**A Technical Analysis of Issues Afflicting the Data and Information Technology Systems of Political Campaigns in the United States**

(Technical Paper)

**Autonomous Vehicles: An STS Perspective into the Development, Production, and Deployment of Autonomous Vehicles in the United States**

(STS Paper)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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## Technical Topic Introduction

In the United States, there are roughly 235 million eligible voters. However, during elections, despite the best efforts of campaigns to drive turnout, only about half of the eligible voters cast a ballot. The level of voter turnout for a specific candidate or campaign can often tip the race in their favor—thus, vast sums of money are spent to identify and target voters. For the 2020 Presidential election cycle, an estimated $10 billion will be spent between campaigns and interest groups (Bruell, 2019). A large portion of this funding goes to infrastructure—the information and technology (IT) systems that function as the backbone for campaigns, from local to national in scope. They manage voter files, online ad campaigns, and volunteer canvassing. However, despite the deluge of funding, these technological systems historically struggle to support modern campaigns, often plagued by weak security, poor reliability, and high costs.

A contributing factor to the weakness of campaign IT systems is the practice of building a new system for every election cycle. This leads to the fragmentation of standards and prevents the continual development of robust infrastructure (Lapowsky, 2015). Without robust infrastructure, issues such as security and reliability arise. In 2017, the personal information of 198 million Americans was leaked from a campaign database, exposing information such as legal names, addresses, registered political parties, and racial demographics. In 2018, the voter registration information for 35 million voters was offered for sale on a dark web hacking forum (Wright, 2019). Meanwhile, a synopsis of Hillary Clinton's 2016 presidential bid found that a poor data operation and IT infrastructure hamstrung the effectiveness of the campaign. Research has shown that voter targeting technologies drive a statistically significant increase in voter turnout and influence voter decisions by identifying specific voters who are favorable to a

candidate (Hoferer et al., 2019). However, robust IT infrastructure is required to power these data-intensive technologies.

## Technical Project

Thus, the technical research project seeks to answer the question: *Why have political entities failed to create robust, secure data and information technology systems, and what steps should be taken to modernize the way campaigns build information technology infrastructure?* This research project seeks to offer suggestions for the purpose of creating a more secure, reliable, and transparent ecosystem of information technology infrastructure for campaigns. In the United States, there exist two major political parties: the Republicans and Democrats. It is widely accepted that the Republican data and IT operation is more sophisticated, with more accurate data and modern tools for digital campaigns and voter targeting. Meanwhile, the Democrat party has historically struggled over the past decade to modernize and build an operation capable of supporting various campaigns (Lapowsky, 2019). Thus, the research project uses the contrast between the two operations as a case study to develop suggestions and recommendations regarding the best practices for building information technology infrastructure and data exchanges. Various elements of the operations are examined, including funding sources, operating structures, and the specific technologies employed.

A common practice during campaigns is canvassing: approaching individual voters either in-person or over the phone. Democratic campaigns, for the most part, rely on pencil-and-paper to conduct this. Due to a lack of infrastructure to process and manage canvassing digitally, most volunteers are handed clipboards with a printed list of names and addresses. Furthermore, much of the data is of poor quality—as Democrats lack a central data exchange platform, updated data

is often siloed into individual repositories which most campaigns lack access to. In contrast, the Republican data operation is much more sophisticated and better funded. Volunteers often go door-to-door wielding an iPad running the i360 app, a product developed to handle all aspects of canvassing (Lapowsky, 2019). It displays the location of houses to knock on and users enter in survey responses directly into the app. This data is then funneled into a central system for analysis, accessible by any Republican campaign that requests the data through an exchange. The previous example is one of many aspects analyzed by the research study.

Over the course of the fall semester, technical data regarding the study subject will be gathered through various methods, including academic journals, technical articles, and interviews. Through studying the current state of data science practices and technology infrastructure, the study will gain insight into the most successful practices in order to recommend strategies for improvement. Background research will be completed by mid-September, with the formulation of specific technologies to study. By November 1st, specific case studies and interview responses will be analyzed, and a first draft will be written. The final research paper and abstract will be finished by November 21st.

## STS Topic Introduction

The STS research project will not focus on the same topic and material as the technical research project. As the technical research project is not yet completed and will extend into the Fall of 2020, a different topic was chosen for the STS research. The research instead focuses on the development and introduction of autonomous vehicles into society. While an emerging technology from the computer science and engineering fields, autonomous vehicles also present many interesting social and political debates. From the beginning of their development to their

eventual introduction into society, debates regarding the usefulness, safety, and ability of autonomous vehicles to transform society have continued. Furthermore, the development of this specific technology serves as an insight into the difference between how engineers and general members of society rationalize. In other words, autonomous vehicles serve as a vignette for positivist and constructivist models of thinking.

First developed in the 1980's by Carnegie Melon's Navlab, autonomous vehicles are vehicles equipped with technology to enable self-driving, that is, the ability to function without a person driving the vehicle. The development of autonomous vehicles has accelerated within the past 10 years, and the technology has recently begun the transition from research projects to the introduction of products available to the public (Bimbraw, 2015). Proponents of autonomous vehicles promise that the technology will revolutionize society—from providing mobility to populations such as the elderly and making everyday transportation safer. However, studies show that the average consumer distrusts the technology (Lienert & Caspani, 2019). But as some consumers begin to utilize autonomous vehicles and travel on public roads and integrate within society, the non-users of the technology will be impacted as well, given that public roads are shared between all vehicles.

The development of autonomous vehicles is dictated by several parties. There are numerous companies, ranging from startups to established corporations that have invested billions of dollars into the technology. In addition, the integration of such technology into society is regulated by various governmental entities such as the NHTSA, to ensure the safety and security prior to approval for public use (Bimbraw, 2015). Finally, the eventual success of the technology will be dictated by consumers. Autonomous vehicles are primarily marketed as a consumer product, packaged with cars and trucks. As consumers adopt the technology, both

users and non-users will be impacted. Comprising a portion of the transportation system, autonomous vehicles share the roadways with standard cars, bicyclists, and pedestrians. Due to the wide-ranging network and impacts of the technology, it is important that the impacts of autonomous vehicles are studied.

## STS Project Introduction

The STS research project will focus on answering the statement *"As autonomous vehicles are developed as a technology, was the initial introduction viewed as progress? Why do users distrust the technology and what factors affect the level of trust, and finally, what will the future of autonomous vehicles be in our society?"* To begin the research process, it is important to understand the history, terminology, and components of the technology. The background research regarding autonomous vehicles, comprising both academic literature and media articles, will be completed within the first month of the fall semester, by September 15th.

To answer the research question and develop an informed analysis of the technology, autonomous vehicles will be examined through the lens of several different STS frameworks. The first framework is the Evolution of Large Technological Systems, a theory articulated by Thomas Hughes. Technological systems are complex networks composed of both physical and nonphysical components. For the purposes of autonomous vehicle research, components of the technological system can include weather/road conditions (physical) and the regulatory environment (nonphysical). These systems also evolve over time, changing in structure and composition. Viewing autonomous vehicles and transportation within society through this framework will be useful for analyzing how the various components and pieces within the network have and will affect the technology as a whole.

The second framework employed is the Social Construction of Technology (SCOT), which describes how users are able to become agents of technological change. In other words, the interpretation and reaction social groups have toward a technology shape the way in which it develops (Kline et al., 1996). This is useful when analyzing the development of autonomous vehicles, as the social acceptance of such technology will determine its success or failure. Using these two frameworks to guide research, methods such as literature review and interviews with individuals knowledgeable on the topic are strong candidates for the project. The goal is to finish the research for the first two frameworks by October 7th.

The final two frameworks used to analyze autonomous vehicle technology are Users and Non-Users and the Sociology of Science. Users and Non-Users is the principle of how people influence socio-technological change. Users and non-users of a technology exert influence over its development, including design, implementation, and widespread use (Oudshoorn et al., 2003). For autonomous vehicles, it is particularly important to study the non-users—the skeptics, disinterested, and indirect users of the technology. Non-users exert tremendous influence, as autonomous vehicles are dictated by regulation, legislation, and the acceptance of the technology into the public. Vehicles share roads with pedestrians, bicyclists, and construction workers, all of whom are non-users.

The Sociology of Science is the idea that scientific facts and information are socially constructed. That is, a scientific fact is accepted as truth due to the agreement between many different sociological components, from scientists to television networks (Jasanoff, 1992). The way scientific facts are interpreted and accepted by society is important and relevant to the study of autonomous vehicles. Statistics show that self-driving vehicles are safer on average than regular vehicles, yet the numbers themselves have proven unable to convince most users and

consumers. Surveys show that most users distrust the safety of the technology, thus, the sociology of science is a useful tool in the search to answer why society has reacted this way to the technology (Lienert & Caspani, 2019). The final two frameworks will be primarily researched through literature review and case studies by October 21st. Following the conclusion of the research, the full research report will be drafted by November 7th.

## Conclusion

With roughly 270 million vehicles on the road in the United States alone and 6 million crashes within the past year, vehicles represent an integral component of American society. From drive-throughs to highways, American culture and society view driving and automobiles as a staple (Humes, 2016). As new technologies emerge such as autonomous vehicles that are set to change this aspect of society, it is important that they are studied. Thus, the specific problems that autonomous vehicles solve, the factors that influence users' trust in the technology, and what the future holds for autonomous vehicles are important topics and questions to be researched.

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