Case Study Resources for an Ethics and Computing Course

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Abstract — Case studies can be an effective part of an ethics and computing course. However, it is often time-consuming for the instructor to build a list of good case studies. This is especially true if the instructor wants to use real-life incidents for the cases. Even for the instructor who prefers to use "anonymized" or "synthetic" case studies, a compilation of real incidents provides a good starting point for creating realistic cases. This paper provides brief descriptions of real case study incidents which have been classroom-tested in an undergraduate "ethics and computing" course. Special effort is made to include incidents with themes that are sometimes given less coverage relative to, for example, hacking or software piracy.

1. Introduction

There is an increasing emphasis on having formal coverage of ethics and professionalism topics in undergraduate computer science and engineering majors. Such topics have grown in prominence in the recommended curriculum for undergraduate Computer Science and Computer Engineering majors. There are now a number of possible textbooks available to support such a course [2, 3, 4, 5, 6, 7, 9].

The USF Department of Computer Science and Engineering instituted a required course in ethics and professionalism for all of its majors in 1992. Fifteen sections of the course have been offered, with the course materials undergoing substantial modification. A textbook has recently been published based on the materials drawn together for the course [3]. A web site for course materials is http://marathon.csee.usf.edu/ethics-and-computing.html. A substantial part of the course is devoted to writing assignments, class presentations and discussions that focus on (real) case studies. The purpose of this paper is to survey some of the case study incidents which have been used in this course.

While many people who use case studies in their teaching prefer to use "made up" cases, my preference is to use specific, real incidents. Some of the advantages of this approach are:

- students can learn and reinforce research skills through looking up information about an incident,
- the incidents should seem more real to the students, because they involve companies that the students have heard of, or could imagine working for,
- the different descriptions of the incident that are available often present competing perceptions of the incident, requiring the students to evaluate the relative merit of different views, and
- the incidents often (but not always) have a natural conclusion of some type, and the students can be asked to evaluate its appropriateness.

There are, of course, some corresponding disadvantages: primarily, real-world cases are not so clean and well-focused as a made-up case might be.

Due to space limitations, the description of each case is brief. The descriptions are meant only to identify the major themes of the case, and to provide enough key words (names, times, ...) to allow an efficient search for more information. For each case, based on experience from teaching the course at USF, it should be relatively easy for any student (or faculty member) to acquire substantial additional information through searches on NEXIS, LEXIS, and the various web search engines. The above-mentioned course web page will have links to source materials for many of the topics. In general, the research skill experience gained by the student through independently tracking down source materials is quite valuable. Thus, the lack of references to specific sources for each case mentioned here is partly due to length restrictions and partly by intention.

Each of the cases surveyed here should be suitable for use in an class discussion facilitated by the instructor, for an assigned worksheet, a short writing assignment, or an in-class presentation to be made by the student on the basis of individual research. (Several sample writing
2. Fraud and Dishonesty in Business

While it may seem a rather mundane topic, it is unfortunately true that one of the most common ethical problems students will confront after they enter the working world is basic fraud. This section lists four cases involving firms which specialize in computer-technology products.

**The SoftRam “placebo software” incident**

SoftRam is a product marketed by Syncronys Softcorp as a utility for use with Microsoft Windows. SoftRam is supposed to provide compression of data stored in main memory, in effect allowing the system to run as if it had more memory. Since buying SoftRam was cheaper than buying more memory, this appealed to many people. At one time, SoftRam was a “best seller.” However, several different sources eventually discovered that the product actually did no compression, and did not even contain code that could have done what was claimed. The Federal Trade Commission investigated the product. Microsoft requested that Syncronys Softcorp remove the “designed for Windows 95” logo from the packaging, and several class-action lawsuits were filed. This case appears to offer an example of blatant fraud on the part of the company, along with questionable product review practices at some PC industry publications.

**Fraud charges against KAI executives**

Kurzweil Applied Intelligence (KAI) is a company which specializes in computer systems to convert between printed text and spoken words. KAI was founded by Raymond Kurzweil, who is highly regarded for his technical accomplishments. Over several years in the early 1990s, KAI followed a practice of recording sales of systems that had not yet actually been sold. This practice made the company look better than it otherwise would have at the time of an initial public offering of KAI stock. The scheme began to unravel during a routine audit by Coopers & Lybrand. A trial in 1996 resulted in convictions of several top KAI executives (Bernard Bradstreet, Thomas Campbell, and others) on charges of securities fraud. Raymond Kurzweil was not among the people charged with any wrongdoing. This case appears to offer a good example of how even people with “squeaky clean” reputations can slide bit-by-bit into major dishonesty.

**Diana Corp. stock price manipulation incident**

The Diana Corporation was the subject of intense discussion on the Internet and America On-Line in 1996. The discussion centered on the merits of their network switching technology, claims about the customer purchases of the switches, and the self-interest of the individuals on both sides of the discussion. The stock price went to record highs on rumors of sales which never happened, and then crashed under attack from critics. This case points out how easy it is for “news” and speculation on the Internet to influence the price of a company’s stock.

**The Paradyne / Social Security incident**

In 1981, Paradyne Corporation won a contract from the Social Security Administration to supply a new generation of computer and communications systems. The total value of the contract over an eight-year span was estimated at $84 million. In 1983, the Securities Exchange Commission formally charged Paradyne with fraud in winning the contract. More specifically, Paradyne was charged with conducting a demo in which it represented an empty box with blinking lights as an encryption device, and represented a DEC computer with the labels switched as a Paradyne P-8400 computing unit. The Social Security Administration was criticized by the General Accounting Office for its handling of the contract with Paradyne. In 1987, Paradyne pled guilty and settled with the government. This case provides an example of fraud in winning a contract, brings up issues of the competence of a government agency in managing a contract, and shows the effects of the incident on the company and people involved.

3. Discrimination and Harassment

Another non-computing-specific ethical issue which many students may eventually have to deal with in the workplace is discrimination. This section gives brief descriptions of one case involving alleged gender discrimination and another involving racial discrimination. Other good cases in this area include the recent race discrimination suits against the Denny’s restaurant chain, and against Texaco Corporation.

**Paradyne gender discrimination lawsuit**

In August of 1996, six women who were current or previous employees of AT&T Paradyne in Largo, Florida filed a gender discrimination lawsuit. The six women’s names are Virginia Beneke, Durema Keefe, Katherine Matheny, Patricia Patterson, Brenda Skip, and Susan Hess. The announcement of the filing of the lawsuit included statistics about the percentages of
female employees at different management levels, stories of meetings held at “exotic” bars, incidents where women allegedly trained less experienced men to become their bosses, and other claims. This case provides a good vehicle to discuss the legal standards for sexual harassment and gender discrimination, appropriate announcement and evaluation mechanisms for filling job openings, and the responsibilities of individuals within the company. (The case has not been settled at the time this paper is written.)

**Circuit City racial discrimination suits**

Circuit City is a chain of stores which sell a wide variety of appliances and electronics products. In 1995, several groups of employees and former employees filed racial discrimination lawsuits against Circuit City. The major allegation was that Circuit City management used various techniques to control the number and level of African-American employees. In a trial in November of 1996, the charges made by several plaintiffs were dismissed for lack of evidence, but two plaintiffs, Renee Lowery and Lisa Peterson, were awarded settlements of $237,000 and $51,000, respectively. This case provides examples to discuss the definition of discrimination, the effects that it has, and the legal burden of proving discrimination.

4. Whistle blowing

Whistle-blowing is a classic topic in engineering ethics, but does not always receive the same emphasis in computer ethics. This section lists a recent case involving Hughes Aircraft, and the classic case of David Parnas and the “Star Wars” project. Other classic cases are the NASA Challenger incident, and the older Bay Area Rapid Transit (BART) incident. The BART incident is old enough that many people are now not familiar with it, but it contains classic themes surrounding safety-critical software in an ambitious and politically-visible public works project [1].

**Hughes Aircraft chip-testing**

Margaret Goodearl and Ruth Aldred were supervisors at Hughes Aircraft’s Microelectronic Circuits Division in Newport Beach, California. In 1985 through 1987, they observed that their company was failing to perform required tests on chips that went into a variety of military aircraft, missiles and tanks. Further, they observed that Hughes managers were falsifying paperwork to cover up the illegal activity. Aldred and Goodearl brought the problems to the attention of Hughes and the federal government in 1986. Aldred eventually left Hughes in 1988, citing on-the-job harassment, Goodearl was laid off in 1989. The two filed suit in 1990, helped by the Taxpayers Against Fraud organization. Aldred ended up on welfare at one point. Goodearl and her husband filed for bankruptcy and eventually divorced. Finally, in 1996, Hughes agreed to pay $4.5 million to settle the suit. Under the federal False Claims Act, Aldred and Goodearl were able to receive about $890,000 of the settlement. This case provides a classic modern study of whistle blowing in industry. The failure to test the circuits was clearly illegal, use of substandard circuits was clearly life-threatening to military personnel, the whistle-blowers went through great personal turmoil, and because it is a modern case involving fraud against the federal government, the False Claims Act comes into play. (More about the False Claims Act and whistle blowing can be found in [3].)

**David Parnas and “star wars”**

The Strategic Defense Initiative (SDI), commonly known as “star wars,” was a program conceived under Ronald Reagan’s presidency. The stated goal of the program was to provide a system which would protect the United States against nuclear attack. (At the time, the presumed enemy was the USSR.) David Parnas is a well-respected scientist and researcher who has spent his career looking at the problems involved in large software engineering projects. Prior to becoming a consultant to the SDI project, he had directed a number of software engineering research efforts for the US military. However, not long after beginning his work as a consultant to SDI, he resigned and made strong arguments for why the software engineering aspect of the SDI project made the project goals unachievable even in principle. While this case is an older classic, it is still important for today’s students because the basic technology arguments are still relevant.

5. Safety-critical systems

Software engineering in safety-critical systems is a topic which has deservedly received a great deal of attention. The modern classic in this area, due in part to the work done by Nancy Leveson in documenting the case [8], is the series of Therac-25 accidents. This section lists two other cases.

**Failure of the ESA Ariane 5 rocket**

This case is a modern (June 1996) instance of a rocket blowing up due to a glaring software error. The European Space Agency’s Ariane 5 was just over 20 seconds into its maiden flight when it self-destructed. The problem was traced to an error in exception handling in the rocket’s software, which is written in ADA. The problem only became a problem when software was carried
over from the Ariane 4 rocket to the Ariane 5 rocket with insufficient attention to software specifications and testing. While no human life was lost, the economic cost of the accident is estimated at $500,000,000. This case provides all the elements for a detailed discussion of software engineering in safety-critical systems. (Also, there is an official report on the accident available on the www at http://www.cnes.fr/actualites/news/rapport_501.html.)

Software timing in the Patriot missile

The Patriot missile received a great deal of positive publicity in the 1991 Gulf War. Much of this initial positive publicity about the Patriot’s performance was later called into question. Also, a timing-related software flaw in the Patriot system was a factor in the incident in which an Iraqi “Scud” missile hit an American Army barracks in Saudi Arabia and killed 28 soldiers. The core software problem is conceptually simple—the bit length of a calculation implies a limit to the accuracy of the time estimate. However, the case also illustrates larger software engineering and management issues such as: system specifications which evolve over time, communication of clear operating instructions to the users, timely completion of software revisions in the field, and others.

6. Intellectual property issues

Intellectual property issues are another “must cover” in an ethics and computing course. This section lists three cases dealing with patent protection and trade secrets.

The Compton multimedia patent

Compton NewMedia was granted patent # 5,241,671 in 1993. This patent was titled “Multimedia search system using a plurality of entry path means which indicate interrelatedness of information,” and was broad enough to cover most forms of computer-based multimedia applications. When the patent was announced, the multimedia industry had an immediate negative reaction. In late 1993, the commissioner of the PTO ordered a re-examination of the patent. In March of 1994, the re-examination suggested an invalidation of all the claims in the patent. Compton filed a response to this in June of 1994, and in October of 1994 the PTO issued a final response invalidating the patent. This case is remarkable in several respects: in showing an example of a patent which should never have been granted but initially was, in showing an instance of the very rarely-applied re-examination procedure, and in illustrating the PTO’s desire to improve its handling of software-related patents.

The microprocessor chip patent

In 1990, Gilbert Hyatt was issued patent # 4,942,516, essentially crediting him with the invention of the single-chip microprocessor. Hyatt had filed the initial application leading to this patent in November of 1989! The granting of the patent touched off some controversy over who should rightfully be recognized as the inventor of the microprocessor. Prior to this patent, most textbooks would have credited teams at Texas Instruments and Intel as being the main competitors for the recognition. And then, of course, some potentially enormous royalties would ride on the validity of this patent. The controversy caused the PTO to call for an interference hearing, to judge the relative merits of claims by Hyatt and Texas Instruments. In June 1996, this resulted in Texas Instruments being awarded a “statutory invention registration” (TI gets credit for the invention, but with no royalty rights). This case provides another example of a patent that shouldn’t have been awarded, but was, and then was invalidated. It also raises interesting questions of how big and little companies compete in the patent process, and of what happens to royalties paid under a patent that becomes invalid.

The VMI / Autodesk trade secrets case

Vermont Microsystems Inc (VMI) was a small company which supplied “third party developer” software for the AutoCad product made by the large software company Autodesk. Otto Beres was a VMI employee who left VMI to go to work for Autodesk. Beres had signed a fairly standard “invention and nondisclosure” agreement when hired by VMI, and had an exit interview with VMI to remind him of his responsibilities when leaving to go to work for Autodesk. Additionally, VMI management contacted Autodesk management to let them know of Beres’ role at VMI and warn them of possible trade secret violation. Nevertheless, Beres eventually did employ his trade secret knowledge of VMI products in the design of AutoCad release 12. At least some of the people in Autodesk management were aware of the trade secret violation and did not prevent it, or possibly even encouraged it. VMI sued Autodesk in late 1994, and was initially awarded $25.5 million in damages. On appeal in 1997, this amount was reduced to $7.8 million. This case provides an excellent vehicle to discuss issues surrounding trade secret protection, as well as illustrating the problems of a small company protecting itself from the actions of a large company.

7. Freedom of speech on the Internet

Freedom of speech on the Internet is a topic that has generated a lot of discussion in recent years. One
case which became something of a mini-classic a few years ago is that of the arrest of University of Michigan student Jake Baker for making a threatening Internet posting that apparently names a specific woman in one of his classes. Perhaps all serious freedom of speech cases have the potential to make at least some people uncomfortable, but the content of this case could score particularly high on this count. It is not one that is easy to use in open discussion. (A sample student paper on the topic is available on the class web page mentioned earlier.) This section lists two cases that are still ongoing to some degree.

**Scientology versus Dennis Elrich**

The Church of Scientology has consistently made efforts to control the discussion of their religion on the Internet. One of the specific incidents involves Johan Helsingius, who ran an anonymous remailer in Finland, and Dennis Elrich, a former Scientology minister who has become an outspoken critic of Scientology. Scientology managed to get the Finnish government to force Helsingius to reveal the Internet address of a particular user of his system who had sent messages critical of Scientology. This apparently led Scientology to Elrich. Since Scientology claims copyright and trade secret protection of their religion’s writings, they obtained a court order for a search of Elrich’s home in California. During the raid on Elrich’s home, his house was searched and his computer system seized. This incident is rich with all sorts of issues for discussion, relating to intellectual property, privacy rights, freedom of expression, freedom of religion, what constitutes a religion, and other topics. This incident has perhaps already become a classic for inclusion in any Ethics and Computing course.

**A “Holocaust revision” web page**

Arthur Butz is a Northwestern University professor of Electrical Engineering. He apparently has no formal training in history, but published a “Holocaust revisionism” book shortly after receiving tenure. Butz has used his web page on Northwestern’s computers to publicize his “Holocaust revisionism” views. The university has issued statements deploiring the content of his web page, but defending his right to express his opinions. The university’s policy on web page content would seem to preclude the possibility of the university censoring his web page. Another engineering teacher at Northwestern, Shelkon Epstein, was fired (his contract “not renewed”) in part for using class time/assignments to counter Butz’s views. The university’s policy on what a faculty member may spend class time on is quite different from its policy on web page content. The style of the content of Butz’s web page makes the incident especially difficult. His views are presented in a ‘dry’ form. Most people would judge that the web page contains no explicit “hate.” This case raises questions of what in fact constitutes censorship, of where the limits to free speech should be (for example, would Butz’s web pages be legal in Germany?), and, of course, of how some people can come to hold the views that they do.

### 8. Conclusion

The use of cases in an ethics and computing course can help to improve the quality of the course by making the students think through how they would want to conduct themselves in the role of the different people in the case. Also, it can provide a sense of realism and immediacy to the issues discussed in the course. Developing a list of cases suitable for teaching can be a time-consuming and tedious activity for the instructor. This paper provides brief descriptions of a list of real cases are suitable for use in teaching.

### References