

A Hippocratic Oath for Technologists

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Abstract

This chapter presents an ethical creed, which we refer to as the Hippocratic Oath for Technologists. The creed is built on three fundamental pillars: proactively understanding the ethical implications of technology for all stakeholders, telling the truth about the capabilities, advantages, and disadvantages of a technology, and acting responsibly in situations you find morally challenging. The oath may be taken by students at Universities after understanding its basic definitions and implications, and it may also be discussed with technology firms and human resources departments to provide the necessary support and understanding for their employees who wish to abide by the norms of this oath. This work lays the foundations for the arguments and requirements of a unified movement, as well as a call for a forum for signing up for the oath to enable its wide-spread dissemination.

1. Introduction

As technology becomes more powerful, intelligent and autonomous, its usage also creates unintended consequences and ethical challenges to a vast array of stakeholders. The ethical implications of technology to society, for example, range from loss of jobs (such as potential loss of truck driver jobs due to automation) to lying and deception about a product that may occur within a technology firm or on user-generated content platforms. The challenges around ethical technology design are so multifaceted that there is an essential need for each stakeholder to accept responsibility. Even policy makers who are charged with providing the appropriate regulatory framework and legislation about technologies have an obligation to learn about the pros and cons of proposed options.

As our technologies become more powerful, intelligent and autonomous, they also bear the potential to address problems previously impossible to penetrate and also to create unintended consequences and challenges for transparency and accountability. In many circumstances it becomes difficult to learn from and identify whether an unfortunate result that caused harm was the result of ethical failures or simply human error. And in either case, who was responsible.

With recent advances in technology, we are faced with new pathways for deception and

escalation of ethical dilemmas leading to some recent collapses that have appeared in the news. Examples of ethical misconduct involving technology abide: Volkswagen [1], [2], [3], and other car manufacturers' use of manipulative software to pass Diesel emission tests. Theranos founder, Elizabeth Holmes charged with wire fraud [4] for deceiving her investors and the public about the capabilities of her blood analysis technology. And of course the employees of Cambridge Analytica [5] abusing Facebook's social media and app platform to obtain personality profiles in order to deploy AI-enabled personalized propaganda at scale.

Our focus in this chapter is to discuss and raise awareness of the ethical responsibility of the technologist as a user and creator of technology. The main purpose of this work is to provide reflection during the creation phase of a technology and to make ethical distinctions that a technologist may not have considered or have been introduced to in prior education. These essential distinctions will be covered in Section 2. A second objective of this work is to help raise sensitivities in technology firms about certain actions that may be deemed legal at the time, and yet have ethical implications to stakeholders. Another objective of this work (and of the proposed oath) is to provide foundations for a movement and its the widespread dissemination. A final objective of this work is to provide humility and a sense of community among experts and technologists who explicitly want to promote technology for human progress.

The Hippocratic oath [6] which is historically taken by physicians has had a long history and several iterations. In fact the greek original is so outdated that most medical doctors would not be willing to take it today. A Wikipedia translation [7] of the most historic surviving version of the oath reads: "*To hold my teacher in this art equal to my own parents; to make him partner in my livelihood; when he is in need of money to share mine with him; to consider his family as my own brothers,*". Even the famous line "first do no harm" does not appear to be part of the original version of the oath and may in fact not withstand critical inquiry as of course doctors may need to inflict significant pain and sometimes even harm a patient in order to treat an ailment.

While the Hippocratic oath is the most famous and possibly the first code of conduct for a profession, there are many other examples. Most relevant is the Archimedean Oath [8] developed by French engineering students in the 1990. The Appendix presents a long and short version of the Archimedean Oath.

After careful deliberation we opted nevertheless to propose this new instrument aimed to guide conduct among technologists under the title "Hippocratic Oath for Technologists" because the concept is so widely recognized and hence we believe it will facilitate adoption and because newer versions of the hippocratic oath - namely the 1964 version by Louis Lasagna, Academic Dean of the School of Medicine at Tufts University - omit the controversial line and simply call for "utmost respect for human life".

We view the work in this chapter as an initial guideline that may promote reflection and pursuit of good practices by technologists committing to the oath's principles by (1) digitally and

publically signing their name on a dedicated website, and (2) subsequently receiving a digital badge that they can include in their social media profiles facebook, twitter, linkedIn etc. (and of course on their personal websites)

2. Basic Distinctions for Ethical Considerations

This part of the chapter reviews basic distinctions to help the technologist understand ethical implications regardless of the legal system and of the dollar value to an organization. We believe that in the current educational system we have today, technologists¹ may not be exposed to some of these distinctions.

2.1. Ethical-Legal-Prudential Considerations

It is important to first understand the basic distinction of what is Ethical, Legal, and Prudential in Figure 1 [9], [10]. The legal distinction is often presented as the norm for what is right or wrong when a situation arises. Very often you may hear statements like "We did nothing wrong" meaning what was done was legal, and may even be encouraged by the legal system. Understanding the difference between legal and ethical considerations helps technologists realize that while something is illegal, it may be unethical. The Prudential distinction refers to what is prudent or beneficial regardless of the legal or the ethical systems. Some might argue that being ethical is prudential in itself, but the distinction helps understand that there may be situations perceived Prudential and Legal when in fact they may have ethical implications.

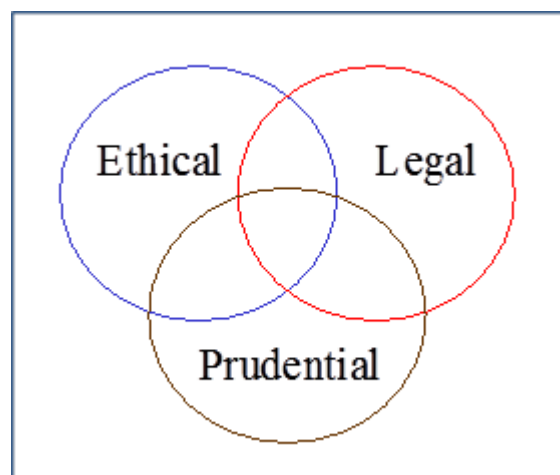


Figure 1. Ethical – Legal-Prudential Distinctions

2.2. Positive vs. Negative Injunctions

Another distinction that is important for identifying the role in reflection about ethical dilemmas is that between positive and negative injunctions [9], [10]. A negative injunctions towards a situation asserts that you yourself will not do it. A positive injunction asserts that you will take

¹ while we aim this initiatives at technologists, the problem of the lack of ethical education goes far beyond this group and in fact a decline of ethical and moral discussions in our society at large can be observed.

action when you observe it happening. Positive injunctions are stronger commitments than negative injunctions. For example, you may take an oath that you will not steal, a negative injunction towards stealing, in contrast to a positive injunction where you will report instances of stealing (or even prevent them) when you observe them. Think about the implications of this important distinction in organizations where one employee observes an ethical issue conducted by another (or by the organization). A positive injunction will require them to take action. While taking a positive injunction stance may be difficult - companies can help by providing a supportive environment and structure. The Stanford University Honor Code [11] is an example of both a positive and negative injunction towards receiving unpermitted aid, whereby students, individually and collectively (i) will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading; (ii) that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

2.3. Deception

Deception is the act of knowingly leaving a false impression or narrative on another person. We find it useful to clarify that deception can occur without even saying a word. If a person has a certain belief (that you know is incorrect), and that person clarifies it with you, then you merely nod, you have knowingly left the person with an incorrect impression. The same applies to interfaces between technology and human, or data gathering, when a user is unaware about the implications/uses of their data. Deception would include situations where a firm has not provided the user with full disclosures about how their data is collected and used.

2.4. Utilitarian vs Kantian

In the Kantian view [12], ethical responsibility attaches to the actions taken, regardless of their consequences. This ethical formalism was devised by the philosopher Immanuel Kant. The other major ethical theory, utilitarianism, is consequence-based. The responsibility attaches to the expected consequences, not to the person's action. Utilitarianism derives from philosophers such as Jeremy Bentham [13] and John Stuart Mill [14] who believed that the calculus of world pleasure and happiness should be the justification for action.

3. Presenting the Oath

3.1. Preamble

Three main goals guided the drafting of the oath: - clarity, simplicity and comprehensiveness.

Clarity of what the oath entails was the central guiding principle meant to ensure that each element is comprehensible and coherent. Another desideratum here is that if any proposed portion is violated, then it should pose a clear ethical issue.

Simplicity is the second requirement, which led us to opt for widely understood terminology and language whenever possible.

Also **comprehensiveness**, or to cover the full scope of technologists' practice and subsequently all possible ethical dilemma, was a goal and of course we had intense debates which elements must be covered and which are included in high level statements.

Another less fundamental requirement was that it should not be based on or merely endorse some entity that may have ethical implications or that may pose terms for a legal/political system².

Last but not least the oath should be personal in its implications. Put differently, we believe that individual human agency and responsibility is at the core of individual as well as societal justice and well being. We acknowledge that taking a positive or negative injunction stance may be difficult in practice, especially when an employment or other organisational/political alliance is present. We nevertheless believe that companies, as well as organisations and communities more generally, can help to promote the good conduct and deliberation intended by the oath.

We should always ask what a technology should do and not only explore what it can do. An ethical code should have some essential criteria: (1) Clarity of what the oath entails, (2) As simple as possible but no simpler. We should not add items in the code that if violated do not pose ethical issues. If any portion of the code is violated, then it should pose a clear ethical issue. (3) The code should not be based on merely endorsing some entity that may have ethical codes with implicit legal/political implications. Rather the code should be independent of the legal system. (4) The oath should be personal in its implications for a person to be willing to commit to it.

To ground our practice and conduct, the following principles shall marshal our mindset, decision making, and practices independent of the legal system as well as our personal and organisational culture:

3.2. The Oath

1) I will seek to Understand the ethical implications of the use of technology when making decisions

- A. *I will take into account the ethical implications of technology that I am aware of when making choices about technology creation.*
- B. *I will seek to understand the ethical implications of technology for all stakeholders.*
- C. *I will engage in deliberation as needed to understand the evaluation of benefits and harms as well as moral practices with regards to the technologies I use and create.*

2) I will Tell the Truth

- a) *I will disclose to the best of my knowledge the potential benefits, disadvantages, risks*

² see also note on Human Rights above

*and consequences of the technology*³.

- b) *I will not exploit ignorance or deceive others*⁴ *with regards to the capabilities, consequences and trade offs of technology.*
- c) *I will appropriately inform the user and will allow the user to decide about the retention and use of personal data and user privacy in the design of technology.*
- d) *I will be truthful and transparent about my positions and stakes with regards to my professional networks, conflicts of interest, and motivation.*
- e) *I will acknowledge the contributions of others by giving credit where credit is due.*

3) I will Act Responsibly

- a) *If asked to do something i find ethically objectionable, I will refuse.*
 - i) *If asked to work on a project or develop a technology that I have an ethical issue with I will refuse to do so and disclose my analysis.*
- b) *If I observe any error or misdeed, I will address it.*
 - i) *Should I witness any misdeed or potential ethical violation with a technology I shall first address and remedy it with the responsible entity. However should it prove impossible to resolve directly, I shall draw the attention of the appropriate authorities to the case.*

3.3. Comments on The Oath

The first part of the oath places responsibility on the technologist to understand the ethical implications of technology and take them into account when making decisions. This has an implicit implication of effort and action needed towards understanding the stakeholder views, and also understanding the rationale by which a decision with ethical implications is made. For example, is it a utilitarian approach where the means justify the ends and the overall good outweighs the means? Or a Kantian approach where ethical considerations are determined by the actions themselves? Thinking about these distinctions and their implications to stakeholders is important for people who are taking the oath. Universities may wish to provide introductions to these types of distinctions in their technology curricula.

The second part of the oath is about truth telling and being conscious about deception. Telling the truth about benefits, disadvantages, risks and consequences may be legal in some instances (such as risks to human life mentioned on labels of cigarettes) and they may not be legally enforced on others. Abiding by this oath requires the taker to be truthful whether or not a legal aspect exists. It also requires making users of the technology aware of the implications and of what they are signing up for, not just having terms and conditions in a fine print.

The third part of the oath is about actions regarding issues one finds ethically objectionable. The first part simply requires you to refuse to do an action that you find objectionable even if you are

³ I will respect privacy and confidentiality by honoring contextual agreements regarding the use and sharing of information and data that I have access to. In order to do so I shall always strive to understand the contextual agreement and make it explicit when in doubt.

⁴ An example would be if there is a fine print that personal data can be used beyond the original data gathering purpose and yet most people are not aware of the fine print.

asked. The second part is a positive injunction requiring you to correct an ethically-objectionable behavior if you see one.

This third part (having both a positive and a negative injunction) is a strong ask that presents an opportunity for companies to provide support on their ethical code. A company might say: we will not force employees to engage in an activity that they find ethically objectionable. Or that we will support and protect people who come forward with observations that they find ethically objectionable.

4. Conclusion

We view this work as a first step in creating a unified movement for increasing awareness about the ethical considerations of technology. Like the original version of the Hippocratic Oath, which we doubt physicians would be willing to take today, we believe that there will be many variations and updates of this oath. But it is important for a unified movement to start.

The next step will be to share this oath with the academic and industrial communities. We hope that deans of engineering and all technology schools will join this movement and help us spread the word to graduates and also incorporate the basic distinctions into technology education. We also invite feedback and deliberation on the oath. Concretely participants would commit by digitally signing the oath on a dedicated website, they would then receive a digital badge that they can include in their social media profiles facebook, twitter, linkedIn etc. (and of course on their personal websites).

The authors assess that the unique power of the oath approach is that it roots the responsibility in a person who can then contribute to the debate and practice of the organisation and team. We are looking forward to the debate on goals, substance and practice related to the Hippocratic oath.

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Appendix : The Archimedean Oath - Source Wikipedia.

The **Archimedean Oath** is an ethical code of practice for engineers and technicians, similar to the [Hippocratic Oath](#) used in the medical world. It was proposed in 1990 by a group of students of the [École polytechnique fédérale de Lausanne](#). The Archimedean Oath has since spread to a number of European engineering schools.

"Considering the life of [Archimedes of Syracuse](#) who illustrated the ambiguous potential of technology since the Antiquity,
Considering the growing responsibility of engineers and scientists towards men and nature,
Considering the importance of the ethical problems stemming from technology and its applications,
Today, I commit to the following statements and shall endeavor to reach towards the ideal that they represent:

- I shall practice for the good of mankind, respecting human rights¹ and the environment.
- I shall recognize the responsibility for my actions, after informing myself to the best of my abilities, and shall in no case discharge my responsibilities on another person
- I shall endeavor to perfect my professional abilities
- When choosing and implementing projects, I shall remain wary of their context and their consequences, notably in their technical, economic, social and ecological aspects. I shall give particular attention to projects with military applications.
- I shall contribute, to the extent of my abilities, to promote equitable relationships between men and to support the development of economically weaker countries.
- I shall transmit, with rigor and honesty, to discerningly chosen interlocutors, any important information, if it constitutes a gain for society or if its retention constitutes a danger for others. In the latter case, I shall ensure that the communication yields concrete action.
- I shall not let myself be governed by the defense of my own interests or those of my corporation.
- I shall endeavor, to the best of my abilities, to lead my company to take into account the preoccupations of the present oath.
- I shall practice my profession in complete intellectual honesty, with conscience and dignity.

I solemnly take this oath, freely and on my honor."

1. According to the [Universal Declaration of Human Rights](#) of the [United Nations](#) (10 December 1948)

A shorter version goes:

"I commit to keeping completely, to the full extent of my capacities and judgment, the following promises:

- I shall use my knowledge for the benefit of mankind.
- I shall not put my skill to the service of people who do not respect human rights.
- I shall not permit consideration regarding religion, nationality, race, sex, wealth and politics to harm people affected by my actions.
- I shall bear the entire responsibility for my actions and shall in no way discharge them

on another.

- I shall practice in respect for the environment.
- I shall not use my knowledge for destructive purposes.
- I shall practice my profession in complete intellectual honesty, with conscience and dignity.

I solemnly take this oath, freely and on my honor."

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