the next two references.
- Perrow, C. (1984) *Normal Accidents: Living with high-risk technologies*. Basic Books, NY, NY.
- Reason, J. (1990/1999) *Human Error* Cambridge University Press: London.

1.4 Case Analysis Module: Machado¹⁹

Computer Ethics

Case Module Template: Machado Case

By William J. Frey

Module Abstract:

This module, designed for the EAC Toolkit (NSF SES 0551779), will test the Toolkit and Connexion's ability to network different online and offline sources for ethics across the curriculum. It consists of four components designed to provide tools for an in-depth analysis of the cases found at www.computingcases.org²⁰; it also makes substantial references to the draft manuscript of a textbook in computer ethics entitled *Good Computing: A Virtue Approach to Computer Ethics* under contract with Jones and Bartlett Publishing Company. (This book will consist of the cases displayed at *Computing Cases—Therac-25, Machado, and Hughes Aircraft*—and 7 additional cases all developed through NSF projects DUE-9972280 and DUE 9980768.)

Module Introduction:

This module as displayed in Connexions presents the case abstract and timeline both taken from *Computing Cases*. It then refers to the website where the following can be found by browsing:

- case narrative,
- case history,
- a teaching introduction which also provides a useful overview,
- an ethical analysis that can be accessed by clicking on the appropriate concept in the table displayed (clicking on safety will open a short document that discusses the safety implications of the case)
- a Socio-Technical Analysis which spells out the different components of the cases socio-technical system such as hardware, software, physical surroundings, people/groups/roles, procedures, laws, and data/data structures.
- supporting documents such as three RFCs (Request for Comments) on the Unix finger command, a profile of students at UCI, and an interview with Allen Schiano from the University of California at Irvine's Office of Academic Computing.

These materials all posted at www.computingcases.org²¹ provide the background information necessary for a detailed and exhaustive case analysis. (A suggestion: since you will be working in groups, divide these readings among your group members and take advantage of class time to report to one another on the contents of the links you have individually explored. Be sure to triangulate by assigning more than one member to each link. This will help to identify and solve problems in interpretation.)

The case abstract and timeline in this module outline the case. The following decision point taken from the Machado case will provide the focus for an in-depth case analysis. You will respond to the decision-point by working through a four stage decision making procedure inspired by the standard Software Development cycle:

- problem specification,
- solution generation,
- solution testing, and...

¹⁹This content is available online at <http://cnx.org/content/m13787/1.2/>.

²⁰<http://www.computingcases.org/>

²¹<http://www.computingcases.org/>

- solution implementation.

Module Activities:

1. Instructor introduces the case based on the abstract and timeline found at www.computingcases.org²²
2. Students read case abstract, timeline, case decision point, and case analysis exercises.
3. Students do further research into the case by consulting ComputingCases materials which include narratives, histories, supporting documents, and ethical analyses.
4. Students carry out the activities outlined in the accompanying case exercises by (a) specifying the problem raised in the decision point, (b) generating solutions, (c) testing solutions using ethics tests, and (d) developing plans for implementing the solution over situational constraints.
5. Students prepare their case analyses working in small groups.
6. These groups present their completed analysis to the class in a case-debriefing session.
7. The instructor concludes by discussing the problem-solving issues and intermediate moral concepts raised by the case.

Machado Abstract:

In September of 1996, 19 year-old Richard Machado sent email to 59 Asian students at his public college, threatening them with phrases like “I will personally make it my life’s career to hunt you down and kill you” and signed by “Asian Hater.” Several of these individuals reported this incident to the Office of Academic computing (OAC). One of the recipients was a student employee of the OAC. The administrators of the OAC were faced with a decision about how to respond to harassing and threatening email sent over their system to students of their University, using their facilities.

Machado Timeline

11/16/95	Machado sends email threat to New University paper (UCI) via his roommate’s computer. The email is traced to the roommate’s computer. Roommate later said Machado had access to the computer. Machado identified as sender.
11/21/95	Warrant for arrest is filed against Machado, issued by Irvine Police Department—the warrant is a “no bail felony warrant.” Machado consents to a property search. Case given up shortly after—Machado’s roommate took the blame so he “wouldn’t be bothered anymore.”
(Between 1/1/96 and 9/20/96)	Machado’s older brother murdered in armed robbery prior to following incident; Machado is doing poorly in school, getting pressure from family to uphold high expectations.
<i>continued on next page</i>	

²²<http://www.computingcases.org/>

9/20/96(Friday, 10:54 am)	Machado sends hate Asians/threat email to about 59 UCI studentsMachado sent message a second time shortly after, when he did not receive replies to the first email.Incident brought to the attention of Assoc. Director of The Academic Computing Center, by her employees.Machado identified in computer lab and was asked to leave by Core Services manager.
9/21/96	Director of OAC reads Machado's email and decides that it is a police matter.
9/24/96(Monday)	The incident is reported to University Police DepartmentAn officer is assigned to the case.
9/26/96	Retrieval of surveillance video confirmed Machado as the sender.Irving City Police notified and involved in case.
9/27/96	Registrar's office helps police locate Machado's address and phone number.
9/28/96	An officer phones Machado's residence and leaves messageMachado calls back and agrees to meet with an officer that afternoon at 5pm.Two charges filed after meeting: Machado (1) knowingly and without permission uses computer services and (2) makes telephone calls with intent to annoy.
11/14/96	A stolen vehicle report is filed for Machado's second roommate's car.Machado had told one roommate he was borrowing his other roommate's car.Machado did not have permission to borrow car.
11/18/96	FBI attempts investigation.An agent goes to Machado's residence; Machado is not there and hasn't been seen there since 11/13.Machado allegedly left with Young's keys on 11/14.Other suspicions: \$80 missing from roommate's coin jar; \$154 visa charges to roommate's card, \$54 of which were unauthorized; calls on 11/10, 11, and 12.
<i>continued on next page</i>	

11/21/96	FBI agent phones Machado's roommate for confirmation of stolen car/info on Machado's disappearance.
11/22/96	Roommate interviewed.
11/23/96	Tammy Machado (Machado's sister) interviewed and said Machado had disappeared on the day his brother called him to inquire about Machado's name appearing in newspaper regarding Asian hate mails. Machado denied the reports in the paper to his brother; claimed it to be someone else. Tammy is informed that court date is set for 11/25 and if Richard doesn't show, they would issue a warrant for his arrest.
2/6/97	Machado is arrested when attempting to enter US from Mexico—caught by US Immigration Inspector. Machado is reported as looking homeless, having no possessions, looking for construction work in Mexico.
9/16/97	Machado is charged with 10 counts of interfering with a federally protected activity—in this case, students attending a university. Machado is told he will face up to 10 years if convicted.
11/12/97	Trial takes place and on this date a recess is granted when new information is uncovered/presented. Questionnaires were revealed in which 9 of the students who got the messages said they were not overtly bothered by Machado's email.
11/18/97	Jury deadlocked 9 to 3 in favor of acquittal. Case said to have national importance by federal prosecutors, so a second trial was set for 1/27/98.
2/13/98	Richard Machado is found guilty on 2 counts of civil rights violations. Took only 3 weeks of trial to reach verdict. Following conviction, Machado is released on a \$10,000 bond from custody but is turned over to Irvine police on impending auto theft charges. Sentencing is postponed until 4/10/98. Possible maximum time Machado could serve would be 1 yr. Machado has already spent 1 yr. in jail awaiting trials, tec. Machado is recommended for anger & racial tolerance counseling, not allowed on UCI campus, and prohibited from having any contact with victims.
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Table 1.20

Scenario #1:

You are a systems administrator at the Office of Academic Computing at the University of California at Irvine and have been asked to modify the Unix system to prevent the reoccurrence of the Machado incident

Scenario #2:

You are a systems administrator at the Office of Academic Computing at the University of California at Irvine and have been asked to develop an orientation program for students who will use university computing laboratories and facilities. Special emphasis is put on preventing a reoccurrence of the Machado incident.

1. Identify key components of the STS

Part/Level of Analysis	Hardware	Software	Physical Surroundings	People, Groups, & Roles	Procedures	Laws & Regulations	Data & Data Structures

Table 1.21

2. Specify the problem:

2a. Is the problem a disagreement on facts? What are the facts? What are cost and time constraints on uncovering and communicating these facts?

2b. Is the problem a disagreement on a critical concept? What is the concept? Can agreement be reached by consulting legal or regulatory information on the concept? (For example, if the concept in question is safety, can disputants consult engineering codes, legal precedents, or ethical literature that helps provide consensus? Can disputants agree on positive and negative paradigm cases so the concept disagreement can be resolved through line-drawing methods?)

2c. Use the table to identify and locate value conflicts within the STS. Can the problem be specified as a mismatch between a technology and the existing STS, a mismatch within the STS exacerbated by the introduction of the technology, or by overlooked results?

STS/Value	Safety (freedom from harm)	Justice (Equity & Access)	Privacy	Property	Free Speech
Hardware/software					
Physical Surroundings					
<i>continued on next page</i>					

People, Groups, & Roles					
Procedures					
Laws					
Data & Data Structures					

Table 1.22

3. Develop a general solution strategy and then brainstorm specific solutions:

Problem / Solution Strategy	Disagreement		Value Conflict		Situational Constraints
	Factual	Conceptual	Integrate?	Tradeoff?	Resource? Technical? Interest

Table 1.23

- 3a. Is problem one of integrating values, resolving disagreements, or responding to situational constraints?
 3b. If the conflict comes from a value mismatch, then can it be solved by modifying one or more of the components of the STS? Which one?
 4. Test solutions:

Alternative / Test	Reversibility	Value: Justice	Value: Responsibility	Value: Respect	Harm	Code
A #1						
A #2						
A #3						

Table 1.24

5. Implement solution over feasibility constraints

Alternative Constraint	Resource		Interest			Technical	
	Time	Cost	Individual	Organization	Legal/ Social	Available Technology	Manufacturability
#1							
#2							
#3							

Table 1.25

1.5 Case Analysis and Presentation: Machado²³

Computer Ethics

Case Module Template: Machado Case

By William J. Frey

Module Abstract:

This module, designed for the EAC Toolkit (NSF SES 0551779), will test the Toolkit and Connexion's ability to network different online and offline sources for ethics across the curriculum. It consists of four components designed to provide tools for an in-depth analysis of the cases found at www.computingcases.org²⁴; it also makes substantial references to the draft manuscript of a textbook in computer ethics entitled *Good Computing: A Virtue Approach to Computer Ethics* under contract with Jones and Bartlett Publishing Company. (This book will consist of the cases displayed at *Computing Cases—Therac-25*, Machado, and *Hughes Aircraft*—and 7 additional cases all developed through NSF projects DUE-9972280 and DUE 9980768.)

Module Introduction:

This module as displayed in *Connexions* presents the case abstract and timeline both taken from *Computing Cases*. It then refers to the website where the following can be found by browsing:

- case narrative,
- case history,
- a teaching introduction which also provides a useful overview,
- an ethical analysis that can be accessed by clicking on the appropriate concept in the table displayed (clicking on safety will open a short document that discusses the safety implications of the case)
- a Socio-Technical Analysis which spells out the different components of the cases socio-technical system such as hardware, software, physical surroundings, people/groups/roles, procedures, laws, and data/data structures.
- supporting documents such as three RFCs (Request for Comments) on the Unix finger command, a profile of students at UCI, and an interview with Allen Schiano from the University of California at Irvine's Office of Academic Computing.

These materials all posted at www.computingcases.org²⁵ provide the background information necessary for a detailed and exhaustive case analysis. (A suggestion: since you will be working in groups, divide these readings among your group members and take advantage of class time to report to one another on the contents of the links you have individually explored. Be sure to triangulate by assigning more than one member to each link. This will help to identify and solve problems in interpretation.)

The case abstract and timeline in this module outline the case. The following decision point taken from the Machado case will provide the focus for an in-depth case analysis. You will respond to the decision-point by working through a four stage decision making procedure inspired by the standard Software Development cycle:

- problem specification,
- solution generation,
- solution testing, and . . .
- solution implementation.

Module Activities:

1. Instructor introduces the case based on the abstract and timeline found at www.computingcases.org²⁶
2. Students read case abstract, timeline, case decision point, and case analysis exercises.

²³This content is available online at <http://cnx.org/content/m13818/1.2/>.

²⁴<http://www.computingcases.org/>

²⁵<http://www.computingcases.org/>

²⁶<http://www.computingcases.org/>

3. Students do further research into the case by consulting ComputingCases materials which include narratives, histories, supporting documents, and ethical analyses.

4. Students carry out the activities outlined in the accompanying case exercises by (a) specifying the problem raised in the decision point, (b) generating solutions, (c) testing solutions using ethics tests, and (d) developing plans for implementing the solution over situational constraints.

5. Students prepare their case analyses working in small groups.

6. These groups present their completed analysis to the class in a case-debriefing session.

7. The instructor concludes by discussing the problem-solving issues and intermediate moral concepts raised by the case.

Machado Abstract:

In September of 1996, 19 year-old Richard Machado sent email to 59 Asian students at his public college, threatening them with phrases like “I will personally make it my life’s career to hunt you down and kill you” and signed by “Asian Hater.” Several of these individuals reported this incident to the Office of Academic computing (OAC). One of the recipients was a student employee of the OAC. The administrators of the OAC were faced with a decision about how to respond to harassing and threatening email sent over their system to students of their University, using their facilities.

Machado Timeline

11/16/95	Machado sends email threat to New University paper (UCI) via his roommate’s computer. The email is traced to the roommate’s computer. Roommate later said Machado had access to the computer. Machado identified as sender.
11/21/95	Warrant for arrest is filed against Machado, issued by Irvine Police Department—the warrant is a “no bail felony warrant.” Machado consents to a property search. Case given up shortly after—Machado’s roommate took the blame so he “wouldn’t be bothered anymore.”
(Between 1/1/96 and 9/20/96)	Machado’s older brother murdered in armed robbery prior to following incident; Machado is doing poorly in school, getting pressure from family to uphold high expectations.
9/20/96 (Friday, 10:54 am)	Machado sends hate Asians/threat email to about 59 UCI students. Machado sent message a second time shortly after, when he did not receive replies to the first email. Incident brought to the attention of Assoc. Director of The Academic Computing Center, by her employees. Machado identified in computer lab and was asked to leave by Core Services manager.
<i>continued on next page</i>	

9/21/96	Director of OAC reads Machado's email and decides that it is a police matter.
9/24/96(Monday)	The incident is reported to University Police Department. An officer is assigned to the case.
9/26/96	Retrieval of surveillance video confirmed Machado as the sender. Irving City Police notified and involved in case.
9/27/96	Registrar's office helps police locate Machado's address and phone number.
9/28/96	An officer phones Machado's residence and leaves message. Machado calls back and agrees to meet with an officer that afternoon at 5pm. Two charges filed after meeting: Machado (1) knowingly and without permission uses computer services and (2) makes telephone calls with intent to annoy.
11/14/96	A stolen vehicle report is filed for Machado's second roommate's car. Machado had told one roommate he was borrowing his other roommate's car. Machado did not have permission to borrow car.
11/18/96	FBI attempts investigation. An agent goes to Machado's residence; Machado is not there and hasn't been seen there since 11/13. Machado allegedly left with Young's keys on 11/14. Other suspicions: \$80 missing from roommate's coin jar; \$154 visa charges to roommate's card, \$54 of which were unauthorized; calls on 11/10, 11, and 12.
11/21/96	FBI agent phones Machado's roommate for confirmation of stolen car/info on Machado's disappearance.
11/22/96	Roommate interviewed.
11/23/96	Tammy Machado (Machado's sister) interviewed and said Machado had disappeared on the day his brother called him to inquire about Machado's name appearing in newspaper regarding Asian hate mails. Machado denied the reports in the paper to his brother; claimed it to be someone else. Tammy is informed that court date is set for 11/25 and if Richard doesn't show, they would issue a warrant for his arrest.
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2/6/97	Machado is arrested when attempting to enter US from Mexico—caught by US Immigration Inspector. Machado is reported as looking homeless, having no possessions, looking for construction work in Mexico.
9/16/97	Machado is charged with 10 counts of interfering with a federally protected activity—in this case, students attending a university. Machado is told he will face up to 10 years if convicted.
11/12/97	Trial takes place and on this date a recess is granted when new information is uncovered/presented. Questionnaires were revealed in which 9 of the students who got the messages said they were not overtly bothered by Machado's email.
11/18/97	Jury deadlocked 9 to 3 in favor of acquittal. Case said to have national importance by federal prosecutors, so a second trial was set for 1/27/98.
2/13/98	Richard Machado is found guilty on 2 counts of civil rights violations. Took only 3 weeks of trial to reach verdict. Following conviction, Machado is released on a \$10,000 bond from custody but is turned over to Irvine police on impending auto theft charges. Sentencing is postponed until 4/10/98. Possible maximum time Machado could serve would be 1 yr. Machado has already spent 1 yr. in jail awaiting trials, etc. Machado is recommended for anger & racial tolerance counseling, not allowed on UCI campus, and prohibited from having any contact with victims.
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Table 1.26

Scenario #1:

You are a systems administrator at the Office of Academic Computing at the University of California at Irvine and have been asked to modify the Unix system to prevent the reoccurrence of the Machado incident

Scenario #2:

You are a systems administrator at the Office of Academic Computing at the University of California at Irvine and have been asked to develop an orientation program for students who will use university computing laboratories and facilities. Special emphasis is put on preventing a reoccurrence of the Machado incident.

1. Identify key components of the STS

Part/Level of Analysis	Hardware	Software	Physical Surroundings	People, Groups, & Roles	Procedures	Laws & Regulations	Data & Data Structures

Table 1.27

2. Specify the problem:

2a. Is the problem a disagreement on facts? What are the facts? What are cost and time constraints on uncovering and communicating these facts?

2b. Is the problem a disagreement on a critical concept? What is the concept? Can agreement be reached by consulting legal or regulatory information on the concept? (For example, if the concept in question is safety, can disputants consult engineering codes, legal precedents, or ethical literature that helps provide consensus? Can disputants agree on positive and negative paradigm cases so the concept disagreement can be resolved through line-drawing methods?

2c. Use the table to identify and locate value conflicts within the STS. Can the problem be specified as a mismatch between a technology and the existing STS, a mismatch within the STS exacerbated by the introduction of the technology, or by overlooked results?

STS/Value	Safety (freedom from harm)	Justice (Equity & Access)	Privacy	Property	Free Speech
Hardware/software					
Physical Surroundings					
<i>continued on next page</i>					

People, Groups, & Roles					
Procedures					
Laws					
Data & Data Structures					

Table 1.28

3. Develop a general solution strategy and then brainstorm specific solutions:

Problem / Solution Strategy	Disagreement		Value Conflict		Situational Constraints
	Factual	Conceptual	Integrate?	Tradeoff?	Resource? Technical? Interest

Table 1.29

- 3a. Is problem one of integrating values, resolving disagreements, or responding to situational constraints?
- 3b. If the conflict comes from a value mismatch, then can it be solved by modifying one or more of the components of the STS? Which one?
- 4. Test solutions:

Alternative / Test	Reversibility	Value: Justice	Value: Responsibility	Value: Respect	Harm	Code
A #1						
A #2						
A #3						

Table 1.30

5. Implement solution over feasibility constraints

Alternative Constraint	Resource		Interest			Technical	
	Time	Cost	Individual	Organization	Legal/ Social	Available Technology	Manufacturability
<i>continued on next page</i>							

#1							
#2							
#3							

Table 1.31

Machado Summary

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http://cnx.org/content/m13818/latest/Machado_F06.ppt

Figure 1.4: PowerPoint File.

Chapter 2

Socio Technical System Modules

2.1 Socio-Technical Systems in Professional Decision Making¹

2.1.1 Module Introduction

Milagro Beanfield War

Joe Mondragon has created quite a stir in Milagro, a small village in New Mexico. He has illegally diverted water from the irrigation ditch to his field to grow beans. Access to scarce water in New Mexico has created sharp political and social disputes which have reached a crises point in Milagro. Competing with traditional subsistence farmers like Joe is the profitable recreation industry. Ladd Devine, a wealthy developer, has joined with the state government in New Mexico to build a large recreational center consisting of a restaurant, travel lodge, individual cabins and a lavish golf course. Since there is not enough water to cover both recreational and agricultural uses and since Ladd Devine's project promises large tax revenues and new jobs, the state government has fallen behind him and has promised to give to the recreational facilities all the water it needs. Hence, the problem created by Mondragon's illegal act. You work for Ladd Devine. He has asked you to look into local opposition to the recreational facility. Along these lines, you attend the town meeting scheduled by Ruby Archuleta in the town's church. You are concerned about Charlie Bloom's presentation and the impact it may have on the local community. Prepare a STS analysis to test Bloom's assertions and better prepare Ladd Devine for local opposition to his facility.

Incident at Morales

Fred is a chemical engineer hired by Phaust Corporation to design and make operational a new chemical plant for the manufacture of their newly redesigned paint thinner. Under financial pressure from the parent French company, Chemistre, they have decided to locate their new plant in Morales, Mexico to take advantage of lower costs and more flexible government regulations. You are well on the way toward designing this new plant when news comes from Chemistre that all budgets are being cut 20% to finance Chemistre's latest takeover acquisition. You are Fred and are now faced with a series of difficult financial-engineering decisions. Should you hold out for the more expensive Lutz and Lutz controls or use the cheaper ones produced locally? Should you continue with the current plant size or cut plant size and capacity to keep within budgetary constraints? You have also been made aware of the environmental and health risks associated with not lining the waste ponds used by the plant. Do you advocate lining the ponds or not, the latter being within compliance for Mexican environmental and health regulations. Prepare a STS analysis to help you make and justify these decisions. Make a series of recommendations to your supervisors based on this study.

Puerto Rican Projects

- Your company, Cogentrix, proposes a cogeneration plant that uses coal, produces electricity, and creates steam as a by-product of electricity generation process. Because the steam can be sold to nearby tuna

¹This content is available online at <<http://cnx.org/content/m14025/1.11/>>.

canning plants, your company wishes to study the feasibility of locating its plant in or near Mayaguez, Puerto Rico. (Co-generation technology has become very popular and useful in some places.) Carry out a STS analysis to identify potential problems. Make a recommendation to your company. If your recommendation is positive, discuss how the plant should be modified to fit into the Mayaguez, Puerto Rico STS.

- Your company, Southern Gold Resources, is interested in mining different regions in central Puerto Rico for copper and gold. But you know that twenty years earlier, two proposals by two international mining companies were turned down by the PR government. Carry out a STS study to examine the feasibility of designing a different project that may be more acceptable to local groups. What does your STS analysis tell you about social and ethical impacts, financial promise, and likely local opposition. Can profitable mining operations be developed that respect the concerns of opposed groups? What is your recommendation based on your STS analysis?
- Windmar, a company that manufactures and operates windmills for electricity generation has proposed to locate a windmill farm in a location adjacent to the Bosque Seco de Guanica. They have encountered considerable local opposition. Carry out a STS analysis to understand and clarify this opposition. Can the concerns of local stakeholders be addressed and the windmill farm still remain profitable? How should the windmill project be modified to improve its chances of implementation?

2.1.2 Things to Know about STSs

What is a Socio-Technical System? (STS)

A socio-technical system (=STS) is a tool to help a business anticipate and successfully resolve interdisciplinary business problems. "Interdisciplinary business problems" refer to problems where financial values are intertwined with technical, ethical, social, political, and cultural values. (Reference: Chuck Huff, Good Computing: A Virtue Approach to Computer Ethics, draft manuscript for Jones and Bartlett Publishers)

Some Things to Know About STSs

1. Socio-Technical systems provide a tool to uncover the different environments in which business activity takes place and to articulate how these constrain and enable different business practices.
2. A STS can be divided into different components such as hardware software, physical surroundings, people/groups/roles, procedures, laws/statutes/regulations, and information systems. Other components include the natural environment, markets, and political systems.
3. But while different components can be distinguished, these are, in the final analysis, inseparable. Socio-Technical Systems are first and foremost **systems**: their components are interrelated and interact so that a change in one often produces changes that reverberate through the system.
4. Socio-Technical systems embody moral values such as justice, responsibility, respect, trust, and integrity as well as non-moral values such as efficiency, satisfaction, productivity, effectiveness, and profitability. Often these values can be located in one or more of the system components. Often they conflict with one another causing the system as a whole to change.
5. STSs change, and this change traces out a path or trajectory. The normative challenge here is to bring about and direct changes that place the STS on a value-positive trajectory. In the final analysis, we study STS to make sure that they change in a value-realizing direction.

2.1.3 Constituents or Sub-Environments of Business Activity

Paragraph summary of sub-environments of business followed by a table devoted to each one.

- **Technology** including hardware, software, designs, prototypes, products, or services. Examples of engineering projects in Puerto Rico are provided in the PR STS grid. In the Therac-25 case, the hardware is the double pass accelerator, in Hughes the analogue-to-digital integrated circuits, and in

Machado the UNIX software system and the computers in the UCI laboratories that are configured by this system. Because technologies are structured to carry out the intentions of their designers, they embed values.

- **Physical Surroundings.** Physical surroundings can also embed values. Doors, by their weight, strength, material, size, and attachments (such as locks) can promote values such as security. Physical surroundings promote, maintain, or diminish other values in that they can permit or deny access, facilitate or hinder speech, promote privacy or transparency, isolate or disseminate property, and promote equality or privilege.
- **People, Groups, and Roles.** This component of a STS has been the focus of traditional stakeholder analyses. A stakeholder is any group or individual which has an essential or vital interest in the situation at hand. Any decision made or design implemented can enhance, maintain, or diminish this interest or stake. So if we consider Frank Saia a decision-maker in the Hughes case, then the Hughes corporation, the U.S. Air Force, the Hughes sub-group that runs environmental tests on integrated circuits, and Hughes customers would all be considered stakeholders.
- **Procedures.** How does a company deal with dissenting professional opinions manifested by employees? What kind of due process procedures are in place in your university for contesting what you consider to be unfair grades? How do researchers go about getting the informed consent of those who will be the subjects of their experiments? Procedures set forth ends which embody values and legitimize means which also embody values.
- **Laws, statutes, and regulations** all form essential parts of STSs. This would include engineering codes as well as the state or professional organizations charged with developing and enforcing them
- The final category can be formulated in a variety of ways depending on the specific context. Computing systems gather, store, and disseminate information. Hence, this could be labeled **data and data storage structure**. (Consider using data mining software to collect information and encrypted and isolated files for storing it securely.) In engineering, this might include the information generated as a device is implemented, operates, and is decommissioned. This information, if fed back into refining the technology or improving the design of next generation prototypes, could lead to uncovering and preventing potential accidents. Electrical engineers have elected to rename this category, in the context of power systems, rates and rate structures.

Technological Component

Component	Description	Examples	Frameworks	More Frameworks
Technological	Hardware: Machines of different kinds	Door (with tasks delegated to it such as automatically shutting and being locked)	Value Discovery (identifying and locating values in STS)	Social Constructionism : Restoring interpretive flexibility to reconstruct a technology to remove bias and realize value
<i>continued on next page</i>				

	Code that configures machines around human purposes	Power generating technologies based on renewable and nonrenewable resources	Value Translation (Operationalizing and implementing values in a STS by designing and carrying out a procedure)	Identifying and mitigating complexity in the form of tightly-coupled systems and non-linear causal chains
	Technology can constrain business activity by de-skilling	Automobiles, computers, cell phones all of which have produced profound changes in our STSs	Value Verification (Using methods of participatory observation to determine how effectively values have been realized.)	De-centralizing control and authority
	Technology, especially software, can instrument human action	Microsoft Office, Firefox Browser, Google Chrome, Google Docs, Social Networking software	Transperspectivity discovering strands of construction of current STS; identifying possibilities for reconstruction	Designing to avoid the technological imperative and reverse adaptation (where humans abandon ends and serve the ends of technologies)

Table 2.1: Technological component of STS

Table 2: Ethical and Social Component

Component	Description	Examples	Frameworks	More Frameworks
Ethical Environment	Moral Constructs: Spheres of justice where distribution takes place according to context-dependent rules (Rules)	Basic Moral Concepts: rights, duties, goods, values, virtues, responsibility, and justice	Utilitarianism: Happiness is tied to maximizing the satisfaction of aggregated preferences.	Basic Capabilities: life, bodily health, bodily integrity
<i>continued on next page</i>				

	Social Constructs: Power and its distribution among groups and individuals	Intermediate Moral Concepts: Privacy, Property, Informed Consent, Free Speech, due Process, Safety/Risk	Rights: Capacities of action that are essential to autonomy, vulnerable to standard threats, and correlated with feasible duties	Cognitive Capabilities: Sense, Imagination, Thought; Emotion; Practical Reason
	Right: A right is a capacity of action, essential to autonomy, that others are obliged to recognize and respect.	Privacy: If the information is directly relevant to the relation to the holder and the seeker, then it is not private.	Virtues: Settled dispositions toward choosing the mean between extremes of excess and defect. (Courage is the mean between cowardice and recklessness)	Social Capabilities: Affiliations, Other Species
	Duty: A duty is a principle that obliges us to recognize and respect the rights of others.	Property: That with which I mix my labor is mine. Intellectual property is non-rivalrous and non-excludable.	Capabilities Approach: For Nussbaum, capabilities answer the question, “What is this person able to do or be?” For Sen, capabilities are “‘substantial freedoms,’ a set of (causally interrelated) opportunities to choose and act.”	Capabilities that address vulnerabilities: Play and Control over one’s environment

Table 2.2: Ethical Environments of the socio-technical system

Physical Surroundings

Physical Surroundings	Description	Examples	Frameworks	Frameworks
	Physical environment imposes constraints (limits) over actions that restrict possibilities and shape implementation.	Influence of rivers, mountains, and valleys on social and economic activities such as travel, trade, economic and agricultural activity, commerce, industry, and manufacturing.	Classroom environment enables or constrains different teaching and learning styles. For example, one can pair off technically enhanced and technically challenged classrooms with student-centered and teacher-centered pedagogical styles and come up with four different learning environments. Each constrains and enables a different set of activities.	The physical arrangement of objects in the classroom as well as the borders created by walls, doors, and cubicles can steer a class toward teacher-centered or student-centered pedagogical styles.

Table 2.3: This table summarizes the physical environment of the STS and how it can constrain or enable action.

People, Groups, and Roles (Stakeholders)

Stakeholders	Description	Examples	Frameworks	Frameworks
	Any group or individual that has a vital interest at play (at stake) in the STS.	Market Stakeholders: Employees, Stockholders	Non-Market Stakeholders: communities, activist groups and NGOs	Role: The place or station a stakeholder occupies in a given organizational system and the associated tasks or responsibilities.
<i>continued on next page</i>				

		customers, suppliers, retailers/wholesalers, creditors	business support groups, governments, general public (those impacted by projects who do not participate directly in their development)	Interests: Goods, values, rights, interests, and preferences at play in the situation which the stakeholder will act to protect or promote.
		(Distinction between market and non-market stakeholders comes from Lawrence and Weber, Business and Society: Stakeholders, Ethics, Public Policy , 12th edition. McGraw-Hill, 14-15.	Alliances are discussed by Patricia Werhane et al., Alleviating Poverty Through Profitable Partnerships: Globalization, Markets, and Economic Well-being . Routledge (2009).	Relation: Each stakeholder is related to other stakeholders in an alliance and each relation is tied to goods and values.

Table 2.4: This table shows the social or stakeholder environment of the STS. A stakeholder is any group or individual that has a vital interest at play in the STS.

Procedural Environment

Procedural	Description	Examples	Framework	Framework
	A series of interrelated actions carried out in a particular sequence to bring about a desired result, such as the realization of a value. Procedures can schematize value by setting out a script for its realization.	Hiring a new employee: (a) settling on and publishing a job description; (b) soliciting and reviewing applications from candidates; (c) reducing candidate list and interviewing finalists; (d) selecting a candidate; (e) tendering that candidate a job offer. Other procedures: forming a corporation, filing for bankruptcy, gaining consent to transfer TGI and PII to a third party (Toysmart: opt-in and opt-out procedures).	Value Realization Process in Software Engineering: (a) Discovery: Uncovering values shared by a given community; (b) Translation: operationalizing and implementing values in a given STS; (c) Verification: using methods of participatory observation (surveys and interviews) to validate that the values in question have been discovered and translated.	Challenging the Statement of Values: (a) A stakeholder group raises a conceptual, translation, range, or development issue; (b) Group presents their challenge and response to other stakeholders; (c) If other stakeholder groups agree, then the challenge leads to a revision in the SOV; (d) Community as a whole approves the revision.

Table 2.5

Legal Environment: Laws, Statutes, Regulations

Laws, Statutes, Regulations	Description	Examples	Frameworks	Frameworks
	Laws differ from ethical principles and concepts in that laws prescribe the minimally moral while ethical principles and concepts routinely explore higher moral "spaces."	Criminal Law: Applies to individuals; interested party in a criminal trial is society, not the victim.	Civil Law: Torts concern wrongful injury. The objective of a tort is to make the victim "whole" after an injury.	US and British law work through a common law system where current decisions are based on past decisions or precedent.
<i>continued on next page</i>				

	Ethical principles challenge and criticize laws by bringing into question their normative content.	Involves proving a mens rea (guilty mind) and actus reus (guilty or law-breaking act) and that the mens rea caused the actus reus.	To prevail in a tort one must prove (in order of severity) negligence, recklessness, or intent.	The Puerto Rican system of law is based on the Napoleonic code where decisions relate directly to existing law and statute and precedent plays a weaker role.
	Laws can challenge ethical principles and concepts by raising issues of practicality. Also, as in responsibility theory, the law can structure and inform the moral discussion.	Criminal law does not apply to corporations because they "have no soul to damn and no body to kick" Baron Thurlow	Negligence involves proving that the defendant failed to meet some standard of due care .	Question: How does the statute-based Napoleonic system in PR constrain and enable business practice in relation to other systems such as the British and American common law systems?
			Contract law concerns the violation of the terms of a contract.	

Table 2.6

Market Environment

Market Environment	Description	Examples	Frameworks	Frameworks
	Business takes place within different markets that shape supply, demand, and price. Globalization frequently requires that a business be adept at operating across different markets	Laissez Faire: Each economic unit makes choice based on rational (enlightened) self-interest. (Private ownership of goods.)	Assumptions of a Free Market System: Individual decisions are aggregated. Information flows through price structure.	Recent economic studies of the limits of laissez faire markets:
<i>continued on next page</i>				

	Liberal use made here of notes from Economics class taught by CR Winegardner, University of Toledo, 1971-1972	Liberal Democratic Socialism: Limited government intervention is needed to improve upon the choice of individual economic units. (Mixture of private and public ownership)	Free association. Absence of force or fraud. Individual agents are rational utility maximizer	Information Asymmetries (as studied by Stiegliz). Monopolies which, in the absence of competition, can dictate standards of price, product and service.
	Materials also take from Natural Capitalism from Lovins and Hawkings.	Communist, Authoritarian Socialism: The state is in the best position to know what choices and policies are beneficial for the economy as a whole and its component parts. (Public ownership of goods and services)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

Table 2.7

2.1.4

Ethics of STS Research

- **Right of Free and Informed Consent:** This is the right of participants in a research project to know the harms and benefits of the research. It also includes the right not to be forced to participate in a project but, instead, offer or withdraw voluntarily their consent to participate. When preparing a STS analysis, it is mandatory to take active measures to facilitate participants's free and informed consent.
- Any STS analysis must take active measures to recognize potential harms and minimize or eliminate them. This is especially the case regarding the information that may be collected about different individuals. Special provisions must be taken to maintain confidentiality in collecting, storing, and using sensitive information. This includes careful disposal of information after it is no longer needed.

2.1.5 Participatory Observation

- As we said above, a socio-technical system (STS) is “an intellectual tool to help us recognize patterns in the way technology is used and produced.” Constructing these tools requires combining modes of analysis that are ordinarily kept separate. Because STSs embed values, they are normative. These values can help to chart out trajectories of change and development because they outline values that the system needs to realize, maintain, or even enhance. In this way, the study of STSs is normative and

a legitimate inquiry for practical and professional ethics. On the other hand, STS analysis requires finding out what is already there and describing it. So STS analysis is descriptive as well. In this textbox, we will talk briefly about the descriptive or empirical components of STS analysis. This material is taken from the draft manuscript of *Good Computing: A Virtue Approach to Computer Ethics* and has been developed by Chuck Huff.

- **Interviews:** Semi-Structured and Structured Interviews conducted with those familiar with a given STS provide an excellent source of information on the constituents of a given STS and how these fit together into an interrelated whole. For example, the STS grid on power systems was put together by experts in this area who were able to provide detailed information on power rates and protocols, software used to distribute energy through the gridlines, and different sources (representing both hard and soft technologies) of power generation.
- **Field Observation:** Those constructing a STS analysis go directly to the system and describe it in its day-to-day operation. Two books provide more information on the types and techniques of field observation: 1. David M. Fetterman, *Ethnography: 2nd Edition, Applied Social Research Methods Series, Vol 17*. London, UK.: Sage Publishers, 1998 and 2. James P. Spradley, *Participant Observation*. New York, Harcourt, 1980. The data collected in this method can also be used to construct day-in-the-life scenarios that describe how a given technology functions on a typical day. These scenarios are useful for uncovering value conflicts and latent accidents. See James T. Reason, *Human Error*, Cambridge, UK.: Cambridge University Press, 1990 for information on latent accidents, how they are detected, and how they are prevented.
- **Questionnaires:** Questionnaires are useful for gathering general information from large numbers of people about a STS. Constructing good questionnaires is a difficult process that requires patience as well as trial and error. (Trying out questions on classmates and friends is the best way to identify unclear or misleading questions.) Avoiding complex, overly leading, and loaded questions represent a few of the challenges facing those who would construct useful questionnaires.
- **Archival and physical trace methods:** Looking at user manuals provides insight into how a system has been designed and how it works. Studying which keys are worn down on computer keyboards provides information on the kind of work being done. Comparing how a system is intended to work with how it is in fact being used is also illuminating, especially when one is interested in tracing the trajectory of a STS. Working with archival and physical trace methods requires critical thought and detective work.
- None of the above methods, taken in isolation, provides complete information on a STS. Triangulation represents the best way to verify data and to reconcile conflicting data. Here we generate evidence and data from a variety of sources then compare and collate. Claims made by interviewees that match direct on-site observations confirm one another and indicate data strength and veracity. Evidence collected through questionnaires that conflicts with evidence gathered through archival research highlights the need for detective work that involves further observation, comparison, interpretation, and criticism.
- Developing STS analyses bears a striking resemblance to requirements analysis. In both cases, data is collected, refined, and put together to provide an analysis. A key to success in both is the proper combination of normative and descriptive procedures.

2.1.6 Exercise 1: Make a Table that Describes the Socio-Technical System

Directions: Identify the constituents of the Socio-Technical System. Use the broad categories to prompt you.

1. What are the major hardware and software components?
2. Describe the physical surroundings.
3. What are the major people groups or roles involved?
4. Describe any procedures in the STS.
5. Itemize the laws, statutes, and regulations.

6. Describe the data and data structures in your STS. Use the two templates below that fill in this table for energy generation systems and for engineering ethics in Puerto Rico.

Socio Technical System Table

	Hard- ware	Software	Physical Sur- round- ings	People, Groups, Roles	Procedures	Laws	Data and Data Struc- tures

Table 2.8

2.1.7 Exercise 2: Identify Value Mismatches in the STS

Directions: identify the values embedded in the STS. Use the table below to suggest possible values as well as the locations in which they are embedded.

1. **Integrity:** "Integrity refers to the attributes exhibited by those who have incorporated moral values into the core of their identities. Such integration is evident through the way values denoting moral excellence permeate and color their expressions, actions, and decisions. Characteristics include wholeness, stability, sincerity, honesty to self and others, suthenticity, and striving for excellence.
2. **Justice:** Justice as fairness focuses on giving each individual what is his or her due. Three senses of justice are (1) the proper, fair, and proportionate use of sanctions, punishments and disciplinary measures to enforce ethical standards (retributive justice), (2) the objective, dispassionate, and impartial distribution of the benefits and burdens associated with a system of social cooperation (distributive justice), (3) an objectively determined and fairly administered compensation for harms and injustices suffered by individuals (compensatory justice), and (4) a fair and impartial formulation and administration of rules within a given group.
3. **Respect:** Respecting persons lies essentially in recognizing their capacity to make and execute decisions as well as to set forth their own ends and goals and integrate them into life plans and identities. Respects underlies rights essential to autonomy such as property, privacy, due process, free speech, and free and informed consent.
4. **Responsibility:** (Moral) Responsibility lies in the ability to identify the morally salient features of a situation and then develop actions and attitudes that answer to these features by bringing into play moral and professional values. Responsibility includes several senses: (1) individuals are responsible in that they can be called upon to answer for what they do; (2) individuals have responsibilities because of commitments they make to carrying out the tasks associated with social and professional roles; (3) responsibility also refers to the way in which one carries out one's obligations (This can range from indifference to others that leads to minimal effort to high care for others and commitment to excellence)
5. **Free Speech:** Free Speech is not an unlimited right. Perhaps the best place to start is Mill's argument in **On Liberty**. Completely true, partially true, and even false speech cannot be censored, the latter because censoring false speech deprives the truth of the opportunity to clarify and invigorate itself by defending itself. Mill only allows for a limitation of free speech based on harm to those at which the speech is directed. Speech that harms an individual (defamatory speech or shouting "fire" in a crowded theatre) can be censored out of a consideration of self-defense, not of the speaker, but of those who stand to be harmed by the speech.

6. **Privacy:** If an item of information is irrelevant to the relation between the person who has the information and the person who seeks it, then that information is private. Privacy is necessary to autonomy because control over information about oneself helps one to structure and shape one's relations with others.
7. **Property:** According to Locke, we own as property that with which we have mixed our labor. Thomas Jefferson argues that ideas are problematic as property because, by their very nature, they are shared once they are expressed. They are also nonrivalrous and nonexclusive.

Drawing Problems from Embedded Values

- Changes in a STS (e.g., the integration of a new technology) produce value mismatches as the values in the new component conflict with those already existing within the STS. Giving laptops to children produces a conflict between children's safety requirements and the safety features embedded in laptops as designed for adults.
- Changes within a STS can exaggerate existing value conflicts. Using digitalized textbooks on laptop computers magnifies the existing conflict concerning intellectual property; the balance between copyrights and educational dissemination is disrupted by the ease of copying and distributing digitalized media.
- Changes in STS can also lead to long term harms. Giving laptops to children threatens environmental harm as the laptops become obsolete and need to be safely disposed of.

Values Embedded in STS

	Hard-ware	Software	Physical Sur-round-ings	People, Groups, Roles	Procedures	Laws	Data and Data Struc-tures
Integrity							
Justice							
Respect							
Responsibility for Safety							
Free Speech							
Privacy							
Intellectual Property							

Table 2.9

2.1.8 Using Socio-Technical System Grids for Problem Specification

The activity of framing is a central component of moral imagination. Framing a situation structures its elements into a meaningful whole. This activity of structuring suggests both problems and solutions. Framing a situation in different ways offers alternative problem specifications and solution possibilities. Since skillful framing requires practice, this part of the module suggests how socio-technical system tables can help provide different frames for problem specification and solution generation.

Different Problem Frames

- **Technical Frame:** Engineers frame problems technically, that is, they specify a problem as raising a technical issue and requiring a technical design for its resolution. For example, in the STS grid appended below, the Burger Man corporation wishes to make its food preparation areas more safe. Framing this technically, it would be necessary to change the designs of ovens so they are more accident-proof.
- **Physical Frame:** How can the Burger Man corporation redesign its restaurants as physical facilities to make them more accessible? One way is to change the access points by, say, designing ramps to make restaurants wheel chair accessible. Framing this as a physical problem suggests solutions based on changing the physical structure and arrangement of the Burger Man STS.
- **Social Frame:** Burger Man as a corporation has stakeholders, that is, groups or individuals who have an essential interest at play in relation to the corporation. For example, framing the problem of making Burger Man more safe as a social problem might suggest the solution of integrating workplace safety into worker training programs and conducting regular safety audits to identify embedded risks.
- **Financial or Market-Based Frames:** Burger Man is a for-profit corporation which implies that it has certain financial responsibilities. Consequently, Burger Man should be concerned with how to provide safe, child-proof chairs and tables that do not cut unduly into corporate profits. But like the legal perspective, it is necessary to conduct ethical and social framing activities to compensate for the one-sidedness of financial framing.
- **Managerial Frame:** Many times ethical problems can be framed as managerial problems where the solution lies in changing managerial structures, reporting relations, and operating procedures. For example, Burger Man may develop a specific procedure when a cashier finishes a shift and turns over the cash register and its contents to another cashier. Burger Man may develop cleaning procedures and routines to minimize the possibility of serving contaminated or spoiled food to customers.
- **Legal Frame:** Burger Man may choose to frame its environmental responsibilities into developing effective procedures for complying with OSHAA and EPA regulations. Framing a problem legally certainly helps to identify effective and necessary courses of action. But, because the ethical and social cannot be reduced to the legal, it is necessary to apply other frames to uncover additional risks not suggested by the legal framing.
- **Environmental Framing:** Finally, how does Burger Man look from the environmental standpoint? Does it consider environmental value (environmental health, safety, and integrity) as merely a side constraint to be addressed only insofar as it interferes with realizing supposedly more important values such as financial values? Is it a value to be traded off with other values? (For example, Burger Man may destroy the local environment by cutting down trees to make room for its latest restaurant but it offsets this destruction through its program of planting new trees in Puerto Rican tropical rain forests.) Framing a problem as an environmental problem puts the environment first and sets as a goal the integration of environmental values with other values such as worker safety and corporate profits.

Burger Man Socio-Technical System Table

This media object is a downloadable file. Please view or download it at
 <Socio Technical System Grid for Business Ethics.docx>

Figure 2.1: Clicking on this figure will open as a Word file a STS table based on the fictional corporation, Burger Man. Below are a list of problems suggested by the STS analysis.

2.1.9 Media File Uplinks

This module consists of two attached Media Files. The first file provides background information on STSs. The second file provides two sample STS grids or tables. These grids will help you to develop specific STSs

to analyze cases in engineering, business, and computer ethics without having to construct a completely new STS for each case. Instead, using the two tables as templates, you will be able to zero in on the STS that is unique to the situation posed by the case. This module also presents background constraints to problem-solving in engineering, business, and computer ethics. These constraints do not differ absolutely from the constituents of STSs. However, they pose underlying constraints that outline the feasibility of an ethical decision and help us to identify obstacles that may arise when we attempt to implement ethical decisions.

Socio-Technical Systems

This media object is a downloadable file. Please view or download it at
<STS_Background_V3.doc>

Figure 2.2: Socio-Technical Systems: Constituents, Values, Problems, and Constraints.

STS Templates

This media object is a downloadable file. Please view or download it at
<STS_Templates.doc>

Figure 2.3: Two STSs, Power Engineering and the Puerto Rican Context of Engineering Practice.

Socio-Technical Environments Table

[MEDIA OBJECT]²

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²This media object is a downloadable file. Please view or download it at
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2.2 Ethical Leadership Using "Incident at Morales"³

2.2.1 Module Introduction

In this module, you will view the DVD Incident at Morales and carry out a series of activities designed to familiarize you with issues in ethical leadership, social responsibility, and globalization. Links to interviews with major figures on globalization, to the Connexions module "Socio Technical Systems in Decision Making" and to online material on "Incident at Morales" will help you to gather the information you need to complete this module.

2.2.2 Issues in Incident at Morales

- Quotes are taken from the Study Guide to "Incident at Morales"
- Confidentiality: "Although the lawyers note that Fred has no legal obligations to Chemitoil because he did not sign a non-disclosure agreement, does Fred have a moral obligation to ensure the confidentiality of the information he may have learned at Chemitoil?"
- Wally's "One Rule": What is the impact of Wally's "One Rule" on Fred's ability to do his job? More importantly, does this interfere with Fred's ability to meet his professional ethical obligations in the course of conducting his job?"
- **Lutz and Lutz** Controls: Wally claims that **Lutz and Lutz** controls are the best among the available alternatives. He also claims that the fact that Chuck's brother-in-law works with **Lutz and Lutz** is not a relevant factor. How should Fred choose in this situation regarding controls?
- Couplings: In choosing both the type of couplings and piping as well as to use a local (Mexico) supplier without a plant inspection, what factors should Fred take into account? What should be the margin of error in terms of pressure? How does Fred balance safety and reliability with the need to cut costs due to the parent company's recent acquisitions?
- Environmental Regulations—When in Rome...: Should Fred take advantage of less strict environmental regulations in Mexico to save money for Phaust corporation? What are the responsibilities of multinational corporations that operate in countries like Mexico?

2.2.3 Exercise 1: Incident at Moral Socio-Technical System

Prepare a socio-technical analysis of Morales, Mexico. Your analysis will examine the insertion of the Phaust chemical plant into the Morales context. Using the following list of values, can you identify any potential value conflicts? Safety, Equity/Justice, intellectual property, confidentiality, responsibility, reasonableness.

Preparing a STS Table

- Study the two templates in the module, "Socio Technical Systems in Professional Decision Making." See which one applies best to the Incident at Morales case.

³This content is available online at <<http://cnx.org/content/m14408/1.9/>>.

- Redo the headings of the table substituting relevant items for those in the templates that are not relevant. For example, in preparing a STS table for a computer system, you may wish to change rate and rate structures into something like data and data structures.
- Fill in the relevant columns in your newly revised table. For example, in the Incident at Morales, the description of the physical surroundings would be based on the brief video segment where Fred is consulting with Wally and Manuel. What is the geographical area like? (It looks like a dry climate given the DVD.) What is the plant like? (It is, at the very least, small.) Attention to detail—even trivial detail—is important for these columns of the STS.
- For the second table, take the short value list we have been working with this semester and (1) look for new value mismatches, (2) identify existing value conflicts, and (3) describe any harmful long term consequences. In Incident at Morales, you may want to concentrate on justice (equity), responsibility for safety, respect, property, and free speech.
- Keep your tables simple and direct. You will have only a few minutes to debrief on them. Remember, this is a device to help you visualize value conflicts hidden in technologies and socio technical systems.

Socio-Technical System

Hardware	Software	Physical Surroundings	People, Groups, Roles	Procedures	Laws, Statutes, Regulations	Data and Data Structures

Table 2.10

STS and Values

	Hardware/Software	Physical Surroundings	People, Groups, Roles	Procedures	Laws, Statutes, Regulations	Data and Data Structures
Justice (Equity and Access)	Responsibility					
Responsibility						
Respect (Privacy and Due Process)						
<i>continued on next page</i>						

Property						
Free Speech						

Table 2.11

2.2.4 Exercise 2: Opportunities for Ethical Leadership

You will be assigned one of the topics described above. Discuss this topic with your group. Answer the questions. The prepare a brief summary of your answers to share with the rest of the class. The topics, again, are confidentiality, Wally's "One Rule", Lutz and Lutz Controls, the quality and integrity of the couplings, and the difference in environmental regulations. Throughout your reflections look for opportunities open to Fred to demonstrate ethical leadership. What obstacles stand in his way? What can he do to overcome them?

Decision Point for Business Ethics, Fall 2007

- Generate Solutions, Test Solutions, and Develop a Solution Implementation plan from the perspective of Fred. Focus specifically on whether Fred, as an engineer, should sign off on the plant as it is being passed over to operations.
- **Decision Point:** Chuck's solution to the French company's budget cuts was to pass along long term expenses and operational problems to the plant operation group.
- At the end of the video, Fred has been asked to sign off on the plant's documents and, essentially, approve this "pass along" strategy.
- What kind of ethical problems does Chuck's solution create?
- Knowing this, should Fred have signed off on the plant at the end of the video?
- Take Fred's perspective. Generate solutions, test them, and develop an implementation from Fred's perspective. Summarize your group's work by developing a solution table, solution evaluation matrix, and a feasibility table. Be prepared to summarize (not present) these tables informally to the rest of the class.

Refined Solution Table

Decision Alternative	Description	Justification: problem fit, ethics, feasibility
Solution 1		
Solution 2		

Table 2.12

Solution Evaluation Matrix

Solution / Test	Reversibility	Harm / Benefits	Publicity	Feasibility (Global)
Solution 1				
Solution 2				

Table 2.13

For Feasibility Table, see m14789.

2.2.5 Exercise 3

Read and listen to the interviews with Shiva, who is opposed to globalization, and O'Rourke, who takes a pro-globalization. Summarize their arguments. Using these arguments, construct your own argument on globalization and apply it to the Morales case: Is the incident that occurred at Morales an inevitable result of globalization or merely the result of bad individual and corporate decisions?

2.2.6 Incident at Morales in Ethics Bowl

Decision Scenario from "Incident at Morales" (Taken from Study Guide)

- "Although the lawyers note that Fred has no legal obligations to Chemitoil because he did not sign a non-disclosure agreement, does Fred have a moral obligation to ensure the confidentiality of the information he may have learned at Chemitoil?"
- Return to the moment where Wally gives Fred the preliminary plant plans. Then place yourself in the following dialogue:
- WALLY Good. Chuck is going to have a project kick-off meeting this afternoon. Your plant design will be on the agenda. It'll be at three. We don't waste time around here. We're fast at Phaust. Corporate tag line. As Fred gazes around his new work-station, smiling, Wally starts routing through a filing cabinet. He finds the preliminary plant plans and hands them to Fred. WALLY You might want to look at this. (hopeful) Tell me if this is like what you were building at your last job.
- You are Fred. Is Wally asking you to violate your (moral) confidentiality obligation with Chemitoil? Present a response to Wally's question. Show how this response respects both your former employer, Chemitoil, and your current employer, Phaust.

Decision Scenario from "Incident at Morales:" Environmental Integrity or Reliable Controls

- You are Fred. After you point out to Wally, that Lutz and Lutz controls are expensive, he advises you to "pick your fights when you can win them." (Chuck's brother-in-law is the customer representative for Lutz and Lutz.) On the other hand your wife, an EPA compliance litigator, points out how dangerous it is to put untreated toxic waste material in unlined evaporation ponds because of the possibility of drinking water contamination.
- You think about taking Wally's advice. Which fight should you choose, saving the environment while opting for cheaper controls or remaining with the expensive Lutz and Lutz controls but going ahead with the unlined evaporation ponds?
- In your presentation address this broader issue. Is Wally right? Should we trade off safety and environmental concerns when the budget is tight?

2.3 Ethics and Laptops: Identifying Social Responsibility Issues in Puerto Rico⁴

2.3.1 Introduction

While social responsibility has been recognized as one of the key areas of business ethics, much more needs to be done to develop frameworks and tools to clarify the concept itself and to implement it in business and professional practice on a day-to-day basis. This module will give students the opportunity to practice using frameworks and techniques that address these two needs.

Developing socio-technical system analyses provides an effective means to highlight issues of social responsibility. Since socio-technical systems embody values, building their descriptions allows us to read off

⁴This content is available online at <<http://cnx.org/content/m14257/1.7/>>.

potential problems due to harmful impacts and value conflicts. To facilitate this, you will be building socio-technical system descriptions using a grid or matrix that provides the components of socio-technical systems, levels under which they can be analyzed, and the values that they tend to embody. Building socio-technical system descriptions also requires using methods of participatory observation. These include constructing surveys and questionnaires, developing interviews, and building day-in-the-life scenarios. This module will help you frame and respond to social responsibility issues by providing a framework for socio-technical analysis and a set of methodological tools taken from participatory observation.

Module m14025 (Social-Technical Systems in Professional Decision Making) provides background information on STSs, their construction and their uses. Links to this module and to the website, Computing Cases, can be found in the upper left hand corner of this module. They provide useful background information. This module makes use of a case, Texas Laptops, that was developed by Chuck Huff and C. Nathan DeWall for NSF projects, DUE-9972280 and DUE-9980768.

2.3.2 Case Narrative

Texas Laptop Case

1. In the late 1990's, the Texas State Board of Education proposed the ambitious plan of providing each of the state's four million public school students with their own laptop computer. This plan was devised to solve several problems confronting Texas public education.
 2. Laptop computers could make educational resources more accessible to students who were faced with special challenges like deafness or blindness. Computers offer software options (such as audio books) that promise to reach more students than traditional printed textbooks.
 3. Laptops also promised to solve the problem of obsolete textbooks. Texas purchased textbooks for their students at considerable costs. The purchasing cycle ran six years. By the end of this cycle, textbooks were out of date. For example, in the late 1990's when the laptop plan was proposed, history textbooks still referred to the Soviet Union and to the existence of the Berlin Wall. Laptops, on the other hand, would present textbook content in digital form which would eliminate printing and shipping costs and facilitate updates through online downloads.
 4. Texas business leaders were concerned about the computer literacy of the upcoming generation of students. By employing laptops in more and more teaching activities, students would learn how to interact with computers while taking advantage of the new and more effective modes of presentation offered.
-
1. However, adopting laptops also presented problems that critics quickly brought forth.
 2. Teachers would need to learn how to use laptop computers and would have to change their teaching to accommodate them in the classroom.
 3. Apparent cost savings disappeared upon further, closer examination. For example, it became clear that textbook publishers would not so easily give up the revenues they had come to depend upon that came from textbook purchases for public school students. Updates from downloads could turn out to be more expensive and educational software could be coded to restrict access and dissemination.
 4. Further studies indicated that technical support costs would run two to three times initial outlays. Keeping laptop hardware and software up and running required technical support and continued investment.
 5. Texas found that while some school districts—the richer ones—had already begun projects to integrate computing technology, the poorer school districts would require considerable financial support.

To deal with these problems, Texas carried out several pilot projects that examined the effectiveness of laptop integration in select school districts. While several successes were reported a series of problems arose that led Texas Board of Education officials to postpone the laptop project. First, pilot projects depended on donations from private computing vendors. While some were forthcoming, others failed to deliver hardware on time and provided only minimal technical support. Second, teachers resisted laptop integration due to

the extensive investment of time required to appropriate computing skills and the difficulty of modifying existing curricula and teaching styles to accommodate laptop hardware and software. Third, at that time the available educational software, such as digitalized textbooks, was expensive, inadequately developed, and narrowly focused on curricular areas such as writing and math practice. Teachers also began to develop more comprehensive and philosophical criticisms of laptop use. Education specialist, Larry Cuban, argued that while laptops provided good support for a vocational education, they failed to deliver on other educational goals such as teaching children how to interact with their peers and teachers and teaching children the civic virtues necessary to become active participants in a democratic form of government. Studies began to appear that argued that skills developed through computer use came at the expense of other, more social skills.

The Texas Laptop plan was never formally implemented beyond the pilot project phase. However, several computer integration projects have been carried out in other parts of the country. For example, Larry Cuban reports on computer integration projects carried out in Silicon Valley in California. MIT has developed a cheap laptop computer for use in developing nations. You can find a link to computer integration projects that have been implemented in Philadelphia public schools through the support of the Microsoft Foundation.

Students in computer ethics classes at the University of Puerto Rico at Mayaguez have looked into the feasibility of integrating laptops in the public school socio-technical system in Puerto Rico. They began by looking at the project to provide public school teachers with laptops that was carried out in the late 1990's under the Pedro Rossello administration. The student research projects came to focus on three problem areas. First, they examined whether there were structures in laptop design that made computers unfit for use by children. Second, they studied whether social or ethical problems would arise from disposal of spent laptops. Third, they investigated the impact on copyright law and intellectual property practices that digitalizing printed textbooks would have.

2.3.3 What you are going to do...

2.3.3.1 Decision Point One

- **You are a computer engineer and have been subcontracted by your local government to purchase new portable computers for high school teachers. Your job includes...**
- selecting the kind of computer to be used
- identifying vendors who will sell the computers
- overseeing the distribution of computers to high school teachers
- developing an implementing a training program to help teachers learn to use computers
- designing a technical support hotline to help teacher work out any technical problems that may arise

Distributing computers to high school teachers seems simple enough. You select the computers, buy them, and give them to the teachers. Yet only a slight change in circumstances can bring into the open latent or potential ethical issues:

- How should you go about setting up the bidding process to determine the computers to be used?
- What should you do to determine teacher and student needs and how computers can respond to these needs? It makes very little sense to provide computers and then tell teachers and students to use them. What are they to do with these computers? How do they fit them into everyday education? This requires seeing the computer project from the standpoints of students, their parents, and teachers. The **reversibility test** will help here.
- Who stands to benefit from your actions? Who stands to be harmed from these actions? How will benefits and harms be distributed through the different stakeholders in this case?
- **Latent ethical problems exist in this socio-technical system that can erupt into full-blown problems with small changes in circumstances**
- Someone you know well—say your cousin—submits a bid. What ethical issues does this turn of events give rise to?

- The contract to provide computers is awarded to your cousin, and he provides reliable computers at a reasonable price. The, a few weeks later, you read the following headline in the newspaper: **"More Government Corruption—Computer Czar's Cousin Counts Millions in Cozy Computer Contract"** What do you do now?
- A group of angry high school teachers holds a press conference in which they accuse the government of forcing them to use computing technology in their classes. They say you are violating their academic freedom. How should you respond?
- Someone in the government suggesting placing a program in each computer that allows government officials to monitor the computers and track user behavior. How would you feel if your computer use were being monitored without your knowledge or consent? Are their circumstances under which monitoring could bring about any social benefits? What are the likely harms? Do the benefits outweigh the harms? Suppose you go along with this and read the following headline in the morning newspaper: **"Government Snoops Bug High School computers"**. Using the publicity test, what kind of person would you appear to be in the public's eye? How would you view yourself in terms of this action?

2.3.3.2 Decision Point Two

You are Dr. Negroponte from MIT. For several years now, you have been working to design laptop computers that respond to a wide range of needs of children in poor, developing nations. You have set up an incentive for people in developed nations to contribute to children in poor nations. For \$300, one can buy two laptops, keep one, and have the other donated to a child in a developing nation. This has generated computers but governments in developing nations—enthusiastic at first—have recently shown themselves reluctant to carry through on their commitments. Your goal of reducing laptop costs to \$100 per computer have also stalled. It has been difficult to generate projected economies of scale.

- The laptops employ a simple design. They use Linux as an operating system since this shareware can be freely downloaded. The computers are also designed to be used in areas where the underlying infrastructure, especially electricity, is unreliable. They are battery driven and a hand crank allows for recharging batteries when electricity is unavailable. They employ a wireless connection to the Internet.
- An Open Education Resource movement has been started to generate educational resources directly and freely available to children using MIT laptops. This movement has generated considerable educational content of varying qualities. Reports available online provide insights into the pros and cons of the open resource educational movement. Whether this can (or should) replace traditional textbooks (which can be quite expensive and difficult to update) is still open to debate.
- There is evidence that laptops can and have contributed to an enhanced learning experience for children in developing nations. Poor attendance, a large and chronic problem, has been improved in laptop programs. Children enjoy their computers and seem better motivated in general as a result. They take their computers home for homework and share them with the rest of their family. Many teachers have successfully adapted their teaching styles to this Internet-supported, technologically enhanced educational mode.
- But recently, laptops have come under increasing critical scrutiny.
- They are more expensive than traditional educational materials such as textbooks
- They compete for scarce financial resources and may be less cost-effective in the long run than other, more traditional educational resources.
- The MIT laptop has no hard drive, a fact critically singled out by Microsoft's founder, Bill Gates. They have been designed to use the Linux operating system rather than Microsoft's more expensive and complicated one.

- Developing nation governments have recently shown "cold feet" to putting action behind their verbal commitments to laptop computers. This may, in part, be due to concerns expressed by parents and teachers.
- Defend the MIT Laptop Project in the face of these and other criticisms.
- Should their design be modified to suit better children's needs as well as the concerns of teachers and parents?
- What features do MIT laptops already display that respond to student, parent, and teacher needs?
- What are the alternatives to MIT Laptops? For example, evaluate the proposal made by a group in computer ethics to invest in and emphasize instruction in computer laboratories housed in schools themselves. What problems would this new approach avoid? What are its limitations in comparison to the laptop approach?

2.3.3.3 Decision Point Three

- **You live in a developing nation. While you have work, it doesn't pay well and you are barely able to provide for your family's basic needs. One problem and things will get very difficult for you and your family.**
- Your child came home with an MIT-designed laptop computer. She and her classmates have benefited from the computers donated to their school by the generosity of developed nations where concerned citizens can buy two computers and have one donated to needy children. You find this somewhat patronizing and you see these laptops as a mixed blessing.
- On the one hand, this laptop has helped you and your family to enjoy the benefits of access to the Internet, although, because of poor infrastructure, this access is limited, sporadic, and subject to frequent breakdowns. On the other hand, you question whether your child is mature enough to use and care for her computer. If anything should happen, you would be required to buy a new replacement laptop, and you simply don't have the money.
- Yet should you not replace your daughter's broken laptop, she would be excluded from the education her peers enjoy because she would no longer have a computer. You question whether you want to run on this "treadmill."
- Furthermore, you can see that laptops—even MIT laptops—are designed for adults, not children. They are made of heavy metals and other toxic materials. The batteries, especially, are dangerous because of the materials they contain. They wear out and replacing them can be expensive.
- Your child could also become a target for robbers. She walks to and from school carrying her computer, and you know of other children who have been beaten and robbed of their laptops.
- So you see these laptops as a mixed blessing fraught with risk. What should you do?

2.3.4 What you are going to do...

Exercise 1: Prepare a STS Grid

- Construct a socio-technical system (STS) grid for public schools in Puerto Rico
- Using the templates found at m14025 (Socio-Technical Systems in Professional Decision Making) identify the key constituents such as hardware, software, physical surroundings, etc.
- Select key levels for analysis. For example, you may want to look at the STS from the standpoint of individuals (students and teachers), small groups (public school systems), and institutions (education and business).
- Starting with a short list of values, identify the values embedded in the public school STS and, if possible, the specific components in which these values are embedded. A good place to start is to see how different physical arrangements of the classroom embody different approaches to education.

Values in STSs

Values that can be used for exercise 1 include Justice (equity and access), Property, Privacy, Free Speech, Responsibility (Safety). More on these values can be found by clicking on the Computing Cases link provided in this module. Several of these values are defined in the Ethics of Team Work module, m13769.

Exercise 2: Identifying Potential or Latent Problems in STSs

- Choose one of the following three problem areas to help focus your work: (1) value problems that may arise when laptops with their current design are integrated in the PR STS; (2) value problems that may arise by the digitalization of textbooks and other educational materials; (3) value problems and potential harms that may arise during the disposal of spent laptops.
- Compare values embodied in current laptop design with those embodied in the Puerto Rican public school STS. Are there any conflicts? What are these?
- Look more closely at the Puerto Rican public school STS. Are there any conflicts that will be highlighted, exaggerated, or increased by the integration of laptop computers.
- Finally, look for potential harms that could occur in the short, middle, and long term future.

Exercise 3: Develop Counter-Measures to Problems

- Generate 5 to 10 options to respond to the problems you have identified. Make sure that you include the status quo among your options.
- Check each option against the problems you have identified. Does the option solve the problems identified in your STS analysis? Does it integrate the conflicting values and avoid untoward results? Does it give rise to new problems?
- Prepare a short presentation for the class (5 to 10 minutes) where you outline your problem, set forth the range of solutions you have identified, and describe and justify your solution. Be sure to address issues that may arise when you turn to implementing your solution.
- Provide a one or two sentence argument that your solution is best for delivering on social responsibility.

Exercise 4: Evaluate the Microsoft Philadelphia Public Schools Project

- Listen to/read the news report on the Microsoft Foundation's project to integrate computing technology in Philadelphia. (You can find it by clicking on the link in this module.)
- Is this an example of a corporation carrying out its social responsibility to the surrounding community?.
- Evaluate Microsoft generally in terms of its social responsibility.

2.3.5 Presentations**Social Justice and Responsible Technology**

[MEDIA OBJECT]⁵

Educational Laptops Presentation

[MEDIA OBJECT]⁶

2.4 Good Computing Reports for Computer Ethics⁷

Good Computing Reports (From Charles Huff, "Practical Guidance for Teaching the Social Impact Statement (SIS). From Proceedings of the 1996 Symposium on Computers and the Quality of Life, pp. 86-89. New York, ACM Press.)

⁵This media object is a downloadable file. Please view or download it at <Social Justice and Resp Tech.pptx>

⁶This media object is a downloadable file. Please view or download it at <Educational Laptops.pptx>

⁷This content is available online at <<http://cnx.org/content/m13756/1.5/>>.

Key Links

1. Materials from Magic Copy Center: Good Computing: A Virtue Ethics Approach to Computer Ethics, Chapter Two, Huff/Frey

2. www.computingcases.org⁸

Goals:

1. To uncover ethical surprises in major design projects. (These are ethical issues—potential ethical problems—that are embedded in the design project.)

2. To communicate effectively to the client the importance of considering ethical issues and problems associated with design projects upstream in the design process. (This means raising ethical problems from the beginning of the design process and continuously throughout the design process. This is opposed to the idea of waiting until the design process is finished to raise ethical issues.)

Four Presuppositions

1. Socio-technical systems and their components (hardware, software, physical surroundings, people/groups/roles, procedures, laws, data/data structures) embody values.

2. Computing technologies (CTs) are always embedded in socio-technical systems.

3. CTs instrument (magnify or augment) human action.

4. There is a close analogy between solving ethical and design problems:

The table below provides a summary of this analogy that helps to introduce the Software Development Cycle. For a more complete account of this analogy see Carolyn Whitbeck: <http://onlineethics.org/essays/education/teaching.html> (This link is attached above in this module.)

Analogy between ethical and design problems	
Design Problem	Ethical Problem
Construct a prototype that optimizes (or satisfices) designated specifications	Construct a solution that realizes ethical values such as justice, responsibility, reasonableness, respect, and safety)
Conflicts between specifications are resolved through integration	Attempt to resolve conflicts between values (moral vs. moral, moral vs. non-moral) by integration
Designed products or services must be implemented over background constraints	Ethical solutions must be implemented over resource, interest, and technical constraints.

Table 2.14

Normative Methodology:

The Software Development Cycle (SDC) arises out of the analogy between design and problem solving in ethics. The core sections of Good Computing Reports are based on its four stages of problem specification, solution generation, solution testing, and solution implementation.

Problem specification: This stage requires specifying the socio-technical system that influences the software in question, recognizing the values embodied in the system, and uncovering the conflicts between these values, for example, between efficiency and safety.

Solution generation: This stage requires resolving value conflicts by changing the design or requirements, or by recommending change to other aspects of the socio-technical system. Brainstorming forms an essential part of this stage.

Solution Testing: The solutions developed in the second stage must be tested in terms of ethics tests (reversibility, harm/beneficence, and public identification) and a code test.

Solution implementation: The chosen solution must be examined in terms of how well it responds to various situational constraints that could impede its implementation. What will be its costs? Can it be implemented within necessary time constraints? Does it honor recognized technical limitations or does it

⁸<http://www.computingcases.org/>

require pushing these back through innovation and discovery? Does it comply with legal and regulatory requirements? Finally, how does it respond to the general social and political conditions surrounding implementation?

Empirical Methodology:

This stage employs various methods for collecting and reviewing data including (1) constructing questionnaires and surveys, (2) holding open and structured interviews with clients and stakeholders, (3) employing methods of participatory observation including on-site visits and day-in-the-life scenarios, and (4) conducting archival research that includes online searches and reading operating manuals.

Basic Format of the Report: This report has nine sections that include the following: (a) executive summary, (b) problem specification, (c) solution generation, (d) solution testing, (e) solution implementation, (f) documenting ethical data collection, (g) readers guide, (h) methodological appendix, (i) group self-evaluation. These stages are set forth in the following description that includes tables and matrices.

1. Executive Summary (From Huff, "Practical Guidance):

One or two page summary of the report that includes (1) description of the report and of the system, (2) discussion of the significant issues discovered, (3) list of the top recommendations highlighted on the page (keyed to page numbers in the longer report). The idea is to provide a summary that an executive can read in 5 to 10 minutes to get the basic information about the report.

2. SDC: Problem Specification

2a. Identify the values embedded in the system and the STS component in which they are specifically located. Use this table and then add a detailed written explanation.

Component/Value	Hardware	Software	Physical Surroundings	People, Groups, & Roles	Procedures	Laws & Regulations	Data/Data Structures
Safety (Responsibility)							
Property (Respect)							
Privacy (Respect)							
Free Speech (Respect)							
Equity & Access (Justice)							

Table 2.15

2b. Specify the problem using the following problem classification matrix. More information can be found at www.computingcases.org⁹ or in Good Computing: A Virtue Approach to Computer Ethics.

⁹<http://www.computingcases.org/>

Problem Type	Sub-Type	Solution Outline		
Disagreement	Factual	Type and mode of gathering information (Archival Research, Interview, Participatory Observation, Survey)		
	Conceptual	Concept in dispute and method for agreeing on its definition		
Conflict	Moral vs. Moral	Value Integrative	Partially Value Integrative	Trade Off
	Non-moral vs. moral			
	Non-moral vs. non-moral			
Framing	Corruption	Strategy for maintaining integrity	Strategy for restoring justice	Value integrative, design strategy
	Social Justice			
	Value Realization			
Intermediate Moral Value	Safety, Property, Privacy, Free Speech, Equity & Access	Realizing Value	Removing value conflicts	Prioritizing values for trade offs

Table 2.16

2c. The problem classification matrix must also be accompanied by a verbal explanation of your problem classification.

2d. Be sure that your problem description corresponds with the elements of the above matrix.

2e. Be sure that you have shown that the solution you eventually propose responds to the components of the problem you have specified.

3. SDC: Solution Generation

Brainstorm solutions to the problem specified above: (a) describe the brainstorming methodology you employed, (b) include the preliminary brainstorming list and provide at least ten (10) solutions, (c) follow with the refined list, (d) explain the process used to refine solutions, and (e) briefly describe how the solutions on the refined list respond to the components identified in the problem specification stage.

4. SDC: Solution Evaluation

Do a comparative evaluation of the solutions you designed in the previous stage. Structure your evaluation around the following matrix: (More information can be found at www.computingcases.org¹⁰ or in Good Computing: A Virtue Approach to Computer Ethics.)

¹⁰<http://www.computingcases.org/>

Solution/Test	Reversibility or Rights	Harms/Benefice or Net Utility	Value	Code	Global Feasi- bility
Description	Reversible with stake-holders? Honors basic rights?	Produces the best bene-fit/harm ratio or maximizes utility?	Moral values: realized or frustrated? Value conflicts resolved or exacerbated?	Does the rec-ommendation violate code provisions?	What the resource, technical, or interest con-straints could impede imple-mentation?
Best recom-mendation					
Second Best recommenda-tion					
Status Quo					

Table 2.17

4a. Accompany this matrix with an in-depth verbal comparison of these alternatives. Recapitulate how each alternative stands with each test. Then provide a justification for each recommendation.

5. SDC: Solution Implementation

Fill out a Feasibility Matrix. Then discuss the obstacles that could impede the implementation of your solution and how you plan to overcome them. You may want to formulate and have ready a Plan B in case these obstacles prove insurmountable. (More information can be found at www.computingcases.org¹¹ or in Good Computing: A Virtue Approach to Computer Ethics.)

Feasibility Matrix								
Resource Constraints			Technical Con-straints		Interest Constraints			
Time	Cost	Available mate-rials, labor, etc	Applicable technol-ogy	Manufactur-ability	Per-son-alities	Organiza-tional	Legal	Social, Political, Cultural

Table 2.18

6. Discuss measures taken to avoid ethical problems that could arise in carrying out a Good Computing analysis. Use the following table to help identify the pertinent topics

Collection	Analysis	Reporting
<i>continued on next page</i>		

¹¹<http://www.computingcases.org/>

Establish a client-professional relationship	All information, claims, and solutions need to be tested, triangulated, and validated	Intelligibility: check for coherence between problems and recommendation; prepare a clear executive summary; document and attribute; discuss and justify methodology
Get client consent	Avoid misconduct. Three sins of academic integrity are plagiarism, falsification, and fabrication	Comprehensiveness: (a) scope out topic carefully; (b) avoid extremes of covering too much and too little; (c) be open about limits and boundaries of investigation
Respect: listen to client, dress professionally, thank interviewee/client for time	Minimize bias and avoid loaded and complex questions	Objectivity and Impartiality: Be sure to report each stakeholder perspective
Confidentiality: (a) explain how you are going to use information; (b) design measures to prevent unauthorized access; (c) destroy raw data after it has been analyzed	Triangulate, that is, use different methods to collect the same data to overcome limits and biases associated with each data collection method	Deliver bad news proactively by minimizing blame language, presenting solutions, and by providing clear and comprehensive justifications of recommendations

Table 2.19

7. A Reader's Guide: An annotated bibliography of materials that could provide the client with the detailed background to the Social Impact Analysis

8. A Methodological Appendix that includes the following:

- a) Rational for particular methods chosen
- b) Detailed and concrete descriptions of those methods
- c) Individual interviews should be noted respecting privacy and confidentiality
- d) Description of field observation including significant events looked for, significant events discovered, changes made in observation protocol, etc
- e) DLS or day-in-the-life-scenarios along with a rational for choice of perspectives and time frames, information from which they were compiled (e.g., interviews, manuals, etc.), and finally, the detailed scenarios themselves.

9. Group Self-Evaluations

- Repeat Group Values and provide an objective assessment of how well these have been met during the semester.
- List Group Work Pitfalls and describe measures taken by your group during the semester to prevent or mitigate them. Assess objectively your success in preventing or mitigating them.
- Discuss the obstacles to successful group work that arose during the semester and the measures your group designed to overcome them. Objectively assess these measures. Would your group recommend these practices as "Best Practices" to other groups? Are they original? Robust?
- Evaluate how effectively the team members worked together referring to the "Team Member Evaluation Form" (See form and 10 criteria just below)

Check List

1. _____ Group Goals (copy)

2. _____ Preliminary Topic Report (copy)
3. _____ Final GCR Presentation (copy in PowerPoint format or online display)
4. _____ Final GCR written report (10-20 pages) due on December 8, 2006
5. _____ Group Self-Evaluation including Team Member Rating Sheets
6. _____ Portfolio including Hughes Solution Evaluation Matrix, Virtue Table, and Right Table, and Presentation Evaluation Prepared by Instructor

I certify that these materials have been prepared by those who have signed below and no one else. I also certify that we have not plagiarized any material but have given due acknowledgement to all the sources used. All who sign below and whose names are included on the title page of this report have participated fully in the preparation of this project and are equally and fully responsible for its results.

Signed:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Presentation Evaluation Form

This is an unsupported media type. To view, please see
[http://cnx.org/content/m13756/latest/Presentation Evaluation Form.doc](http://cnx.org/content/m13756/latest/Presentation%20Evaluation%20Form.doc)

Figure 2.4: This evaluation form will be used by the instructor to give your group preliminary feedback on the presentation and to identify issues that need to be integrated into the final report.

Teamd member Rating Sheet

This is an unsupported media type. To view, please see [http://cnx.org/content/m13756/latest/TEAM MEMBER RATING SHEET.doc](http://cnx.org/content/m13756/latest/TEAM_MEMBER_RATING_SHEET.doc)

Figure 2.5: This form needs to be filled out by each team member and turned in confidentially to the instructor. Be sure to evaluate each team member, including yourself.

Chapter 3

Theory Building Modules

3.1 Theory Building Activities: Mountain Terrorist Exercise¹

3.1.1 Module Introduction

This module poses an ethical dilemma, that is, a forced choice between two bad alternatives. Your job is to read the scenario and choose between the two horns of the dilemma. You will make your choice and then justify it in the first activity. In the second activity, you will discuss your choice with others. Here, the objective is to reach consensus on a course of action or describe the point at which your group's progress toward consensus stopped. The Mountain Terrorist Exercise almost always generates lively discussion and helps us to reflect on our moral beliefs. Don't expect to reach agreement with your fellow classmates quickly or effortlessly. (If you do, then your instructor will find ways of throwing a monkey wrench into the whole process.) What is more important here is that we learn how to state our positions clearly, how to listen to others, how to justify our positions, and how to assess the justifications offered by others. In other words, we will all have a chance to practice the virtue of reasonableness. And we will learn reasonableness not when it's easy (as it is when we agree) but when it becomes difficult (as it is when we disagree).

The second half of this module requires that you reflect carefully on your moral reasoning and that of your classmates. The Mountain Terrorist Exercise triggers the different moral schemas that make up our psychological capacity for moral judgment. Choosing one horn of the dilemma means that you tend to favor one kind of schema while choosing the other horn generally indicates that you favor another. The dominant moral theories that we will study this semester provide detailed articulations and justifications of these moral schemas. Reflecting on your choice, the reasons for your choice, and how your choice differs from that of your classmates will help you get started on the path of studying and effectively utilizing moral theory.

The following scenario comes originally from the philosopher, Bernard Williams. It is also presented in introductory ethics textbooks (such as Geoffrey Thomas' *An Introduction to Ethics*). The first time this module's author became aware of its use in the classroom was in a workshop on Agriculture Ethics led by Paul Thompson, then of Texas A&M University, in 1992.

3.1.2 Moral Theories Highlighted

1. Utilitarianism: the moral value of an action lies in its consequences or results
2. Deontology: the moral value of an action lies, not in its consequences, but in the formal characteristics of the action itself.
3. Virtue Ethics: Actions sort themselves out into virtuous or vicious actions. Virtuous actions stem from a virtuous character while vicious actions stem from a vicious or morally flawed character. Who we are is revealed through what we do.

¹This content is available online at <<http://cnx.org/content/m13764/1.11/>>.

3.1.3 Mountain Terrorist Scenario

You are in a remote mountain village. A group of terrorists has lined up 20 people from the village; they plan on shooting them for collaborating with the enemy. Since you are not from the village, you will not be killed. Taking advantage of your position, you plead with the terrorists not to carry out their plan. Finally, you convince the leader that it is not necessary to kill all 20. He takes a gun, empties it of all its bullets except one, and then hands it to you. He has decided to kill only one villager to set an example to the rest. As an honored guest and outsider, you will decide who will be killed, and you will carry out the deed. The terrorists conclude with a warning; if you refuse to kill the villager, then they will revert back to the original plan of killing all 20. And if you try any “funny business,” they will kill the 20 villagers and then kill you. What should you do?

Your Options

1. Take the gun, select a villager, and kill him or her.
2. Refuse the terrorists’ offer and walk away from the situation.

Spanish Translation by Dr. Halley Sanchez

El Terrorista de la Montaña Tú eres un antropólogo que por un mes ha estado viviendo con y observando (o sea, estudiando) a los residents de una aldea en una area remota montañosa de un país en América Latina. El día que te dispone irte de la aldea, aparece un grupo de hombres armados que reúnen a los aldeanos y les anuncian que se han enterado de que ellos han estado cooperando con el gobierno represivo y que, como lección, han de ejecutar viente de ellos. El líder de los terroristas te mira y te dice que tú te puedes ir, ya que no estás involucrado en la lucha patriótica y que ellos no están en la costumbre de tomar rehénes extranjeros. Debido a que te da la impresión de que el líder de los supuestos patriotas (terroristas?) es un hombre educado, tú te atreves tratar de razonar con él. Le explica que llevas un mes en la aldea y que los aldeanos no han cooperado de forma voluntaria con el gobierno. Sí, por supuesto, las tropas del gobierno pasaron por la aldea y confiscaron algunas provisiones, pero los aldeanos no se las dieron libremente sino que estaban indefenso y no pudieron prevenir que le confiscaran las mismas. El líder piensa un tiempo y te dice que por tú ser forastero y obviamente un antropólogo estudioso, te va a dar el beneficio de la duda, y que por tanto no van a ejecutar viente aldeanos. Pero dado que la lucha patriótica está en un proceso crítico y que la aldea sí le proveyó provisiones al gobierno, por el bien de la lucha patriótica y el bien de la humanidad, es menester darle una lección a la aldea. Así que tan sólo han de ejecutar un aldeano. Más, como huesped, tú has de escoger quién ha de morir y tú has de matarlo tú mismo. Te da una pistola con una sola bala y te dice que proceda, mientras que a la vez te advierte que de tratar algo heroico, te ejecutarán inmediatamente y procederán a ejecutar a los viente aldeanos como dijeron al comienzo. Tú eres el antropólogo. ¿Qué harás?

Activity 1

In a short essay of 1 to 2 pages describe what you would do if you were in the position of the tourist. Then justify your choice.

Activity 2

Bring your essay to class. You will be divided into small groups. Present your choice and justification to the others in your group. Then listen to their choices and justifications. Try to reach a group consensus on choice and justification. (You will be given 10-15 minutes.) If you succeed present your results to the rest of the class. If you fail, present to the class the disagreement that blocked consensus and what you did (within the time limit) to overcome it.

3.1.4 Taxonomy of Ethical Approaches

There are many ethical approaches that can be used in decision making. The Mountain Terrorist Exercise is based on an artificial scenario designed to separate these theoretical approaches along the lines of the different "horns" of a dilemma. Utilitarians tend to choose to shoot a villager "in order to save 19." In other words they focus their analysis on the consequences of an action alternative and choose the one that produces the least harm. Deontologists generally elect to walk away from the situation. This is because they judge an action on the basis of its formal characteristics. A deontologist might argue that killing the villager violates

natural law or cannot be made into a law or rule that consistently applies to everybody. A deontologist might say something like, "What right do I have to take another person's life?" A virtue ethicists might try to imagine how a person with the virtue of courage or integrity would act in this situation. (Williams claims that choosing to kill the villager, a duty under utilitarianism, would undermine the integrity of a person who abhorred killing.)

Table Connecting Theory to Domain

1. Row 1: Utilitarianism concerns itself with the domain of consequences which tells us that the moral value of an action is "colored" by its results. The harm/beneficence test, which asks us to choose the least harmful alternative, encapsulates or summarizes this theoretical approach. The basic principle of utilitarianism is the principle of utility: choose that action that produces the greatest good for the greatest number. Cost/benefits analysis, the Pareto criterion, the Kalder/Hicks criterion, risk/benefits analysis all represent different frameworks for balancing positive and negative consequences under utilitarianism or consequentialism.
2. Row 2: Deontology helps us to identify and justify rights and their correlative duties. The reversibility test summarizes deontology by asking the question, "Does your action still work if you switch (=reverse) roles with those on the receiving end?" "Treat others always as ends, never merely as means," the Formula of End, represents deontology's basic principle. The rights that represent special cases of treating people as ends and not merely as means include (a) informed consent, (b) privacy, (c) due process, (d) property, (e) free speech, and (f) conscientious objection.
3. Row 3: Virtue ethics turns away from the action and focuses on the agent, the person performing the action. The word, "Virtue," refers to different sets of skills and habits cultivated by agents. These skills and habits, consistently and widely performed, support, sustain, and advance different occupational, social, and professional practices. (See MacIntyre, *After Virtue*, and Solomon, *Ethics and Excellence*, for more on the relation of virtues to practices.) The public identification test summarizes this approach: an action is morally acceptable if it is one with which I would willingly be publicly associated given my moral convictions. Individual virtues that we will use this semester include integrity, justice, responsibility, reasonableness, honesty, trustworthiness, and loyalty.

Covering All the Bases				
Ethical Dimension	Covering Ethical Approach	Encapsulating Ethical Test	Basic Principles	Application or Bridging Tools
Consequences	Utilitarianism	Harm/Beneficence (weigh harms against benefits)	Principle of Utility: greatest good for greatest number	Benefit & cost comparison Utility Maximization
Formal Characteristics of Act	Deontology (Duty-based, rights-based, natural law, social contract)	Reversibility (test by reversing roles between agent and object of action)	Categorical Imperative Formula of End Autonomy	Free & Informed Consent, Privacy, Property, Due Process, Free Speech, Conscientious objection
<i>continued on next page</i>				

Skills and habits cultivated by agent	Virtue Ethics	Public Identification (impute moral import of action to person of agent)	Virtues are means between extremes with regard to agent and action Virtues are cultivated dispositions that promote central community values	Integrity, justice, responsibility, reasonableness, honesty, trustworthiness, loyalty
---------------------------------------	---------------	--	---	---

Table 3.1

3.1.5 Comments on the Relation Between Ethical Approaches

The Mountain Terrorist Exercise has, in the past, given students the erroneous idea that ethical approaches are necessarily opposed to one another. As one student put it, "If deontology tells us to walk away from the village, then utilitarianism must tell us to stay and kill a villager because deontology and utilitarianism, as different and opposed theories, always reach different and opposed conclusions on the actions they recommend." The Mountain Terrorist dilemma was specially constructed by Bernard Williams to produce a situation that offered only a limited number of alternatives. He then tied these alternatives to different ethical approaches to separate them precisely because in most real world situations they are not so readily distinguishable. Later this semester, we will turn from these philosophical puzzles to real world cases where ethical approaches function in a very different and mostly complimentary way. As we will see, ethical approaches, for the most part, converge on the same solutions. For this reason, this module concludes with 3 meta-tests. When approaches converge on a solution, this strengthens the solution's moral validity. When approaches diverge on a solution, this weakens their moral validity. A third meta-test tells us to avoid framing all ethical problems as dilemmas (=forced choices between undesirable alternatives) or what Carolyn Whitbeck calls "multiple-choice" problems. You will soon learn that effective moral problem solving requires moral imagination and moral creativity. We do not "find" solutions "out there" ready made but design them to harmonize and realize ethical and practical values.

Meta-Tests

- **Divergence Test:** When two ethical approaches differ on a given solution, then that difference counts against the strength of the solution. Solutions on which ethical theories diverge must be revised towards convergence.
- **Convergence Test:** Convergence represents a meta-test that attests to solution strength. Solutions on which different theoretical approaches converge are, by this fact, strengthened. Convergence demonstrates that a solution is strong, not just over one domain, but over multiple domains.
- **Avoid Framing a Problem as a Dilemma.** A dilemma is a no-win situation that offers only two alternatives of action both of which are equally bad. (A trilemma offers three bad alternatives, etc.) Dilemmas are better dissolved than solved. Reframe the dilemma into something that admits of more than two no-win alternatives. Dilemma framing (framing a situation as an ethical dilemma) discourages us from designing creative solutions that integrate the conflicting values that the dilemma poses as incompatible.

3.1.6 Module Wrap-Up

1. **Reasonableness and the Mountain Terrorist Exercise.** It may seem that this scenario is the last place where the virtue of reasonableness should prevail, but look back on how you responded to those of your classmates who chose differently in this exercise and who offered arguments that you had not initially thought of. Did you "listen and respond thoughtfully" to them? Were you "open to new ideas"

even if these challenged your own? Did you "give reasons for" your views, modifying and shaping them to respond to your classmates' arguments? Did you "acknowledge mistakes and misunderstandings" such as responding critically and personally to a classmate who put forth a different view? Finally, when you turned to working with your group, were you able to "compromise (without compromising personal integrity)"? If you did any or all of these things, then you practiced the virtue of reasonableness as characterized by Michael Pritchard in his book, *Reasonable Children: Moral Education and Moral Learning* (1996, University of Kansas Press, p. 11). Congratulate yourself on exercising reasonableness in an exercise designed to challenge this virtue. You passed the test.

2. **Recognizing that we are already making ethical arguments.** In the past, students have made the following arguments on this exercise: (a) I would take the gun and kill a villager in order to save nineteen; (b) I would walk away because I don't have the right to take another's life; (c) While walking away might appear cowardly it is the responsible thing to do because staying and killing a villager would make me complicit in the terrorists' project. As we discussed in class, these and other arguments make use of modes of thought captured by ethical theories or approaches. The first employs the consequentialist approach of utilitarianism while the second makes use of the principle of respect that forms the basis of our rights and duties. The third works through a conflict between two virtues, courage and responsibility. This relies on the virtue approach. One accomplishment of this exercise is to make you aware of the fact that you are already using ethical arguments, i.e., arguments that appeal to ethical theory. Learning about the theories behind these arguments will help you to make these arguments more effectively.
3. **Results from Muddy Point Exercises** The Muddy Point Exercises you contributed kept coming back to two points. (a) Many of you pointed out that you needed more information to make a decision in this situation. For example, who were these terrorists, what causes were they fighting for, and were they correct in accusing the village of collaborating with the enemy? Your request for more information was quite appropriate. But many of the cases we will be studying this semester require decisions in the face of uncertainty and ignorance. These are unavoidable in some situations because of factors such as the cost and time of gathering more information. Moral imagination skillfully exercised can do a lot to compensate when all of the facts are not in. (b) Second, many of you felt overly constrained by the dilemma framing of the scenario. Those of you who entered the realm of "funny business" (anything beyond the two alternatives of killing the villager or walking away) took a big step toward effective moral problem solving. By rejecting the dilemma framing of this scenario, you were trying to reframe the situation to allow for more—and more ethically viable—alternatives. Trying to negotiate with the Terrorists is a good example of reframing the scenario to admit of more ethical alternatives of action than killing or walking away.
4. Congratulations on completing your first ethics module! You have begun recognizing and practicing skills that will help you to tackle real life ethical problems. (Notice that we are going to work with "problems" not "dilemmas".) We will now turn, in the next module, to look at those who managed to do good in the face of difficulty. Studying moral exemplars will provide the necessary corrective to the "no-win" Mountain Terrorist Exercise.

3.2 EAC Toolkit - Instructor Module for Theory Building Activities: Mountain Terrorist Exercise²

3.2.1 REFERENCE OR LINK TO STUDENT MODULE

Introduction

The Mountain Terrorist scenario that constitutes the core of the corresponding student module comes from the philosopher, Bernard Williams. It is common in introductory ethics textbooks (such as Geoffrey Thomas' *An Introduction to Ethics*). Williams' own account can be found in several anthologies including

²This content is available online at <<http://cnx.org/content/m14351/1.4/>>.

Ethical Theory: Classics and Contemporary Readings, 5th edition (2007) edited by Louis Pojman. (See note below,) The corresponding student module uses the core scenario to introduce students to ethical argument, to get them to recognize that they are already employing ethical arguments, and to get them to practice the virtue of reasonableness.

Core Instructor Module Links include...

- The Instructor Module Template which provides the general framework for instructor modules in the EAC Toolkit.
- The student module, "Theory Building Activities: Mountain Terrorist Exercise," which is published in the Connexions® Content Commons.
 - The student module is also accessible in the course, **Corporate Governance** (col10396). A link included in this module provides access to this course.
 - The student module can be accessed through the course, **Professional Ethics in Engineering** (col10399) which is published in the published in Connexions® Content Commons and linked to in this instructor module.
 - See notes below for textbooks that present the core dilemma scenario.

3.2.2 INSTRUCTOR RESOURCES(Sharing Best Practices in EAC!)

This section contains information related to the above referenced Student Module. The intent and expectation is that the information contained in this section will evolve over time based on the experiences and collaborations of the authors and users of the Student Module and this Instructor Module. For example, the authors, collaborators or users can provide the following kind of information (mainly directed at or intended for instructors).

3.2.2.1 Module-Background Information

Where did this module come from? (e.g. A workshop, news story, based on a movie, etc.) What condition is it in? (e.g. first draft, needs editing, publishable, etc.) How has it been used in the past? (e.g. in classroom, workshop activity, ethics debate, etc.) Other relevant or interesting details

The first time this module's author became aware of its use in the classroom was in a workshop on Agriculture Ethics led by Paul Thompson, then of Texas A and M University, in 1992. Thompson's particular instantiation of this exercise was broadcast over the AG-SAT network in the spring of 1992 during a course on Agricultural Ethics. The module is based on a scenario, "Jim and the Jungle," first put forth by Bernard Williams (see note below) in a work devoted to the criticism of utilitarianism. While the scenario does present challenges to utilitarianism (and deontology), it is used in this context to help students see how ethical theories are encapsulated in moral reasoning and moral arguments.

3.2.2.2 Learning Objectives

- **Ethical Reasoning:** Practicing and improving ethical reasoning.
- **Ethical Evaluation:** Evaluating decision alternatives in terms of their ethics.
- **Ethical Awareness:** Becoming aware of how ethical theory and ethical issues are embedded in everyday discourse.
- **Reasonableness:** Practicing the virtue of reasonableness in the context of reasonable disagreement
- Learning **how to recognize** the ethical theory embedded in everyday reasoning.

The following table documents the objectives for the student module.

EAC Matrix

This is an unsupported media type. To view, please see
http://cnx.org/content/m14351/latest/ADEM_EACMatrix_Feb2007_MT.doc

Figure 3.1: This table documents an EAC integration activity in terms of moral objectives, accreditation criterion, and curriculum location.

3.2.2.3 Instructional / Pedagogical Strategies

Which pedagogical or instructional strategies are used or suggested for this module. (For example: Discussion/Debate, Decision-Making Exercise, Presentation, Dramatization or Role Playing, Group Task, Formal or Informal Writing, Readings, among others)

This module employs the following pedagogical strategies:

- **Informal Writing:** Students prepare for the activity by reading the scenario and writing out their response.
- **General Class Discussion:** Students discuss the scenario as a class. No attempt is made to reach agreement or closure.
- **Cooperative Learning:** Students are divided into groups of three to five. Each student reads his or her written response to the other group members. Then the group is charged with reaching an agreement within a time frame or outlining the terms of their disagreement
- **Eliciting Knowledge:** The instructor provides a formal debriefing outlining the ways in which students have used ethical reasoning, the structures in terms of which they raised and resolved disagreements, and how they made use of different ethical theories in formulating their justifications and arguments. If time permits, the instructor can add a more formal introduction to different kinds of ethical theory that draws the theory from the arguments the students have made during their discussions.
- This module is used to introduce two new modules, the Ethics of Team Work and Moral Exemplars. (The latter explores issues in ethical leadership.)

For those new to teaching cases and teaching by discussion, the Computing Cases website has information and links that will be of great help. Address: http://computingcases.org/general_tools/teaching_with_cases/teaching_w_cases_intro.html

3.2.2.4 Assessment / Assurance of Learning

What assessment or assurance of learning methods are used or suggested for this module? (For example: 1-minute paper, Muddiest Point, Quiz/Test Items, Oral Presentation, Student Feedback, among others). What did or didn't work?

Modes of Assessment

1. **Informal Writing:** A baseline for assessment can be established by examining the students' initial written responses to the scenario. For example, student responses can be assessed in terms of where the responses provided by the students fit on Kohlberg's scale of moral development. In this particular version, students are assessed in terms of the moral schemas that are triggered by the dilemma situation. (See Rest et al below.)
2. **Muddiest Point Exercise:** The student module can also be assessed by using a simple Muddiest Point exercise that asks the students to indicate the strongest and weakest (=muddiest) parts. (See figure just below for handout.)
3. **EAC Module Assessment Form:** A form modified from one developed and used by Michael Davis of IIT helps provide a more detailed assessment of this and other modules. See figure below.

Muddiest Point Handout

This is an unsupported media type. To view, please see <http://cnx.org/content/m14351/latest/MuddiestPointModule.doc>

Figure 3.2: This file provides a handout in Word form for carrying out a Muddiest Point assessment activity. This module's author learned about this activity from an assessment webpage at Southern Illinois University at Edwardsville. For more information consult the Muddiest Point link in this module.

Module Assessment Form

This is an unsupported media type. To view, please see
http://cnx.org/content/m14351/latest/EAC_AACSB_Assessment_Form_Davis.doc

Figure 3.3: This file contains an assessment form developed by Michael Davis of the Illinois Institute of Technology to assess EAC integration projects. It has been slightly modified by the authors.

Preliminary Assessment Results from Muddy Point Exercise

1. Some students felt constrained by the dilemma framing of the scenario. They didn't like being forced to choose between shooting a villager or walking away. They wanted more freedom to explore other options.
2. Other students wanted the scenario to provide more details to aid them in making their decision. For example, did the villagers collaborate with the enemy, which ones collaborated, what was the cause of the terrorists, etc. They felt this would make it easier to make an defend an ethical choice.
3. Some students (not all) had trouble seeing how their modes of reasoning made use of established ethical modes of argument.
4. Finally, many wanted to see more closure in the activity. For example, what did the instructor think, what was the correct answer to the dilemma, how did this relate to their project study in business ethics.
5. As a result of this assessment exercise, a new conclusion was added to the student module. It emphasized how moral theory was embedded in the students' comments and how the students practiced the virtue of reasonableness in listening to different positions and searching for areas of agreement.

3.2.2.5 Pedagogical Commentary

Any comments or questions regarding this module? (For example: suggestions to authors, suggestions to instructors (how-to), queries or comments directed o EAC community, pitfalls or frustrations, novel ideas/approaches/uses, etc.)

This exercise always evokes a strong response from students. In final course evaluations, students often refer to this exercise as the most memorable experience in the course. But many are frustrated by the lack of closure and are uncomfortable with the lack of closure. The following list provides a partial set of guidelines to keep in mind when teaching this module:

- The most important thing an instructor can do in this module is listen. Students often make use of moral arguments and ethical theory. Listening carefully to their arguments and highlighting how they use argument and theory provides a means of introducing ethical theory without falling prey to the theory-practice gap.
- Closure can be reached by having students reflect on how they dealt with disagreements with their peers. In small groups, for example, students who have trouble agreeing can be asked to reflect on this experience. They can be encouraged by showing them how their discussion, while not issuing in agreement, often sharpened and clarified the nature and terms of disagreement.
- Students often come into an ethics class with the idea that all ethical problems are dilemmas, that is, forced choices between two, equally bad alternatives. The frustration they experience in resolving the Mountain Terrorist dilemma can be used to motivate them to reframe problems that initially take the

dilemma form. In other words, the exercise can be used as an occasion to introduce and practice moral imagination.

3.2.2.6 Appendix (Annotated)

Bibliography

1. Bernard Williams, "Against Utilitarianism," in **Ethical Theory: Classics and Contemporary Readings, 5th edition** (2007) edited by Louis Pojman, Belmont: Wadsworth: 219-228.
2. Geoffrey Thomas (1994) **An Introduction to Ethics**, U.K.: Oxford.
3. James R. Rest, D. Narvaez, M.J. Bebeau, and S.J. Thoma. (1999) **Postconventional Moral Thinking: A Neo-Kohlbergian Approach**, Lawrence Erlbaum Press, Hillside, N.J.
4. Mark Johnson (1993) **Moral Imagination: Implications of Cognitive Science for Ethics**, University of Chicago Press, Chicago.
5. Anthony Weston (2006) **A Practical Companion to Ethics**, U.K.: Oxford University Press.

Additional information or annotations for instructors regarding the Student Module Appendix

3.3 Theory-Building Activities: Virtue Ethics³

Based on material presented by Chuck Huff (St. Olaf College) and William Frey at the Association for Practical and Professional Ethics in 2005 at San Antonio, TX. Preliminary versions were distributed during this presentation.

3.3.1 Module Introduction

This module uses materials being prepared for Good Computing: A Virtue Approach to Computer Ethics, to set up an exercise in which you will identify and spell out virtues relevant to your professional discipline. After identifying these virtues, you will work to contextualize them in everyday practice. Emphasis will be placed on the Aristotelian approach to virtues which describes a virtue as the disposition toward the mean located between the extremes of excess and defect. You will also be asked to identify common obstacles that prevent professionals from realizing a given virtue and moral exemplars who demonstrate consistent success in realizing these virtues and responding to obstacles that stand in the way of their realization. In a variation on this module you could be asked to compare the virtues you have identified for your profession with virtues that belong to other moral ecologies such as those of the Homeric warrior.

3.3.2 Three Versions of Virtue Ethics: Virtue 1, Virtue 2, and Virtue 3

Virtue ethics has gone through three historical versions. The first, Virtue 1, was set forth by Aristotle in ancient Greece. While tied closely to practices in ancient Greece that no longer exist today, Aristotle's version still has a lot to say to us in this day and age. In the second half of the twentieth century, British philosophical ethicists put forth a related but different theory of virtue ethics (virtue 2) as an alternative to the dominant ethical theories of utilitarianism and deontology. Virtue 2 promised a new foundation of ethics consistent with work going on at that time in the philosophy of mind. Proponents felt that turning from the action to the agent promised to free ethical theory from the intractable debate between utilitarianism and deontology and offered a way to expand scope and relevance of ethics. Virtue 3 reconnects with Aristotle and virtue 1 even though it drops the doctrine of the mean and Aristotle's emphasis on character. Using recent advances in moral psychology and moral pedagogy, it seeks to rework key Aristotelian concepts in modern terms. In the following, we will provide short characterizations of each of these three versions of virtue ethics.

³This content is available online at <<http://cnx.org/content/m13755/1.13/>>.

3.3.3 Virtue 1: Aristotle's Virtue Ethics

- **Eudaimonia.** Happiness, for Aristotle, consists of a life spent fulfilling the intellectual and moral virtues. These modes of action are auto-telic, that is, they are self-justifying and contain their own ends. By carrying out the moral and intellectual virtues for a lifetime, we realize ourselves fully as humans. Because we are doing what we were meant to do, we are happy in this special sense of eudaimonia.
- **Arete.** Arete is the Greek word we usually translate as "virtue". But arete is more faithfully translated as excellence. For Aristotle, the moral and intellectual virtues represent excellences. So the moral life is more than just staying out of trouble. Under Aristotle, it is centered in pursuing and achieving excellence for a lifetime.
- **Virtue as the Mean.** Aristotle also characterizes virtue as a settled disposition to choose the **mean** between the extremes of excess and defect, all relative to person and situation. Courage (the virtue) is the mean between the extremes of excess (too much courage or recklessness) and defect (too little courage or cowardice). Aristotle's claim that most or all of the virtues can be specified as the mean between extremes is controversial. While the doctrine of the mean is dropped in Virtue 2 and Virtue 3, we will still use it in developing virtue tables. (See exercise 1 below.) You may not find both extremes for the virtues you have been assigned but make the effort nonetheless.
- **Ethos.** "Ethos" translates as character which, for Aristotle, composes the seat of the virtues. Virtues are well settled dispositions or habits that have been incorporated into our characters. Because our characters are manifested in our actions, the patterns formed by these over time reveal who we are. This can be formulated as a decision-making test, the **public identification test**. Because we reveal who we are through our actions we can ask, when considering an action, whether we would care to be publicly identified with this action. "Would I want to be publicly known as the kind of person who would perform that kind of action? Would I, through my cowardly action, want to be publicly identified as a coward? Would I, through my responsible action, want to be publicly identified as a responsible person? Because actions provide others with a window into our characters, we must make sure be sure that they portray us as we want to be portrayed.
- **Aisthesis of the Phronimos.** This Greek phrase, roughly translated as the perception of the morally experienced agent, reveals how important practice and experience are to Aristotle in his conception of moral development. One major difference between Aristotle and other ethicists (utilitarians and deontologists) is the emphasis that Aristotle places on developing into or becoming a moral person. For Aristotle, one becomes good by first repeatedly performing good actions. So morality is more like an acquired skill than a mechanical process. Through practice we develop sensitivities to what is morally relevant in a situation, we learn how to structure our situations to see moral problems and possibilities, and we develop the skill of "hitting" consistently on the mean between the extremes. All of these are skills that are cultivated in much the same way as a basketball player develops through practice the skill of shooting the ball through the hoop.
- **Bouleusis.** This word translates as "deliberation." For Aristotle, moral skill is not the product of extensive deliberation (careful, exhaustive thinking about reasons, actions, principles, concepts, etc.) but of practice. Those who have developed the skill to find the mean can do so with very little thought and effort. Virtuous individuals, for Aristotle, are surprisingly unreflective. They act virtuously without thought because it has become second nature to them.
- **Akrasia.** Ross translates this word as "incontinence" which is outmoded. A better translation is weakness of will. For Aristotle, knowing where virtue lies is not the same as doing what virtue demands. There are those who are unable to translate knowledge into resolution and then into action. Because akrasia (weakness of will) is very real for Aristotle, he also places emphasis in his theory of moral development on the cultivation of proper emotions to help motivate virtuous action. Later ethicists seek to oppose emotion and right action; Aristotle sees properly trained and cultivated emotions as strong motives to doing what virtue requires.
- **Logos** Aristotle's full definition of virtue is "a state of character concerned with choice, lying in a mean, i.e. the mean relative to us, this being determined by a rational principle, and by that principle

by which [a person] of practical wisdom would determine it." (Ross's translation in **Nicomachean Ethics**, 1106b, 36.) We have talked about character, the mean, and the person of practical wisdom. The last key term is "logos" which in this definition is translated by reason. This is a good translation if we take reason in its fullest sense so that it is not just the capacity to construct valid arguments but also includes the practical wisdom to assess the truth of the premises used in constructing these arguments. In this way, Aristotle expands reason beyond logic to include a fuller set of intellectual, practical, emotional, and perceptual skills that together form a practical kind of wisdom.

3.3.4 Virtue 2

- The following summary of Virtue 2 is taken largely from Rosalind Hursthouse. While she extensively qualifies each of these theses in her own version of virtue ethics, these points comprise an excellent summary of Virtue 2 which starts with G.E.M. Anscombe's article, "Modern Moral Philosophy," and continues on into the present. Hursthouse presents this characterization of Virtue 2 in her book, **On Virtue Ethics** (2001) U.K.: Oxford University Press: 17.
- **Virtue 2 is agent centered.** Contrary to deontology and utilitarianism which focus on whether actions are good or right, V2 is agent centered in that it sees the action as an expression of the goodness or badness of the agent. Utilitarianism focuses on actions which bring about the greatest happiness for the greatest number; deontology seeks those actions that respect the autonomy of individuals and carry out moral obligations, especially duties. These theories emphasize **doing** what is good or right. Virtue 2, on the other hand, focuses on the agent's becoming or **being** good.
- **Can Virtue 2 tell us how to act?** Because V2 is agent-centered, critics claim that it cannot provide insight into how to act in a given situation. All it can say is, "Act the way a moral exemplar would act." But what moral standards do moral exemplars use or embody in their actions? And what moral standards do we use to pick out the moral exemplars themselves? Hursthouse acknowledges that this criticism hits home. However, she points out that the moral standards come from the moral concepts that we apply to moral exemplars; they are individuals who act **courageously**, exercise **justice**, and realize **honesty**. The moral concepts "courage," "justice," and "honesty" all have independent content that helps guide us. She also calls this criticism unfair: while virtue 2 may not provide any more guidance than deontology or utilitarianism, it doesn't provide any less. Virtue 2 may not provide perfect guidance, but what it does provide is favorably comparable to what utilitarianism and deontology provide.
- **Virtue 2 replaces Deontic concepts (right, duty, obligation) with Aretaic concepts (good, virtue).** This greatly changes the scope of ethics. Deontic concepts serve to establish our minimum obligations. On the other hand, aretaic concepts bring the pursuit of excellence within the purview of ethics. Virtue ethics produces a change in our moral language that makes the pursuit of excellence an essential part of moral inquiry.
- Finally, there is a somewhat different account of virtue 2 (call it virtue 2a) that can be attributed to Alisdair MacIntyre. This version "historicizes" the virtues, that is, looks at how our concepts of key virtues have changed over time. (MacIntyre argues that the concept of justice, for example, varies greatly depending on whether one views justice in Homeric Greece, Aristotle's Greece, or Medieval Europe.) Because he argues that skills and actions are considered virtuous only in relation to a particular historical and community context, he redefines virtues as those skill sets necessary to realize the goods or values around which social practices are built and maintained. This notion fits in well with professional ethics because virtues can be derived from the habits, attitudes, and skills needed to maintain the cardinal ideals of the profession.

3.3.5 Virtue 3

Virtue 3 can best be outlined by showing how the basic concepts of Virtue 1 can be reformulated to reflect current research in moral psychology.

1. **Reformulating Happiness (Eudaimonia).** Mihaly Csikszentmihalyi has described flow experiences (see text box below) in which autotelic activities play a central role. For Aristotle, the virtues also are autotelic. They represent faculties whose exercise is key to realizing our fullest potentialities as human beings. Thus, virtues are self-validating activities carried out for themselves as well as for the ends they bring about. Flow experiences are also important in helping us to conceptualize the virtues in a professional context because they represent a well practiced integration of skill, knowledge, and moral sensitivity.
2. **Reformulating Values (Into Arete or Excellence).** To carry out the full project set forth by virtue 3, it is necessary to reinterpret as excellence key moral values such as honesty, justice, responsibility, reasonableness, and integrity. For example, moral responsibility has often been described as carrying out basic, minimal moral obligations. As an excellence, responsibility becomes refocused on extending knowledge and power to expand our range of effective, moral action. Responsibility reformulated as an excellence also implies a high level of care that goes well beyond what is minimally required.
3. **De-emphasizing Character.** The notion of character drops out to be replaced by more or less enduring and integrated skills sets such as moral imagination, moral creativity, reasonableness, and perseverance. Character emerges from the activities of integrating personality traits, acquired skills, and deepening knowledge around situational demands. The unity character represents is always complex and changing.
4. **Practical Skill Replaces Deliberation.** Moral exemplars develop skills which, through practice, become second nature. These skills obviate the need for extensive moral deliberation. Moral exemplars resemble more skillful athletes who quickly develop responses to dynamic situations than Hamlets stepping back from action for prolonged and agonizing deliberation.
5. **Greater Role for Emotions.** Nancy Sherman discusses how, for Aristotle, emotion is not treated as an irrational force but as an effective tool for moral action once it has been shaped and cultivated through proper moral education. To step beyond the controversy of what Aristotle did and did not say about the emotions (and where he said it) we place this enhanced role for emotions within virtue 3. Emotions carry out four essential functions: (a) they serve as modes of attention; (b) they also serve as modes of responding to or signaling value; (c) they fulfill a revelatory function; and (d) they provide strong motives to moral action. Nancy Sherman, **Making a Necessity of Virtue: Aristotle and Kant on Virtue** (1997), U.K.: Cambridge University Press: 39-50.

3.3.6 Flow Experiences

- The psychologist, Mihaly Csikszentmihalyi, has carried out fascinating research on what he terms "flow experiences." Mike Martin in **Meaningful Work** (2000) U.K.: Oxford,; 24, summarizes these in the following bullets:
- "clear goals as one proceeds"
- "immediate feedback about progress"
- "a balance between challenges and our skills to respond to them"
- "immersion of awareness in the activity without disruptive distractions"
- "lack of worry about failure"
- loss of anxious self-consciousness"
- time distortions (either time flying or timeslowing pleurably)"
- the activity becomes **autotelic**: an end in itself, enjoyed as such"

3.3.7 Virtue Tables

The table just below provides a format for spelling out individual virtues through (1) a general description, (2) the correlative vices of excess and defect, (3) the skills and mental states that accompany and support it, and (4) real and fictional individuals who embody it. Following the table are hints on how to identify and characterize virtues. We start with the virtue of integrity:

Virtue	Description	Excess	Defect	Obstacles to realizing the virtue in professional practices	Moral Exemplar
Integrity	A meta-virtue in which the holder exhibits unity of character manifested in holding together even in the face of strong disruptive pressures or temptations	Excess: Rigidity—sticking to one's guns even when one is obviously wrong(2,3)	Defect: Wantonness. A condition where one exhibits no stability or consistency in character	Individual corruption: Individuals can be tempted by greed toward the vice of defect. Lack of moral courage can also move one to both extremes	Saint Thomas More as portrayed in Robert Bolt's <i>A Man for All Seasons</i> . More refuses to take an oath that goes against the core beliefs in terms of which he defines himself.
				Institutional Corruption: One may work in an organization where corruption is the norm. This generates dilemmas like following an illegal order or getting fired.	

Table 3.2

3.3.8 Exercise 1: Construct Virtue Tables for Professional Virtues

1. Discuss in your group why the virtue you have been assigned is important for the practice of your profession. What goods or values does the consistent employment of this virtue produce?
2. Use the discussion in #1 to develop a general description of your virtue. Think along the following lines: people who have virtue X tend to exhibit certain characteristics (or do certain things) in certain kinds of situations. Try to think of these situations in terms of what is common and important to your profession or practice.
3. Identify the corresponding vices. What characterizes the points of excess and defect between which your virtue as the mean lies?
4. What obstacles arise that prevent professionals from practicing your virtue? Do well-meaning professionals lack power or technical skill? Can virtues interfere with the realization of non-moral values like financial values? See if you can think of a supporting scenario or case here.
5. Identify a moral exemplar for your virtue. Make use of the exemplars described in the **Moral Exemplars in Business and Professional Ethics** module.
6. Go back to task #2. Redefine your description of your virtue in light of the subsequent tasks, especially the moral exemplar you identified. Check for coherence.

7. Finally, does your virtue stand alone or does it need support from other virtues or skills? For example, integrity might also require moral courage.

3.3.9 Exercise 2: Reflect on these Concluding Issues

- Did you have trouble identifying a moral exemplar? Many turn to popular figures for their moral exemplars. Movies and fiction also offer powerful models. Why do you think that it is hard to find moral exemplars in your profession? Is it because your profession is a den of corruption? (Probably not.) Do we focus more on villains than on heroes? Why or why not?
- What did you think about the moral leaders portrayed in the **Moral Exemplars in Business and Professional Ethics** module?
- Did you have trouble identifying both vices, i.e., vices of excess and defect? If so, do you think this because some virtues may not have vices of excess and defect? What do you think about Aristotle's doctrine of the mean?
- Did you notice that the virtue profiles given by your group and the other groups in the class overlapped? Is this a problem for virtue theory? Why do our conceptions of the key moral values and virtues overlap?
- Did you find the virtues difficult to apply? What do you think about the utilitarian and deontological criticism of virtue ethics, namely, that it cannot provide us with guidelines on how to act in difficult situations? Should ethical theories emphasize the act or the person? Or both?
- The most tenacious obstacle to working with virtue ethics is to change focus from the morally minimal to the morally exemplary. "Virtue" is the translation of the Greek word, *arête*. But "excellence" is, perhaps, a better word. Understanding virtue ethics requires seeing that virtue is concerned with the exemplary, not the barely passable. (Again, looking at moral exemplars helps.) *Arête* transforms our understanding of common moral values like justice and responsibility by moving from minimally acceptable to exemplary models.

Moral Leaders⁴ The profiles of several moral leaders in practical and professional ethics. Computer Ethics Cases⁵ This link provides several computer ethics cases and also has a description of decision making and socio-technical systems frameworks. Moral Exemplars in Business and Professional Ethics (Section 4.4) Profiles of several moral leaders in practical and professional ethics.

3.3.10 Presentation on Virtue Ethics

[MEDIA OBJECT]⁶

3.3.11 Resources

- Murdoch, I. (1970). *The Sovereignty of Good*. UK: London, Routledge.
- Sherman, N. (1989). *The Fabric of Character: Aristotle's Theory of Virtue*. UK: Oxford, Oxford University Press.
- Hursthouse, R. (1999). *On Virtue Ethics*. UK: Oxford, Oxford University Press.
- *Virtue Ethics*. (2003). Edited by Stephen Darwall. UK: Oxford: Blackwell.
- Blum, L. (1994). *Moral Perception and Particularity*. UK: Cambridge University Press.
- Pincoffs, E.L. (1986). *Quandaries and Virtues: Against Reductivism in Ethics*. Lawrence, KS: University of Kansas Press.
- *Virtue Ethics* (1997). Edited by Crisp, R. and Slote, M. UK: Oxford, Oxford University Press.
- *Environmental Virtue Ethics*. (2005). Edited by Sandler, R. and Cafaro, P. New York: Rowman and Littlefield.

⁴<http://www.onlineethics.org>

⁵<http://www.computingcases.org>

⁶This media object is a downloadable file. Please view or download it at
<An Introduction to Virtue Ethics.pptx>

- Frey, W. (2008). "Engineering Ethics in Puerto Rico: Issues and Narratives. *Science and Engineering Ethics*, 14: 417-431.
- Frey, W. (2010). "Teaching Virtue: Pedagogical Implications of Moral Psychology. *Science and Engineering Ethics*, 16: 611-628.
- Huff, C., Barnard, L. and Frey, W. (2008) "Good computing: a pedagogically focused model of virtue in the practice of computing (parts 1 and 2)." *Information, Communication and Ethics in Society*, 6(3), 246-278.
- Huff, C., Barnard, L. and Frey, W. (2008) "Good computing: a pedagogically focused model of virtue in the practice of computing (parts 1 and 2). *Information, Communication and Ethics in Society*, 6(4), 284-316.,

3.4 Theory-Building Activities: Rights⁷

3.4.1 Module Introduction

Preliminary Draft distributed at APPE, 2005 in San Antonio, TX

Engineers and other professionals work in large corporations under the supervision of managers who may lack their expertise, skills, and commitment to professional standards. This creates communication and ethical challenges. At the very least, professionals are put in the position of having to advocate their ethical and professional standards to those who, while not being opposed to them, may not share their understanding of and commitment to them.

This module is designed to give you the tools and the practice using them necessary to prevail in situations that require advocacy of ethical and professional standards. In this module you carry out several activities. (1) You will study the philosophical and ethical foundations of modern rights theory through a brief look at Kantian Formalism. (2) You will learn a framework for examining the legitimacy of rights claims. (3) You will practice this framework by examining several rights claims that engineers make over their supervisors. This examination will require that you reject certain elements, rephrase others, and generally recast the claim to satisfy the requirements of the rights justification framework. (4) Finally, in small groups you will build tables around your reformulation of these rights claims and present the results to the class. This module will help you to put your results together with the rest of your classmates and collectively assemble a toolkit consisting of the legitimate rights claims that engineers and other professionals can make over their managers and supervisors.

For more background on rights theory and the relation of rights and duties see (1) Henry Shue, **Basic Rights: Subsistence, Affluence, and U.S. Foreign Policy**, 2nd edition, Princeton, 1980 and (2) Thomas Donaldson, **The Ethics of International Business**, Oxford, 1989. This exercise has been used in computer and engineering ethics classes at the University of Puerto Rico at Mayaguez from 2002 on to the present. It is being incorporated into the textbook, *Good Computing: A Virtue Approach to Computer Ethics* by Chuck Huff, William Frey, and Jose Cruz.

3.4.2 What you need to know...

Problematic Right Claims

1. El derecho para actuar de acuerdo a la conciencia etica y rechazar trabajos en los cuales exista una variacion de opinones morales.
2. El derecho de expresar juicio profesional, y hacer pronunciamientos publicos que sean consistentes con restricciones corporativas sobre la informacion propietaria.
3. El derecho a la lealtad corporativa y la libertad de que sea hecho un chivo expiatorio para catastrofes naturales, ineptitud de administracion u otras fuerzas mas alla del control del ingeniero.

⁷This content is available online at <<http://cnx.org/content/m13758/1.6/>>.

4. El derecho a buscar el mejoramiento personal mediante estudios postgraduados y involucrarse en asociaciones profesionales.
5. El derecho a participar en actividades de partidos políticos fuera de las horas de trabajo.
6. El derecho a solicitar posiciones superiores con otras compañías sin que la compañía en la que trabaje tome represalias contra el ingeniero.
7. El derecho al debido proceso de ley y la libertad de que se le apliquen penalidades arbitrarias o despidos.
8. El derecho a apelar por revisión ante una asociación profesional, ombudsman o árbitro independiente.
9. El derecho a la privacidad personal.
10. Rights claims come from: Bill W. Baker. (2004) "Engineering Ethics: An Overview," in **Engineering Ethics: Concepts, Viewpoints, Cases and Codes**, eds. Jimmy H. Smith and Patricia M. Harper. Compiled and Published by the National Institute for Engineering Ethics: 21-22.
11. Translated into Spanish and published in: **Etica en la Practica Profesional de la Ingenieria** by Wilfredo Munoz Roman published in 1998 by the Colegio de Ingenieros y Agrimensores de Puerto Rico and Universidad Politecnica de Puerto Rico

Problematic Rights Claims quoted directly from Bill Baker, Engineering Ethics: An Overview. Claims form a "Bill of Rights" set forth by Murray A. Muspratt of Chisholm Institute of Technology, Victoria, Australia (American society of Civil Engineers' Journal of Professional Issues in Engineering, October 1985)

1. "The right to act in according to ethical conscience and to decline assignments where a variance of moral opinion exists.
2. The right to express professional judgment, and to make public pronouncements that are consistent with corporate constraints on proprietary information.
3. The right to corporate loyalty and freedom from being made a scapegoat for natural catastrophes, administrative ineptitude or other forces beyond the engineer's control.
4. The right to seek self-improvement by further education and involvement in professional associations.
5. The right to participate in political party activities outside of working hours.
6. The right to apply for superior positions with other companies without being blacklisted.
7. The right to due process and freedom from arbitrary penalties or dismissal.
8. The right to appeal for ethical review by a professional association, ombudsman or independent arbitrator.
9. The right to personal privacy."

Kantian Formalism, Part I: Aligning the moral motive and the moral act

- Kant's moral philosophy has exercised substantial influence over our notions of right and duty. We begin with a brief summary of this theory based on the work, **The Foundations of the Metaphysics of Morals**.
- Kant states that the only thing in this world that is good without qualification is a good will. He characterizes this will in terms of its motive, "duty for duty's sake."
- Consider the following example. You see a boy drowning. Even though the water is rough and the current strong you are a good enough swimmer to save him. So while your inclination may be to give way to fear and walk away, you are duty-bound to save the drowning boy.
- An action (saving or not saving the drowning boy) has moral worth depending on the correct correlation of right action and right motive. The following table shows this.

Duty for Duty's Sake

	Motive = Inclination (desire for reward or fear)	Motive = Duty
Act Conforms to Duty	You save the drowning boy for the reward. Act conforms to duty but is motivated by inclination. Has no moral worth.	You save the drowning boy because it is your duty. Act conforms to duty and is for the sake of duty. Your act has moral worth.
Act violates a duty.	You don't save the drowning boy because you are too lazy to jump in. Act violates duty motivated by inclination.	You drown trying to save the drowning boy. He also dies. Act fails to carry out duty but is motivated by duty anyway. The act miscarries but since the motive is duty it still has moral worth.

Table 3.3

Part II of Kantian Formalism: Giving content to Duty for Duty's Sake

- Kant sees morality as the expression and realization of the rational will. The first formulation of this rational will is to will consistently and universally.
- This leads to the Categorical Imperative: **I should act only on that maxim (=personal rule or rule that I give to myself) that can be converted into a universal law (=a rule that applies to everybody without self-contradiction).**
- This formulation is an imperative because it commands the will of all reasonable beings. It is categorical because it commands without exceptions or conditions. The CI tells me unconditionally not to lie. It does not say, do not lie unless it promotes your self interest to do so.
- The following table shows how to use the Categorical Imperative to determine whether I have a duty not to lie.

Applying the Categorical Imperative

1. Formulate your maxim (=personal rule)	Whenever I am in a difficult situation, I should tell a lie.
2. Universalize your maxim.	Whenever anybody is in a difficult situation, he or she should tell a lie.
3. Check for a contradiction (logical or practical)	When I lie, I will the opposite for the universal law. Put differently, I will that everybody (but me) be a truth-teller. I then make myself the exception to this universal law. Thus my maxim (I am a liar) contradicts the law (everybody else is a truth-teller)

Table 3.4

Kantian Formalism, Part III: The Formula of the End

- When I will one thing as universal law and make myself the exception in difficult circumstances, I am treating others, in Kantian terms, merely as means.
- This implies that I subordinate or bend them to my interests and projects without their consent. I do this by circumventing their autonomy through (1) force, (2) fraud (often deception), or (3) manipulation. Treating them with respect would involve telling them what I want (what are my plans and projects) and on this basis asking them to consent to participate and help me. The extreme case for treating others merely as means is enslaving them.

- We do on occasion treat others as means (and not as mere means) when we hire them as employees. But this is consistent with their autonomy and rational consent because we explain to them what is expected (we give them a job description) and compensate them for their efforts. For this reason there is a world of difference between hiring others and enslaving them.
- **The Formula of the End = Act so as to treat others (yourself included) always as ends and never merely as means.**

Some Key Definitions for a Rights Framework

- Kantian formalism provides a foundation for respect for the intrinsic value of humans as autonomous rational beings. Using this as a point of departure, we can develop a method for identifying, spelling out, and justifying the rights and duties that go with professionalism. This framework can be summarized in four general propositions:
- 1. Definition: A **right** is an essential capacity of action that others are obliged to recognize and respect. This definition follows from autonomy. Autonomy can be broken down into a series of specific capacities. Rights claims arise when we identify these capacities and take social action to protect them. Rights are inviolable and cannot be overridden even when overriding would bring about substantial public utility.
- 2. All rights claims must satisfy three requirements. They must be (1) **essential to the autonomy** of individuals and (2) **vulnerable** so that they require special recognition and protection (on the part of both individuals and society). Moreover, the burden of recognizing and respecting a claim as a right must not deprive others of something essential. In other words, it must be (3) **feasible** for both individuals and social groups to recognize and respect legitimate rights claims.
- 3. Definition: A **duty** is a rule or principle requiring that we both recognize and respect the legitimate rights claims of others. Duties attendant on a given right fall into three general forms: (a) duties not to deprive, (b) duties to prevent deprivation, and (c) duties to aid the deprived.
- 4. **Rights and duties are correlative**; for every right there is a correlative series of duties to recognize and respect that right.
- These four summary points together form a system of professional and occupational rights and correlative duties.

Right Claim Justification Framework

- Essential: To say that a right is essential to autonomy is to say that it highlights a capacity whose exercise is necessary to the general exercise of autonomy. For example, autonomy is based on certain knowledge skills. Hence, we have a right to an education to develop the knowledge required by autonomy, or we have a right to the knowledge that produces informed consent. In general, rights are devices for recognizing certain capacities as essential to autonomy and respecting individuals in their exercise of these capacities.
- Vulnerable: The exercise of the capacity protected under the right needs protection. Individuals may interfere with us in our attempt to exercise our rights. Groups, corporations, and governments might overwhelm us and prevent us from exercising our essential capacities. In short, the exercise of the capacity requires some sort of protection. For example, an individual's privacy is vulnerable to violation. People can gain access to our computers without our authorization and view the information we have stored. They can even use this information to harm us in some way. The right to privacy, thus, protects certain capacities of action that are vulnerable to interference from others. Individual and social energy needs to be expended to protect our privacy.
- Feasible: Rights make claims over others; they imply duties that others have. These claims must not deprive the correlative duty-holders of anything essential. In other words, my rights claims over you are not so extensive as to deprive you of your rights. My right to life should not deprive you of your right to self-protection were I to attack you. Thus, the scope of my right claims over you and the rest of society are limited by your ability to reciprocate. I cannot push my claims over you to recognize and respect my rights to the point where you are deprived of something essential.

Types of Duty Correlative to a Right

- **Duty not to deprive:** We have a basic duty not to violate the rights of others. This entails that we must both recognize and respect these rights. For example, computing specialists have the duty not to deprive others of their rights to privacy by hacking into private files.
- **Duty to prevent deprivation:** Professionals, because of their knowledge, are often in the position to prevent others from depriving third parties of their rights. For example, a computing specialist may find that a client is not taking sufficient pains to protect the confidentiality of information about customers. Outsiders could access this information and use it without the consent of the customers. The computing specialist could prevent this violation of privacy by advising the client on ways to protect this information, say, through encryption. The computing specialist is not about to violate the customers' rights to privacy. But because of special knowledge and skill, the computing specialist may be in a position to prevent others from violating this right.
- **Duty to aid the deprived:** Finally, when others have their rights violated, we have the duty to aid them in their recovery from damages. For example, a computing specialist might have a duty to serve as an expert witness in a lawsuit in which the plaintiff seeks to recover damages suffered from having her right to privacy violated. Part of this duty would include accurate, impartial, and expert testimony.

Application of Right/Duty Framework

1. We can identify and define specific rights such as due process. Moreover, we can set forth some of the conditions involved in recognizing and respecting this right.
2. Due Process can be justified by showing that it is essential to autonomy, vulnerable, and feasible.
3. Right holders can be specified.
4. Correlative duties and duty holders can be specified.
5. Finally, the correlative duty-levels can be specified as the duties not to violate rights, duties to prevent rights violations (whenever feasible), and the duties to aid the deprived (whenever is feasible).

Example Rights Table: Due Process

Right: Due Process	Justification	Right-Holder: Engineer as employee and member of professional society.	Correlative Duty-Holder: Engineer's Supervisor, officials in professional society.	Duty Level
<p>Definition: The right to respond to organizational decisions that may harm one in terms of a serious organizational grievance procedure. Necessary</p> <p>Conditions: 1. Several levels of appeal. 2. Time limits to each level of appeal. 3. Written notice of grievance. 4. Peer representation. 5. Outside arbitration.</p>	<p>Essential: Due Process is essential in organizations to prevent the deprivation of other rights or to provide aid in the case of their deprivation.</p>	<p>Professionals who are subject to professional codes of ethics. Supports professionals who are ordered to violate professional standards.</p>	<p>Human Resources, Management, Personnel Department. (Individuals with duty to design, implement, and enforce a due process policy) Corporate directors have the duty to make sure this is being done.</p>	<p>Not to Deprive: Individuals cannot be fired, transferred, or demoted without due process</p>
	<p>Vulnerable: Rights in general are not recognized in the economic sphere, especially in organizations.</p>			<p>Prevent Deprivation: Organizations can prevent deprivation by designing and implementing a comprehensive due process policy.</p>
	<p>Feasible: Organizations, have successfully implemented due process procedures.</p>			<p>Aid the Deprived: Binding arbitration and legal measures must exist to aid those deprived of due process rights</p>

Table 3.5

3.4.3 What you are going to do...

Exercise: Develop a Rights Table

1. You will be divided into small groups and each will be assigned a right claim taken from the above list.
2. Describe the claim (essential capacity of action) made by the right. For example, due process claims the right to a serious organizational grievance procedure that will enable the right-holder to respond to a decision that has an adverse impact on his or her interests. It may also be necessary in some situations to specify the claim's necessary conditions.
3. Justify the right claim using the rights justification framework. In other words show that the right claim is essential, vulnerable, and feasible.
4. Be sure to show that the right is essential to **autonomy**. If it is vulnerable be sure to identify the **standard threat**. (A standard threat is an existing condition that threatens autonomy.)
5. Provide an example of a situation in which the right claim becomes active. For example, an engineer may claim a right to due process in order to appeal what he or she considers an unfair dismissal, transfer, or performance evaluation.
6. Identify the correlative duty-holder(s) that need to take steps to recognize and respect the right. For example, private and government organizations may be duty-bound to create due process procedures to recognize and respect this right.

7. Further spell out the right by showing what actions the correlative duties involve. For example, a manager should not violate an employee's due process right by firing him or her without just cause. The organization's human resources department might carry out a training program to help managers avoid depriving employees of this right. The organization could aid the deprived by designing and implementing binding arbitration involving an impartial third party.

Be prepared to debrief on your right claim to the rest of the class. When other groups are debriefing, you are free to challenge them on whether their claim is essential to autonomy, whether they have identified a valid "standard threat," and whether the correlative duties are feasible or deprive others of something essential. Your goal as a class is to have a short but effective list of rights that professionals take with them to the workplace.

Makes copies of your rights table and give it to the other groups in class. Be sure to make a copy for your instructor. Together, you will build a table of rights claims that engineers and other professionals make against managers and corporations. This will provide you a useful and comprehensive decision making tool in that you will be able to examine decision alternatives in terms of how they stand with regard to the rights you and your classmates and scrutinized and justified through this exercise.

3.4.4 Conclusion

Conclusion: Topics for Further Reflection

- Not every claim to a right is a legitimate or justifiable claim. The purpose of this framework is to get you into the habit of thinking critically and skeptically about the rights claims that you and others make. Every legitimate right claim is essential, vulnerable, and feasible. Correlative duties are sorted out according to different levels (not to deprive, prevent deprivation, and aid the deprived); this, in turn, is based on the capacity of the correlative duty holder to carry them out. Finally, duties correlative to rights cannot deprive the duty-holder of something essential.
- Unless you integrate your right and its correlative duties into the context of your professional or practical domain, it will remain abstract and irrelevant. Think about your right in the context of the real world. Think of everyday situations in which the right and its correlative duties will arise. Invent cases and scenarios. If you are an engineering student, think of informed consent in terms of the public's right to understand and consent to the risks associated with engineering projects. If you are a computing student think of what you can do with computing knowledge and skills to respect or violate privacy rights. Don't stop with an abstract accounting of the right and its correlative duties.
- Rights and duties underlie professional codes of ethics. But this is not always obvious. For example, the right of free and informed consent underlies much of the engineer's interaction with the public, especially the code responsibility to hold paramount public health, safety, and welfare. Look at the different stakeholder relations covered in a code of ethics. (In engineering this would include public, client, profession, and peer.) What are the rights and duties outlined in these stakeholder relations? How are they covered in codes of ethics?
- This module is effective in counter-acting the tendency to invent rights and use them to rationalize dubious actions and intentions. Think of rights claims as credit backed by a promise to pay at a later time. If you make a right claim, be ready to justify it. If someone else makes a right claim, make them back it up with the justification framework presented in this module.

Chapter 4

Decision Making Frameworks

4.1 Three Frameworks for Ethical Decision Making and Good Computing Reports¹

4.1.1 Module Introduction

In this module you will learn and practice three frameworks designed to integrate ethics into decision making in the areas of practical and occupational ethics. The first framework divides the decision making process into four stages: problem specification, solution generation, solution testing, and solution implementation. It is based on an analogy between ethics and design problems that is detailed in a table presented below. The second framework focuses on the process of solution testing by providing four tests that will help you to evaluate and rank alternative courses of action. The reversibility, harm/beneficence, and public identification tests each "encapsulate" or summarize an important ethical theory. A value realization test assesses courses of action in terms of their ability to realize or harmonize different moral and nonmoral values. Finally, a feasibility test will help you to uncover interest, resource, and technical constraints that will affect and possibly impede the realization of your solution or decision. Taken together, these three frameworks will help steer you toward designing and implementing ethical decisions the professional and occupational areas.

Two online resources provide more extensive background information. The first, www.computingcases.org, provides background information on the ethics tests, socio-technical analysis, and intermediate moral concepts. The second, <http://onlineethics.org/essays/education/teaching.html>, explores in more detail the analogy between ethics and design problems. Much of this information will be published in *Good Computing: A Virtue Approach to Computer Ethics*, a textbook of cases and decision making techniques in computer ethics that is being authored by Chuck Huff, William Frey, and Jose A. Cruz-Cruz.

4.1.2 Problem-Solving or Decision-Making Framework: Analogy between ethics and design

Traditionally, decision making frameworks in professional and occupational ethics have been taken from rational decision procedures used in economics. While these are useful, they lead one to think that ethical decisions are already "out there" waiting to be discovered. In contrast, taking a design approach to ethical decision making emphasizes that ethical decisions must be created, not discovered. This, in turn, emphasizes the importance of moral imagination and moral creativity. Carolyn Whitbeck in *Ethics in Engineering Practice and Research* describes this aspect of ethical decision making through the analogy she draws between ethics and design problems in chapter one. Here she rejects the idea that ethical problems are multiple choice problems. We solve ethical problems not by choosing between ready made solutions given with the situation;

¹This content is available online at <<http://cnx.org/content/m13757/1.23/>>.

rather we use our moral creativity and moral imagination to design these solutions. Chuck Huff builds on this by modifying the design method used in software engineering so that it can help structure the process of framing ethical situations and creating actions to bring these situations to a successful and ethical conclusion. The key points in the analogy between ethical and design problems are summarized in the table presented just below.

Analogy between design and ethics problem-solving	
Design Problem	Ethical Problem
Construct a prototype that optimizes (or satisfices) designated specifications	Construct a solution that integrates and realizes ethical values (justice, responsibility, reasonableness, respect, and safety)
Resolve conflicts between different specifications by means of integration	Resolve conflicts between values (moral vs. moral or moral vs. non-moral) by integration
Test prototype over the different specifications	Test solution over different ethical considerations encapsulated in ethics tests
Implement tested design over background constraints	Implement ethically tested solution over resource, interest, and technical constraints

Table 4.1

4.1.3 Software Development Cycle: Four Stages

(1) problem specification, (2) solution generation, (3) solution testing, and (4) solution implementation.

4.1.4 Problem specification

Problem specification involves exercising moral imagination to specify the socio-technical system (including the stakeholders) that will influence and will be influenced by the decision we are about to make. Stating the problem clearly and concisely is essential to design problems; getting the problem right helps structure and channel the process of designing and implementing the solution. There is no algorithm available to crank out effective problem specification. Instead, we offer a series of guidelines or rules of thumb to get you started in a process that is accomplished by the skillful exercise of moral imagination.

For a broader problem framing model see Harris, Pritchard, and Rabins, **Engineering Ethics: Concepts and Cases**, 2nd Edition, Belmont, CA: Wadsworth, 2000, pp. 30-56. See also Cynthia Brincat and Victoria Wike, **Morality and Professional Life: Values at Work**, New Jersey: Prentice Hall, 1999.

Different Ways of Specifying the Problem

- Many problems can be specified as disagreements. For example, you disagree with your supervisor over the safety of the manufacturing environment. Disagreements over facts can be resolved by gathering more information. Disagreements over concepts (you and your supervisor have different ideas of what safety means) require working toward a common definition.
- Other problems involve conflicting values. You advocate installing pollution control technology because you value environmental quality and safety. Your supervisor resists this course of action because she values maintaining a solid profit margin. This is a conflict between a moral value (safety and environmental quality) and a nonmoral value (solid profits). Moral values can also conflict with one another in a given situation. Using John Doe lawsuits to force Internet Service Providers to reveal the real identities of defamers certainly protects the privacy and reputations of potential targets of defamation. But it also places restrictions on legitimate free speech by making it possible for powerful wrongdoers to intimidate those who would publicize their wrongdoing. Here the moral values of privacy

and free speech are in conflict. Value conflicts can be addressed by harmonizing the conflicting values, compromising on conflicting values by partially realizing them, or setting one value aside while realizing the other (=value trade offs).

- If you specify your problem as a disagreement, you need to describe the facts or concepts about which there is disagreement.
- If you specify your problem as a conflict, you need to describe the values that conflict in the situation.
- One useful way of specifying a problem is to carry out a stakeholder analysis. A stakeholder is any group or individual that has a vital interest at risk in the situation. Stakeholder interests frequently come into conflict and solving these conflicts requires developing strategies to reconcile and realize the conflicting stakes.
- Another way of identifying and specifying problems is to carry out a socio-technical analysis. Socio-technical systems (STS) embody values. Problems can be anticipated and prevented by specifying possible value conflicts. Integrating a new technology, procedure, or policy into a socio-technical system can create three kinds of problem. (1) Conflict between values in the technology and those in the STS. For example, when an attempt is made to integrate an information system into the STS of a small business, the values present in an information system can conflict with those in the socio-technical system. (Workers may feel that the new information system invades their privacy.) (2) Amplification of existing value conflicts in the STS. The introduction of a new technology may magnify an existing value conflict. Digitalizing textbooks may undermine copyrights because digital media is easy to copy and disseminate on the Internet. (3) Harmful consequences. Introducing something new into a socio-technical system may set in motion a chain of events that will eventually harm stakeholders in the socio-technical system. For example, giving laptop computers to public school students may produce long term environmental harm when careless disposal of spent laptops releases toxic materials into the environment.
- The following table helps summarize some of these problem categories and then outlines generic solutions.

Problem Type	Sub-Type	Solution Outline		
Disagreement	Factual	Type and mode of gathering information		
	Conceptual	Concept in dispute and method for agreeing on its definition		
Conflict	Moral vs. Moral	Value Integrative	Partially Value Integrative	Trade Off
	Non-moral vs. moral			
	Non-moral vs. non-moral			
<i>continued on next page</i>				

Framing	Corruption	Strategy for maintaining integrity	Strategy for restoring justice	Value integrative, design strategy
	Social Justice			
	Value Realization			
Intermediate Moral Value	Public Welfare, Faithful Agency, Professional Integrity, Peer Collegiality	Realizing Value	Removing value conflicts	Prioritizing values for trade offs

Table 4.2

Instructions for Using Problem Classification Table

1. Is your problem a conflict? Moral versus moral value? Moral versus non-moral values? Non-moral versus non-moral values? Identify the conflicting values as concisely as possible. Example: In Toysmart, the financial values of creditors come into conflict with the privacy of individuals in the data base: financial versus privacy values.
2. Is your problem a disagreement? Is the disagreement over basic facts? Are these facts observable? Is it a disagreement over a basic concept? What is the concept? Is it a factual disagreement that, upon further reflection, changes into a conceptual disagreement?
3. Does your problem arise from an impending harm? What is the harm? What is its magnitude? What is the probability that it will occur?
4. If your problem is a value conflict then can these values be fully integrated in a value integrating solution? Or must they be partially realized in a compromise or traded off against one another?
5. If your problem is a factual disagreement, what is the procedure for gathering the required information, if this is feasible?
6. If your problem is a conceptual disagreement, how can this be overcome? By consulting a government policy or regulation? (OSHA on safety for example.) By consulting a theoretical account of the value in question? (Reading a philosophical analysis of privacy.) By collecting past cases that involve the same concept and drawing analogies and comparisons to the present case?

If you are having problems specifying your problem

- Try identifying the stakeholders. Stakeholders are any group or individual with a vital interest at stake in the situation at hand.
- Project yourself imaginatively into the perspectives of each stakeholders. How does the situation look from their standpoint? What are their interests? How do they feel about their interests?
- Compare the results of these different imaginative projections. Do any stakeholder interests conflict? Do the stakeholders themselves stand in conflict?
- If the answer to one or both of these questions is "yes" then this is your problem statement. How does one reconcile conflicting stakeholders or conflicting stakeholder interests in this situation?

Framing Your Problem

- We miss solutions to problems because we choose to frame them in only one way.
- For example, the Mountain Terrorist Dilemma is usually framed in only one way: as a dilemma, that is, a forced decision between two equally undesirable alternatives. (Gilbane Gold is also framed as a dilemma: blow the whistle on Z-Corp or go along with the excess pollution.)
- Framing a problem differently opens up new horizons of solution. Your requirement from this point on in the semester is to frame every problem you are assigned in at least two different ways.
- For examples of how to frame problems using socio-technical system analysis see module m14025.
- These different frames are summarized in the next box below.

Different Frames for Problems

- **Technical Frame:** Engineers frame problems technically, that is, they specify a problem as raising a technical issue and requiring a technical design for its resolution. For example, in the Hughes case, a technical frame would raise the problem of how to streamline the manufacturing and testing processes of the chips.
- **Physical Frame:** In the Laminating Press case, the physical frame would raise the problem of how the layout of the room could be changed to reduce the white powder. Would better ventilation eliminate or mitigate the white powder problem?
- **Social Frame:** In the "When in Aguadilla" case, the Japanese engineer is uncomfortable working with the Puerto Rican woman engineer because of social and cultural beliefs concerning women still widely held by men in Japan. Framing this as a social problem would involve asking whether there would be ways of getting the Japanese engineer to see things from the Puerto Rican point of view.
- **Financial or Market-Based Frames:** The DOE, in the Risk Assessment case below, accuses the laboratory and its engineers of trying to extend the contract to make more money. The supervisor of the head of the risk assessment team pressures the team leader to complete the risk assessment as quickly as possible so as not to lose the contract. These two framings highlight financial issues.
- **Managerial Frame:** As the leader of the Puerto Rican team in the "When in Aguadilla" case, you need to exercise leadership in your team. The refusal of the Japanese engineer to work with a member of your team creates a management problem. What would a good leader, a good manager, do in this situation? What does it mean to call this a management problem? What management strategies would help solve it?
- **Legal Frame:** OSHA may have clear regulations concerning the white powder produced by laminating presses. How can you find out about these regulations? What would be involved in complying with them? If they cost money, how would you get this money? These are questions that arise when you frame the Laminating Press case as a legal problem.
- **Environmental Framing:** Finally, viewing your problem from an environmental frame leads you to consider the impact of your decision on the environment. Does it harm the environment? Can this harm be avoided? Can it be mitigated? Can it be offset? (Could you replant elsewhere the trees you cut down to build your new plant?) Could you develop a short term environmental solution to "buy time" for designing and implementing a longer term solution? Framing your problem as an environmental problem requires that you ask whether this solution harms the environment and whether this harming can be avoided or remedied in some other way.

4.1.5 Solution Generation

In solution generation, agents exercise moral creativity by brainstorming to come up with solution options designed to resolve the disagreements and value conflicts identified in the problem specification stage. Brainstorming is crucial to generating nonobvious solutions to difficult, intractable problems. This process must take place within a non-polarized environment where the members of the group respect and trust one another. (See the module on the Ethics of Group Work for more information on how groups can be successful and pitfalls that commonly trip up groups.) Groups effectively initiate the brainstorming process by suspending criticism and analysis. After the process is completed (say, by meeting a quota), then participants can refine the solutions generated by combining them, eliminating those that don't fit the problem, and ranking them in terms of their ethics and feasibility. If a problem can't be solved, perhaps it can be dissolved through reformulation. If an entire problem can't be solve, perhaps the problem can be broken down into parts some of which can be readily solved.

Having trouble generating solutions?

- One of the most difficult stages in problem solving is to jump start the process of brainstorming solutions. If you are stuck then here are some generic options guaranteed to get you "unstuck."

- **Gather Information:** Many disagreements can be resolved by gathering more information. Because this is the easiest and least painful way of reaching consensus, it is almost always best to start here. Gathering information may not be possible because of different constraints: there may not be enough time, the facts may be too expensive to gather, or the information required goes beyond scientific or technical knowledge. Sometimes gathering more information does not solve the problem but allows for a new, more fruitful formulation of the problem. Harris, Pritchard, and Rabins in *Engineering Ethics: Concepts and Cases* show how solving a factual disagreement allows a more profound conceptual disagreement to emerge.
- **Nolo Contendere.** Nolo Contendere is latin for not opposing or contending. Your interests may conflict with your supervisor but he or she may be too powerful to reason with or oppose. So your only choice here is to give in to his or her interests. The problem with nolo contendere is that non-opposition is often taken as agreement. You may need to document (e.g., through memos) that your choosing not to oppose does not indicate agreement.
- **Negotiate.** Good communication and diplomatic skills may make it possible to negotiate a solution that respects the different interests. Value integrative solutions are designed to integrate conflicting values. Compromises allow for partial realization of the conflicting interests. (See the module, *The Ethics of Team Work*, for compromise strategies such as logrolling or bridging.) Sometimes it may be necessary to set aside one's interests for the present with the understanding that these will be taken care of at a later time. This requires trust.
- **Oppose.** If nolo contendere and negotiation are not possible, then opposition may be necessary. Opposition requires marshalling evidence to document one's position persuasively and impartially. It makes use of strategies such as leading an "organizational charge" or "blowing the whistle." For more on whistle-blowing consult the discussion of whistle blowing in the Hughes case that can be found at computing cases.
- **Exit.** Opposition may not be possible if one lacks organizational power or documented evidence. Nolo contendere will not suffice if non-opposition implicates one in wrongdoing. Negotiation will not succeed without a necessary basis of trust or a serious value integrative solution. As a last resort, one may have to exit from the situation by asking for reassignment or resigning.

Refining solutions

- Are any solutions blatantly unethical or unrealizable?
- Do any solutions overlap? Can these be integrated into broader solutions?
- Can solutions be brought together as courses of action that can be pursued simultaneously?
- Go back to the problem specification? Can any solutions be eliminated because they do not address the problem? (Or can the problem be revised to better fit what, intuitively, is a good solution.)
- Can solutions be brought together as successive courses of action? For example, one solution represents Plan A; if it does not work then another solution, Plan B, can be pursued. (You negotiate the problem with your supervisor. If she fails to agree, then you oppose your supervisor on the grounds that her position is wrong. If this fails, you conform or exit.)
- **The goal here is to reduce the solution list to something manageable, say, a best, a second best, and a third best. Try adding a bad solution to heighten strategic points of comparison. The list should be short so that the remaining solutions can be intensively examined as to their ethics and feasibility.**

4.1.6 Solution Testing: The solutions developed in the second stage must be tested in various ways.

1. Reversibility: Is the solution reversible between the agent and key stakeholders?
2. Harm/Beneficence: Does the solution minimize harm? Does it produce benefits that are justly distributed among stakeholders?

3. **Publicity:** Is this action one with which you are willing to be publicly identified? Does it identify you as a moral person? An irresponsible person? A person of integrity? An untrustworthy person?
4. **Code:** Does the solution violate any provisions of a relevant code of ethics? Can it be modified to be in accord with a code of ethics? Does it address any aspirations a code might have? (Engineers: Does this solution hold paramount the health, safety, and welfare of the public?)
5. **Global Feasibility:** Do any obstacles to implementation present themselves at this point? Are there resources, techniques, and social support for realizing the solution or will obstacles arise in one or more of these general areas? At this point, assess globally the feasibility of each solution.
6. The solution evaluation matrix presented just below models and summarizes the solution testing process.

Solution/Test	Reversibility	Harm/ Beneficence	Publicity/Values	Code	Global Feasibility
Description	Is the solution reversible with stakeholders? Does it honor basic rights?	Does the solution produce the best benefit/harm ratio? Does the solution maximize utility?	Does the solution express and integrate key virtues?	Does the solution violate any code provisions?	Are there constraints or obstacles to realizing the solution?
Best solution					
Second Best					
Worst					

Table 4.3

4.1.7 Solution Implementation

The chosen solution must be examined in terms of how well it responds to various situational constraints that could impede its implementation. What will be its costs? Can it be implemented within necessary time constraints? Does it honor recognized technical limitations or does it require pushing these back through innovation and discovery? Does it comply with legal and regulatory requirements? Finally, could the surrounding organizational, political, and social environments give rise to obstacles to the implementation of the solution? In general this phase requires looking at interest, technical, and resource constraints or limitations. A Feasibility Matrix helps to guide this process.

The Feasibility Tests focuses on situational constraints. How could these hinder the implementation of the solution? Should the solution be modified to ease implementation? Can the constraints be removed or remodeled by negotiation, compromise, or education? Can implementation be facilitated by modifying both the solution and changing the constraints?

Feasibility Matrix		
Resource Constraints	Technical Constraints	Interest Constraints
		Personalities
Time		Organizational
Cost	Applicable Technology	Legal
Materials	Manufacturability	Social, Political, Cultural

Table 4.4

Different Feasibility Constraints

1. The Feasibility Test identifies the constraints that could interfere with realizing a solution. This test also sorts out these constraints into **resource** (time, cost, materials), **interest** (individuals, organizations, legal, social, political), and **technical** limitations. By identifying situational constraints, problem-solvers can anticipate implementation problems and take early steps to prevent or mitigate them.
2. **Time.** Is there a deadline within which the solution has to be enacted? Is this deadline fixed or negotiable?
3. **Financial.** Are there cost constraints on implementing the ethical solution? Can these be extended by raising more funds? Can they be extended by cutting existing costs? Can agents negotiate for more money for implementation?
4. **Technical.** Technical limits constrain the ability to implement solutions. What, then, are the technical limitations to realizing and implementing the solution? Could these be moved back by modifying the solution or by adopting new technologies?
5. **Manufacturability.** Are there manufacturing constraints on the solution at hand? Given time, cost, and technical feasibility, what are the manufacturing limits to implementing the solution? Once again, are these limits fixed or flexible, rigid or negotiable?
6. **Legal.** How does the proposed solution stand with respect to existing laws, legal structures, and regulations? Does it create disposal problems addressed in existing regulations? Does it respond to and minimize the possibility of adverse legal action? Are there legal constraints that go against the ethical values embodied in the solution? Again, are these legal constraints fixed or negotiable?
7. **Individual Interest Constraints.** Individuals with conflicting interests may oppose the implementation of the solution. For example, an insecure supervisor may oppose the solution because he fears it will undermine his authority. Are these individual interest constraints fixed or negotiable?
8. **Organizational.** Inconsistencies between the solution and the formal or informal rules of an organization may give rise to implementation obstacles. Implementing the solution may require support of those higher up in the management hierarchy. The solution may conflict with organization rules, management structures, traditions, or financial objectives. Once again, are these constraints fixed or flexible?
9. **Social, Cultural, or Political.** The socio-technical system within which the solution is to be implemented contains certain social structures, cultural traditions, and political ideologies. How do these stand with respect to the solution? For example, does a climate of suspicion of high technology threaten to create political opposition to the solution? What kinds of social, cultural, or political problems could arise? Are these fixed or can they be altered through negotiation, education, or persuasion?

4.1.8 Ethics Tests For Solution Evaluation

Three ethics tests (reversibility, harm/beneficence, and public identification) encapsulate three ethical approaches (deontology, utilitarianism, and virtue ethics) and form the basis of stage three of the SDC, solution testing. A fourth test (a value realization test) builds upon the public identification/virtue ethics test by evaluating a solution in terms of the values it harmonizes, promotes, protects, or realizes. Finally a code test provides an independent check on the ethics tests and also highlights intermediate moral concepts such as safety, health, welfare, faithful agency, conflict of interest, confidentiality, professional integrity, collegiality, privacy, property, free speech, and equity/access). The following section provides advice on how to use these tests. More information can be found at www.computingcases.org.

4.1.9 Setting Up the Ethics Tests: Pitfalls to avoid

Set-Up Pitfalls: Mistakes in this area lead to the analysis becoming unfocused and getting lost in irrelevancies. (a) Agent-switching where the analysis falls prey to irrelevancies that crop up when the test application is

not grounded in the standpoint of a single agent, (b) Sloppy action-description where the analysis fails because no specific action has been tested, (c) Test-switching where the analysis fails because one test is substituted for another. (For example, the public identification and reversibility tests are often reduced to the harm/beneficence test where harmful consequences are listed but not associated with the agent or stakeholders.)

Set up the test

1. Identify the agent (the person who is going to perform the action)
2. Describe the action or solution that is being tested (what the agent is going to do or perform)
3. Identify the stakeholders (those individuals or groups who are going to be affected by the action), and their stakes (interests, values, goods, rights, needs, etc.)
4. Identify, sort out, and weigh the consequences (the results the action is likely to bring about)

4.1.10 Harm/Beneficence Test

- What harms would accompany the action under consideration? Would it produce physical or mental suffering, impose financial or non-financial costs, or deprive others of important or essential goods?
- What benefits would this action bring about? Would it increase safety, quality of life, health, security, or other goods both moral and non-moral?
- What is the magnitude of each these consequences? Magnitude includes likelihood it will occur (probability), the severity of its impact (minor or major harm) and the range of people affected.
- Identify one or two other viable alternatives and repeat these steps for them. Some of these may be modifications of the basic action that attempt to minimize some of the likely harms. These alternatives will establish a basis for assessing your alternative by comparing it with others.
- Decide on the basis of the test which alternative produces the best ratio of benefits to harms?
- Check for inequities in the distribution of harms and benefits. Do all the harms fall on one individual (or group)? Do all of the benefits fall on another? If harms and benefits are inequitably distributed, can they be redistributed? What is the impact of redistribution on the original solution imposed?

Pitfalls of the Harm/Beneficence Test

1. "Paralysis of Analysis" comes from considering too many consequences and not focusing only on those relevant to your decision.
2. Incomplete Analysis results from considering too few consequences. Often it indicates a failure of moral imagination which, in this case, is the ability to envision the consequences of each action alternative.
3. Failure to compare different alternatives can lead to a decision that is too limited and one-sided.
4. Failure to weigh harms against benefits occurs when decision makers lack the experience to make the qualitative comparisons required in ethical decision making.
5. Finally, justice failures result from ignoring the fairness of the distribution of harms and benefits. This leads to a solution which may maximize benefits and minimize harms but still give rise to serious injustices in the distribution of these benefits and harms.

4.1.11 Reversibility Test

1. Set up the test by (i) identifying the agent, (ii) describing the action, and (iii) identifying the stakeholders and their stakes.
2. Use the stakeholder analysis to identify the relations to be reversed.
3. Reverse roles between the agent (you) and each stakeholder: put them in your place (as the agent) and yourself in their place (as the one subjected to the action).
4. If you were in their place, would you still find the action acceptable?

Cross Checks for Reversibility Test (These questions help you to check if you have carried out the reversibility test properly.)

- Does the proposed action treat others with respect? (Does it recognize their autonomy or circumvent it?)
- Does the action violate the rights of others? (Examples of rights: free and informed consent, privacy, freedom of conscience, due process, property, freedom of expression)
- Would you recommend that this action become a universal rule?
- Are you, through your action, treating others merely as means?

Pitfalls of the Reversibility Test

- Leaving out a key stakeholder relation
- Failing to recognize and address conflicts between stakeholders and their conflicting stakes
- Confusing treating others with respect with capitulating to their demands (“Reversing with Hitler”)
- Failing to reach closure, i.e., an overall, global reversal assessment that takes into account all the stakeholders the agent has reversed with.

4.1.12 Steps in Applying the Public Identification Test

- Set up the analysis by identifying the agent, describing the action, and listing the key values or virtues at play in the situation.
- Association the action with the agent.
- Describe what the action says about the agent as a person. Does it reveal him or her as someone associated with a virtue or a vice?

Alternative Version of Public Identification

- Does the action under consideration realize justice or does it pose an excess or defect of justice?
- Does the action realize responsibility or pose an excess or defect of responsibility?
- Does the action realize reasonableness or pose too much or too little reasonableness?
- Does the action realize honesty or pose too much or too little honesty?
- Does the action realize integrity or pose too much or too little integrity?

Pitfalls of Public Identification

- Action not associated with agent. The most common pitfall is failure to associate the agent and the action. The action may have bad consequences and it may treat individuals with respect but these points are not as important in the context of this test as what they imply about the agent as a person who deliberately performs such an action.
- Failure to specify moral quality, virtue, or value. Another pitfall is to associate the action and agent but only ascribe a vague or ambiguous moral quality to the agent. To say, for example, that willfully harming the public is bad fails to zero in on precisely what moral quality this ascribes to the agent. Does it render him or her unjust, irresponsible, corrupt, dishonest, or unreasonable? The virtue list given above will help to specify this moral quality.

4.1.13 Code of Ethics Test

- Does the action hold paramount the health, safety, and welfare of the public, i.e., those affected by the action but not able to participate in its design or execution?
- Does the action maintain faithful agency with the client by not abusing trust, avoiding conflicts of interest, and maintaining confidences?
- Is the action consistent with the reputation, honor, dignity, and integrity of the profession?
- Does the action serve to maintain collegial relations with professional peers?

4.1.14 Meta Tests

- The ethics and feasibility tests will not always converge on the same solution. There is a complicated answer for why this is the case but the simple version is that the tests do not always agree on a given solution because each test (and the ethical theory it encapsulates) covers a different domain or dimension of the action situation. Meta tests turn this disadvantage to your advantage by feeding the interaction between the tests on a given solution back into the evaluation of that solution.
- When the ethics tests converge on a given solution, this convergence is a sign of the strength and robustness of the solution and counts in its favor.
- When a given solution responds well to one test but does poorly under another, this is a sign that the solution needs further development and revision. It is not a sign that one test is relevant while the others are not. Divergence between test results is a sign that the solution is weak.

4.1.15 Application Exercise

You will now practice the four stages of decision making with a real world case. This case, Risk Assessment, came from a retreat on Business, Science, and Engineering Ethics held in Puerto Rico in December 1998. It was funded by the National Science Foundation, Grant SBR 9810253.

Risk Assessment Scenario

Case Scenario: You supervise a group of engineers working for a private laboratory with expertise in nuclear waste disposal and risk assessment. The DOE (Department of Energy) awarded a contract to your laboratory six years ago to do a risk assessment of various nuclear waste disposal sites. During the six years in which your team has been doing the study, new and more accurate calculations in risk assessment have become available. Your laboratory's study, however, began with the older, simpler calculations and cannot integrate the newer without substantially delaying completion. You, as the leader of the team, propose a delay to the DOE on the grounds that it is necessary to use the more advanced calculations. Your position is that the laboratory needs more time because of the extensive calculations required; you argue that your group must use state of the art science in doing its risk assessment. The DOE says you are using overly high standards of risk assessment to prolong the process, extend the contract, and get more money for your company. They want you to use simpler calculations and finish the project; if you are unwilling to do so, they plan to find another company that thinks differently. Meanwhile, back at the laboratory, your supervisor (a high level company manager) expresses to you the concern that while good science is important in an academic setting, this is the real world and the contract with the DOE is in jeopardy. What should you do?

Part One: Problem Specification

1. Specify the problem in the above scenario. Be as concise and specific as possible
2. Is your problem best specifiable as a disagreement? Between whom? Over what?
3. Can your problem be specified as a value conflict? What are the values in conflict? Are the moral, nonmoral, or both?

Part Two: Solution Generation

1. Quickly and without analysis or criticism brainstorm 5 to ten solutions
2. Refine your solution list. Can solutions be eliminated? (On what basis?) Can solutions be combined? Can solutions be combined as plan a and plan b?
3. If you specified your problem as a disagreement, how do your solutions resolve the disagreement? Can you negotiate interests over positions? What if your plan of action doesn't work?
4. If you formulated your problem as a value conflict, how do your solutions resolve this conflict? By integrating the conflicting values? By partially realizing them through a value compromise? By trading one value off for another?

Part Three: Solution Testing

1. Construct a solution evaluation matrix to compare two to three solution alternatives.
2. Choose a bad solution and then compare to it the two strongest solutions you have.
3. Be sure to avoid the pitfalls described above and set up each test carefully.

Part Four: Solution Implementation

1. Develop an implementation plan for your best solution. This plan should anticipate obstacles and offer means for overcoming them.
2. Prepare a feasibility table outlining these issues using the table presented above.
3. Remember that each of these feasibility constraints is negotiable and therefore flexible. If you choose to set aside a feasibility constraint then you need to outline how you would negotiate the extension of that constraint.

Decision-Making Presentation

This media object is a downloadable file. Please view or download it at
<Decision Making Manual V4.pptx>

Figure 4.1: Clicking on this figure will allow you to open a presentation designed to introduce problem solving in ethics as analogous to that in design, summarize the concept of a socio-technical system, and provide an orientation in the four stages of problem solving. This presentation was given February 28, 2008 at UPRM for ADMI 6005 students, Special Topics in Research Ethics.

Problem Solving Presentation

[MEDIA OBJECT]²

Shortened Presentation for Fall 2012

[MEDIA OBJECT]³

Vigo Socio-Technical System Table and Problems

[MEDIA OBJECT]⁴

Decision Making Worksheet

This media object is a downloadable file. Please view or download it at
<Decision Making Worksheet.docx>

Figure 4.2: This exercise is designed to give you practice with the three frameworks described in this module. It is based on the case, "When in Aguadilla."

Test Rubric Fall 2009: Problem-Solving

[MEDIA OBJECT]⁵

²This media object is a downloadable file. Please view or download it at
<Decision Making Manual V5.pptx>

³This media object is a downloadable file. Please view or download it at
<Decision Making Manual V6.pptx>

⁴This media object is a downloadable file. Please view or download it at
<Vigo STS.docx>

⁵This media object is a downloadable file. Please view or download it at
<PE_Rubric_EO_S09.docx>

4.2 Ethical Decision Making in Engineering⁶

The cases used in this module have been developed through NSF SBR-9810253 and UPRM ABET EAC Workshops. Also to thanks to Jaime Rodriguez, a former MBA student at UPRM, for providing cases 1 and 2. This module represents a modification of the Gray Matters format developed by George Sammet. For a more detailed description of the history of Gray Matters, see Whitbeck, Caroline. 1998. Ethics in Engineering Practice and Research. Cambridge, Mass.: Cambridge University Press, 176-181.)

Directions

Read the following scenarios and the accompanying solutions.

- Evaluate the alternatives in terms of the tests described below.
- Choose the one you think best or design your own solution if you believe you can do better.
- Summarize your results by filling in the solution evaluation matrix that appears on the page following the scenario. Notice that the first column repeats the solution alternatives.
- Be prepared to present your matrix to the class. You will also provide the other groups in the class with a copy of your matrix for their ethics portfolios

Solution Evaluation Tests

- REVERSIBILITY: Would I think this is a good choice if I were among those affected by it?
- PUBLICITY: Would I want to be publicly associated with this action through, say, its publication in the newspaper?
- HARM/BENEFICENCE: Does this action do less harm than any of the available alternatives?
- FEASIBILITY: Can this solution be implemented given time, technical, economic, legal, and political constraints?

Decision Making Scenarios and Exercises

This is an unsupported media type. To view, please see [http://cnx.org/content/m14033/latest/Gray Matters in Engineering.doc](http://cnx.org/content/m14033/latest/GrayMatters%20in%20Engineering.doc)

Figure 4.3: This file contains four cases: When in Aguadilla...?, The Laminating Press Room, Prints and Primos, and The Persistent Engineer.

Harm Test Set-Up

1. Identify the agent (=the person who will perform the action).
2. Describe the action (=what the agent is about to do).
3. Identify the stakeholders (individuals who have a vital interest at risk) and their stakes.
4. Identify, sort out, and weight the expected results or consequences.

Harm Test Pitfalls

- Paralysis of Action—considering too many consequences.
- Incomplete analysis—considering too few results.

⁶This content is available online at <<http://cnx.org/content/m14033/1.3/>>.

- Failure to weigh harms against benefits.
- Failure to compare different alternatives.
- Justice failures—ignoring the fairness of the distribution of harms and benefits.

Reversibility Test Set-Up

- Identify the agent
- Describe the action
- Identify the stakeholders and their stakes
- Use the stakeholder analysis to select the relations to be reversed.
- Reverse roles between the agent (you) and each stakeholder: put them in your place (as the agent) and yourself in their place (as the target of the action)
- If you were in their place, would you still find the action acceptable?

Reversibility Pitfalls

- Leaving out a key stakeholder relation.
- Failing to recognize and address conflicts between stakeholders and their conflicting stakes.
- Confusing treating others with respect with capitulating to their demands (Reversing with Hitler).
- Failing to reach closure, i.e., an overall global reversal assessment that takes into account all the stakeholders the agent has reversed with.

Public Identification Set-Up

- Set up the analysis by identifying the agent, describing the action under consideration, and listing the key values or virtues at play in the situation.
- Associate the action with the agent.
- Identify what the action says about the agent as a person. Does it reveal him or her as someone associated with a virtue/value or a vice?

Public Identification Pitfalls

- Action is not associated with the agent. The most common pitfall is failure to associate the agent and the action. The action may have bad consequences and it may treat individuals with disrespect but these points are not as important in the context of this test as what they imply about the agent as a person who deliberately performs such an action.
- Failure to specify the moral quality, virtue, or value of the action that is imputed to the agent in the test. To say, for example, that willfully harming the public is bad fails to zero in on precisely what moral quality this attributes to the agent. Does it render him or her unjust, irresponsible, corrupt, dishonest, or unreasonable?

4.3 Practical and Professional Ethics Bowl Activity: Follow-Up In-Depth Case Analysis⁷

4.3.1 Module Introduction

This module provides students with a structure for preparing an in-depth case study analysis based on feedback they have received through their participation in an **Ethics Bowl** competition as part of the requirements for courses in Practical and Professional Ethics taught at the University of Puerto Rico at Mayaguez. Students viewing this module will find formats for analyzing decision making cases and position cases such as the decisions published by the National Society of Professional Engineers **Board of Ethical**

⁷This content is available online at <<http://cnx.org/content/m13759/1.12/>>.

Review. They will receive information pertinent to preparing in-depth case analyses, short summaries of the case pool for the Ethics Bowl competition, and a summary of procedures for carrying out a group self-evaluation. More information on the Engineering Ethics Bowl carried out at UPRM can be found in Jose A Cruz-Cruz, William J. Frey, and Halley D. Sanchez, "The Ethics Bowl in Engineering Ethics at the University of Puerto Rico - Mayaguez" in *Teaching Ethics* 4(3): 15-32.

4.3.2 Choosing Your Case

1. You must choose one of the two cases you presented on in the Ethics Bowl. (This means the case on which you gave your initial presentation.
2. You may choose either the first round decision-making case or the NSPE Board of Ethical Review Case

How should you choose your case?

1. Which case did you find the most interesting, challenging, or fruitful?
2. On which case did you receive the most interesting feedback from the other team and the judges?
3. Do you want to make, defend, and implement a decision or analyze a BER decision?

Once you choose your case, you need to analyze it according to the following steps:

Decision-Making Cases

Worksheets	Decision-Making Case
	Identify and state the (ethically) relevant facts
STS Table (Table + Verbal Explanation)	Prepare a Socio-Technical Analysis. Fill in the STS table (see below) and then verbally describe each component.
Value Table (Table + Written Problem Statement)	Fill out a Value Table (see below) Use it to identify the ethical problem or problems. Summarize this by providing a concise problem statement that is explicitly tied to the Value Table.
Brainstorm Lists (initial and refined lists)	4. Brainstorm solution to the problem or problems. Be sure to discuss how list was generated and how it was refined. Describe value integration and interest negotiating strategies used.
Solution Evaluation Matrix (Matrix + Verbal Explanation and Justification)	5. Compare, evaluate, and rank the solutions
	6. Choose the best available solution. Provide a justification summarizing ethical and feasibility considerations highlighted in Solution Evaluation Matrix.
<i>continued on next page</i>	

Feasibility Matrix (Matrix + Verbal Explanation)	7. Develop a plan for implementing your solution. Discuss and justify this plan explicitly in terms of the specific feasibility considerations in the Feasibility Matrix.
	Develop and discuss preventive measures (if applicable)

Table 4.5

NSPE-BER Case

Worksheets	
	1. Identify and state the (ethically) relevant facts
Stakeholders (Matrix + Verbal Explanation)	2. Identify the stakeholders and their stakes.
Problem Classification (Matrix + Concise Verbal Problem Statement)	3. Identify the ethical problem or problems
	4. State the BER decision and summarize their code-based justification (cite code provisions, summarize principles, and list relevant precedents)
Solution Evaluation (Matrix + detailed verbal explanation and justification)	5. Evaluate the BER decision using the three ethics tests, code test, and global feasibility test.
	6. Construct a strong counter-position and counter-argument to the BER decision
Solution Evaluation (Matrix + detailed verbal explanation and justification)	7. Evaluate counter-position and counter-argument using the 3 ethics tests, feasibility test, and code test
Solution Implementation (Feasibility Matrix + Verbal Explanation)	8. Evaluate counter-position and counter-argument in terms of relevant feasibility considerations. Provide a matrix/table + verbal explanation.

Table 4.6

4.3.3 In-Depth Analysis: Step by Step

Description of In-Depth Case Analysis

Title of Assignment: "In-Depth Case Analysis"

Due Date for Written Projects: One week after the last class of the semester.

What is required?

1. Participation in at two ethics bowl competitions.
2. Each group will choose from the two cases it debated in the Ethics Bowl a case for a more extended analysis carrying out the seven-step decision making framework. They will prepare an extended analysis of this case (10 to 20 pages).
3. Each group will prepare summaries of the 15 cases assigned for the ethics bowl. These summaries (a minimum of one page for each case) will be handed in with the extended case study analysis. These summaries should include a problem statement, a solution evaluation matrix, and a feasibility matrix.
4. Each final submission will also include a group self-evaluation. This evaluation will include:
 - _____ a list of the goals each group set for itself

- _____ a careful, justified and documented assessment of your success in reaching these goals
 - _____ a careful assessment of what you did and did not learn in this activity
 - _____ a discussion of obstacles you encountered and measures your group took to overcome these.
 - _____ a discussion of member participation and contribution including the member contribution forms
 - _____ in general what worked and what didn't work for you and your group in this activity
5. A group portfolio consisting of the materials prepared by your group during the group class activities:
- _____ Virtue Chart (Responsibility)
 - _____ Gray Matters Solution Evaluation Matrix
 - _____ Rights Chart: Free & Informed Consent
 - _____ Group Code of Ethics

Structure of Written Analysis

1. A brief summary of the case focusing on the ethically relevant facts.
2. A Socio-Technical System Table + Short paragraph on each of the seven categories.
3. A Value Table + a short paragraph on the embedded values you have identified and where they occur in the STS. Then state whether you have found any value mismatches, magnified existing value conflicts, and remote/harmful consequences.
4. On the basis of your STS analysis and value conflict analysis, provide a short, concise problem statement. Make sure your the problem you have identified is grounded in your STS and value analysis. If not, one or the other (or both) needs to be changed.
5. A brainstorm list in which you record the solutions your group has designed to solve the problem stated above. The rough unrefined list should include around 10 solutions. Then refine this list into three. Spend time detailing how you reached your refined list. Did you synthesize rough solutions? On what basis did you leave a solution out all together? Did you find other ways of relating or combining solutions? Spend time documenting your brainstorming and refining process. Show in detail how you came up with the refined list.
6. Do a comparative evaluation of three of the refined solutions you developed in the previous step. First, prepare a solution evaluation matrix that summarizes your comparative evaluation. Use the table provided below. Second, provide a verbal account of the solution evaluation and comparison process you present in the solution evaluation matrix.
7. Reach a final decision. Defend your decision using the ethics and feasibility tests. If the decision situation in which you are working is a dynamic one, then propose a series of solutions that you will pursue simultaneously, including how you would respond to contingencies that might arise. (You could express this in the form of a decision tree.)
8. Fill out a Feasibility Matrix. See matrix below
9. Present an implementation plan based on your Feasibility Matrix. This plan should list the obstacles that might arise and how you plan to overcome them. (For example, don't just say, "Blow the whistle." Discuss when, how, where, to whom, and in what manner. How would you deal with reprisals? Would your action seriously disrupt internal relations of trust and loyalty? How would you deal with this?) Work out a detailed plan to implement your decision using the feasibility constraints to "suggest" obstacles and impediments.
10. Finally, discuss preventive measures you can take to prevent this type of problem from arising again in the future.

Socio-Technical System Table

Hardware	Software	Physical Surroundings	People, Groups, Roles	Procedures	Laws, Statutes, Regulations	Data and Data Structures

Table 4.7

STS Value Table

	Hardware	Software	Physical Surroundings	People, Groups, Roles	Procedures	Laws	Data and Data Structures
Integrity							
Justice							
Respect							
Responsibility for Safety							
Free Speech							
Privacy							
Property							

Table 4.8

Solution Evaluation Matrix

Solution/Test	Reversibility or Rights	Harms/Benefice or Net Utility	Virtue	Value	Code	Global Feasibility
Description	Is the solution reversible with stakeholders? Does it honor basic rights?	Does the solution produce the best benefit/harm ratio? Does the solution maximize utility?	Does the solution express and integrate key virtues?	Moral values realized? Moral values frustrated? Value conflicts resolved or exacerbated?	Does the solution violate any code provisions?	What are the resource, technical, and interest constraints that could impede implementation?
<i>continued on next page</i>						

Best solution						
Best alternate solution						
Worst solution						

Table 4.9

Feasibility Matrix								
Resource Constraints			Technical Constraints		Interest Constraints			
Time	Cost	Available materials, labor, etc	Applicable technology	Manufacturability	Personalities	Organizational	Legal	Social, Political, Cultural

Table 4.10

4.3.4 Format

1. Group, team-written projects are to be 10-20 pages in length, double spaced, with standard 1-inch margins, and typewritten. This does not include documentation, appendices, and other notes.

2. It is essential that you carefully and fully document the resources that you have consulted. The most direct way to do this is to include numbered entries in a concluding section entitled, "Works Cited". These entries should provide complete bibliographical information according to standard form (Chicago Manual of Style or the MLA Manual of Style). Then insert the number of the entry in parenthesis in the text next to the passage that is based on it. (Example: "The self is a relation that relates itself to its own self..." (4) The number "4" refers to the fourth item in the "Works Cited" section at the end of your paper.)

3. Practical norm 5j of the CIAPR code of ethics sets forth the obligation of the professional engineer to give others due credit for their work. For this reason, plagiarism will not be tolerated in any form. Possible forms of plagiarism include but are not limited to the following:

- Quoting directly from other sources without documenting (footnote or bibliography) and/or without using quotation marks. Claiming that this is an appendix will not excuse this action. Claiming ignorance will not excuse this action.
- Using the ideas or work of others without giving due credit or proper acknowledgment. "Proper acknowledgment," in this context, requires a standard bibliographical reference and the use of quotation marks if the material is being directly quoted.
- If your paper relies exclusively or primarily on extensively quoted materials or materials closely paraphrased from the work of others, then it will not be credited as your work even if you document it. To make it your own, you have to summarize it in your own words, analyze it, justify it, or criticize it.
- You will not be credited for material that you translate from English to Spanish unless you add to it something substantial of your own.
- In general, what you appropriate from another source must be properly digested, analyzed, and expressed in your own words. If you have any questions on this, please ask me.

- Any plagiarized document—one which violates the above rules—will be given a zero. You will be given a chance to make this up, and the grade on the make-up project will be averaged in with the zero given to the plagiarized document. Since this is a group grade, everyone in the group will be treated the same, even though the plagiarizer may be only one person. Each member of the group is responsible to assure that other members do not plagiarize in the name of the group. (Since the due date for the written project is late in the semester, this will probably require that I give the entire group, i.e., all members, an Incomplete.) Each member of the group will be held individually responsible in the above-described manner for the final content of the written report.

4. This is not a research project but an exercise in integrating ethics into real world cases. In Chapters 2 and 3 of *Engineering Ethics: Concepts and Cases*, the authors present a thorough discussion of the case study analysis/problem solving method discussed in class. You also have supporting handouts in your file folders from Magic Copy Center as well as materials I have presented directly in class. *Engineering Ethics: Concepts and Cases* also contains several sample case studies that can help guide you in constructing your own presentation. What I am looking for is a discussion of the case in terms of the ethical approaches and decision-making frameworks we have discussed this semester. You do not need to "wow" me with research into other areas peripherally related to the case; you need to show me that you have practiced decision-making and made a serious effort to integrate ethical considerations into the practice of engineering.

5. The usual criteria concerning formal presentations apply when competing in the Ethics Bowl. Dress professionally.

6. You may write your group, team-written project in either Spanish or English.

7. All competitions will take place in the regular classroom.

4.3.5 Media Files Beginning Spring 2007

These media files provide information on the ethics bowl and the follow-up activities including individual decision point summaries, in-depth case analysis, and group self-evaluation. They have been integrated into the Business Ethics course during the Spring semester, 2008 and will apply from this date on into the future.

Team Member Evaluation Form

This media object is a downloadable file. Please view or download it at
<TEAM MEMBER RATING SHEET.doc>

Figure 4.4: This file contains the team member rating sheet which each group member must fill out and turn in with his or her group project.

Final Project and Group Self-Evaluation Rubrics

This media object is a downloadable file. Please view or download it at
<Be_Rubric_S07.doc>

Figure 4.5: This rubric will be used to grade the in-depth case analysis, the group self-evaluation, and the Ethics Bowl case summaries.

Basic Moral Concepts for Ethics Bowl

This media object is a downloadable file. Please view or download it at
<BME_V2_97.doc>

Figure 4.6: Clicking on this figure will download the basic moral concepts that you will be integrating into the ethics bowl and your final in-depth case analysis. You will be asked to show how you worked to integrate these concepts in your group self-evaluation.

Intermediate Moral Concepts for Ethics Bowl

This media object is a downloadable file. Please view or download it at
<IMC_V2_97.doc>

Figure 4.7: Clicking on this figure will open a table that summarizes the intermediate moral concepts that are at play in the four cases that are being used in the Ethics Bowl: Hughes, Therac, Toysmart, and Biomatrix.

Ethics Bowl Cases for ADMI 4016: Environment of the Organization [MEDIA OBJECT]⁸

4.3.6 Check List

Breakdown of Project Grade:

Group Team-Written Project: 200 points, group grade.

- This is your group's in-depth case analysis
- It will analyze the decision scenario your group presented on in the ethics bowl
- Your task is to give a full and comprehensive analysis of a decision point using the tables presented above, accompanying verbal descriptions, and carrying out the four-stage problem-solving framework of specifying the problem, generating solutions, testing solutions in terms of their ethics, and implementing these solutions.

Nota Bene

- After the Ethics Bowl, I will provide the class with general feedback and presentations on how to prepare the final project. When you submit your final report, I will be looking for how you responded to my comments and suggestions and to the comments and suggestions of the judges and the class.
- Attendance is mandatory for all Ethics Bowl competitions. This is important because you will help one another by the comments and discussions that are generated by the presentations. Students not competing need to listen actively and respectfully to the presenting group. Keep in mind the twin standards of respect and professionalism. I will deduct points from the grades of groups and/or

⁸This media object is a downloadable file. Please view or download it at
<Ethics Bowl Cases.docx>

individuals who do not listen courteously to the presentations of others or who do not attend class during the presentation cycle.

Nota Bene:

Check List

- **Each group will turn in this checklist, fully filled out and signed. Checking signifies that your group has completed and turned in the item checked. Failure to submit this form will cost your group 20 points**
- _____ One page summaries of the 10 Ethics Bowl decision points taken from the Therac-25, Biomatrix, Toysmart, and Hughes cases.
- _____ Group, in-depth analysis of the case your team presented on in the Ethics Bowl.
- _____ List of Ethically Relevant Facts
- _____ Socio-Technical System Table + Verbal Explanation
- _____ Value Table + Problem Statement + Justification
- _____ List of Brainstormed Solutions + Description of Refining Process + Refined list
- _____ Solution Evaluation Matrix + Verbal Comparison of Three Alternatives from refined solution list
- _____ Chosen Solution + Verbal Justification
- _____ Feasibility Matrix + Solution Implementation Plan concretely described and based on feasibility matrix
- _____ Preventive Measures (if applicable)

Materials Required from Ethics Bowl

- _____ Ethics Bowl Score Sheets
- _____ The decision point your team **presented** on in the competition
- _____ The decision point your team **commented** on in the competition

_____ Group Self-Evaluation Form including...

- _____ a list of the goals your group set for itself
- _____ a carefully prepared, justified, and documented assessment of your group's success in reaching these goals
- _____ a careful assessment of what you did and did not learn in this activity
- _____ a discussion of obstacles you encountered and the measures your group took to overcome these
- _____ a discussion of member participation and contribution including the member contribution forms
- _____ a general discussion of what worked and what did not work for you and your group in this activity

_____ Each member will turn in a filled out Team Member Evaluation Form. This form can be accessed through the media file listed above. It is suggested that you do this anonymously by turning in your Team Member Evaluation Form in a sealed envelop with the rest of these materials. You are to evaluate yourself along with your teammates on the criteria mentioned in the form. Use the scale suggested in the form.

Group Portfolios Include...

- _____ Virtue Tables including the moral exemplar profile your group prepared and presented.
- _____ The justification using the rights framework of the right assigned to your group. This was one of the rights asserted by engineers against their corporate employers.
- _____ A one page summary of how you developed your role in the Incident at Morales "**Vista Publica.**"
- _____ The code or statement of values summary prepared by your group as a part of the Pirate Code of Ethics module. This summary focused on one of six organizations: East Texas Cancer Center, Biomatrix, Toysmart, Hughes Aircraft, CIAPR, or AECL (in the Therac case).

Copy-paste this checklist, examine the assembled materials prepared by your group, and check the items your group has completed. Then read, copy-paste, and sign the following pledge.

Group Pledge

- **I certify that these materials have been prepared by those who have signed below, and no one else. I certify that the above items have been checked and that those items with checkmarks indicate materials that we have turned in. I also certify that we have not plagiarized any material but have given due acknowledgment to all sources used. All who sign below and whose names are included on the title page of this report have participated fully in the preparation of this project and are equally and fully responsible for its results.**
- Member signature here _____

4.4 Moral Exemplars in Business and Professional Ethics⁹

4.4.1 Module Introduction

Through the activities of this module you will learn to balance cautionary tales in business and professional ethics with new stories about those who consistently act in a morally exemplary way. While cautionary tales teach us what to avoid, narratives from the lives of moral exemplars show us how to be good. A study of moral best practices in business and professional ethics shows that moral exemplars exhibit positive and learnable skills. This module, then, looks at moral exemplars in business and the professions, outlines their outstanding accomplishments, and helps you to unpack the strategies they use to overcome obstacles to doing good.

You will begin by identifying outstanding individuals in business and associated practices who have developed moral "best practices." Your task is look at these individuals, retell their stories, identify the skills that help them do good, and build a foundation for a more comprehensive study of virtue in occupational and professional ethics.

4.4.2 Exercise 1: Choose a moral exemplar

- Identify a moral exemplar and provide a narrative description of his or her life story.
- To get this process started, look at the list of moral exemplars provided in this module. The links in the upper left hand corner of this module will help you to explore their accomplishments in detail. Feel free to choose your own exemplar. Make sure you identify someone in the occupational and professional areas such as business and engineering. These areas have more than their share of exemplars, but they tend to escape publicity because their actions avoid publicity generating disasters rather than bring them about.

4.4.3 Moral Exemplars

1. William LeMesseur. LeMesseur designed the Citicorp Building in New York. When a student identified a critical design flaw in the building during a routine class exercise, LeMesseur responded, not by shooting the messenger, but by developing an intricate and effective plan for correcting the problem before it issued in drastic real world consequences. Check out LeMesseur's profile at [onlineethics](#) and see how he turned a potential disaster into a good deed.

⁹This content is available online at <http://cnx.org/content/m14256/1.10/>.

- 2. Fred Cuny, starting in 1969 with Biafra, carried out a series of increasingly effective interventions in international disasters. He brought effective methods to disaster relief such as engineering know-how, political savvy, good business sense, and aggressive advocacy. His timely interventions saved thousands of Kurdish refugees in the aftermath of the Persian Gulf War in 1991. He also helped design and implement an innovative water filtration system in Sarajevo during the Bosnia-Serb conflict in 1993. For more details, consult the biographical sketch at [onlineethics](#).
- 3. Roger Boisjoly worked on a team responsible for developing o-ring seals for fuel tanks used in the Challenger Shuttle. When his team noticed evidence of gas leaks he made an emergency presentation before officials of Morton Thiokol and NASA recommending postponing the launch scheduled for the next day. When decision makers refused to change the launch date, Boisjoly watched in horror the next day as the Challenger exploded seconds into its flight. Find out about the courageous stand Boisjoly took in the aftermath of the Challenger explosion by reading the biographical sketch at [onlineethics](#).
- 4. Muhammad Yunus won the Nobel Prize for Peace in 2006. His effort in setting up "micro-businesses" funded through "micro-lending" has completely changed the paradigm on how to extend business practices to individuals at the bottom of the pyramid. Learn about his strategies for creating micro-businesses and how those strategies have been extended throughout the world, including Latin America, by listening to an interview with him broadcast by the Online News Hour. (See link included in this module.)
- 5. Bill Gates has often been portrayed as a villain, especially during the anti-trust suit against Microsoft in the mid 1990's. Certainly his aggressive and often ruthless business practices need to be evaluated openly and critically. But recently Gates stopped participating in the day-to-day management of his company, Microsoft, and has set up a charitable foundation to oversee international good works projects. Click on the link included in this module to listen to and read an interview recently conducted with him and his wife, Melinda, on their charitable efforts.
- 6. Jeffrey Skilling, former CEO of Enron, can hardly be called a moral exemplar. Yet when Enron was at its peak, its CEO, Jeffrey Skilling, was considered among the most innovative, creative, and brilliant of contemporary corporate CEOs. View the documentary, *The Smartest Guys in the Room*, read the book of the same title, and learn about the configuration of character traits that led to Skilling's initial successes and ultimate failure. A link included in this module will lead you to an interview with Skilling conducted on March 28, 2001.
- Inez Austin worked to prevent contamination from nuclear wastes produced by a plutonium production facility. Visit [Online Ethics](#) by clicking on the link above to find out more about her heroic stand.
- Rachael Carson's book, *The Silent Spring*, was one of the key events inaugurating the environmental movement in the United States. For more on the content of her life and her own personal act of courage, visit the biographical profile at [Online Ethics](#). You can click on the Supplemental Link provided above.

4.4.4 Exercise Two: Moral Exemplar Profiles

- What are the positive and negative influences you can identify for your moral exemplar?
- What good deeds did your exemplar carry out?
- What obstacles did your moral exemplar face and how did he or she overcome them?
- What skills, attitudes, beliefs, and emotions helped to orient and motivate your moral exemplar.?

4.4.5 Exercise Three

Prepare a short dramatization of a key moment in the life of your group's moral exemplar.

4.4.6 Textbox: Two different Types of Moral Exemplar

- Studies carried out by Chuck Huff into moral exemplars in computing suggest that moral exemplars can operate as craftpersons or reformers. (Sometimes they can combine both these modes.)

- Craftspersons (1) draw on pre-existing values in computing, (2) focus on users or customers who have needs, (3) take on the role of providers of a service/product, (4) view barriers as inert obstacles or puzzles to be solved, and (5) believe they are effective in their role.
- Reformers (1) attempt to change organizations and their values, (2) take on the role of moral crusaders, (3) view barriers as active opposition, and (4) believe in the necessity of systemic reform
- These descriptions of moral exemplars have been taken from a presentation by Huff at the STS colloquium at the University of Virginia on October 2006. Huff's presentation can be found at the link provided in the upper left hand corner of this module.

4.4.7 What Makes a Moral Exemplar? PRIMES Explained

General Comments on Exemplars

- Moral exemplars have succeeded in integrating moral and professional attitudes and beliefs into their core identity. Going against these considerations for moral exemplars is tantamount to acting against self. Acting in accordance with them becomes second nature.
- Moral exemplars often achieve their aims with the support of "support groups." In fact, moral exemplars are often particularly adept at drawing support from surrounding individuals, groups and communities. This goes against the notion that exemplars are isolated individuals who push against the current. (Not all exemplars need fit as heroes into Ayn Rand novels.)
- Moral exemplars often do not go through periods of intensive and prolonged deliberation in order to hit upon the correct action. If we want a literary example, we need to replace the tortured deliberations of a Hamlet with the quick and intuitive insight of an Esther Summerson. (Summerson is a character in Charles Dickens' novel, Bleak House. See both William Shakespeare and Charles Dickens for more examples of villains and exemplars.) Some have situated moral exemplars within virtue ethics. They have cultivated moral habits that allow them to do good as second nature. They have also found ways to integrate moral reasoning with emotion (as motive), perception (which helps them zero in on moral relevance), and skill (which helps implement moral value). In this sense, moral expertise functions much as athletic or technical expertise; all are difficult to acquire but once acquired lead to highly skilled actions performed almost effortlessly.

PRIMES

Primes stands for Personality, Integrating value into self-system, Moral Ecology, and Moral Skills Sets. These are the elements composing moral expertise that have been identified by Huff and Rogerson based on interviews they conducted with exemplars in the areas of computing.

Personality

- Moral exemplars exhibit different configurations of personality traits based on the big five. Locate the moral exemplar you have chosen in terms of the following five continuums (or continua):
- Neuroticism to Lack of Neuroticism (Stability?)
- Agreeableness to Disagreeableness
- Extraversion to Introversion
- Openness to Closedness
- Conscientiousness to Lack of Conscientiousness
- Examine your exemplar on each of these scales. In and of themselves, these qualities are neither good nor bad. They can be integrated to form bad characters or good characters. In many cases, moral exemplars stand out through how they have put their personality characteristics to "good use." (They have used them as vehicles or channels to excellence.)

Integrating Moral Value into Self-System

- As said above, moral exemplars stand out by the way in which (and the extent to which) they have integrated moral value into their self-system. Because of this, they are strongly motivated to do good and avoid doing bad. Both (doing good and refraining from doing bad) express who they are. If they slip into bad deeds, this motivational system pushes them to improve to avoid repeating bad deeds.
- One way of integrating moral value into self-system is by looking at stories and narratives of those who have displayed moral excellence. Many of the individuals portrayed above (Carson, Boisjoly, LeMesseur, Cuny, Austin, and Yunus) provide concrete models of outstanding moral careers.
- Literature also provides its models of moral exemplars. Charles Dickens paints especially powerful portraits of both moral heroes (Esther Summerson and "Little Dorritt") and villains (Heep and Skimpole).
- Other vehicles for integrating moral value centrally into the self-system lie in affiliations, relationships, and friendships. Aristotle shows the importance of good friendships in developing virtues. Moral exemplars most often can point to others who have served as mentors or strong positive influences. For example, Roger Boisjoly tells of how he once went to a senior colleague for advice on whether to sign off on a design that was less than optimal. His colleague's advice: would you be comfortable with your wife or child using a product based on this design?
- The ethicist, Bernard Williams, has argued forcefully for the importance of personal projects in establishing and maintaining integrity. Personal projects, roles, and life tasks all convey value; when these hold positive moral value and become central unifying factors in one's character, then they also serve to integrate moral value into the self system.
- Augusto Blasi, a well known moral psychologist, gives a particularly powerful account (backed by research) of the integration of moral value into self-system and its motivational effect.

Moral Ecology

- Moral Ecologies: "The term moral ecology encourages us to consider the complex web of relationships and influences, the long persistence of some factors and the rapid evolution of others, the variations in strength and composition over time, the micro-ecologies that can exist within larger ones, and the multidirectional nature of causality in an ecology." From Huff et. al.
- Moral ecologies refer to social surrounds, that is, the different groups, organizations, and societies that surround us and to which we are continually responding.
- We interact with these social surrounds as organisms interact with their surrounding ecosystems. In fact, moral ecologies offer us roles (like ecological niches) and envelop us in complex organizational systems (the way ecosystems are composed of interacting and interrelated parts). We inhabit and act within several moral ecologies; these moral ecologies, themselves, interact. Finally, moral ecologies, like natural ecosystems, seek internal and external harmony and balance. Internally, it is important to coordinate different the constituent individuals and the roles they play. Externally, it is difficult but equally important to coordinate and balance the conflicting aims and activities of different moral ecologies.
- Moral ecologies shape who we are and what we do. This is not to say that they determine us. But they do channel and constrain us. For example, your parents have not determined who you are. But much of what you do responds to how you have experienced them; you agree with them, refuse to question their authority, disagree with them, and rebel against them. The range of possible responses is considerable but these are all shaped by what you experienced from your parents in the past.
- The moral ecologies module (see the link provided above) describes three different moral ecologies that are important in business: quality-, customer-, and finance-driven companies. (More "kinds" could be generated by combining these in different ways: for example, one could characterize a company as customer-driven but transforming into a quality-driven company.) Roles, strategies for dissent, assessment of blame and praise, and other modes of conduct are shaped and constrained by the overall character of the moral ecology.
- Moral ecologies, like selves, can also be characterized in terms of the "centrality" of moral value. Some support the expression of moral value or certain kinds of moral value (like loyalty) while undermining

or suppressing the expression of others (like courage or autonomy).

- Finally, think in terms of how personality traits integrated around moral value interact with different types of moral ecology. If a moral ecology undermines virtuous conduct, what strategies are available for changing it? Or resisting it? If there are different kinds of moral exemplar, which pair best with which moral ecology? (How would a helper or craftsman prevail in a finance-driven moral ecology like those characterized by Robert Jackall in **Moral Mazes**?)

Moral Skills Sets

- Moral expertise is not reducible to knowing what constitutes good conduct and doing your best to bring it about. Realizing good conduct, being an effective moral agent, bringing value into the work, all require skills in addition to a "good will." PRIMES studies have uncovered four skill sets that play a decisive role in the exercise of moral expertise.
- **Moral Imagination:** The ability to project into the standpoint of others and view the situation at hand through their lenses. Moral imagination achieves a balance between becoming lost in the perspectives of others and failing to leave one's own perspective. Adam Smith terms this balance "proportionality" which we can achieve in empathy when we feel with them but do not become lost in their feelings. Empathy consists of feeling with others but limiting the intensity of that feeling to what is proper and proportionate for moral judgment.
- **Moral Creativity:** Moral Creativity is close to moral imagination and, in fact, overlaps with it. But it centers in the ability to frame a situation in different ways. Patricia Werhane draws attention to a lack of moral creativity in the Ford Pinto case. Key Ford directors framed the problem with the gas tank from an economical perspective. Had they considered other framings they might have appreciated the callousness of refusing to recall Pintos because the costs of doing so (and retrofitting the gas tanks) were greater than the benefits (saving lives). They did not see the tragic implications of their comparison because they only looked at the economic aspects. Multiple framings open up new perspectives that make possible the design of non-obvious solutions.
- **Reasonableness:** Reasonableness balances openness to the views of others (one listens and impartially weighs their arguments and evidence) with commitment to moral values and other important goals. One is open but not to the extent of believing anything and failing to keep fundamental commitments. The Ethics of Team Work module (see link above) discusses strategies for reaching consensus that are employed by those with the skill set of reasonableness. These help avoid the pitfalls of group-based deliberation and action.
- **Perseverance:** Finally, perseverance is the "ability to plan moral action and continue on that course by responding to circumstances and obstacles while keeping ethical goals intact." Huff et. al.

4.4.8 Presentation on Moral Exemplars

[MEDIA OBJECT]¹⁰

4.4.9 Bibliography

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¹⁰This media object is a downloadable file. Please view or download it at <Brief Comments on Moral Exemplars.pptx>

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Chapter 5

Computing Cases Modules Assessment

5.1 EAC Toolkit - Assessment Tools Module¹

5.1.1 REFERENCE OR LINK TO STUDENT MODULE

- **This module has been developed for a workshop in ethics across the curriculum that will be held May 9, 2007. It recommends EAC as an effective and efficient strategy for AACSB ethics compliance. It also recommends the EAC Toolkit (situated in Connexions) as a ideal place to develop, refine, and disseminate best practices in EAC. -**
- Links to rubrics posted in Business Administration at Scranton University and a Toolkit Rubric module have been included to provide a broad range of assessment instruments that can aid in charting continuous improvement in EAC.
- The rubrics and assessment forms developed below come from a variety of sources including a DOLCE workshop (Doing Online Computer Ethics sponsored by the NSF), and an Illinois Institute of Technology EAC workshop led by Michael Davis and sponsored by the NSF. Finally, some of the rubrics have been modified from rubrics used in practical and professional ethics taught at the University of Puerto Rico - Mayaguez.

¹This content is available online at <<http://cnx.org/content/m14498/1.1/>>.

Available for free at Connexions <<http://cnx.org/content/col10423/1.2>>

5.1.2 INSTRUCTOR RESOURCES(Sharing Best Practices in EAC!)

This section contains information related to the above referenced Student Module. The intent and expectation is that the information contained in this section will evolve over time based on the experiences and collaborations of the authors and users of the Student Module and this Instructor Module. For example, the authors, collaborators or users can provide the following kind of information (mainly directed at or intended for instructors).

5.1.2.1 Module-Background Information

Sources of this module can be gleaned from the links that accompany it. Starting with a DOLCE workshop held at the Colorado School of Mines in summer 2000, UPRM ethicists have been collecting assessment tools and modifying them to fit courses in practical and professional ethics as well as more contextualized ethics across the curriculum integration modules for mainstream business, science, and engineering classes. Many of the tools included in this module have been tested in the classroom.

5.1.2.2 Learning Objectives

What are the intended learning objectives or goals for this module? What other goals or learning objectives are possible?

Content Objectives described below come from the AACSB Ethics Education Task Force Report

- **Ethical Leadership (EL):** "Expanding ...awareness to include multiple stakeholder interests and ...developing and applying...ethical decision-making skills to organizational decisions in ways that are transparent to...followers." (b) "Executives become moral managers by recognizing and accepting their responsibility for acting as ethical role models."
- **Decision-Making (DM):** "Business schools typically teach multiple frameworks for improving students' ethical decision-making skills. Students are encouraged to consider multiple stakeholders and to assess and evaluate using different lenses and enlarged perspectives."
- **Social Responsibility (SR):** "Businesses cannot thrive in environments where societal elements such as education, public health, peace and personal security, fidelity to the rule of law, enforcement of contracts, and physical infrastructures are deficient."
- **Corporate Governance (CG):**(a) "Knowing the principles and practices of sound, responsible corporate governance can also be an important deterrent to unethical behavior." (b) "Understanding the complex interdependencies between corporate governance and other institutions, such as stock exchanges and regulatory bodies, can be an important factor in managing risk and reputation."

Below are three different sets of skills objectives:

- Skill objectives used at UPRM in various EAC efforts
- The Hastings Center List
- A list presented by Huff and Frey (referenced below) that combines recent research in moral psychology with skills useful for students learning the practice and profession of computing that includes computer science, computer engineering, and software engineering

UPRM Ethical Empowerment Skills List

- UPRM Objectives are described in the context of faculty development workshops in the Science and Engineering Ethics article by Cruz and Frey referenced below:
- **Ethical Awareness:** "the ability to perceive ethical issues embedded in complex, concrete situations. It requires the exercise of moral imagination which is developed through discussing cases that arise in the real world and in literature."

- **Ethical Evaluation:** “the ability to assess a product or process in terms of different ethical approaches such as utilitarianism, rights theory, deontology, and virtue ethics.” This skill can also be demonstrated by ranking solution alternatives using ethics tests which partially encapsulate ethical theory such as reversibility, harm, and publicity.
- **Ethical Integration:** “the ability to integrate—not just apply—ethical considerations into an activity (such as a decision, product or process) so that ethics plays an essential, constitutive role in the final results.”
- **Ethical Prevention:** the ability to (a) uncover potential ethical and social problems latent in a socio-technical system and (b) develop effective counter-measures to prevent these latent problems from materializing or to minimize their harmful or negative impact. "Ethical" is an adjective that modifies “prevention”; hence ethical prevention does not mean the "prevention of the ethical" but the "prevention of the unethical", i.e., the harmful, the untoward, the incorrect, and the bad.
- **Value Realization:** “the ability to recognize and exploit opportunities for using skills and talents to promote community welfare, enhance safety and health, improve the quality of the environment, and (in general) enhance wellbeing.

Hastings Center Goals

- Stimulate the moral imagination of students
- Help students recognize moral issues
- Help students analyze key moral concepts and principles
- Elicit from students a sense of responsibility
- Help students to accept the likelihood of ambiguity and disagreement on moral matters, while at the same time attempting to strive for clarity and agreement insofar as it is reasonably attainable (from Pritchard, Reasonable Children, 15)

Goals for ethical education in science and engineering derived from psychological literature (Huff and Frey)

- Mastering a knowledge of basic facts and understanding and applying basic and intermediate ethical concepts.
- Practicing moral imagination (taking the perspective of the other, generating non-obvious solutions to moral problems under situational constraints, and setting up multiple framings of a situation)
- Learning moral sensitivity
- Encouraging adoption of professional standards into the professional self-concept
- Building ethical community

5.1.2.3 Instructional / Pedagogical Strategies

5.1.2.4 Assessment / Assurance of Learning

Muddiest Point Exercise

This is an unsupported media type. To view, please see
<http://cnx.org/content/m14498/latest/MuddyPoint.doc>

Figure 5.1: This file contains a handout in Word format called the "Muddiest Point" Exercise or a "Muddy Point" exercise. It encourages students to reflect on an activity and identify its strongest and weakest points.

EAC Module Assessment Form

This is an unsupported media type. To view, please see
<http://cnx.org/content/m14498/latest/DavisIITForm.doc>

Figure 5.2: This Word file consists of a handout that allows students to assess ethics integration exercises. It has been modified from a form used by Michael Davis at the Illinois Institute of Technology to assess EAC modules developed during NSF-funded EAC workshops.

EAC Matrix for AACSB

This is an unsupported media type. To view, please see
http://cnx.org/content/m14498/latest/EACMatrix_AACSB.doc

Figure 5.3: This EAC Matrix helps users to model activities and gaps in EAC programs. It maps courses onto EAC objectives, and AACSB accreditation criteria. It helps both to recognize existing, ongoing EAC Integration projects and to identify gaps for which new EAC Integration Projects can be designed.

Ethics Bowl Rubric

This is an unsupported media type. To view, please see [http://cnx.org/content/m14498/latest/Ethics Bowl Rubric.doc](http://cnx.org/content/m14498/latest/Ethics+Bowl+Rubric.doc)

Figure 5.4: The Ethics Bowl activity has been modified and adapted for the classroom at UPRM in Practical and Professional Ethics classes. The modified score sheets used at UPRM have been reworked into rubric form. They concentrate on intelligibility, integration of ethical considerations, treatment of feasibility issues, and demonstration of moral imagination and creativity.

Ethics Test Rubric

This is an unsupported media type. To view, please see [http://cnx.org/content/m14498/latest/Ethics Test Rubric.doc](http://cnx.org/content/m14498/latest/Ethics+Test+Rubric.doc)

Figure 5.5: This rubric helps assess success in integrating the ethics tests of reversibility, harm/beneficence, and public identification into a decision-making exercise. It identifies common pitfalls and set up problems.

Ethical Considerations Rubric

This is an unsupported media type. To view, please see [http://cnx.org/content/m14498/latest/Ethical Considerations Rubric.doc](http://cnx.org/content/m14498/latest/Ethical+Considerations+Rubric.doc)

Figure 5.6: This rubric can be found at <http://academic.scranton.edu/department/assessment/ksom/>. This uploaded version has minor modifications to fit the UPRM context.

5.1.2.5 Pedagogical Commentary

Any comments or questions regarding this module? (For example: suggestions to authors, suggestions to instructors (how-to), queries or comments directed o EAC community, pitfalls or frustrations, novel ideas/approaches/uses, etc.)

5.1.2.6 Appendix (Annotated)

Additional information or annotations for instructors regarding the Student Module Appendix

5.2 Rubrics for Exams and Group Projects in Ethics²

5.2.1 Key to Links

- The first link connects to the Ethics Bowl assignment for engineering and business students. It corresponds with the Ethics Bowl rubric displayed below.
- The second link connects to the module on developing reports on computing socio-technical systems. It outlines an assignment where computing students carry out an analysis of the impact of a computing system on a given socio-technical system. A rubric to this activity used in computer ethics classes is provided below.
- The third link to the Three Frameworks module corresponds to a rubric below that examines how well students deploy the frameworks on decision-making and problem-solving outlined by this module.
- The final link to Computing Cases provides the reader with access to Chuck Huff's helpful advice on how to write and use rubrics in the context of teaching computer ethics.

5.2.2 Introduction

This module provides a range of assessment rubrics used in classes on engineering and computer ethics. Rubrics will help you understand the standards that will be used to assess your writing in essay exams and group projects. They also help your instructor stay focused on the same set of standards when assessing the work of the class. Each rubric describes what counts as exceptional writing, writing that meets expectations, and writing that falls short of expectations in a series of explicit ways. The midterm rubrics break this down for each question. The final project rubrics describe the major parts of the assignment and then break down each part according to exceptional, adequate, and less than adequate. These rubrics will help you to understand what is expected of you as you carry out the assignment, provide a useful study guide for the activity, and familiarize you with how your instructor has assessed your work.

5.2.3 Course Syllabi

Syllabus for Environments of the Organization

[MEDIA OBJECT]³

Syllabus for Business, Society, and Government

[MEDIA OBJECT]⁴

²This content is available online at <<http://cnx.org/content/m14059/1.17/>>.

³This media object is a downloadable file. Please view or download it at <[ADMI4016_F10.docx](#)>

⁴This media object is a downloadable file. Please view or download it at <[ADMI6055_F10.docx](#)>

Business Ethics Course Syllabus

This media object is a downloadable file. Please view or download it at
<Business Ethics Spring 2007.doc>

Figure 5.7: Course Requirements, Timeline, and Links

Business Ethics Syllabus, Spring 2008

This media object is a downloadable file. Please view or download it at
<Syllabus_S08_W97.doc>

Figure 5.8: This figure contains the course syllabus for business ethics for spring semester 2008.

Business Ethics Syllabus Presentation

This media object is a downloadable file. Please view or download it at
<BE_Intro_F07.ppt>

Figure 5.9: Clicking on this figure will open the presentation given on the first day of class in Business Ethics, Fall 2007. It summarizes the course objectives, grading events, and also provides a PowerPoint slide of the College of Business Administration's Statement of Values.

5.2.4 Rubrics Used in Connexions Modules Published by Author

Ethical Theory Rubric

This first rubric assesses essays that seek to integrate ethical theory into problem solving. It looks at a rights based approach consistent with deontology, a consequentialist approach consistent with utilitarianism, and virtue ethics. The overall context is a question presenting a decision scenario followed by possible solutions. The point of the essay is to evaluate a solution in terms of a given ethical theory.

Ethical Theory Integration Rubric

This media object is a downloadable file. Please view or download it at
<EE_Midterm_S05_Rubric.doc>

Figure 5.10: This rubric breaks down the assessment of an essay designed to integrate the ethical theories of deontology, utilitarianism, and virtue into a decision-making scenario.

Decision-Making / Problem-Solving Rubric

This next rubric assess essays that integrate ethical considerations into decision making by means of three tests, reversibility, harm/beneficence, and public identification. The tests can be used as guides in designing ethical solutions or they can be used to evaluate decision alternatives to the problem raised in an ethics case or scenario. Each theory partially encapsulates an ethical approach: reversibility encapsulates deontology, harm/beneficence utilitarianism, and public identification virtue ethics. The rubric provides students with pitfalls associated with using each test and also assesses their set up of the test, i.e., how well they build a context for analysis.

Integrating Ethics into Decision-Making through Ethics Tests

This media object is a downloadable file. Please view or download it at
<CE_Rubric_S06.doc>

Figure 5.11: Attached is a rubric in MSWord that assesses essays that seek to integrate ethical considerations into decision-making by means of the ethics tests of reversibility, harm/beneficence, and public identification.

Ethics Bowl Follow-Up Exercise Rubric

Student teams in Engineering Ethics at UPRM compete in two Ethics Bowls where they are required to make a decision or defend an ethical stance evoked by a case study. Following the Ethics Bowl, each group is responsible for preparing an in-depth case analysis on one of the two cases they debated in the competition. The following rubric identifies ten components of this assignment, assigns points to each, and provides feedback on what is less than adequate, adequate, and exceptional. This rubric has been used for several years to evaluate these group projects

In-Depth Case Analysis Rubric

This media object is a downloadable file. Please view or download it at
<EE_FinalRubric_S06.doc>

Figure 5.12: This rubric will be used to assess a final, group written, in-depth case analysis. It includes the three frameworks referenced in the supplemental link provided above.

Rubric for Good Computing / Social Impact Statements Reports

This rubric provides assessment criteria for the Good Computing Report activity that is based on the Social Impact Statement Analysis described by Chuck Huff at www.computingcases.org. (See link) Students take a major computing system, construct the socio-technical system which forms its context, and look for potential problems that stem from value mismatches between the computing system and its surrounding socio-technical context. The rubric characterizes less than adequate, adequate, and exceptional student Good Computing Reports.

Good Computing Report Rubric

This media object is a downloadable file. Please view or download it at
<CE_FinalRubric_S06.doc>

Figure 5.13: This figure provides the rubric used to assess Good Computing Reports in Computer Ethics classes.

Computing Cases provides a description of a Social Impact Statement report that is closely related to the Good Computing Report. Value material can be accessed by looking at the components of a Socio-Technical System and how to construct a Socio-Technical System Analysis.⁵

Business Ethics Midterm Rubric Spring 2008

This media object is a downloadable file. Please view or download it at
<Midterm Rubric Spring 2008.doc>

Figure 5.14: Clicking on this link will open the rubric for the business ethics midterm exam for spring 2008.

5.2.5

Insert paragraph text here.

5.2.6 Study Materials for Business Ethics

This section provides models for those who would find the Jeopardy game format useful for helping students learn concepts in business ethics and the environments of the organization. It incorporates material from modules in the Business Course and from Business Ethics and Society, a textbook written by Anne Lawrence and James Weber and published by McGraw-Hill. Thanks to elaineftzgerald.com for the Jeopardy template.

Jeopardy: Business Concepts and Frameworks

[MEDIA OBJECT]⁶

⁵<http://www.computingcases.org>

⁶This media object is a downloadable file. Please view or download it at
<Jeopardy1Template.pptx>

[MEDIA OBJECT]⁷

Privacy, Property, Free Speech, Responsibility

[MEDIA OBJECT]⁸

Jeopardy for EO Second Exam

[MEDIA OBJECT]⁹

Jeopardy 5

[MEDIA OBJECT]¹⁰

Jeopardy 6

[MEDIA OBJECT]¹¹

Jeopardy7

[MEDIA OBJECT]¹²

5.3 Ethics of Teamwork¹³

- Ethics of Team Work
- William J. Frey (working with material developed by Chuck Huff at St. Olaf College)
- Centro de la Etica en las Profesionas
- University of Puerto Rico - Mayaguez

5.3.1 Module Introduction

Much of your future work will be organized around group or team activities. This module is designed to prepare you for this by getting you to reflect on ethical and practical problems that arise in small groups like work teams. Four issues, based on well-known ethical values, are especially important. How do groups achieve justice (in the distribution of work), responsibility (in specifying tasks, assigning blame, and awarding credit), reasonableness (ensuring participation, resolving conflict, and reaching consensus), and honesty (avoiding deception, corruption, and impropriety)? This module asks that you develop plans for realizing these moral values in your group work this semester. Furthermore, you are provided with a list of some of the more common pitfalls of group work and then asked to devise strategies for avoiding them. Finally, at the end of the semester, you will review your goals and strategies, reflect on your successes and problems, and carry out an overall assessment of the experience.

5.3.2 Module Activities

1. Groups are provided with key ethical values that they describe and seek to realize through group activity.
2. Groups also study various obstacles that arise in collective activity: the Abilene Paradox, Groupthink, and Group Polarization.
3. Groups prepare initial reports consisting of plans for realizing key values in their collective activity. They also develop strategies for avoiding associated obstacles.

⁷This media object is a downloadable file. Please view or download it at <Jeopardy2.pptx>

⁸This media object is a downloadable file. Please view or download it at <Jeopardy_3.pptx>

⁹This media object is a downloadable file. Please view or download it at <Jeopardy4a.pptx>

¹⁰This media object is a downloadable file. Please view or download it at <Jeopardy5.pptx>

¹¹This media object is a downloadable file. Please view or download it at <Jeopardy6.pptx>

¹²This media object is a downloadable file. Please view or download it at <Jeopardy7.pptx>

¹³This content is available online at <<http://cnx.org/content/m13760/1.17/>>.

4. At the end of the semester, groups prepare a self-evaluation that assesses success in realizing ethical values and avoiding obstacles.
5. Textboxes in this module describe pitfalls in groups activities and offer general strategies for preventing or mitigating them. There is also a textbox that provides an introductory orientation on key ethical values or virtues.

5.3.3 A Framework for Value-Integration

The objective of this module is to teach you to teach yourselves how to work in small groups. You will develop and test procedures for realizing value goals and avoiding group pitfalls. You will also use Socio-Technical System Analysis to help you understand better how to take advantage of the way in which different environments enable groups activities and to anticipate and minimize the way in which other environments can constrain or even oppose group activities.

- **Discovery:** "The goal of this activity is to 'discover' the values that are relevant to, inspire, or inform a given design project, resulting in a list of values and bringing into focus what is often implicit in a design project." [Flanagan et al. 323]. Discovery of group values is a trial and error process. To get started, use the ADEM Statement of Values or the short value profiles listed below.
- **Translation:** "[T]ranslation is the activity of embodying or expressing...values in a system design. Translation is further divided into operationalization, which involves defining or articulating values in concrete terms, and implementation which involves specifying corresponding design features" [Flanagan et al., 338]. You will operationalize your values by developing profiles. (See below or the ADEM Statement of Values for examples.) Then you will implement your values by developing realization procedures. For example, to realize justice in carrying out a group task, first we will discuss the task as a group, second we will divide it into equal parts, third, forth, etc.
- **Verification:** "In the activity of verification, designers assess to what extent they have successfully implemented target values in a given system. [Strategies and methods] may include internal testing among the design team, user testing in controlled environments, formal and informal interviews and surveys, the use of prototypes, traditional quality assurance measures such as automated and regression-oriented testing and more" [Flanagan et al., 344-5]. You will document your procedures in the face of different obstacles that may arise in your efforts at value-realization. At the end of your semester, you will verify your results by showing how you have refined procedures to more effectively realize values.

The framework on value realization and the above-quoted passages can be found in the following resource: M. Flanagan, D. Howe, and H. Nissenbaum, "Embodying Values in Technology: Theory and Practice," in **Information Technology and Moral Philosophy**, Jeroen van den Hoven and John Weckert, Eds. Cambridge, UK: Cambridge University Press, 2008, pp. 322-353.

5.3.4 Value Profiles for Professional Ethics

1. **Definition** - A **value** "refers to a claim about what is worthwhile, what is good. A value is a single word or phrase that identifies something as being desirable for human beings." Brincat and Wike, *Morality and the Professional Life: Values at Work*
2. **Reasonableness** - Defusing disagreement and resolving conflicts through integration. Characteristics include seeking relevant information, listening and responding thoughtfully to others, being open to new ideas, giving reasons for views held, and acknowledging mistakes and misunderstandings. (From Michael Pritchard, *Reasonable Children*)
3. **Responsibility** - The ability to develop moral responses appropriate to the moral issues and problems that arise in one's day-to-day experience. Characteristics include avoiding blame shifting, designing overlapping role responsibilities to fill responsibility "gaps", expanding the scope and depth of general and situation-specific knowledge, and working to expand control and power.

4. **Respect** - Recognizing and working not to circumvent the capacity of autonomy in each individual. Characteristics include honoring rights such as privacy, property, free speech, due process, and participatory rights such as informed consent. Disrespect circumvents autonomy by deception, force, or manipulation.
5. **Justice** - Giving each his or her due. Justice breaks down into kinds such as distributive (dividing benefits and burdens fairly), retributive (fair and impartial administration of punishments), administrative (fair and impartial administration of rules), and compensatory (how to fairly recompense those who have been wrongfully harmed by others).
6. **Trust** - According to Solomon, trust is the expectation of moral behavior from others.
7. **Honesty** - Truthfulness as a mean between too much honesty (bluntness which harms) and dishonesty (deceptiveness, misleading acts, and mendaciousness).
8. **Integrity** - A meta-value that refers to the relation between particular values. These values are integrated with one another to form a coherent, cohesive and smoothly functioning whole. This resembles Solomon's account of the virtue of integrity.

5.3.5 Exercise 1: Developing Strategies for Value Realization

Directions

1. Identify value goals. Start with two or three. You can add or subtract from these as the semester progresses.
2. Give a brief description of each using terms that reflect your group's shared understandings. You may use the descriptions in this module or those in the ADEM Statement of Values but feel free to modify these to fit your group's context. You could also add characteristics and sample rules and aspirations.
3. For each value goal, identify and spell out a procedure for realizing it. See the examples just below for questions that can help you develop value procedures for values like justice and responsibility.

Examples

- Design a plan for realizing key moral values of team work. Your plan should address the following value-based tasks
- How does your group plan on realizing justice? For example, how will you assign tasks within the group that represent a fair distribution of the work load and, at the same time, recognize differences in individual strengths and weaknesses? How does your group plan on dealing with members who fail to do their fair share?
- How does your group plan on realizing responsibility? For example, what are the responsibilities that members will take on in the context of collective work? Who will be the leader? Who will play devil's advocate to avoid groupthink? Who will be the spokesperson for the group? How does your group plan to make clear to each individual his or her task or role responsibilities?
- How does your group plan on implementing the value of reasonableness? How will you guarantee that each individual participates fully in group decisions and activities? How will you deal with the differences, non-agreements, and disagreements that arise within the group? What process will your group use to reach agreement? How will your group insure that every individual has input, that each opinion will be heard and considered, and that each individual will be respected?
- How does your group plan on implementing the value of (academic) honesty? For example, how will you avoid cheating or plagiarism? How will you detect plagiarism from group members, and how will you respond to it?
- Note: Use your imagination here and be specific on how you plan to realize each value. Think preventively (how you plan on avoiding injustice, irresponsibility, injustice, and dishonesty) and proactively (how you can enhance these values). Don't be afraid to outline specific commitments. Expect some of your commitments to need reformulation. At the end of the semester, this will help you write the final report. Describe what worked, what did not work, and what you did to fix the latter.

5.3.6 Obstacles to Group Work (Developed by Chuck Huff for Good Computing: A Virtue Approach to Computer Ethics)

1. The **Abilene Paradox**. "The story involves a family who would all rather have been at home that ends up having a bad dinner in a lousy restaurant in Abilene, Texas. Each believes the others want to go to Abilene and never questions this by giving their own view that doing so is a bad idea. In the Abilene paradox, the group winds up doing something that no individual wants to do because of a breakdown of intra-group communication." (From Huff, Good Computing, an unpublished manuscript for a textbook in computer ethics. See materials from Janis; complete reference below.)
2. **Groupthink**. The tendency for very cohesive groups with strong leaders to disregard and defend against information that goes against their plans and beliefs. The group collectively and the members individually remain loyal to the party line while happily marching off the cliff, all the while blaming "them" (i.e., outsiders) for the height and situation of the cliff. (Also from Huff, **Good Computing**, an unpublished manuscript for a textbook in computer ethics.)
3. **Group Polarization**. Here, individuals within the group choose to frame their differences as disagreements. Framing a difference as non-agreement leaves open the possibility of working toward agreement by integrating the differences or by developing a more comprehensive standpoint that dialectally synthesizes the differences. Framing a difference as disagreement makes it a zero sum game; one's particular side is good, all the others bad, and the only resolution is for the good (one's own position) to win out over the bad (everything else). (Weston provides a nice account of group polarization in Practical Companion to Ethics. This is not to be confused with Cass Sunstein's different account of group polarization in **Infotopia**.)
4. Note: All of these are instances of a social psychological phenomenon called conformity. But there are other processes at work too, like group identification, self-serving biases, self-esteem enhancement, self-fulfilling prophecies, etc.

More Obstacles to Group Work

- **Free Riders**: Free riders are individuals who attempt to "ride for free" on the work of the other members of the group. Some free riders cynically pursue their selfish agenda while others fall into this pitfall because they are unable to meet all their obligations. (See conflict of effort.)
- **Outliers**: These are often mistaken for free riders. Outliers want to become participants but fail to become fully integrated into the group. This could be because they are shy and need encouragement from the other group members. It could also be because the other group members know one another well and have habitual modes of interaction that exclude outsiders. One sign of outliers; they do not participate in group social activities but they still make substantial contributions working by themselves. ("No, I can't come to the meeting—just tell me what I have to do.")
- **Hidden Agendas**: Cass Sunstein introduces this term. A group member with a "hidden agenda" has something he or she wants to contribute but, for some reason or other, hold back. For example, this individual may have tried to contribute something in the past and was "shot down" by the group leader. The next time he or she will think, "Let them figure it out without me."
- **Conflict of Effort**: conflict of Effort often causes an individual to become a free rider or an outlier. These group members have made too many commitments and come unraveled when they all come due at the same time. Students are often overly optimistic when making out their semester schedules. They tightly couple work and class schedules while integrating home responsibilities. Everything goes well as long as nothing unusual happens. But if a coworker gets sick and your supervisor asks you to come in during class times to help out, or you get sick, it becomes impossible to keep the problem from "spilling out" into other areas of your schedule and bringing down the whole edifice. Developing a schedule with periods of slack and flexibility can go a long way toward avoiding conflict of effort. Groups can deal with this by being supportive and flexible. (But it is important to draw the line between being supportive and carrying a free rider.)

Best Practices for Avoiding Abilene Paradox

- At the end of the solution generating process, carry out an anonymous survey asking participants if anything was left out they were reluctant to put before group.
- Designate a Devil's Advocate charged with criticizing the group's decision.
- Ask participants to reaffirm group decision—perhaps anonymously.

Best Practices for Avoiding Groupthink (Taken from Janis, 262-271)

- "The leader of a policy-forming group should assign the role of critical evaluator to each member, encouraging the group to give high priority to airing objections and doubts."
- "The leaders in an organization's hierarchy, when assigning a policy-planning mission to a group, should be impartial instead of stating preferences and expectations at the outset."
- "Throughout the period when the feasibility and effectiveness of policy alternatives are being surveyed, the policy-making group should from time to time divide into two or more subgroups to meet separately...."
- One or more outside experts or qualified colleagues within the organization who are not core members of the policy-making group should be invited to each meeting ...and should be encouraged to challenge the views of the core members."
- "At every meeting devoted to evaluating policy alternatives, at least one member should be assigned the role of devil's advocate."

Best Practices for Avoiding Polarization (Items taken from "Good Computing: A Virtue Approach to Computer Ethics" by Chuck Huff, William Frey and Jose Cruz (Unpublished Manuscript))

- **Set Quotas.** When brainstorming, set a quota and postpone criticism until after quota has been met.
- **Negotiate Interests, not Positions.** Since it is usually easier to integrate basic interests than specific positions, try to frame the problem in terms of interests.
- **Expanding the Pie.** Conflicts that arise from situational constraints can be resolved by pushing back those constraints through negotiation or innovation..
- **Nonspecific Compensation.** One side makes a concession to the other but is compensated for that concession by some other coin.
- **Logrolling.** Each party lowers their aspirations on items that are of less interest to them, thus trading off a concession on a less important item for a concession from the other on a more important item.
- **Cost-Cutting.** One party makes an agreement to reduce its aspirations on a particular thing, and the other party agrees to compensate the party for the specific costs that reduction in aspirations involves.
- **Bridging.** Finding a higher order interest on which both parties agree, and then constructing a solution that serves that agreed-upon interest.

5.3.7 Exercise 2 - Avoiding the Pitfalls of Group Work

- Design a plan for avoiding the pitfalls of group work enumerated in the textbox above.
- How does your group plan on avoiding the Abilene Paradox?
- How does your group plan on avoiding Group Polarization?
- How does your group plan on avoiding Groupthink?
- Note: Use imagination and creativity here. Think of specific scenarios where these obstacles may arise, and what your group can do to prevent them or minimize their impact.

5.3.8 Exercise 3: Socio Technical System

Your group work this semester will take place within a group of nested or overlapping environments. Taken separately and together, these will structure and channel your activity, facilitating action in certain circumstances while constraining, hindering, or blocking it in others. Prepare a socio-technical system table

for your group to help structure your group self-evaluation. Include hardware/software, physical surroundings, stakeholders (other groups, teacher, other classes, etc.), procedures (realizing values, avoiding pitfalls), university regulations (attendance), and information structures (collecting, sharing, disseminating)

Some things about Socio-Technical Systems

1. Socio-Technical System Analysis provides a tool to uncover the different environments in which business activity takes place and to articulate how these constrain and enable different business practices.
2. A socio-technical system can be divided into different components such as hardware, software, physical surroundings, people/groups/roles, procedures, laws/statutes/regulations, and information systems.
3. But while these different components can be distinguished, they are in the final analysis inseparable. STSs are, first and foremost, systems composed of interrelated and interacting parts.
4. STSs also embody values such as moral values (justice, responsibility, respect, trust, integrity) and non-moral values (efficiency, satisfaction, productivity, effectiveness, and profitability). These values can be located in one or more of the system components. They come into conflict with one another causing the system to change.
5. STSs change and this change traces out a path or trajectory. The normative challenge of STS analysis is to find the trajectory of STS change and work to make it as value-realizing as possible.

Socio-Technical System Table for Groups

Hardware/Software	Physical Surroundings	Stakeholders	Procedures	University Regulations	Information Structures
Think about the new role for your smart phones in group work in class. Will you be using Google Docs to exchange documents?	How does the classroom and the arrangement of objects within it constrain and enable group activities?	Think about other teachers, classes, supervisors, jobs, and other individuals that can have an impact on your ability to carry out group assignments.	Name but don't describe in detail, the value-realizing procedures your group is adopting.	What are university regulations that will have an impact on your group work. For example, switches between MWF and TTH schedules.	There is a wealth of information and skill locked in each of your group's members. How will you unleash these and telescope them into group work and activities? How, in other words, will you work to maximize group synergies and minimize group disadvantages?

Table 5.1

Exercises 1-3 compose the Preliminary Self-Evaluation which is due shortly after semester-long groups are formed. Exercise 4 is the close-out group self evaluation which is due at the end of the semester.

5.3.9 Exercise 4: Prepare a Final, Group Self-Evaluation

- Due Date: One week after the last class of the semester when your group turns in all its materials.

- Length: A minimum of five pages not including Team Member Evaluation Forms
- Contents:
 - 1. Restate the Ethical and Practical Goals that your group developed at the beginning of its formation.
 - 2. Provide a careful, documented assessment of your group’s success in meeting these goals. (Don’t just assert that “Our group successfully realized justice in all its activities this semester.” How did your group characterize justice in the context of its work? What specific activities did the group carry out to realize this value? What, among these activities, worked and what did not work?)
 - 3. Identify obstacles, shortcomings or failures that you group experienced during the semester. How did these arise? Why did they arise? How did you respond to them? Did your response work? What did you learn from this experience?
 - 4. Assess the plans you set forth in your initial report on how you intended to realize values and avoid pitfalls. How did these work? Did you stick to your plans or did you find it necessary to change or abandon them in the face of challenges?
 - 5. Discuss your group’s procedures and practices? How did you divide and allocate work tasks? How did you reach consensus on difficult issues? How did you ensure that all members were respected and allowed significant and meaningful participation? What worked and what did not work with respect to these procedures? Will you repeat them in the future? Would you recommend these procedures as best practices to future groups?
 - 6. What did you learn from your experience working as a team this semester? What will require further reflection and thought? In other words, conclude your self-evaluation with a statement that summarizes your experience working together as a team this semester.

5.3.10 Wrap Up: Some further points to consider...

1. Don’t gloss over your work with generalizations like, “Our group was successful and achieved all of its ethical and practical goals this semester.” Provide evidence for success claims. Detail the procedures designed by your group to bring about these results. Are they “best practices”? What makes them best practices?
2. Sometimes—especially if difficulties arose—it is difficult to reflect on your group’s activities for the semester. Make the effort. Schedule a meeting after the end of the semester to finalize this reflection. If things worked well, what can you do to repeat these successes in the future? If things didn’t work out, what can you do to avoid similar problems in the future? Be honest, be descriptive and avoid blame language.
3. This may sound harsh but get used to it. Self-evaluations—group and individual—are an integral part of professional life. They are not easy to carry out, but properly done they help to secure success and avoid future problems.
4. Student groups—perhaps yours—often have problems. This self-evaluation exercise is designed to help you face them rather than push them aside. Look at your goals. Look at the strategies you set forth for avoiding Abilene, groupthink, and group polarization. Can you modify them to deal with problems? Do you need to design new procedures?

5.3.11 Ethics of Team Work Presentations

Values in Team Work (Thought Experiments)

[MEDIA OBJECT]¹⁴

Pitfalls to Avoid in Group Work

[MEDIA OBJECT]¹⁵

¹⁴This media object is a downloadable file. Please view or download it at <Ethics of Team Work.pptx>

¹⁵This media object is a downloadable file. Please view or download it at <Pitfalls to Avoid in Group Work.pptx>

Thought Experiments on Group Work

[MEDIA OBJECT]¹⁶

Team Member Evaluation Forms (Required)

[MEDIA OBJECT]¹⁷

New Ethics of Teamwork Presentation (Spring 2012)

[MEDIA OBJECT]¹⁸

5.3.12 Ethics of Teamwork Jeopardy

[MEDIA OBJECT]¹⁹

5.3.13 Bibliography

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¹⁶This media object is a downloadable file. Please view or download it at <Thought Experiments on Group Work.docx>

¹⁷This media object is a downloadable file. Please view or download it at <TEAM MEMBER RATING SHEET-3.docx>

¹⁸This media object is a downloadable file. Please view or download it at <Ethics of Teamwork.pptx>

¹⁹This media object is a downloadable file. Please view or download it at <Team_ Jeopardy.pptx>

Index of Keywords and Terms

Keywords are listed by the section with that keyword (page numbers are in parentheses). Keywords do not necessarily appear in the text of the page. They are merely associated with that section. *Ex.* apples, § 1.1 (1) **Terms** are referenced by the page they appear on. *Ex.* apples, 1

- A** Assessment, § 5.1(131), § 5.2(136)
- B** Business, § 2.1(51), § 2.2(66)
Business and Professional Ethics, § 2.3(69)
Business Ethics, § 1.1(1), § 2.1(51)
- C** Case Analysis, § 1.2(26), § 1.3(31)
Cases, § 4.2(115)
Codes of Ethics, § 3.4(96)
Collaborative Learning, § 5.3(140)
Computer, § 1.4(38)
Computer Ethics, § 1.1(1), § 2.4(74), § 3.1(81), § 3.4(96), § 4.1(103)
Computers, § 1.5(43)
Computing, § 1.2(26), § 1.3(31)
Curriculum, § 3.2(85), § 5.1(131)
- D** Decision, § 4.2(115)
Decision Making, § 4.1(103)
Dissenting Professional Opinions, § 1.2(26)
Duties, § 3.4(96)
- E** EAC, § 3.2(85), § 4.2(115), § 5.1(131)
EAC Toolkit, § 1.1(1), § 3.2(85)
Engineering, § 2.1(51), § 4.2(115)
Engineering Ethics, § 3.1(81), § 3.4(96), § 4.1(103), § 4.3(116)
Ethical Awareness, § 3.2(85)
Ethical Dilemma, § 3.1(81)
Ethical Theory, § 3.1(81), § 3.3(90)
Ethical Values, § 5.3(140)
Ethics, § 1.1(1), § 1.2(26), § 1.3(31), § 1.4(38), § 1.5(43), § 2.1(51), § 2.2(66), § 2.4(74), § 3.1(81), § 3.2(85), § 3.4(96), § 4.1(103), § 4.2(115), § 4.4(125), § 5.1(131), § 5.2(136), § 5.3(140)
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Ethics Case Analysis, § 4.3(116)
Ethics in Decision-Making, § 4.3(116)
- Exams, § 5.2(136)
- G** Globalization, § 2.2(66)
Good Computing Reports, § 2.4(74)
Group Projects, § 5.2(136)
- H** Humanities, § 1.1(1), § 2.2(66), § 4.3(116)
- I** Instructor, § 5.1(131)
Instructor Module, § 3.2(85)
- L** Leadership, § 2.2(66)
- M** Module, § 5.1(131)
Moral Exemplars, § 4.4(125)
Moral Psychology, § 4.4(125)
Mountain Terrorist Module, § 3.2(85)
- O** Organizational Dissent, § 1.2(26)
- P** Problem Specification, § 1.4(38)
Professional Ethics, § 3.3(90)
- R** Rights, § 3.4(96)
Rubric, § 5.2(136)
- S** Safety, § 1.3(31)
Social Impacts, § 2.1(51)
Social Responsibility, § 2.2(66), § 2.3(69)
Socio-technical analysis, § 4.1(103)
Socio-Technical System, § 2.1(51)
Socio-Technical Systems, § 1.4(38), § 1.5(43), § 2.2(66)
- T** Technical Impacts, § 2.1(51)
Template, § 5.1(131)
Toolkit, § 5.1(131)
- V** Value Conflict, § 1.4(38)
Values, § 2.3(69)
Virtue Ethics, § 3.3(90), § 4.4(125)
- W** Work Teams, § 5.3(140)

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