Garrett Cuillier
CSE488 Karant
21 March 2013

An Analysis on the Ethical Dilemmas of Technology

What are the consequences of technology? There are times when technology can be used as an aid, and other times where it costs money and lives. For example, in the 90's Intel sold a microprocessor that did not meet IEEE floating point requirements. This fault meant that there were errors in calculations involving floating points numbers. Banks that were using these chips could have made mistakes that cost people their life savings. There is also the case of the Therac-25. This radiation therapy machine was designed to administer measured doses of medicine. In at least six cases, the patients received massive doses of radiation from the machine. These are all incidents that happened many years ago. Today we are seeing the increasing rate of technological development that leaves society dependent on electronic devices. Many are now asking the question of how will artificial intelligence, cybernetic augmentation, and robots effect our future?

In the 1990's intel sold a microprocessor that had an error in its floating point calculations. Many of these chips were sold, and the error went unnoticed for quite some time. It was reported that every digit after the 8th was erroneous(Wolfe par 6). This may not be very important for the average user, but there are many different professions that require absolute precision in any calculations. Engineers, accountants and mathematicians would especially be affected by this error. When dealing with larger numbers the error would cause even more damage. These errors could include lost money on large transactions, flaws in engineered structures, or even error in scientific research. Intel did eventually replace any chips that people sent back to the company, but suffered much criticism for the

way the bug was handled. The company knew about the bug through testing but still sold the microprocessor anyway. It wasn't until the bug was noticed by professionals that intel actually admitted the mistake.   These actions could be justified through nihilism. Nihilism explains that actions could be justifiable if they are done to help further the company or organisation(Nihilism Par 1). Intel probably kept the bug a secret because they didn't want to lose sales in a competitive market. Either way, it wasn't in compliance with the IEEE standards and most likely resulted in some damages from the bug (IEE sec 3 and 9).

One of the more famous classic errors in computing is related to the Therac-25. This machine was designed to administer medicine for radiation therapy. Between the years 1985 and 1987, an error occurred in the machine that led to six patients receiving a massive doses of radiation(Leveson pg 1, par1). This resulted in a many lawsuits against the company and hospital. Even though the FDA is supposed to regulate these types of machines, no official investigation was ever performed. In the United States' legal system, the manufacturer could face both civil and criminal charges. If it was found that this error had been known beforehand and then subsequently ignored, then the producer would be criminally liable.   This scenario could be justified using an Egoist ethical system. The Egoist system describes an event where actions are performed in a way that best rewards the person performing them, even at the expense of others (Shaver par 1). In this case, the producer was making these machines as fast as possible in order to make more money. When this happens, quality tends to decrease. This just proves that it is not always smart to rely on machines for critical operations. In some scenarios, the machine or tool might not work as intended, which could have dire consequences.

What are the consequences of futuristic technologies? These can include artificial intelligence,

robotics, and cybernetic augmentation. The rate at which these technologies has been progressing has increased exponentially over the last decade. Tests such as the Turing test and Chinese room have been used to track this processes throughout the digital age. There is a theory that propagates the notion of a critical point in time where machine surpases man. The theory of "Singularity" describes a future that faces the repercussions from these accelerating technologies. One theory of the Singularity describes a point in the future where computers become more intelligent than humans(Grossman pg 1 par5). When this happens, it will result in the transformation of society as we know it. Though there are a couple of different theories proposed about the issue, it is almost unanimously accepted that this is an event that will happen in the future.

One of the main scenarios discussed in the Singularity is when man becomes more machine than human. There is already evidence that this is possible. Wounded veterans are receiving robotic limbs to replace the ones lost during combat. These limbs are even smart enough to respond to a user's thoughts. Biomechanical organs are now being used in place of real organs. All of this new technology points to a future that has human-machine hybrids or cybernetic organisms. Scientists have even found a way to store data in strands of DNA. At this moment in time, cybernetics has provided great leaps forward in civilization. While this is a good thing, there are bound to be repercussions or bugs in these new advancements.

What are the ramifications of cybernetics and human-machine hybrids? In some cases it can mean that someone with a spinal cord injury may get to walk again. In others it could mean a soldier with super strength that is nearly unstoppable. While the cybernetics has been used to treat medical conditions, it is easy to imagine that most of the funding for these projects comes from the military.

Looking back in history, it is easy to tell that some of the most significant advances in civilization have come from military development. Even though cybernetics can bring substantial advancements, what happens when there is a bug in the system? If a person is more machine than robot, it is possible that they can be hacked like a normal computer or be affected by a bug in the system. Who is legally responsible if one these bugs or vulnerabilities causes damage to people and property? Some could argue that it is the responsibility of the manufacturer to prevent these issues. That type of thinking is not observed in today's legal system. If someone gets a virus that disables a computer, it is not the manufacturers responsibility to replace it. Both the general idea of cybernetics and its legal ramifications could fall under a situational ethical system. This describes an ethical system where the consequences are justifiable depending on the situation(situational par1). If the advancement of cybernetics means a person can be repaired, then it would be deemed justifiable. On the contrary, if cybernetic modifications cause death and destruction from a bug or malicious attacker, then the company who built it could be held responsible. Either way this scenario has perhaps the best outlook for humankind when it comes to the Singularity.

On of the other views seen in the Singularity is the thought that an artificial intelligence will become smarter than humans. This could be related to a Terminator or My. Data type of scenario. There are many tests and rules that can possibly govern the actions of these super-intelligent beings. Something like the fictional "three laws of robotics" can be put in place to possibly prevent a catastrophe. It is likely that we will eventually reach a point where we do have a Mr. Data cybernetic being with artificial intelligence. Despite best practices, though, there still remains the possibility of a skynet type scenario where machines become self aware and turn on humans. While there are many

advantages and dangers of artificial intelligence, it is too soon to tell if this technology will progress

civilization or doom it.

How is artificial intelligence actually measured? There are a couple of classical tests that are

used to measure artificial intelligence. Some of the more famous ones are the Turing test and the

Chinese room. The Turing test proposes an experiment where someone interacts with two entities, one

human and the other machine, through a text channel. After five minutes, the test subjects were then

asked if they could tell the difference between the two. If they could not then the machine would be

deemed to have a certain level of intelligence. There are many flaws to this test though. One of the

main problems is that the test is very one dimensional. Text is not the only form of communication but it

is the only one that is measured in this test. It could be modified to include speech but that still may not

be going far enough. Humans also utilize subtle ways of communication such as facial expressions and

body movement. These are just a few things that would need to happen to more accurately measure the

intelligence of an AI machine. The other classic test, the Chinese room, is more complicated than the

Turing test. The Chinese room illustrates an experiment where a person and the computer are in the

room. The person in the room only speaks english but submits letters to the machine in chineses. The

machine then replies back to the person in chinese. The creator of the test, John Searle, theorizes that

"the thought experiment underscores the fact that computers merely use syntactic rules to manipulate

symbol strings, but have no understanding of meaning or semantics," (Cole par 1). This test can be

used as an argument against the idea of artificial intelligence. Other scientists argue that Searle is wrong,

and that a computer can be built to accurately simulate a brain. The argument of can a computer obtain

consciousness and really simulate a brain will only be resolved with time.

In conclusion, there are many advantages and disadvantages of modern technology. Advancements can be made to save people's lives, or help them regain functionality previously lost. Cybernetics alone has given people who are disabled hope that they will eventually return a somewhat normal lifestyle. Artificial intelligence can be used to help further civilization. There are downsides, though, of all this new technology. Take the examples of Intel's floating point problem and the Therac-25. These both had bugs in the system that caused physical and financial damage to people. All of this new technology is building to what some have deemed the singularity. When that happens, it will be a true paradigm shift in the way that we think and act as human beings. If one thing could be said, it is that this will eventually come to pass, and that we should prepare now in order to realise the best possible outcome.

Works Cited

Cole, David, "The Chinese Room Argument", *The Stanford Encyclopedia of Philosophy (Spring*

2013 Edition), Edward N. Zalta (ed.), URL =

<http://plato.stanford.edu/archives/spr2013/entries/chinese-room/>.

Grossman, Lev, 2045: The Year Man Becomes Immortal , *"Time Magazine",* URL =

<http://www.time.com/time/magazine/article/0,9171,2048299-1,00.html?

IEEE code of Ethics.Blackoard from IEEE-code-of-ethics.pdf . Web. 26 Jan. 2013. <

http://blackboard.csusb.edu/bbcswebdav/pid-461813-dt-content-rid-6329177_1/courses/132cse4880

1/Course%20Documents%20IEEE%20Code%20of%20Ethics/ieee-code-of-ethics.pdf>

Leveson, Nancy, Medical Devices: The Therac-25*, *"University of Washington,"* URL =

<http://sunnyday.mit.edu/papers/therac.pdf>

Moral Nihilism." *Wikipedia: The Free Encyclopedia*. Wikimedia Foundation, Inc. 26 Sept 2004.

Web. 26 Jan. 2013. <http://en.wikipedia.org/wiki/Moral_nihilism>

Shaver, Robert, "Egoism", *The Stanford Encyclopedia of Philosophy (Winter 2010 Edition)*,

Edward N. Zalta (ed.), URL =

<http://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=egoism/>.

Situational Ethics." *Wikipedia: The Free Encyclopedia*. Wikimedia Foundation, Inc. 17 Dec 2004.

Web. 26 Jan. 2013. <http://en.wikipedia.org/wiki/Situational_ethics>

Wolfe, Alexander "Intel Fixes a Pentium FPU Glitch" *EE Times",* ECMP Publications URL =

<https://www.cs.drexel.edu/~introcs/F2K/lectures/5_Scientific/PentiumFDIV/EE%20Times.txt>