

Eng. X is a software engineer in BioFirm, a small startup biomedical engineering firm. For the past two years he has been working as a test engineer for BioCAD, a computer-aided diagnosis software for mammography. BioCAD is a project to build a prototype of the next generation automated diagnostic system funded by a contract from the ministry of health. This project is a very important one for BioFirm given that it is the first major contract. So, mindful of its strategic importance, the company had bid very aggressively for the original contract (that is, made an offer to do the work with barely sufficient funds to cover the costs 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 eager to get this project. 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 hour days 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 Eng. X 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 microcalcification spots (small early indications cancer) in the image, it will sometimes lose track of one or more of them. The "forgotten" cancer spots will simply not shown on the output screen, there will be no trace of it anywhere, and it will be ignored by all diagnostic reports of the case. Eng. X has been working with the software 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.

Eng. X meets with his boss, the project manager, to discuss the implications. He tells him that what he is asking for is impossible. The contract requires that the company delivers 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 BioFirm is afraid that 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 software before turning it over, but Eng. X 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.

The project manager finally said, "We'll have to deliver the software as is. I can't jeopardize this project or the jobs of my people by missing that deadline. We have contacts in the ministry of health, 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 in controlled clinical situations. There is no way they will overload the system in any of this to cause the bug to appear. After that they will likely 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". Eng. X was under pressure from his boss to approve the release of BioCAD.

What would you do if you were in place of Eng. X? What is your analysis of the situation based on engineering ethics guidelines and justifications for your decision?

- *Assigned:* February 8, 2015
- *Deadline:* Sunday February 15, 2015
- *Submission:* Electronic form (PDF) to instructor's email address: ykadah@kau.edu.sa