EEAP 398, 399: SENIOR PROJECT PROFESSIONAL ETHICS ASSIGNMENT Summer 2003

Attached are descriptions of several situations in which engineers have found themselves in the course of their jobs. A problem is presented; in some cases the decisions that were made by an engineer or engineers are also presented. Questions are posed regarding the decisions that were made. Each situation requires application of professional ethics for its resolution. They are

> The Co-Op Student Turning Down a Job Recruitment – Finder's Fee Public Welfare – Hazardous Waste Objectivity of Engineer Retained As Expert Grievance Procedure Computer-Aided Design When In Rome...

A second series of situations addresses situations in which technology is clearly an issue but there may not be a direct application of a professional code of ethics. These may also be more applicable to the ACM Code of Ethics.

Marketing personal information from sales

Restricted software and US export control laws

Abuse of an electronic database?

Responsibility for actions on a public bulletin board/chat room

Responsibility of a consultant for computer security?

You are to write a paper that addresses the issues and questions that are raised in <u>one</u> situation from each group.

Your entire paper (two cases) should be at least 3 **double-spaced** printed pages. The cases should be addressed separately in the paper. You must discuss your reasons for the responses that you give, not merely answer "yes" or "no."

Papers will be graded on the basis of completeness, logical consistency of the presentation and arguments, and on English construction and usage.

This is an individual assignment, not a collaborative effort. You are, however, free to discuss the situations among yourselves. The written document must be your own.

The NSPE Code of Ethics for Engineers is designed to provide positive stimulus for ethical conduct as well as helpful guidance and advice concerning the primary and basic obligations of engineers. The Code also establishes the ethical guideposts for the NSPE Board of Ethical Review in interpreting ethical dilemmas submitted by engineers, public officials, and members of the public. Refer to these Codes in your papers.

ACM Code of Ethics IEEE Code of Ethics NSPE Code of Ethics

The Co-op Student

Project leader Bruce Barton was being sorely pressed to complete the development of several engineering prototypes for a field test of a new appliance model for the XYZ company. One particular plastic component of the new model had given difficulty in laboratory tests as it failed repeatedly before reaching the stress level necessary for successful operation. Bruce had directed a redesign of the component using a tough new engineering plastic recommended by the Research Laboratory's Material Science Department. Stress tests needed to be run on the redesigned component, but Bruce was running short of time and needed to get on with building the prototype.

Bruce sought out the manager of the Material Science Department for help in running stress tests on samples of the new component. With this assistance he could go ahead with prototype building and conduct the tests concurrently. The prototypes, of course, would not be released to field test until the stress tests on the redesigned component proved its design to be satisfactory.

Tom Mason, manager of the Material Science Department, was willing to assist because he knew how critical completion of the development was to XYZ's future appliance plans. However, this was also a busy time for Tom's department. So, Tom suggested to Bruce that he could assign the test work to one of the engineering co-op students. Tom was also coordinator of engineering co-op students, and he liked to use the co-op students in demanding situations to give them practical experience.

• Do you think it is a good idea for Tom to ask a co-op student to do the work? What responsibilities do you think Tom has in making sure that the student does the work properly?

Tom assigns the test work to Jack Jacobs, an engineering co-op student from the Case School of Engineering who is completing his second work session at XYZ. Jack is familiar with the test equipment and previously had done similar test work. Jack is a good student and his co-op work has been usually well done. Tom comments to Jack that he will need to work diligently to complete the tests before he returns to CWRU.

Jack completes the tests on schedule and turns in a report to Tom indicating the component has successfully passed the stress tests. Upon completion of the test report Jack returns to the university for his next school session. Tom gives Bruce the good news. The prototypes are completed and the field test of these prototypes gets underway on schedule.

A few weeks later, Bruce rushes into Tom's office to tell him that most of the prototypes are out of operation because of a catastrophic failure of the component that had been tested in Tom's lab. Bruce wants to discuss the test immediately with Jack; but since Jack has already returned to the university, he and Tom settle for studying Jack's lab notebook in detail.

After review Tom says, "Bruce, I hate to say it but these data look too good. I know the equipment and there should be more scatter in the measurements Jack took. I think some, if not all, these measurements are in error or they have been faked! At best, Jack probably took a few points and 'extrapolated' the rest!"

• What ethical issues, if any, does this scenario raise?

Bruce and Tom make plans to run all the tests again. Meanwhile, Tom phones Dr. Frank Thompson, Co-op Coordinator at CWRU, to discuss his fear that Jack falsified the data. In the course of the conversation he asks Dr. Thompson if any effort is made to discuss professional ethics with co-op students before their first work session and if the importance and value of engineering test results is stressed to these students. Dr. Thompson explains that no specific instruction on professional ethics is given to co-op students, but all lab courses emphasize the need for accuracy in data taking. Dr. Thompson adds that he found it hard to believe that a co-op student would "fake" data!

- Was it appropriate for Tom to discuss his concerns about Jack with the university's Co-op Coordinator prior to discussing the matter with Jack?
- Should Tom have a conversation with Jack about his concerns? If so, what type of conversation should Tom have with Jack when he talks with him? Should he refuse to have Jack return to XYZ as a co-op student?
- What comments would you make about the supervision given co-op students at XYZ?
- Should CWRU incorporate into its instruction program some emphasis on professional ethics? If so, what form might this take? If not, why not?

TURNING DOWN A JOB

FACTS:

The city of Orion began a recruitment process the first week of January for a city engineer/public works director. The recruitment was necessitated by the pending retirement of the former city engineer/public works director in May. The city wanted to have the new employee on board for orientation and training prior to the incumbent leaving. The city received a great number of applications and went through the laborious task of screening for finalists. During the screening period, Engineer A was in the area and requested an appointment to gather more information regarding the position. The appointment was granted and Engineer A was given information regarding the position, the city, housing, schools, etc. Engineer A expressed a strong interest in the position and stated he had friends living nearby. He also stated that he was familiar with the area. Engineer A was one of the four finalists interviewed for the position during the first week in March, and was selected as the best qualified applicant. An offer of employment was extended to Engineer A on March 10, which was accepted. Engineer A agreed to start employment on or before April 10.

During the period of March 15-April 10, several phone conversations were held with Engineer A during which he expressed some doubt as to his ability to start on April 10 due to obligations to his current employer and personal reasons. Engineer A was advised by the city that he would be permitted to return to his former home for meetings to satisfy his employment obligations. Engineer A was also advised by the city that if he was hesitant about employment due to personal reasons, the city could understand but that it would appreciate a decision so that it could begin a new recruitment process. Each time this was discussed, Engineer A stated that he wanted the position and would be there no later than April 10. On April 5th, Engineer A advised the city that he could not start on April 10th but that he could start on April 24th. Engineer A assured the city that this was a firm commitment. On April 23, Engineer A advised the city that he could not take the position.

QUESTION: Was it ethical for Engineer A to deal with the city in the manner described?

RECRUITMENT – FINDER'S FEE

Facts: Engineer A received an unsolicited letter and explanatory material from a commercial firm engaged in manpower placement, offering a monetary bonus to Engineer A if he provided names of qualified engineers (and other technical disciplines listed in the brochure) who were subsequently employed by others through the services of the commercial firm. The amount of bonus was indicated as ranging from \$1000 (designers, specifications writers, estimators) to \$5000 (chief engineer, director of projects, etc.). Engineers, as such, were listed as worth a \$2000 bonus. The covering letter stated that there were presently openings for this type of personnel in several client companies of the placement firm. It further stated that these prospective employers offer highly competitive salaries and liberal benefit packages. Engineer A has submitted the case for comment on the ethical aspects of this type of personnel operation, recognized in the solicitation letter of the commercial firm as "a highly novel approach to personnel recruitment." Although the facts submitted do not so state, we assume for the purposes of this case that the prospective employer firms have indicated a willingness to employ engineering personnel under the described method, and that in doing so have agreed to pay through the commercial firm the amount of the bonus in addition to other fees charged by the commercial firm.

Question: Would it be ethical for Engineer A to submit names of prospective employees under the described method?

PUBLIC WELFARE – HAZARDOUS WASTE

FACTS: Technician A is a field technician employed by an consulting environmental engineering firm. At the direction of his supervisor Engineer B, Technician A samples the contents of drums located on the property of a client. Based on Technician A's past experience, it is his opinion that analysis of the sample would most likely determine that the drum contents would be classified as hazardous waste. If the material is hazardous waste, Technician A knows that certain steps would legally have to be taken to transport and properly dispose of the drum including notifying the proper federal and state authorities.

Technician A asks his supervisor Engineer B what to do with the samples. Engineer B tells Technician A only to document the existence of the samples. Technician A is then told by Engineer B that since the client does other business with the firm, Engineer B will tell the client where the drums are located but do nothing else. Thereafter, Engineer B informs the client of the presence of drums containing "questionable material" and suggests that they be removed. The client contacts another firm and has the material removed.

QUESTIONS:

- 1. Was it ethical for Engineer B to merely inform the client of the presence of the drums and suggest that they be removed?
- 2. Did Engineer B have an ethical obligation to take further action?

OBJECTIVITY OF ENGINEER RETAINED AS EXPERT

Facts: Engineer A is a forensic engineer, an engineer who determines how and why devices fail.. H e is hired as a consultant by Attorney Z to provide an engineering and safety analysis report and courtroom testimony in support of a plaintiff in a personal injury case. Following Engineer A's review and analysis, Engineer A determines that he cannot provide an engineering and safety analysis report favorable to the plaintiff because the results of the report would have to suggest that the plaintiff and not the defendant was at fault in the case. Engineer A's services are terminated and his fee is paid in full. Thereafter, Attorney X, representing the defendant in the case, learns of the circumstances relating to Engineer A's unwillingness to provide a report in support of Attorney Z's case and seeks to retain Engineer A to provide an independent and separate engineering and safety analysis report. Engineer A agrees to provide the report.

Question: Was it ethical for Engineer A to agree to provide a separate engineering and safety analysis report?

GRIEVANCE PROCEDURE

Facts: An engineering school hired a new department head from another educational institution. Some ten months later, engineers of the department met and prepared a memorandum of grievances against the new department head. That followed a series of attempts by individual faculty members to resolve grievances by personal contact with the department head. When those efforts failed, several of the faculty members told the department head they intended to take the issues to the dean. Each of the 22 faculty members signed the memorandum and submitted it to the dean of engineering. The dean then confronted the department head with the memorandum. The department head submitted a statement rebutting the various allegations and, in turn, accused the faculty members of maliciously injuring his professional reputation. The aggrieved faculty members, after reviewing the department head's memorandum, and at the request of the dean, prepared a 20-page detailed statement expanding on their grievances.

Question: Did the engineer members of the faculty act ethically in submitting their grievances to the dean?

COMPUTER-AIDED DESIGN

Facts: Avery Green, P.E., an electrical engineer with no electrical facilities design and construction experience, receives a solicitation in the mail with the following information: "Engineers today cannot afford to pass up a single job that comes by-including construction projects that may be new or unfamiliar. "Now, thanks to a revolutionary new CD-ROM, specifying, designing, and costing out any electrical construction project is as easy as pointing and clicking your mouse-no matter your design experience. For instance, never designed a highway before? No problem. Just point to the 'Factory Wiring' window and click. "Simply sign and return this letter today, and you'll be among the first engineers to see how this full-featured interactive library of standard design can help you work faster than ever and increase your firm's profits." Green orders the CD-ROM and begins to offer facilities design and construction services.

What Do You Think?

Was it ethical for Green to offer facilities design and construction services under the facts presented?

WHEN IN ROME ...

Facts:Avery Global, P.E., is a consulting engineer who works in the U.S. and abroad. Global is contacted by the government of Country A and asked to submit a proposal for a major water project being constructed there. As part of the project, Global is encouraged to associate with and retain Engineer B, a local engineer in Country A, with whom Global has worked on private projects in that country. One of the accepted "customs" in Country A is for consultants, such as engineers, to give substantial gifts to public officials in connection with the awarding of public works contracts. Global recognizes that the giving of such gifts may be a violation of U.S. law-although it may not technically violate the law in Country A. Engineer B proposes to Global that if the project is awarded to Global's firm, Engineer B will handle "business arrangements" in Country A and that Global will be involved in overall project management as well as all technical matters.

What Do You Think?

Would it be ethical for Global to proceed with the project under these circumstances?

Duane Etright, P.E., is employed by a software company and designs specialized software used in the operation of facilities affecting the public health and safety, such as air quality control, and water quality control facilities. As part of the design of a particular software system, Etright conducts extensive testing, and although the tests show that the software is safe to use under existing standards, Etright is aware of new draft standards that are about to be released by a standard-setting organizationstandards that the new software might not meet. Testing is very costly and the company's clients are eager to move forward. The software company wants to satisfy its clients and protect its finances and employees' jobs; but at the same time, wants to be sure that the software will be safe to use under the new standards. Tests proposed by Etright will likely result in a decision on whether to move forward with the use of the software. The tests are costly and will delay the use of the software by at least six months, which will put the company at a competitive disadvantage and cost it money. Also, delaying implementation will cause the state public service commission utility rates to rise significantly. The company requests Etright's recommendation on the need for further software testing.

What Do You Think?

Under the Code of Ethics, does Etright have a professional obligation to inform his company of the reasons for additional testing and recommend that it be undertaken?

A commercial network operator collects information about the interests and purchases of its users by keeping track of the forums and bulletin boards they use and the purchases they make; it then sells this information to other merchandisers. Users are not asked if they wish to participate in redistribution of such information.

Questions

- 1. To what extent are such practices permitted today under existing laws and codes of behavior?
- 2. What constitutes "informed consent" for the user to agree to the redistribution of personal information? For example, is it sufficient to give users the option of not participating in the redistribution of personal information? May users be offered financial incentives (e.g., reduced rates for using the system) if they agree to participate? How comprehensively should possibilities be described to users to illustrate the ramifications of redistribution?
- 3. How are secondary and tertiary redistribution to be controlled, if at all?
- 4. Once users have granted permission for redistribution, should they have the option to revoke it? How does revocation apply to secondary and tertiary uses?
- 5. With what granularity should various characteristics (e.g., cigarette and alcohol purchases, regular sign-ons to the gay and lesbian bulletin board) be associated with the user? (At one extreme, the individual is in a group of one. At the other, every user of the service is a member of the group.)
- 6. How is this situation similar to and/or different from supermarkets that track customer purchases and preferences through scanners and check cashing, credit cards, and personalized coupons?

A university is connected to the Internet. Under a joint effort of its alumni relations and industrial liaison program, the university also provides library and Internet access for Company X, a small start-up business founded by university alumni, in return for stock options in Company X. To facilitate private communications, the university provides RSA-based public-key encryption software on its host computers, encourages the software's use, and maintains databases that facilitate the lookup of the public keys of all users using the university as a node. ("RSA" refers to a type of highly secure public-key encryption scheme that is widely available in the U.S. and elsewhere. Software that implements RSA encryption/decryption algorithms may be subject to U.S. export control laws.)

Questions:

- 1. A foreign national in Iraq accesses the university system and downloads the encryption software. Who has violated what law? What obligation does the university have to report the incident? To configure its system to prevent a recurrence?
- 2. Encrypted messages are sent from Company X, based in the U.S., to a client located in Brussels. The client uses decryption software obtained locally. Any violation?
- 3. The FBI requests access to the university's records regarding who has requested the public keys of a particular client of Company X. Should the university cooperate? Must the FBI use any particular process to compel disclosure? What standard should apply to such requests? Is the standard different if the request is made to Company X?
- 4. The FBI determines that a staff member of the university and a client of Company X, unbeknown to these institutions, are using the electronic communications system to plan a terrorist act, The FBI demands access to the private keys that will allow them to monitor encrypted communications between the parties, They have a search warrant, Is it feasible/lawful to comply? May the system providers require registration of private keys for purposes of allowing compliance with such warrants? May the government require such registration?
- 5. Company X uses the authentication capability of public-key encryption to determine that requests for assistance actually come from its clients. The university, which administers the database of public keys, does a sloppy job, and a prankster obtains the private keys of the officers of Company X. In consequence, a student prankster sends a request for information that appears to be from a client of Company X, but is not. Company X discloses confidential information to the prankster, who then reveals this information publicly. As a result, Company X incurs costs, based on its assumption that the message is genuine. Who is liable to whom?

The library of a large university connected to the Internet subscribes to an electronic database (accessible via a gateway on the library system) and an electronic journal (to be distributed to subscribers by electronic mail). The database owner provides access for up to six users at a time, for a flat fee to be paid by the library. The electronic journal provides its electronic mail service to subscribers who have authorized the charge for the subscription against their Master Card accounts, Anyone can post materials to public areas on the system.

Questions:

- 1. The library discovers that a student has defeated the six-user limit and regularly logs onto the database as an extra user. What liability/obligation does the Library have to the database provider? Must it report this security breach to the database provider? Should the university discipline the student? Does it have an obligation to change its system? What obligations stem from copyright law and what obligations turn on the contract between the parties?
- 2. A faculty member regularly copies and posts portions of the journal in a public area of the system. She invites her students to access these areas, so that they can discuss these materials in class. What liability, if any, does the university have for infringement of copyright? What if the journal is already available to students in paper form in the library? May the journal require by contract that copies not be redistributed to more than a stated number of people or that copied materials not consist of more than a stated portion of the journal? How can the journal enforce the contract?
- 3. A graduate student/lecturer figures out how to send an electronic mail message that looks like it is part of the journal distribution. This fake 'edition" of the journal defames an innocent non-public figure. Is the university liable? Must it discipline the graduate student? What recourse does the journal have?
- 4. After having received a copy of the journal, a student refuses to pay the Master Card bill for her subscription. The journal claims that the library should make good on this charge, or at least help the journal collect from the student (perhaps putting the charge on the student's bill from the bursar). Result? Should the journal be entitled to cut off all subscriptions through the library unless the university cooperates?
- 5. An assistant librarian excerpts portions of the database on a particular subject and includes them in a newsletter distributed by electronic mail. The university charges for subscriptions to this newsletter by users who are not otherwise affiliated with the university. Because the newsletter has accurate excerpts of the best materials on its narrow topic, many non-university readers cancel their subscriptions to the database. If the newsletter uses only a tiny portion of the overall materials in the database, can the database provider enjoin the redistribution as copyright infringement? What if the database consists entirely or substantially of materials (e.g., government documents) that are, individually, in the public domain? If such excerpts are held legal under fair use, can the database provider ban the redistribution by contract? Is that the best strategy for the database provider to use to protect its interests and maximize its revenue?

A computer club at a local high school sets up a Web page and chat room, using equipment bought for the club by a banker whose son is club president. The equipment is set up at the club president's home, who has a DSL line. The banker also has a computer system for working at home and that is tied directly into the club's computer; the bankers computer is used to write a public newsletter for his bank. The URL of the Web page is distributed through a national magazine, and over time, the following activities are taking place, though no club members are involved in any of these activities.

Stolen credit card numbers are posted.

Hate messages are sent to Canada, where such messages are illegal.

A program is posted in a public space by .Joe, a non-member. Others download the program and discover that it contains a virus that causes considerable damage.

A second program is posted that is designed to disrupt network services when run.

Questions:

What responsibilities do club members have to monitor the activities on their site? What actions are various parties obligated to take?

Actions might include removing virus-laden programs, notifying authorities, and/or enabling authorities to monitor activities. The various parties include the club members, the club president, and the banker who provided the equipment.

1. What is Joe's individual liability for his program posting? Does it depend on whether or not he knew about the damaging potential of the program?

2. What are the rights and responsibilities of law enforcement officials in investigating the criminal activities described above? What jurisdiction applies when an illegal act is committed by a person living in one area and accessing a computer located in another? What if one end of the connection is overseas? How should the execution of a search warrant proceed in collecting evidence from a computer that may have been used in the commission of a crime? If a computer is seized and it contains both information of evidentiary value and information that has been collected for the public newsletter, how should those materials be treated? Under what circumstances can law enforcement authorities seize the banker's computer for evidence?

3. Consider changes in the answers to these questions if:

Three years ago Diane started her own consulting business. She has been so successful that she now has several people working for her and many clients. Their consulting work includes advising on how to network microcomputers, designing database management systems, and advising about security. Presently she is designing a database management system for the personnel office of a medium-sized company. Diane has involved the client in the design process, informing the CEO, the director of computing, and the director of personnel about the progress of the system. It is now time to make decisions about the kind and degree of security to build into the system. Diane has described several options to the client. Because the system is going to cost more than they planned, the client has decided to opt for a less secure system. She believes the information they will be storing is extremely sensitive. It will include performance evaluations, medical records for filing insurance claims, salaries, and so forth.

With weak security, employees working on microcomputers may be able to figure out ways to get access to this data, not to mention the possibilities for on-line access from hackers. Diane feels strongly that the system should be much more secure. She has tried to explain the risks, but the CEO, director of computing and director of personnel all agree that less security will do. What should she do? Should she refuse to build the system as they request?

(Adapted from: Johnson, D. G. Computer Ethics, Second Ed. Prentice Hall, Englewood Cliffs, N.J., 1993.)