**Thesis Project Portfolio**

# CASA: A Home for Mobile Computing at UVA

(Technical Report)

# Lies, Damned Lies, and Statistics: Deception and its Ethics as Applied to Statistics and Data Science

(STS Research Paper)

An Undergraduate Thesis

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## Sociotechnical Synthesis

Technology is inanimate. In itself, it is no more moral or immoral, no more good or bad, than a rock or a drop of water. But how is it then, that so very often it causes such great harm or help to society? Very often, when things go wrong, we are tempted to blame the technology, as when we say that guns cause school shootings. Just as often, we attribute good outcomes to technology, such as when we say that some medical imaging device saved someone's life. It is true that if the technology had not been present, the event, whether good or bad, often would not have occurred. Yet while these attributions are often a helpful model to understand a given situation, they are, like all models, ultimately wrong. Technology is not and cannot be the cause of anything, whether good or bad, as it has no ability to cause things. Rather, it is the human beings behind the technology, that design it, that build it, or that use or abuse it that are the cause of all of these things which we attribute to the technology. This is not to say that technologies are not often designed specifically to augment human actions towards a certain end, which end is often either good or bad, nor is it to say that it is not often useful to abstract away the human choice behind the technology when analyzing an event or social problem. Rather, it is to remind us that, while we can and often do study technology apart from the human beings behind it, we cannot and should not ignore this aspect entirely. If we forget this, we cannot truly be ethical in our dealings with technology. It is precisely the importance of this human element that has fueled both my technical and sociotechnical projects.

In my technical project, my team and I designed the user interface for a mobile academic computing solutions program. Our program sought to consolidate all of the fundamental pieces of mobile software used by students at UVA into a single application. By integrating all of these separate programs into one place, we were able to design student workflows that sped up existing

processes by a factor of at least 2. This was accomplished by eliminating the time needed to transfer information between separate applications, such as transferring class times between SIS and one's calander. We empirically evaluated the successfullness of our designs by performing user testing, the results of which were overwhelmingly positive. By carefully taking a user-first approach to all of our design work, we were able to achieve substantial success with our design. In focusing on the human element of user experience, and the desires and needs of our users, we produced an interface that had true potential to improve the lives of students at UVA.

As a sort of darker counterpoint to this positive focus on the humanity behind technology, my sociotechnical research focused on grasping the ethics of deception as applied to data science and statistics. I applied the ethical understanding furnished by the Catholic moral tradition to analyze deception in three distinct classes. In light of this tradition, I examined the ethicality of each class of deception and when, if ever, each is moral. I was then able to apply the analysis of each of these classes of deception to various concrete examples in the fields of data science and statistics, concluding that, while certain specific forms of deception are sometimes ethical, these are situations which are not particularly frequent in data science and statistics, and that therefore most deception in these fields is immoral.

By focusing on the importance of human choices in this and other scientific fields, the importance of ethics and morals are highlighted, and analyses of sociotechnical systems are clarified, and we are able to more deeply understand the causes of the harm or help that technologies can provide to society. Though this focus is sometimes positive, as in my technical project, and sometimes negative, as in my sociotechnical research, it is typically worth the extra effort it may take to analyze the human element in a technical system. Society and technology,

though they appear distinct, will always be inextricably mingled, and the more we acknowledge this, the more effectively we can study them.