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CSCI 315 40

26 October 2021

Malpractice Makes Perfect

Every choice made in one's life has a consequence—this ethicality is not difficult to distinguish when the outcome is predictable. As written in Proverbs 11:3, "The integrity of the upright guides them, but the crookedness of the treacherous destroys them" (*The Bible*, Prov. 11:3). What is often less considered is how impactful each individual's action or inaction has the capacity to be, with respect to others. These results can be immediate or delayed, range from negligible to severe, and frequently present themselves as unintended outcomes. "With his mouth the godless man would destroy his neighbor, but by knowledge the righteous are delivered" (*The Bible*, Prov. 11:9). Society as a whole has the ability to cause great harm, be it deliberate or not. This concept is particularly relevant within the field of software engineering; even with the best intentions, inadvertent consequences are a reality. It is paramount then, that computer science professionals consider this implication and take great care to mitigate it as best as possible.

Generally speaking, while poorly designed/implemented software may not perform as intended, it typically does not pose any danger to public health. This is not the case for safety-critical systems, such as THERAC-25, or any such device that when not functioning properly could result in a life-threatening situation. In this regard, one of the most important tenants of the Association for Computing Machinery's (ACM) Code of Ethics is section 1.2: Avoid Harm, which emphasizes "significant" consequences of harm, to "include unjustified physical or mental injury" (ACM Code of Ethics, 2018). To this extent, adequate testing and quality control must

take place in order to confidently ensure a system's dependability. Of course, the greater the risk potential, the higher the level of assurance desired, and the more expensive this endeavor becomes. For safety-critical applications specifically, the ambition should always be zero margin for error—why provide a product that can save lives, when potential flaws exist that could result in death? Inherently, this is not feasible, therefore a realistic balance must be struck that considers the short term cost of testing thoroughness, versus the long term cost of device failure (resultant injury or death, loss of public trust, e.g.). A less expensive alternative that carries with it a higher rate of 'failure' only functions as a dangerous disservice to society.

Alongside the ACM, the Institute of Electrical and Electronics Engineers (IEEE) similarly states under Principal 1: "Software engineers shall act consistently with the public interest" and "approve software only if they have a well-founded belief that it is safe, meets specifications, passes appropriate tests, and does not diminish quality of life" (IEEE Code of Ethics, 2020). Not striving for or selectively ignoring this ideal would likely cause more harm than benefit to others. In a broad sense, the Accreditation Board for Engineering and Technology (ABET) stands to establish a suitable foundation and authority for individuals within their associated fields, while numerous other certifications exist for specific platforms and disciplines. These certifications/licenses are not universally required or regulated, but must be strongly considered as part of any successful company's operational practices in safeguarding quality and reliability. With that, it is important to note that ethical responsibility, within the scope of this discussion, must be shared by all involved parties. It is as much the responsibility of the programmer as it is the company, their clients, and user base. Given proper, proactive policies and procedures, mistakes and accidents may still occur despite all efforts in mitigation. This is a part of human nature, but the more critical question is, how well will we respond?

Works Cited

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