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<div align="center">Ethics Paper</div>

Software engineers today face many problems, not only in the workforce, but personally as well. With things such as: learning new programming languages, dealing with code plagiarism, understanding new technologies, and writing new code constantly, the life of someone in software development can be hectic. As deadlines pile up and expectations raise to their peak, small bugs tend to get skipped in favor of meeting the expectation over making the program reliable. Time is money, and cheaper means better. Everything cannot be fixed. That is just how it is. In the case of the THERAC-25, "cheaper means better" caused three human lives to be lost. When dealing with human lives, the user, operator, and software engineer need to be informed and to be conscious of the risks involved when using a potentially dangerous piece of equipment that is resting on the complete success of a single program.

The THERAC-25 was a medical radiation machine used to treat cancer patients. Due to the combination of software bugs and user error, this machine was able to kill 3 patients that were to be treated using the machine. If the software bugs had been removed, the situation would have never occurred. A software engineer should be aware of the consequences that can be caused as a result of his code. The ACM Code of Ethics and Professional Conduct § 1.2 and § 1.3 speak to this issue by stating that the main principles that a software engineer should stand behind include avoiding harm and being honest and trustworthy (ACM). One should not publish or sell code that they believe could cause harm. Additionally, one should be truthful about what

problems the code could encounter if used despite the coder's best efforts to remove such possibilities. The ideas stated in Deuteronomy 22:8 show the necessity of building code that is trustworthy: "When you build a new house, make a parapet around your roof so that you may not bring the guilt of bloodshed on your house if someone falls from the roof." All three parties affected should be informed of the risks involved with utilizing such a machine and therefore can made educated decisions as to whether they wish to participate in using it.

To ensure code stays as bug free as possible to avoid situations such as this, code should be tested beforehand to the extent that is acceptable as long as the user is aware of the risks involved. As bugs become increasingly removed, the cost to find future problems increases exponentially. As a result, a bug free machine is astronomically more expensive than a bug riddled piece of software. There is no correct answer as to how much bug testing is "acceptable". This must be settled with the client. The bottom line should be that the client and anyone using the code should be informed of how much testing was performed. One could argue that a cheaper system will be available to more people, but again, that is to be decided by the client and not the coder. A coder should be responsible for the software, but not the distribution.

The reliability of machines could be easily determined if a certification system was implemented for software engineers as it is for other trades. This would allow experienced programmers to be recognized more easily. One statement from the IEEE code of ethics speaks very much to what the purpose of a software engineer should be: "[The purpose of a software engineer is] to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, and to disclose promptly factors that might endanger the public or the environment."

Works Cited

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