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Data Structures Analysis Ethics Paper

Considering the THERAC-25 incident, where medical software malfunctioned, killing four patients, questions arise on how computing professionals should respond. Should software be thoroughly tested? What if this makes software more expensive and inaccessible? What kind of testing should software engineers use? How about getting certifications like other engineers?

As with any kind of testing, it will not be fully comprehensive. However, testing code can be thorough, accounting for most bugs. The THERAC software failed to meet even basic software testing which is bad practice at best and negligent at worst. In contrast, coders should write tests prior to creation of software. The THERAC software testing should have been more robust with pre-written test cases.

Limited testing is not without its benefits. Less testing decreases costs and makes software cheaper to acquire. As a result, more people get access to it and can receive lifesaving treatment. This would comply with IEEE's Code of Ethics by promoting health "and welfare of the public" (Section 1.1). However, without proper testing the product could parallel the THERAC. Instead of limiting testing, price can be offset by acquiring more investors. Insurance would buffer most of the added patient cost.

Now after analyzing some ethics, say I was sick with a disease that the THERAC could treat. Would I use the machine? It all depends on the odds. If my odds of survival increased from use, then yes. Since the machine was not fully tested, the risk would not be worth it.

Finally, testing should be predetermined prior to coding. If the product is non-life sensitive, the amount of testing is optional. However, life-sensitive machines should be thoroughly and extensively tested. In Deuteronomy 22:8 it talks about accountability for builders for negligent

Commented [JAK1]: If a house falls on someone the builder is accountable

Commented [JAK2]: IEEE 1.1 to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, to protect the privacy of others, and to disclose promptly factors that might endanger the public or the environment;

Commented [JAK3]: ACM 1.2 Prevent Harm

practices (*English Standard Version, 2011*). Coders should ensure safety in anything that can physically harm others to avoid negligent practices.

With software engineers creating tools that may be used in sustaining life or in infrastructure, should programmers go through certification like other engineers to ensure reliability? Accreditation can promote safe and quality work. This is especially important in the vital processes of health care and transportation. In addition, standardized practices from accreditation can foster maintainable bug free software.

However, there are also drawbacks to mandatory credentials. Software engineering already has a shortage (Breux, Travis, and Moritz). This could prevent self-taught engineers from attaining on the job training as accreditation and decrease the worker pool. This shortage of workers would increase testing costs.

Taking these into account, coders should get base certifications to acquire a job. Certifications are an example of seeking the good of others as shown in 1 Corinthians 10:24 (*English Standard Version*). Certificates prove the programmer is knowledgeable in testing and in good code practices. ACM's Code of Ethics talks about how computing professionals should give special thought to programs that affect infrastructure (Section 3.7). Therefore, for sensitive applications involving life and infrastructure, programmers should acquire a more rigorous accreditation that shows competence in creating a reliable application.

Software engineering is an evolving profession with adapting standards. The THERAC tragedy brought questions regarding the necessity of testing and accreditation for computing professionals. These certificates are vital in the protection of stakeholders. Tiered certifications should be required for all programmers to display their ability for given tasks.

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Commented [JAK5R4]: IEEE 1.6

Commented [JAK6]: ACM 2.2 Maintain High standards of professional competence, conductm and ethical practice

Commented [JAK7]: ACM 3.5 Create opportunities for members of the organization or group to grow as professionals

Commented [JAK8]: ACM 3.7 Recognize and take special care of systems that become integrated into the infrastructure of society

Commented [JAK9]: 1 Corinthians 10:24 [Let no one seek his own good, but the good of his neighbor.](#)

Works Cited

“1 Corinthians 10:24.” *The Holy Bible: English Standard Version (ESV), Containing the Old and New Testaments*, Crossway Books, Wheaton, IL, 2011.

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