CSE 456 Embedded Systems Spring 2019

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# Professional ethics.

Please read the reading assignment materials and answer the following questions.

* 1. What is professional ethics?

Professional ethics in computing or information technology has a lot of meaning to it. The main topic or idea is that professionals should be held accountable for malfunctions involving computer systems. For example, the U.S. Navy military defense system (AEGIS Radar System) targeted an Iranian airplane killing 290 passengers. I was apart of the U.S. Navy military defense system in the AEGIS Radar System, I oversee the system invested by the power of the Fire-Controlman, and I always remind myself to pay attention to details or it will cause devasting catastrophes. For example, the AEGIS Radar System malfunction which cause the equipment to spin uncontrollably with personnel attached by loose articles that resulted in killing the Fire-Controlman. I worked with AEGIS Radar System Fire-Controlman and to put in respective, the system is an electronic detection, and can scan further than any radar system can scan, which can input the combat system to locate targets and output damage. In a foundational view, professional ethics can be described as cybernetics issues and we can further discuss this by the Gotterbarn ideas which he implements the professional ethic as a principal. Defining principal first in order of importance; main.

* 1. Explain Gotterbarn’s threefold distinction: codes of ethics, codes of conduct, and codes of practice.

The threefold distinction is incorporated in a professional code developed by a joint task force of the IEEE-CS/ACM. Codes of ethics, have important functions and have ten general directives; here are the first 4..

1. accept responsibility in making engineering decisions consistent with the safety,

health, and welfare of the public . . . ;

2. avoid real or perceived conflicts of interest wherever possible . . . ;

3. be honest . . . ;

4. reject bribery in all its forms; . . .

Gotterbarn describes codes of ethics as “aspirational,” because they often serve as

mission statements for the profession and can thus provide vision and objectives. Codes of conduct, on the other hand, address the professional and the professional’s attitude and behavior. Finally, codes of practice relate to operational activities within a

profession. In disregard, violations involving codes of ethics, which are primarily

aspirational, are often considered no more than “light concerns.” Violations involving codes of conduct, on the other hand, can range from warnings given to an individual to the possibility of exclusion from practicing in a profession. Violations of codes of practice go one step further, however, in that they may also lead to legal action.

1. Engineering design ethics case study.

Wayne Davidson is an embedded software engineer in the aerospace division of Engineering, a large engineering firm. For the past two years he has been working as a test engineer for Operation Safe Skies, a project to build a prototype of the next generation air traffic control system. This project, which is funded by a contract from the Federal Aviation Agency (FAA). With all the cutbacks in defense spending, the aerospace division has been losing business. The Safe Skies project has provided much needed business, and could lead to a much larger contract if successful. Mindful of its strategic importance, the company had bid very aggressively for the original contract. In fact they had "low-balled" it, bidding less than it would take to do the work properly. They felt that was the only way they could beat out their competitors, who were just as hungry for the work. Because of their somewhat shaky financial position, the company was not willing to take a loss on the project, so the project has been underfunded and understaffed.

Nevertheless those working on the project have made a heroic effort, working eighteen hours seven days a week to meet the deadline, because they know how much it means to the company, not to mention their own jobs. They are now very close to success.

A version of the prototype has been completed and turned over to Wayne for testing. He has run extensive simulations on it and found that it works as it should except for one little problem.

When there are too many aircraft in the system, it will sometimes lose track of one or more of them. The "forgotten" aircraft will simply disappear from the screen, there will be no trace of it anywhere, and it will be ignored by all of the collision avoidance and other safety tests. Wayne has been working with the system designers to identify the cause of the problem, and they have traced it to a subtle error in memory allocation and reuse. They are confident that they can fix it, but it will take a month or more to do the redesign, coding and testing.

Wayne meets with his boss, Deborah Shepherd, the project manager, to discuss the implications. She tells him that what he is asking for is impossible. The contract requires that the company deliver a fully certified, working version of the software in three days for system integration and test. The government has developed a new, get-tough policy on missed deadlines and cost overruns, and if they miss this deadline, the government will make an example of them. They would be subject to fines and the loss of the remainder of the prototype contract; and they might

not be allowed to bid on the contract for the full system. This would have a devastating effect on the aerospace division, resulting in thousands of lost jobs.

They consider whether they can do a quick patch to the system before turning it over, but Wayne adamantly refuses to release any code that has not been tested thoroughly. There is always a chance that the patch would interact with some other part of the program to create a new bug.

"Then we'll have to deliver the software as is," Deborah says. "I can't jeopardize this project or the jobs of my people by missing that deadline."

"We can't do that!" exclaims Wayne. "That's like delivering a car with defective brakes."

"Don't worry," Deborah reassures him. "We have contacts in the FAA, so we know their testing plans. They will do a lot of simulations to make sure the software works with the hardware and has all the functionality in the specs. Then they will do live tests, but only at a small airport, with a backup system active at all times. There is no way they will overload the system in any of this. After that they will have some change requests. Even if they don't, we can give them an updated version of the program. We can slip the bug fix in there. They will never see the problem. Even if they do, we can claim it was a random occurrence that would not necessarily show up in our tests. The important thing is no one is in any danger."

"Maybe they won't find the bug, but I know it's there. I would be lying if I said the system passed all the necessary tests. I can't do that. Anyway, it would be illegal and unprofessional."

"You can certify that it is safe, because it is, the way they are going to use it."

And so he does. In the end Wayne signs off on the prototype. It is delivered to the FAA and makes it through all the preliminary tests, including live tests at a small airport in the Midwest. As a result of these tests, the FAA requests some changes in the user interface, and when the firm delivers the new software it includes a robust solution to the problem of the disappearing aircraft. No one outside of Deborah's group ever learns of the problem. In fact the firm’s success with the prototype leads to major contracts for air traffic control software, giving much-needed business to the aerospace division. This saves hundreds of jobs, and allows the company to add hundreds more.

Wayne Davidson, however, takes early retirement once the prototype project is finished, in order to write a book on software testing. He feels that the book should have a chapter on ethics, but he can never bring himself to write it.

# What do you think about Wayne's decision? Was it ethical?

# To be honest this is a rhetorical question, because it asks a simple true of false answer to an imperial statement. First, we know that Wayne was in no position to make decisions. He was forced in a way that we call a subtle delivery. I’m very knowledge in philosophy so to further my understanding of Wayne, he has no decision on the matter. Was Wayne ethical? Yes, because it always seems that the first decision is always overlooked, Wayne decided to not agree with Deborah; "We can't do that!" exclaims Wayne. "That's like delivering a car with defective brakes." I would be lying if I said the system passed all the necessary tests. I can't do that. Anyway, it would be illegal and unprofessional. But to wrap up the idea of is this ethical? Simply No and yet the world continues to exist.

* 1. Please discuss the possible impacts of Wayne’s decision with economic, environmental and societal contexts if the bug was not discovered and fixed.

When there are too many aircraft in the system, it will sometimes lose track of one or more of them. The "forgotten" aircraft will simply disappear from the screen, there will be no trace of it anywhere, and it will be ignored by all of the collision avoidance and other safety tests. Wayne has been working with the system designers to identify the cause of the problem, and they have traced it to a subtle error in memory allocation and reuse. the government will make an example of them. They would be subject to fines and the loss of the remainder of the prototype contract; and they might not be allowed to bid on the contract for the full system. This would have a devastating effect on the aerospace division, resulting in thousands of lost jobs. If an airplane was lost, and loses its ability to avoid collision, this result in 290+ passenger deaths in an environmental societal context if the bug was not found. In an economic standpoint, we can see the government impacts on Wayne decision, even to humiliate Wayne (make example of) and this results of thousands of jobs lost.